



# A WORLD OF WATER

RAIN, RIVERS AND SEAS IN SOUTHEAST ASIAN HISTORIES

EDITED BY PETER BOOMGAARD



A WORLD OF WATER



V E R H A N D E L I N G E N  
VAN HET KONINKLIJK INSTITUUT  
VOOR TAAL-, LAND- EN VOLKENKUNDE

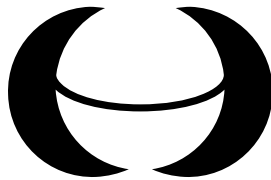
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Rain, rivers and seas in  
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PETER BOOMGAARD



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## Preface

Books have their fortunes. This book started life as a workshop organised from 14-16 June 2001 as one of the features of the KITLV 150-year jubilee. Upon the request of the board of KITLV, the topic of the workshop was prepared by a small committee consisting of Franz von Benda Beckmann, Willem Wolters and myself. The idea behind it was that the theme of the workshop should reflect both the various disciplines represented by the members of the KITLV and the two geographical areas covered by the Institute's charter – Southeast Asia and the Caribbean. However, as not all the speakers invited to deal with the Caribbean could make it to the workshop, it was decided not to include that region in the book.

The theme chosen was 'water', a topic of great importance everywhere, but perhaps particularly in Maritime Southeast Asia, with its long shorelines in relation to its landmass, and with the enormous expanses of sea surrounding Island Southeast Asia and abutting the shores of Mainland Southeast Asia. This is a theme that, according to the committee, could be addressed fruitfully by scholars specialized in disciplines as far apart as cultural anthropology, economy, fisheries studies, geography, history, and medicine. Water, in several respects a necessity of life, is at the same time a very dangerous element, and it was thought that it should be possible to present these facets of water under the various disciplinary angles, thus constituting a kaleidoscopic image of water in Southeast Asia. It is, of course, up to the reader to judge whether this collection of studies succeeds in presenting such an image.

One of the disadvantages of such a collection is that it never can be complete, and that some people will be disappointed because their pet aspect is lacking. Another drawback is that such a book by its very nature cannot have a conclusion. However, it is hoped that the advantages of the novel approach chosen here outweigh the disadvantages.

This volume is also part of the EDEN (Ecology, Demography and Economy in Nusantara) project of the KITLV, which was established to investigate the environmental history of Indonesia. It goes without saying that the presence or absence of water is an environmental factor of the greatest importance, a topic that is elaborated upon in many contributions to this book.



Various developments have slowed down the preparation of this volume. For several reasons it was not possible to include all contributions to the workshop, while one article in this volume has been written specifically for the book. Some delay was caused by the fact that the intended co-editor was unable to fulfil the tasks he had taken upon himself. Most authors have shown admirable patience during the long gestation period.

Let me finish by conveying my thanks to those institutions that have funded the workshop and the book. This is of course in the first place the KITLV itself, while in addition funding has been obtained from the Netherlands Organisation for Scientific Research (NWO), the Leiden University Fund (LUF), and the Royal Netherlands Academy of Arts and Sciences (KNAW).

PETER BOOMGAARD

## **In a state of flux**

### **Water as a deadly and a life-giving force in Southeast Asia**

#### *Preamble*

In the study of Southeast Asia, there has always been a strong emphasis on everything terrestrial with a concomitant neglect of aquatic aspects.<sup>1</sup> Given the fact that water in its many forms is of critical importance in the region, this is a remarkable oversight. Water, particularly in the form of seawater, heavily influences (and has done so in the past) the fortunes of the region.

As it was exposed to the sea, the area was more accessible to outside political, economic and cultural influences than many landlocked regions. It was a crossroads of many different influences being exercised at the same time. Nevertheless, it could be argued that there is, at least in a cultural sense, 'unity in diversity', and that Southeast Asia is a region with common cultural characteristics that sets it apart from its neighbours. It is clear that India and China have influenced the area for hundreds and even thousands of years, but also that Southeast Asia is evidently culturally quite distinct from these two regions.

What applies to culture does not seem to apply to politics. The area was never an empire in its own right or even belonged in its entirety to any one empire. The area was always politically fragmented, sometimes extremely so. A tiny island could be an independent political unit, and even small islands could comprise a number of 'states', often in constant conflict with each other. On the other hand, the possibility must not be ruled out that neighbouring islands coexisted and traded peacefully for long periods of time, without the benefit of shared statehood. Over the last half century, Southeast Asia has been fairly successful as regards the development of larger states, although lately counter currents are visible in countries such as Indonesia, the Philippines, and Thailand.

Easy access via the sea routes to the area made it quite vulnerable to political control by strong outsiders. So the same easy access that may have been an

<sup>1</sup> I am grateful to Judith van Oosterom, who corrected my English.

advantage in the cultural sphere would be regarded by most as a disadvantage in a political respect.

Easy access through sea routes also stimulated trade from an early age onward. Although the influence of trade on the areas concerned should not be underestimated, it is sometimes amazing to see that it only went 'skin deep'. In Southeast Asia even the inhabitants of areas not too far from the sea could be quite 'thalassophobic' and (at least seemingly) untouched by the winds of trade. It could be argued too that Southeast Asia is also in an economic sense a region with characteristic features that sets it apart from its neighbours.

At the same time, Southeast Asian societies and cultures are confronted with and permeated by 'water from heaven' in the form of rain, flash floods, irrigation water, water in rivers, brooks and swamps, electricity from water-driven power plants, and pumped or piped water, in addition to water as a carrier of sewage. It is in relationship to these types of non-sea water that it can be said that the region has a water crisis on its hands. This crisis has now been around for some time, and it has a profound influence on large groups of people in Southeast Asia.

Finally, we are dealing with the role of water in classification systems, beliefs, myths, healing, and the like: primeval waters, water of life, elixir of life, purifying water, the world ocean with its gods, goddesses, and monsters, water as one of the four or five elements, and water as an element of the body. In this respect water is perhaps more a metaphor than anything else but there are clear links to so-called real water nevertheless.

Seawater, water from heaven, and water-as-a-metaphor all have in common that they can be 'good' or 'bad'. The sea is both a barrier and a link, it brings trade and pirates, and trade itself can bring prosperity or ruin. The sea opens up a region to outside influences, which is usually deemed positive when we think of the exchange of inventions and other ideas, as it may lead to a more versatile people. But, it also renders a region more vulnerable than a landlocked area might have been. People living in such areas, therefore, have to be constantly alive to these two faces of the sea, switching effortlessly from an open, welcoming approach towards it to a defensive one when necessary. Does this mean that 'sea cultures' are more resilient than 'land cultures'?

Water from rivers and lakes, if clean, is a life-giving force. It produces good drinking water, and in the past has enabled the 'Malays' to bathe frequently, something they availed themselves of with enthusiasm. However, pollution of inland waters turns these advantages into evident disadvantages, and it would appear that not all riverine people have made this transition to a policy of water-avoidance. If the people of Southeast Asia are literally able to clean up their act, by stopping pollution at its source and building water treatment plants on a large scale, the presence of river and lake waters will become an advantage again. However, as long as that is not the case a behavioural switch

seems to be called for, unless it must be assumed that resilience in this case means that people just stick it out until things get better.

People living in upland areas, the *montagnards*, are regarded as being typical representatives of a mountain culture. They have the reputation of being a hardy, rugged and fierce people. Those living in the desert, create a sand or a desert culture. Their means of transportation, their clothing, their whole way of life are all geared towards living in the desert. When *they* think of purification, they take a sweat bath.

Can we say, by analogy, that those who are surrounded by water, created a water culture? Or is there a difference in the sense that deserts and mountains are always barriers, always hostile elements, while water can be both, always in flux, oscillating between a life-giving force and a deadly one?

In the following pages, I look in more detail at a number of aspects of water in Southeast Asia, as a prelude to the articles to follow.

### *The sea*

If one links the notion of water to the notion of Southeast Asia, it is probably the sea that comes to mind as the first association. Indonesia and the Philippines are surrounded by the sea, Peninsular Malaysia is almost entirely surrounded by it, while most countries of mainland Southeast Asia have very long stretches of sea coast in proportion to their total surface area, particularly Vietnam.

One of the questions to be discussed in this volume is whether we should conceive of the sea as a unifying rather than a dividing force. Does the sea keep people apart or does it facilitate their getting together? There is a strong tendency to think of islanders as living in 'splendid isolation' (England, Japan). There are certainly many instances of islands where highly characteristic cultures could develop and survive relatively unaltered for long periods of time due to the fact that they were islands (Bali, Nias). In this respect culture mirrors nature, as islands have often a high percentage of endemic species, with the Galapagos Islands as best known example.

The sea is often perceived as dangerous, both on account of the spots of bad weather that have killed many a sailor, and that it was – and still is? – assumed to be home to monsters and evil spirits. Not all islanders are, therefore, sailors.

On the other hand, until the arrival of the modern means of land transport, travel over seas was often quicker than travel over land, which implies that long distances over sea were easier to overcome than long distances over land. It also implies that transport per unit of length was cheaper on sea routes, which, theoretically, and all things being equal, may have been an advantage to commodity-exporting islanders. This may be one of the reasons that small

islands could and did become the nuclei of successful and influential trading states (Ternate, Tidore), a reminder that successful states need not be large landmasses.

In this volume, Heather Sutherland deals in more detail with the opportunities for trade 'created' by the presence of coastal areas at the crossroads of maritime exchange between various Eurasian regions. It could be argued that trade between Southeast Asian polities on the one hand, and China, India, and Europe on the other, has shaped the destinies of many Southeast Asians, in both positive and negative ways. It is a development that dates back at least to the beginning of the first millennium AD, but increases in importance in the fifteenth century, and has continued to grow ever since, albeit with temporary setbacks (Reid 1988, 1993; Brown 1997; Lieberman 2003). With the commodity flows came people, ideas, technology, money, crops, and firearms that, taken together, transformed the region almost beyond recognition. The advantages (and disadvantages) created by trade shaped the lives of many Southeast Asian coastal dwellers throughout the ages. Coastal areas often played a dynamic role in the economic development of the polities in which they were located (for example Tana 2004:3).

But then, of course, a prolonged bout of piracy might cause all these advantages to evaporate, at least for a long time to come. Or was piracy merely a calculated risk, such as living in tiger country, or, for that matter, below sea level?

### *Cosmology*

I briefly mentioned monsters and evil spirits. Powerful beings, represented by named places on the border between land and sea is the theme dealt with by Sandra Pannell in this volume.

Living surrounded by water, people have tried to make sense of the blessings, the dangers and the risks that are connected, or at least thought to be connected to the sea. Thus, they 'populated' the sea with a rich variety of animals, spirits, and other beings. Some of these sea beings are recognized by modern biology (for instance, we now recognize mermaids as dugongs) and it is widely accepted that the seas have not yet yielded all their secrets, not even the bigger ones, such as the supposedly vicious giant squid.

In the past, many societies in Southeast Asia recognized as a power of importance the giant watersnake or *naga*, a name – if perhaps not a motif – borrowed from the Indian sphere of influence.

Another personality is the Goddess of the South Sea, or Ratu Lara Kidul, of the Javanese (Junghuhn 1853-54, I:274; Headley 2004:135-45). It is a multifaceted, complex being, and it is certainly possible that in this Javanese example of a mighty sea deity, features of other beings have come together that else-



where were kept separate. Ratu Lara Kidul is a dangerous deity, living in a palace at the bottom of the ocean, made of the hair and bones of her victims (fishermen, bird's nest collectors). The Goddess is linked to the main temple of the Prambanan complex (Loro Jonggrang, ninth/tenth centuries AD). She was also ritually wedded every year to the Muslim rulers of the Central Javanese state of Mataram and its successor states (seventeenth to nineteenth centuries). Here the state, even when it had officially turned Muslim, apparently felt the need to maintain a visible link with a sea deity. One would like to know whether such a relationship was common to Southeast Asia and other areas with high proportions of coastline.

Sea deities, however, had also much to offer, as they held the key to the riches of the sea. They were supposed to assist those who were in search of these riches, provided they knew how to deal with the goddess (sea deities almost always seem to be female). So can it be said that the female sea deities were, on balance, more benevolent than dangerous?

The Goddess of the South Sea was also held responsible for a number of epidemics, a theme to be dealt with below.

The sea was obviously held to be a dangerous place by many groups in Southeast Asia. Various upland peoples positively avoided the sea – sometimes it was even deemed dangerous to feel the sea breeze. Here, one wonders, whether bad experiences from the past (epidemics, pirates, 'foreigners') may have led to a worldview in which the sea is something to be avoided. One also wonders whether the political leaders of these groups stimulated such feelings, as a means of keeping their subjects from leaving the territory.

At the same time the sea was often perceived as the region where the ancestors came from. There are, at least in Indonesia, many local myths of origin in which part of the population is assumed to be the offspring of immigrants, people who had come from over the sea (and, generally speaking, this was of course true). A general pattern seems to be that a man arriving from overseas would marry a local woman. The descendants of the man's clan would be the political leaders, whereas the clan of the woman would produce the spiritual leaders, with links to the soil (*tuan tanah*, lord of the land). Pre-historical evidence often supports the story of the overseas origins of many peoples in the Indonesian Archipelago. It is remarkable, to say the least, that people who originally came from the sea apparently in some cases have not only withdrawn to the interior of their 'new' island, but in addition have developed a 'thalassophobic' cosmology.

Obviously, we are faced here with quite some variations between societies. At the other end of the spectrum there are the *orang laut* (sea people), who evidently are not afraid of the sea, which also applies to the various trading groups who have made a living from maritime trade, the coastal and pelagic fishermen, the pearl divers, and the pirates. Although they know, of course, of

the threatening aspects of the sea, it is also their means of existence.

However, a society's view on seawater need not determine its perception of all types of water. The Ngaju Dayak (Borneo), for instance, who share the above-mentioned view that many illnesses come from across the seas, are certainly not averse to all kinds of water. On the contrary, water is quite significant in their worldview. In their cosmology, 'the life-giving essence of everything in existence is contained within the Water of Life which is, in turn, stored up in the Tree of Life'. Although, therefore, water is of paramount importance, it is also clear that some forms of water are ambiguous in character. Take for instance the river, the lifeline for many Ngaju Dayak. On the one hand its annual floods are a source of prosperity, as is the fact that it connects upstream with downstream, but on the other hand it causes 'bad deaths' (drowning, death by crocodile) (Jay 1992).

Finally, large water reservoirs (*baray*, *talaga*, and *tirtha*), even though they may have been used for other purposes as well, clearly were also, and perhaps even primarily, religious constructions, a point dealt with in more detail below (Christie 1992; Moore 1992).

### *Disasters*

Some modicum of fear of the sea, whether it is one's main means of existence or not, is probably a good thing. The sea is, indeed, a dangerous place, even though it could be argued that the above-mentioned monsters do not constitute the main threat. Under normal circumstances, that was probably drowning, and it would be interesting to try and find out who could swim and who could not in the areas we are studying.

However, circumstances were often far from normal, and even good swimmers could not do much when the weather was inclement. One assumes that coastal people were used to 'ordinary' storms, and that coastal villages and trading and fishing vessels would be able to survive such an occurrence without too much damage, perhaps partly because going out to sea would be avoided during bad weather. But were people also able to predict sudden weather changes timely enough not to be caught unawares?

In all likelihood, however, most death and destruction at sea and in the coastal areas were caused by the extraordinary weather anomalies conditions to be found in Southeast Asia. I am referring to cyclones, tidal waves (tsunamis), flash floods, tidal bores and other destructive, large water masses, sometimes in combination with storms and/or earthquakes. This is the theme dealt with by Greg Bankoff in this volume.

Flash floods and tidal bores are, of course, not a 'maritime' phenomenon, but as their effects seem to be rather similar to those of the disasters that are, I have included them. One hesitates to include volcanic eruptions, even though

floods often follow in their wake, either because there was a lake in the crater, or because volcanic ejecta were dumped in rivers in large quantities.

The main question, however, seems to be whether Southeast Asia was and is often hit by such water-related disasters. It seems rather obvious that this was more often the case than in land-locked areas. In how far did the frequent occurrence of these disasters shape the worldview of the coastal people? Has it made all but the hardiest averse to maritime activities, or is such a natural disaster just one cause of death and destruction amongst so many others? Did it contribute to an – alleged – inclination towards fatalism and gambling? Did it keep people from building houses of stone or brick instead of bamboo or wood?

We also would like to know how those in authority reacted. Was the tribal lineage head, the chief, or the ruler of a larger polity held responsible for such disasters? Did they attempt to support those who had been hit by one? Did this change with colonial and post-colonial states?

There are those who argue that due to global warming (the greenhouse effect) the incidence of ‘extreme weather events’ is increasing. If that be the case, what does that entail for Southeast Asia?

### *Piracy*

Seas, so it seems, could be rendered quite unsafe by natural phenomena. Moreover, in addition to monsters and cyclones, man-made threats were not rare either. The phenomenon that in this respect has most captured the imagination is no doubt piracy, a theme dealt with in this volume by James Warren. Pirates figure in all ages and all places, but, at least in the eyes of historians, they appear to be associated particularly strongly with the Caribbean and Southeast Asia. In the latter region, piracy, by many probably regarded as a quaint relic of the past, has lately returned with a vengeance.

Ever since the late nineteenth century scholars have assumed that piracy in Southeast Asia was a response to colonialism and Western enterprise (Rutter 1986:26-8). This was no doubt partly true but when the first Portuguese arrived in Southeast Asia, the pirates were already there. It is even suggested (Tomé Pires) that some states, particularly in Sumatra, were in effect sea-robber states (Cortêsão 1944). This makes it difficult to link piracy exclusively to the absence of strong states, because, apparently, sometimes the pirates were the state (compare also Warren 1981).

This does not mean, of course, that there was no relationship at all between the strength of the state and the incidence of piracy. A state with strong mercantile interests, whether local or colonial, would probably try to curb pirate activities (unless, perhaps, it was cheaper to learn to live with them). Piracy could also be the result of internal strife in a state, for instance if a cadet branch

of the ruler's family felt that they were not receiving an income commensurate to their status. As there were always many pretenders to the throne in Southeast Asian polities, disgruntled contenders were an endemic feature.

Piracy also seems to come in cycles. It can be absent for many decades in a row, but it also surfaces just as suddenly as it disappears. One is tempted to look for a relationship between bouts of piracy and economic booms, as it stands to reason that pirates will become active in a general climate of growing commodity flows. Or do they take to the sea in desperation, in times when normal trade comes to a standstill?

However, it also seems that piracy was never entirely absent from Southeast Asia, at least during the Early Modern Period, perhaps partly because piracy was linked to another phenomenon that played quite some role in the social and economic history of the region, namely slavery. The demand for slaves was always high, both in the indigenous and in the foreign sectors of the economy, and slave raids were, therefore, always profitable, and could be easily combined with some general plunder as a sideline (Junker 1999; Boomgaard 2003).

Nowadays piracy is, needless to say, no longer linked to the slave trade. So what makes it tick? Is it 'politically correct' to call it just a criminal activity as any other form of theft? It seems to me that the 'old' piracy was surrounded by a romantic anti-colonial aura, and that it was (and is?) not politically correct to regard it as just a criminal activity, but more as something akin to peasant unrest, social banditry, and the Luddites.

### *Exploitation of aquatic resources*

The sea is, of course, not only a wrathful goddess; it is also a bounteous provider (for Indonesia see Tomascik et al. 1997). In a region with such a high ratio of coastline per unit of surface area, fishing must be – and must have been – an important activity, a theme dealt with in this volume by Manon Osseweijer. It provides a fair number of people – boat owners, traders – with an above-average income (compared to the ordinary peasant-cultivator), and in the past it also may have stimulated monetization. At the same time it provides densely populated areas where meat is a luxury with a cheap source of protein. Theoretically, a high proportion of fishing could have kept numbers of livestock low, as an abundant supply of cheap fish should make animal husbandry less attractive. All this applies to both fresh water (Masae and McGregor 1998) and pelagic fisheries. As a considerable proportion of this fish was dried and salted, it must have stimulated salt production, in many areas of Southeast Asia another coastal activity (Backhaus 1998).

But fish is, of course, not the only kind of food that comes from seas and rivers. Shellfish, crustaceans (shrimp, crab, lobster), turtles, and – mostly

for export to China – sea cucumbers are also caught in large quantities, as is seaweed. Here we seem to see a gender division of labour, as those who go fishing are almost always men, while those who go out to collect shrimps, etcetera, are mostly women. One would like to know whether the production (in large quantities) of non-fish food from seas and rivers is a relatively new phenomenon, perhaps related to depleted stocks of fish. Old shell-middens suggest otherwise, and it might just be a lack of data that make the collection of non-fish food in the colonial period difficult to trace.

One also expects to see a coming and going of different species of fish at the markets, as one species after another becomes depleted. Is this a relatively recent phenomenon in Southeast Asia? There are some indications of this already in colonial times (Butcher 2004).

Some of the animals captured from the sea are partly eaten, but other parts are sold as non-food commodities. Turtles are an example. Another example is the whale, which is still being hunted by small-scale local fishermen (Barnes 1996), while they used to be hunted by Americans on much larger ships (*Moby Dick!*). Pearls are another highly coveted item, as are rare shells (for tourists and collectors). In former times some shells were used as medium of exchange (for example cowries), and were therefore collected in large quantities. The sea, therefore, for a long time has been exploited by many peoples in many ways, but our knowledge of all this, at least as regards the past, seems to be rather limited (but see Butcher 2004 and Boomgaard 2005). One would like to know, among other things, whether shifts could be observed in the shares of fish, non-fish food and non-food over time.

The question of how large-scale exploitation of aquatic resources developed in addition to small-scale enterprise seems to be highly relevant, including the question about restrictions imposed – by local, regional, and/or national authorities – on big enterprise, if any. Is the state imposing limits on catches, and if so, since when? Are these attempts successful? How seriously are maritime resources being overexploited (compare also Covich 1993; for Indonesia see Dutton 2005)?

One also would like to know to what extent (state sponsored?) aquaculture has taken the place of collecting wild aquatic resources, and whether the former activity is more sustainable than the latter.

Finally, polluted water (see below) from the big rivers seems to be threatening both fisheries and aquaculture (Lucas 2000:75-7). It is difficult to imagine that this problem could be solved without state intervention. So it might seem that, for various reasons, the state would have to intervene more often, and be stricter about implementation of and adherence to its regulations.



*Water rights*

Given the importance of the sea (and other waters) as a provider of food and tradable non-food commodities alike, one expects that people stake out claims as the rightful users of these areas. It could be argued that the more resource-rich the sea, the more strategically important it will be, and the more likely that, when population increases, it becomes the object of competition between a variety of people, groups, and organizations. The sea was (and is) both battlefield and prize, so to speak. In this volume, Franz von Benda-Beckmann deals with rights over various kinds of water, and with the conflicts generated by these scarce resources.

Control over the sea, as a source of wealth and a means of transport, has been the object of conflict and of legal regulation. Regulations cover both legitimate control over sea space and rights to access and exploitation of sea resources. While shallow coastal waters often fall under the legal-political control of the adjacent land-based political organizations, more distant waters are less easily laid claim to and even less easily controlled by the latter. Historically, there is a tendency of ever increasing 'enclosure' of the sea, as states are continually extending the boundaries of their maritime territories or zones of economic influence. As the 'global commons' become increasingly enclosed, conflict over them is intensified.

With the arrival of colonial states and, later, national states, and with the increasing influence of international organizations and treaties (UN law of the sea, 1982), earlier rights of 'tribes', villages, and small and large kingdoms were (partly?) superseded by claims of a higher level, at least in theory. In practice 'higher' claims were and are not always recognized by those who held the earlier claim, and a rich source of conflict was thus created.

As is shown in Von Benda-Beckmann's contribution, growing population densities and the overlapping of various legal systems have also led to increased conflict over fresh water resources, owing to growing competition over inland water sources. As population growth continues, and as the frequency and intensity of droughts might increase due to global warming (still a hypothetical possibility), the frequency of such conflicts is not likely to diminish.

*Water in health and illness*

The 'Malay', who came in boats to the areas where they live at present, have existed as typical 'water people' for a long time. They often lived along rivers, and some people have argued that their houses on stilts and their custom to drop all refuse through a hole in the floor dates from the time that they all lived thus. It could be said that this way of getting rid of household waste (in

Malaysia and Sumatra) was a health hazard, although the animals penned beneath the house (particularly pigs and dogs) often functioned as a kind of 'sanitation police' service, while during the rainy season everything just washed away.

Most European visitors in the past also remarked on the fact that the Malay people bathed at least once a day in the river. As water, at least among the Muslims, was often also their main beverage and the river normally the sole source of water, there was (and still is) a potential conflict between drinking and bathing in one and the same. Moreover, the river was also the place where sick and feverish people sought to cool of, where people relieved themselves, where clothes were washed, and where the cleaning of household utensils took place.

It may be assumed that such potential conflicts did hardly play a role in sparsely populated areas, but larger population concentrations must have been faced by problems at an early stage. The first Dutchmen to visit the then influential port-of-trade Banten (western Java) around 1600, commented upon the dirty water of the river running through the city. As time went on, and numbers increased, almost all rivers turned into health hazards.

All this applies under normal circumstances, but problems increase in magnitude as soon as water becomes more polluted than usual. This could occur during an epidemic of a waterborne disease such as cholera. It could also happen during the rainy season when the river was full of natural debris, and during the dry season when the concentration of pollutants went up. Nowadays, the rivers of the region are faced with year-round industrial pollution.

Thus, until the introduction of piped water and a separate sewage system, a 'water people' with a keen sense of cleanliness ran into serious trouble when the self-cleaning capacity of rivers could no longer cope with ever increasing levels of pollution.

Another problem where state intervention is inevitable is that of the competition for water between various claimants, particularly during dry spells, when there is a water shortage anyway. Drought induced water shortages always have been notable health hazards. With the growth of the population it is to be expected that this problem will become more acute as well.

Particularly during prolonged droughts – such as in the summer of 2003 – the problem of water shortages becomes acute in places such as Jakarta. Water tables have dropped, a phenomenon often exacerbated by uncontrolled logging and other acts of environmental destruction. As the water in reservoirs gets close to critical levels, electricity supplies are threatened, because water for the hydropower plants is lacking, as is that for tap water and irrigation.

At the same time flooding is increasing in Jakarta, as the soil has been compacted by construction activities and the removal of water by a large number of wells, as witness the large *banjir* in February 2002, particularly in the lower lying, that is poorer areas of the city.

### *Water in indigenous medical theory*

Given the fact that water is a potential health hazard nowadays, and has been one for a long time in many areas of Southeast Asia, the notion, held by many indigenous people, of water as a healing force might make matters even worse. This notion applies, of course, particularly to 'sacred' water, water that has been blessed. In Java, the 'sacred pool' (*tirtha*) and the 'tank' (*talaga*) are very ancient 'institutions' indeed. Many Javanese inscriptions mention in addition 'the water of life' or 'the elixir of life' (*amrta*) (Christie 1992).

In the many rituals that marked – and sometimes still mark – the daily lives of many people in Southeast Asia, water is often an important feature. This seems to be the case with both coastal and – at least some – inland groups.

Among many Indonesians there is a – related? – theory that, while wind is unhealthy (*masuk angin*), water is healthy (although, strangely enough, rain is often perceived as 'bad'). In many instances, bathing a patient in water was the only 'remedy' indigenous healers would apply, as in the case of small-pox, besides incantations and offerings, of course. It seems likely that water is regarded as healthy because it is 'cold' and can, therefore, be used to cure people who are diseased and as a result 'hot'. The binary opposition hot-cold is one of the basic elements in Malay medical thought.

As we have seen, many Southeast Asian areas have long coastlines and have the sea as their neighbour. Other, more inland areas, particularly in Mainland Southeast Asia, have large rivers as their lifelines. Moreover, many of these areas are characterized by very high levels of precipitation. In other words, it is probably difficult to find regions 'wetter' than (tropical) Southeast Asia, at least of a similar size. Could it be argued that this is reflected by the importance of water in indigenous medicine?

### *Waterborne diseases*

On the other hand, as we have seen above, many Southeast Asian island people dreaded that large body of water, the sea, and those who came from the sea, as most epidemics seemed to come from there. So there is often an association of epidemics such as cholera with some sort of Goddess of the Sea. When in Java the Goddess of the South Sea and her servants were heard riding through the air, cholera was on its way. This notion, by the way, that epidemics came from overseas, is often based on actual fact, at least on islands that are not too densely populated. Here, diseases such as cholera and smallpox would die out eventually and only with a fresh infection from outside could the disease spread again.

It was often not the sea itself that carried these diseases to the shores of Southeast Asia – although, as recent research shows, in the case of cholera it

was – but rather the people who came from overseas. Rivers, however, did (and do) indeed carry the causative organisms of many diseases, particularly gastro-enteritic strains.

Finally, (stagnant) water should be mentioned as breeding ground for malaria-carrying *Anopheles* mosquitoes. In this case pollution might be a blessing in disguise, as it appears that the larvae of *Anopheles* do not survive as well in dirty as in clean water.

In late-colonial times, the medical establishment was rather confident that malaria could be eradicated, but it seems safe to say that that is no longer the case. Now that the use of DDT has been forbidden – and rightly so – species sanitation seems to have lost some of its lustre. At the same time, some forms of malaria seem to have developed immunity against the drugs employed to kill them. Altogether it forms a rather bleak prospect. Is there better news regarding the gastro-enteritic diseases? And how reliable is the registration of these diseases, if one takes into account that there are sometimes clear disincentives for bureaucrats to call a disease such as cholera by its proper name? Although it is now easier to keep young children from dying from cholera than in the old days, cholera is still far from having been tamed, and in the early 1990s an upsurge was reported worldwide (Gleick 1993:4).

We are also interested in the question of state initiatives regarding water-related health issues, in addition to medical advances and setbacks. In historical perspective, one would like to know whether water was ever regarded as a health hazard by pre-colonial indigenous states. One would also like to know when colonial states started to perceive the multi-purpose use of water as problematic, and when they started to do something about it. From a present-day perspective we would be interested in the priorities formulated by the state in this respect, as much as the action really undertaken. In this volume, Foong Kin deals with a number of water-borne and water-related diseases in historical perspective.

### *Pollution, sewage, drinking water*

Water pollution was not a major problem in Southeast Asia prior to the 1970s, although of course locally the waste products of the big cities did cause very dirty water prior to that date (Yeoh 1993). However, it seems fair to argue that real pollution came with large-scale industrialization. Many of the big rivers in the area became so polluted from then on that they came to constitute a major health hazard to the downstream areas. It is an issue taken up in this volume by Anton Lucas and Arief Djati.

Nowadays, available and affordable technological possibilities largely determine quantity and quality of the water supply for the majority (?) of the urban end-users. Technological factors also determine the modalities of the disposal of water-borne waste in the urban areas.

As we are talking about available and affordable technology, it could be argued that the real determining factor is the availability of capital (Nash 1993). Or even the willingness of the state (central, provincial or local) to take upon itself the construction (and maintenance) of a good system of piped water, an equally good sewage system, and high quality water treatment plants. This, in turn, might be related to the ability of the state to increase taxes, as it is unlikely, at least in the short run, that such systems are self-financing. Or is it too dogmatic a thought that only the state can take care of these things? In many countries water companies are being privatized because the state does not appear to be able to turn the production of tap water for the masses into an economically viable venture. The issue of privatization of the urban water supply (in Jakarta) is dealt with in this volume by Okke Braadbaart. As the provision of clean drinking water for the poor was not guaranteed when the water companies were run by the state, it becomes increasingly unlikely that such guarantees will be forthcoming in the near future, under private ownership.

This does not mean that the state is perceived as an efficient provider of clean water. At least in Indonesia, polluted water has become a hotly debated issue, and even during the repressive New Order regime of Soeharto, protests about polluted water erupted from time to time (Lucas 2000).

Be that as it may, technological change over the last century has been at the heart of adaptations of water supply and liquid waste disposal to increased population concentrations.

Modern sewage systems may be healthy in many respects, but they pollute the sea, unless water treatment plants have been installed. They also remove substances that could have been – and in the past have been – used as manure. Instead, farmers now have to buy and apply large quantities of artificial fertilizer. In addition to higher costs, this loss might also be detrimental to the structure of the soil. The loss of nutrients, however, might possibly be stopped if advanced methods of water treatment were applied.

For the moment, the low quality of drinking water for the many to whom piped water or water from uncontaminated sources is not available, does not yet show up in the overall mortality figures. A more detailed breakdown of these figures might give a different outcome. After all, what is bad for marine life can hardly be healthy for humans.

### *Climatic variation and agriculture*

One of the most important prerequisites for good health is, of course, the availability of sufficient food of a good quality. Most food in Southeast Asia is locally produced. Of these foodstuffs, fish and other edible maritime and river products have been mentioned above. The two large categories hitherto not dealt with are agricultural crops and livestock. It goes without saying



that water is of utmost importance for a good harvest and for successful livestock raising.

Monsoon Asia, to which most of Southeast Asia pertains, is characterized by a variety of agro-climatological regions. Most of these regions have a typical rainfall distribution with a wet and a dry season, the length of which varies from region to region. These climatological characteristics have implications for agriculture and animal husbandry.

A question one would like to have answered is whether rainfall patterns determine cropping and stock rearing patterns as well and therefore also the flow of tradable surpluses – and so of money and credit. Are patterns of land-use and land holding (partly) determined by the same precipitation patterns?

And what do we get if we compare Monsoon Asia with Tropical Rainforest Asia? If rainfall patterns do, indeed, to a large extent determine patterns of agricultural production, one wonders whether the same is true regarding population densities and state formation. One also would like to find out whether the existence of these zones has ever been a reason for state expansion. Here I am thinking of conscious attempts by states to include different climatic zones within its boundaries, as a form of insurance against total crop failure and famine. Perhaps it may be seen as a variation on the lowland-upland theme that has featured prominently in the history of many Southeast Asian polities.

I hasten to add that rainfall patterns are not a given that keeps for instance cropping patterns in an eternal iron grip. Humans have manipulated the flow of water for thousands of years, a phenomenon that is usually indicated with the term irrigation, a topic to which we turn presently.

### *Water in irrigation and drainage*

Water control is a key feature of Southeast Asian civilizations. It has shaped the Southeast Asian landscape, and irrigation systems are visible records of labour, history and power relations. Irrigation and drainage systems, in turn, have shaped social relations, cropping patterns, and cultural, economic and political behaviour (Lansing 1991; Mosse 2003).

Uneven and variable rainfall makes it imperative for the farming population to regulate the flow of water. In low rainfall areas the problem is, of course, that water shortages are to be expected. It is therefore attempted to store water in times of relative abundant precipitation. This can then be used for irrigation in both the wet and the dry season. However, in regions with high rainfall (1,800 mm/year and over) there is, in addition to periods of shortages, also a problem of periodic water surpluses. In such regions drainage is as important as irrigation.

Strangely enough, most sites established in Southeast Asia between 1000 BC and 1000 AD were located in low rainfall areas, where some sort of irrigation was a necessity (Stargardt 1992).

### *Pre-European irrigation*

In Southeast Asia, irrigation is an old feature of wet-rice agriculture. Aspects of socio-political organization are thought to be connected with the need to construct and maintain irrigation and drainage systems. These connections have drawn scholarly interest since the publication of Karl Wittfogel's studies on the features of hydraulic societies (Wittfogel 1957). This analysis has led to a long debate among social scientists. In this volume, the contributions of Jan Wisseman Christie and Willem Wolters take part in this debate.

It now seems that the value of Wittfogel's ideas in this respect, namely that the need for large-scale irrigation works ('hydraulic agriculture' in Wittfogel's term) created the 'oriental despotic' state, is rather limited as regards Southeast Asia. This is not really criticism that should be levelled at Wittfogel, as he was talking mainly about arid areas. In a collection of essays, published a few years ago (Rigg 1992), it was argued that most medieval systems were small-scale ('hydroagriculture') and that rulers were seldom involved with these irrigation systems. Moreover, the large-scale (and state sponsored?) systems that could be encountered in some regions had primarily religious functions, not agricultural ones.

However, we should avoid throwing out the baby with the bath water, and perhaps it is time to rethink some of the arguments raised in Rigg's volume. For instance, the argument that the large tanks of mainland Southeast Asia may have had primarily a religious function, smacks a bit of an overly rigid, perhaps typically Western attempt to impose as separate categories what may have been perceived as not more than simply aspects. If water is perceived as representing fertility, is it really useful to try and distinguish between primarily a religious function and secondarily an agricultural one?

Neither should it be assumed that the state played no role at all (Aung-Thwin 1990), or that all state-sponsored water works had religious functions only. Recently the old discussion concerning the large artificial lakes (*baray*) of Angkor has been revived, and it is once more deemed possible that they had at least partly an irrigation function (Pottier 2000; Lieberman 2003:228-9).

Another interesting question is why so much energy was invested in irrigation. Most scholars would probably agree that around 800 AD, population pressure cannot have been the reason that people constructed irrigation works and started to cultivate wet rice. Material from Java suggests that the state provided tax incentives (Christie 1992), so one would assume that they had an interest in making people grow wet rice. Is that because a wet rice cultivating population

is a sedentary population? Is it because it is easier to tax them (but weren't they exempted?), to call them up for *corvée* duties, and to make them serve in the army when the ruler goes to war? Was it because wet rice has a better chance to yield a good harvest than dry rice? Was it an attempt to create safe zones (against robbers/raiders?). Would rulers in those days have known that wet rice planters have higher population growth rates than shifting cultivators?

The tax incentives suggest that without the stimulating role of the state people may not have taken upon themselves the burden of constructing water works and the bother of wet rice cultivation. Is this Wittfogel having been ejected by the front door, making his comeback through the back door?

Finally, one would like to see more research on 'natural' irrigation systems, such as the 'flood-water retreat agriculture' in the past in Cambodia (Stott 1992), Kalimantan (Borneo), and Sulawesi (Celebes).

### *Colonial irrigation*

Manipulating water flows is something the Dutch have been doing for centuries. When they came to Java around 1600, they soon started digging canals there as well, albeit on a modest scale, particularly around Batavia (Jakarta). In early nineteenth-century Java, Dutch civil servants ('Residents') were expected to supervise the wet-rice related irrigation systems, and occasionally they were also involved in the construction of dams and the digging of canals. One could argue, however, that in these instances the Residents were applying local, Javanese technology, not Western knowledge (the occasional European surveyor apart).

Only after circa 1850 the construction of large-scale irrigation systems was undertaken by the colonial state. These were usually public, large-scale gravity flow systems serving both peasant smallholders and plantations. The construction of these systems was in the hands of Western engineers, applying technical knowledge from the engineering schools that were gaining in number across Europe and the USA during the nineteenth century.

It would be interesting to put the perceptions and the performance of these engineers in a comparative perspective, including the strength of the engineers lobbies in the various mother countries. How well did the engineers really do? So-called counterfactual history is no longer as popular as it was some 30 years ago, but in this case one would gladly revive it with the question what would have happened if the engineers had not intervened. Could a growing population have been fed solely on the basis of more small-scale irrigation schemes? Or would population growth have been lower?

One is also tempted to argue that the construction of these large-scale systems forced the cultivators to grow rice, at least in the wet season. We can only speculate what their own preference would have been. It has been argued that

Wittfogel's 'Hydraulic State', purportedly called into being in the Pre-Modern Period, did really develop in Southeast Asia after 1850, with the large-scale irrigation works laid out by the colonial states (Boomgaard 1993:211).

### *Communities of end-users*

Robert Hunt presents in this volume a comparative perspective for communal irrigation systems. Probably the oldest types of irrigation are small-scale community systems, constructed by the local population. These works often have been considered as inadequate and too small, but these are in many instances sustainable, sometimes age-old and still functioning systems. Examples are the *subak* of Bali and the *zanjera* in the Ilocos region in the Philippines. A remarkable feature of these systems is the local social organization, which orchestrated their maintenance and the successful long-term interaction between community and physical infrastructure (Christie 1992 and Stargardt 1992; see also Wolters, this volume).

However, the large-scale irrigation systems constructed by the colonial states did not have the benefit of the smaller systems with their organization neatly tailored to local needs. While the dam and weir and the primary and secondary canals would be administered and maintained by the central irrigation bureaucracy or their provincial representatives, the management and upkeep of the tertiary canals and the distribution of the water over the fields of the end-users was less easily organized. Should this be entirely in the hands of the local community? Or should the central (provincial) bureaucracy have a larger say in these local affairs?

National irrigation bureaucracies, both during the colonial period and after independence, have often been stymied by this end-user problem. In many cases they have attempted to create what we now call Water User Associations, with the above-mentioned local organization – Hunt calls them Irrigation Communities – in mind, only to discover that this did not work. In some cases (Philippines, Mexico), however, these attempts were more successful (Hunt 1989). So what seems to be the secret of turning a Water User Association into an Irrigation Community? And what are the prospects of doing this in Southeast Asia outside the Philippines?

However, Water Users Associations, it seems, run the risk of being perceived as panaceas by scholars and policy-makers alike. Above all, they are supposed to improve the efficiency of the irrigation systems, and one sincerely hopes that to be true. It is also expected that they will do better at making cultivators pay (more) for the privilege of using irrigation water than does the irrigation bureaucracy (Postel 1993). One assumes that paying a 'realistic' price for irrigation water would help in the struggle among the many contestants for water, but one hesitates to call this a realistic expectation.

*Anti-dam struggles*

Another interesting aspect of the large-scale irrigation systems is that they have been popular for such a long period. As we have seen earlier, the first ones date from around the middle of the nineteenth century. Around 1900, large projects were under way in the Indonesian Archipelago and elsewhere in Southeast Asia. Now, a century later, large dams and irrigation systems are still on the agenda of a number of Asian countries, and also on that of the World Bank.

It seems, however, that this popularity is being slowly but surely eroded as the scale of the projects increases, particularly, as far as Asia is concerned, in India (Narmada dam) and China (Three Gorges dam). Another factor is that environmental concerns are being voiced louder than before, by NGOs among others. At the same time there is less inclination to accept the social costs that will have to be borne by those who live in the areas to be inundated when a large dam is constructed. There are several examples of such anti-dam protests in mainland Southeast Asia (Hirsch 1998) and in Indonesia (Aditjondro 1998).

Although, as we have seen, the role of the Southeast Asian state in the construction of irrigation works was probably not all that important prior to, say, 1500 AD, the large-scale irrigation works dating from the period 1850-2000 could not have been carried out without intensive state intervention. Now, it appears that the state in Southeast Asia has reached the limits of its involvement with large-scale irrigation, at least in the eyes of many of its citizens. According to the literature on this topic, there are many different factors involved in the coming of age of the anti-dam protest movements, and it would be interesting to discuss these factors in more detail.

After all, if these movements are successful, the epoch of the 'hydraulic state' in its modern guise might be drawing to a close, though I may be exaggerating slightly. There are signs that some states are now avoiding these large-scale projects, as they are eager to avoid the hassle of the recent protest movements (Mitchell 1998:84).

*Epilogue*

The possible end of the large-scale irrigation projects is an apt metaphor to end this introduction. Water, in all its aspects, may be a given in Southeast Asian society, its role at any given moment of time is clearly politically, economically, socially and culturally constructed. Seen in this light, the meaning of a notion such as 'water culture' (as opposed to a desert culture or a mountain culture) will evidently fluctuate with the times, stressing the advantages at one moment, and the darker side of water at another. It will have to be rethought for every epoch and for every aspect to be studied.

In many respects the role of water in Southeast Asia has changed over the years, and it will no doubt change in the years to come. For instance, it could be argued that water used to be a free gift of nature, an open access resource, such as air. In most Southeast Asian areas that is no longer the case, and it may be expected that conflicts over water (rights) will increase in number. Thus, a different 'water culture' is or has been emerging.

However, it is also clear that geography, climate, and other water-related natural features have played a powerful role in shaping Southeast Asian histories, cultures, societies and economies. This volume presents a number of possible approaches that attempt to study Southeast Asia with water as the central idea.

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## **Part One Waterscapes**





HEATHER SUTHERLAND

## **Geography as destiny? The role of water in Southeast Asian history**

Standard historical narratives usually contain iconic images, epitomizing their central themes. In Indonesian history, one such emblematic scene is said to have occurred in the port-city of Makassar, South Sulawesi (Celebes), in the first half of the seventeenth century. A representative of the *Verenigde Oost-Indische Compagnie* (VOC, Dutch East India Company) confronted the leaders of the twin kingdom of Goa-Tallo', lords of this thriving east Indonesian entrepôt, and demanded that non-Dutch access to Moluccan spices be curbed. Each time the Company official pressed his case, the ruler responded with variations of the same statement: 'God has made the earth and the sea, and has divided the earth among men and made the sea common to all'.<sup>1</sup>

This exchange symbolizes both the crucial role of oceans and trade in Southeast Asian history, and the conflict between indigenous and European interests and perceptions. This fundamental difference was not rooted in Asian maritime or commercial incapacity, but reflects rather the more aggressive attitudes of the European powers, which in turn derived from the dynamics of their history. Charles Tilly (1990) has argued that the burgeoning states of early modern Europe were driven by the competitive pressures of 'coercion and capital', as the accumulation of wealth and power formed a mutually reinforcing spiral. Initially supported by royal resources, and later by state-backed trading companies, the Europeans entered the southern seas with a desire to dominate. They regarded cannon and exclusive contracts not only as legitimate instruments of mercantile policy, but as indispensable if they were to be able to operate profitably in these waters. This is not to say that Southeast Asian kings and chiefs were indifferent to the economic, and hence political, potential of trade. On the contrary, they strove to concentrate commerce in their harbours, offering security and access to commodities in exchange for gifts and taxes. However, their demands were moderated by their awareness that extortion would drive shipping to less demanding ports beyond their political reach. The Europeans were more ambitious, seeking to extend their hegemony over the main sea-lanes. But Asian sea-faring skills, social and political networks, and consequent access to products, markets and protec-

<sup>1</sup> Stapel 1922; Resink 1968; L. Andaya 1981; Wolters 1999.

tion gave them a powerful edge over the newcomers. This social capital had been generated by many centuries of maritime interaction, and consequently had been shaped by the physical features of the Southeast Asian world.

As Fernand Braudel (1975:23) has observed, geography 'helps us to rediscover the slow unfolding of structural realities, to see things in the perspective of the very long term, geography, like history, can answer many questions ... it helps us to discover the almost imperceptible movement of history, if only we are prepared to follow its lessons and accept its categories and divisions'. Drawing on the long French tradition of social geography, Braudel's famous work on the Mediterranean traces the patterns of interaction between setting, structure and events. Because of its sea-focussed physical structure, its diversity of cultures, and rich and multi-layered trade, the Mediterranean has been a favoured model for historians seeking the underlying patterns of Southeast Asian history. As I have suggested elsewhere, an additional factor in the popularity of this analogy has been that it seemed to offer a way of acknowledging the openness of the region to economic and cultural penetration, without reducing it to peripheral and subaltern status.<sup>2</sup>

Water has been a decisive factor in Southeast Asia's historical development in a number of ways, many of which are discussed elsewhere in this volume, but our focus here is upon the impact of water-borne commerce. Over thousands of years, Asian waters have been much traveled, and it has often been suggested that the central dynamic of Southeast Asian history is to be found in the interaction between peoples, primarily through trade: down the rivers, along the coasts, across the seas and oceans. If this focus was once restricted to 'island Southeast Asia' (Malaysia, Indonesia, the Philippines), more recent research, as we will see below, acknowledges the crucial significance of trade on 'the mainland' (Myanmar or Burma, Thailand, Laos, Cambodia, Vietnam). This emphasis raises fundamental questions concerning the relative roles of local agency and external influence. The resulting debates encompass such issues as the differing strengths of various communities in commerce, and the role of trade in state formation, and in the dissemination of world religions. Long distance economic exchanges are also seen as central to the development of urban society, cultural change and identities.

The old colonial-era image of Southeast Asians, as passive beneficiaries of successive waves of civilizing invaders from overseas, has long been abandoned. Indian cultural influence cannot be explained in terms of Hindu colonization; it is no-longer advisable to see Islam as a uniformly thin veneer imposed by an alliance of local kings and foreign traders, and even the notion of a European 'civilizing mission' has been undermined. On the other hand, there is a growing if grudging recognition that Chinese were not just parvenu merchants or ignorant coolies serving imperial goals, but had a much longer

<sup>2</sup> Sutherland 2003; Guillot, Lombard and Ptak 1998; Reid 1988:xiii-xv; Chaudhuri 1990.

and deeper history in the region. Topics of this scale and complexity cannot, and need not, be explored here; all are subjects of ongoing debate, and there is already an impressive body of literature around these themes.<sup>3</sup> One common point of departure, however, is the recognition that any understanding of Southeast Asia must begin with the geographic imperatives of location, water and wind.

### *Geography*

The force of the constraints and opportunities that have helped form Southeast Asia can only be understood if the implications of its location are fully accepted. The region lies between the two great economic powers of Asia. Both India and China were vast and complex centres of production and consumption, generating a surplus of manufactured goods, such as ceramics, textiles and metalware, while offering a wealthy market for the exotics produced by the forests and seas of Southeast Asia, including foods, dyestuffs and medicines. The logic of ocean-currents, land-barriers and Straits channeled shipping through certain sea-lanes, enabling settlements on neighbouring coasts, estuaries and beaches to tap into the flow of goods by offering shelter and services. Moreover, and crucially, Southeast Asia fell under the regulating rhythm of the monsoon winds, which determined climatic and hence sailing patterns up the East African coast from Madagascar, to the Persian Gulf, and across to southern Japan and down to west Papua. These winds change direction, driven by temperature fluctuations in Siberia, Central Asia and Australia. Typically, the north easterlies blow down across the South China Sea from November to January, while the south west monsoon brought vessels from India between May and October. The monsoons, like the more southerly trade winds, filled the sails of ships carrying commodities across a wider 'Indian Ocean' trading system. These air currents thus influenced economic exchange in an area that extended from the southern shores of the Black Sea to Madagascar, including the present day Turkey and the Middle East, and reached across the Indian sub-continent, Southeast Asia and China to Japan and Korea.

Southeast Asia, as its name implies, was on the fringe of this system, but in another sense it was central. A glance at a map confirms that travelers between China and India, who sought to maximize the benefits of water transport, had

<sup>3</sup> See Tarling 1999 for overviews of the state-of-play and bibliographic essays; the thirty one volumes of collected articles published by Ashgate/Variorum under the general series title *An expanding world; the European impact on world history, 1450-1800*, and periodicals such as the Paris based *Archipel* (since 1971) or Leiden's *Itinerario* (1977) for reviews of the literature and information on conferences. In 1979 *Archipel* issued a special number (18) on trade and shipping in the southern ocean.

several options. One was to combine shipping with land crossings, although 'land' is perhaps misleading, given the crucial role of rivers and canals in carrying cargoes from sea to sea. Early harbours important in handling goods moving across the areas now included in southern Vietnam, Cambodia, Thailand and Myanmar were located in the deltas of the Mekong, Chao Phraya, Salween and Irrawaddy (Cooke and Li Tana 2004). Here boats could be used on man-made canals or natural streams to lighten the load, while the rivers provided access to inland markets or sources of commodities. Another possibility was to sail further south in the Andaman Gulf or the Gulf of Siam, and there make use of portage to have commodities carried across the narrow Isthmus of Kra.

But traders and skippers could also keep to the water, and pass through the Strait of Malacca or Sunda, between the Malay Peninsula and Sumatra, or Sumatra and Java, respectively. In either case, goods moving between India and China had to wait for the change of winds. An obvious transit region was around the Strait of Malacca, which not only provided the shortest sea-route, but also were on the edges of the complementary monsoons. Quick turn-arounds were impossible; large ocean-going vessels, sometimes carrying many hundreds of men, had to lie up for months in harbour, where they were the focus of port-based life and a magnet for the small ships of the coastal feeder-traffic.<sup>4</sup> The resulting ramifications in trade and social contacts were felt throughout littoral zones, into estuaries and up rivers; commodities and ideas were carried in sailing vessel, canoes and rafts, by pack animals and porters into apparently remote corners of the region.

To appreciate the significance of this, we must re-tune our minds, forgetting maps in which Southeast Asia is a neatly defined patchwork of states, brightly clad in the cartographic livery of colonial empires, or proudly distinct in separate colours, emphasizing new national borders. This familiar image should be allowed to fade, enabling the seas and oceans to predominate. Appropriate emphasis can then be given to the western and eastern maritime arenas. The Bay of Bengal is the first, linking Sri Lanka, the Coromandel coast and Bengal to Burma, Thailand and the Malay Peninsula. The second is the South China Sea, connecting the east coast of the Malay Peninsula to Vietnam, southern China, Taiwan, the Philippines and Borneo's northern shores.

But such a shift in focus is only a beginning, albeit a good one. We should not concentrate on the Bay of Bengal or the South China Sea exclusively, because they derive much of their importance from the waters beyond. The Bay of Bengal opens into the Indian Ocean to the south, offering access not

<sup>4</sup> Pluvier 1995:3; Cribb 2000. There is an overwhelming literature on Indian Ocean history; for introductions see Pearson 2003; Das Gupta and Pearson 1987; Chaudhuri 1990; McPherson 1993; Risso 1995; Tagliacozzo 2002. On Indian ships, see Mathew 1997. For a comparative perspective, see Tracy 1990, 1991. See also Reid 1993a:36-53; Manguin 1980; Ng 1983:137-63.

only to the Swahili coast, but also to the rich Arabian Sea, and through it to the Red Sea, the Mediterranean and the Gulfs of Persia and Oman. While the shallow South China Sea was more enclosed, within the arc of Malaysia, the Indonesian and Philippine archipelagos, its waters nonetheless blended with those of smaller seas: Sulu, Celebes, Banda and Java. Some of the commodities from the islands of southern and eastern Southeast Asia were rich enough to draw ships to this periphery since ancient times.<sup>5</sup>

This emphasis on the sea must not blind us to the ongoing, if in many ways less visible, importance of land communications. The hunger for Asian spices drove early Europeans to seek a trans-ocean route to Asia, but we should remember that the caravan trade was more significant until well into the seventeenth century. From the eastern Mediterranean, merchants traveled through modern Syria, Iran, Iraq, Afghanistan and Pakistan, and then had to brave the Gobi and Takla Makan deserts before reaching China. Another major route linked land and sea travel at the Red Sea ports of Mocha and Aden, feeding Indian Ocean commodities into Europe and Asia Minor. It has even been suggested that more spices might have reached Asia in 1600 if the Portuguese had never sailed into the Indian Ocean, as their interference with traffic into Alexandria blocked more exotics from entering Europe through the Muslim networks than their own ships carried.<sup>6</sup> In mainland Southeast Asia caravan trails linked Northern Burma and Siam to Vietnam and Southern China, and by the mid seventeenth century, at least, relatively densely populated Java also had a few major roads with toll-gates and permanent bridges. Networks of horse, ox-cart and porter trails connected the interior with the coasts, and crossed water-sheds to link river systems, providing supplements and even alternatives to water transport.<sup>7</sup> While these routes might have been much more labour intensive, they did offer inland populations the chance to seek the most favourable economic and political conditions for their transactions. Land and sea were linked by interlocking webs of collecting centres, markets, entrepôts and feeder routes. However, water remained a more efficient transport medium, particularly for bulkier cargoes; it has been estimated that it required only 20% of the energy expenditure required for movement by land.<sup>8</sup>

Besides the oceans and the seas, rivers provided another important element of Southeast Asia's water-borne heritage. Kenneth Hall (1985:2-3) has described how two different types of river system exerted their influence on early state formation.<sup>9</sup> In island Southeast Asia many streams flow from interior mountains to the sea, where populations clustered near river mouths. A distinction emerged

<sup>5</sup> Glover 1990; Pearson 2003:47-61; Ray 1999.

<sup>6</sup> Waites 1999:64; Abu-Lughod 1989; Frank 1998.

<sup>7</sup> Hall 1999:221-2; Schrieke 1957:102-20; Reid 1993a:53-61; L. Andaya 2000.

<sup>8</sup> Miksic 1990:122; Pearson 2003:29; for more modern organizations see Bruijn 1990; Menard 1991.

<sup>9</sup> Hall 1985:2-3 ; also Bronson 1977 and Hall 1999.

between the relatively inaccessible peoples of the inland and upland, the 'hulu' in Malay terminology, and the down-river settlements.<sup>10</sup> Any chief who controlled the river mouth could manipulate the exchange of inland goods, such as forest produce or gold, for imports like salt, metals or textiles. Pressure could then be exerted on peoples of the interior, and alliances forged. The resulting 'partial hegemony through direct rule of only coastal plains and river mouths' (Hall 1985:3) was the defining characteristic of such 'dendritic' or tree like polities (Christie 1995:270). Jan Wisseman Christie (1990) stresses that these states were not mere passive 'conduits', as they compartmentalized and managed trade in three distinct segments, dealing respectively with raw materials from the interior, manufactures and sea-products from the coast, and imported valuables. This was typical of Sumatran, Bornean and Malay chiefdoms and even later sultanates. The great rivers of Kalimantan – the Rajang, Kapuas, Barito and Mahakam – provided channels for limited political and economic penetration of the interior. The shorter streams of Java's north coast, such as the Demak, and those of the east coast of Sumatera, facing the Strait of Malacca and the Java Sea (the Asahan, Siak, Inderagiri, Batang Hari and Musi) were also central to the power of local rulers. Nineteenth century Terengganu on the East Coast of the Malay Peninsula was a typical later example, where the Kemaman, Dungun and Terengganu were the main rivers, with the last directly administered by the Sultan and the others under powerful if subordinate chiefs.<sup>11</sup>

However, the second main type of river system described by Kenneth Hall (1985) offered richer opportunities, including as it did broad and fertile plains, fed by tributaries and streams, which could provide sustenance for rice growing peasantries. Here power might be accumulated on a much grander scale, by such 'classical' states as Pagan on the Irrawaddy in Burma (11-14th century), Angkor near Tonle Sap in Cambodia (9-13th century), or the independent Dai-Viet state in the Red River basin (from the 10th century). Great rivers like the Solo or the Brantas (central and east Java), Burma's Salween, the Chao Phraya of Siam or the mighty Mekong, which runs through modern Southern China, Laos, Cambodia and southern Vietnam, shaped not only the physical but also the political and cultural ecology of Southeast Asia.<sup>12</sup>

Southeast Asia's location between major trading centres, and the patterns of oceans, seas, rivers and winds made much of the region open to interaction with distant lands. Add to this the attractions of local commodities,<sup>13</sup> and it was inevitable that contact and commerce over long distances would be a constant historical theme. In more recent times, with their emphasis on the centrality of nation-states, and on the bureaucratic administration of fixed

<sup>10</sup> L. Andaya 2000; B. Andaya 1993a, 1997a; Li 2001.

<sup>11</sup> B. Andaya and L. Andaya 1982; Sandbukt 1991; Wolters 1999:160-2; Sutherland, 1978.

<sup>12</sup> Marr and Milner 1986; Cooke and Li 2004; Aung-Thwin 1995; Hall 1999; Taylor 1999.

<sup>13</sup> B. Andaya and L. Andaya 1982; Tarling 1999, II-1. L. Andaya 2000; Reid 1993a:2-36.



categories,<sup>14</sup> Southeast Asia's openness has often confronted governments and even historians with dilemmas of definition. But before we can consider the historiographical ambiguities posed by the region's fluid frontiers, we need to understand just how deeply rooted these patterns of interaction are.

### *Chronology*

The 'openness' of insular Southeast Asia was demonstrated as early as circa 3000 BCE, when the western and central parts of the archipelago were settled by Austronesian-speakers. These pottery-using peoples, with varied agricultural economies, migrated from Taiwan, through the Philippines and the Indonesian Archipelago, to Madagascar, Melanesia and the Pacific, with groups hiving off and settling as they went. They encountered existing populations, and adapted their own technologies to local environments. The very nature of their travel, by boat, was accompanied by the introduction of highly developed shipbuilding and navigational skills, and is reflected in mythologies. Marine food resources were also important in the development of early settlements.<sup>15</sup> Exchanges of commodities between ecological zones, and the exploitation of advantageous niche resources, encouraged transactions between groups. Collecting centres, where products were accumulated, have been located in the Malay Peninsula from the first millennium BCE to the early first millennium CE. Such centres would have been located in strategic locations, such as those that could control an important route or transportation node.<sup>16</sup>

Given this background, it is not surprising that maritime contacts have a long history, going back more than 2500 years; Arabs were sailing to west India's Malabar Coast, and Chinese to the adjoining northern regions of modern Vietnam, in the pre-Christian era. Early on, commodities such as Moluccan spices reached distant markets, having passed through extended chains of transactions. The earliest archeological find of cloves, from a plant native only to Maluku, is from a Mesopotamian kitchen store dated at circa 1700 BCE, and sources document Chinese use of the spice back to the third century BCE.<sup>17</sup> Trade oriented coastal cities such as Broach (Barugaza), on the north-west Indian Gulf of Cambay, or Coromandel's Masulipatnam had emerged by the beginning of the Common Era. Roman commerce with India reached a peak during the first and second century CE, and soon encompassed the east coast. An increasingly wealthy southern China was also turning seaward as the land caravan trade was disrupted. As will be described below, under the

<sup>14</sup> Scott 1995, 1998; Aung-Thwin 1998; Sutherland 2001, 2005.

<sup>15</sup> Cribb 2000; Bellwood 1999; Manguin 1991; Wolters 1999:179-80; Hall 1999; F. Dunn and L. Dunn 1984.

<sup>16</sup> Miksic 1995; Leong 1990; L. Andaya 2000:23.

<sup>17</sup> L. Andaya 1993:1-2; see also on cloves in Ptak 1999; L. Andaya 2000; Pearson 1996 and 2003.

T'ang (618-907) and Song (960-1126) dynasties China's markets drew traders from the west, including the newly emerging Muslim world. From the first millennium CE onwards, 'true entrepôts' developed in Southeast Asia. These centres of transshipment and commerce were strategically located, offered safe warehousing, food and water as well as access to supplies of commodities accumulated from local, regional and long-distance trade. Despite the existence of long-distance links since about the third century BCE, regional trade was probably – and logically – more important to Southeast Asian societies until maybe the fifth century CE.<sup>18</sup>

Christie (1995) gives an excellent overview of maritime Southeast Asian prehistory and its connections to trade.<sup>19</sup> She notes the emergence of two main centres of wealth accumulation in the last few centuries BCE, one located on the Strait of Malacca, the other in the southern Java Sea region, the results of an 'explosion of trading activity' between about 500 and 200 BCE. Malay and Indonesian shipping probably carried the bulk of goods in the Bay of Bengal trade, and so was well placed to capitalize upon the growing Roman trade with India. During the fourth and fifth centuries southern China's trade in these seas expanded, leading Christie to comment that it is probable that 'this increased wealth from the China trade paid for the 'Indianization' of maritime Southeast Asia'. She concludes:

Trade appears to have been the key to economic growth; control of trade seems to have provided the key to political development. Moreover, trade in Southeast Asia waters seems to have [...] carried a substantial baggage of information and ideas along with material commodities. This suggests that the carriers of most of this trade were members of Southeast Asian communities rather than outsiders, and that the long-distance trade networks extending into the South China Sea and the Bay of Bengal were focused on the chiefdoms of western Indonesia and peninsular Malaysia. (Christie 1995:277.)

At the beginning of the Common Era trade already linked the Roman Empire, India and Southeast Asia, and by the second or third century Fu-Nan, where land and sea met in the lower Mekong delta, had developed into a commercial centre. From the second to sixth centuries Oc-Eo, Fu-Nan's port in Southern Vietnam near the Cambodian border, was a major entrepôt for sea-land traffic. Hall (1999:131) describes how the Fun-Nan traders 'went to China in order to exchange Mediterranean, Indian, Middle Eastern and African goods... for China's silk. But [...] sailors from the Sunda Strait area responded with entrepreneurial skill, and began to introduce their own products', substituting archipelago forest produce for frankincense and myrrh. By the fifth and sixth centuries south China and the Sunda State region were trading strongly, creating

<sup>18</sup> Christie 1995:252-3; Chaudhuri 1985:34-62; Risso 1995; Christie 1990:42.

<sup>19</sup> Christie 1995, particularly 251, 253, 277. See also Christie 1999 and 1990, 1991; Miksic 1995.

a climate in which the thalassocracy of Srivijaya could develop (670-1025). This South Sumatran polity's expanding trade with both China and India enabled Southeast Asian commodities and shippers to play an increasingly important role in maritime commerce. A polyglot population of merchants, skippers, traders and seamen sailed alongside the Southeast Asians. The commercial share of the various communities fluctuated. Persians were active in the seventh century, though the Arabs later eclipsed them; Gujerati and Coromandel shippers were then prominent, while the Chinese emerged strongly in the 1100s. From the mid-fourteenth to the mid-seventeenth century trade expanded, and with it the production or collecting of commodities, leading Anthony Reid (1993a) to characterize the period 1570-1630 as 'the boom years'.<sup>20</sup>

We can get some idea of the exposure of Southeast Asian societies to these commercial and cultural currents, if we consider the routes that were traveled. O. Wolters (1999:132) concludes that Chinese were sailing to Southeast Asia as early as the tenth century. Early traders between India and China had hugged the coastlines, and then gone overland either at the Isthmus of Kra, or through natural and man-made channels across the lower Mekong plain. However, an easier all sea-route via the Strait of Malacca gained in favour from the beginning of the fourth century, heralding an expanding role for the Malays. Later history shows how the oceanic connection between Europe and Asia pioneered by the Portuguese facilitated trade expansion, and it seems logical that the earlier regional introduction of all-water freight movement, as opposed to shipping plus portage, also had a significant impact.

The all-important trade with China developed its own patterns, shaped by geopolitics and increasing knowledge (Ptak 1992, 2004). Up to the later fifteenth century, writes Denys Lombard (1995), the main route was that of the west. Ships sailed past the tip of the Malay Peninsula, to Cochin China via Tioman, along the Cham coast of the later Indo-China, then to Hainan in the Gulf of Tonkin, following the south China coast of Guangdong (Kwangtung) and south Fujian (Fukien) to reach the main ports of Canton (Guangzhou) and Quanzhou. Chinese, Indians, Persians, Arabs and Southeast Asians traveled between the ports along these shores. The early Muslim communities of Champa, together with those of Fujian and Guangdong, were linked into this network, which facilitated the spread of Islam. Vietnamese invasions, culminating in the fall of Vijaya in 1471, weakened the Chams, so contributing to the growth of an alternative passage.

There was also an 'eastern route' running more or less directly south from South Fujian's Quanzhou to Maluku and Timor. Ships threaded their way past the western coast of Luzon, through the Sulu Archipelago and the

<sup>20</sup> Hall 1999:195-6; Bellwood 1996; Manguin 1993a; Wolters 1970; Das Gupta and Pearson 1987: 'Introduction'; Reid 1993a:1-61; Kulke 1999; Ray 1999. Cribb 2000 gives maps showing trade routes and the rise of early states in Indonesia.

Sangihe and Taulud Islands off north Sulawesi to reach Ternate and Tidore. Ptak thinks this path may have been most popular in the late thirteenth and fourteenth centuries, but later declined, perhaps because of endemic piracy in the Sulu and Borneo seas. Another, linked seaway along the coast of north Borneo and then on to the Strait of Malacca, which was popular in the fifteenth and sixteenth centuries, is called the 'northern route' by Ptak. This benefited from the long established trade in sea and forest products of Brunei, which gained further in importance after the fall of Malacca in 1511, and also from the creation of the Spanish link with Mexico in the Philippines at the end of the sixteenth century. Chinese settlements of private merchants in the north Java ports, such as Tuban, were linked to both Maluku and the Straits by ships sailing an east-west course through the Java Sea. Perhaps for the sake of symmetry this could be described as 'southern', complementing the 'northern' path along the top of Borneo; later these two were less significant than the 'eastern' seaway between the Philippines and Borneo, and the coast-hugging 'western' route along the Southeast Asian mainland. By 1567 these two had become standardized within the Fujian trade complex as the Xiyang or Western Seas and Dongyang or Eastern Seas systems. West Javanese Banten was the wealthy southern terminus of the Western passage, while the Eastern was focused on Manila.<sup>21</sup> Shifts in the location, or levels of use, of these commercial circuits would have profound effects on the polities and communities that were sustained by them.

The new arrivals from southern Europe fitted into these patterns. The Portuguese also followed the 'northern' route, heading east out of Malacca and turning southeast at the tip of north Borneo, through the Sulu Islands and past the pepper-rich coasts of eastern Kalimantan to reach Maluku. From the north, their compatriots in South China sailed between the Philippines and Borneo to Maluku, some going further south to the sandalwood island of Timor. These Portuguese, who had been settling on the southern Chinese coast since 1540, did a thriving business during the sixteenth and seventeenth centuries, working with local 'smugglers and pirates' despite imperial bans on trade. After 1557 Macau provided them with a base for expanding their commerce with Japan, the Philippines and India, and by the mid-seventeenth century the settlement was trading vigorously with Makassar, Manila and Tonkin. The Spanish were also a presence to be reckoned with, as in the later sixteenth century silver from Acapulco and Chinese commodities drew traders to Manila despite legal restrictions on access.<sup>22</sup> As knowledge about more efficient routes spread, sailors adjusted, and the resulting shifts could offer

<sup>21</sup> Taylor 1999:158, 173; Lombard 1995:13-4; Bouchon and Lombard 1987:65; Tonnesson 2005; Ptak 1992, particularly the map on p. 30. See also Wang 1998; Ptak 1999; L. Andaya 1999:3; Reid 1996, including the map on p. 16.

<sup>22</sup> Ptak 1992:320; Souza 1987; Subrahmanyam 1993:208; Kathirithamby-Wells 1999:262-3.

new and profitable possibilities to harbours along their way. But the opposite was no doubt also true: port-polities able to provide a range of goods and services could draw business away from less well-managed rivals, who might actually have had a more advantageous location.

All these contacts fuelled cultural exchange and stimulated innovation. The adaptation of elements from Indian religions by Southeast Asian elites is one of the best-known examples of this process. Although Indian traders had been visiting Southeast Asia for hundreds of years, it was only when more sophisticated polities developed there that they sought and absorbed aspects of Indian culture. Hall (1999:193) comments that 'a cultural dialogue of profound importance to Southeast Asia generally developed between Fu-Nan and India' by the second or third century CE.<sup>23</sup> This dialogue, like those with other interlocutors in China, the Middle East and later Europe, went on for centuries, the changing content reflecting developments on all sides. In this context, the spread of Islam can be seen as a continuation of earlier processes.

After the Fatimid conquered Egypt (969 CE), existing Ismaili trade networks between the Middle East and India strengthened, as did those between India and China. During the prosperous T'ang (618-907) and Song (960-1126) dynasties, adherents of the new Islamic religion were major freight carriers between the western Indian Ocean and China, where Islamic quarters developed in a number of cities. Relations were not always smooth, and Muslims were expelled from Canton in 879 CE; some settled in Southeast Asia, reinforcing existing Islamic communities. But it was some four hundred years before the first Muslim states appeared in Southeast Asia, at the end of the thirteenth century. Islam gained further acceptance during the fourteenth century, when the new religion spread along the trade routes, creating enclaves in Java and Sumatra. In the mid-fifteenth century Islam in Southeast Asia received a decisive boost with the conversion of Malacca, a pivotal node in fifteenth and sixteenth century oceanic commerce. Sultanates emerged in the Malay Peninsula in the sixteenth century, and the following hundred years saw a strong expansion of the faith. The Portuguese conquest of Malacca in 1511 encouraged a partial shift of Malay settlement and Muslim commerce to more congenial ports, in the face of competition from aggressively Christian powers. Islam's position was consolidated during the sixteenth century. The prestige of the Islamic empires of the Mughals in India, the Safavid in Persia and the Ottomans in Iraq, Syria and Egypt further reinforced the image of Islam. Commercially active groups like the 'Moors' – as the Indian Muslims were known – and the Malays were vigorous proponents of the new religion. Victor Lieberman (1993) comments: 'The fifteenth through seventeenth centuries saw the creation of a distinctive Malayo-Muslim coastal commercial

<sup>23</sup> See also Mabbett and De Casparis 1999; Wolters 1999:108-9; Kulke 1999; B. Andaya 1999b.

culture along a three-thousand mile arc reaching from Western Sumatra to the Spice Islands and the southern Philippines'.<sup>24</sup>

As Reid (1993a:12) has observed 'before the seventeenth century China was undoubtedly the most important market for Southeast Asian goods'. From the ninth to the fifteenth centuries, South Fujian's port Quanzhou became the centre of China's maritime trade, overshadowing the more southerly Canton, although it was to be surpassed by Amoy (Xiamen) from the late 1600s. Reid suggests that the symbolic beginning of the fifteenth century commercial boom could be dated from the famous expeditions of the Chinese admiral Zheng He (Cheng Ho) from 1405. The subsequent flourishing trade was dependent on the China market, despite the shocks attendant upon intermittently enforced bans on private trade. During such periods of theoretical isolation from foreign commerce, official 'tribute missions' from overseas were a significant means of exchange, while the enterprising southern provinces of China threw themselves into 'smuggling'. When Ibn Battuta visited Gujerati Cambay in northwest India in the mid-fourteenth century, he noted the diversity of trading communities there, including a strong Chinese presence. Contacts with the Middle East also increased during the 1400s, stimulated by the expanding trade.<sup>25</sup>

At the end of the fifteenth century the Portuguese sailed into the Indian Ocean, an event which was once seen as marking the abrupt beginning of a new era. But the old image of a powerful Portuguese state ruling the seas has been abandoned in favour of that of a ramshackle system of maritime extortion. This system was relatively successful along the east African coast and western India, including the Gulf of Cambay, which controlled access to the rich Gujerati ports. The Portuguese were also quite powerful in the waters immediately around Malacca. But the Arabian Sea remained open to other traders, while the Portuguese were weak in the Bay of Bengal, and largely irrelevant east of the Strait of Malacca. By the second half of the sixteenth century Portuguese commerce was increasingly in the hands of private traders operating under state-granted contracts within an Asian context. But, as M. Pearson (1987) observes, the Portuguese had brought one major change: they claimed the right to control and tax all trade in the Indian Ocean. As early as 1499 the Portuguese king had declared himself to be Lord of Conquest, Navigation and Commerce of Ethiopia, Arabia, Persia and India. In 1500 the Indian Ocean had been a *mare liberum*, now cannon and the *cartaz* (pass) were intended to determine rights to trade. However, the Portuguese fleets, and their forts at Malacca and Tidore, were quite incapable of enforcing these pre-

<sup>24</sup> Lieberman 1993; Risso 1995; B. Andaya 1999b; Hall 1999; Das Gupta and Pearson 1987: 'Introduction':24.

<sup>25</sup> Pearson 2003; Ng 1983; Wang 1998; Wang 1981; Souza 1987; Risso 1995:45; Reid 1996; Ptak 1998; Ray 1999; Hall 1999:219.



tensions, and by the first half of the seventeenth century the Portuguese in Asia were increasingly marginalized. Nonetheless, a new principle had been introduced.<sup>26</sup>

During the fifteenth and early sixteenth centuries local Southeast Asian societies had still built and sailed large ocean-going vessels (Pearson 2003:63-75). *Jong* were the main carriers of the eastern Indian Ocean, and benefited from the booming pepper trade. But by the end of the 1500s these ships had vanished, leaving the bulk of the western Indian Ocean trade to the Gujerati, and the east to the Chinese. The resulting seascape encouraged Europeans to focus on the small-scale nature of indigenous shipping and the 'peddling' character of its trade. Pierre-Yves Manguin (1993b:209) rejects the idea that this disappearance of the big Southeast Asian *jong* was due to the Portuguese impact or technological failure, as the naval power of regional polities remained considerable. He stresses the causality of changing economic circumstances, which encouraged 'a new type of political power, with a growing emphasis on territoriality, centralisation, cash-cropping economy, absolutism, and the rise of belligerence at sea'. This maritime contraction and changing political climate precedes the 'mid seventeenth century crisis' which Reid sees as terminating Southeast Asia's Age of Commerce. Other historians, however, question the very existence of a crisis. Lieberman describes the idea of such a watershed as 'untenable' for the mainland, and Barbara Andaya doubts if the shift was so dramatic even in maritime Southeast Asia.<sup>27</sup>

On the surface, the seventeenth and eighteenth centuries seem relatively amenable to a Eurocentric approach. The boom in trade during the 1600s is apparently inseparable from the expansion of the Dutch and English Company fleets, while the late 1700s saw the triumph of non-Asian 'country traders' operating out of an increasingly English India. But we should not assume that this must have meant a decline in Asians' business. On the contrary, even if their relative share of the maritime economy shrank, the actual intensity, volume and value of their commerce may have increased. Moreover, it seems that there was no Southeast Asia-wide decline in Asian trade. While the Dutch East India Company might have increasingly squeezed the Malay world (and the extent of this was subject to variation), the situation for the mainland was indeed very different.

During the 1600s, Gujerati merchants from northwest India strengthened their ties with Aceh, Johor, Kedah, Jambi, Gresik and Banten. Initially Surat remained the central West Asian distribution point for Southeast Asian commodities, such as spices and tin, although it gradually lost access to these

<sup>26</sup> Pearson 1987:84; Barendse 2002; Subrahmanyam 1990, 1993; Prakash 1997; Subrahmanyam and Thomaz 1991; Souza 1986.

<sup>27</sup> Lieberman 1993:479; see also the later publication in Lieberman 1999; B. Andaya 1997b:166-8; Reid 1993a:285-98, see also Chapter One; Reid 1999; Lieberman 1997; Sutherland 2005.



in the later seventeenth century as Dutch power grew in Indonesia. On the other hand, Gujerati traders, making use of English expertise, entered the Manila market from the 1660s, and developed it into a bridgehead for the China trade. S. Arasaratnam (1987:113) concludes that while Southeast Asia's commerce with Gujerat may not have grown in the seventeenth century, it did not decline.

Coromandel's age-old commerce with Southeast Asia, notably Malacca, the Burmese and Thai coasts, as well as Malayan ports (Kedah, Perak, Johor), Aceh, Jambi and Banten, remained so profitable that east Indian merchants persisted in visiting there despite tariffs and fees imposed in Dutch controlled ports. Coromandel trade with the independent states of mainland Southeast Asia flourished. The Burmese kingdom of Arakan imported cloth and pepper, in exchange for rice and slaves, while Ava was an even larger textile market. Tenassarim, to the south, fed Coromandel goods to its overlord Ayutthaya and to Cambodian ports. Similarly, Bengal's commerce with Southeast Asian boomed from the 1640s on, with foodstuffs, textiles, saltpeter and opium being exported in exchange for elephants, gold, tin and spices. In fact, as observes, the 'trade to mainland Southeast Asia remained an Indian preserve until the end of the century' (Arasaratnam 1987:120), despite Dutch and English attempts at infiltration.

Lieberman concludes that while there was a downturn in Southeast Asian trade in the mid-seventeenth century, this was a temporary slip that lasted a few decades at most, and not a severe structural shift. Despite this interruption, 'starting in the 1690s and more especially the 1730s, and continuing with but limited interruption into the nineteenth century, the overall volume of foreign trade grew sharply' (Lieberman 1995:801-2, 1999). Mainland Southeast Asia actually gained from the presence of the Europeans, which generated widening trade circuits and capital infusions, while Armenian, Indian and other Muslim merchants left Dutch controlled areas and brought their expertise with them. Burma, and particularly Thailand, benefited. The dislocating impact of Dutch political control over the Strait of Malacca and Indonesian markets in Maluku, Banten and Makassar for the archipelagos should not be underestimated, but Asian merchants adjusted. Some areas of Southeast Asia, such as the Malay Peninsula, Thailand and Manila showed an actual increase in Asian commerce. Lieberman also mentions a third factor underpinning flourishing trade in mainland Southeast Asia, namely the expanding activities of Chinese shippers and middlemen.<sup>28</sup>

In the preceding paragraphs we have tended to see Southeast Asia as the southeastern fringe of the Indian Ocean system, emphasizing the relativity of European activity, and the continuity of Indian shipping and capital. But the

<sup>28</sup> Lieberman 1993:490-3, 1999. See also Lieberman 1995; Pombejra 1990; Cushman 1993; Blussé 1999.

Bay of Bengal was only one major maritime arena. The other was the South China Sea, and if we re-focus our attention on that arena, then our perspective changes, as different commodities, markets, freighters and skippers take centre stage.<sup>29</sup> This emphasis on China is crucial if we are to understand eighteenth century developments. In the late seventeenth century political turmoil in southern China ended when the Qing defeated the Ming. In 1683 Taiwan was conquered, and trade bans were consequently relaxed. This cleared the way for a surge in Chinese trade with Southeast Asia, as merchants from Fujian, Guangdong and Zhejiang (Chekiang) competed with the European companies for products such as pepper. Despite new bans, including a final one between 1717 and 1727, Chinese trade flourished.<sup>30</sup>

The 1700s have attracted considerable attention from historians of Asia, and interpretations reflect the preoccupations of the times. From a European perspective it all seemed fairly straightforward. There was an undoubted shift mid-century, with the Dutch East India Company and Indian shippers losing ground to English (or Scots) and, somewhat later, American, country-traders. This applied in both the Bay of Bengal and the South China Sea, where commodities like tea and opium became increasingly important. This cold wind was felt most obviously by the Indian skippers. As Ashin Das Gupta (1987:140) observed, 'Asian ship-owners had always found it difficult to compromise with the Europeans because of the competition for the carrying trade, while the shore-based merchant had found accommodation both possible and often desirable'. The great Gujerati fleet 'dwindled into insignificance' and Muslim ship owning seemed to collapse' (Das Gupta 1987:134). But Indian merchants were also affected, and by the second half of the eighteenth century banking in India was also being taken over by the English. As for China, the English had been active there since 1701, and were regularly collecting cargoes from the 1720s. After 1734 the VOC moved in, but despite some initial successes it lost out to the English in the second half of the century. Since the problems in China coincided with successful pressure from the English and French Companies in India, from the mid eighteenth century on the Dutch East India Company, like the Indian skippers, gradually had to concede predominance on the high seas to the English.<sup>31</sup>

However, once again we cannot assume that this change in the balance of commercial power resulted in a generalized Asian economic decline. As had been the case in the preceding century, the many-leveled nature of commerce,

<sup>29</sup> The problematic issue of boundaries and regions in Southeast Asia continues to stimulate debate, see Kratoska, Raben and Schulte Nordholt 2005; Sutherland 2005; Subrahmanyam 1997; Evans 2002.

<sup>30</sup> Ng 1983; Viraphol 1977; Mazumdar 1998; Souza 1986; Blusse 1996; Gardella 1994.

<sup>31</sup> Marshall 1987; Watson 1987:313; Torri 1990; Prakash 1998; Knaap and Sutherland 2004; Kwee Hui-Kian 2005. On the historiography of the eighteenth century, see Blussé and Gaastra 1998.

the complementary skills of the diverse participants, and the practised flexibility of traders combined to ensure there was no monolithic European victory. Southeast Asian kings and merchants had always had their trusted agents who could link them to wider networks, and such advisers, intermediaries and partners were even more essential for the newcomers from the north. Even the most powerful banker, wholesaler, broker or captain needed access to commercial intelligence, capital, political protection, commodities and markets. For hundreds of years, maritime officials like the *saudagar raja* (the king's merchant) and *syahbandar* (harbourmaster), or financial and commercial specialists like the *shroff* and *comprador*, remained indispensable brokers and counselors. Bruce Watson (1987) has also described the ways in which Indian merchants were part of both English East India Company and 'country' commercial activities in the century before 1760. Apparently peripheral areas, like east Indonesia, became increasingly integrated into Asian long distance trade networks that cut across emerging colonial spheres of influence.<sup>32</sup> Moreover, as trade expanded, considerable space could be created in the margins and interstices of the system. Domination of the main ocean routes by Europeans might have displaced the long distance skippers from the Indian sub-continent, but it may well have increased the opportunities for smaller Asian shipping on coastal and feeder routes. As always, there were winners and losers, but perhaps the most spectacular success was reserved for the Chinese.

During the 'long eighteenth century' the economic logic of new markets and commodities shaped the pattern of trade, and Sino-Anglo cooperation was central to this process. Country traders, Chinese junks and Indonesian *perahu* – particularly those of the recalcitrant Bugis from South Sulawesi (Celebes) – met in harbours and exchanged cargoes from Sulu to the Straits. These profitable relationships were later to be epitomized in the role of Singapore, established in 1819. Reid (1997b) has noted that the resurgence of Southeast Asian commerce from the mid-eighteenth century onwards was dependent upon China's impressive development, particularly during the stable and extended rule of Emperor Qianlong (1736-1795). The impact of China during this period was such that the term 'Chinese century' has been used to characterize Southeast Asia between circa 1740 to 1840. Carl Trocki (1997) argues that the appearance of numerous Chinese settlements producing for the market was a new phenomenon of the mid-eighteenth century. While communities of Chinese merchants in Asian port cities were long established, going back to the Song (960-1126 AD), during the eighteenth century the pattern of 'off-shore' (that is, outside China itself) cash-cropping which had begun in Taiwan spread to Southeast Asia. This was linked to financing, migration and trade, which under-pinned

<sup>32</sup> Hao 1970; B. Andaya 1978 notes the ambitious role of the Persians in the seventeenth century Thai court, and the accepted role of other foreigners, such as Chinese – and even Greeks. Marshall 1987; Watson 1987; MacLeod and Rawski 1998; Disney 1995.

the expansion of tin- and gold-mining, pepper, gambier and sugar production in places like Bangka, Perak, Sambas, Pontianak, Phuket, Kedah, Riau, Terengganu, Kelantan, West Java and Brunei. Such centres of commercial production could offer reliable sources of supply for Chinese traders and the China market. Trocki (1997:96) suggests that the embedding of these communities within Southeast Asia, usually in alliance with local rulers, represents 'the first elements of an emergent capitalist society'.<sup>33</sup>

In the early nineteenth century, commercial expansion stimulated the need for feeder shipping by indigenous and Chinese sailing craft. Bugis sailors continued to supply Singapore with Straits produce through the 1800s, and they remained a factor on some routes through the twentieth century as well.<sup>34</sup> The period from the mid nineteenth century is more unequivocally dominated by the European powers, in a familiar story of expanding influence, subjugation, colonial state building and the emergence and vicissitudes of independent states. If we accept this hegemonic colonial framework, representatives of old diaspora trading communities are recast as 'middle-men', while border negotiations, and systems of tariffs and customs duties, carved Southeast Asia's lands and waters into neat pieces in an imperial jig-saw. Defining and confining become central preoccupations in maritime policy. The arrival of steam technology broke the power of the monsoons, at least for trans-oceanic shipping and longer regional routes. The first steam ships arrived in Indonesia in the mid 1820s, but the new fleets only began to expand significantly after the opening of the Suez Canal in 1869. Howard Dick (1987:5) notes that between 1869 and 1879 'the tonnage of steamships entering Singapore increased five-fold while that of sailing vessels (excluding Malay craft) declined by more than a quarter'. Steam also made its appearance on the great rivers, a notable example being Burma's state-subsidized Irrawaddy Flotilla Company. From the mid nineteenth century on, a 'mosquito fleet' of Chinese steamers plied the Straits and coasts; their low cost flexibility made them an irritating competitor of the European lines.<sup>35</sup> But in later decades the military, industrial and managerial skills of the Europeans gave them crushing advantages in that increasing number of sectors that they found both interesting and accessible.

Iron bands cut through the old geographic constraints during the second half of the nineteenth century. If in 1867 there were circa 10 km of railways in the Dutch East Indies, by 1939 this had grown to almost 7,500; Burma had 2,500 km by 1914. After 1885 modern railways in the Malay Peninsula enabled expanding tin-mines and plantations to move their products to the ports. In Indo-China, the largest item on the French colonial budget between 1900 and

<sup>33</sup> L. Andaya 1991; Reid 1997b; Blussé 1999; Trocki 1997:96. As always, there were precedents: Reid 1993a:32-6 for earlier examples of cash cropping.

<sup>34</sup> Wong 1960:74-7 on the Bugis; L. Andaya 1991; Leirissa 1993; Dick 1975a, 1975b.

<sup>35</sup> Campo 1992:339-86, 1993; Reid 1993b.

1935 was infrastructure, providing almost 3,000 km of railways, canals and metalled roads. A glance at the railway map reveals the new pattern of colonial economic and administrative centres: Mandalay, Rangoon, Chiangmai, Bangkok, Kunming, Hanoi, Haiphong, Phnom Penh, Saigon, Kuala Lumpur, Singapore, Medan, Palembang, Jakarta, Semarang, Surabaya, and Manila.<sup>36</sup> New road networks and the coming of the bicycle and the automobile further freed people from dependence on water transport, while the telegraph and air travel slashed communication times.

This revolution in transport supported the creation of a new political and economic order in Southeast Asia, in which land seemed to triumph over sea, and new types of cities became the centres of theoretically integrated states within clear borders. Times had changed. We have seen that the old views of European hegemony in the sixteenth to eighteenth centuries have had to make way for recognition of continuities in the Asian maritime world. Both the relativity of the technological gap between West and East, and the resilience of regional trading systems, have now been acknowledged. But in the final decades of the 1800s Asian commerce was becoming increasingly subordinated to the white-managed, steam-driven rhythms of a more modern global economy, with trade and transport policies serving imperial political aims (Tagliacozzo 2005). Although non-European institutions and networks persisted into the twentieth century, they were increasingly seen as remnants of a fading world, or as illegitimate. Discussions on the role of trade and shipping in modern Southeast Asia have tended to focus on issues of 'economic integration' and 'state formation', particularly in the case of the Indonesian Archipelago.<sup>37</sup> However, the consolidation of trans-state alliances and the resurgence of local identity politics in the late twentieth and early twenty-first centuries are now modifying earlier teleological assumptions.

### *Historiography*

Given Southeast Asia's exposure, and even apparent subjugation, to external influence, it is not surprising that questions of agency have a particular resonance for historians of the region. Braudel (1985:134) has commented on the 'historiographical inequality' between Europe and the rest of the world, but Southeast Asia often seems doubly disadvantaged. The Arab world, India and China each have strong historical traditions, and each helped shape the world of Southeast Asia. Indeed, it is all too easy for Southeast Asians to disappear from their own history, particularly when considering such themes as commerce and long-distance connections. The very 'openness' of Southeast Asia,

<sup>36</sup> Knaap 1989: Table 11; Kaur 1985; Elson 1999; East, Spate and Fisher 1950:274.

<sup>37</sup> Dick, Houben, Lindblad and Thee 2002; Resink 1968:107-48; Tagliacozzo 1998; Dick 1990; Campo 1994; Touwen 1997.

born of geography, is both a defining characteristic of the region, and a cause of the vagueness surrounding it (Sutherland 2003).

Craig Reynolds (1995:422) has persuasively suggested that history is a 'discourse about origins', and that Southeast Asian nationalist historiographies have built upon earlier work in their determination to 'pursue, locate and document' the genealogy of the new states. This has encouraged efforts to rescue the presumably real and authentic identity of the region, by dismantling colonial ideological superstructures, and peeling back the layers of alien contamination. It is apparently suspected that acceptance of decisive Indian, Chinese or European influence will deny indigenous autonomy and creativity, and hence, by implication, invalidate subsequent independent nation states. Interestingly, the sub-text on Islam's role is quite different, and also varies among the three countries most affected. Malaysian state-sponsored rhetoric places Islam at the core of national identity, and although Indonesia is more cautious, the faith is still often seen as a bulwark against the undesirable impact of both Western culture and Chinese economic or political subversion. The Philippines, as a majority Christian state, remains suspicious. In all three cases, however, Islam plays an important part in shaping regional difference and attitudes, reflecting, within the state, some of the identity dilemmas faced by Southeast Asia on a global level.

Reynolds (1995:434-5) notes that one solution has been to seek Southeast Asian agency in 'the capacity, the inventiveness, the genius to adapt, and this capacity is what makes localization, indigenization and vernacularization work'. In turn, this is rooted in 'an outward-looking attitude and openness', a 'dynamic interdependence with the rest of the world'. He does feel, however, that this emphasis on tolerance is 'a clear manifestation of the Western liberal imagination projected onto the region's past'. Sanjay Subrahmanyam (1997:740) shares Reynolds' suspicion that historians have allowed modern states too influential a role in shaping their perceptions. Subrahmanyam has been dismissive of Lieberman's attempts to embed Southeast Asian history in a Eurasian comparative framework, because he feels that Lieberman 'seeks to downplay the global and connected character of the early modern period, in order to reify certain chosen national entities'. More post-modern, culturalist interpretations go further in rejecting the centrality of the state, using the idea 'hybridity' to conjure up a unique identity from maritime Southeast Asia's patterns of adaptation.<sup>38</sup> Like 'openness', however, 'hybridity' poses its own problems, as the focus upon accommodation and blending presupposes the existence of clearly defined entities, from which the constituent components of 'the hybrid' can be drawn.

This uncomfortable ambivalence in dealing with issues of identity, autonomy and influence is partly caused by the nature of the sources (often Western in origin), and historians' predispositions (of which more below), but it

<sup>38</sup> Sutherland 2005; see also Wolters 1999; Young 1995; and Lombard's work.



is also due to the character of trade itself. Most attention is naturally given to the trans-oceanic routes, and the imposing vessels that traveled them; after the end of the sixteenth century these sea-lanes were rarely, if ever, sailed by Southeast Asians, but by foreigners. However, we should not forget that even they were dependent upon networks accumulating commodities and transferring them through hierarchies of collecting centres, local and coastal feeder traffic, and systems of tribute, feasting and gift-giving (see, for example, Junker 1999). We know little of these lower levels of trade, where goods might pass from boat to boat like a baton in a relay race, with most transactions generating small profits for the man or woman involved.

Major themes in historiographical debate continue to be the role of trade in state formation, the interaction between external influences and local innovation, and attempt to balance profit and loss for different regions, states or groups. Almost forty years ago Harry Benda (1972:121, 153) drew on work by such pre-war Dutch scholars as B.J.O. Schrieke (1955) and J.C. van Leur (1967) to suggest that two basic types of polity evolved in Southeast Asia. These were 'the inland-agrarian "hydraulic" prototype of which Angkor and the early Mataram are good examples, [...] and the riparian or coastal, commercial prototype, of which Srivijaya may have been the most important'. Water is crucial to both, and although subsequent research has blurred the distinction, it remains useful. For later periods of history, these ideal types became fused with distinct cultural and political identities. The 'inland agrarian' polity, exemplified by ninth-century Angkor, and including the 'classical' kingdoms of Siam, Burma and central or East Java, is seen as remaining more subject to 'Indian' influence. Early examples of maritime kingdoms were Funan, Champa and Srivijaya, but after the coming of Islam newly Muslim Malacca became the definitive archetype. Coastal trading polities became identified with a relatively strong commitment to Islam. However, this dichotomy underestimated both the dependence of some port-principalities on their food-producing hinterlands, and also the crucial role of long-distance trade in the expansion of such 'interior' kingdoms as Pagan, Ayutthaya, Angkor or Majapahit.<sup>39</sup>

The debate on early state formation in Southeast Asia underlines the central interaction between ecology, human settlement and the development of hierarchy. John Miksic (1990:107) has explored how ecological zones, with varying seasons, may have developed complementary exchange patterns. As was noted above, such symbiosis could underlie patterns of prehistoric trade. Since water transport is much more energy efficient than movement by land, a coastal site, confluence or estuary provided a natural focus of settlement. L. Andaya (2000) describes how such *pankalan*, bases or departure points, developed in the early history of the Malay region. Miksic (1990:223) notes

<sup>39</sup> See Tarling 1999, I-1, particularly Hall, and 1999, II; also Miksic 2003; Marr and Milner 1986; Reid 1993; Sutherland 2005.



that during the first millenium BCE hierarchies of settlements had emerged in the mainland, but such differentiation is not visible in island Southeast Asia for at least another thousand years. He writes: 'In maritime Southeast Asia, transport was not sufficiently limited to be an effective incentive for people to live in dense agglomerations. This geographic feature combined with a high grade of maritime technological skill, a social adaptation tolerant of high mobility, and an environment permitting the transport of great bulk over long distances. These four factors produced the 'open' character of the cities of maritime Southeast Asia upon which the first Europeans visitors remarked'.

Similar arguments are advanced by Christie (1995:269): 'The geographical complexity of the Malay Peninsula and Sumatra (as well as Borneo), in combination with the rigid ecological constraints that high rainfall and relatively poor soil conditions imposed upon them, produced a diversity of economic niches more persistent than in better endowed regions'. Elsewhere in the same article (Christie 1995:270), she observes of southeast Sumatra that: 'the economic base of these polities was trade, and since most of them survived by trading the goods produced by others, individual states were economically quite fragile and historically often ephemeral, although the political tradition itself was very resilient'.<sup>40</sup> These suggestions that variations in access to water transport could account for a general distinction between settlement patterns in island and mainland Southeast Asia are intriguing.

The mainland was indeed different, but here too water was crucial. Janice Stargardt (1986:23) opens her essay on 'Hydraulic Works and Southeast Asian Polities' with an uncompromising statement. 'Whatever the merits of "the great river valley" theory for delineating the ancient pattern of settlement in the Near East, North India and North China, it seems to have little relevance in ancient South East Asia'. Early civilizations, she argues, did not arise on the richest soils of the valleys, but rather on the fringes of the alluvial tracts of the Irrawaddy, Mekong and Chao Phraya. Here, the seasonally differentiated climate provided a context for early and successful hydraulic systems which under-pinned urban sites and emerging polities. Small streams and tributary rivers were harnessed by increasingly complex social mechanisms. Thus, while the 'great valleys' may not have been the 'cradles of civilization' in Southeast Asia, the interaction between water and man remained central. Like other essays in the same collection, Stargardt (1986:31-2) refers to Karl Wittfogel's theories of 'hydraulic society', which, while the more extreme claims may be rejected,<sup>41</sup> have done much to focus attention on these issues. However, she also notes that profits from long distance trade were ploughed back into the expansion of irrigation systems.<sup>42</sup>

<sup>40</sup> See also Christie 1999.

<sup>41</sup> See also Christie and Wolters, this volume.

<sup>42</sup> Stargardt 1986:31-2; Christie 1986, 1995:240-3, and the bibliography to Sidky 1997.

Clearly, discussions of the role of trade or irrigated agriculture in early state formation in Southeast Asia cannot be reduced to an either/or proposition. The apparent clarity achieved by imposing fixed typologies on complex processes is often of short duration. Reid (1997b) has now given greater recognition to the continuing vigour of Southeast Asia's commercial economy, and the region's capacity for innovation, during the period 1750-1900. But he remains somewhat ambivalent. On the one hand, he concludes (Reid 1997b:20) that 'the colonial conquests of the nineteenth century in one sense mark the progressive retreat or extinction of one autonomous polity after another'. On the other hand, his caveat ('one sense') is based on the suggestion (Reid 1997b:21) that the 'most enduring changes of the colonial era – commercialisation, centralisation, intellectual renovation and popularisation of culture' had already taken hold in the region in the period since 1740 but before direct European intervention. However, somewhat paradoxically, Reid suggests that much of this last period of 'autonomy' could also be characterized as the 'Chinese century', as so many of these dynamic processes were heavily dependent on Chinese input (Reid 1997b:11-4). There seems to be an assumption that a shared 'Asianness' of Chinese and Southeast Asians made unequal economic relationships compatible with 'autonomy', while political intervention by alien Europeans destroyed it.

The concept of 'autonomy' has been central to ideas of Southeast Asian history since John Smail (1961) published his seminal article seeking to locate the authentic dynamic of Southeast Asian history. The underlying suggestion of the centrality of self-governing communities, with an implicitly self-determined trajectory, is difficult to reconcile with notions of openness or hybridity. Consequently, this juxtaposition of 'autonomy' with migration, regional economic networks and cross-cultural influence remains ambivalent. As was described above, from the second or third century CE, Indian influence becomes clear in inscriptions, architecture and art, revealing in turn new forms of political culture and organization. In 1990 it was still possible for Christie (1990:39) to comment that 'surprising numbers of scholars' still subscribed to the idea that the earliest Southeast Asian states were formed by, or through the agency of, emigrant South Asians. Chinese trading contacts, while less visible, go back to pre-historic times, and from the fifth century CE the sea link between the Strait of Malacca and China further stimulated commerce with India. Tributary relations between China and Straits kingdoms, incorporating political respect and economic exchange, are known from the seventh century, playing an important part in the development of South Sumatran Srivijaya. The ubiquitous presence of Indian beads and Chinese ceramics bears witness to the richness and extent of these trading systems. The diffusion of Islam from the fourteenth century onwards apparently confirms the recipient character of Southeast Asian societies, which seems to be neatly reinforced by the role of European trade and colonialism from the end of the 1400s.

However, as was also noted above, long-distance commerce did not necessarily lead to transformations of local polities or societies. As Miksic (1995:55) has observed, there is strong evidence of Indian exchanges with Southeast Asia long before any adaptation of Indian traits can be seen. Consequently, the 'assumption that trade inevitably has been accompanied by cultural change is now shown to be incorrect'. Old ideas of 'Indianization', to cover the adaptation of elements from the subcontinent, have now been rejected in favour of more emphasis on 'localization' or 'indigenization'. Similar shifts characterize discussions of Islamization and the rise of 'modernity'.<sup>43</sup> Influence from China has attracted less attention, perhaps because it has been seen as less decisive, producing no visible cultural change, such as religious conversion, preserved in great monuments. The Chinese legacy lay in the less obvious fields of technology and economy. An ironic result of this unobtrusiveness is a contemporary tendency to emphasize the 'alien', recent and exploitative character of the Chinese presence.<sup>44</sup>

Once it was possible for a historian (Panikkar 1974) to write of a 'Vasco da Gama' epoch in Asian history, as the first Portuguese voyage into the Indian Ocean, in 1498, was seen as ushering in a uniquely new age. However, as we have seen, this perspective ignores the resilience and complexity of Asian trading networks, and grossly inflates the Portuguese role. The impact of the Dutch, English and Spanish is less easy to marginalize, and, after a post-colonial reaction, more recent work tends once again to admit their formative role in maritime Southeast Asia from the early eighteenth century, and on the mainland from the 1820s. But now, with the knowledge generated over the last fifty years of internal Southeast Asian developments, the European powers are seen as major players in an Asian context, rather than as giants moving across an empty stage. Indeed, it has even been suggested that some European regimes, such as that of the Spanish in the Philippines, are perhaps essentially more 'Asian' than 'European' in their organization and character.<sup>45</sup> Government sponsored Companies no longer absorb all the limelight, as increasing recognition is given to the crucial role of private enterprise. English, Scottish and American country captains, Chinese skippers, Armenian merchants and Bugis 'smugglers' are beginning to emerge from the wings, although they will never be as visible as the bureaucratic state enterprises.

Our understanding of the Southeast Asian past has been limited by the persistent, if unconscious, influence of a structural evolutionist perspective, and our reliance on external sources. The view from the deck of a ship, as described by Van Leur, remained predominant until the mid-nineteenth

<sup>43</sup> Aung-Thwin 1995; Reid 1997b; Wolters, 1999; Christie 1990; Mabbet and De Casparis 1999; B. Andaya 1999b.

<sup>44</sup> Lombard and Salmon 1994; Reid 1996; Chirot and Reid 1997.

<sup>45</sup> Lieberman 1993:557-8; B. Andaya 1999a; Reid 1997b; Legarda 1999.

century.<sup>46</sup> Stories by travelers, pilgrims and traders are a mainstay of early description, (and hence of accounts such as Reid's influential *Age of commerce*, 1988, 1993a), while the Company's trade-focussed archival collections are also limited in interest and insight. The indigenous bodies of evidence required to amplify this perspective remain little known. Relatively few societies have produced written historical records and what there are primarily present a court perspective on politics and culture. Dynasties, battles, genealogies and competing claims to status and power dominate chronicles and folk accounts. These can be a very valuable corrective to the profit-obsessed Eurocentrism of the more accessible sources, but they often seem to inhabit different realms. However, archeology is being increasingly deployed to give a less one-sided understanding of Southeast Asian societies. Here, where trade goods are literally embedded in the local earth, a contextualized view is easier to achieve.<sup>47</sup> When external long-distance trade is brought back to the appropriate proportions, we are reminded that such commerce could only exist if Southeast Asian gatherers, producers, authorities, consumers and, at the least, local freight carriers, responded to the opportunities offered by such systems of exchange. It is against this more differentiated background that the question of Southeast Asian agency can best be raised.

The desire to reconcile local identity and diversity with the impact of external influence is at least partly driven by a wish to rescue Southeast Asians from what, in another context, has been called the 'enormous condescension' of history (Thompson 1970:13). Such a desire derives not only from the well-intentioned Western liberal imagination, and agendas concomitant upon decolonization, but is also, and more importantly, a prerequisite for understanding how the societies we wish to describe participated in an increasingly globalized world. As was noted at the beginning of this essay, the Braudelian view of the Mediterranean world seemed to offer Southeast Asianists a way out of this impasse; but despite the poetic power of his vision problems of data and analysis remain profound. Scholars working on India or China, however, seem less preoccupied with agency than their Southeast Asianist colleagues. Recognition is given to the relative vicissitudes of various trading communities, but even discussions of the decline of Hindu sea-farers, when compared with Muslims, seem – at least to an outsider – relatively straightforward. The unquestioned depth of both Hindu and Muslim culture in the subcontinent probably freed the debate of implicit and perhaps unconscious sub-texts, related to civilizational hierarchies and implications of inferiority, which have resonated in debates on early Southeast Asian history.<sup>48</sup>

<sup>46</sup> Reynolds 1995:428; Day 1996; Emmerson 1980; Van Leur 1967:261.

<sup>47</sup> Junker 1999; Bulbeck and Caldwell 2000; B. Andaya 1997b; L. Andaya and B. Andaya 1995; see Wolters 1999:122-4 on Joyce White's work on Thailand.

<sup>48</sup> The wider discussion on 'the rise of the west' reflects, more explicitly and on a global scale, similar themes: see among others Frank 1998; Landes 1998; Pomeranz 2000; also the thoughtful contribution by Barendse 2002.

The publication in 1955 of the English version of J.C. van Leur's *Indonesian trade and society* is generally seen as a turning point in the critically reassessment of the European role in Asian and Indonesian waters; the Dutch original dated from 1934. A crucial document supporting this revisionist approach was the *Suma Oriental* of Tomé Pires, with its description of the wealth and international renown of early fifteenth century Malacca, published in English in 1944 (Cortese 1944). During the next fifty years an impressive body of publications appeared, with M.A.P. Meilink-Roelofs detailed examination of 'Asian trade and European influence in the Indonesian Archipelago' appearing in 1962. In both institutional and personal terms, the work by Denys Lombard, at the EHESS in Paris, Oliver Wolters at Cornell, and Anthony Reid at the Australian National University in Canberra, has been crucial to the development of Southeast Asian historiography. All three began their careers in the late 1960s, with dissertations on local histories, and all three subsequently went on to guide the careers of many younger scholars, while moving towards broader visions of the region's history. Lombard's three volume *Le carrefour javanais; Essai d'histoire globale* (1990a, 1990 b, 1990c) and Reid's two volumes on *Southeast Asia in the age of commerce* (1988, 1993a) both reveal their debt to Braudel's work, particularly on the Mediterranean, economic change and capitalism. In 1995 Lombard summarized some of his preoccupations in an article on 'Networks and synchronisms in Southeast Asian history', directly addressing the tension between 'outside influences' and the integration of the region. He saw the solution as lying in the study of contacts between regions, the roles of Chinese, Muslim and European networks, and moments when significant events seem to coincide throughout much of the region.

Following the movement of commodities is another way of tracing the interaction between long distance commerce and local societies;<sup>49</sup> the history of trading communities and diaspora groups is also a useful point of entry. Reference has already been made to Southeast Asia's Chinese settlements, exemplified by the long-established merchant quarters in many ports, or the more recent, eighteenth-century mining and planting colonies. The Hokkien from Fujian were one of the most widespread and enterprising communities. But not all trading minorities came from outside the region, and many of those who did ended up thoroughly localized, including the Portuguese. The conquests of Malacca in 1511 and 1641 had paradoxical effects on the commercial integration of Southeast Asia. They were defining moments in the consolidation of Portuguese and Dutch influence respectively, but the resulting dispersal of Malay communities throughout the archipelago reinforced

<sup>49</sup> See for example the essays collected in the Ashgate Variorum series, particularly Pearson 1996 and Mazzaoui 1998; also Ptak and Rothermunde 1991; Clarence-Smith and Topik 2003; Mazumdar 1998; L. Andaya 2000; Sutherland 2000.

the infrastructure of indigenous trade. Similarly, the fall of Makassar to the Dutch in 1666-1669 created 'Bugis' diaspora communities who were to play a major political and economic role in the eighteenth century. Both Malays and Bugis, however, had longer trading lineages.<sup>50</sup>

Other communities also had roots stretching far back into history. Chulia and Kling diasporas were extremely important. The former, Tamil-speaking Muslims from the Coromandel coasts, were 'Chulia' in the Malay Peninsula, while the Portuguese and the Dutch referred to them as 'Moors'. The Klings, also known as Chettiars, were Hindus from Coromandel who could be Tamil, Telugu or Kannada speakers. They had a temple in the great southern Chinese port of Quanzhou in the twelfth century, although they subsequently lost ground there to Chinese and Muslim merchants. Later they flourished further west and took advantage of British protection. During the nineteenth century, Nattukottai Chettiars of Madras spread their financial networks throughout Burma and the British colonies in the Strait of Malacca, where, along with other Indian groups such as Gujerati, Multanis and Marwaris, they became the region's 'indigenous bankers'. In the Straits they competed with Chinese from the South China coast, the Hokkien, Teochew and Cantonese. The alliance between the Bombay Parsis and the British is well documented. Similarly, the migration of Arabs from the Hadhramaut to Southeast Asia revived again in the nineteenth century; they became important ship-owners and traders in Indonesia.<sup>51</sup> Such groups may have been seen as exotic fringe inhabitants of colonial cities, but they embodied the old networks that, in alliance with local nobles and merchants, had created maritime Southeast Asia.

The ways in which the rhythms and vicissitudes of Asian trade could be of decisive influence on local societies is well illustrated in the history of Makassar, on the southwest peninsula of Sulawesi (Celebes). Located strategically close to the Moluccan Spice Islands, commerce was the key to the spectacular rise of the twin kingdom of Goa-Tallo'. By the seventeenth century their capital of Makassar, as we saw in our opening quotation, was a major thorn in the VOC's side, and the Dutch conquest in 1666-1669 was intended to close Maluku to all competitors of the Company. The fall of Goa was a major shock to the whole Indonesian trading system, but although the free spice trade ended, the laws of supply and demand reasserted themselves, reinforced by the expansion of Chinese trade in the 1700s. With the boom in the export of marine produce, particularly trepang or sea-cucumbers, seemingly periph-

<sup>50</sup> Wang 1990, which was reprinted in Subrahmanyam 1996, along with other relevant essays on merchant networks; L. Andaya 1995a, 1995b; Dobbin 1996; Sutherland 2001; Chang 1991; Baghdiantz-McCabe, Harlaftis and Mingalou 2005; Bellwood 1999:135, note 56.

<sup>51</sup> Dobbin 1996:131-55 discusses the Madras Chettiars in Burma; R. Ray 1987; Arasaratnam 1989; MacPherson 1990; Habib 1990; Van den Berg 1886; Mobini-Kesheh 1999; Broeze 1978; Abaza 1988; Ellen 1996.



eral areas of eastern Indonesia became increasingly integrated into the wider market. Exports of slaves and trepang were channeled through Bugis ports, or Buton and Sumbawa, from the distant catchment areas of the north Australian coast, New Guinea, Tanimbar and Aru to Makassar (and later Singapore) and eventually to China. In exchange, porcelain, metalware, tobacco, textiles and money were diffused through the eastern islands, first as luxuries and then as necessities. As the country traders from India and the Straits passed through the islands fringing the South China Sea, they also sought products for the China market, offering opium, weapons and textiles in exchange.<sup>52</sup> Guns could tip the balance in local politics, and were an important element in the expansion of raiding and trading in areas in island Southeast Asia, the Malay coasts, and the southern Philippines.<sup>53</sup>

Historians have become increasingly aware of the importance of differentiating between various contextual levels. Simple dichotomies between Asians and Europeans, or back projections of modern borders, are acknowledged as inadequate to contain or explain the many layered patterns of interaction which have formed Southeast Asia. We now recognize the powerful on-going presence of Asian shippers in the Indian Ocean and South China Sea, and see that government management of commerce proved less effective than private traders in adapting to, and profiting from, Asian markets. This was true of the Portuguese, who ended up relying on 'contracted' voyages, and of the English East India Company which relinquished intra-Asian trade to local captains. The fate of the apparently all-powerful trading companies was often, perhaps usually, determined less by their own strategies than by changes in the states and economies of the region itself. This theme recurs in articles by Pearson and Arasaratnam on the Arabian Sea and the Bay of Bengal, in references to the impact of Chinese imperial policies, in Christie's emphasis on regional trade, in Subrahmanyam's comments on the importance of the local political context in Portugal's maritime decline and in recent analyses of the VOC, such as that by Jacobs.<sup>54</sup> In the framework of such wider sea-borne economic systems, Asian agency is increasingly apparent, as the roles of merchants, shippers and rulers become at least partially visible.

But Southeast Asians direct participation in oceanic trade seems to have contracted. Manguin described the decline of the *jong* in the mid-sixteenth century, and over the next hundred years archipelago states increasingly withdrew from long-range commerce. European perceptions of the Southeast Asian maritime past reflected the resulting balance of forces, so they were unimpressed by indigenous economic initiative. The convenient notion that

<sup>52</sup> Knaap and Sutherland 2004; Sutherland 1988, 2000; L. Andaya, 1991.

<sup>53</sup> Warren 1981, but also Sutherland 2004; Velthoen 1991; Laarhoven 1989. See also Lapien 1987; Ellen 2003; Henley 2005.

<sup>54</sup> Christie 1990; Subrahmanyam 1993; Reid 1996; Jacobs 2000.



Southeast Asians were passive and isolated became widespread, and Europeans assumed that coastal traffic was all the local shippers could manage. They failed to see that while indigenous trade in the Malay world might have contracted, much had relocated to routes and harbours beneath their notice or beyond their ken. Similarly, most of mainland Southeast Asia's economy remained invisible to Europeans. The obvious surface of international trade might have been increasingly dominated by westerners, but in many areas, and for many commodities, local merchants continued to play a central role. In a simplified reflection of perceived political competition, it is sometimes assumed that trade was an ethnically structured zero-sum game, and that European or Chinese advances must have caused indigenous withdrawal or exclusion. However, in reality an expanding or diversifying economy often depended on, and rewarded, the varying input of all communities. Although the continuities in Asian social and economic history are increasingly emerging from the shadow of imperial priorities, critical contextualization remains essential. It might be tempting, for example, to see the economic dynamism of the mid-eighteenth century 'Chinese century' as a precursor of the 'bamboo networks' of the late twentieth century with overseas Chinese typifying entrepreneurial skills alien to indigenous rent-capitalists. The exploration of such ideas is rewarding, but demands careful work: recognizing local and international contexts, distinguishing between the structural and the contingent, acknowledging the role of cultural capital, while avoiding essentialism.<sup>55</sup>

In his 1997 study of economic change in Southeast Asia between 1830 and 1980 Ian Brown (1997:277) concluded that the two factors crucial to the region's development were long distance maritime trade, and the presence of immigrant commercial minorities. He notes 'the proximity to the sea has drawn South-East Asia into long-distance trade in a dramatic manner [...], the major rivers brought vast interiors close to the sea and to the world that lay beyond [...] in almost all circumstances, and in almost all periods, water has provided the cheapest, frequently the only means to transport large bulk/low value commodities, and until [...] the twentieth century, often the most secure way to move substantial volumes of high value articles over long distances'. Actually, these two factors could be further reduced to one, the role of trade, as the presence of powerful Chinese and Indian business communities was, ultimately, a by-product of this commercial pattern.

<sup>55</sup> Sutherland 1995; Sutherland 2005; Van Leur, while striving to rehabilitate Indonesia's maritime past, nonetheless concluded that small-scale peddling typified its trade; Meilink-Roelofs 1962; Braudel 1985 and many subsequent writers disagreed. For an impression of the extensive literature on the Chinese, see Brown 1995; McVey 1992 or numerous websites. Sutherland 1988 illustrates how peripheral areas in eastern Indonesia became integrated in long distance commodity exchanges.

*Conclusion*

Southeast Asia's 'openness' is an attractive but problematic notion. If we assume that seas and rivers have always brought settlers, traders and ideas to the region, and that this is a unique and defining regional trait, then we can indeed conclude that geography is destiny. But while the idea of 'openness' has reassuringly positive connotations, it actually says very little, especially when it is used without any attempt to establish causality or standards of comparison. Moreover, it implies a continuity and uniformity of historical experience, dependent on geography. But much of Southeast Asia was not accessible by water, and the extent and impact of trade varied at different times. L. Andaya (2000) has argued that the early modern shift in favoured exports from forest products to pepper and tin resulted in a definitive loss of status for inland peoples. Nonetheless, as Reid (1997a) has pointed out, until modern times the interior – even in maritime Southeast Asia – was in many cases more attractive for settlement than the coasts. The seas, and their commercial possibilities, did offer increased possibilities for mobility, enabling commodities, people, ideas, techniques and beliefs to be exchanged over a wide area, paving the way for cultural and political adaptation and innovation. But these opportunities had to be used: the mere existence of seas and rivers, or the presence of passing ships, meant little in themselves. The basic patterns and institutions of local societies, and the concepts we use to describe them, remain uncomfortably vague. Abstractions like 'openness' or 'hybridity', or the back projection of twentieth-century ethnic and political categories, only offer illusory insights.

A thousand years ago sea-borne trade already connected four great cultural zones: the Irano-Arabic, Hindu, Indonesian and Chinese. The movement of goods in the wider Indian Ocean was naturally organized within sea-focused arenas. In the far west there was the Swahili coast, while the Arabian Sea, Red Sea and Persian Gulf offered access to rich markets, including those fed by the Mediterranean. To the East the Bay of Bengal and South China Sea were linked by the Strait of Malacca, and fringed by Southeast Asian waters, such as the Gulfs of Siam and Tonkin, and the Java, Banda, Celebes and Sulu Seas. Apart from the great ocean going vessels, these waters were plied by coastal and small-scale local traffic. Like riverine commerce, this was largely unrecorded. The opening of the European ocean route to India, spice-rich Maluku and China in 1492 introduced new players to the Asian seas. Although their commercial intelligence was less, and their technology no better, than that of their Asian fellow sailors, the northerners did have new and aggressive attitudes. The Portuguese impact remained extremely limited and Dutch glory brief, but, after the mid-eighteenth century, Anglo-American commerce expanded. Initially, both the East India Company and country traders com-

peted with, and depended upon, Indian merchants and shippers, but during the late 1700s the English advantage was consolidated. At the same time, following ancient routes in from the east, Chinese entrepreneurs and traders brought new capital and technology to expand their long established roles in Southeast Asia's commerce and society. Sino-Anglo cooperation was exemplified in the Malacca Straits port of Singapore (1819), which became as symbolic of the new age as Malacca had been of the fifteenth and sixteenth centuries. The Suez Canal (1869), steam shipping and railways broke the old rhythms, binding dominant colonial cities into new transport systems.

Many of the major debates in Southeast historiography involve the role of water. These include discussion of the ecological, economic and cultural foundations of early states, of settlement patterns and the role of cities, the significance of river and sea transport, hydraulic engineering and the impact of trade. Related attempts to assess the relative roles of 'local genius' and 'external influence' in decisive phases of cultural change once known by such simplistic terms as 'Indianization', 'Islamization' and 'Westernization' have confronted historians with fundamental, and sensitive, questions of agency. Local, comparative and regional approaches to the Southeast Asian history of the late nineteenth and twentieth centuries are still dominated by categorisations derived from Western priorities. As the Europeans began to build land-based, colonial and increasingly bureaucratic states, they also finally seemed able to realize their dream of controlling the sea. But we should learn from the fluid flexibilities of less structured eras. Current political and social debates are preoccupied with such issues as 'globalization' and 'identity', including the roles of ethnic minorities in cosmopolitan cities. Experts in the media ponder the pros and cons of global commerce, of free trade versus protectionism. Trans-national organizations, both political and economic, may prove to be inimical to the survival of the nation-state, and the vulnerability of local economies to penetration by alien business is a cause for concern. Because of its location, and the ways in which water enabled local communities to interact with other civilizations, both inhabitants and historians of Southeast Asia have been confronting these issues for many years.

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SANDRA PANNELL

## **Of gods and monsters**

### **Indigenous sea cosmologies, promiscuous geographies and the depths of local sovereignty**

#### *Introduction*

In a recent volume on 'Customary marine tenure in Australia', the editors point to an 'ethnographic blind spot' regarding the documentation of indigenous people's relationship with the sea (Peterson and Rigsby 1998:2). In offering various explanations for this state of affairs, Peterson and Rigsby raise the idea that not all coastal-dwelling people have systems of customary marine tenure or necessarily rely upon the sea for their livelihood.<sup>1</sup> This idea was initially proposed by Nicolas Polunin (1984:272), who suggested that one of the reasons for this is that 'people in several areas tend [...] to be averse to the sea'. In his consideration of the evidence from Indonesia and Papua New Guinea, Polunin (1984:272) describes how the Balinese view the sea as polluted by the 'filth of the land', in contrast to the purity of the mountains, regarded as the 'seat of the gods'. The Javanese, on the other hand, view the sea as a 'wilderness beyond the control of human society' (Polunin 1984:271), a 'supernatural background drea ... of the sea' apparently also shared by the Tanga Islanders of Papua New Guinea (Polunin 1984:272).

While Polunin hints at the association of the sea with evil spirits and monsters, other writers link the sea to various deities and ancestors. For example, in the Kei Islands of eastern Indonesia, Cécile Barraud discusses the ancestors of the village society of Tanebar-Evav. These ancestors are collectively known as *wadar*, and are said to be eighteen men and women who went to sea and subsequently disappeared. These ancestral figures, also referred to as 'our fathers-grandfathers', are ritually offered people's catch from the sea, including 'parts of dolphins, sea-cows [dugongs] and turtles' (Barraud 1990:43). In other Indo-

<sup>1</sup> Due to local hostilities and open warfare, many societies throughout Indonesia, for example, traditionally built their villages on hilltops some distance from the coast. In the course of Dutch 'pacification' of the population, many of these village societies were forced to move down to the coast and occupy village sites which could be more effectively accessed and controlled by the Dutch (see De Jonge and Van Dijk 1995).

nesian societies, such as the seafaring Bajo people of southeast Sulawesi,<sup>2</sup> the ancestors not only inhabit the sea but they also accompany people on their long maritime voyages around the archipelago. Writing of the Bajo of the Tukang Besi Islands, Natasha Stacey (1999:71) observes that Mbo Madilao, the 'ancestors of the sea', are not 'confined to any particular location but live "wherever there is sea"'. Stacey (1999:71) concludes that 'the spiritual maritime domain of the Bajo has no boundaries, it is infinite'. As such, it encompasses politically-charged areas within the Exclusive Economic Zone (EEZ) claimed by Australia under the 1982 United Nations Law of the Sea Convention.

In Australia, indigenous sea cosmologies also have far-reaching political and legal ramifications. For example, in the seas surrounding Croker Island in northern Australia, the Dreamtime figure of the Rainbow Serpent lies beneath the water, resting on the seabed.<sup>3</sup> Around this island, Aboriginal people refrain from throwing meat overboard in fear that it will 'arouse the local Rainbow Serpent' (Peterson and Rigsby 1998:6) which, when disturbed, may manifest itself as a cyclone, a waterspout or tidal floods (see Memmott and Trigger 1998:121). These beliefs about the Rainbow Serpent and the danger it poses have recently been put to the test in the Croker Island native title case,<sup>4</sup> where the question of Aboriginal ownership of the seabed and their exclusive possession of offshore waters is at issue.

As these ethnographic examples from Indonesia and Australia suggest, indigenous cosmologies implicate specific geographic features or environments, in the process defining a landscape of memory, action and identity. James Fox (1997:8) notes that cosmologies often take the form of 'topogeny' – 'the recitation of an ordered sequence of place names'. Fox observes that 'topogenies' may recount the journey of an ancestor or the migration of a group. For instance, cosmological narratives in eastern Indonesia often refer to the sea voyages of ancestral figures as they migrate from their point of origin, usually an island, to the place of their eventual settlement. In many eastern Indonesian societies, these narratives underpin local orders of precedence and the division of authority into ritual and secular domains. Fox also notes that topogenies may refer to the movement of objects. To illustrate this latter point, he briefly alludes to a Rotinese narrative which describes the journey of 'two great rocks that eventually came to settle along the north coast of the island' (Fox 1997:9).

In northern Australia, indigenous sea cosmologies, often in the form of detailed song cycles, refer to the creation of islands and the journeys of ancestral Dreaming-beings across large bodies of open sea. For example, in

<sup>2</sup> Also known as 'sea nomads', 'sea gypsies', 'Bajau Laut' and *orang laut* ('sea people') (Stacey 1999:1).

<sup>3</sup> The Rainbow Serpent, a mythological figure similar to the giant water snake or Naga recognized in many parts of Southeast Asia, is a pervasive image throughout indigenous Australia (see Maddock and Buchler 1978; Radcliffe-Brown 1926).

<sup>4</sup> Formally known as *Yarmirr v Northern Territory* (1998) 156 ALR 370.

the Wellesley Islands, in the southern Gulf of Carpentaria, the site known as Ngaliwan, consisting of three rocks rising from the sea, is regarded by Lardil people as the bodies of their ancestors, while the Shark Dreaming is said by Lardil people to travel along the northwest coast of Mornington Island planting cycad seeds at the places where it stopped (Memmott and Trigger 1998:119-120). In the Wellesley Islands, these Dreamings are linked to individual totemic identity, as well as being accorded an important ritual status in regional initiation ceremonies.

As a number of studies from north Australia indicate, the journeys and the sites associated with these Dreaming-beings often serve as the basis for claims of estate group ownership or for the assertion of individual rights and interests (see Peterson and Rigsby 1998). In eastern Indonesia a similar situation exists. Discussing cultural topographies in West Timor, Andrew McWilliam (1997:111) observes that in Meto society origin narratives not only link a named group with significant places but they also serve as a 'legitimizing discourse and statement of claim to land'. This is a point also made by Pannell (1997a) in her examination of the social and political ramifications of invoking traditional 'topostories' in coastal boundary and marine resource disputes on the island of Damer.

As these comments suggest, in Indonesia and Australia indigenous cosmologies are implicated in local perceptions of territoriality and resource ownership. In this respect, they often function, to borrow Michel de Certeau's term (1984:122), as forms of 'spatial legislation'. The efficacy of cosmologies to serve as spatial legislation or as the foundation of sovereign power is not simply a function of an association between founding figures and certain places. These cosmologies also constitute moral discourses, inculcating cultural values regarded as intrinsic to the customary order of things and people. As indigenous parables, these narratives profess a certain truth or 'ultimate verity' (Herzfeld 1987:13) about the world. On the basis of this claim to identify the fundamental conditions (and limits) of truth, indigenous sea cosmologies can be regarded as potent political statements about the nature of knowledge and power, on both a minute and monumental scale.

In plotting assertions of territorial sovereignty or indigenous orders of moral authority, these cosmologies translate into a cultural landscape where certain places are valued as *keramat* ('sacred'), *pemali* ('taboo'), *suci* ('holy'), *jahat* ('evil'), *panas* ('hot') or *bahaya* ('dangerous'), linked as they are to a pantheon of gods and monsters.<sup>5</sup> Liisa Malkki (1995:55-6) refers to this imagina-

<sup>5</sup> Throughout this article, Indonesian terms are presented in italics and identified with the abbreviation 'BI'. Unless otherwise stated, all other italicized words are terms from the Austro-nesian language spoken on Luang. As a result of the limited nature of linguistic research on the language spoken on Luang (see Grimes 1996; Taber 1996), the orthography used in this article for local language terms is largely based upon the phonetic system used by informants.

tive labour of mapping affect and experience as 'worldmaking' and suggests that making the world through narrative is sometimes an oppositional process concerned with remaking 'the moral order of the world' and recasting identity and history.

This article explores the often contested and sometimes subversive relationship posited between cosmological narratives, space and sovereign power through a consideration of ethnographic examples from eastern Indonesia and Aboriginal Australia. In focusing upon the articulation of indigenous 'sea cosmologies' as spatial discourses, I attempt to go beyond the popular view of these accounts as quaint or fabulous stories referring to a creative epoch in a dim and mystical past. Instead, the emphasis of this article is upon the role of this spatial imaginary in the assertion of local sovereignty and in the creation of what Jane Jacobs (1996:5) calls 'promiscuous geographies of dwelling in place'. As the histories of Indonesia and Australia graphically demonstrate, the exercise of power and the politics of cultural identity are primarily about space. In his spatial history of colonial discovery and settlement in Australia, Paul Carter (1987) reminds us that space is not simply a backdrop or stage upon which significant events take place or are inscribed upon. To paraphrase Carter (1987:xxii), a culture declares its presence through 'spatial forms and fantasies'. These spatial forms and fantasies are part of 'an ever-shifting social geometry of power and signification' (Massey 1994:3). In this regard, the cosmological landscapes considered in this article represent 'geographies which struggle' (Said 1993:7), vividly disturbing the notion of space, identity and authority as somehow inherently fixed or settled.<sup>6</sup>

### *Landscapes with sea views: space and discourse*

In a number of European languages, the term 'landscape' originally referred to a province, a district or an area of land, in other words, a geographical region. Thus, in Europe in the early 1500s regional maps were described as 'landscapes' (*landschap* in Dutch) and their production constituted an exercise in chorography. The notion of chorography, with its emphasis upon regions, can be contrasted with the Ptolemaic concept of geography, which entails the representation of the entirety of the known world.<sup>7</sup>

The concept of landscape which we are familiar with today is of landscape as pictorial subject matter rather than as a geographical region. However, the

<sup>6</sup> Throughout this article, I use the term 'landscape' in its broadest connotation to refer to spatial histories with both a marine and terrestrial focus.

<sup>7</sup> As previously noted, the Dutch concept of *landschap* originally referred to a small area of land, which was viewed as an inset of a much larger region or context. The concept of chorography emerged as a way of representing and talking about this form of confined perspective. In this respect, *landschap* coincides with the German meaning of the word *Landschaft* (see Bender 1993:2).



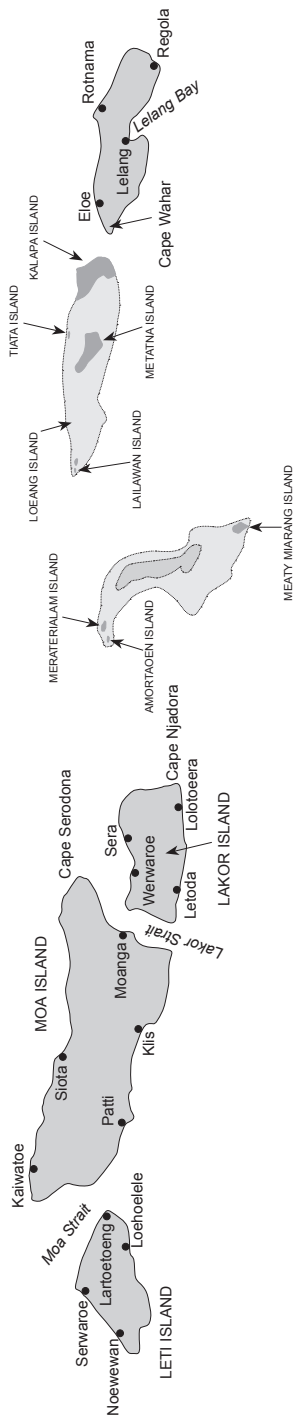
regional connotation of the word landscape still persists in terms of the scope or prospect of the artistic subject matter. Although the concept of landscape has been unhooked for some time from its original art associations (see Bender 1993; Hirsch and O'Hanlon 1995), there is still a dominant view of landscape as an inscribed surface, akin to a map or a text, from which cultural meaning and social forms can simply be read.

Susan Kuchler refers to the view of landscape as inscribed or associated surface as the 'landscape of memory', wherein memories (or meanings) are somehow captured in, or represented by, the form of visual landmarks. She points out that in this view the idea of landscape is not 'affected by the project of its representation and remembrance' (Kuchler 1995:104). Kuchler (1995:85) contrasts this view of landscape as the encoding of memory and meaning with the notion of 'landscape as memory'. In this perspective, landscape is implicated in both the dynamic and interactive social processes of memory-making as well as being one of the products of these on-going processes.

The historian, Paul Carter, is another scholar who takes issue with the idea of space as a backdrop or stage upon which significant events, such as European discovery or an indigenous 'Dreamtime', take place or are inscribed. Similarly, Carter is critical of the view which presents physical surroundings as merely this. As Carter (1987:349) points out in his book, *The road to botany bay*, what is symbolized is not 'the physical country' per se but 'the enactment of [an already] historical space'. In other words, references to such things as physical country can only be made by means of the cultural representations of those things.

Carter draws our attention to the importance of realizing that a cultural landscape, whether indigenous or European, signifies more than just another way of representing or symbolizing geographical entities or natural surroundings. Representation constitutes just one facet of people's interaction with and experience of their environment. As this statement suggests, landscape can be seen not only as a complex cultural product but as a dynamic one as well.

Drawing upon the work of Kuchler, Carter, Bender and others, this article adopts a view of landscape as both an immanent and emergent cultural construct which is informed by and, in turn shapes, historical experiences and social relations. Put another way, landscapes can be regarded as both the objects and effects of specific discourses. If landscapes are created by humans, then they are also contested, disputed and, at times, denied by them. In this sense, the idea of landscape can be regarded as a 'concept of high tension' (Inglis 1977), often enacted at the interstices of history, politics, and society. One is reminded here of Simon Schama's warning (1995:18) that not all landscapes are 'places of delight', nor are all memories 'pastoral picnics'. Schama's cautionary words (1995:18) refer to the horror and tragedy often encountered on the 'trail of social memory'.



Map 1. The islands of Leti, Mosa, Lakor, the reef complex of Mettriralma, Luang and Sermata (from left to right)

*Gods and monsters I: discursive landscapes in Luang*

The island of Luang (known in the local Austronesian language as Lgona) is about as far away as you can get from Jakarta and still be in Indonesia. It is located in the southernmost waters of the Banda Sea, and is marginally closer to Darwin than it is to the provincial capital of Ambon. Covering an area of only eight square kilometres, Pulau Luang (BI) is well known in the region for its near absence of trees, scarcity of drinking water<sup>8</sup> and its extensive reefs which, covering some 350 square kilometres, makes it the second largest reef system in Indonesia. This reef complex consists of the home reef system, centred upon the island of Luang, and the barrier reef system of Mettriralma ('within the reef'), situated some twenty five kilometres southwest of Luang (see Map 1). The sea surrounding the two reef complexes drops off quickly from the edge of the reef to a depth of some 2000 metres (*hlela*, 'deep sea'), making the passage between the two reef systems quite rough and, at times, quite dangerous. The 1800 or so inhabitants of Luang reside in two villages – Luang Timur and Luang Barat (BI). The residents of Luang are also well known in the region, largely because they constitute a highly mobile sailing population and because of the widespread belief that they live entirely on fish and other marine resources. While rarely found on maps these days, Luang occupies a pivotal place in the cosmological landscape of the region.

Throughout Maluku Tenggara, the island of Luang is widely acknowledged as the respective geomorphological and ontological source of the islands and societies in this part of Maluku. I recorded one account of how this came to be from a ritual specialist from the island of Damer:

In the past, so the narrative goes, Pulau Luang was a sizeable, mountainous island with a large population of people. A sailfish, named *Upo Hru* cut through the island with its dorsal sailfin, shattering it into many pieces. These terrestrial fragments of Luang became the islands which now comprise Maluku Tenggara. The island of Luang itself was reduced to a small speck in the Banda Sea. The people of Luang were unable to live on this island fragment and so many left to settle the other islands created by *Upo Hru*.

My informant then proceeded to narrate the history of settlement on the island of Damer resulting from the actions of the sailfish (BI *ikan layar*) *Upo Hru*:<sup>9</sup>

The Tuan Tanah of Luang, from the house of Wolonteri, sailed by *perahu* [BI] to what is now the island of Damer. The *perahu* ran aground on the exposed summit of Gunung Lumtuni when the rudder became entangled in the moss/algae

<sup>8</sup> According to local government statistics, Luang receives an average annual rainfall of 150 mm.

<sup>9</sup> On Damer, *upo* is the generic term for ancestor whereas on Luang, the term *upa* is used.

(*lumtun*) which covered the mountain. As the sea receded, the Wolonteri ancestors descended down the mountain in the *perahu*, stopping at various places and performing certain activities. These exploits are captured in the names ascribed to these places. The Wolonteri ancestors changed their name to Surlialy and, as the first group to arrive on the island, proclaimed themselves *lelehro* [Western Damer Language] or *rajah* (BI 'king').

Other island societies in Maluku Tenggara have similar origin stories linked to the *Upa Hruai* narrative which depict the establishment of pre-colonial polities in the region.

While the account from Damer identifies the reason for the dispersal of the original population as overcrowding, other versions of the *Upa Hruai* narrative I recorded on Luang specifically identify incessant warfare between the eleven autonomous polities on the island as the explanation for the wholesale departure of six of the original indigenous states. The inhabitants of these six polities eventually settled on the islands of Seram, Tanimbar, Kei, Sermata, Timor, Kisar, Lakor, Teun and Damer. As this suggests, the *Upa Hruai* narrative is as much a 'colonization myth' (Geertz 1960:23) as it is an account of creation.

As a creation story, however, the *Upa Hruai* narrative has an ambiguous status. For it is as much a story about the transformation and differentiation of the world as it is an account of its origin and nature. In this respect, the narrative emphasizes destruction and dispersal, disruption and displacement as essential elements in the cosmological process. An indigenous equivalent to the second Law of Thermodynamics if you like. The *Upa Hruai* narrative can be regarded as an inter-linked set of cosmological and moral ordering stories which converge to make and, perhaps more importantly, remake the world.

While conducting research on the island of Luang, I recorded detailed versions of the sailfish narrative from a number of senior men. Akin to a Shakespearean drama, these versions use an affinal arrangement between Luang and the ancestral village of Melai Watukali in East Timor to explore what is a common theme in Indonesian cosmologies, the rivalry between elder and younger brothers. At the heart of these accounts is the betrayal of the younger brother's wife (who originates from Melai Watukali) and her marriage to the wealthier older sibling (from Luang) called Rettiau Lay. In retaliation for this breach, the younger brother, Rettiau Ruru, with the assistance of Rarilmietma – Rarlekialwa, an old woman referred to as *putri laut* (BI 'queen of the sea'), calls up the sailfish, *Upa Hruai*, from the depths of the ocean. The younger brother climbs on the back of the sailfish and orders it to destroy the island of Luang so that 'people will not be able to say its name anymore' – a reference to the affective power and political potency of place names on Luang. According to this account:

The sailfish jumped out of the water and cut across Luang creating Mettutun. It jumped out of the water again and cut up the islets of Donna, Liakra, Kapuri and Tiata. The whole of Luang shook as the sailfish jumped across the island. People became afraid and fled Luang to the other islands in the region. Eventually the sailfish and the younger brother were stopped by an old woman, Surriai, who pleaded with the sailfish and her grandson [the younger brother] not to entirely destroy the island of Luang, not to shatter the earth. In her efforts to halt these destructive forces, she became a large boulder at Tutungain [BI *muka tanjung* or 'front of the cape'] while the sailfish became the island of Upa Hruai.<sup>10</sup>

From the *Upa Hruai* narrative it would appear that transgressions of the social and moral order evoke equivalent cataclysmic repercussions, in this case, the dispersal of society and destruction of the known world.<sup>11</sup> In this sense, the narrative can be thematically likened to biblical stories, European fairytales, and Aboriginal Dreaming accounts (see Stanner 1989). Like Aboriginal cosmologies, people on Luang are spatially confronted with the displacing and dangerous effects of transgression and indiscretion in their physical engagement with the landscape created by Upa Hruai.

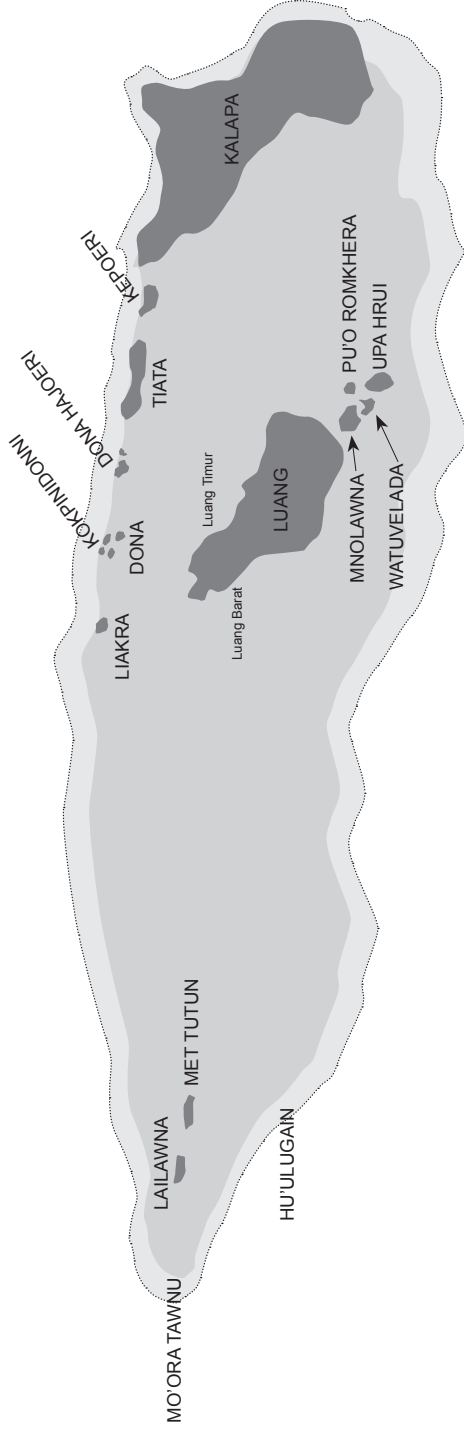
The *Upa Hruai* narrative not only recounts the fundamental formation of the islands of this region but it also provides explanations for their specific geomorphological features. For example:

The sailfish and the younger brother surfaced from the depths of the sea between Timor and Kisar. When they surfaced, the sailfish was facing south. He wanted to test his strength against the island of Timor and in doing so he cut off the tip of the island called Nohmehi. Then he turned around and headed straight for Kisar and the island shook vigorously. Because of this the mountains of Kisar are at the edge of the island and the villages are in the middle of the island. Then Upa Hruai headed north to Romang and destroyed the western side of the island, in the process creating Pulau Nohyata Roma.

Susan McKinnon records that in Tanimbarese cosmological narratives the geomorphological differentiation of the world is a task undertaken by prospective bridegrooms from offshore islands, in lieu of a hefty bridewealth payment. As McKinnon (1991:45) points out, these Herculean tasks made marriage with distant others 'virtually impossible', thus maintaining the 'self-contained unity of the [Tanimbarese] world'.

<sup>10</sup> In some accounts of this master narrative, Upa Hruai cuts through the island of Luang with its bill, in other versions, it is the dorsal sail fin that slices up the island. In a number versions I have recorded, Upa Hruai trails a long rope from its mouth, which it acquired from the old woman of the sea, and it is this rope that cleaves Luang into the islands which comprise Maluku Tenggara today.

<sup>11</sup> Cécile Barraud (1985:122) makes a similar point with regard to the implications of 'incest, adultery and murder' in Tanebar-Evav society. According to Barraud (1985:122), 'the whole society [...] is destroyed in [the] case of such misconduct'.



Map 2. The reef complex of Pulau Luang

On Luang, this relationship between local and distant bride-givers and bride-receivers, expressed in terms of the alliance between Luang and Melai Watukali, is the subject of a number of related narratives which are set in, and give further definition to, the cosmological landscape recreated by *Upa Hruui*.

In common with Aboriginal totemic accounts, the landscape of Luang comprises a rich geography of named places and powerful beings (see Map 2 and Map 3). As one informant observed, *semua tempat yang ada nama, punya orang dan sejarah* (BI 'all places which have a name, have a person and a history associated with them'). An observation similar to Claude Lévi-Strauss's comment (1966:168) that 'space is a society of named places'.

These named places include various types of beaches, capes and points, islands, submerged and exposed rocks, spits, sandbars, submerged reefs, areas of deep water, tidal areas, and areas where strong currents and whirlpools are encountered. The names bestowed often evoke what is regarded as the primary physical feature of a place. For example, *hnyariwarta* or 'west door', refers to one of only two passages through the barrier reef at Mettrirma. A name may also evoke a resemblance, as in the case of Donna Hayuri or 'buffalo horn rock', or be historically invigorated by an event. For instance, Watuvlada, the white rock said to be a petrified Dutchman whose boat apparently ran aground on the reef in the VOC period. Throughout the reef complex, there are a number of stone boats (*pu'o*). For example, the rocky islet in the vicinity of Pulau Upa Hruui is identified as a *perahu* (BI 'traditional sailing vessel') from the island of Romang (*pu'o romkhéra*), replete with the fossilized belongings of its occupants, while at Mo'ora Liwutenna (BI '*pusat meti*' or 'navel of the reef'), the western point in the Mettrirma reef complex, one can see the stone keel of a *perahu* from Melai Watukali. In addition to these stone *perahu*, it is also possible to see the wrecks of a number of wooden *perahu* which have run aground in the reef systems of Luang and Mettrirma.

The names of other places in the reef system may appear quite general or neutral in terms of their lexical meaning yet are associated with quite significant cosmological events and figures. The uninhabited island of Mnlawna illustrates this point. Translated as 'big place', at one level, the name of the island refers to its size in relation to the surrounding islands. At another level, however, the name captures the former status of the island as the peak of the highest mountain on Luang, located in the middle of the island (*nohophorara-iapnu*). On the summit of this mountain are situated the 'stairs' and the 'rope' (*retna lotna*), which not only connect the sky with the earth but also allow humans to access and communicate with the 'ancestral sun' being known as Upléra Mermetma, Upléra Warwarha.<sup>12</sup> This being is described by people on

<sup>12</sup> *Up* or *upa* is the local term generally used for ancestral figures, while the term *lera* specifically refers to the sun. As Marshall Sahlins (1985:18-9) points out with respect to Hawaiian chiefs, the solar associations of Upléra Mermetma, Upléra Warwarha may be linked to indigenous notions of divine beauty and ancestral power as displays of 'brilliance', 'radiance' and 'luminosity', rather than to the existence of a solar cult.



Luang as an ambivalent amalgam of Setan and Tuhan (the 'Devil' and 'God'), and is regarded as the singular incarnation of the different powers associated with each of these beings.<sup>13</sup> According to the *Upa Hru* narrative, the destructive actions of the sailfish caused the mountain to shake so much that the peak fell off, landed in the sea, and became the island of Mnolawna. With its connection to the middle of the island, Mnolawna is also identified as the anchor of Luang, preventing the island from drifting away in the strong southerly currents. The earthly conduit to Upléra Mermetma, Upléra Warwarha is still located on the summit of the mountain, now known as Mnolawna, and is guarded by a being which sometimes presents itself in the shape of a cat (*o'ha*). Interestingly, while *Mnolawna* is identified as an island which has a 'history' (BI *pulau yang bersejarah*), it is not generally regarded as a *keramat* ('sacred') site.

In his review of marine tenure in the Torres Strait, John Cordell observes that reefs, shoals, rocks and open sea are not only named after events but, when considered in their entirety, constitute a detailed seascape. Cordell (1984:307) defines this seascape as 'a living history with associated myths, stories and legends that provide moral and cultural guidelines. It is the storehouse of social identity for islanders'.

James Weiner (1991:32) succinctly captures this relationship between names, space and social identity when he states that 'a society's place names schematically image a people's intentional transformation of their habitat from a sheer physical terrain into a pattern of historically experienced and constituted space and time'. As Cordell and Weiner suggest, names are not 'inert, lexical labels for places'. Rather, 'place names have their origin in discourse, and it is within discourse [...] that places are named' (J. Weiner 1991:45). In the sea cosmologies of the people from Luang, named places in the coastal zone and the reef environment are also invigorated by the presence of powerful beings.

The beings which are associated with named places are variously described as 'witches' or 'ghosts', 'malevolent figures', 'ancestors', 'chiefs' and 'people' (BI *suangi, iblis* or *setan, moyang, datuk* or *orang*). While these various entities are often granted basic anthropomorphic characteristics, as Valerio Valeri (2000:25) points out in his discussion of 'occult powers' among the Huaulu of Seram, the use of the appellation 'superhuman' to describe these figures is inadequate as it fails to grasp the often 'subhuman' or 'inhuman' features of these beings. Like the occult powers identified by the Huaulu, the beings associated with Luang are 'wild at heart' (Valeri 2000:26), and their mediat-

<sup>13</sup> While this reference to Setan ('Devil') and Tuhan ('God') implies some similarity with a Judaeo-Christian moral cosmos, particularly the opposition between good and evil which we find in the latter, there are also considerable differences in the way morality is construed on Luang. Marshall Sahlins (1985:17) provides an example of the way in which indigenous moral universes differ from the Judaeo-Christian one when he observes that, 'many Oceanic societies [...] employ the aesthetic at the boundaries of the moral'.

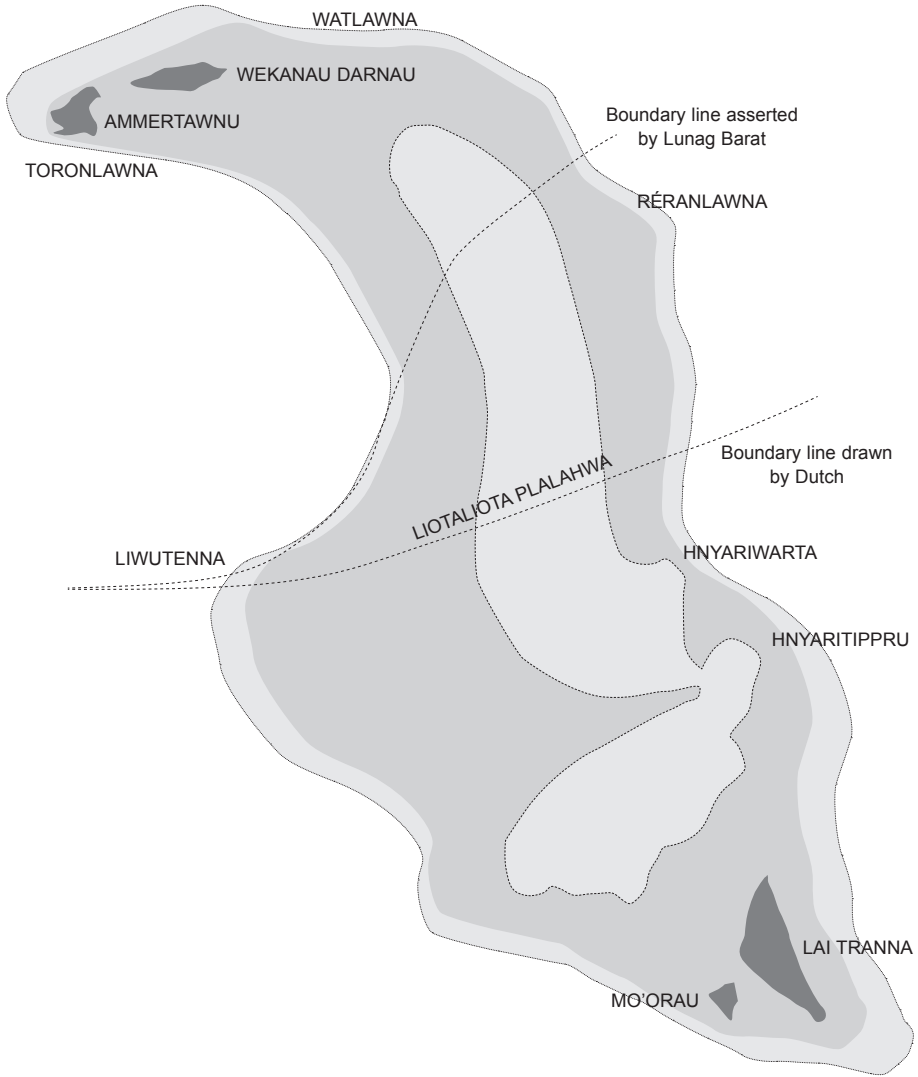
ing presence in the reef environment contributes to a dangerously unstable and uncertain landscape. For people on Luang, the presence of these powerful agents also configures a discursive landscape which is redolent with all kinds of sexual tensions and perversions.

These beings are also ascribed a somewhat exuberant sexuality and a range of gendered identities. At times, these identities can appear to be singular in nature, yet at other times can be quite ambivalent or polymorphic. For example, Toronlawna, a submerged reef in the Mettriralma complex, is associated with the presence of an old woman who is likened to 'Satan', and is thus regarded as *paling jahat* (BI 'very evil'), particularly at the time of a full moon. At this time, the gender neutral *suangi* figure (BI akin to a 'witch' or a 'sorcerer') at Watlawna, another point in the reef complex of Mettriralma, travels across the lagoon to have bestial sex with the old woman at Toronlawna, mounting each other in the manner of 'dogs'. This is a dangerous time to be anywhere near these two places, as it is possible for the voracious sexual desires of the beings to be turned upon any humans encountered. It is through these acts of excessive, demonic sex that the beings not only reveal their animal-like nature but also highlight the vulnerability of humans to their bestial charms and unprovoked attempts at seduction.

For example, at Mo'ora Tawnu, identified at the 'tip of the [home] reef' (BI *ujung karang*), an ancestral woman from Luang (from the founding village of Mnyettumjau) is mysteriously impregnated by the semen of a man from Melai Watukali. He places his semen in a bamboo receptacle and sends it to her across the sea. After throwing the bamboo container away several times, she decides to keep it and use it as a pillow. Not long afterwards she has a bastard son.<sup>14</sup> Soon after the birth of the child, a *perahu* carrying the man from Melai Watukali arrives at what remains of the island of Luang, the mountain of Wu'urplalahwa ('Long Mountain'), and moors alongside of it. Evocative of sexual union, the *perahu* and the mountain become fused, and what was once deep water (*hleta*) becomes land. The *perahu* is transformed into the mountain Wu'urluli, creating the twin-peaked form of the current island of Luang, and its anchor becomes the large rock known as Watgarniha. In the narrative, the woman from Luang and the man from Melai are also fused together into a single body, one side male, the other half female. Informants referred to this coupling with the Indonesian term for coitus, *mereka bersetubuh* ('they became one body').

In the same reef complex, at the rocky islet of Kokpinidonni, a woman from Luang repeatedly engages in sex with several men, disregarding the demands of elders to stop. Shamed by her actions, the elders drowned the woman at

<sup>14</sup> Debbona Battaglia (1990:40) notes that on Sabarl Island women believed that they could 'somehow become pregnant in the sea'. She suggests that this belief may stem from the image, associated with ambergris, of 'congealed father's blood adrift on the sea headed towards the shores of the living' (Battaglia 1990:223).



Map 3. The reef complex of *Mettriralma*

Kokpinidonni, giving her name to the place where the sexual acts and the drowning occurred.<sup>15</sup> While I use the past tense here, the woman, like the figures at Toronlawna and Watlawna, is regarded as occupying Kokpinidonni in the present and capable of seducing men who venture into the vicinity. While the men of Luang engage in banter with each other about the *keramat* site, Kokpinidonni, they also realize that succumbing to these sexual temptations will result in a fatal copulation. One is reminded here of *pontianak* (BI), promiscuous, supernatural female figures which seduce men with their charms and then castrate them with their claw-like fingernails.<sup>16</sup> In the *pontianak* accounts I have recorded in village communities in Maluku, these beings are usually associated with people's experiences of regional centres. The *pontianak* stories are part of a discourse in which cities like Ambon, Tual and Dili, constitute alienating landscapes, where self-conscious perceptions of social difference and economic disadvantage intersect and are made all too visible. As Roland Barthes observed, the city is the very 'place of our meeting with the other' (quoted in Jacobs 1996:4).

In the seas of Luang, this sense of otherness is primarily articulated in terms of the unregulated and ambivalent sexuality of the occult beings. The animated presence of these beings confronts people with the dangerous ambiguity inherent in the constitution of their own human identity and that of other things. In this sense, the world of humans is constantly haunted by images of similarity and difference, and the possibilities for other kinds of identities. This idea of ambivalent identity is deeply embedded within the shifting seascape of Luang – a valley is a deep-water harbour, a hill is a boat, the summit of a mountain is an island, an island is an anchor, a rock is an ancestor or a boat, and so on. Objects and subjects are never quite what they appear to be in this promiscuous intermingling of identity and order. In this respect, Alain Corbin's depiction (1994:14) of the littoral zone as a 'dangerous area in which the activities of deities, human beings and animals, living in confused, dangerous proximity, threaten to interfere with one another', equally describes the troubled seascape of Luang.

In a discussion of the magical potency of witches to create islands and sea passages, S. Tambiah notes that a common theme in Trobriand narratives is how these beings are eventually stabilized as rocks. In Tambiah's words (1985:303): This stabilisation of the witches, then, allows for their becoming agents for granting (restricted) benefits, and their locations appropriately become shrines for propitiation by *kula* sailors.

<sup>15</sup> Cécile Barraud (1985:122) notes that in Tanebar-Evav society in the Kei Islands couples engaged in incestuous relations were traditionally 'cast into the sea to drown'.

<sup>16</sup> In this respect, *pontianak* are similar to *sundel bolong* ('prostitute with a hole in her') which Geertz (1960:18) describes as a 'beautiful naked woman' with a hole in her back who seduces men and castrates them.

The process of physical stabilization that Tambiah refers to not only applies to individual witches but to the cosmological accounts which feature these witches. This is an important consideration, as the representation of these stories in terms of concrete objects points to a social environment in which inter-subjective communication and understanding is construed as part of a phenomenal landscape which is both enduring and changing in its very nature.

Like the Trobriand Islanders, people on Luang also recognize the need to engage with and, if possible, to appease the beings at Toronlawna and Watlawna. These beings and others like them are regarded as both the original owners of the sea and the ones responsible for producing a continuous supply of valuable resources in the marine environment. Similar to the situation Valeri (2000) describes for the Huaulu of central Seram, human ownership of the lands and seas of Luang is thus regarded as derivative. In this situation, there is no sense of total human ownership. To quote Valeri (2000:308), 'one always owns as part owner, as part of a superior [occult] ownership; one is forever an interloper or at best a tenant'. As Valeri points out, this idea of ownership is far removed from the notion of property as a reified and inanimate possession. Like the Huaulu, for people on Luang ownership entails confronting, cajoling and pacifying the non-human beings who live in the sea. One cannot access and use the products of the sea with total freedom and impunity. In this sense, the right to own and use an area or a resource is contingent upon and is mediated by a relationship between the user and a powerful being. Given the fundamental role ascribed to these beings in the reproduction of people's livelihood, it is not so surprising that they are primarily spoken of in terms of the leitmotif of sex. However, the very presence of these beings also highlights the destructive and fatal consequences of uncontrolled reproductivity, expressed in the being's overly exuberant sexuality.

The beings and the places they inhabit are regarded as *keramat* (BI) and there are a number of taboos associated with them. These beings are identified as possessing 'hot' (BI *panas*) or 'heavy' (BI *berat*) names, and the indiscriminate uttering of their names can result in injury or death. As people stated, these beings are capable of 'cutting your throat'. In order to publicly say the names of these beings, and recount the stories associated with them, it is necessary to *sumpah sopi* (BI) – a ritualized drinking and spilling of palm spirit which entails an avowal of truth. When a person's actions or statements signify a discontinuity with the truth constructed in local discourse, then the vow acts like a curse, and sudden death becomes the fate (BI '*segera jatuh mati*'). As Kenneth George (1996:133) observes in his discussion of ritual violence in Sulawesi, oathmaking is not necessarily 'the outcome of powerful emotions, but of powerful obligations made in discourse'.

In order to sail near places regarded as *keramat* (BI) without encountering immediate misfortune and death, people avoid wearing red clothing and

maintain a respectful silence.<sup>17</sup> To emphasize the 'hotness' of *keramat* sites, a cautionary tale is told about the fate of a fisherman from the island of Leti who, ignorant of the *keramat* status of Mo'ora Liwutenna, not only wore a red shirt but who also spoke the wrong language in its vicinity. According to local accounts, a large wave suddenly appeared, capsized the boat, and drowned its occupant.<sup>18</sup>

The association of the sea with what appears to be an uncontrolled and dangerous sexuality, epitomized by places like Kokpinidonni, also conjures up related images in the western tradition of mermaids and sirens. In a similar vein to the Greek myth of the singing sea nymphs, places like Kokpinidonni, Toronlawna and Watlawna signpost natural features of the reef system which pose a possible physical hazard to sailors and fishermen. While there is a temptation to posit a functional explanation for this relationship between cosmology and geography, I should point out that the most dangerous features of the reef for shipping, the narrow and shallow passages through the barrier reef, are not associated with either 'libidinous' or 'dangerous' beings.

Places like Kokpinidonni, Toronlawna and Watlawna also represent points in the social landscape where emotions and social values coincide. The sea worm festival in western Sumba represents a similar conjunction of space and sentiment. Janet Hoskins (1983:205) describes how in the waxing light of the moon, the beaches around Kodi in the month of February are awash with the swarming 'sexual dance' of sea worms and humans. While Hoskins invokes a logic of analogy between the fertility of the sea and human sexual license, I would like to go one step further and suggest here that places like Kokpinidonni are focal points in a discourse which produces 'promiscuous geographies of dwelling in place' (Jacobs 1996:5). In speaking of promiscuous geographies, Jane Jacobs (1996:5) has in mind the ever-shifting negotiations of identity and difference which arise from the 'cohabitation of variously empowered people and the meanings they ascribed to localities and places'. As Jacobs (1996:5) points out, in this notion of politically-engaged, impassioned space 'the categories of Self and Other, here and there, past and present, constantly solicit one another'.

For the people of Luang, this particular experience of dwelling in place, epitomized by the solicitous relationship between themselves and powerful beings, is in a continual state of tension. On the one hand, the features and actions of these beings suggest that they share the same values and concerns as humans. Yet, on the other hand, their non-human attributes and often inhuman

<sup>17</sup> In many parts of Maluku, particularly in Maluku Tenggara, the wearing of red cloth is associated with warfare, specifically headhunting.

<sup>18</sup> The dangerous potential of 'sacred' sites for both locals and outsiders is a belief also found among indigenous people in Australia. For example, Memmott and Trigger (1998:119) report that there are coastal and offshore 'Dreaming' sites that can create heavy rain, strong winds, rough seas and even cyclones if interfered with by outsiders.

behaviour points to their transcendence of the human order, or perhaps to the extremes possibilities of the human condition. By avoiding or minimizing contact with these beings through the observation of a series of prohibitions and prescriptions, people on Luang attempt to neutralize the moral effects of a perceived continuity between themselves and these non-human entities. As Valeri (2000) points out, taboo in these situations often marks both a relationship of similarity and effects a recognition of difference. In the dangerous waters of Luang, the maintenance of this difference, in the form of the social order and relations of the community, is always a profoundly unstable enterprise.

In this ambivalent experience of dwelling in place, the people of Luang are not alone. They inhabit a landscape which is 'doubly [and even triply] occupied' (Stewart 1997). For in addition to humans, powerful, promiscuous agents such as the *suangi* figure at Watlawna, the landscape of Luang is also inhabited by the 'undead'. For people in the village of Luang Timur, the island of Wekanau Darnau is identified as the place of the dead. To get to Wekanau Darnau, the dead travel along a specific path or *straat*, as one informant called it. From Luang they travel to Hu'ulagain, another *keramat* site associated with a powerful being, from there they cross the deep waters between Luang and Mettriralma, to Réranlawna ('large forehead'), another *keramat* site, and then onto the island of Wekanau Darnau. The place of the dead is described in somewhat heavenly terms; the houses are larger, there is an abundance of food and, importantly, palm spirit; no one works, and the women are beautiful. People who suddenly become sick and die soon are said to have dreamed of Wekanau Darnau and been seduced by its very earthly attractions.

The island closest to Wekanau Darnau, Ammwertawnu is identified as the place of the dead for people from Lakor, while the dead from Luang Barat travel to the islet of Mo'or au ('reef where trees grow'), again in the Mettriralma reef complex. Upon reaching Mo'orau, Wekanau Darnau or Ammwertawnu, the dead are revived and, in the words of my informants, become 'human again' (*BI menjadi manusia lagi*), in the process, achieving a state of very un-humanlike immortality. Thus, it is possible, and not uncommon according to local accounts, to encounter the dead as they travel across the seas towards the *keramat* sites of Wekanau Darnau, Ammwertawnu or Mo'orau or to encounter them at these islands. As this suggests, the undead do not relinquish their bodily existence at death, and it is this inability to distinguish the undead and other beings from ordinary humans and animals which 'makes them dangerous' (Valeri 2000:24). While not regarded as dangerous as the beings at Toronlawna and Watlawna, the undead are capable of distracting people as they sail through the physically challenging reef environment or of interfering with their fishing activities, cutting fishing lines and anchor ropes, for example.

For people on Luang, this landscape of named places and powerful beings is not simply an elaborate sign system for mythological events (see Morphy



1995:186). Nor is the landscape just a mnemonic or metaphor for processes that are really going on at some other level (see Layton 1995:229). As Morphy and Layton both argue in their respective discussions of Yolngu and Pitjantjatjarra landscapes in north and central Australia, 'landscape is conceived within a cultural tradition' so that 'the land itself as socially constituted plays a fundamental role in the ordering of cultural relations' (Layton 1995:229). As this last comment suggests, for Aboriginal people landscape is not so much a text to be read but the discursive ground for the consummation of ancestral actions and human experiences. Michael Taussig's explanation (1980:15) in 'The devil and commodity fetishism' for the revelatory power of magical beliefs equally applies to landscape – both resonate with the 'poetic echoes of the cadences that guide the innermost course of the world'. In the context of Luang, the cosmological landscape resonates with the social passions and power struggles of 'ordinary, everyday life' (Geertz 1973:443). In this sense, cosmologies can be viewed, to paraphrase Clifford Geertz (1973:448), as the 'stor[ies] people tell themselves about themselves'. However, they are more than just 'meta-social commentaries' on ordinary, everyday experience.

As I argue in the following sections, cosmological narratives create, articulate and, at times, manipulate what E.V. Daniel (1990:27) identifies as 'epistemic and ontic realities'. That is, they provide people with a way of 'seeing and being' in the world. Considered as 'vital form[s] of social action' (Malkki 1995:105), these discourses have both reflexive and very real consequences, linked as they are to ideas about sacrality and local assertions of sovereignty.

### *Cosmology, sovereignty and the sacred*

Echols and Shadily (1978:182) gloss the Arabic-derived term *keramat* as 'sacred', 'holy' or as 'having supernatural qualities'. In the anthropological literature, the term is often applied to rituals, objects or sites associated with founding or ancestral figures, linking the potency of an action, a thing or a place to divine or supernatural power, grace or energy (see Bowen 1993:197; Geertz 1980:106). This connection between place, ancestors and sacrality is also evident in the literature from Aboriginal Australia and the Pacific. For example, in Australia 'sacred sites' are described as places associated with the travels of ancestral beings and the transformation of these beings into named places (see Morphy 1995). In the Pacific, Edward Hviding (1995:250) discusses 'sacred sites' in the barrier reef areas of Marovo Lagoon which are 'connected with genealogically placed ancestors' and linked to certain taboos. While in eastern Indonesia, Andrew McWilliam (1996:154) describes how the concept of *le'u*, which carries the 'sense of sacred or taboo', is 'intimately connected to the hidden world of ancestors, spirits and the supreme being' and, at the time of headhunting raids, was focused upon the site of the 'hostility' cult house.

In the landscape which emerges in the cosmological accounts from Luang, the concept of *keramat* is not just linked to named places and powerful 'supernatural' beings, but it is also positioned at the centre of a discourse on morality, sexuality and ultimately the nature of sociality. Implicated in this discursive topography of promiscuity, violence, danger, and power, *keramat* in this context represents a peculiar or 'uncanny' (Gelder and Jacobs 1998) form of the sacred. A kind of 'impure sacred', to borrow Durkheim's expression for the idea that not only 'God but evil is part of the notion of sacredness' (Taussig 1992:114). As Michael Taussig (1992:111-4) points out, both fear and reverence, respect and horror are intertwined in this double helix of the sacred. Going well beyond Durkheim, and the posturing of the sacred in terms of the double act of good and evil, he links the ambivalent quality of the sacred not just to society, but to the 'cultural practice of Statecraft' (Taussig 1992:115). For Taussig (1992:116), it is the inter-penetration of the sacred with the impure and the erotic, and its link to the 'trafficking' between rationality and violence, which contributes to the attraction and repulsion of the state.

Like Taussig, Phillip Winn (2003) draws our attention to 'the involvement of the sacred in local questions of power, autonomy and sovereignty' in some of the writings on headhunting in Indonesia. For instance, in his account of 'history, politics and headhunting in southwest Timor', McWilliam (1996:146) discusses how the:

Development of the political domain under Nabuasa leadership was constituted as both a political and a religious system. The continuing prosperity of the wider political community was underpinned by an ongoing communication with the hidden world of ancestors and spirits.

Picking up on this relationship between politics and cosmology, Kenneth George (1996:69), in his discussion of the cultural politics of headhunting, argues that 'cosmographic ideas can shape and take shape from a lived-in ethnic and political terrain'. Crucial to George's analysis is the role played by the 'grotesque' in the political economy of ritual headhunting. By 'grotesque', George (1996:92) has in mind: The kind of imagery and discourse that foreground the monstrous, the fantastic and bizarre, the exaggerated, the incongruous, and the terrifying or awe-provoking.

As George (1996:96) remarks, the grotesque imagery of headhunting 'lies at the heart of traditional upland 'official' discourse and power'. In his work, the grotesque is foremost a 'mode of political discourse' (George 1996:100), akin in many ways to Taussig's discussion of the insinuation of the impure sacred in the cultural practices of the state.

In the final sections of this article, I briefly explore this relationship between the 'grotesque'/'impure sacred', cosmology, and sovereignty within the context of boundary and marine resource disputes in Luang.

*Domains of difference, polities of power*

All of the named places and beings mentioned so far are associated with one of the eleven polities which originally occupied the summits of the eleven hills on Luang. In the middle or 'navel' of the island (*nohophoraraipnu*) was located Uhutéla'a, Mnyettumjau, Watihli Wattriha (also known as Lettra Wo'ora) and Lakkanno'a. In the front or 'face' of the island (*nohulugairierna*) was Wettagai Lettra, while at the back or 'tail' of the island (*nohuputnaraitiawnu*) was Watulu Harulu, Mnowaru, Wo'ormaha, Ihlura Watunhora, Melai Watukali and Noknokamaupéhi.

Often described as *kampung lama* (BI) or *leta tgakmu* ('old village'), the physical remains of these eleven polities are evident as a series of multi-terraced, stone-walled compounds. According to local narratives, the present-day indigenous residents of Luang (known as *ornoha* or *orleta*, 'people of the island' or 'people of the village') are the descendants of the original occupiers of the five polities which remained on Luang after a period of prolonged warfare involving all eleven hill-top states. As previously mentioned, people from six of these *leta* were forced to flee the island due to local hostilities, and the descendants of these original occupiers can be found throughout the province of Maluku.

People on Luang trace the origins of the *leta rahuna* (BI *soa*)<sup>19</sup> on Luang, and their constituent *rahuna a'na* (BI *marga*) or 'house' groups, to the ancestral figures associated with the remaining five original states. According to local narratives, the occupiers of the remaining five village-states descended from the original *leta* sites and settled together on either the east or west coast of Luang, forming the physical and social foundations for the present village communities of Luang Timur and Luang Barat. Upon leaving the original hill-top *leta* sites, the original occupiers acquired new names which reflect the circumstances of their descent and settlement. Today, these names are identified as referring to *marga* (BI) or 'house' groups (for example Romailioha, Romhadi, Romlawna).

Depicted in narratives as autonomous sovereign entities, each of the eleven polities asserted authority over specific areas of land (*ra*) and sea (*lora*), the geographic extent of which was cosmologically decreed. The extent of these domains is marked by named places, and the topographic features, powerful beings and human-made signs associated with them. As one informant observed, speaking of the history of the western-most point in the home reef known as Mo'ora Tawnu, the original polities placed ancestral or other figures in the landscape to establish the name of a place and to give a physical presence to their assertion of territorial authority.<sup>20</sup> These site-specific beings are

<sup>19</sup> In the village of Luang Timur, there are four *soa*; Tuprulu Gérlorna, Pupugéni, Hinléli and Pépupun Tra'upun, while in Luang Barat there are three: Horupun, Tiataupun and Lewnupun.

<sup>20</sup> *Dulu Melai Watukali kas turun orang di Mo'ora Tawnu, kasih tanda sebagai hak.*

referred to in the local language as *marna watu onni*,<sup>21</sup> 'the ones who guard the stone', a reference to the stone shrines (*nattra*) which form the focus of each of the eleven original polities and those sites identified as *keramat*. The 'stones' and other markers used to indicate the extent of the interests of each of the different polities are known as *ghéra li'ai*, a term which is glossed in Indonesian as *sasi* (see Pannell 1997b). A local narrative describes the origins of the different signs used to mark territorial interests, ascribing different signs or markers to each of the original polities which remained on the island after the period of the great wars. The name of one of these polities, Ihlura Watunhora, actually refers to the particular mark used by it to indicate its sovereign interests. The name of this polity can be glossed as 'the ones who lived on top of a high mountain and who placed a stone in the ground'. While stones, lontar leaf containers, and a hole created by an ancestral spear mark the interests of the different polities on land, in the sea, named places in the reef complex, which are also associated with various beings, perform this role. It is important to realize here that as markers of sovereign interests, *ghéra li'ai* do not constitute linear alignments of physical objects in space, in the manner of a wooden fence or a stone wall. Rather, *ghéra li'ai* are named places in the landscape which are not only identifiable physical entities but also the products of discourse. In this sense, *ghéra li'ai* focus local statements about sovereignty, identity and history.<sup>22</sup>

### *A line in the water: gods and monsters II*

The relationship between cosmology, geography and sovereignty has been the subject of on-going disputes and open hostilities between people from Luang Timur and Luang Barat for at least the past hundred years or so, perhaps even longer. One of these disputes pivots around the identity of the ancestral being occupying the northern islands of Wekanau Darnau and Ammwertawnu, and the geographic extent of the territorial interests and resource rights of both villages in the reef complex of Mettriralma. A number of people link the genesis of this particular dispute to increased demands for marine resources, such as trepang and trochus shell, and identify the intervention of agents of the Netherlands Indies colonial state in the late 1800s as exacerbating the situation. As one senior informant stated, before the intervention of the Dutch, there were no boundaries or lines which bisected the reef complex of Mettriralma into exclusive regions. While there may not have been a boundary per

<sup>21</sup> Informants glossed this indigenous expression in Bahasa Indonesia as *penjaga sasi*.

<sup>22</sup> Interestingly, when translating statements about the sovereign interests of the various founding villages, informants also used the Indonesian term *sifat*, rather than *batas*, to describe these named points in the landscape. In the Echols and Shadily Indonesian-English dictionary (1985), *sifat* is glossed as 'quality', 'characteristic' or 'prospect', while the meaning of *batas* is given as 'limit', 'border' or 'boundary'.

se, areas of Mettriralma are historically linked to different founding polities and a number of ancestral beings.

According to some accounts, Wo'orau, an ancestral figure from the village of Watulu Harulu, is identified as the first being to die and travel to and inhabit the northern islands of Wekanau Darnau (also known as Lai Riar'i) and Ammwertawnu. In doing so, Wo'orau established the identity of these islands as the 'place of the dead'.

According to another account, however, the islands of Wekanau Darnau and Ammwertawnu are controlled by a dangerous old woman known as Rarweru Rarwatu from Watulu Harulu, the same ancestral village as that of Wo'orau. According to this account, an ancestor from the village of Wo'ormaha caught the old woman stealing his palm wine. To punish her, the ancestor from Wo'ormaha decreed that she could only eat from the islands of Wekanau Darnau and Ammwertawnu, which the village of Wo'ormaha claimed authority over. In this account, the ancestral occupiers of Wo'ormaha assert a sovereign right over the entire Mettriralma complex, including Meti Miarang (also known as Lai Tranna), the sand island in the southern part of the reef complex.

While the two ancestral figures associated with the islands of Wekanau Darnau and Ammwertawnu are from the same leta, the fundamental difference between these accounts, a difference which lies at the heart of the disputes, is the issue of precedence and agency. In the first account, Wo'orau precedes all others and independently establishes an authoritative and lasting presence on the island, while in the second account, the connection of Watulu Harulu to the island is predicated upon the actions of an ancestral figure from a more powerful polity with prior interests in the island. In both accounts, however, the territorial interests of Watulu Harulu appear to be confined to the islands of Wekanau Darnau and Ammwertawnu, and perhaps the immediate vicinity.

People who claim descent from the ancestors of Watulu Harulu live in Luang Timur, while the descendants of the ancestral occupiers of the village state of Wo'ormaha reside in the village of Luang Barat. These descendants have inter-married with members from other 'house' groups in the two villages, contributing to a situation where proprietary claims to Mettriralma are primarily expressed in terms of contemporary village identities (as in, Luang Timur and Luang Barat) and not individual 'house' or even 'family' identities, as some people argue should be the case. As previously indicated, the physical extent of the interests of the two villages in Mettriralma has been the source of considerable contention between the two communities.

In all local accounts regarding the sovereign identifications of Mettriralma, the *keramat* site of Liwutenna is identified as the 'feature' (BI *sifat*) which marks the divergence of interests of the two villages. Situated at the most westerly point in the reef complex, Liwutenna is described as a 'very hot' place, associa-

ted with an extremely dangerous being. People from both Luang Barat and Luang Timur acknowledge the potency of Liwutenna and are aware of the unfortunate fate which awaits those who transgress past this point. Traditionally, Liwutenna constituted the only *ghéra li'ai* in the Mettriralma complex which exerted a powerful, and limiting influence upon the movements and activities of villagers from both communities.

At some point in the late 1800s or early 1900s, the issue of the delineation of sovereign interests in Mettriralma came to a violent head and the Dutch 'district officer' (*controleur*) for the area intervened. There is some suggestion that the fighting was triggered by accusations that people from each community were poaching marine resources, particularly trepang, from the other's area. The event which marked the supposed resolution of the dispute consisted of an interesting amalgamation of state and local 'native political rituals' (Sahlins 1981). In true colonial fashion, the Dutch formalized the divergence of interests of the two communities by introducing a boundary and erecting stone cairns to mark the western and eastern points of this line in the water.<sup>23</sup> In doing so, it could be said that the Dutch attempted to place their own gods and monsters in the politically-charged, cosmological landscape of Luang.

In selecting an easily identifiable physiographic feature, known locally as Liotaliota Plalahwa, a large area of 'deep water', as signalling the eastern point of this border of difference, the Dutch effectively cut the reef system of Mettriralma into two. Luang Timur would control the northern half, while Luang Barat exploited the southern section of the reef system. Unbeknown to the Dutch officials, their own cultural practices of statecraft nicely dovetailed with local political rituals concerning the assertion of sovereign right. The western point chosen by the Dutch to mark the boundary was the physically obvious western tip of the reef complex. As previously mentioned, this point is known locally as Liwutenna, a *keramat* site implicated in the local landscape of sovereign power. For people on Luang, the presence of the powerful being at Liwutenna constituted a far more effective influence on people's movements than any stone cairn erected by the colonial state. Interestingly, the stone cairn that was erected at this point was not seen as desecration of this site. On the contrary. The stone marker erected by the Dutch at Liwutenna was regarded as recognition of the *keramat* status of the site, with the cairn likened to a traditional ancestral shrine (*nattra*).

To mark the event, the local government heads (BI *orang kaya*) from Luang Timur and Luang Barat, journeyed to Liwutenna and at low tide, spread a locally 'woven cloth' (BI *kain tenun*) on top of the exposed reef and together

<sup>23</sup> As Moore (1996:135) points out in his discussion of environmental struggles in Zimbabwe, 'the separation of cordoned spaces sanctioned by property deeds' is a characteristically colonial practice 'critical to state control of subject populations'. This practice, as Osseweijer et al. (2003) observe, is not confined to a colonial past but is readily invoked by contemporary governments and non-government organizations.



they *sumpah sopi* (BI). While the Dutch officials may have viewed the ritual drinking of palm spirit at Liwutenna as a quaint, local conclusion to the cairn-erecting ceremony, for people from Luang the drinking and spilling of *sopi* did not mark the end of the dispute. Nor did it signal or celebrate local recognition of the sovereign power of the Netherlands Indies State. Rather, this political ritual was aimed at establishing whose claim to sovereign authority was cosmologically authenticated by ancestral potency (compare A. Weiner 1992). In this search for truth, so one account goes, the *orang kaya* of Luang Timur died soon after the *sopi* ceremony, losing his tongue as a result of a mysterious cut to it. For people in Luang Barat, the alleged death of the *orang kaya* from Luang Timur is interpreted as evidence of the cosmological righteousness of their claims to the reef system.

The establishment of a state-sanctioned boundary at Mettriralma did not herald the cessation of hostilities between the two village communities. Rather, the colonial introduction of a line in the water triggered off new arguments about the location of this bureaucratic border and the gods and monsters associated with it. The disputes revolve around the site which marks the extent of the interests of the two villages on the eastern side of the reef. The marine feature selected by the Dutch, Liotaliota Plalahwa, as signalling the approximate location of the eastern point in the boundary, is a cosmologically neutral and ancestrally devoid area of water in the reef system. While all parties acknowledge the 'occult' significance and power of Liwutenna in the west, and there is no suggestion of abandoning this site as a boundary marker, in the east there are attempts to re-anchor the border to a site which is cosmologically empowered in local discourse. Thus, people from Luang Barat argue that the ancestral interests of people from Luang Timur are confined to the region of Wekanua Darnau. Accordingly, they stipulate that their interests do not extend beyond Réranlawna, a dangerous, ancestor-inhabited *keramat* site in the northern section of the reef complex. Drawing upon the cultural logic of previous state territorial practices, as further evidence for this assertion they point to the existence of a '*straat*' between Réranlawna and Liwutenna which is said to be free of rocks and is likened to a 'main road' (BI *jalan raya*), linking the two named markers. Indirectly acknowledging the authoritative limits of their ancestral claim to Mettriralma, people from Luang Timur insist that Liotaliota Plalahwa marks the boundary in the east. In doing so, they harness their claims to the cosmological authenticity of another divine power – the state. Indeed, it is apparent that in the guise of *desa* (BI) or 'village governments', both communities draw upon the 'mythic power' (Taussig 1992:122) or totemic energy of the Indonesian state to further authenticate their assertions and actions. In recent years, both *desa* have been busy erecting and re-erecting stone cairns at Mettriralma in the name of this organ of supreme potency.



### Conclusion

The sacred and sovereign power enshrined in stone erections (also in stone objects and monoliths) has long been recognized in Australian Aboriginal anthropology.<sup>24</sup> Writing of oval or oblong-shaped stone objects called 'Churinga' by Aranda people, Durkheim (1965:141) observed that these objects are not only 'eminently sacred things' but their potency is also intrinsically linked to the patriarchy exercised by initiated men. The power of these objects is sensually communicated to the men by rubbing the greased boards and stones across the lower parts of their bodies. As Durkheim (1965:143) points out, these objects are both desired and adored, and their loss is the 'greatest misfortune which can happen to the group'. While Durkheim viewed Aboriginal religious adoration of 'Churinga' as ultimately the fetishization of society, the sentiments associated with these objects also attach to the ancestral environment which the objects are regarded as manifestations of. While this latter point is much overlooked in Durkheim's treatment of Aboriginal totemism, it occupies a central place in Géza Rohéim's analysis (1945) of Aboriginal myths from Central Australia.

Rohéim observes that these myths are 'full of phallic heroes, who march gloriously and triumphantly across the landscape performing rituals as they go, rituals whose libidinal origins are evidence by forms of symbolic sexuality'.<sup>25</sup> He argues that through ceremonial participation, Aboriginal people's relationship to the environment has been thoroughly 'libidinized' (Rohéim 1945:9). According to Rohéim, the libidinization of the landscape functions to make a virtue out of the necessity of a nomadic way of life in a 'harsh' desert region. While mindful of the limitations of his psychoanalytical approach, and T. Strehlow's criticism (1971:xlii) that Rohéim was duped by his informants who 'liberally' supplied him with 'odd' or 'unusual sexual information', Rohéim's work does, however, alert us to the explicit sensual and sexual nature of indigenous (and non-indigenous) cosmologies.<sup>26</sup>

One is reminded here of Sahlin's description of the Hawaiian cultural order as 'a political economy of love' (Sahlin 1985:19), where sex is both everywhere

<sup>24</sup> For example, in their book, *Uncanny Australia*, Gelder and Jacobs (1998) discuss how Uluru ('Ayers Rock') is a 'meta-sacred site' which stands at the centre of a discourse on nationalism and Aboriginal land rights.

<sup>25</sup> Morton 1988:xx. In another analysis of myths from Central Australia, Isobel White (1975) discusses the violent nature of sexual relations depicted in these accounts. Arguing that myths generally can be seen as a 'charter for the values of society, as represented in desires and fears', White (1975:138) concludes that the 'violence of sexual relations in Central Australian myths [is] a reflection of the sexual values of a male-dominated society'.

<sup>26</sup> One is reminded here of Simon Schama's discussion (1995) of the 'primitive' Arcadian landscape depicted in Greek myth. Contrary to later depictions, the original myth constructed Arcadia as 'the playground of the unchained senses' (Schama 1995:530), marked by the interplay of 'bestiality', 'brutishness', 'wildness' and 'fecundity'.

and 'everything: rank, power, wealth, [and] land' (Sahlin 1985:26). Both Rohéim's notion of a landscape invigorated by a 'promiscuous sacredness' (Gelder and Jacobs 1998:117) and Sahlins' idea of a kingdom structured by beauty and sexual attraction takes us beyond the usual male-female symbolism reported for indigenous cosmologies and, for that matter, beyond the anthropological tradition of narrowly understood political systems.

References to the sensual, political, erotic, and aesthetic scenery of socio-cosmological landscapes, which we see so compellingly explored in the work of Rohéim, Sahlins, and others like Simon Schama (1995), are largely muted in, if not absent from, discussions of indigenous cosmologies from Indonesia and Australia. Indeed, as Franca Tamisari points out with respect to writings on Aboriginal cosmologies and epistemologies, it is only relatively recently that the 'poetic', 'affective' and 'experiential' aspects of the relationship between Aboriginal people and country (both sea and land) has been considered (Tamisari 1998:249). She suggests that an anthropological preoccupation with social organization, together with an approach to 'land as space rather than a series of experienced places' (Tamisari 1998:250), are underlying reasons for the 'static portrayal' of indigenous cosmological landscapes. Tamisari's comments equally apply to the ethnographic situation in eastern Indonesia, where the study of the 'poetics of place' is in 'early efflorescence' (Fox 1997:3), while the discussion of indigenous sea cosmologies is, for all intents and purposes, still in the bud.

Examination of the anthropological literature on eastern Indonesia reveals that people's relationship to the sea is either spoken of as; a physical 'setting', part of a system of folk orientation based upon a land-sea opposition, a range of economic activities, or discussed in terms of the cultural symbolism of the boat. While there are a considerable number of ethnographic references to the meaning of boats and the widespread association of boats with some form of social organization, by and large, anthropologists have chosen to pass over the significance of the 'boat' in favour of detailed discussion and analysis of the 'house'. As I conclude in a recent article, the anthropological record points to a very 'unromantic' view of indigenous people's relationship to the sea.<sup>27</sup> If this is the case, then perhaps the 'ethnographic blindspot' I referred to at the beginning of this article should be extended to include the study of indigenous sea cosmologies as poetic topographies of the diverse and sometimes subversive experiences of human life.<sup>28</sup>

<sup>27</sup> Pannell 1994. I use the term 'romantic' here to try and capture the kind of sentiments Stephen Greenblatt (1990) speaks of when using the concepts of 'resonance' and 'wonder' to characterize what he calls 'new historicism'. 'Romancing the sea', as an exercise in writing, thus involves capturing the mysterious, the sensual, the dangerous, the erotic and nostalgic qualities ascribed to particular places or spaces.

<sup>28</sup> The reference to 'poetic' here draws upon the Greek root of this term, '*poiein*', 'to make'.

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MANON OSSEWEIJER

## **A toothy tale**

### **A short history of shark fisheries and trade in shark products in twentieth-century Indonesia**

#### *Introduction*

A grey triangular fin cutting the surface of an otherwise calm sea, which many people will immediately associate with the 1975 suspense movie *Jaws*, strikes dread in the hearts of beach-goers and fishermen alike. Beneath the fin is a creature most people love to hate, a creature whose predatory menace and mastery of the sea has made it notorious: the shark. More recently, sharks have been in the news and have starred in film documentaries in a more positive light. Sharks are presented as animals which have been at the top of the ocean food chain for millions of years, but have now become an endangered species. Since the mid-1980s, a relatively new predator has jeopardized the survival of the shark, the fisherman who catches sharks, even overfishes the stocks. Biological characteristics such as slow growth, late maturity, relatively long-lived, long reproductive cycles, and a limited number of young, make sharks inherently vulnerable to overfishing.

In response to demand in the international marine food resource market, sharks have become a new target species for fishermen of the tropical seas. Sharks are most often sought for their fins: the stringy tendrils of the dorsal, pectoral, and lower tail fins are prized as the namesake ingredient of oriental shark-fin soup, an expensive delicacy in Asian cuisine. To a lesser extent, sharks are caught for their teeth, skin, cartilage, and liver oil for use in health products, cosmetics, lubricants, and tourist trinkets. In response to the rising trade in shark and ray products, an international conservation lobby has started to seek ways to warn people about the consequences of the high level of global shark fisheries and to protect the shark through the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES) and national legislation. Environmental action groups as well as international organizations such as the International Union for Conservation of Nature and Natural Resources (IUCN) and the Food and Agriculture Organization (FAO) of the United Nations have founded specialist groups and launched campaigns to attract people's attention

to the precarious situation of sharks and rays. This is done not only to protect sharks for their intrinsic value, but just as much for their scientific value. Much more attention could be paid to sharks' life-histories and medical knowledge derived from shark research (Cunningham-Day 2001:16).

Some of the action groups, such as the Singapore-based Sea Shepherd Conservation Society, have resorted to harsh methods of campaigning. In 2001 the society circulated a free postcard showing a bride and groom gazing lovingly into each other's eyes as they entered a blood-splattered banquet hall littered with mutilated sharks (Figure 1). Another example is anti-shark fishing posters which crudely say 'For 400 million years, the undisputed lord of the oceans. Now presiding over four ounces of tepid broth and a mushroom', or 'The shark in your soup had his fins chopped off, then was returned to the ocean to die an agonizing death. You'll be happy to know the onions suffered not in the least.'<sup>1</sup>

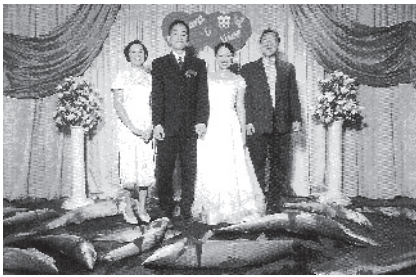


Figure 1. Free postcard for the anti-shark-fin consumption campaign (Sea Shepherd Society Singapore, 2001)

Shark fishery is a classic example of a fishery in a frontier phase. Fishermen have been obliged to open up new horizons by sailing progressively farther from their home bases to find shark populations in more accessible areas. However, as John Butcher (2004:1) describes in his historical work on fishing frontiers: 'By the 1990s, nearly all of the three-dimensional sea was being exploited, catches had fallen sharply in many areas, and the freedom to move from one fishing ground to another had been severely curtailed' (see also Bailey et al. 1987). Usually a fishery develops as follows: in the first phase, a potentially profitable fishery is identified but remains undeveloped. Then, as basic technology, essential infrastructure, and market demand improve, a rapid take-off follows during which both the fishing catch and the effort required to land it increase rapidly. At the end of this phase, the fishery reaches maturity or full development. Stock variability now proliferates and catches start to exceed the economically optimal level. Almost invariably, a fourth phase of declining yields follows, as overfishing severely reduces the spawning potential. In the

<sup>1</sup> These cynical quotes are from anti-shark-fishing posters, designed respectively by Mark Conlin, R. and V. Taylor, and David Fleetham of Innerspace Visions. See [www.elasmo.org](http://www.elasmo.org).

most serious cases, stocks even fall below economically profitable levels and the fishery collapses.

Shark fishery, like other exploitations of marine resources, is therefore subject to 'boom-and-bust' cycles. Although in the fishery sector it is usual to speak of a process of fishing down the food web, whereby fishers, having over-exploited large predatory fish, switch to smaller species lower down the food chain which have undergone a temporary increase in numbers after the removal of their predators. In the case of shark fisheries it is precisely the large predatory species which is targeted. Historically, sharks have been regarded by the large-scale fishing industry as a species of low economic value, and for a long time have mainly constituted by-catch alongside other species. Since the mid-1980s, several countries have been promoting the hunting of sharks as an 'under-utilized' resource of palatable, nutritionally valuable meat (Butcher 2004; Seaweb 1996). Taking this into account, it is no surprise that the majority of countries have no controls on shark fisheries yet, and that so far there is not any meaningful international regulation.<sup>2</sup>

According to international organizations, the controversial practice of 'finning' – whereby only the fin is cut from the (often still living) shark, which is then thrown back into the ocean – is putting unprecedented pressure on shark populations around the world. Reported shark catches increased from 622,908 metric tonnes (mt) in 1985 to over 800,000 mt in 1998. Reported trade in fins increased from 3,011 mt in 1980 to 7,048 mt in 1997. However, much of the harvest, such as by-catch and trade, is unreported (WildAid 2001).

Although it is not known if the level of shark fishing is sustainable, because of a lack of management and research, the negative impact of shark fishing and the trade in shark products might very well lead to a closure of the frontier and consequently the collapse of shark fishing in the near future. In addition to 'hard' proof in the form of numbers showing a decline in catch, there are signs which indicate the endangered status of certain shark species and stocks in particular regions, such as increased numbers of sting-rays in Florida, apparently brought on by removal of the hammerhead sharks which preyed on them, and a proliferation of lobster-eating octopuses in Australia, formerly controlled by sharks. These are salient pieces of evidence that sharks maintain diversity by preventing explosions of single species (Seaweb 1996; Cunningham-Day 2001:15). Two other warning signs are the decline in shark-fin size and the fact that fishermen are moving into remoter areas as they follow sharks; these are signs which should ring alarm bells about overfishing.<sup>3</sup>

The object of this essay is to examine the history of shark fisheries in Indonesia, at present the world's main supplier of shark fins. Presenting various

<sup>2</sup> Only four countries, United States, Canada, Australia, and New Zealand, have a shark management plan.

<sup>3</sup> Chen Hin Keong 1996:31; Reid and Fox 1992; Fox 1998; Osseweijer 2001.

perceptions about sharks entertained by governments, fishermen, and consumers in the colonial past, or more precisely the early twentieth century, and the present, I show that the attitude towards shark fishing has grown more positive and is implicitly supported by the Indonesian government. The shark-fishing situation in the late 1990s is illustrated by a case study of the Aru Islands in eastern Indonesia.

### *Shark products and consumer perceptions*

Sharks provide many products, both edible and inedible, such as fins, skin, lips, stomach, liver, cartilage, and teeth. Of all shark products, fins are the most valued. Shark fin is one of the most expensive fish products in the world. Fins are used to prepare soup, which is mainly appreciated by Chinese ethnic groups and can be sold for as much as US\$100 per bowl (Chen Hin Keong 1996). The benefits of shark fin as documented by ancient Chinese medical books include rejuvenation, appetite enhancement, nourishing to blood, beneficial to vital energy, kidneys, lungs, bones and many other parts of the body. Today, shark fin is primarily served at dinner parties to express the host's respect for his guests, usually at weddings and other important functions. The most shark fin is consumed between October and February, the customary season for weddings and other parties, with a peak during Chinese New Year (Vannuccini 1999; Chen Hin Keong 1996).

The world of the shark-fin trade, like that of some other exotic products, is an intriguing one, requiring a wealth of special knowledge to participate in it and to understand the value of fins fully, which means both their economic and cultural or culinary value. Shark fins are processed and marketed in many forms, such as fresh wet fins, raw fins in dried form only, semi-prepared with the skin removed but fibres still intact as one dry mass (which is usually the most expensive form as it is the cleanest and purest presentation), fully prepared, packed in cardboard boxes or simply in a single or double layer of viscose film, frozen prepared fins, fins in brine, and ready-to-eat or ready-to-cook products. There are various grades and categorizations. First there is a gradation according to the type of fin, which roughly distinguishes between first grade, or the first dorsal fin, the pair of pectorals, and the lower lobe of the tail, and lower grade, which consists of all other fins, namely second dorsal fin, the pair of ventral fins, and the anal fin. Another way of grading is based on colour. In this system white fins are preferred to black. Moreover, shark fins are traditionally traded as fin sets, and preference is given to complete sets from the same shark rather than a mixture (Vannuccini 1999). According to experts, a complete set consists of two pectoral fins, the first (rarely the second) dorsal fin, and the lower lobe of the tail fin. The proportion of fins by quantity should normally be around 50 per cent for pectoral fins, 25 per cent for dorsal fins, and 25 per cent for tail fins (Figure 2). It is rather difficult to pinpoint the pre-

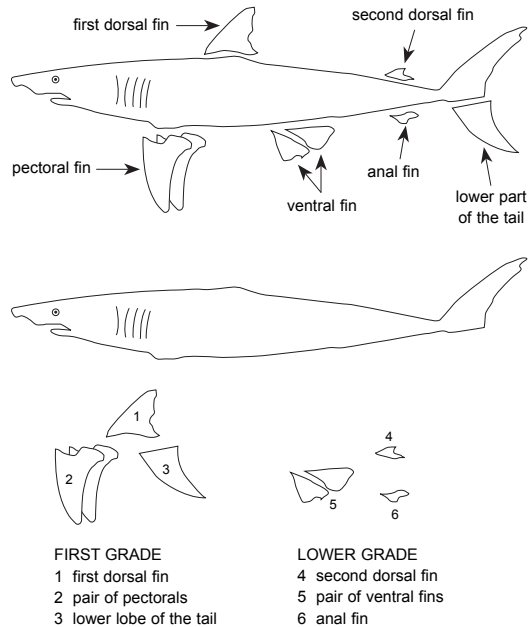


Figure 2. First grade and lower grade shark's fins (Source: Vannuccini 1999)

ferred species. This varies from country to country and even among individuals, although it is safe to say that the fins of sharks over 1.5 metres in length are preferred by all consumers (Vannuccini 1999: section 6.2.4).

The commercial value of the fin depends on various factors, the principal ones being: 1. percentage yield of fin rays or fin needles, which varies with type of fin, with shark species, and how the fin is processed; 2. general appearance of the fin, its colour and cleanliness; and 3. texture or tenderness of the fin. Generally speaking, the price of shark fins, worldwide, increased dramatically in the late 1980s and 1990s. This reflects the substantial growth in demand, which is linked mainly to the opening of the Chinese market and the simultaneous reduction of tariffs, plus the relaxing of political pressure in China that discouraged consumption of this product in the past, as it was considered too luxurious for domestic consumption (Chen Hin Keong 1996).

The expensive dried fins are retailed in specialty shops in cities, where other (mostly) dried products are sold, such as sea cucumbers, sea horses, edible birds' nests, ginseng roots and the like. Sometimes fins are packed in special gift boxes and sell easily for hundreds of dollars. In wet markets, semi-processed fins are sold. However, in Singapore and Hong Kong, two major centres for shark-fin consumption, only older women are still knowledgeable

about the preparation of shark fins. It takes two to three days to soak, cook, and simmer the fins. Their daughters and granddaughters have lost interest in traditional recipes, mainly because their life-style has changed and they no longer have time to spend so many hours cooking.

### *Shark fisheries in Indonesia*

In Indonesia, shark fishing has long been a practice in which artisanal or small-scale fishermen engaged, but unfortunately there are no thorough descriptions of how it was actually done. Starting in the early twentieth century, shark fishing began to appear in colonial newspaper articles and was mooted as a new opportunity for Netherlands Indies fisheries. In a 1930 article on shark fisheries in South Africa, it was explained that this new business was flourishing and was thought to be a way to increase fishermen's safety at sea. In those days, sharks were clearly regarded as vicious, dangerous animals which had to be hunted as much as possible. It was also suggested that shark fishery would be good for Indonesia, especially in the region between Batavia and Singapore (*Haaienvisscherij* 1930c:1624). A fortnight later, in the same weekly agricultural newspaper, a shark-fishing experiment in the Lingga Archipelago (Riau) was described. Sharks were caught with gill nets and used for their skin, meat (to be salted and dried), and fins. The skin was to be exported to Europe, the meat and fins were destined for Singapore (*Haaienvisscherij* 1930d:1702).

Mrs Weber-van Bosse who accompanied her husband, Professor Weber, on a scientific expedition on the *H.M. Siboga*, vividly conveys the contemporary perception of sharks even earlier in the twentieth century:

While we were still at dinner, the steward told us excitedly that sharks were swimming around the ship, and instantly everyone was up and rearing to catch these sailors' enemies. [...] I firmly believe that every sailor is convinced that there is always a shark lurking nearby to devour him or to bite off his leg, should he accidentally fall into the water, and that for this reason the sailor bears the sharks such a profound hatred.<sup>4</sup>

In the articles promoting shark fishing, it is this – sharks being the enemy of fishermen and sailors – which is given as a reason for starting shark fishing on a large scale. This was backed up by an economic reason, namely to promote the 'sea predator fishery', a fishery 'which might become much more significant than the catch of fish as popular food' (*Haaienvisscherij* 1930b:145).

According to an American ichthyologist, around 43 per cent of a shark's weight had economic value, consisting of 15 per cent meat, 6 per cent tanned epidermis, 6 per cent cattle feed, 5 per cent fish oil, 5 per cent fertilizer, 2 per

<sup>4</sup> Weber-van Bosse 2000:34. All English translations of Dutch quotes from colonial accounts in this article are my own.

cent split leather, and 2 per cent fins. Although the dried meat was traded to Java, Madura, and China, the dried fins were sent exclusively to China (*Zeevisscherij in Indië* 1929:1025-6; *Haaienvisscherij* 1930b:145). He contends:

When the public reads about sharks, what springs to mind is a frightening fish, which, with a pilot fish in front, renders ships at sea unsafe and provides material for a host of fascinating adventures in popular boys' books. Rarely is it supposed [...] that the shark is a fish which can be as useful to humans as a cow. (*Nieuwe bron van inkomsten* 1929:1159.)

As a result of this promotion, the government advisor on sea fisheries in the Netherlands Indies, Johan Poortman, who was asked to draft a plan for future sea fisheries in the Indies waters along the same lines as that for European fisheries, included shark fishery in his assessment. Therefore, in June 1930, on the initiative of the Dutch government, a KPM (Koninklijke Paketvaart Maatschappij)-sponsored steamship was dispatched to the Lingga Archipelago in Riau to start collecting samples of shark products. Four smaller motorboats accompanied the steamship and the sharks and rays were caught in heavy set nets. This one-year experimental business focused on good quality shark skins, dried and salted shark meat, and dried fins. In the *Indische Gids*, it was excitedly stated that if it were true that the shark could be frequently found in the Indian archipelago in such numbers as found nowhere else in the world, then Indonesian waters would contain a wealth so great that it would be almost impossible to calculate, an opportunity that had so far been left untouched (*Zeevisscherij in Indië* 1929:1256).

After only five months, the same journal reported disappointing shark catches. The reason given for the small catch was that the sharks had migrated elsewhere, seeking places unknown to fishermen. Professor Delsman, director of the Aquarium in Batavia, who was interviewed for the journal, explained that scientists still had a great deal to learn about shark behaviour. However, he considered it likely that the sharks had migrated in response to a change in monsoons (*Haaienvisscherij* 1930a:1025-6; see also *Indisch verslag* 1931:155).

The descriptions of shark fishing mentioned above are all comments by Dutch people who were encouraged to invest in the new fishing branch. References to local people fishing for shark in the colonial period are far fewer. The oldest report is by a civil servant writing to the Governor-General in Batavia in 1800, saying that the bay was rich in fish and teeming with sharks. The Javanese feared the sharks but caught them in great numbers. Apparently, all the oil found in these people's houses was shark oil (Delsman 1923:62). Elsewhere there are brief mentions of shark fisheries in Maluku (*Zeevisscherijen* 1882:328), shark and ray fishing near the Rokan River in east Sumatra, described by H. Delsman (1922:157), and local, small-scale shark fishing off the shore of the north coast of Java and Madura using long lines, as noted in



the *Indisch verslag* (1931:150).

A more detailed account is given by W. Kooiman (1918:501-3), who wrote about shark fishing in Wijnkoopsbaai (today Teluk Pelabuhan Ratu) with the romantic title 'A dreamer on a shark fishing trip'. He describes how every night at half past seven the *prahoe oesoep*, the smallest boats used in Pelabuhan Ratu, with three men on board, would leave with the offshore wind to sail to the fishing grounds close to the bay. There, with the help of torches, the fishermen started fishing for bait fish (ribbon fish or *ikan layur*) using a long line. Around five o'clock in the morning, the boats left the fishing grounds to set sail to the offshore area where sharks would be caught. Using a long line (80-200 *depa* or *vadem*<sup>5</sup>) tied around his knees and neck, the fisherman woke up immediately he felt a strong tug. The line was tied to the boat and, if the shark was a large one, the men let the shark drag along behind the boat. By constantly hauling and then giving rein to the line, the shark became exhausted (*hioe ngamok*). In the end, the weakened shark gave in and could be hauled into the boat. If the shark was too big, the line was cut to prevent serious accidents.

The line is hauled in and the shark, finally in view, is violently thrashing the water with its huge tail and rotating the line, so that its white belly becomes visible and then once again its shiny leaden back. [...] [B]y the large dorsal fin, which rises quite a height above the gunnels, the people waiting on the beach know whether or not a shark has been caught. (Kooiman 1918:503.)

After independence up until the 1980s, there is a blank in information on shark fisheries in Indonesia. Most of the western and central provinces of Indonesia saw the greatest expansion in the shark catch during the early 1980s. Since then, catches have generally decreased or remained constant. In the eastern provinces of North Sulawesi, Maluku, Nusa Tenggara Barat, and Irian Jaya, the catches have been increasing enormously since the late 1980s. Thus while there has been an increase in overall shark catch, there has also been a significant shift in its geographical distribution. At the peak of the shark-fin trade, the total export of shark fins from Indonesia was 547 metric tonnes, which is the equivalent of about 40,000 to 60,000 metric tonnes of live-weight shark. The recorded landings of shark in that year totalled 36,884 metric tonnes (Chen Hin Keong 1996:19).

A decline in fin size is often seen as an indicator that a shark population is being threatened. Perhaps the sudden increase in fin prices (in dollars) since the Asian economic crisis (1998) might be an indicator as well, although caution should be exercised here. Shark fins, like other maritime products, have always been traded in dollars (Singapore and US dollars), and the crisis resulted in a devaluation of Asian currencies. Apart from the fact that there

<sup>5</sup> A *depa* (also known as *vadem* or fathom) is approximately 1.8 meters (De Graaff and Stibbe 1918:686).

is hardly any good overview of the population dynamics of each shark stock, which makes it impossible to estimate whether the level of the current shark harvest is sustainable or not, the government of Indonesia, or more precisely the Department of Fisheries and Sea Affairs, does not have any special management or policy for sharks.

*Case study: the Aru Islands*

Shark fins, like other products for which Aru is renowned, which include pearl oysters, edible sea cucumbers (*trepang*), edible birds' nests, mother-of-pearl shell, and birds of paradise, have gone through boom-and-bust cycles, often more than once. Having been part of a trade network in Southeast Asia for nearly two thousand years, from the mid-seventeenth century the Aru Islands developed into a region where marine products for the China market were collected, with Dobo as its major trade entrepôt (Spyer 2000:25; Swadling 1996:166). Especially since the nineteenth century, written sources have described this trade in Aru, which initially was mostly in the hands of Makassarese, Moluccan, and some Arab traders, but after 1860 was dominated by Chinese migrant traders. Up until the present, Dobo has retained its role of trade entrepôt, where dozens of Chinese trader families have lived for generation after generation, buying the natural resources which are in such high demand from local Arunese fishers and hunters, and in return providing the islanders with modern consumer goods and food products (Osseweijer 2001).

Although shark fins formed part of the total package of luxury marine products from Aru, pearls, mother-of-pearl shells, and trepang must have figured more prominently, at least in the eyes of the nineteenth-century writers who reported on trade of the Aru Islands. Shark fins barely rate a mention. The earliest accounts of the shark-fin trade are by Wallace (1962:329) and Van Hoëvell (1890:76, 86, 99). Up to that time, trepang and pearl shell had made up the bulk of Aru exports. Wallace describes shark fins as one of the many products brought to Dobo by Aru Islanders living in backshore villages. Van Hoëvell gives trade statistics in which shark fins are mentioned as one of the significant export products from Aru. The amount of shark fins and the price they fetched, however, reveal that this product was not yet very popular. Whereas mother-of-pearl and edible sea cucumber exports were 1325.5 *pikol* (at f100) and 863 *pikol* (at f30), respectively, in 1885 shark fins were only 252 *kati*<sup>6</sup> (at f0.50) (Van Hoëvell 1890:99).

Apart from these reports, which mention shark fins as a product, there are no descriptions of the fishery itself. Consequently, it is difficult to say who caught the sharks in Aru – local people or outsider fishermen. However, it seems likely that specialist shark fishermen from southeast Sulawesi, who are

<sup>6</sup> One *pikol* is approximately 62 kilograms; one *kati* is 0.617 kilogram (De Graaf and Stibbe 1918:688).

known to have targeted sharks for centuries, caught the sharks for their meat and fins. Sulawesi fishermen undertook long annual voyages and fished for sharks using hand lines. To attract the creatures, they used a shark rattle, a bamboo pole hung about with coconut shells (Wallner and McLoughlin 1995). Local perceptions of sharks are briefly mentioned by the assistant-resident of the Moluccas, C. Bosscher, who in his description of the physical appearance of the Arunese says that they had beautiful long hair which was bunched together but never touched by a comb. This tangled mop of hair was believed to scare off sharks and other fish (Bosscher 1854:342). Thirty years later, Riedel (1886:253) explained that certain Aru families honoured crocodiles and sharks as their ancestors and kept carvings of these animals, which they were forbidden to consume, in their houses. Whether Arunese fishermen really did catch sharks for their fins is not known. Certainly, older Arunese people remember particular shark species, especially rays, always having been caught for food.

In the late 1980s, shark fishing in Aru boomed again. As Patricia Spyer recounts, local fin prices had shot up and tail and dorsal fins were found sun-drying in front of houses and Chinese shops; new boats were built, and shark nets were made or repaired. New consumer products bought with shark money were to be seen everywhere, in backshore villages as well as in the main town of the archipelago, Dobo. As a result of the massive exploitation of sharks, in 1994 there were already signs of a decline in the shark population in Aru waters (Spyer 2000:22-3).

### *Non-local shark fishermen*

Today, as in many other fisheries in eastern Indonesia, fishermen from southern Sulawesi dominate the Aru shark fishery.<sup>7</sup> Sulawesi shark fishermen, like their fellow fishermen targeting other marine species such as Trochus shells (*lola*), are known for migrating from one region to another, 'following the resources', that is, as soon as stocks become exhausted in one place, they move to another. While their network covers the whole of Indonesia, they do still have a home village in Sulawesi or elsewhere in eastern Indonesia. As James Fox (1992:17) said of Buton fishermen, there is a clear impression

[...] of a highly mobile (almost nomadic) younger male population who for the most part have taken up sailing at an early age and therefore have little formal education; who spend a great deal of their time away from their 'home village'; and who may eventually, as circumstances permit, marry a woman from any settlement within their 'network'. In the off-season, most of these fishermen would engage in farming, in boat-building or in local petty trading to earn their meagre living.

<sup>7</sup> Unless explicitly sourced, the next two paragraphs rely heavily on and are partly taken from Chapter IV of my unpublished PhD thesis (Osseweijer 2001).

This is equally true of the shark fishermen of Aru: Bugis and Buton fishermen are seasonally involved in shark fishing and arrive in Dobo at the beginning of the west monsoon in September. Many of them remain in Aru until December and continue fishing from March to June, after which they return to their families in Sulawesi. During the fishing season, the fishermen live on their fishing vessels. There are also fishers who live in Dobo and return to Sulawesi only once every few years. Buton shark fishermen come from various locations in eastern Indonesia (Bonerate, Flores, and Alor), which together form what is known as the Buton network (Abe 1999).

When I visited Aru in 1996, the shark-fin fishery was completely in the hands of Sulawesi fishermen. By the following year, however, the Arunese residents of the village of Batugoyang had taken up shark fishing and had made it their primary maritime product. In southeast Aru, where my research was carried out, the presence of Sulawesi fishermen (of whom the majority are Bugis) was highly visible: in the trade settlement of Meror, almost without exception, there were several of their brightly coloured boats, locally referred to as *motor pancing* (fishing boats), riding at anchor. Sometimes the number of these boats would rise as high as twenty. The fishers themselves were easily recognizable by their appearance: rather short men wearing a typical checked sarong.

In 1996, before I had spoken to any backshore fishermen, I encountered shark fishers from Sulawesi in Meror. Unlike local Arunese villagers who visited Meror every day, the shark fishermen were not at all shy and liked hanging around on the veranda of the nature conservation office where I was staying. Although they enjoyed asking questions about my stay in this remote place, they were less willing to talk about their business in Aru. After some time, this reluctance wore off and a couple of fishermen showed me some of their shark fins, locally categorized as 'super', in the very narrow, low cabin of their boat. Bugis boats are lower and more streamlined than their high Buton counterparts. The boats have a capacity of between ten and fifty tonnes and are either owned by the captain (*juragan*), who has borrowed money from a trader in Sulawesi (or even in Dobo) to buy the engine, or are (partly) owned by the trader, who then receives a certain percentage of the catch. Besides these, there were also boats owned by *haji* in Dobo or Sulawesi. In all cases, there was an unmistakably strong relationship between the Sulawesi fishers and Chinese traders in Dobo. Invariably on such boats there is a clear division of labour. Navigation is the responsibility of the captain. The crew or *anak buah kapal* (ABK) shoulder the manual work, such as catching bait, pulling in lines, cutting and drying fins, and day-to-day maintenance of the ship. The crew and the captain share the catch, of which the captain always receives a bigger share, as well as the expenses of each fishing trip (fuel, food and other supplies) (see also Abe 1999).

During the time I spent in the region, contact with these shark fishermen continued to be difficult. Even attempts to become better acquainted with

them in an informal setting, for instance, during an Idul Fitri picnic organized by one of the Meror traders, did nothing to dispel the great reluctance shown by the fishermen to share any information about shark fishing. In a group interview with the whole crew of one of the Bugis boats in Meror joined by some interested colleagues from other boats, we all sat on the deck of a trader's boat and for a few minutes the young fishermen spoke about shark fishing. They gave some names of the sharks they regularly caught, and pointed them out in my booklet of shark photos, all showing off their knowledge by summing up as many names as possible, such as the 'seven fin shark' (*tujuh sirip* or whitetip reefshark), the *tarantikolo* (blacktip reef shark, and common blacktip shark), and the *pandru* (white spotted guitarfish, and the giant shovel-nose ray). It was mostly the older fishermen who gave some explanation of shark fishing, as it was their right by seniority to display their knowledge. Depending on weather conditions and the total catch, they explained, fishermen usually spent fifteen to twenty days at sea in the vicinity of Enu Island<sup>8</sup> and as far south as Australian territorial waters. Then they would return to Meror to buy provisions in exchange for some shark fins. The sharks were caught with pelagic long lines longer than 100 m, using hooks of 7.5 and 9.5 cm, baited with dolphin meat. The lines were put out at night, and hauled in early in the morning. Then the crew would start cutting off the fins of the sharks, mostly dead by then, keeping the fins together as a set of four. The fins were left to dry in the sun on the roof of the cabin. The shark carcasses were thrown overboard, because shark meat fetched only Rp. 500 per kilo and was not worth the space it would take up, as it would have to be salted and stored in barrels. A small proportion of the total catch of shark fins was sold in Meror to pay for fuel and necessary purchases.

The crew consisted mostly of relatively young men, who had come along with their relatives. Once one of these young men proudly described his work while two of his friends, both crew on other Ujung Pandang boats, listened and nodded:

I have been in Dobo for four years now, with my uncle. We come from Ujung Pandang. We sail the *Cahaya Perkasa*, which is owned by a man in Ujung Pandang, and we catch sharks. We don't receive a steady income. This only happens when we sail the boat of our Chinese 'boss' in Dobo. Usually we stay at sea for twenty days, and then, if the catch is enough to settle the debt and make a little profit as well, we return to Dobo. We repay our credit to our 'boss' and sell the fins. Today, shark fishing is very good: 'super' fins yield Rp. 650,000 per kilo. So, unlike in the past, when twenty fins would hardly cover the debt, today we all receive a few million rupiah profit!

<sup>8</sup> Enu and Karang are known as islands where green turtles (*Chelonia mydas*) come ashore at high tide to pick a suitable spot to lay their eggs.

Whenever the boats anchored in Meror, the crews would hang out in the small settlement, sitting in the shade of the big tree in front of one of the shops, or loafing around in the store, watching television or just talking. Quite often the fishermen liked to provoke the Arunese villagers and would shout remarks at them as they strolled on the jetty. Fishermen who were cleaning or painting their boats always found this a source of entertainment. Especially when drunk, the fishers could be very nasty towards both the men and women of the village, although most of the time the fishermen would start brawls among themselves. Local villagers often complained about their behaviour, saying that 'being Muslim they should know how to behave better'. Generally speaking, though, the villagers accepted but did not appreciate the presence of the Sulawesi fishermen, and kept them at arm's length from their village life. Equally unimpressed, the shark fishermen thought that Arunese Islanders were primitive and backward.

When fishing in the Arafura Sea, off the southeast coast of Aru, these fishermen usually do not hunt for sharks within the waters traditionally claimed by local Aru communities. Only when hit by bad weather do they anchor near Enu Island, and on these occasions they collect sea turtle eggs on the beach and catch fish at sea. As a general rule, Sulawesi fishers do not recognize local marine ownership conventions and uphold the national idea that open access is applicable to the Indonesian seas. The Indonesian slogan *Satu nusa, satu bangsa, satu bahasa* (One land, one people, one language) is emphatically transferred to fisheries, turning the sea into common property, teeming resources which can be exploited by all Indonesian citizens. With this idea of freedom in mind and in search of rich fishing grounds, many Sulawesi fishermen in Meror, of Makassarese, Bugis, and Butonese origin, find themselves fishing close to and even in Australian waters. They proudly recounted stories about their shark fishing in the Australian Economic Zone, which begins only a few hours' sail from southeast Aru. Sometimes they also recalled being caught by the Australian navy and taken to Darwin. Although Ashmore Reef and four other reefs on the northwest Australian continental shelf are identified in a Memorandum of Understanding as a region to which traditional Indonesian fishermen are given access, these waters south of Aru are not subject to such a special arrangement (Campbell and Wilson 1993; Fox 1998).

The main reason to go as far as northern Australian waters is the abundance of big sharks there, as opposed to the recent situation in the Arafura Sea. It is considered lucrative enough to take the risk of crossing the territorial border and being caught, which usually results in losing both the catch and the boat (which are seized and burnt). Especially with shark fin prices as high as they have been since 1998 (up to Rp. 650,000 per kilo), the potential catch has seemed worth the risk of losing a less than optimally seaworthy boat.



Nevertheless, for many fishermen, whether they own their boat or not, the loss of a vessel is devastating. Often it is their only means of income and the whole crew and their families are affected.

As Fox contends, the magistrates in Darwin intended to warn small-scale fishermen by seizing boats and catches when they enter Australian waters (Fox 1992:21). However, in 1998 when I visited Aru, the newspapers regularly carried stories about Indonesian shark fishermen being arrested in Australia, and the Sulawesi shark fishermen in Meror still talked about trips to the Australian waters. The penalty was high, but obviously the risk of being apprehended was considered fairly negligible.

Although these are the main players, there are other shark fishers in this region. One group, which hardly ever interacted with Arunese villagers or Sulawesi shark fishermen, was Dobo-based fishers on boats owned by Chinese. They catch sharks using two-kilometre-long drift nets. They too operate in the region between Enu and Australia. Only occasionally did these boats put in to Meror (during bad weather, or just to pay a visit to traders) and the roofs of the cabins were completely covered with hundreds of shark fins drying in the sun: mainly of blacktip and whitetip reef sharks, and tiger sharks. Scattered among the fins were other parts of a shark's anatomy like stomachs. The other outsiders were the fishermen on boats locally referred to as *Tanjung Balai* boats. These boats were said to come from Karimun, one of the Riau islands off the east coast of Sumatra, but operating from Benjina, the industrial fishing settlement along the Workai strait in Aru. These boats primarily fished for *ikan merah* (red snapper – *Lutjanidae* spp.) for which they had refrigeration facilities on board, but regularly attracted sharks with their baited long lines as well. For these fishermen, sharks were just a by-catch, but a very lucrative one, and selling fins brought them extra income. On a daily basis they could easily catch between three and ten big sharks with 'super' category fins.

#### *Arunese shark fishermen*

The Arunese, who live along the backshore, or the east coast of the islands, depend economically on their natural coastal environment, which consists of forest, savannah, mangroves, sandy beaches, tidal flats, and islets. In these various environments, the islanders are mainly involved in activities referred to as *mencari*, the foraging (of natural resources). To a large extent, they rely on the collection of non-domesticated foodstuffs, of which extraction of starch from the *Metroxylon* palm (sago) is one of the most significant. The harvest of the sea, too, has been important in Aru's coastal zone, for both consumption and trading purposes, and since the 1980s it has become the most important source of livelihood (*mata pencarian*). Almost all male villagers participate in fishing and diving at sea, or gathering on the tidal flats and coral reefs (Osseweijer 2001:62-



3). Having noticed the fortunes made by Bugis and Buton shark fishermen, a large group of Batugoyang men followed the trend and shifted from diving for pearl oysters and trepang, the traditional resource-extraction activities, to shark fishing, which has become one of their main income-generating activities. They have been able to do so because they have obtained gill nets from other fishing boats in their waters; sometimes in exchange for access to the waters near Batugoyang, but more often simply stolen from these boats. With more probity, a few men bought nets with a government subsidy for underdeveloped villages to start small businesses (locally referred to as *Inpres Desa Tertinggal*).

During the west monsoon (September to March), all boats are used for shark fishing, six days a week. The boats are traditional *belang*, but a bit larger and always with cabins instead of plastic covers, and are owned or shared by a family group, of which the custom in Beltubur provides an example. Usually the fishermen leave at the end of the day, between 4 and 7 p.m., taking along several sets of nets (*kepala*) approximately 40 *depa* in length. Early in the morning, the shark catch is landed on the sandy beach of the lower village, and female relatives of the fishermen come to cut the fins from the carcasses. The sharks caught are mainly very small, yielding fins known as *kacang-kacang* (very small). The meat is cut, salted, and then taken into the village to dry in the sun. It is for home consumption only. The village seems to be festooned with shark fins being dried on racks or lines. The men spend the day mending their nets.

Batugoyang men have created their own niche fishery by using drift nets in fishing grounds close to the shore. They leave it to Bugis and Buton fishermen to catch larger sharks using long lines and bait, happy to let them sail much farther away from the archipelago. Hence a harmonious situation prevails in the shark fisheries, as long as each group remains in its own waters, and as long as outsider fishermen do not enter the inshore waters where most of the islanders engage in other resource extraction activities. In Beltubur, a village some two-and-a-half hours sail to the north of Batugoyang, only one man occasionally fished for sharks. Others complained, saying they would like to catch sharks but did not have the necessary nets. The sons of the two Chinese-Indonesian traders, like other traders' children in the region, were involved in shark fishing, both using their own small boats and being assisted by young men from Kei and Tanimbar, who temporarily spent time in this remote region earning a living. The reason most often heard there to explain the reluctance to go shark fishing was that the tiger shark and the hammerhead shark are associated with certain families.<sup>9</sup> Those who have a special

<sup>9</sup> Aru islanders perceive the land and seascape as places that remind them of their ancestors (*kaijenan*), who set their footprints there (see also Pannell, this volume). The landscape is a collection of actions and events by ancestors in a far-away past (*ninuijjesir*), ancestors who are not with the people in this world anymore, but reside in another dimension. All ancestors are associated with land and sea animals, and certain ancestors of certain family groups or clans are known to have relations with sharks. Therefore, members of these clans are not allowed to catch or eat sharks.

mythical relationship with the hammerhead are also known for their power to call the shark to protect their family or to scare off enemies. In a symbolic coming onto land, the shark symbol is used for magic charms, made from the veins of sago palm fronds, to protect garden produce. The punishment for ignoring the charm and stealing fruit and vegetables is to be attacked by a shark while diving. Despite such old traditions, it is highly likely that even the Aru Islanders with their shark ancestors will soon be attracted by the high prices for shark fins, as has already happened in the Solomon Islands (Cunningham-Day 2001:11).

As far as overfishing is concerned, both local and outsider fishermen in Aru did not seem to be very worried about the future of shark-fin fisheries. Arunese fishermen from Batugoyang noticed smaller catches, but at the time of my fieldwork did not believe that this presaged a difficult future. Sulawesi fisherman acknowledged smaller catches and decreasing fin sizes, too, but as long as prices were still rising it was profitable for them and hence a matter to be shrugged off. In the unlikely event of severe depletion of sharks, the fishermen explained, they would just move to other regions known for abundant sharks. This is the way they have always done in fisheries.

### *Conclusion*

Sharks have evoked various images down the centuries. Whereas Chinese consumers very much appreciate sharks for their fins, and other body parts, for many centuries Westerners and Indonesians alike have feared sharks as dangerous animals and as enemies of humankind. Sharks were better dead than alive. Certain ethnic groups in Indonesia, such as the Arunese families in the case study, value the shark as a potentially dangerous but mythical and ancestral animal, which should not be caught or consumed. In response to the opening of the Chinese market for shark fins in the 1980s, the shark-fin trade in Indonesia boomed, and various groups of Indonesian fishermen have turned to shark fisheries. Especially fishermen from Sulawesi stepped into this niche and expanded the fishing frontier to the eastern Indonesian seas and even to the Australian Economic Zone. Suddenly the shark became a target species with which to earn plenty of money in a short period of time.

As a result of this 'discovery' of the commercial value of sharks and the continuous growth of the fin trade, which has been accompanied by a rapid decline in shark-fin catches per fishing boat (usually a sign of overexploitation), since the 1990s there has been growing international concern about the status of shark species. There is a widely acknowledged need to improve shark fishery monitoring, expand biological research, and take management action (Chen Hin Keong 1996:1). Sustainable management plans for shark fisheries should be based upon reproductive rates, which requires knowledge of shark

life-histories, including vulnerable life stages, population dynamics, and spatial and temporal distribution. Life-history knowledge is also needed to put legislative protection in place, which is preferably targeted at individual species and vulnerable life stages as well as particular nursery and mating zones (Cunningham-Day 2001:9-10). In the case of Indonesia, as for many other places, this knowledge is not yet available. However, management of shark fisheries is only possible if there is a change in attitude that would allow the implementation of regulated sustainable exploitation of marine resources. Otherwise shark fishery is likely to collapse, and fisheries that have collapsed are by no means an exception. Looking at the history of world fisheries, several well-known cases spring to mind, among them the Atlantic cod fishery (Kurlansky 1998) and the spiny dogfish fisheries in British Columbia in 1907-1949 and in the Scottish and Norwegian waters in 1946-1986 (Cunningham-Day 2001:25).

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## **Part Two Hazards of sea and water**





JAMES F. WARREN

**A tale of two centuries**  
**The globalization of maritime raiding and piracy**  
**in Southeast Asia at the end of the eighteenth**  
**and twentieth centuries**

*Introduction: connections and problems of framing and definition*

Maritime raiding already existed when the Portuguese arrived in Asia in the sixteenth century (Corteseo 1944:I,147, II, 233). But the incidence of piracy in Southeast Asia (the region encompassing all the countries within a boundary defined by India, China, Australia and New Guinea) only rises dramatically in direct response to colonialism and western enterprise. There is a strong inter-connective relationship between the ascendancy of long-distance maritime raiding or 'piracy' on a regional scale and the development of an economic boom in Southeast Asia linked to the China trade at the end of the eighteenth century. In this context, maritime raiding was also closely linked to slaving and slavery as social and economic phenomena that became a crucial part of an emergent global commercial system and economic growth in the region.

The comparative temporal perspectives in this paper, which covers the latter part of two centuries, the late eighteenth and the late twentieth centuries, lends considerable explanatory power to my treatment of the multi-faceted links and changes between Iranun maritime raiding, on the one hand, and on the other, modern day crime on the high seas in Southeast Asia, with the China connection, growing commodity flows, and the fluctuations of the global economy (Warren 1981, 1998a, 2001). Just as maritime raiders and slavers became generally active due to global economic development and disruption(s) in Asia in the 1790s, the incidence of piracy, or crime and terrorism on the high seas in Southeast Asia has steadily increased in a time of desperation at the end of the twentieth century; the final decade marked by widespread ethnic and political conflict and the near total collapse of global financial systems and associated regional trade by the late 1990s.

For me, one way to make sense of this extraordinary burst of maritime raiding at the end of the eighteenth century, is by viewing it from the standpoint of the interests, perspectives and conceptual frameworks marking the

initial opening of China to the west and the emergence of new global ethnoscares, such as the Sulu Zone, and then comparing and contrasting that with China's recent momentous economic transition that has paralleled bouts of trans-national maritime crime and piracy in Southeast Asia at the end of the twentieth century. These Iranun 'pirates' were among the first real predators of global commerce in the eyes of the West by the end of the eighteenth century, and, as a new high-seas breed, were well organized, financed and ruthless. And their latter day counterparts of sorts would be on the rise again two centuries later, after 1968 in the Strait of Malacca, the Gulf of Thailand, the South China Sea and in the waters surrounding the Sulu Archipelago.

Central to my notion of late eighteenth century globalization is the realization of the inter-connectivity of local day-to-day activities and events either read or construed as maritime raiding or 'piracy' on one side of the globe, namely Southeast Asia, and the removal of the civilizational, societal, ethnic and regional boundaries on the other side of the regional out-there, and of the globe (Giddens 1996). The discovery of the global as a condition for the advent of Iranun maritime raiding, in the 1790s, requires, I would thus argue, a specific shift in subjectivity and framing; it marks, at one level, recognition of the continuing struggle of the reified 'other', Iranun, or latter day criminal and terrorist, against the history of modernity and the four centuries of western efforts to gain hegemony over the oceans and seas of Asia. Eric Wolf (1982), in his path-breaking book, *Europe and the people without history* traces the development and nature of the chains of causes and consequences of the complex relationship between Europe and the rest of the post-1400 world. By emphasizing a common past, he persuasively argues that European expansion created a market of global magnitude, by incorporating pre-existing networks of exchange, and by creating new itineraries and historical trajectories between continents which linked European and non-European populations and societies. This pattern of historical processes and international commodity exchange would also foster regional specialization and initiate worldwide movements of commodities. This history of connection between Europe and non-European societies also gave rise to long range maritime raiding or 'piracy' in Southeast Asia on a hitherto unknown scale at the end of the eighteenth century. Essentially the growth of European trade and dominion – capitalism – would bring about a qualitative change not only in the regnant mode of production, but also in the commercial network connected with it (Wolf 1982:386-9).

The Sulu Zone was an area of great economic vitality at the end of the eighteenth century. This vitality was based on global-local links to the China trade. Commodities – marine and jungle products found within the Zone – were highly desired on the Canton market, and as Sulu chiefs prospered through strict regulation of the redistributive economy, they required more and more

labour to collect and process these commodities. It was the Iranun, clients of the Sultan of Sulu, who scoured the shores of the island world in their swift raiding boats, finding slaves to meet this burgeoning labour demand. In the context of the development of the law of international sea piracy, the global economy and the advent of the China trade, it should be understood that the maritime raiding and slaving activities of the Iranun, so readily condemned in blanket terms as acts of 'piracy' by European colonial powers and later historians, were a traditional means of consolidating the economic base and political power of the Sultan and coastal chiefs of Sulu, and which functioned as an integral, albeit critical, part of the emerging statecraft and socio-political structure(s) of the Zone. Thus viewed from inside the Sulu world of the late eighteenth century, the term 'piracy' is difficult to sustain.

The term 'piracy' was essentially a European one. Significantly, Carl Trocki notes that the term appears in the Malay literature as a developing concept and a new terminology only in the latter half of the eighteenth century (Trocki 1988:262). The term subsequently criminalized political or commercial activities in Southeast Asia that indigenous maritime populations had hitherto considered part of their statecraft, cultural-ecological adaptation and social organization. Trocki, Esther Velthoen and I have demonstrated that it was the dynamic interplay between raiding – *merompak* (Malay) or *magooray* (Iranun) – and investment in the maritime luxury goods trade that was a major feature of the political economies of coastal Malay states. In effect, maritime raiding was an extension of local-regional trade and competition, and a principal mechanism of state formation, tax collection and the processes for the in-gathering – forced and voluntary – and dispersion of populations in the post late-eighteenth century Southeast Asian world. Wolf's influential theoretical work shows that European expansion not only transformed the trajectory of societies like Sulu but also reconstituted the historical accounts of their societies after intervention, introducing powerful new concepts, myths and terminologies linked to patterns of dominance, as in the case of the invention of the term 'piracy' in the Malay world at the end of the eighteenth century.

Because the way to power in Southeast Asia lay in control over slaves and dependent labour, guns and trade goods, it is not surprising that slaving in the region was bound up with maritime raiding and warfare. Captives were a main source of booty and, not surprisingly, they were also one of the leading items of regional trade (Warren 1998b:80-7; Reid 1983). The trading kingdoms and states in Southeast Asia were continually faced with the problem of a lack of labour power, and they were all, without exception, states that organized and conducted wars and systematic raids both over land and sea to seize labour power (Warren 1998b:80-7, 1998a; Scott 1999:3, 45). Their problem of a severe shortage of labour power was most acute in the coastal kingdoms that did not have an irrigated wet-rice core and depended on systems of trad-

ing, raiding and slaving for the development and evolution of statecraft and social structure.<sup>1</sup>

One major result of the rise of globalizing, cross-cultural commerce and wars of rival empires of trade was a systematic shift to maritime raiding and slaving on a more general scale than before by Southeast Asian coastal states now determined to seize labour power from wherever possible and by whatever means. The accelerated growth of global trade, especially with the Dutch and English, led to the widespread practice of the acquisition of slaves, by way of raiding, warfare or purchase, as a labour force to collect exotic products of the forests and seas as commodities for export to China, and to build and maintain public works and port facilities in the major port cities of Southeast Asia from the seventeenth to the late-eighteenth centuries. Because much of this activity took place at a time that coincided with the advent of large, standing maritime populations of sea-faring, trading-raiding peoples throughout the Southeast Asian region, the Malay sovereigns, as Christian Pelras, Barbara and Leonard Andaya and Velthoen have shown, often had recourse to particular Bugis and Bajau people whose skills and energies were cultivated for slave trafficking, the procurement of exotic marine products, particularly tripang, and who, under the sponsorship of various states and local lords, received encouragement to raid coastal shipping or neighbouring shores in the spice islands and the Strait of Malacca.<sup>2</sup>

'Piracy' suddenly appears at the end of the eighteenth century because of the economic boom developing across Asia with the greatly increased flow of commodities between Southeast Asia, China and the West. Here I want to resolve an apparent temporal paradox in Southeast Asian history about 'piracy' and politics in the Malay world and European imperial policy and expansion in the region. The paradox is that the rise of the Sulu Sultanate increased maritime raiding and the opening and imminent decline of China at the hands of Europe took place at much the same time (the eighteenth and first half of the nineteenth centuries) as the introduction of tea, an important commercial plant from China, in Europe (Warren 1998a:15). By the end of the eighteenth century, Britain's insatiable desire for this commodity was to change the face of Asian history and shape the future destinies of both Sulu and China. The capitalist world economy came to dominate Malay states like the Sulu Sultanate and its environs. Chinese demand for exotic commodities, suddenly of great interest to Europeans, encouraged both the establishment and 'take-off' of sub-regional trade networks and the production of commodity flows. New *entrepôts* emerged, especially in the area of the Sulu Sea and Borneo. The island of Jolo became a major centre for cross-cultural trade in the recent history of Asia and the Sulu Sultanate flourished. The Taosug became locked into

<sup>1</sup> Warren 1998b:80-7; 1998a, Scott 1999:3, 45; Sears 1993:6-9.

<sup>2</sup> Pelras 1996; L. Andaya 1975; B. Andaya 1993; Velthoen and Acciaiola 1993.

a vast web of trade and exchange involving the exploitation of the rich tropical resources of the area, with producers, distributors and controllers involved in a complex set of relationships and structural dependency. For the Sultan, with his capital located on the seacoast, the entrepôt and neighbouring areas incorporated a set of cultural-institutional practices typical of centralized trading states based on redistribution for the production and acquisition of goods, on the one hand, and kinship, warfare, slavery and other forms of organization and culture on the other. As the Sultanate and the Malay States organized their economies around the collection and distribution of marine and jungle commodities, there was a greater need for large-scale recruitment of labour to do the intensive work of procurement. An estimated sixty-eight thousand men laboured each year alone in the Sulu Zone's tripang fisheries to provide the popular Chinese exotica, a standard banquet fare that appeared on so many menus, sometimes braised with geese's feet or abalone. The Taosug with their retainers and slaves collected about ten thousand *pikul* of tripang in any one season in the first half of the nineteenth century (one *pikul* is equivalent to 133.33 pounds) (Warren 1981:61-2, 69-75). Birds' nest for the Qing cuisine had to be obtained in the wilderness of Borneo. The Iranun, the slave raiders of the Sulu Zone, met this need for a reliable source of workers. Within three decades (1768-1798) their raids encompassed all of insular Southeast Asia.

Certain lessons and examples from history about global economic-cultural interconnections and interdependencies tend to explain historical processes, patterns and events which have formally been glossed over. For example, sugar 'demanded' slaves and the Atlantic slave trade. Similarly, tea, inextricably bound to sugar as product and fate, would also inadvertently 'demand' slaves in the Sulu-Mindanao region and elsewhere and thus lead to the advent of Iranun maritime slave raiding or, what the British, Dutch and Spanish decried as 'piracy'. Since the British primarily wanted sea cucumber, sharks' fin and birds' nest for the trade in China tea, the issue of the nature of productive relations in Sulu – slavery – suddenly became primary at the end of the eighteenth century. The demand for certain local commodities in return for imports affected the allocation of labour power and the demand for fresh people throughout the Sulu Zone, as well as in other sectors of Southeast Asia. In this globalizing context, tea was more than simply the crucial commodity in the development of trade between China and Britain, it was also a plant that was instrumental in the stunning, systematic development of commerce, power and population in the Sulu Zone; a commerce which changed the regional face and history of Southeast Asia, and inadvertently gave birth in the Malay world to the essentially European term 'piracy'. Past and present historians of the colonial period, in considering the Iranun maritime raids and slaving activity, have uncritically adopted the interpretation perpetrated by interests 'on the right side of the gunboat' (Warren 1981:147). They have

relied heavily on sources inherently antagonistic to the nature of the society and values of the Iranun raiders, such as the hostile accounts of the Spanish friars, the printed reports of Dutch and English punitive expeditions, and Sir Thomas Stamford Raffles and James Brooke's influential reports on 'Malay piracy'. In these Eurocentric histories, which dwell on the activity of the Iranun at length, the term 'piracy' is conspicuously present in the titles.<sup>3</sup> While there are references to them in earlier histories, travel accounts, and official reports historians have had to burrow deeper and deeper into the fragmented sources in various archives in Europe and Southeast Asia, especially the Philippine National Archive, in order to reconstruct a detailed ethno-historical account of these maritime people. As I have shown in *The Sulu Zone*, particular sources are of critical importance, but they are of little value unless the historian knows what to do with them (Warren 1998a:51-8). The main impetus for fashioning a new understanding of the Iranun past has been the radical change in perspective that some historians have adopted to study the region's recent history and its continuing integration within the world capitalist economy. These changes in perspective attempt to combine the historiographical approaches and ideas of the Annales historians with the conceptual framework of world system theorists and solid ethnography.<sup>4</sup> Here, I again pay particular attention to the well written, stimulating book Eric Wolf (1982:384-91) wrote in the early 1980s, *Europe and the people without history*. Wolf argues that no community or nation is or has been an island, and the world, a totality of interconnected processes or systems, is not and never has been a sum of self-contained human groups and cultures. The modern world-system, as it developed, never confined capitalism to the political limitations of single states or empires. Wolf's postulations, if accepted, imply that an analysis of capitalism not limited to the study of single states or empires will be more complete and, in certain ways, less static. The point is that history consists of the interaction of variously structured and geographically distributed social entities which mutually reshape each other. The transformation of the West and China and the rise of the Iranun in modern Southeast Asian history cannot be separated: each is the other's history. In this paper, this ethnohistorical viewpoint is a fundamental frame of reference. No ethnic group, even those as apparently misunderstood as the Iranun, can be studied in isolation from the maritime world(s) around and beyond them (Warren 1978:477-90).

### *The Iranun: a deadly force*

The Iranun originally inhabited coastal stretches around the mouth of the Pulangi, Polok (Polluc) harbour and further round the eastern shore of Illana

<sup>3</sup> Barrantes 1878; Bernaldez 1857; Montero y Vidal 1888; Tarling 1963.

<sup>4</sup> Burke 1990; Baran 1957; Frank 1978; Wallerstein 1974.



Bay. By the start of the seventeenth century, thousands had also migrated inland to the lake and plateau region at the southwest corner of the Tiruray highlands. The maritime raiders, who, in the nineteenth century were labelled the Illanun (Illanoons), were, according to the Spanish, a distinct people, who inhabited the stretch of coast within the great bight of Illana Bay, from which they took their name, distinguishing themselves from other ethnic groups. This coast and Bay, whose shorefront constituted a continuous line of impenetrable mangrove and swamps, was readily linked to the great lake behind it, which the Iranun considered their stronghold and home, and hence they were termed by the Spaniards in Zamboanga and Manila a 'distinct race', *los llanos de Laguna*, or 'the Illanoons of the lake'.<sup>5</sup> The Iranun burst quite suddenly into Southeast Asian history in the second half of the eighteenth century with a series of terrifying raids and attacks on the coasts and shipping of the Philippines, the Strait of Malacca and the islands beyond Sulawesi. Their primary targets were unprotected coastal settlements and sailing boats that travelled throughout Southeast Asia bringing valuable commodities from China and the West back to the most remote parts of the archipelago. Many of these marauders were sponsored under the authority of rulers from the trading states of Sulu, Cotabato, Siak and Sambas. They were soon described as 'Lanun' or 'Illanoon' – 'pirates' – by those who suffered their depredations, or either travelled with or hunted them, and wrote about their widespread impact on the Southeast Asian World.

Lanun. The name struck fear into the hearts and minds of riverine and coastal populations across Southeast Asia nearly two centuries ago. Recently, ethno-historical research has also shown that where Lanun or Iranun maritime raiding is concerned, old traditions diehard. The terror of the sudden harsh presence of these well-armed alien raiders lives on in the oral recollections, reminiscences, popular folk epics and drama of the victims' descendants in the Philippines, Indonesia and Malaysia, to this day.<sup>6</sup> Only in one part of the globe, in the latter part of the eighteenth century, did Europeans find 'piracy' flourishing extensively; pursued as a calling, not by individuals, as was the case with most of those who had followed the profession of buccaneering in the West, but by entire communities and states with whom trading and raiding was to be regarded as perfectly normal and the most honourable course of life – a profession. The Iranun were frequently the enemies of every community and nation stretching from the Bird's Head coast of New Guinea and the Moluccas (among the most productive spice islands of the Netherlands East Indies) to mainland Southeast Asia. Over two centuries ago, a Bugis writer chronicled that 'Lanun' in double-decked *prahu* up to ninety or one hundred feet long, rowed by more than one hundred slaves and armed with intricately

<sup>5</sup> Blake to Maitland, 13-8-1838, Admiralty 125/133 – Sulu Piracy.

<sup>6</sup> Frake 1998: 41-54; Sandin 1967: 63-5, 127; Velthoen 1997; Warren 1998a.

wrought swivel cannon cast in bronze, were plundering villages and robbing Malay fishers in the Strait of Malacca and the Riau Islands. Among other victims of their marauding were the coastal inhabitants of Thailand and Vietnam (Raja Ali Haji ibn Ahmad 1982). They would also raid in the Philippines, where the central and northern sections of the archipelago were under the control of Spain (Warren 1981:147-56, 165-81). Iranun squadrons regularly plundered villages and captured slaves. Their exploits and conquests had the immediate effect of either disrupting or destroying traditional trade routes. Chinese junks and traders were driven off from states such as Brunei and Cotabato, the erstwhile masters of the Iranun, robbing parts of the archipelago of the traditional trade and exchange of spices, birds' nests, camphor, rattans and other valuable items (Warren 1981:152-3). The Iranun earned a fearsome reputation in an era of extensive world commerce and economic growth between the West and China.

The migratory maritime raiders spread to the rest of Southeast Asia, establishing major bases in the Philippines, Sumatra, Lombok, Flores and Sulawesi. Forrest noted that some of the Iranun-Maranao migrants and warriors, who had formerly held a lowly rank within the traditional hierarchy of the Magindanao and Taosug involved in the China trade, became men of power and prowess, both a master and a lord, when they became 'Illanun'. A key factor in the late-eighteenth century Sulu expansion was global trade which certainly provides the most convincing explanation of the origins of Iranun maritime raiding and slaving to the north and south. Slave raiding was used to increase Sulu's population. The late-eighteenth century was a time of growing political instability and macro-conflict among rival European powers in Asia. The resulting regional-wide economic competition led to an increase in trade with the Sulu Sultanate, which was an important source of exotic natural commodities for China, such as sea cucumber, bird's nest and pearls, as well as more mundane commodities such as wax and rice. The spread of large scale Iranun maritime raiding by the mid-1770s implies the presence of something worth plundering, so the increased global trade with the English and Spanish also encouraged Taosug-sponsored Iranun marauding. By the latter half of the eighteenth century, the Iranun had already begun to establish themselves in settlements like Tempasuk and Pandassan, west of the Sulu Sea. These villages were specifically established as forward bases for maritime raiding and the collection of slaves, that the Taosug could use to procure and process natural commodities to supply European traders for the China market.

*Blood upon the sails and sand*

It is estimated that during the last quarter of this century (1774-1798) of maritime raiding and slaving against the Dutch and Spanish, between one hundred

and fifty and two hundred raiding ships set out from the Mindanao-Sulu area each year. The sheer size of the vessels – the largest *lanong* measuring upward of one hundred and thirty feet in length – and the scale of the expeditions dwarfed most previous efforts, marking a significant turning point in the naval strategy of Malay maritime raiding as it had been traditionally understood. Armed with the latest firearms, the Iranun slave raiders struck fear into the hearts of coastal and riverine people throughout Southeast Asia. Large settlements were targets of fleets of forty to fifty *prahu*. The boats carried 2,500 to 3,000 men as well as heavy artillery. The regularity of these raiding sweeps for slaves were as predictable as the winds which carried the Iranun boats to their target areas. Customary warnings were issued each year by the Dutch, Spanish and English to coastal towns and small craft on the approach of the ‘pirate wind’ in August, September and October that brought these fishers of men. Physical evidence of the Iranun raids can still be found in the Philippines today. Scattered along the coastlines of the Philippine Archipelago are remnants of the century-long terrifying presence of these raiders. An old stone watchtower, a crumbling church cum garrison, or the remains of a Spanish fort and cemetery can be found along the coasts of Catanduanes, Albay, Leyte and Samar, bearing witness to the advent of sudden affluence in the zone and deep despair throughout the Philippines (Javellana 1997). So notorious were the Iranun slave raiders that they are recalled in the exploits of local heroes, who drove them off, in the folktales of Virac, Catanduanes and the Riau Archipelago and Madura in Indonesia. The number of people plucked by the Iranun from the shores of Southeast Asia in a span of one hundred years was staggering. Several hundred thousand slaves were moved in Iranun vessels to the Sulu Sultanate in the years between 1768-1848 (Warren 1981:208-11).

The greatest threat to late-eighteenth century seaborne trade came from the Iranun who operated from the mangrove-lined inlets, bays and reef strewn islets in the waters round the southern Philippines and Borneo, especially the Sulu and Celebes seas. They preyed on an increasingly rich shipping trade of the Spanish, Dutch and English, and Bugis and Chinese, and seized their cargoes of tin, opium, spices, munitions and slaves as the merchants headed to and from the trading centres of Manila, Makassar, Batavia and Penang.<sup>7</sup> The Iranun had a stranglehold on this trade across Southeast Asia because it was so exposed along its entire course through numerous hazardous straits and channels among countless islands – islands frequented by a fearless sea-going people of predatory tendencies possessed of swift sailing *prahu* – which offered every opportunity for stealth and surprise attack. When small merchant *prahu* and Chinese junks made their halting voyages on the sea’s calm waters, the Iranun were never far away, striking at all sized craft. They simply had to wait,

<sup>7</sup> For an important study of how Southeast Asia became a crucial part of a global commercial system between the fifteenth and mid-seventeenth centuries, see Reid 1993.

sheltered behind a convenient island, headland or bay overlooking strategic sea routes, and sooner or later 'coastwise' targets, never straying out of sight of land, would cross their path. From England, the United States and Europe, other larger sailing ships, laden with arms, opium and textiles for the China market repeatedly ran the gauntlet of these narrow straits which were the hunting ground of the Iranun. By the end of the eighteenth century, the British East India Company had moved to establish trading bases in the Strait of Malacca. While the authorities in Bengal began to exert some influence over the commercial affairs of the Straits Settlements, the Royal Navy did not dominate the seas of the area. Iranun maritime raiding and slaving in this region were complex phenomena confronting several global powers, namely Britain, the Netherlands and Spain, and a number of local Sultanates, Kedah, Riau-Lingga, Jambi, Siak and Palembang, all located in the area of highest risk, within a long narrow rectangle drawn to link Banka Island and Billiton to the Riau Archipelago, Singapore and the Malay Peninsula. According to Dutch and British reports, and figures, between 1800 and 1830, Iranun slave raids and marauding accounted for almost half of all the incidents reported in this region. The West's developing involvement in the China trade and the subsequent founding of Singapore contributed to the Strait of Malacca and its environs experiencing one of the highest rates of maritime raiding in Southeast Asia at that time. The annual value of Singapore's entrepôt trade in 1833 was estimated at about two million Spanish dollars, but it was in fact worth far more as the settlement acted as the central redistributive point for the circulation of goods throughout Southeast Asia, in every direction. Wong Lin Ken (1960:82-3) suggests that Iranun marauding in the Strait of Malacca seriously damaged English commerce as losses of cargoes and *prahu* to these sea raiders pushed up local prices and led to an overall decline in Singapore's country trade.

At the end of the eighteenth century the Iranun maritime raids had a profound, albeit decisive impact on Southeast Asia. The Iranun have been rightly blamed for demographic collapse, loss of agricultural productivity and economic decline as well as the break-up of the Dutch stranglehold on the Strait of Malacca and eastern Indonesia. But the driving force for this process was still global and economic: the Iranun profited from Spanish, Dutch and English internal colonial problems and expansion, but were not the cause of the problems. In the 1790s, a top-heavy administratively moribund VOC could barely keep the vast archipelago – already fraying at the edges – together. Few parts of eastern Indonesia seemed more prone to Iranun raiding and violence than Buton and neighbouring islands. For the first two decades of the nineteenth century, it was wracked by Iranun-Tobello violence that left thousands of people dead and left tens of thousands of others homeless as they abandoned the coastline and fled to the interior. Rescued captives interrogated by colonial officials had often been traumatized by the violence they

had witnessed during the sea attacks and settlement raids along the coastline. The oral traditions of their descendants still speak of 'the terror'. They tell of the terrifying landing on the beach and the way that the slave raiders ended years, perhaps even several decades of anonymity and a quiet life, that hid their ancestors from the war at sea and the machinations of the global economy. Robert Barnes, in his classic study of Lamalera, a remote community on the south coast of the island of Lembata, near the eastern end of Flores, notes the village is really a 'twin settlement', with the lower one (Lamalera Bawah) on the beach and an upper one (Lamalera Atas) on a nearby cliff for protection from earlier Iranun maritime raids. Such villages in eyrie-like settings were usually palisaded, but in this case (as at Tira, the site of Southon's fieldwork in Buton) the main defence was inaccessibility. Christiaan Heersink also notes that on Salayer most of the nineteenth-century settlements were situated in the interior. Here the northern and southern extremities of the island were the least safe, and suffered most from Iranun 'piracy', while the alluvial west coast became the prominent zone of security and trade (Barnes 1996:44; Heersink 1988:103-4). New evidence has also emerged supporting the widespread fear and dread of the Iranun in the Java Sea. Stenross, researching the traditional sailing boats of Madura, recently accidentally came across people with terrifying memories of the Iranun still intact on the north coast, in a small isolated village. In Tamberu, he found – while discussing photographs of Bajau grave markers shaped like miniature boats – evidence of centuries old oral traditions about the 'Lanun' that signify tales of cultural confrontations and conflicts. These confrontations originated in the violent intimacies of the encounter between expansive Iranun and struggling, oppressed coastal people. Obviously, the fear of the Iranun went a long way since their maritime raiding tracks crossed regional and ethnic boundaries like no other before, not bypassing even a tiny village like Tamberu, reaching extremes of pain and alienation among the Madurese coastal inhabitants there.<sup>8</sup> The memory of the Iranun raiders lingered well into the first half of the twentieth century long after they had ceased to pose an imminent menace. For example, Daniel F. Doeppers and Peter Xenos (1998:89) stress, in their reconstruction of the regional demographic history of Cebu, that the memory and fear of 'moro depredations' is embedded in the legends and folk histories of many municipalities and parishes of Cebu to this day. *Moro* came to symbolize all that was dangerous, dark and cruel about the tragic confrontation, and the Iranun's adherence to Islam.

But whether the Iranun were really any more wantonly cold-blooded than their colonial adversaries and neighbouring rivals was immaterial because by the end of the eighteenth century the traditional image of the Iranun warrior, as savagely cruel and destructive had gained widespread acceptance.

<sup>8</sup> Stenross to Warren, personal correspondence, 8 March 2000.

The complexities of relations in the struggle over power and autonomy on the seas, between the maritime Islamic world of the Iranun and the conflicting interests and machinations of the western powers bent on controlling the oceans and sea lanes, demonstrates how a pathology of physical and cultural violence associated with global macro-contact wars and empire building, particularly with political struggles between the English and Dutch in various parts of Southeast Asia, led to widespread conflicts and regional tragedies. At the same time, the very survival of slavery in different parts of Southeast Asia, as elsewhere in the world, was being called into question. The main slave raiding zones in the South China Sea and the waters of eastern Indonesia attracted the intense naval pressure of Britain, Spain and the Netherlands for more than a quarter of a century; by the 1880s, the numbers of slaves moving across the region had been reduced to a trickle. Consequently, forced sales into slavery and debt bondage to ensure the survival of the economies of states like Sulu rose in the second half of the nineteenth century as the autonomy of traditional Malay states, and maritime raiding and slaving, both declined under the combined pressure of modern colonial navies (Warren 1981:200-16).

*Borders, state power and crime on the high seas, 1968-2000*

The Asia-Pacific basin is a major contributor to the world economy and particularly to those Southeast Asian nations that its seas and oceans touch directly. It provides low-cost sea transportation between Asia, especially China, Japan and South Korea, and the West, extensive fishing grounds and offshore oil and gas fields.<sup>9</sup> Southeast Asia, since the 1970s, has become one of the global 'hot spots' of vessel attacks. And, at the end of the twentieth century, more than half of all reported attacks on vessels worldwide occurred in this region.<sup>10</sup> The entire area of Southeast Asia, including the South China Sea, once again has come to be considered a danger zone, as was the case at the end of the eighteenth century. The waters off Indonesia, Malaysia, Singapore and the Philippines are the predominant areas of incident occurrences as commercial and wealthy yachting interests are attacked with increasing frequency.

The earlier terrifying days of the lateen square rigged Iranun raiders flying the raven flag are gone, but some of the world's most murderous and blood-thirsty 'pirates' have roamed the waters of Southeast Asia since the 1970s. The spots pinpointed by the IMB (International Maritime Bureau) as the most vulnerable to attack and hijacking currently include the South China Sea area between the northern Philippines, China, Taiwan and include Hong Kong

<sup>9</sup> 'Intelligence file: Pacific Ocean' at [http://www.maritimesecurity.com/research/pacific\\_ocean.htm](http://www.maritimesecurity.com/research/pacific_ocean.htm), accessed 15 July 2000.

<sup>10</sup> 'Worldwide maritime piracy', 1999 piracy report, p. 8, <http://www.maritimesecurity.com/archive.htm>, accessed June 1999.



and Macau; the Gulf of Thailand; the sea north of Java in Indonesia; and the narrow Strait of Malacca off Singapore, where sixty per cent of the world's merchant tonnage passes (1996:7). For example, statistics compiled over the seven-month period from May to December 1993, showed that forty-two incidents were reported in the East and South China Sea out of sixty-seven world-wide. Most of the attacks took place in international waters and, in many cases, firearms were used (*Piracy and armed robbery* 2000:4). The geographical challenges defy solutions to curb piracy. It was the case at the end of the eighteenth century, and it remains the case at the end of the twentieth, that geography remains a sinister ally of the modern Southeast Asian pirates. In 1996, Mr Martin, IMB regional manager for Southeast Asia, stated, 'You look at the Philippines, it has such a long coastline [...] you will need at least ten thousand patrol boats. Indonesia is the same, there are thousands of islands for pirates and hijackers to hide' (1996:7).

The geography of insular Southeast Asia also offers fresh insights into the complex and various ways in which international frontiers have encouraged maritime raiding, slaving and modern-day crime on the high seas. Just as maritime borders became barriers against the hot pursuit of raiders and pirates in relation to earlier competing colonial powers, nowadays the borders of hostile nations in the region provide similar barriers. Many Southeast Asian states in the worst affected areas – South China Sea, Strait of Malacca, Gulf of Thailand and the Sulu Sea – are not capable of policing a jurisdiction which extends two hundred nautical miles (370 km) from their coasts. In congested areas, these jurisdictions overlap and are often the subject of bitter international legal disputes and boundary squabbles. When a foreign vessel is attacked in these worst-affected areas, the navies of other cannot help because the vessel is within a particular jurisdiction. These other Southeast Asian states cannot always also help because, they either have insufficient resources or are aiding and abetting the piracy and crime on the high seas. In the last three decades of the twentieth century, 'piracy' has no longer been linked to the slave trade in a conventional historical sense. But it is directly linked to global traffic in illegal migrants and women and children destined for prostitution, right across Asia. Thus, piracy, or the exercise of extreme violence and theft on the high seas of Southeast Asia, has become a major criminal activity linked up with emergent globalized culture and regional states. The late twentieth-century pirates of Southeast Asia, be they Thai fishers, Vietnamese pirates, Indonesian shipjackers or Sulu 'terrorists' are all products of new post-colonial relationships where globalization, wars, and ethnic-political struggles have enhanced material crime relationships on the sea. A comparison with the sudden emergence of the Iranun at the end of the eighteenth century shows that, in both cases we are dealing with processes of engagement and disengagement from world commerce and economic growth, through which regional states formed, stagnated or fragmented and



new groups of 'brokers in violence' could emerge, and rule the seas of Southeast Asia (Schulte Nordholt 2000:3). The Iranun were among the first predators of global commerce in Asia to seriously attract the attention of the West that was bent on expanding economically into China at the beginning of the nineteenth century. But south sea 'piracy' is on the rise again and the new breed is well organized, financed and no less ruthless than the Iranun.

On the one hand, the economic boom of the 1970s and 1980s enabled former Indonesian president B.J. Habibie to turn Batam, the island twenty kilometres south of Singapore, into the headquarters of a dark alliance between triad-linked figures, space-age pirate gangs armed with the latest technology and Indonesian marine officials. On the other hand, economic hardship, fuelled by the Asian currency crisis of the late 1990s, a new generation of technology and a lack of law enforcement among governments, especially in the South China Sea and the Sulu Zone, have helped push the extreme violence of a new wave of pirates to unprecedented heights. Piracy and violence in the modern manner with machine guns, grenade launchers, fast boats, rape and death pose a very serious challenge to Asian states and navies. In this context, crime on the high seas must be understood on the same terms as any other major market force, with pirates in the region ranging from opportunistic Thai, Vietnamese and Taosug fishers, common criminals and rogue elements in various regional naval forces, to members of sophisticated Asian crime syndicates, namely composed of Chinese overseas. Consequently, the current economic and political conditions in both Indonesia and the Philippines throughout the 1990s have left many Indonesians, Filipinos and foreign observers with the impression that both nations have become, in the language of Thomas Friedman, 'messy states' – states in very severe difficulties and where corruption is overwhelming (McCarthy 2000). Similarly, in the Netherlands Indies at the end of the eighteenth century, global trade and Iranun maritime raiding and slaving were largely shaped and reinforced by one another. Two centuries ago, in the period just before the VOC fell (1795), the Company was also in a 'messy state', governed by a ring of officials united by self-interest and unable to control the maritime raiding and slaving that it had inadvertently helped to create.

The globalizing forces emanating from changing scales of production and consumption in Southeast Asia today and this relationship to crime on the high seas, including human traffic or the new slavery, cannot be denied or wished away. Further, by reviewing certain acts of 'piracy' occurring after the 1970s, and by contrasting these acts with the Iranun type of incidents occurring two centuries before, it becomes obvious that the conventional articles on piracy now do not apply to many of the acts of crime found in current reports of the IMB and newspaper accounts of the incidents. This was also the case in the 1790s with Iranun maritime raiding in contrast to the western buccaneers and swash bucklers of the seventeenth-century Caribbean basin and Spanish Main.

*On modern day definitions of 'piracy' in Southeast Asia*

The term 'piracy' has a narrow definition in the eyes of many modern governing bodies in Asia. The United Nations Law of the Sea defines piracy as: 'illegal acts of violence or detention, or any act of depredation, committed for private ends by the crew or passengers of a private ship and directed on the high seas or in a place outside the jurisdiction of the state'.<sup>11</sup> While for statistical purposes the IMB defines 'piracy' as: 'An act of boarding or attempting to board any ship with the intent to commit theft or any other crime and with the attempt or capability to use force in the furtherance of that act'.<sup>12</sup> This definition, thus, also covers actual or attempted attacks whether the ship is berthed, at anchor, or at sea. However, a review of illegal acts of 'piracy' occurring across Southeast Asia between the years 1970 and 2000, highlights the fact that the conventional definitions of piracy and the scholarly interpretation of legal issues do not apply to many types of incidents nowadays. I do not wish to dwell here on the semantics of what may actually define an act of piracy. Rather, this paper is concerned with comparing the operational aspects of maritime raiding and slaving with piracy and/or the even narrower definition of maritime terrorism at the tail end of two centuries, namely slaving, sea robbery, vessel hijacking, human traffic and other related maritime crimes.

It is important to distinguish between three forms of piracy in Southeast Asia in the recent period (1970-2000) under consideration. The first type is more mundane, takes place in inshore waters, and is perpetrated by bands of impoverished fishers, ill-organized gangs or idle roustabouts.<sup>13</sup> They opportunistically approach and board larger vessels where the concentrations of shipping are greatest, or where the law enforcement is weakest. Thousands of ships pass each month through the Strait of Malacca between Indonesia and Malaysia, or call at Singapore at the southern end of the straits. There is also an extraordinary concentration of ships in the South China Sea plying well-established shipping lanes to Hong Kong, Taiwan, South Korea and Japan. These ships, particularly at anchor, are easy prey for the pirates, who board from small speedboats, armed with guns or machetes, threaten the crew, and make off with cash and valuables such as mooring ropes and paint (*Rising piracy* 2000).

Indonesian coastal communities, over the past three decades, have suffered from the emphasis on commercial exploitation for short-term profit making.

<sup>11</sup> 'Worldwide maritime piracy', 1999 piracy report p. 4, <http://www.maritimesecurity.com/archive.htm>, accessed June 1999.

<sup>12</sup> 'Weekly piracy report', International Chamber of Commerce (ICC), [http://www.iccwbo.org/home/news\\_archives/1999/weekly\\_piracy\\_report.asp](http://www.iccwbo.org/home/news_archives/1999/weekly_piracy_report.asp), accessed 4-10 July 2000.

<sup>13</sup> 'South sea piracy; Dead men tell no tales', *The Economist*, [http://www.economist.com/display-story.cfm?Story\\_ID=327568](http://www.economist.com/display-story.cfm?Story_ID=327568), accessed 16 December 1999.

Indonesia's fishing communities are among the poorest of the poor because of large-scale illegal fishing operations, fish bombing and the destruction of coral reefs. In some cases, even a few thousand dollars worth of stolen goods constitutes a fortune for individuals and coastal communities which rely on traditional fishing methods to subsist. The continual lack of response from the authorities against the practices that have destroyed the resources of these communities (particularly trawling, fish bombing and cyanide poisoning) has ended in uni-lateral action – raids by local people on illegal fishing boats and merchant vessels (*Indonesia's coastal resources* 2000). For all its size and mass, a deep draft vessel, like a small tanker or cargo ship, is a vulnerable target because of its own tonnage. When confined to narrow and restrictive channels, and operating at night or times of limited visibility, these vessels are extremely susceptible to hostile boarding. Typically, many of these attacks occur at night with the ship at anchor. In the late 1970s and 1980s, fishing vessels, particularly round the southern Philippines, also received the attention of pirates and armed robbers. The bandits operated swiftly and accurately from faster boats, taking the fish catch, boat engines, fuel, personal effects, or worse, the boat itself (*Piracy and armed robbery* 2000:4). The single linking factor was that many were driven to piracy by poverty and the coastal resource crisis facing Indonesia, the Philippines and Thailand, particularly in times of thin fishing or poor harvests (Eames 1998).

During the 1970s and 1980s, attacks on merchant ships began to increase in a general climate of growing commodity flows and patterns of Japanese investment and shipping. It was at this time that ship owners and their crews became increasingly alarmed about a relatively new and far more sophisticated, well organized type of crime: the high seas – hijacking of ships and cargoes by international crime syndicates based across the Asian region. Over the past three decades, the actions of these syndicates, which are comparable to the Iranun in operational terms, argues Arthur Bowring, director of the Hong Kong Shipowners' Association, are nothing less than 'high seas terrorism'.<sup>14</sup> This far more serious type of piracy in Southeast Asia usually targeted small tankers or larger vessels and stole the entire cargo. In such incidents, it was not unusual, after hijacking a ship, for a second pirate-directed vessel to move alongside the hijacked vessel to siphon off the oil, to collect the bulk cargo, or both. This type of operation required a far higher degree of organization than the piracy conducted by bands of impoverished fishers, and was/is orchestrated by gangs who follow shipping schedules on the Internet (*Rising piracy* 2000). International Maritime Organisation (IMO) reports say that most of the attacks occurred at night, with armed gangs boarding the ships while they were usually anchored or berthed. Regardless of where these

<sup>14</sup> 'South sea piracy; Dead men tell no tales', *The Economist*, [http://www.economist.com/display-story.cfm?Story\\_ID=327568](http://www.economist.com/display-story.cfm?Story_ID=327568), accessed 16 December 1999.

strikes happen in the region, nearly all attackers of high-tonnage vessels have intimate knowledge of vessel design and layout, being able to make their way through a ship quickly. After the late 1970s, the lack of effective watch – on targeted vessels standing at anchor or pier side – often further increased vulnerability in many incidents. In addition to the hijacking of ships and the theft of cargo, the main targets of Southeast Asian attackers appear to be cash in the ship's safe, crew possessions and any other portable ship's stores, even including coils of rope (IMO 1999:1).

#### *Dangerous areas within the region*

In this period between 1970 and 2000, the most pitiful victims of Southeast Asia's pirates were the defenceless boat people in the Gulf of Thailand. For those who headed across the gulf to Thailand the journey could be a nightmare if they found Thai fishing boats in their path. The attacking fishers were often part-timers, pirates of opportunity, who could make up for a bad catch by stealing the passengers' valuables. The attacking fishers were also capable of extreme brutality, murdering scores of people heading for southern Thailand. Women were systematically taken off refugee boats and raped by the crew of a fishing boat and then passed to another fishing boat and then on to another. After 1987, Thailand began to crack down on the pirates who robbed and terrorized refugees fleeing Vietnam with some success (Hanlon 1987).

Refugees fleeing from Indo-China, the boat people, were the pirates' easiest targets. But pirates were preying with growing frequency on ships in the sea-lanes of Southeast Asia, especially in the Sulu Zone, with authorities in the region largely unable to cope with them. In the late 1970s, the most pirate-infested waters were those around the southern Philippines and Borneo, the Sulu and Celebes seas. Armed with heavy weapons left over from the Indochina war, the pirates were halting fishing boats, yachts, coastal steamers and even small ocean-going freighters on the high seas and taking their cargo and other possessions. Often there were violent clashes as the Taosug and Samal pirates fired heavy machine guns, grenade launchers, recoilless rifles and mortars at their victims, and casualties increased. The vessels themselves were frequently taken as prizes by the pirates, and the hapless crews and passengers were left to swim for shore. Sometimes, reminiscent of the Iranun, the victims were held for ransom. The Malaysian authorities accused these pirates of also sabotaging navigation buoys and lights so that ships would go aground on the numerous reefs of the Sulu Sea – making them sitting ducks for plunder. The pirates' stratagem of shooting up navigation beacons in the Sulu Sea in apparent attempts to force ships aground was partially successful. In December 1978, Philippine Air Force aircraft were forced into action to rescue a grounded Panamanian freighter from the armed raiders. More than one hundred pirates attacked

and seized the ship, holding it until the Philippine Air Force drove them away (*Piracy resurgence* 1978). Japanese shipping lines now considered southern Philippine waters so dangerous that the majority of their vessels bound for Indonesian ports began to detour westward into the South China Sea.

The 1980s was to see a major increase in piracy around Southeast Asia. But the Gulf of Thailand and the Sulu Zone were still considered two areas where it was most prevalent. However, by the late 1980s attacks on merchants' ships began to increase sharply in the Strait of Malacca, the Strait of Singapore and the Phillips Channel, major shipping lanes that connect the South China Sea with the Indian Ocean. In 1986, armed pirates used grappling hooks to board large freighters off Indonesia and Singapore and strip them of their cargoes. In addition, Taosug pirates cum Muslim insurgents, who could not find a ship to plunder, took over the east coast town of Semporna (where I lived from 1967-1969), locked the inhabitants in the community hall and looted its banks and all the shops. The daylight raid was the second on the remote town in six weeks. The incidents had shaken the state of Sabah, and the town's residents in particular. The raids highlighted the inadequacy of the Malaysian Navy and police who lacked the staff to effectively patrol Sabah's long east coast. The deadly trail of these ominous incidents, at opposite ends of the region, would set the tone for the late 1980s: a decade which would be wracked by violence and crime on the high seas of Southeast Asia on a scale hitherto unprecedented, except for the scope and magnitude of the freewheeling Iranun operations in the 1780s when they burst from the Bay of Illana to prey upon the china trade and coastal villages across the region.

Pirate attacks against large ships have tripled during the 1990s, to three hundred a year. Nearly three quarters of all the world's pirate attacks now take place in Southeast Asia. The waters and ports around Indonesia alone accounted for a third of all attacks.<sup>15</sup> The International Chamber of Commerce has designated Indonesia as 'the most piracy prone country in the world' (*Rising piracy* 2000). This is not surprising as, under the New Order, problems were solved by using violence and corruption in a state where those who held the economic reins of power were loath to surrender them. In fact, by 2000, pirate attacks in Indonesia's sea-lanes alone outnumbered all attacks in the Middle East, Africa and Latin America combined (Brandon 2000). More than three hundred incidents of pirate attacks on shipping in south and Southeast Asia took place in 2000, making it the worst year on record. The most dangerous waters were around Indonesia where well-armed gangs were responsible for forty-three percent of the total number of attacks (*Indonesia's dangerous waters* 2001). Regardless of the statistics, it is also not unrealistic to project that less than half of all incidents in Indonesian waters are actually being reported.

<sup>15</sup> 'South sea piracy; Dead men tell no tales,' *The Economist*, [http://www.economist.com/display-story.cfm?Story\\_ID=327568](http://www.economist.com/display-story.cfm?Story_ID=327568), accessed 16 December 1999.

Hence, these already damning figures can only serve as nominally reliable regional indicators of piratical activity, particularly in Indonesia, where most ports experience robbery and hostile boardings of vessels at berth and anchor. Ships calling at the Indonesian ports of Belawan, Jakarta, Merak Panjang, Samarinda and Tanjung Priok have reported numerous attacks while at anchor and berth.<sup>16</sup> Local government and law enforcement agencies within Indonesia have had little or no ability to respond in an appropriate manner to such attacks against shipping or yachts and other pleasure craft.<sup>17</sup> Nor are there any signs that the number of attacks will drop unless Indonesia takes serious steps, according to the IMB (Alford 2001).

Singapore, located between Malaysia and Indonesia, is a global centre for transnational capital and regional trade, with strong service and manufacturing sectors, and international trading links that allowed the port city to weather the effects of the Asian financial crisis better than its neighbours. Singapore in the 1990s, according to regional security analysts, also became the prime transit point for all sorts of contraband going to the United States, Western Europe and the third world.<sup>18</sup> Ship attack and piracy activity has become a regular occurrence in the Singapore Strait in a decade of growing commodity flows of drugs, arms, fauna and human beings. In the waters around Singapore, teams of pirates with high powered rifles, operating from speedboats, began to attack slow moving cargo ships in a series of hit and run robberies in the early and mid 1990s. Piracy against ships in these waters rose sharply over the next five years. One of the main reasons for this, apart from Singapore's obvious economic success and globalized culture, was the disastrous economic and political situation in Indonesia after 1997.

The Strait of Malacca, at five hundred miles long, is the world's longest strait, and it is the main seaway connecting the Indian Ocean to the China Sea. It varies in width from eleven to two hundred miles and the entire strait is peppered with wrecks and shifting shoal banks.<sup>19</sup> The strait, in some stretches, is shallow and narrow and requires precise navigation. Prior to 1989, the Strait of Malacca was considered to be relatively safe, with seven cases of piracy and armed robbery being reported annually from the area. But, in 1989 the figure rose to twenty-eight and by 1991, it had gone up to fifty a year (*Piracy and armed robbery* 2003:3). The Strait of Malacca, the gateway to Singapore, is located between Indonesia and Malaysia, and is one of the world's busiest

<sup>16</sup> 'Weekly piracy report', International Chamber of Commerce (ICC), [http://www.iccwbo.org/home/news\\_archives/1999/weekly\\_piracy\\_report.asp](http://www.iccwbo.org/home/news_archives/1999/weekly_piracy_report.asp), accessed 4-10 July 2000.

<sup>17</sup> 'Intelligence file: Indonesia', [http://www.maritimesecurity.com/re-search/intel\\_file\\_indonesia.htm](http://www.maritimesecurity.com/re-search/intel_file_indonesia.htm), accessed 20 May 2001.

<sup>18</sup> 'Intelligence file: Singapore', [http://www.maritimesecurity.com/re-search/intel\\_file\\_singapore.htm](http://www.maritimesecurity.com/re-search/intel_file_singapore.htm), accessed 2001.

<sup>19</sup> 'Worldwide maritime piracy', 1999 piracy report, p. 9, at <http://www.maritimesecurity.com/archive.htm>, accessed June 1999.



shipping lanes now used by over six hundred vessels a day. It has become the most pirate-infested channel in the world, which was also the case during the Iranun age at the height of the China trade. In the Strait of Malacca, in terms of the political economy of crime and globalization, piracy is one of the thriving trades, alongside industrial development, slick resorts and prostitution.

In the Straits region as a whole, most of the attacks have occurred in the Phillips Channel in the Strait of Malacca or the Singapore Strait. In these areas, ships generally have to slow down to avoid collisions in the crowded sea-lanes. At the beginning of 2000, the Strait of Malacca recorded the second highest number of attacks, after the waters around Indonesia, with fifty, followed by the area around Chittagong Port in Bangladesh at forty-six (*Indonesia's dangerous waters* 2001). The IMB, which monitors piracy attacks globally, said in a study last year that ongoing political and economic turmoil in Indonesia has made the Strait of Malacca and surrounding waters more risky than ever for ships (*Pirates attack* 2001).

Another factor that often did not receive the recognition it deserved, was the effect these attacks had on the seafarers involved. The annual reports of the IMB Piracy Reporting Centre in Kuala Lumpur highlight that modern piracy, particularly in the three decades under consideration, has become more violent, bloody and ruthless. For ship owners, and the staff and fishers who crew their ships and trawlers, maritime crime is a serious and dangerous business. According to Captain Jayant Abhyanker, the IMB Deputy Director, it is made all the more fearsome because its victims know they are usually alone and defenceless. He said, 'It is impossible for those of us here to fully appreciate the trauma pirate attacks cause, both physically and mentally' (Ellen 1997:29). Hapless seafarers in the Gulf of Thailand, the Strait of Malacca and the Sulu Sea were often threatened with guns, knives, machetes or other weapons, were tied up, beaten, and stripped of all their possessions. In some cases, crewmembers were murdered. In others, whole crews were cast adrift in lifeboats. Many victims have never fully recovered from the trauma they experienced and have not gone to sea again. The greatest violence in maritime crime attacks is related to the seizing of refugee boats and 'phantom ships'. In the recent hijacking of a Panamanian cargo vessel, the *MV Cheung San*, the pirates confessed to the Chinese authorities that they gathered the twenty-three crew on deck and shot them. In a similar bloody incident, a hijacked Japanese-owned cargo vessel, *MV Tenyu*, was found in China with a new crew. The fate of the original fourteen crew-members is still unknown, although they too are feared to have been murdered.

The impact of widespread environmental disaster and pollution is another potential by-product of maritime crime that is often overlooked – and waiting to happen – in Southeast Asia, particularly in the Strait of Malacca, where the cost implications of environmental pollution are huge. Tankers, bulk carriers



and cargo ships have often been left unmanned during attacks. In the 1990s, pirates have, on several occasions, endangered navigation by leaving vessels, including fully laden tankers, underway and without command, dramatically increasing the risk of collision or grounding in the narrow congested shipping lanes. The resulting ecological and navigation implications of such reckless behaviour are enormous. Such a nightmare had almost come to pass seven years earlier. In 1992, an ecological disaster was only narrowly averted, after pirates boarded a Panamanian registered ship, carrying 240,000 tons of crude oil. They tied up its twenty-four crew and left. Fortunately, one of the crew members managed to break free fifteen minutes after the raiders had gone and took control of the thousand foot ship, which had been steaming unguided at night through one of the most crowded channels in the world – Phillips Channel off Singapore. The risk of a collision or grounding was very real and it was a matter of pure luck that the hulking super-tanker did not run aground, creating a worse oil spill than that of the *Exxon Valdez* disaster off Alaska. The near fatal incident became a closely kept secret by the Straits Authorities and the ship-owner, but it galvanized the local maritime world into action against Indonesia where the pirates had sought a safe haven.

Four Asian syndicates with Mafia-style dons in Indonesia, the Philippines, Hong Kong and mainland China, seem to have had the right amount of transnational sophistication to make money from crime on the high seas during the 1980s and 1990s. The leaders of these syndicates, whose working vessels are equipped with satellite dishes, computers and automatic weapons, can control dangerous region-wide operations from a great distance – for example from an office building in Hong Kong, Singapore, or Manila, or from a flashy brothel or resort golf course on the Indonesian island of Batam. Other branches are based in Johore Bahru in Malaysia and Taipei in Taiwan. The syndicates robbed the crews and stole their ships. In this way they direct the criminal operations that hijack ships heading for Singapore, which is the world's busiest harbour. At the end of the twentieth century, the act of hijacking ships in Southeast Asia crossed all boundaries and involved all nationalities. The modern day masterminds of crime on the high seas are well-suited businessmen, sitting in plush offices hidden behind ghost companies, stealing ships and goods, sometimes via the Internet. The same Hong Kong and Singapore-based syndicates were also already heavily involved in illegal immigration based on using stolen ships. The syndicate in Indonesia, which is believed to be linked to former President Soeharto's closest business associates, was almost certainly behind the surge in Indonesian and especially, Chinese stowaways transported on 'phantom ships' that over the past seven or eight years have turned up in Canada, the United States and Australia.

In a sense, these pirates and criminals are obviously being used as pawns in the struggle for power in Jakarta and elsewhere across the region. This is

not new given the close links between the New Order regime (particularly the generals), capital and the globalization of crime that has occurred over the past two decades. Military personnel like Soeharto's son-in-law, Prabowo Subianto, allegedly have found it in their interest to cultivate crime on the high seas in all its manifest forms – shipjacking, traffic in illegal aliens, the arms trade – to serve their political interests in the context of both national and global transition. This new wave of pirates, who rule the waters of the South China Sea, have turned Batam, a small Indonesian island across the strait from Singapore, developed by B.J. Habibie, into the headquarters of pirate gangs with links to the Indonesian navy. The island of about half a million people is only an hour by ferry from Singapore. In the late 1970s, Dr Habibie, as the young protégé of President Soeharto, was appointed head of the Batam autonomous area and he boldly drafted liberal legislation inviting foreign investors, mostly from Singapore, Taiwan and Japan, to build golf course resorts, electronics and other middle size factories in Batam. What Habibie had not planned for was the growing sex industry. Rapid industrial development and the influx of foreign tourists, particularly Singaporean Chinese and Japanese looking for young girls, have made Batam a strategic location for doing business. One of the thriving businesses on the island, home to manufacturing, ship repair and prostitution, has become piracy in the Strait of Malacca. The region's authorities have learnt from interviews with seamen, shipping agents, coast guard officers and prostitutes that this modern piracy or crime on the high seas is controlled from Batam by a murky alliance between pirates, the Indonesian coastal patrol and other marine officials (Harsono 1999).

Like the case of the Iranun at the end of the eighteenth century, due in part to the technology transfer, maritime security forces increasingly proved to be no match for well organized pirates in the Strait of Malacca, the Gulf of Thailand, the South China Sea and Sulu Sea. In the last three decades of the twentieth century, these space-age raiders have used computers and the Internet to select vessels and itineraries; they have relied on radar to locate targeted vessels; they have gathered intelligence from radio transmissions and informers and carried out night attacks using swift, small motorized boats and automatic weapons. These raiders have easily escaped in boats that are simply too fast or that blend in with hundreds of other small ships in Southeast Asian waters (Brandon 2000). On board some of these vessels, ASEAN naval forces have found sets of handcuffs, face masks, fake immigration stamps, paint of various colours, welding equipment and ship stamps with which the pirates could turn hijacked vessels into phantom ships. Theoretically, a ship stolen in the region could simply turn up in another part of Asia, with a different name and flags, as faraway as southern China or Chittagong (Harsono 1999). While they have not been ignored, between the late 1970s and 2000 and as a major feature of an emergent globalized culture, the pirates and criminals on the

high seas of Southeast Asia have become more numerous, more dangerous and equipped with more sophisticated crime technology.

### *Containing modern piracy*

At the end of the twentieth century, forms of consumerism and significant market forces in China and the West, and the rhythm of Chinese history, have continued to affect development and modernity in Southeast Asia. In the 1990s, China was repeatedly accused of being soft on piracy and has been identified as the country in which the majority of pirates and criminals in Southeast Asia sell hijacked cargoes and vessels. Most of the missing ships were registered in Honduras and Panama and conveyed bulk cargoes such as timber, fuel and minerals that were easy to dispose of in China's booming economy. However, as the Chinese authorities have reluctantly started to crack down on the pirates, criminal syndicates in Southeast Asia have recently begun to go further afield to dispose of hijacked cargoes, with India and Iran being favoured destinations.<sup>20</sup>

Maritime raiding, slaving and modern crime on the high seas, if we frame it from this angle and context, was/is part of a larger globalizing process of a sub-region engulfed by an economic boom (1768-1800) and a financial crisis (1990-2000), and widely understood as also encompassing the first and second openings of China with global, albeit predominantly western, financial systems and trans-national trade. Emphasizing this fact, that Southeast Asia in its pre-colonial, colonial and post-colonial pasts has experienced unhindered flows of commodities, capital and labour, especially in productive zones like Sulu, allows us, on the one hand, to understand the economic-political relationships between maritime raiding, slaving and state formation at the end of the eighteenth century. On the other hand, it highlights the link between modern piracy and crime, as agents of social change, in the context of the stark reality of economic crisis and global transition with its social and political consequences for re-structuring the new order in Southeast Asia.

But, in global comparative terms, the problem of piracy resurgence on the high seas of Southeast Asia can also be represented as one of the historical imagination – of the ability to imagine alternative interpretations and futures. This creative shift in perspective shows that between 1768 and 1800 and 1968 to 2000, Iranun maritime raiding and slaving and space-age piracy and criminally related matters on the high-seas of Southeast Asia, were as much forces of engagement with world commerce and economic growth then as globalization is a force for maritime crime in Southeast Asia now. I am also suggesting

<sup>32</sup> 'Weekly piracy report', International Chamber of Commerce (ICC), [http://www.iccwbo.org/home/news\\_archives/1999/weekly\\_piracy\\_report.asp](http://www.iccwbo.org/home/news_archives/1999/weekly_piracy_report.asp), accessed 4-10 July 2000.

that the shaping of economic and political violence associated with maritime raiding, slaving and the criminalization of piracy in Southeast Asia in both the past and present contexts belonged to a new moment(s) (1768-1800 and 1968-2000) in history. There is a strong continuity in certain respects between late-eighteenth century Malay trade-based states like the Sulu Sultanate and the post 1970s new order state of Indonesia, the Philippines and Thailand, using 'pirates' and criminals on the high seas to galvanize their economies and get things done in a region beset by political and economic instability. International pressure has not been able to force Indonesia to act against piracy. Indonesia continues to suffer severe political and economic turmoil, and the Indonesian navy, tainted by allegations of corruption and crime on the high seas, is understaffed and short of resources (*Rising piracy* 2000). Operations, such as human traffic in illegal migrants, illegal fishing by trans-national trawlers and attacks on vessels and shipjacking in the Strait of Malacca, have relied on the collusion of local naval authorities and regional crime syndicates. By the late 1990s, the most obvious obstacles preventing effective anti-piracy activities in Indonesian waters have been the adverse impact of regional autonomy, especially in the Riau-Bantam region, and the devastating effects of the economic crisis, and, increased communal tension and political violence across the archipelago.

Regional cooperation in Southeast Asia under these circumstances remains untenable, as Indonesia continues to be wracked by political and economic turmoil and real law enforcement in China remains an abstract concept, when it comes to prosecuting piracy and crime in Asian waters. Globalization and emergent globalized culture continues to enhance material crime relationships linked to piracy in Southeast Asia. As was the case at the end of the eighteenth century, with respect to Iranun maritime raiding and slaving, space-age piracy and crime on the high seas is on the increase in Southeast Asia at the dawn of the twenty-first century. And so too is the cost to industry, trade, local fishers, coastal inhabitants and regional consumers, which now tops billions of dollars. Estimates of losses from piracy and related criminal activity in Southeast Asia reach as high as twenty-five billion dollars annually. Most cargo insurers and shipping companies are helpless in the face of this criminal trend in the context of regional change and global transition. In the 1780s and 1790s, there appeared to be little prospect of a solution within the foreseeable future to what had become a major problem in Southeast Asia's sea-lanes when the Iranun launched their large-scale operations, carried out by well-organized fleets of large raiding *prahu*, that ushered in a major transformation of regional history. Nowadays, as the world contracts through ever-increasing connected ventures, a somewhat different mirror image has appeared on the horizon once again, as new-wave pirates and ship thieves rule the seas of Asia.

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GREG BANKOFF

## **Storms of history**

### **Water, hazard and society in the Philippines**

#### **1565-1930**

The Philippine Archipelago is both geo-physically and meteorologically one of the world's natural hazard 'hot spots'; it experiences more such events than any other country.<sup>1</sup> Modern databases, however, are usually limited by their inability to provide a more extensive historical overview of the incidence and experience of hazard as their documentation rarely extends further than the nineteenth century. Without a fuller historical appreciation of these phenomena, there is always the risk that the disasters caused by natural hazards may be viewed as of recent provenance, simply the product of larger populations, a greater concentration of infrastructure, and, perhaps, accelerated environmental degradation. While few would deny the importance of these factors in contributing to the increasing impact of disasters on modern societies, the emphasis on the present or the recent past tends to disguise the fact that many societies long have had exposure to such events. Moreover, these events may be factors of considerable importance in understanding the historical development of the peoples inhabiting these areas.

Above all, the Philippines is part of a region dominated by water: the degree of marine influence over its climate, environment, settlement, communications and development of resources considered unmatched in any other part of the world (Barrow 1990:78). Hazards associated with near-shore waters such as tropical cyclones, storm surges and tsunamis have posed a constant threat to shipping and repeatedly endangered coastal settlements. The relationship, too,

<sup>1</sup> According to the Belgium based Centre for Research on the Epidemiology of Disasters, which has compiled one of the most comprehensive records on the occurrence of natural hazards in the world since 1900, the Philippines has experienced the most events defined as requiring international assistance, or causing ten deaths or affecting more than a hundred persons. Between 1900 and 1991, there were 702 disasters – earthquakes, volcanic eruptions, typhoons, floods, droughts, landslides and the like – an average of eight a year, causing 51,757 fatalities (Bengco 1993:2). In terms of fatalities over the same period, the countries with the five highest death tolls from natural disasters were China 13,284,633; the former USSR 8,874,719; India 8,576,064; Bangladesh 3,164,642; and Nigeria 1,016,519 (RP Tops 1993:1, 11). For full data on the twentieth century, see EM-DAT n.d.

between typhoons, rainfall levels and recurrent climatic cycles associated with the El Niño Southern Oscillation (ENSO) weather pattern have also ensured that this influence extends well beyond the shoreline. All the peoples who live in these islands have been affected by these same phenomena either through flood and drought or by the waves of volcanic debris known as *lahar* that have engulfed entire communities. Given the frequency and magnitude of these hazards in the Philippines, this paper argues that a systematic documentation of such events beginning with the Spanish conquest in the sixteenth century is such as to warrant an investigation of the ways in which disasters may have actually affected the evolution and adaptation of societies in the archipelago (Bankoff 2003). Even within the islands, the evidence suggests that some areas, and therefore some peoples, have been more vulnerable to hazards than others. First an appreciation of the general nature of hazard and the physical environment is explored before the history of those disasters most associated with its maritime geography up until the 1930s is reconstructed from archival sources. In particular, an attempt is made to estimate the effect of these hazards in terms of numbers of people affected, damage to property and loss of life. Though incomplete and patchy at times, the data still clearly show the magnitude of such phenomena on colonial society in the archipelago.

### *Environment and hazard*

An archipelago located off Indo-China in the Western Pacific, the land area of the Philippines consists of 7,107 islands that total little more than 300,000 square kilometres but comprises over seventeen thousand kilometres of coastline. It lies on what has been called the 'Pacific Rim of Fire' between two deep-sea trenches, the Philippine Trench to the east and the Manila Trench to the west, and is bounded in the south and southwest by the Cotabato, Davao, Sulu and Negros Trenches respectively. Wedged between the much larger Pacific and Eurasian tectonic plates, the small Philippine Sea one is an area of extreme seismic activity. There are numerous earthquakes and volcanic eruptions caused by movements and displacements along the major Philippine Fault Zone and by the head-on collision and subduction of the neighbouring continental and oceanic plates (Punongbayan 1994:5).

In the quarter century alone between 1950 and 1975, the islands experienced 2,126 recorded earthquakes (Torrado 1978:7-8) and are shaken on average five times a day by such events, though most are too faint to be felt (Almario 1992:15-9). There are also 220 volcanoes, 21-22 of which are classified as active since their eruptions have been historically documented.<sup>2</sup>

<sup>2</sup> Punongbayan 1994:5; Rantucci 1994:25. As the historical record does not extend much beyond four hundred years, there will undoubtedly be a reclassification of some volcanoes from inactive to active (Martinez 1994:107).

The three most active volcanoes, Mayon (Albay), Taal (Manila) and Canlaon (Negros) have erupted 98 times between 1572 and 1993 and there have been no less than 41 such eruptions described as destructive over the same period, an average of one major event every decade (Rantucci 1994:25-6). Both the volcanic chain and earthquake belt closely parallel the distribution of the various deep-sea trenches bounding the islands. Thus the volcanoes in the Sulu Archipelago constitute a northeast-southwest chain that parallels the direction of the Sulu Trench, while those in the Bicol Peninsula are aligned with the north-northwest direction of the Philippine Trench. Proximity to these deep-sea trenches also appears to have some bearing on the depth of earthquakes with those having epicentres closer to them being less deep than those with ones further away (Punongbayan 1994:5).

Closely associated with both submarine earthquakes and volcanic eruptions are the tsunamis that have periodically ravaged the coastline. Since 1603, at least 27 of these giant sea waves with crests sometimes exceeding 25 metres have been recorded hitting the coastline of the Philippines with areas in southern Mindanao facing the Celebes Sea being the most vulnerable to such hazards (Rantucci 1994:24; Punongbayan 1994:8). Aside from this seismic activity, the Philippines is also prone to climate-related hazards especially in the form of powerful typhoons that sweep across the islands from the Southwest Pacific, mainly in the period from June to November. On average, the islands are hit by over 20 typhoons each year, some with wind speeds in excess of 200 kilometres an hour, that recurrently devastate low-lying areas of the eastern seaboard (Rantucci 1994:27).

The principal hazard associated with volcanic eruptions apart from the accompanying lava flows or tephra clouds<sup>3</sup> is the danger posed by *lahar*, pyroclastic material composed of boulders, pebbles, sand, dust and gas in the form of a dense mud-like substance. Often heated to temperatures of a 1000°C, such mudflows create a layer of expanding air in their advance that enables them to sweep along the ground at great speeds, sometimes in excess of 500 kilometres per hour. Objects in their path are either destroyed by direct impact or buried, while the encounter proves mainly near fatal for all living things. Cold or secondary concentrations of *lahar* accumulate on the slopes of volcanoes only to be regularly set in downward motion by the subsequent heavy rains associated especially with the typhoon season. Metre-high waves of this material flow onto the lowlands and cover surrounding areas to distances of 40 kilometres (Punongbayan 1994:8-9; Rantucci 1994:26, 110). Typhoons, which are responsible for 47 per cent of average annual rainfall in the archipelago,

<sup>3</sup> Lava flows are relatively large streams of incandescent molten volcanic material that usually issue non-explosively from or near a crater's summit, while tephra refers to the various sized material extruded into the air by volcanic eruptions, the ash among which may be carried long distances by the prevailing winds.

not only set off landslides and *lahar* flows, but are also principally responsible for the severe and recurrent flooding of lowland areas (Rantucci 1994:28). Extended periods of heavy rainfall are particularly linked with slow-moving or almost stationary typhoons.

Table 1. Proportion of forest cover to land area, 1575-1990

Year	Forest cover (million hectares)	Proportion to total land area (%)	Deforestation rate (estimated average hectares per year)
1575	27.5	92.0	22,917
1863	20.9	70.0	35,088
1920	18.9	64.0	78,571
1934	17.8	57.3	191,667
1970	10.9	36.3	350,000
1980	7.4	24.7	120,000
1990	6.2	20.7	120,000

Source: Department of Environment and Natural Resources as cited in Ibon 1997:2.

Human activity has also adversely affected the physical environment, progressively rendering populations more vulnerable to natural hazard and increasing the incidence of disaster. In particular, the accelerating pace of deforestation since the 1930s has exacerbated the exposure of large areas of the archipelago to a range of different hazards as well as raised its predisposition to new ones (Table 1). Loss of forest cover affects local climatic conditions accentuating the likelihood of drought, while increasing the possibility of flood and landslide. Forests also serve as efficient watersheds to collect and regulate the supply of water and moderate its pollution. Deforestation on the scale experienced by the Philippines over the last 50 years has caused massive soil erosion and led to the siltation and sedimentation of inland and coastal waters. Moreover, the appearance and spread of what are called red tides in near-shore waters since the 1970s, harmful planktonic blooms that can cause paralytic shellfish poisoning, has been partially attributed to the rapid eutrophication of waters from siltation, pollution and deforestation (Anderson 1989:13-4; Chua et al. 1989:335-6, 341).

#### *A history of hazard 1565-1930*

Spanish chroniclers have left a record of their trials and misfortunes from the earliest days of colonial settlement in the archipelago that provides a rich source of material from which to attempt a reconstruction of the history of natural hazard in the islands after 1565. Before the nineteenth century, how-

ever, the documentation is often patchy and nearly always selective so that certain regions are over represented in comparison to others, generally in accordance with the extent of the colonial domain at any given time. Thus Manila and central Luzon loom large in the records, the rest of Luzon and the Visayas less so, and Mindanao and the southern islands remain largely terra incognita till much more recently.

The more systematic recording of seismic and meteorological data from around the entire archipelago had to await the establishment of the Manila Observatory in 1865 and the first deployment of purpose-built measuring devices.<sup>4</sup> More precise instrumentation including a Bertelli tromometer, Cecchi and Rossi seismoscopes, an improved Simple Pendulum, two geophones and a Gray-Milne three-component seismoscope was added between 1881 and 1889.<sup>5</sup> This unique array of scientific equipment deployed at so relatively early a date has allowed a much more comprehensive and precise record of natural hazard in the Philippines than in many other areas of Southeast Asia. Most of this body of data is the legacy of three dedicated Jesuit priests who were principally responsible for the seismic work performed at the observatory: Federico Faura (1879-1890), Saderra Masó (1890-1896 and 1901-1928) and William Repetti (1928-1942). To this list should be added the name of Miguel Selga S.J. to whose offices much of the historical data on the early centuries of Spanish occupation can be attributed. The support previously furnished the Observatory by the Spanish government was continued by the new military authorities after the American occupation of Manila in 1898, who both extended its services and modernized its instrumentation. Philippine Commission Act 131 established a Weather Bureau and a network of 51 meteorological and 20 rain stations throughout the archipelago, while new instruments including a Vicentini's universal microseismograph and a ceraunograph were installed in 1902.<sup>6</sup> Altogether, these sources help confirm the evident scale, frequency and magnitude of natural hazard in the archipelago, and give some indication of the significant role such phenomena may have played in shaping the historical development of Filipino society.

### *Tropical cyclones and typhoons*

The loss of life and property caused by tropical cyclones and their epiphenomena such as landslides, storm surges and floods are greater than any other natural hazard in the Philippines. Each year about 20 typhoons, tropi-

<sup>4</sup> Initially a simple pendulum seismoscope and another of a spiral spring vertical variety.

<sup>5</sup> Repetti 1946:133-4. For a complete list of the instruments installed in the Manila Observatory during the Spanish colonial period, see Masó (1905:199-200).

<sup>6</sup> *Second report* 1901:1, 50-1; *Third report* 1903:1, 667. The full benefit of the extended meteorological service was ironically hampered by the repeated destruction of telegraph poles through the activities of white ant and typhoons (*Third report* 1903:1, 305).

cal cyclones with very strong winds, equivalent to over 25 per cent of the total number of such events in the world, occur in the Philippine Area of Responsibility.<sup>7</sup> About 95 per cent of these originate in the Pacific Ocean and so mainly affect the eastern half of the archipelago; the remainder comes across the South China Sea. Therefore the western and central areas of the archipelago are generally less exposed to the full force of typhoons whose intensity tends to dissipate as they cross the central mountain ranges. A distinction should be made between 'remarkable' or destructive typhoons and the more ordinary variety of tropical cyclones. The former are 'one of the greatest natural calamities that may occur in any place', while the latter are responsible for much of the rain that makes the climate so conducive to agriculture (Coronas 1920:446). According to modern meteorological terminology, a distinction is made between tropical depressions with wind speeds of up to 63 kilometres per hour (kph), tropical storms with wind speeds between 64 and 118 kph and typhoons with wind speeds over 118 kph.<sup>8</sup> Whatever the denomination, however, tropical cyclones and typhoons have exerted considerable influence on the history of the archipelago.

No such fine distinctions were made in the past. Known respectively by Filipino and Spaniard alike in the Islands as *baguios*, by the Portuguese in India and China as *tifones*, and as *huracanes* in Spain, there are a surprising number of historical sources on typhoons testifying to their importance whether or not their effect has been generally recognized in conventional histories.<sup>9</sup> The etymology of the words is also indicative given the local significance of typhoons in the region. *Tifón* is considered to derive from the Chinese *tai* meaning strong and *fung* meaning wind. The origin of *baguio* is more problematic having general usage throughout the languages of the archipelago from the oldest of accounts (Selga 1926:16, 110). The prime historical source on this phenomenon is Fr. Miguel Selga's *Primer catálogo de Baguios Filipinos*. This astonishing chronicle of typhoons in the archipelago commences with a Chinese account of the one that struck the ship carrying the Buddhist sage Fa-hien on his return to China off the West coast of Palawan in July 414 as well as an account of a similar event experienced by the Moorish traveller Ibn Batuta on a voyage between Amoy and Sumatra in July 1348. However, the

<sup>7</sup> Brown et al. 1991:196. The Philippine Area of Responsibility (PAR) includes a rectangular area of ocean with the Philippine Islands at the centre, Palau at the eastern edge, Taiwan in the north and Sabah in the south.

<sup>8</sup> PAGASA (Philippine Atmospheric, Geophysical and Astronomical Services Administration) uses a three now four level warning system based on the windspeed of storms expected within 12-18 hours: Signal Number 1, 30-60 kph (kilometres per hour); Signal Number 2, 60-100 kph; Signal Number 3, 100-185 kph; and Signal 4, over 185 kph – the latter being first raised on 27-10-1991 when Typhoon Trining hit Northern Luzon (Almario 1992:41).

<sup>9</sup> A detailed discussion of the historical sources on the nomenclature of typhoons is given in note 40 of the *Relación inédita del P. Francisco Ignacio Alzina S.J.* (Selga 1928:18, 43).



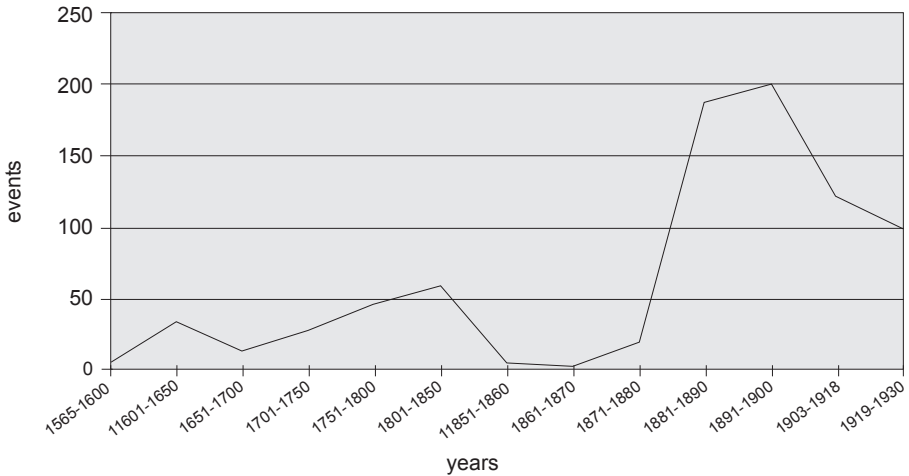
main matter of the compilation provides an historical account of typhoons between 1565 and 1863 (Selga 1928-30). The catalogue of typhoons is continued for the late nineteenth century in a publication on climate compiled by the Manila Observatory in 1899 and published as part of the *El Archipiélago Filipino* printed in Washington at the expense of the US government and later reproduced in the *First report of the Philippine Commission to the President* (First report 1901:4, 290-344). Additional material on southern Luzon for the mid-nineteenth and early twentieth centuries is provided in the chronicle of Nabua ('List of typhoons', *Archive of the Manila Observatory* Box 9-35), while the *Census of the Philippine Islands, 1918* (Census 1920:1, 445-67) contains material on the number of typhoons experienced during the first two decades of the US colonial period. An additional source on the Visayas is Selga's commentary on the *Relación inédita del P. Francisco Ignacio Alzina S.J.* (Selga 1928) but the material on this period is still incomplete, especially for the early years of US occupation from 1903 to 1907. A comprehensive list of typhoons, from which reliable observations can be made, really only exists from 1948 onwards (Manalo et al. 1995:8).

Only a proportion of tropical cyclones and typhoons in the vicinity of the Philippines actually make landfall somewhere in the archipelago, only 384 or 45 per cent of the 850 documented events that entered the PAR between 1948-1990 (Soriano 1992:12). Reference to typhoons in the more historical sources frequently records the passage of tropical cyclones that never crossed land, usually in the context of vessels damaged or lost at sea. In fact, Selga's catalogue of historical typhoons is often nothing less than a chronicle of maritime disaster with 80 per cent of all entries describing such events prior to the eighteenth century (Selga 1928-30). Among the notable catastrophes was the loss of a whole squadron of six vessels, 'the best that the King had placed at sea', together with over 1,000 men to a typhoon between 10 and 15 October 1617 (Selga 1930:20, 44-5). In fact, many particularly severe typhoons were popularly named after the ships that were caught at sea by them such as *Gravina*, *Cantabria*, *Quantico* and *Euzkadi*.<sup>10</sup> Despite the incomplete record of such events, the historical sources clearly show the effect that this hazard exercised on communities in the archipelago, especially after documentation becomes more reliable in the 1880s (Graph 1).

Most of the typhoons recorded in these historical sources were notable either for their intensity, for the particularly severe damage that they inflicted or for some miraculous intervention. Thus the crew of the galleon *Santo Cristo de Burgos*, struck by a violent typhoon off the shores of Ticao on its way to Mexico in 1726, attributed their lives to Don Julián de Velasco's pledge to endow the local church with an annual endowment in gratitude for their sal-

<sup>10</sup> Other typhoons were named after the islands that suffered the most damages, most notably Samar and Leyte, Negros, Cebu, Ilocos, and the Batanes (Selga 1938:206, 65).

Graph 1. Philippine tropical cyclones, 1565-1930



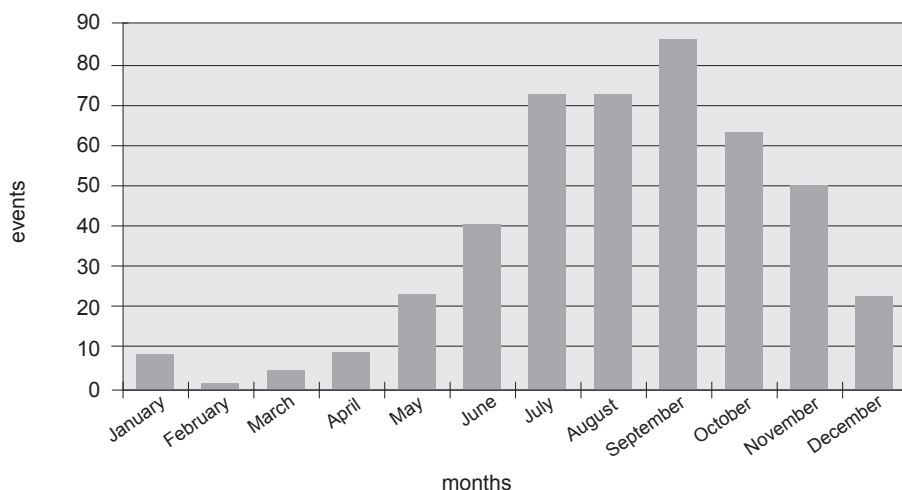
Sources: Selga, 1928-30; 'List of typhoons', *Archive of the Manila Observatory* Box 9, 35; *First report* 1901:4, 292; *Census* 1920:1, 452; *Report of the Governor-General* (1919:181, 1920:143, 1921:230, 1922:177, 1923:210, 1924:197, 1926:216, 1927:261, 1928:201, 1929:192, 1930:255).

vation.<sup>11</sup> Or the great typhoon of 1928 that laid waste the eastern Visayas and southern Luzon, inflicted serious damage to at least twelve other provinces, caused over 500 deaths and damaged 25,000 homes (*Report Governor-General* 1928:15). These sorts of statistics and anecdotal accounts, however, give little impression of what the actual historical experience meant to people in the past. On the other hand, the 'Chronicle of Nabua' provides an insight into how often communities in eighteenth and nineteenth century Camarines and Albay were subjected to 'remarkable' typhoons known locally as *oguis*. The chronicle shows a high degree of consistency in the number of such events: there were nine recorded typhoons between 1701 and 1750, nine between 1751 and 1800, twelve between 1801 and 1850, and eleven between 1851 and 1900. That is a person was likely to experience such a phenomenon twice every eleven years in the eighteenth century and twice every nine years in the nineteenth century, or between five to six times an average life expectancy.<sup>12</sup>

<sup>11</sup> Selga 1930:20, 10. The ship's image was placed on the main altar at Ticao and became an object of local veneration to the islanders.

<sup>12</sup> 'List of typhoons', *Archive of the Manila Observatory* Box 9-35. The 'Chronicle of Nabua' was compiled from the municipal reports sent in reply to the questionnaire of 1911. The chronicle lists typhoons in the following years: 1701, 1703, 1709, 1713, 1721, 1723, 1726, 1733, 1748, 1758, 1762, 1766, 1774, 1776, 1781x3, 1790, 1801x4, 1803, 1811, 1816, 1824, 1839x3, 1857, 1867, 1870, 1875x2, 1881, 1885, 1891x2, 1892x2.

Graph 2. Seasonality of tropical cyclones, 1880-1901



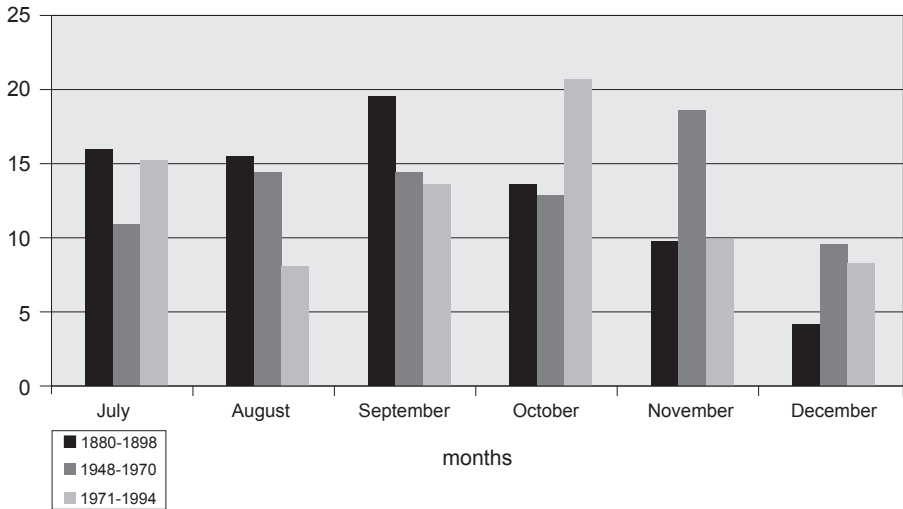
Source: Algué 1904:86.

The nature of tropical cyclones also changes both in terms of duration and seasonality. An historical comparison of the lifespan of typhoons shows that while the average event lasted from four to six days in the latitude of Shanghai and Japan, those in the Philippines endured one day longer. Of the 445 typhoons experienced in the islands between 1902 and 1921, 62 per cent were over in one week or less and 86 per cent were over in ten days or less. Perhaps surprisingly 63 typhoons lasted over ten and one as long as eighteen days. Many of the tropical cyclones that approached the archipelago were of the type that either moved slowly or tended to hover in the vicinity of Taiwan (Selga 1927:69). Even more distinctive than duration was the seasonality of typhoons. While tropical cyclones could occur in any month of the year, they were much more frequent between July and November, a period synonymous with the *tag-ulan* or wet season in the vernacular, and very rare between January and March.<sup>13</sup> Fully 352 out of 468 tropical cyclones (more than 75 per cent) recorded between 1880 and 1901 took place in those five months and only sixteen between January and March (Graph 2). An analysis with later periods for which there is more detailed data suggests a possible shift in the monthly frequency of such events corroborating popular belief that the 'typhoon season' is gradually moving later in the year. An historical comparison between 1880 and 1994 reveals that the percentage of tropical cyclones in

<sup>13</sup> Tropical cyclones are highly unlikely to occur in February, though data for the period 1948-1994 documents such events in 1953, 1980 and 1993 all of which were tropical depressions (Manalo et al. 1995:8).

August and September is decreasing while those in December are noticeably increasing (Graph 3). The data, however, are not conclusive and the implications for agriculture, if any, remain unclear.

Graph 3. Percentage monthly variations of tropical cyclones, 1880-1994



Sources: *First report* 1901:4, 292; Manalo et al. 1995:8.

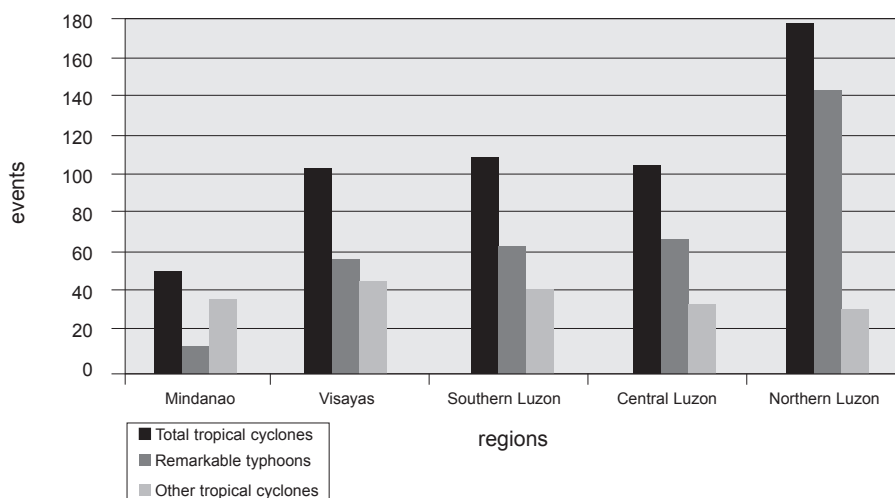
Just as significant as the variations in duration and seasonality are the paths taken by tropical cyclones and the consequences for various parts of the islands. At least five main tracks have been identified: one that crosses to the north of Manila, one that traverses south of the capital, one that passes east or northeast of the archipelago either disappearing or re-curving in the Pacific, one that forms in the China Sea to the west of the Philippines, and another that re-curves in the China Sea between the parallels 10° and 20° (*Census* 1905:1, 158-60; 1920:1, 447-52). As a result some provinces are more frequently exposed to typhoons than others.

A comparative analysis of the total number of tropical cyclones experienced by each major region of the archipelago between 1903 and 1918 reveals marked differences (Graph 4). Northern Luzon receives by far the highest number of all tropical cyclones and equally the highest number of remarkable typhoons (those with strong winds).<sup>14</sup> No fewer than seven of the ten provinces or sub-

<sup>14</sup> The regions are defined as constituting the following provinces and sub-provinces as designated under the US colonial regime: Northern Luzon as Nueva Vizcaya, Amburayan-Benguet, La Union, Ifugao-Lepanto-Bontoc, Isabela, Abra, Ilocos Sur, Cagayan, Ilocos Norte, Babuyan Islands

provinces most exposed to this latter type of typhoon are situated within this region (Cagayan, Ilocos Norte, Babuyan Islands, Abra, Ilocos Sur, Isabela and the Batanes). There is little difference both in total numbers or the nature of tropical cyclones between Central Luzon, Southern Luzon and the Visayas with each region respectively receiving 107, 109 and 105 events. However, two islands in the Visayas, Samar and Leyte also figure in the ten most exposed provinces to remarkable typhoons accounting for 25 out of 59 or 42 per cent of all such storms in that region. Mindanao, on the other hand, presents a very different profile with fewer tropical cyclones and a higher percentage of milder events proportionately than any other region (*Census 1920:1, 462*).

Graph 4. Tropical cyclones by region, 1903-1918



Source: *Census 1920:1, 462*.

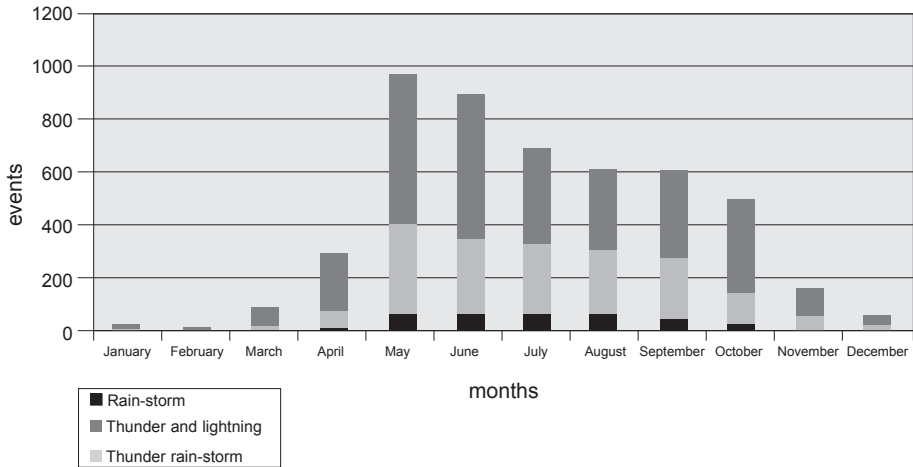
Any true appreciation of the regional variation in both the number and effect of tropical cyclones on the islands needs to consider the occurrence of more localized storms, sometimes referred to as 'tornadoes', in the historical context. These are defined as tempests, usually of short duration, accompanied by thunder and lightning. They are extremely frequent at certain times of the

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and the Batanes; Central Luzon as Southern Tayabas, Northern Tayabas, Batangas, Laguna, Cavite, Rizal, Manila (city), Bataan, Bulacan, Pampanga, Zambales, Tarlac, Nueva Ecija and Pangasinan; Southern Luzon as Masbate, Romblon, Mindoro, Marinduque, Sorsogon, Albay, Catanduanes and Ambos Camarines; the Visayas as Oriental Negros, Occidental Negros, Bohol, Cebu, Leyte, Iloilo, Antique, Capiz and Samar; and Mindanao as Sulu, Cotabato, Davao, Zamboanga, Lanao, Bukidnon, Agusan, Misamis, Surigao, Southern Palawan and Northern Palawan.

year, especially during the *tag-ulan* (rainy season) and are responsible for a large percentage of rainfall in the archipelago.

Graph 5. Storms in the vicinity of Manila, 1888-1897



Source: *First report* 1901:4, 348-350.

The number of these storms in any year is phenomenal as the data collected by the Manila Observatory on the capital and its immediate surrounds between 1888 and 1897 testify. No fewer than 5,050 storms of all types were recorded for this ten-year period or an annual average of 505. Three different variations of storms were distinguished: those that were simply violent rain-storms, those that were rains-storms accompanied by much thunder, and, by far the most numerous, those that could only be perceived by flashes of lightning and peals of thunder. The pattern of their occurrence resembles that of the typhoon season except that the storms commence and peak earlier (May-June) and diminish sooner (November) (Graph 5). In both cases, there then follows a long dry period between December and March. Something of the sudden menace of these storms is conveyed in the words of Saderra Masó who described the onset of one such 'tornado' on 21 May 1892 as terrifying Manila's 'inhabitants by the number of electric sparks which accompanied it and by the tremendous peals of thunder'. He recorded a rainfall of 60 mm in 30 minutes (*First report* 1901:4, 354). Such a downpour, however, was nothing out of the ordinary: another such event on 14 September 1931 measured 2.3 inches or over five centimetres of rain in the same time period (Selga 1931:21, 113). Perhaps, more than any other hazard, tropical cyclones and storms exert

an influence on communities and peoples in the archipelago, creating an intricate and complex web of relationships that oscillate between disasters on the one hand and the timely need for rainfall on the other.

### *Floods, storm surges and tsunamis*

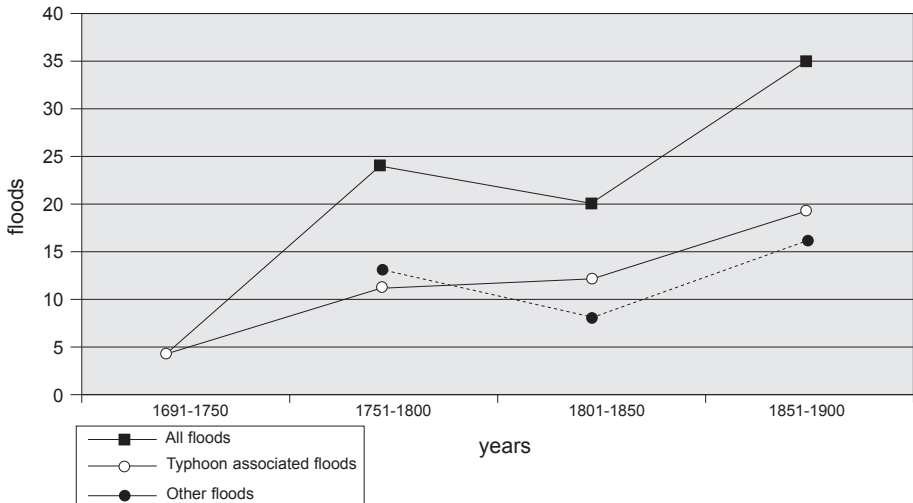
The peoples of the Philippines have experienced a large number of other hazards, as much in the past as in the present, many of which are epiphenomenal to those already discussed. Thus floods and storm surges are often caused by tropical cyclones and droughts by the lack of them. Tsunamis are mainly triggered by volcanic eruptions or earthquakes that almost invariably also cause landslides and slope failures. Unfortunately, the historical record of these events is extremely patchy, not because of their infrequency but as a result of the very regularity of their occurrence that made their observation something less than remarkable. While earthquake, volcanic eruption and even typhoons inspired an almost divine awe at the majesty and power of nature (or even of some higher authority), flood and drought, though no less destructive or infrequent, were not so spectacular and belonged more to the commonplace order of daily existence in the archipelago. That is, at least in the accounts of those European observers who have left the written record of such phenomena.

Floods, in particular, have historically been the source of much privation and suffering in the Philippines. Since the islands of the archipelago are relatively small with the exception of Luzon and Mindanao, there is no coastal plain wider than sixteen kilometres.<sup>15</sup> Rivers, therefore, are short, sluggish and shallow, following courses chiefly determined by tectonic lines, folding and faulting. Floods are largely of two types: the sudden raging torrent that peaks sharply and dies away in a few minutes as a result of localized rainfall; and those of a much more widespread nature and longer duration usually associated with persistent rainfall. Such events were not generally considered worth documenting unless they had relevance or consequences to Europeans. Thus one of the earliest accounts describes how a localized flood in Cebu rendered useless the firework display that had been designed especially to celebrate the beatification of San Ignacio on the night of 30 July 1611 (“*Dolo de Samar*”, *Archive of the Manila Observatory* Box 7-16). In this manner, too, Miguel Selga’s catalogue of typhoons, drawn mainly from the chronicles of conquistadors and prelates, rarely mentions flood; it is much more concerned with shipwreck and other maritime disaster.

<sup>15</sup> Nor are there any extensive tracts of land whose fertility may be renewed by seasonal flooding (Fisher 1964:697).



Graph 6. Total recorded floods, 1691-1900



Source: 'Floods in the Philippines', *Archive of the Manila Observatory* Box 10-37.

The minutes of local 'town chronicles', on the other hand, give frequent accounts of such hazards. A list drawn up from these sources found in the Archive of the Manila Observatory constitutes a record of major floods that occurred between 1691 and 1900.<sup>16</sup> While almost certainly incomplete, it does provide an indication of the primary causes, geographical predisposition and even the frequency of such events in specific areas. In particular, the chronicles regularly refer to flooding in connection to the passage of tropical cyclones; over 56 per cent of all recorded incidences are directly attributed to typhoons (Graph 6). On other occasions, floods were mainly attributed to heavy rainfall, at times associated with the monsoons. According to the chronicle of Binmaley, the flood of 1774 in Northern Pangasinan was due to the Agno River changing its course. Moreover, the close association between flooding and typhoons suggests a certain seasonality in their occurrence that corresponds to the peak in the latter's annual cycle between July and November (see Graph 2).

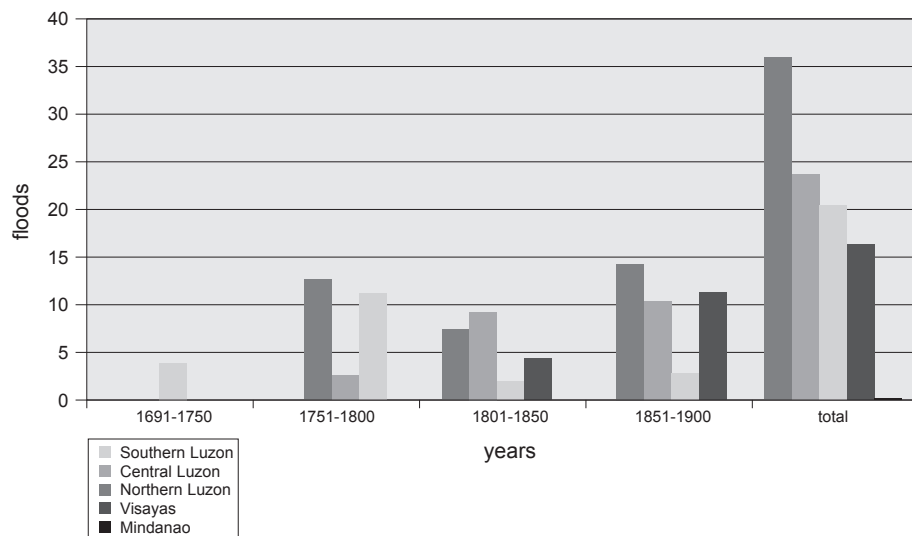
The geographical predisposition of flooding is even more tenuous to gauge as the records largely reflect the principal centres of Spanish colonialism (Graph 7). There is no record of any event in Mindanao prior to 1900 when, however, they constitute as many as 20 per cent of all floods.<sup>17</sup> Still, the preponderance of the northern part of Luzon over the rest of that island is consistent with the

<sup>16</sup> The list, simply entitled 'Floods in the Philippines 1691-1911', is anonymous and does not seem to have been composed by Selga but makes frequent reference to his works and so presumably post-dates him.

<sup>17</sup> There were three floods out of a recorded fourteen for the period 1901-1911 ('Floods in the Philippines', *Archive of the Manila Observatory* Box 10-37).

higher incidence of typhoons there and its greater vulnerability as the most hazard-prone region of the Philippines (see Graph 4). Some idea of what the incidence of flood on local communities might mean can be gauged by a closer scrutiny at the more complete local chronicles that suggest how often people were faced with such situations. The records for Nabua in Camarines between 1691 and 1856 and those for Pangasinan between 1768 and 1872 depict just how frequent a life-event floods were.<sup>18</sup> In Nabua, a person experienced one such event every 9.7 years on average but once every 5.6 years between 1733 and 1800. This latter figure is more in line with that for Pangasinan where the average was once every 5.7 years.<sup>19</sup> ('Floods in the Philippines', *Archive of the Manila Observatory* Box 10-37).

Graph 7. Total recorded floods by region, 1691-1900



Source: 'Floods in the Philippines', *Archive of the Manila Observatory* Box 10-37.

Other local histories present a glimpse of the reality of this hazard for communities in different regions of the archipelago. In northern Luzon, the Chronicle of San Nicolas in Ilocos Norte describes a violent storm and flood

<sup>18</sup> Half of the eighteen floods in Pangasinan were recorded in the chronicle of Calasiao.

<sup>19</sup> Floods occurred in Nabua in 1691, 1697, 1733, 1748, 1758, 1767, 1775, 1783, 1786, 1787, 1790, 1793, 1798, 1800, 1817, 1840, 1856; and in Pangasinan in 1768, 1774, 1776, 1777, 1779, 1785, 1790, 1794, 1797, 1806, 1820, 1821, 1825, 1831, 1857, 1865, 1871 and 1872 ('Floods in the Philippines', *Archive of the Manila Observatory* Box 10-37).

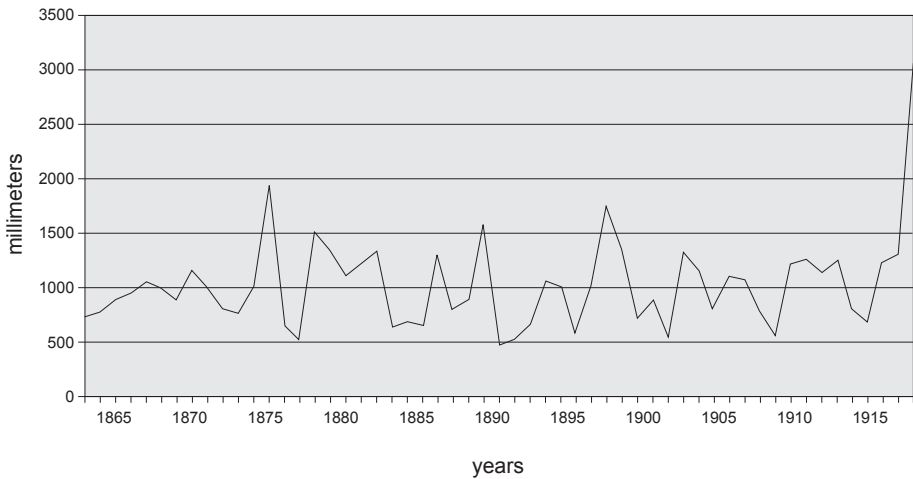
that destroyed half the town in 1798, while that of Balaoan, La Union, reports heavy rains in 1830 that demolished many houses and led to the relocation of the military barracks to safer ground. Still in La Unión, the Chronicle of San Fernando narrates a severe storm that drowned several people in October 1908. The same was true of central Luzon. The Chronicle of Pagsanjan in Laguna gives details of the overflowing of the Balanoc and Bumbungan rivers on a number of occasions: flooding the town with enormous loss to both life and property on 22 October 1831, rising to over half a metre along the Calle Real in October 1840, and again inundating the town in 1882. The Chronicle of Nasugbu in Batangas recounts a flood so great in 1839 that many animals were carried away and the town submerged so that people had to use *bancas* (indigenous canoes) to move around even in the centre. Further south, the Chronicle of Daet in Camarines relates how rain carried away the newly constructed bridge in 1847 and how those of 1857 were 'exceedingly heavy' ('List of Typhoons', *Archive of the Manila Observatory* Box 9-35).

A similar picture emerges for the Visayas with the Chronicle of Pototan in Iloilo mentioning a big flood in 1837 and heavy rains in December 1893. Various other chronicles from Iloilo recite similar occurrences: the overflowing of two rivers and the great destruction wrought in Dumangas on 3 April 1841, the floods in Barnate in 1848 and in 1890, and in Alimodian in 1866 and again in July 1877. The Chronicle of Bacolod in Negros tells of 'abundant rains' that demolished several houses in 1875, while that of Caibiran, Leyte, of a big flood that washed away 'most of the houses, and even the church and bell tower' in 1876. Any impression that these were simply small scale disasters and localized tragedies are refuted by chronicles such as that of Tayum whose account of the rising of the Abra River to a height of more than 25 metres above its normal course caused over 1,800 deaths between 25-27 September 1867 ('List of Typhoons', *Archive of the Manila Observatory* Box 9-35). The flooded area around Bangued was reported as almost circular with a diameter of approximately ten kilometres and a height of more than 20 metres. The entire town of Caoayan disappeared beneath the waters ('Floods in the Philippines', *Archive of the Manila Observatory* Box 10-37). Or the flood that inundated large portions of Central and Northern Luzon in October 1871, drowning 1,342 cattle, 842 horses, 761 carabaos and numberless hogs and domestic animals in Ilocos Norte alone ('Floods in the Philippines', *Archive of the Manila Observatory* Box 10-37). Or again the flood in Santa Maria, Ilocos Sur, that destroyed the *barrio* of Sumagui, carrying away over 22 houses and causing more than one hundred thousand pesos worth of damages in 1911 ('List of typhoons', *Archive of the Manila Observatory* Box 9-35). The most obvious flood-prone areas in the islands are the ancient channels of river systems filled with Quaternary alluvial deposits. As these are also among the flattest, most fertile and easiest to irrigate landscapes, they have also been the richest centres of agriculture and

intensive human settlement. Currently, half of the country's provincial capitals and major cities are situated on these floodplains (Balce et al. 1994:20-1).

Drought, on the other hand, is considered more of a contemporary hazard in the Philippines and is perhaps even more difficult to determine: sometimes an absence of a thing is less easily described than an excess of it. Most rainfall occurs between June and August with the last two months in particular important for rice cultivation. Late or low rainfall during this season can have serious consequences for the sowing and growth of *palay* (unhusked rice). Yet the evidence suggests that drought too was a recurrent if not as regular an event as flood. A circular issued by the Archbishop of Manila on 31 August 1849, that is towards the end of the *tag-ulan* testifies to the severity of one such drought. The prelate initiated processions of the Holy Sacrament throughout the diocese and urged the faithful to pray for deliverance from their even greater fears of 'the terrible scourge of hunger and sickness that just the same we merit as a result of our many sins'. A similar sort of circular from the Bishop of Cebu suggests the presence of drought in the Visayas during 1865 (Selga 1920:10, 96).

Graph 8. Rainfall (June-August) around Manila, 1865-1919



Source: Selga 1920:10, 97.

In fact, an analysis of Manila's wet season rainfall between 1865 and 1919 reveals considerable annual variations characteristic of the familiar El Niño-La Niña weather oscillation. Thus while the average rainfall for June, July and August amounted to 1,039 mm, annual totals varied from a low of 496.2 mm in 1892 to an astonishing 3,068.8 mm in 1919. Rainfall patterns suggest possible periods

of drought in 1874-1875, 1885-1887, 1892-1894, 1897, 1903, 1909-1910 and 1915-1916 followed by years of high rainfall with consequent higher likelihood of flood in 1876-1877, 1888, 1895-1896, 1898-1900, 1904-1905, 1911-1914 and 1917-1919 (Graph 8). This close relationship between drought and flood is typified in the annual report for Mountain Province in 1915. While relating how nearly all districts had been afflicted by drought over a number of months that had seriously reduced the rice and camote crops (sweet potato), it also details the consequences of two severe typhoons, one following closely upon the other, that wrought major damage to life and property, causing a number of deaths and washing away the terraced walls of rice fields and burying others under slides of dirt, rocks and gravel (*Report Philippine Commission* 1915:115).

The incidence of other hazards is also fragmentary, especially the further the distance from Manila and the more remote its occurrence in time prior to 1865. In particular, coastal communities were subject to their own distinctive forms of hazard in the form of storm-surges and tsunamis. Storm surges are caused by an abnormal rise in sea levels as typhoons approach the coastline.<sup>20</sup> Atmospheric pressure drops causing sea levels to rise as a storm forms and, as it approaches land, the strong winds pile up the already raised sea that then sweeps inland. With its long coastline, the archipelago is a natural storm surge-prone landmass with those regions most exposed to the path of tropical cyclones most at risk. The earliest documented storm-surge in the Spanish historical sources provides details of a typhoon that tore through southern and central Luzon between 27 September and 6 October 1881 and a subsequent wave so immense that more than 20,000 corpses were recovered after it struck the coast of Indo-China (*Archive of the Manila Observatory* Box 9-35). The first such recorded event to cause widespread damage and loss of life in the Philippines is that of the 'hurricane wave' of 12 October 1897 that devastated coastal regions of Samar and Leyte. Sea levels rose from three to as high as 7.3 metres in Hernani (southern Leyte) and remained at that height for over three hours. Accounts describe a small boat being cast more than one hundred metres from the shoreline and of two carts being lifted up and thrown down beside two dazed sailors. These latter were among the storm-surge's lucky survivors as the event is estimated to have claimed between 1,300-1,500 lives (*First report* 1901:4, 310-1; 'List of typhoons', *Archive of the Manila Observatory* Box 9-35).

Since then a number of other such similar events have been documented, though again the data seems incomplete, especially considering the absence of incidents for the 1940s and 1950s and their disproportionately greater occurrence in the 1970s and 1980s (Table 2). Still, a pattern emerges showing some regions of the archipelago being more vulnerable than others to storm surges.

<sup>20</sup> Less commonly, typhoons leaving a landmass may also generate storm-surges.

Table 2. Storm-surges by region, 1897-1984

Years	Events	Northern Luzon	Central Luzon	Southern Luzon	Visayas	Mindanao
1897-1910	7	1	1		5	
1911-1920	6	1			5	
1921-1930	3	1	1		1	
1931-1940	2		2			
1941-1950						
1951-1960	6	2	3	1		
1961-1970	9	3	2	2	2	
1971-1980	10	1	3	1	2	3
1981-1984	10	2	3	2	1	2
Totals	53	11	15	6	16	5

Sources: Gonzalez 1994:17; Soriano 1992:15.

Particularly vulnerable coastlines include: the northern tip of Luzon, Isabela, the eastern coast of Bicol and the eastern Visayas on the Pacific Ocean side; and the Ilocoses, Manila, Batangas and western Mindoro on the South China Sea side. Most of Mindanao with the exception of northeastern Surigao and small parts of northern Zamboanga, is unaffected by such phenomena.

As distinct from storm surges, tsunamis are waves generated by sudden vertical movements of the seafloor during earthquakes, submarine landslides triggered by nearby earthquakes or by volcanic eruptions.<sup>21</sup> Two to three waves often over a hundred kilometres apart spread outwards in all directions from the point of origin reaching speeds of over 1,000 kilometres per hour. Often undetectable in the open ocean, the waves slow as they approach shallowing water and irregular coastal features such as bays and estuaries that sharply heighten their amplitude so that they become almost vertical walls of water that strikes the shore with devastating force, sweeping aside all before them. The most powerful tsunami recorded prior to the 1970s occurred in 1897 as a consequence of the severe earthquake that rocked Mindanao, the Sulu Archipelago and the southern Visayan Islands on 21 September. The sea was described as rising in several locations: small boats were driven rapidly inland in Zamboanga, two hills collapsed alongside the river there and many dwellings were washed away; in Isabela de Basilan, the ocean rose six metres above its bed, rolling great *yakal* timbers and blocks of masonry aside and carrying away the market place; and the waters were said to rise and fall every fifteen minutes in

<sup>21</sup> Tsunamis are often erroneously referred to as 'tidal waves' that are caused by the gravitational attraction of the sun and moon.

Sulu, dividing the island of Tubigan into two, and washing away that of Damei (Repetti 1946:315-6; Masó 1905:217-9). Many hundreds of casualties were discovered in the wake of these occurrences (PHIVOLCS: PL E076).

Tsunamis have also been recorded following earthquakes in Zambales on 26 January 1872, in Cotabato on 31 January 1917 and again on 15 August 1918 causing seven and 50 deaths respectively, and in northeastern Samar on 13 November 1925.<sup>22</sup> No less than nine of the 29 recorded tsunamis to have struck the archipelago prior to 1970 occurred in Mindanao in comparison to eight in the Visayas, seven in northern Luzon and five between central and southern Luzon.<sup>23</sup> The data are even more telling that the statistics suggest as only events after 1897 are documented for Mindanao, while those for other regions date from as early as 1627. More localized events also took place as a consequence of the eruption of Taal given the volcano's situation in the centre of Lake Bombon. Following the explosion of 1716, immense waves were said to have striped away the beach and endangered the church, while fish were cast ashore 'in a state as if they had been cooked, since the water had been heated to a degree that it appeared to have been taken from a boiling cauldron'. Once again the lake town of Taal was threatened during the massive eruption of 1754 by the 'raging waters' that invaded the main part of the municipality 'sweeping away everything they encountered' (Masó 1911:7, 9). Despite the particular topographical circumstances of Taal, the areas most vulnerable to tsunamis are the coastlines of southern Mindanao facing the Celebes Sea (Punongbayam 1994:8).

### *Hazard and society in the past*

The historical record, incomplete though it may be, leaves no doubt that hazard has played an important role in shaping the past of peoples and communities living in the archipelago, along its shores as well as inland. Assessing just how central that part may be deserves a detailed study in its own right and is beyond the intention and encompass of the present work. Not until the collection of detailed statistics on the damages wrought by disasters beginning in the 1970s can the 'costs' of natural hazards be approximated with any degree of confidence. Still, there are some documents that afford a rare glimpse into the past and provide some measure of the scale and scope of that experience. Yet an appreciation of the true extent of their effect on the political, economic and social structures of society can only be inferred from tantalizing statements such as that given by William Daland before the Philippine Commission on 19 June 1899. When asked what the impact of construct-

<sup>22</sup> PHIVOLCS: PL E076. A further such event may have taken place in Isabela on 29-12-1949 after fifteen people were drowned by the capsizing of their *bancas*.

<sup>23</sup> Rantucci (1994:24-5) records only 27 tsunamis in the text while providing a map from PHIVOLCS that clearly records thirty including that of 1976.



ing an electric tramway connecting Manila to Antipolo would have, he replied that: 'It would take some time before the people would move out there and take houses. This being a center of earthquakes and typhoons foreigners don't care to own much property' (*First report* 1901:2, 170).

One such event for which a substantial number of documents have survived describes the typhoon that hit central Luzon on 22-23 October 1831. Once again, the compilation and preservation of this material is due to the diligence of Fr. Selga. Not only has he preserved the harrowing eye-witness account written by Nicolás de Saavedra within a couple of days of the storm, supplemented by the logs and personal observations of Captains Bankcroft and Griswold of the ships *Crocodile* and *Panamá*, but he also provides detailed records of the damages and costs incurred for some provinces (Table 3).

Table 3. Damages by region following the typhoon of 22-23 October 1831

Provinces	Deaths	Houses destroyed	Cost in pesos
Tondo	58	20,197	131,242
Cavite	131	4,320	32,849
Bulacan	N/A	4,272	14,106
Laguna	36	4,175	62,775
Bataan	N/A	393	968
Totals	225	33,357	241,940

Source: Selga 1921:58-9.

This data collated from the returns of the *alcaldes mayores* (governors) and parish priests of the respective provinces to the Governor-General furnish some idea of the scale of such disasters though it should be borne in mind that Selga (1928-30:21, 27) describes this event 'as one of the most horrific in the records of Philippine history'. At the very least, however, the death of 225 persons, the loss of 33,357 dwellings and damages amounting to just under a quarter million pesos was a significant cost for colonial society to bear.<sup>24</sup> Using an estimate of five persons per household, that means a minimum of 166,785 people was affected by the typhoon.<sup>25</sup> In response to this degree of distress, Governor-General Pascual Enrile opened a voluntary subscription on 8 November for the victims of the event in which the names of those who contributed were publicly acknowledged.<sup>26</sup> Despite this incentive,

<sup>24</sup> Selga makes it quite clear that these figures are far from complete, writing: ¿Quién dará cuenta de otras personas que perecieron y cuyos nombres no hubo pluma que los transmitiera a la historia?

<sup>25</sup> Early Spanish statistics are often cited in terms of tribute payers that are usually calculated at the rate of five to one, a tribute payer being regarded as a householder.

<sup>26</sup> Those contributors who wished to remain anonymous could simply write their initials.

the amount of 'state' relief did not amount to much more than a fraction of the most conservative estimate of the damages incurred. In the event, it appears that the subscription raised in relief from official sources did not total more than 34,714 pesos, equivalent to a little over fourteen per cent of the reported damages in the five provinces for which statistics are provided.<sup>27</sup>

At other times, a series of brief reports describing a number of similar events that all transpired in the same locality give some impression of the cycle of risk and hazard that people confronted in their daily lives. Thus the communities who lived in the shadow of Mayon, the most active volcano in the archipelago that has erupted at least 44 times since records begun in 1572, live with the knowledge that on average they will experience one such event every ten years. But every year, they must also fear that the torrential rains of passing typhoons will unleash an avalanche of water, mud and rock composed from the loose pyroclastic material that lies on the mountain's slopes. Just such a catastrophe struck the surrounding towns in November 1875, reportedly killing over 1,500 people.<sup>28</sup> Again, a heavy flood carried sand, gravel and boulders down the mountain in 1915 and washed away the rail-track between Legaspi and Libog, suspending communications between the towns for over two weeks. Four typhoons passing in quick succession in October and November 1934 caused floods that, according to the Provincial Board of Albay: 'inundated and submerged thousands of hectares of lands, particularly rice lands, in the municipality of Oas, Guinobatan, Camalig, Daraga, Legaspi, Libog, Tabaco, Malinao and Tiwi, especially with great quantities of sand and eroded rocks and big stones from the slopes of Mayon volcano, rendering those lands unproductive now and for many years to come and perhaps permanently'.<sup>29</sup>

Not only did natural hazards cost lives and destroy property but it also wrought havoc on agriculture, the foremost economic activity of the majority of peoples and the principal basis of commerce and industry in the archipelago. An examination of the provincial reports for a single year, 1906, gives some idea of the often longer-term impact of hazard that continued to affect communities after the threat of the event itself had receded. The year was not an exceptional one overall though more severe in certain provinces. In the first place, a particularly destructive typhoon on 25-26 September 1905 materially reduced the crops in eight mainly central and southern Luzon provinces.<sup>30</sup> In particular,

<sup>27</sup> Selga 1921:79, 72. The government offered twenty-five thousand pesos, the Obra Pía de la Misericordia four thousand pesos, the Venerable Third Order of Saint Francis two thousand pesos, the Recollects two thousand pesos, D. Luis Abilés 829 pesos and the armed forces 885 pesos.

<sup>28</sup> An earlier event occurred on 23-10-1766 entirely destroying the town of Malinao.

<sup>29</sup> 'Accounts of the eruption of various volcanos', *Archive of the Manila Observatory* Box 13-8. The respective dates of the typhoons were: 14 October, 28 October, 15 November and 29 November 1934.

<sup>30</sup> The eight provinces were Samar, Sorsogon, Alba, Ambos Camarines, Tayabas, Batangas, Laguna and Cavite.

there was a fall in hemp production with exports for the six months to 30 June 1906 only slightly over 70 per cent of the figure for the same period of the preceding year.<sup>31</sup> The storm also seriously damaged the coconut crop, the high winds shaking growing nuts to the ground. Apart from the typhoon, there was a drought in Mindanao, Cebu and some of the southern islands and a locust plague in the areas directly north of Manila (*Seventh report* 1906:2, 195-6).

The reports of provincial governors add details about local situations. Thus in the north, two typhoons severely affected the tobacco harvest in the southern half of Isabela: the first in December 1905 flooding fields and causing the loss of plants set out and seeded; the second in the following May completing the process as 'to the great misfortune of the long-suffering inhabitants [...] the storm came just at the time of cutting'. The loss to both crops and housing was estimated at one hundred and fifty thousand pesos (*Seventh report* 1906:1, 301). A similar fate awaited the tobacco crop of La Unión that, not only had to contend with the storms of May, but also with the effects of a prolonged drought between October 1905 to April 1906 that reduced the harvest by one-third (*Seventh report* 1906:1, 476). In the Cordillera, the early coming of the rains broke a drought that threatened the rice harvest in Lepanto-Bontoc (*Seventh report* 1906:1, 317). Drought, too, was a major factor reducing agricultural production in central Luzon where the rice crop was 30 to 40 per cent below expectation due to lack of rain in some towns of Cavite (*Seventh report* 1906:1, 222). The situation was much worse in Pangasinan:

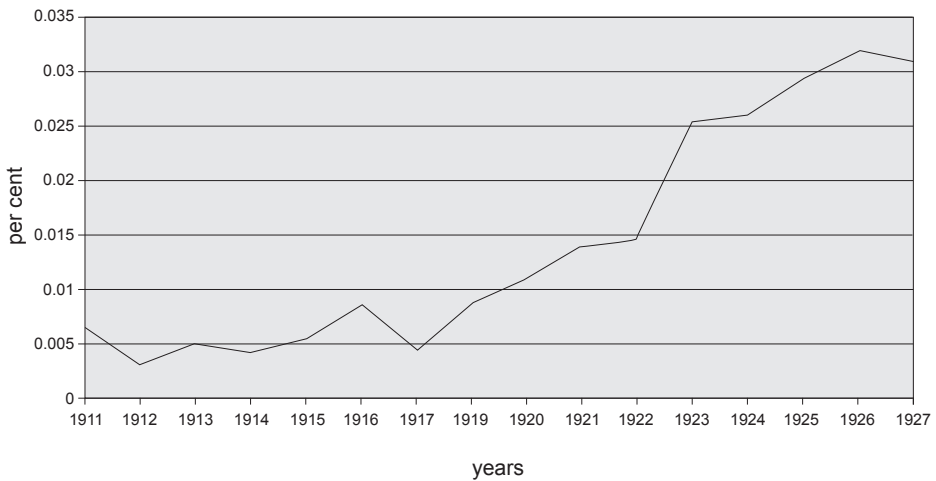
The last rice crop suffered a loss of 50 per cent by the storm of last September and the drought during the months of November and December. The ravages of the locusts during the months of July to November, 1905, also contributed to the loss of several crops, especially that of rice. The last storms during the months of May and June levelled the rice fields, which had to be planted over again, and injured the mango trees, the last storm having occurred at the time of gathering' (*Seventh report* 1906:1, 416).

In southern Luzon, it was the severe typhoon of 25 September that was mainly responsible for agricultural losses. The Governor of Albay felt that 'the incalculable losses caused by the terribly destructive baguio' would not be made good till the end of 1906 and only then providing that the harvest was a good one (*Seventh report* 1906:1, 157). The 'deplorable condition' to which Sorsogon had been reduced was due to the drought that reigned throughout most of 1905 compounded by the typhoon that had 'heaped the greatest desolation and misfortune upon the province'. Statistics collected by municipalities in the wake of the storm conservatively estimated the losses at 50 injured, 13,174 houses destroyed and total damages at 7,297,055.35 pesos (*Seventh report* 1906:1, 444).

<sup>31</sup> Exports fell from 66,213 to 48,227 tons. For the importance of 'Manila hemp' on the economy of late nineteenth and early twentieth-century Philippines, see Owen 1984.

In the Visayas, drought ravaged Leyte, occasioning a loss of 30 per cent in the hemp crop (*Seventh report 1906:1, 328*), while in Samar, the hemp crop was ruined by the typhoon of 25 September along with 5,000 houses including all the public buildings in eleven municipalities (*Seventh report 1906:1, 437*). The annual report for Cebu begins with the terse sentence that the past fiscal year 'was ushered in by gaunt famine, which lasted till August and was unprecedented during a period of fifty years' (*Seventh report 1906:1, 239*).

Graph 9. Amount of typhoon and earthquake insurance as per cent of total insurance policies, 1911-1927



Sources: *Report Philippine Commission 1913:240, 1914:256, 1915:206; Report Governor-General 1918:144, 1921:137, 1923:158, 1924:144, 1926:129, 1927:207, 1928:139; Census 1921:4, 2, 749.*

Insurance, too, provides another avenue of exploring the costs and perceptions of hazard in the Philippines though its relevance to the majority of people remained and still remains today rather tenuous. By 1918, 60 insurance companies were doing business in the islands, nine local, twelve domiciled in the United States and the remainder in various foreign cities, mainly London. These companies mainly wrote policies in fire, marine and life insurance but three also covered damages caused by typhoons and earthquakes: the British Traders Insurance Company and the Union Insurance Company of Canton both with their home offices in Hong Kong, and the Fidelity and Surety Company of the Philippines based in Manila.<sup>32</sup>

<sup>32</sup> *Census 1918:4, 2, 741.* The rather haphazard situation that had prevailed earlier had largely been systematised with the passage of the Insurance Law Act No. 2427 of 1-7-1915 that had effectively set up the Insular Treasurer as ex-officio Insurance Commissioner and established a scheme of official registration.

Table 4. Typhoon and earthquake risks, premiums and losses, 1919-1928 (pesos)

Type	1919	1920	1921	1922	1923
Risks written	2,525,835	5,967,000	5,584,150	8,333,080	13,125,250
Premiums written	16,849.87	37,334.21	34,683.77	41,052.25	67,176.51
Losses incurred	1,700	37,402.48		44,104.82	50,284.34
Losses paid	1,700	37,402.48		44,104.82	1,997.72
Ratio of premiums to losses	10.08	100.18		107	73

Type	1924	1925	1926	1927	1928
Risks written	6,806,400	9,920,060	9,920,060	17,748,123	19,757,555
Premiums written	31,683.99	19,603.52	25,854	46,257	55,950.34
Losses incurred					42,156.32
Losses paid					69,998.82
Ratio of premiums to losses					75.3

Sources: *Census* 1921:4, 2, 751; *Report Governor-General* 1920:84, 1922:125, 1924:118, 1926:129, 1927:191, 1928:121.

While premiums for these phenomena only comprised a small fraction of a market that was dominated by policies in marine and fire insurance, the percentage that natural hazards constituted steadily increased in importance from just over half of one per cent to just over three per cent between 1911 and 1927 (Graph 9). This increase represented an eighteen-fold rise in the amount of insurance from 1,710,500 to 31,640,643 pesos over the same period and signifies a growing awareness of the degree to which natural hazards posed a danger to US property and commerce in the islands. However, given the regularity with which natural hazards occur in the Philippines, insurance was not a particularly lucrative business. An analysis of insurance policies written for typhoon and earthquake damages incurred between 1919-1928 reveals a ratio of premiums to losses of 47 per cent with the latter exceeding the former in two years, 1920 and 1922 (Table 4).<sup>33</sup>

<sup>33</sup> The actual amount of losses paid again exceeded premiums in 1928 but why such losses were greater than those incurred is unclear.

*Conclusion*

Delving into the past to uncover the history of hazard in the islands is fraught with its own 'perils' that lurk in the unevenness of the sources and the imperfect nature of the data. Yet the sheer weight of material leads to the conclusion that, whatever the actual rate or magnitude may have been, natural hazards – floods, droughts, storm surges, tsunamis and especially typhoons – have proven to be a major factor in the development of societies in the archipelago. A fuller historical account will reveal just how significant that influence has been. However, there is already sufficient data to show how economic activity, particularly agricultural production, was intricately related to the succession of hazards that regularly afflicted the islands. So regularly, in fact, that these events should not be seen as exceptional but as part of peoples' daily life experience.<sup>34</sup> And to what extent did hazard affect commerce and trade? How much was US investment in the early twentieth century prejudiced by sentiments that foreigners were not keen to own property here, 'this being a center of earthquakes and typhoons'? Such questions merit consideration.

Moreover, there would also appear to be definite cycles of higher activity in the occurrence of hazards that are followed by more quiescent periods. The latter half of the nineteenth century seems to be part of one such cycle. While the data is insufficient to conclude whether earthquakes were more frequent during that time than in earlier centuries, there were two major events that devastated the colonial capital, Manila, in 1863 and again in 1880. Certainly, too, there was a related increase in the number of volcanic eruptions that appears to be more substantial than simply a question of improved data collection. There were a large number of eruptions in the second half of the century, 49 between 1850 and 1900, including that of Mayon in 1897 and of three new cones – Bulusan in 1852, Canlaon in 1866 and Camiguin in 1871 that either 'awoke' or newly emerged. All this raises some fascinating historical questions about the coincidence of these seismic cycles with major political upheavals. How significant to the pre-revolutionary indigenous consciousness was it that the land itself appeared to be in revolt against centuries of colonial oppression? Much has been written on the contributory factors to the outbreak of the Philippine Revolution in 1896 but did the natural history of the archipelago play any role in those developments?

It is also abundantly clear that some areas and so some communities were more exposed than others to particular types of hazards. Thus northern Luzon, Samar, and Leyte were struck by a disproportionately high number of typhoons. These latter areas were also among those most prone to damages from storm-surges. But if most of Mindanao was mercifully free from

<sup>34</sup> Ken de Bevoise (1995:ix-x) makes a similar claim in relation to health and disease in the late nineteenth and early twentieth-century Philippines.

such dangers, its coastal communities were another matter being particularly vulnerable to tsunamis. And all communities were vulnerable to flood and drought. If the consequences of such phenomena may hold some significance for economic and political developments in the archipelago, then the same may be true for the social and, perhaps, even the cultural development of communities exposed annually to repeated disasters.

The late Fr. Selga, who passed much of his long and distinguished career at the Manila Observatory collecting data on typhoons, published a particularly curious paper towards the end of his life describing a mass state of fear that he had observed on occasions in the Philippines and for which he coined the word *tifonitis*. He defines this condition as 'a pathological state owing to nervous over-stimulation produced by the frequency or extraordinary intensity of typhoons' and then proceeds to recount in great detail the events of mass-induced hysteria that followed the passing of five strong typhoons in quick succession between 15 October and 10 December 1934. It all began with a letter written by an old man in Mexico (Pampanga) during the first days of November that predicted a worse typhoon than the destructive one that had hit Manila the month before. This is then followed by reports from all over central Luzon and the Bicol region of farmers abandoning their fields, of neglected fish pens, of parents not sending children to school, of general apathy, lack of concentration and of a sweeping religious mania that the end of the world was at hand. Mass panic subsequently broke out among the fisherfolk and coastal dwellers around Manila as a rumour that two powerful typhoons from opposing paths would strike one another over the bay causing a devastating storm surge. The dread of typhoons apparently also extended to fear of other natural phenomena, especially of earthquakes and was most pronounced in the larger cities and among those already most severely affected by disaster as rumour fed on panic that, in turn, gave rise to more rumour.<sup>35</sup>

For those who can expect to experience repeated disasters in both their personal lives and in the histories of their communities, the concept of hazard as a distinct phenomenon is often not a very meaningful one. There is no very clear separation between it, environmental degradation, poverty, marginalization,

<sup>35</sup> Selga 1935:54-8. Selga concludes with an account of an intriguing interview he had with 'one of the most typical cases of tifonitis' that had stretched his patience to the limits. A young man from Cavite had approached Malacañang claiming to have important information on typhoons and had naturally been referred on to the Observatory. The intelligence he subsequently imparted to the incredulous priest 'who would not have believed it if he had not seen it with his own eyes and heard it with his own ears' was the news that elders in the mountains of his province had old books that charted the phases of the moon and the position of the planets from which could be predicted the height of the tides, the state of the harvest, the scarcity or abundance of fish and the severity of storms for the next fifteen years. He had come to tell them that within five days a volcano would emerge from the depths of the sea off the Visayas and that many local steamboats would be sunk but that then the Philippines would be absolutely free of typhoons for the next five and a half years (Selga 1935:58).



disempowerment and disempowerment. As Arturo Escobar (1999:10) so forcefully reminds us, organic life originates and is maintained through a perpetual interchange with its environment: 'The formation of an organism and the environment are one and the same. People develop in a nexus of relations with the environment and with other persons'. Hazard is not an isolated event but is an integral feature of the very fabric of life for millions, if not billions of people. It is, in fact, a frequent life experience, the awareness of which is always present at a level just below that of consciousness and that can be summoned swiftly to the surface at the slightest provocation. And just as peasants may possess 'local models' of land, economy and production that are significantly different from modern ones and that exist chiefly only in practice (Gudeman and Rivera 1990:14), so there may be parallel schemas in which the concept of hazard only denotes a degree of risk within a continuum of those that beset everyday life and whose manifestations may baffle western social scientists determined to fit all human existence into a single uniform framework.<sup>36</sup> It is only through an appreciation of the past that anything approximating a true measure of the real impact hazards have played on societies such as the Philippines can be gauged. What is ultimately suggested is that societies here have come to terms with hazard in such a way that disasters are not regarded as abnormal situations but as quite the reverse, as a constant feature of life. This cultural adaptation whereby threat has become an integral part of the daily human experience, where it has become so 'normalized' in a sense, permits the historian of the Philippines to speak of societies that have evolved just as much in the shadow of the volcano as *bajo de campanas* (or literally 'under the bells').<sup>37</sup>

<sup>36</sup> These ideas are more fully explored in Bankoff 2003, Chapter 8.

<sup>37</sup> The term commonly used to denote the inordinate influence of the clergy over Filipino society especially during the period of Spanish colonialism between 1565 and 1898. In particular, it refers to the policy of *reducción* whereby people were brought to live together in municipalities centred round the parish church.

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## **Part Three Water for agriculture**





ROBERT C. HUNT

## **Communal irrigation** **A comparative perspective**

### *Introduction*

There are upwards of 1 million irrigation systems in our world, supplying water to grow at least 40% of the food we produce annually on this planet.<sup>1</sup> These irrigation systems vary in climate, degree of development of the nation in which they are found, in complexity of how they extract water from nature, in size, in age, in their social organization, in their cost, and in how sustainable they are. We know much about the role of water in the green plant (Chrispeels and Sadava 1977; Grigg 1996). We know a good deal about how to manage the flow of water (hydrology) and to build dams and canals (hydraulic engineering). We know relatively little about how people organize, or are organized, to manage the process of moving water between some natural place (river, stream, aquifer) and the root zone of the plant. My article will concentrate on the organization of people.

To inquire about communal irrigation implies that irrigation can be modified by other adjectives. Some of the noun phrases that can be found are agency irrigation, public irrigation, and bureaucratic irrigation. There is a general perception that the dichotomy of communal versus bureaucratic is strongly correlated with if not composed of users versus engineers, small versus large, inexpensive versus expensive, effective versus ineffective, efficient versus inefficient, and good versus bad. As will be made clear below, many of these oppositions as descriptions are indeterminate, and some are inaccurate. The models most of us use to think about irrigation, and particularly the dichotomy between bureaucratically and communally managed, are far too simple. The reality is more complex, and more interesting.

In this article I will first describe the major concepts needed for the comparative study of irrigation, paying particular attention to those needed for

<sup>1</sup> I am grateful to Boomgaard, Wolters and von Benda-Beckmann for inviting me to participate in the Jubilee workshop of KITLV. I am grateful to KITLV for supporting the venture. Previous work of mine has been supported by ACLS, NIMH, and NSF, and by sabbatical grants from Brandeis University. Some of the work reported on here was undertaken while at Cambridge University, and I thank the Cambridge Department of Anthropology and Clare Hall for their support.

communal irrigation. Second, I will summarize the results of empirical studies. Third I will articulate a number of questions about communal irrigation which have not been addressed satisfactorily in the literature.

### *Concepts*

#### *Comparison*

All comparative inquiry depends upon clear concepts to achieve valid and reliable results. The amount of scholarly work needed to achieve clarity and comparability of concepts is often unappreciated. A comparative effort asks the same questions of two or more instances (say irrigation systems), and expects that the answers will be mutually intelligible. If, for example, we wish to ask about the relationship of the size of a system to the way that it is organized (a question which everybody thinks they know the answer to), then we must have clear concepts of irrigation system, size, and the way that it is organized. The comparative effort has to make valid observations of the several instances and conceptual equivalence is necessary (see Hunt 2007 for an account of how this is done). Fuzzy or ambiguous concepts reduce the comparability of the several observations, and thus raise the uncertainty in the results to a very high level, rendering them nearly if not totally useless. The concepts to be used in comparison must be clear, and ideally will be operationalized.

Conceptual clarity is not mere semantics. It is a prerequisite to comparable sets of observations, which is a prerequisite to the establishment of correlations, which are the core of empirical knowledge (see Hunt 1979, 2007).

This section of the paper will deal with the clarification and specification of the concepts needed for the comparative study of communal irrigation.

#### *Irrigation*

Irrigation will be described as moving sweet or fresh water from some point (or points) in nature to the root/zone of the intended crop, when the water would not so move under natural conditions. There are two problems with water in agriculture, not enough, and too much. Each condition is a constraint on crop growth. Irrigation systems typically are designed to deal with insufficient water, although dealing with too much water is often built into the same systems.

Every part of our habitable world is subject to floods. Humans can organize physical systems to deal with floods and often do so. Wittfogel's massive work (1957) on *Oriental despotism* is widely taken to be about irrigation works and their effects. But Wittfogel's hydraulic hypothesis includes protective (flood) works as well as productive works (irrigation), as Mitchell (1973) has so clearly argued. I have defined my task as a discussion of communal irrigation, which excludes flood protection works, and therefore the Wittfogel

hypotheses will be relegated to another discussion (on other Wittfogel discussion, see also Christie, Wolters, this volume).

The water may be found in streams and rivers, or in lakes, or in an aquifer under the surface of the soil. The water is extracted from these sources by a variety of means.

The most common is to erect some kind of a barrier in a stream. Usually called dams, there are two separate functions. One is to raise the head, or level of the water surface, and those barriers that only do this are often called barges. The other function is to store water for later distribution by creating a reservoir behind the dam, and these are often called storage dams. Water storage dams are very old. The Purrón Dam in Mexico dates from 1000 BCE, and had a capacity of 3 million cubic meters (Spencer 1979). In Sri Lanka the Anuradhapura tanks are at least 2,000 years old.<sup>2</sup> Note that these barriers often serve other purposes as well, including flood protection and power. Both the power and the flood protection functions are pre-industrial, although they apparently do not pre-date classical Rome.

Underground water has been utilized for a very long time. Access requires that overburden be removed down to, and usually below, the water table. This is usually a vertical shaft of fairly narrow diameter. The water often seeps into the shaft at a slow rate, although occasionally one hits water under pressure (an artesian well). Utilizing the water for irrigation requires that it be lifted out of the shaft to the surface, a non-trivial problem for water is liquid (and therefore must be contained) and it is heavy (1 metric ton/cubic meter). Preindustrial lift irrigation is small in scale due to the energy demands for raising the water. Some devices are the *shaduf*, the Archimedean screw, pedal pumps, and the use of animals to pull up the container, or power a pump (the *saquia* in Egypt).

There are also nearly horizontal shafts, *quanats*, found in Iran and Central Asia (with two examples in the new world, the Tehuacan valley gallerias and in Peru). These may be tens of kilometres in length, and are excavated and maintained by crews of specialists. The tunnels usually are started close to where the water will be used, and are excavated into the hills until a water table is reached. In this case the water flows by gravity, so it is the use of underground water without lifting.

Once extracted the water has to be led to the vicinity of the crops. By far the most common way to accomplish this is to use open channels on the surface of the land. Most often these are ditches dug in dirt. Small sections may be constructed differently to deal with problems of the terrain. A siphon (a closed tube) or an aqueduct (made of wood or stone or brick) may be used to cross a valley.

<sup>2</sup> Murphey 1957. In the West we often use the terms dams and reservoirs to refer to water storage on the surface. In South Asia tank is the term used. The South Asian tank is a reservoir held behind a dam.

In the industrial era we have invented two other means of leading the water to the crops, sprinklers and drips. Both require industrial power sources. In sprinkler systems there is a pump which sends water under pressure through a closed system of pipes, and the water is delivered through the air by means of sprinkler heads. The centre pivot sprinklers can be enormous, with the sprinkler heads mounted on carriages which are powered around in a circle, or back and forth in a rectangle, by the water pressure in the system. Drip systems on the other hand bury pipes with holes in the root zone. Water is then pumped through the pipes, and the water in the irrigation system never appears above the surface of the soil. In the remainder of this paper I will be referring only to irrigation systems which deliver water to the plant by means of open channels on the surface.

When the water arrives in the vicinity of the crop another set of considerations becomes paramount. Ideally one delivers the right amount of water at the right time to each plant. Conditions in and near the field have to be appropriate for achieving this aim. Most irrigation systems deliver water to and in the field by means of open surface channels. If one part of the surface of the field is too high water delivery will be deficient and the plants will suffer from water shortage. If another part of the surface of the field is too low water delivery to that section will be excessive, and the plants there will suffer from water logging. In consequence the preparation of the field's surface is a critical operation. It must be nearly flat, and sloped very carefully. And it must be so prepared every growing season. If the water is delivered in open surface ditches the levels of those ditches must also be very carefully adjusted so that water will flow, and not too rapidly. Slope is very important.

Constructing the extraction device, the delivery device, and the field are not trivial tasks. They are expensive in labour and require technical competence. Furthermore, once constructed properly they are subject to entropic pressures on many different time and force scales. When we build such systems we are forcing water to take a longer route to the lowest point. Water is heavy and liquid, and will eventually take the shortest route. Sometimes this pressure is slow and gentle, as during the normal drier part of the year. But most parts of the world are subject to flooding, and major floods unleash forces that can destroy, or at least severely damage, the anthropogenic landscape. Dams break apart, canals fill with silt, and the water escapes the system and returns to its natural channels, perhaps created anew by the flood waters. This means that sustaining an irrigation system requires constant battle against entropy, and frequent major repairs to broken devices.

Clearly technical competence is required, and it is in fact found in a very wide variety of places, times, and contexts. We know almost nothing of folk knowledge of hydrology and engineering, but we can certainly see the results, so we know it must be there. But the technical capacity is only part of the

story. Once built, keeping these systems operating is in part a social problem. People must organize to provide the technical skill, and the resources, to keep these systems going. My focus in the rest of this paper will be on the social organization which manages these irrigation systems.

### *Irrigation system*

We are all aware of irrigated agriculture spread across the landscape, sometimes covering many thousands of square kilometres. The question then arises as to whether, and how, the irrigated landscape might be partitioned at a scale larger than the irrigated field. The entire irrigated landscape may well be a single ecological and perhaps economic entity. But in terms of hydrological and social organization it may be partitioned into irrigation systems. There are socially integrated irrigation systems of 500,000 hectares and more, so it is clearly possible to do so on a vast scale. But many irrigated landscapes are partitioned into much smaller social entities (on the order of thousands, or hundreds, of hectares.)

The question of how to identify individual irrigation systems must be solved if comparative observation and analysis is to proceed. In 1988 I presented a tentative definition of irrigation system: 'a canal irrigation system is composed of 1. a facility (gate, offtake) which takes water from a natural channel and moves it away from its natural downhill course and 2. the subsequent control works (canals, gates, fields) that guide the water flowing on the surface to the agricultural plants until that water either soaks into the earth or flows on the surface out of the control works' (Hunt 1988:339-40). Two problems I then singled out were multiple sources of water for a single system, and the question of whether these systems are physically distinct at all levels.

Jacinta Palerm Viqueira (2001) and her co-workers have looked at this issue on the ground in Mexico, and have found many irrigation facilities with more than one source of water, and some where the physical facilities seem to be intermingled. However, in the remainder of that article the term irrigation system is used without a new definition.

An alternative to the physical network concept which I presented in 1988 might be to consider the social network. Starting with where the water is abstracted from a natural source, one might identify the social entity that is responsible for that abstraction down to the social entity (often a person) that is eligible to receive the water and apply it to plants. The network of these social entities in many cases constitutes a social system, and might be an attractive candidate for the concept of irrigation system.

Comparative work demands some sort of solution to the problem of an irrigation system concept. What most of us have resorted to is accepting the naming of a network as evidence of the existence of a system. If a network is named in local practice it is assumed to be a system. It is not an ideal solution,

but there is no evidence as yet that there are severe difficulties with the comparative studies as a consequence.

### *Size of system*

Size or scale of irrigation systems has been with us as a potentially significant variable since at least the work of Wittfogel. The concept has been extremely fuzzy. It might refer to the amount of water managed, to the number of people who use the system, to the complexity of the management tasks, or to the territorial extent of the use of the water. Most systems that measure their own size use number of hectares irrigated, although how they determine that number is never publicly discussed. In my comparative work I defined size as the number of hectares irrigated from the physical system, recognizing that the numbers we are given are more than somewhat approximate (Hunt 1988:343-5).

### *Roles and tasks*

An irrigation system has work to do, and those who are delegated to do it, and it is useful to partition these into roles, and tasks. Tasks refers to the kinds of work to be done for the system. It includes construction, allocation, distribution, maintenance, accounting, conflict resolution, and often ritual (see Uphoff 1986; Hunt 1988; Jha 1998). All but ritual are universally found. The line between maintenance and re-construction can be hard to draw.

Role includes users or farmers, officers, and workers. The terminology in our comparative efforts has not been precise. We tend to be hazy about users and farmers, for example. The situation on the ground can be very complex, with owners, operators, tenants, share-croppers, and squatters. Who the user or farmer is under these circumstances has not been adequately clarified. In the vast majority of irrigation systems so far investigated there is some office which is recognized as having authority over managing the water (I referred to this office as the CEO in 1988). Whether that officer is also a user of the water varies in important ways. There is always work to be done, and those doing the work can be called workers. Whether they are also officers, and/or farmers, varies with the scale and kind of organization of the system.

### *Charter of authority*

Karl Wittfogel set a political problem for our understanding of irrigation, and the question has been with us ever since. A major form has been the relationship between size and political structure, with many suspecting (or asserting) that large size demands a centralized management structure. In this context centralized is often contrasted with communal.

Most discussions of centralization are less than clear about the concept. Kelly (1983) waded into the swamp and distinguished between the organization of power within a system, and how the system is linked to other (usually

higher) realms of power, such as the state. In 1988 Hunt attempted to clarify matters further. 'The charter of authority is the variable used for measuring administrative authority structure. [...] Charter is the source of authority of the chief executive officer, who is responsible for carrying out allocation decisions at the head facility. The scale of this variable is nominal. Its values as isolated so far are 1. national government, 2. irrigation community, and 3. private.' (Hunt 1988:343.)

The variable charter of authority has not been challenged so far. The values of the variable, however, have been, and need further differentiation. There are some supranational charters of authority, often found in colonial situations. Within the nation it is useful to distinguish between the national and the provincial<sup>3</sup> levels. In India for example the provincial level charters many irrigation systems, not the state. My original value of Irrigation Community was challenged by Wang (1997) in his dissertation. He perceived that in California we had two distinct forms of organization for irrigation systems, the mutual company and the irrigation district, thereby splitting my value of irrigation community into two distinct concepts.

### *Communal irrigation*

Communal has at least two meanings, both referring to forms of social organization. Communal has been used to refer to local territorial units of government (such as a village, or Leiden, or Cambridge). It has also been used to refer to an organization of people who are all users of the water (as in Irrigation Community). It now seems to me that we have several different ways of organizing irrigation systems that have been referred to as communal.

In my original meaning of irrigation community I included a corporate group of users of the irrigation water, who chartered their CEO. These groups exist in large numbers, and as I suggest organized as common property resource managers (see Hunt 1986; Ostrom 1990).

<sup>3</sup> Terminology is important here. We usually reserve the term state for the political entity that effectively claims sovereignty. A reasonable operational definition at this point in time is membership in the United Nations. All states, so defined, are structured with levels of organization. What we label these levels is an important decision. In the USA, India and Mexico, for example, the level below the state is labeled State (New York, Andhra Pradesh, Oaxaca). In France they are called *département*. Province seems a useful general term for this level of government. At the bottom all states are divided into what are often called townships, and in the Spanish speaking world are usually called *municipios*. They have a territory, a capital, a set of offices, and some government responsibilities. They may or may not have the right to generate revenue, to decide on education policy, etc. Between the province and the municipality there is usually at least one other level, called variously county, district, region. In France the Province seems to be very important, and in China the County seems to be very important. Further, the boundaries of the sub-state levels seem to be very stable. In parts of Mexico they are hydraulic in nature, but in the US they are not. We have here a set of interesting problems in comparative political structure, and it does not seem to have received much attention. It is highly relevant for our comparative analysis of irrigation organization.



There is another kind of local organization of irrigation wherein the municipality contains (entirely, or largely) the physical irrigation system, and it is the political structure of the municipality that provides the charter of authority, and perhaps even the officers, of the irrigation system. Resources for some or all of the irrigation system tasks may come from the municipality. Note that in this case only some of the residents (citizens) of the municipality are irrigators, and some non-residents may well be irrigators as well. The irrigators may or may not dominate irrigation affairs, or municipal affairs (see also Wolters, this volume).

There is a third kind of local organization of irrigation wherein a special-purpose governmental entity is created. We have found these in California, USA. The province provides the template for these, and they are spatially rather than hydraulically defined. A block of territory is marked out, which may or may not be isomorphic with the boundaries of counties or municipalities, but are always totally within the boundary of the province. The province authorizes an election to determine whether an irrigation district should be formed. Those resident within the territory vote in an election. If the irrigation district is approved, then a special-purpose government entity is created with a bureaucracy to run the irrigation system. This entity has taxing power, and the power of eminent domain. The number of farmers (or, alternatively, of owners of irrigated land) may be a tiny fraction of the voting population of the territory.

We have, then, three different forms of communal organization of irrigation (as of this moment!). In the subsequent discussion of what we know about communal irrigation it will be useful to distinguish between these three forms.

They need to be named unambiguously. I suggest that Irrigation Community has a core meaning, which is that the holders of water rights, and only the holders of water rights, are organized to manage their own affairs. I suggest Municipal for the second type. I suggest single-purpose District for the third type.<sup>4</sup>

### *Rights and duties*

All role systems involve sets of interlocked rights and duties. These apply to the roles (and the offices) in an irrigation system. The rights and duties may be spelled out, in part, in formal documents, including laws and regulations. An important feature of irrigation systems is juralty. By juralty I refer to the condition whereby rules of conduct can legitimately be formulated and enforced. There are two distinct loci of juralty, internal to the system, and

<sup>4</sup> There are two other ways of organizing local irrigation. In one, there is a private entity (a person, or a firm) which owns the water rights, and organizes the irrigation system. Most of the users of the water are employees of the private entity. Some sugar mills in Mexico were, and perhaps still are, organized in this fashion. There are only two accounts of this phenomenon in the literature that I am aware of (Barkin and King 1970; Ronfeldt 1973). The other way is to not have any authority structure at all. Less than ten cases have come to light (Hunt 1988:345).

external to it. By internal juralty I mean that the system (however defined) has legitimate authority, in the eyes of group members, to make and enforce rules. Note that criminal gangs have internal juralty. By external juralty I mean that in the eyes of an exterior entity (such as the state), the group has a right to exist, and to make and enforce certain rules. There may not be perfect conformity of internal and external juralty. When there are disjunctions we have the condition called legal pluralism (see Bruns and Meinzen-Dick 2000; see also Von Benda Beckmann, this volume).

With respect to irrigation, and particularly communal irrigation, we need to investigate whether the communal system has internal juralty, and external juralty, and whether or not they conform to each other. The impact on rights and duties, and their enforceability, is substantial.

### *Water rights*

There is virtually no discussion of irrigation without some reference to water rights. What exactly is being referred to by water rights is very rarely clear. In English speaking countries the word right has recently been used in a wide variety of contexts – natural rights, human rights, property rights, the rights of species other than *Homo sapiens*. It is standard procedure to analyze social systems in terms of rights and duties.

Water rights, when they appear in most discussions, seem to belong to this generalized category of vague and unspecified rights. Some would seem to think that if someone needs irrigation water they have, or should have, a right to it. In cases of legal pluralism there may be violent disagreement between local and national social and jural entities over what the rights to water are, and who has them under what circumstances (see Bruns and Meinzen-Dick 2000; Mathieu et al. 2001 and Ruf 2001 for striking cases).

We do not have a body of extended case studies of water rights and how they operate. However, some outlines are clear, due particularly to the work of the Von Benda-Beckmanns. Presumably water rights refers to some legitimate and potentially enforceable claim to a benefit stream, in this case to supplies of irrigation water. If this is accepted, then at least the internal juralty of the water managing organization must exist (otherwise the claim is neither legitimate nor enforceable). Several questions can then be asked. How does an entity<sup>5</sup> acquire such a claim? What must the entity do to maintain the claim? And under what circumstances can the claim be alienated from the entity? The clearest and most nuanced analysis, although for Nepal, not a particular system, that has come to my attention is Von Benda-Beckmann et al. (2000).

<sup>5</sup> By entity here I mean a jural entity (see Appell 1983; 1984). In the irrigation context this entity will in most cases be a person. But it could also be a municipality, a corporate group, a lineage, a household, a shrine, even the irrigation community itself. Many entities can be the possessors of claims to water. We must not assume that the individual person is the only relevant social entity.

Sometimes the right is inalienably associated with some other phenomena, as when water rights are permanently attached to land. This is the most frequent form (insofar as our small number of ethnographies and reports is representative of the universe of irrigation systems). But there are some systems where water rights are separated from land rights, and transacted independently (see Maass and Anderson 1978). The accounts of communal systems are more likely to contain statements about water rights than are accounts of national systems.<sup>6</sup>

### *Property*

All irrigation systems involve property relationships. Only recently have we begun to appropriate concepts of property analysis to the irrigation arena. Bruns and Meinzen-Dick (2000) and Pradhan and the Von Benda-Beckmanns (2000) have recently published books which begin to analyse some of the property aspects of water rights.

A conceptual basis for an analysis of property is found in Hunt (1998). Property is there seen as a relationship between two kinds of social entities – owners, and non-owners – where there are rights and duties attached to both entities with respect to the object owned.<sup>7</sup> Most analyses of property focus on the object alone. Analysis has been shifted from the object to the social relationships with respect to that object. There are a number of categories of rights, including possession, use, exclusion, alienation, and destruction. Almost every property relationship involves more than one right with its linked duty, and in consequence we speak of bundles of rights. Such bundles can be disaggregated, and particular rights distributed to different social entities.

Irrigation systems are potentially owners of water, land, dams, canals and gates, roads, buildings, equipment, rituals, and cash. Individual irrigators are also potential owners of water, land, infrastructure, buildings, animals, equipment and cash. This ownership automatically invokes rights (and duties), and implies juralty someplace in the social system.

We have the conceptual apparatus for doing an analysis of property. That conceptual apparatus is being applied by Von Benda-Beckmann and Von Benda-Beckmann (2000) in Nepal.

<sup>6</sup> See Wade 1986 and Mollinga 1998 for examples from South India. The water right situation in large nationally chartered irrigation systems is largely a mystery. It is not even clear if there is any local conception of a water right.

<sup>7</sup> Object is not a good term. Non-material phenomena can be the subject of property relationships. Some examples include dances, songs, rituals, and stories, which are now called intellectual property. In this analysis I am trying to shift attention away from the object to the rights and duties in the relationships of owners and non-owners. A single term for whatever it is that is the subject of these relationships is necessary, but object, with its implication of tangibility, is not the right term. Any suggestions for a better term would be most welcome.

### *Sustainability*

It seems as though every other book published in US these days has sustainable in the title. With such general enthusiasm it will come as no surprise that the meanings of the term have proliferated and precision has declined. In most cases sustainable has an environmental or ecological meaning. It refers to organizing a production system so that renewable resources are harvested at such a rate that that rate can be continued indefinitely (assuming that environmental parameters do not change).

In reference to irrigation systems, sustainable use means using water no faster than it is replenished. This is particularly important with ground-water extraction systems. Sustainable irrigated agriculture would mean that the soil, soil nutrients, and water would all be used at rates which can be sustained indefinitely.

There are other ways to look at the question of sustainability in the context of irrigation systems. We can ask whether irrigation systems are economically and politically sustainable.

An irrigation system that did not produce a sufficient economic benefit stream (roughly profit plus subsidies) would not be sustainable in the long run. The first place to look is at the economic performance of the agriculture. If the economic costs of agriculture are more than the returns, then some sort of subsidy is being provided. That subsidy can be coming from savings, or from urban relatives, or from the state. If the agriculture sustains these losses for a considerable time period the subsidy may well dry up. This in turn implies that the irrigation system itself will not be viable economically.

If the irrigation system is dependent upon the financial health of the users (as in communal systems), then the sustainability of the irrigation system will respond to the financial condition of the users. Alternatively, some systems are dependent upon the financial health of the state, and when the state withdraws payments for the operation and maintenance of the irrigation system, then the irrigation system is not economically sustainable (see Hayami and Kikuchi 2000 for a case study in the Philippines).

A sustainable irrigation system is embedded in a political environment, and is also itself a political environment. Political sustainability might refer to the ability of an entity to perform tasks (including delivering water, maintenance, and resolving conflict). Officers exist, pay attention to their duties, and are able to recruit others to do the work. Meetings are held, decisions are made, and succession to office occurs. If the communal system is rent with violence due to factionalism, it is not politically sustainable. Chaos and/or incompetence at the national level also compromises political sustainability. If payments are not made, contracts not written, too much is skimmed in corrupt practices, then the work will not get done and the system will spiral down in effectiveness.

*Privatization*

The term 'privatization' is as ubiquitous as the term 'sustainable' and has even less substantive content. There is a very old discussion in western civilization over the appropriate, or just, distribution of market relationships. It goes back at least to Aristotle, who was highly suspicious of the market, and the market principle.

At the state level we have been encouraged to use a simple dichotomy on this matter – either the state does it (command economy) or the market does it. (Note that communal is left out of the discussion.) For most of the twentieth century there was a marked tendency to shift from market to the state. Since 1980 or so (Thatcher and Reagan terms in office) there has been a shift towards what has been called the market, and private enterprise. This whole conversation is so imbued with ideology that it is hard to discuss it sceptically and empirically.

In the arena of irrigation there are two contexts where the matter has arisen. One is the withdrawal of the state. Virtually all public and charitable enterprises (governments, museums, churches, universities) have seen demands for expenditures rise above the supply of money. One consequence has been a call for these entities to reduce their expenditures. Health care, safety nets, roads, railroads, and especially irrigation systems have seen a decrease in national funding. The effect upon the activities of these systems has been deferred maintenance at best, and abandonment of activity in many cases. Part of the argument has been that the state is inefficient in use of resources, and it would be better to privatize these functions by shifting responsibility from the state to some non-state organization such as a private firm.

The other context is the claim, particularly in developed countries, that the users of irrigation water are not paying the market value of the water they use. The demand for water is increasing more rapidly than the supply resulting in increasing frequency of scarcity. In this context the other users of water are putting pressure on the irrigation systems to release water for other, more economically productive, uses. The argument used is a market valuation one (see also Braadbaart, this volume).

Privatization then means at least two things, the reduction of state activity with respect to water, and the application of market principles to the allocation of water in society. They are not identical meanings. The first case is a question of who is going to pay for something, in the irrigation case the O and M costs of systems. The impression has been that the state pays some or all of the costs, and those costs should be paid for by the users, not the taxpayers of the state. The second case is a question of how much is paid for the water. The general impression has been that the farmers are paying too little, and if they paid the real market rate the farmers would use less, and the urban and industrial users would have less scarcity.

*Findings so far**Incidence of communal irrigation*

Communal irrigation, as defined above, is very widely found in the world, and nobody knows how many systems there are, how many hectares they irrigate, and how many people work on them. The two major gaps in the world literature are for the ex-Soviet Union, and the People's Republic of China. In the 1970s Mexico had identified and named most of the communal irrigation systems, and there were more than 14,000 of them, varying in size from a few dozen hectares to several thousand hectares. Virtually all of the irrigation systems in the USA are communal, of one form or another, but there is no central register of them. I am unaware of any central register for France, Spain or India, three heavily irrigated countrysides.

I have guessed that there may be as many as 1,000,000 communal irrigation systems in the world now. We have accounts of perhaps 200 of these, and the majority come from a few countries. India for example has many communal systems, with only a tiny handful of reports on them (Easter and Palanisami 1986). We have a number of reports from Peru and Mexico, some from Ecuador (see Ruf 1997, 2001) and virtually nothing from Colombia, Bolivia, Chile and Argentina, all of whom have a large number of such systems. It is likewise with Turkey, Iraq, Iran and Algeria.

Nepal and Sri Lanka are now well represented, due largely to the efforts of the International Water Management Institute (IWMI) (formerly the International Irrigation Management Institute – IIMI). Thailand, Indonesia and the Philippines also have very large numbers of communal irrigation systems, yet we have only a small number of reports on them (see Lewis 1991). Myanmar and Vietnam, two large countries with many irrigation systems, are virtually a blank so far as our field studies are concerned (but see Fontenelle 2001).

We are reasonably certain that there are very large numbers of such systems in the world. I am reasonably certain that very few countries have identified them, counted them, or measured them for any variables of interest. They are not a part of national or planetary social accounting. I am reasonably certain that their economic importance is far greater than their statistical presence indicates.

*Multiple levels of control*

At this point in time all agricultural land is in territory claimed by some state and therefore all communal irrigation systems are found in states. The relationship of these communal systems to the state is never irrelevant. I have argued that a recent set of case studies shows that the state is always present and relevant, but that the functional load of the state is highly variable (Hunt 2001). The role of the state may be as slight as providing a legal charter for the

system (thereby providing external juralty), or it may stretch as far as investment of funds, providing technical advice, or paying for the management of the headgate. Even in the very large state-run systems there is considerable influence of the farmers.

Most cases of conflict involving legal pluralism are instances of the state extending its involvement in communal irrigation, often to the detriment of the communal system (Bruns and Meinen-Dick 1998; Mathieu et. al. 2001; Ruf 2001). The state decides to 'improve' the local situation, with new physical works, or new sets of rules, and either advertently or inadvertently creates conflict with established local custom or rule.

When the situation is stable the two entities, the state, and communal irrigation systems, have a working relationship whereby the division of labour is clear (although not always uncontested). Trying to expand or change a sphere of influence usually produces tension, but it may not result in a change in the sphere of influence. When the sphere of influence does actually change then legal pluralism is on the table for all to see.

#### *Size and structure of authority*

There is a widespread belief that state-managed systems are large, and communal systems are small. I have demonstrated that, empirically, there is no truth to this truism (Hunt 1988). Some state systems are small (the smallest so far is 700 hectares), and many communal systems are very large (the largest so far is 448,000 hectares.) All of the systems so far found below 700 hectares in size are communal in authority structure, and all above 448,000 hectares are run by the state. In between 700 hectares and 448,000 hectares, however, there is no explanation for why the system is run by state or by communal management.

Thus it is not true that communal systems are small in size. Many are, but many are not. And it is not true that state systems are large. Many are, but some are not. The popular generalization linking size and form of authority has no basis in fact.

This is a fact of considerable import. With the withdrawal of the state from irrigation we are not faced with the destruction of irrigation. Rather, we know that farmers can manage irrigation systems of very large size, so our thinking should be moving towards how to shift the large state systems to communal control, thus extending their lives. The Water User Associations have been suggested as a solution to this problem, whereby small areas of a state-managed irrigation system would be turned over to the farmers. I have made some suggestions about this matter (Hunt 1989). But I suggest a more radical move, which is to substitute farmer control for state control over the system, which my comparative work shows to be more than a possibility. At issue of course is the political culture of the individual states.



*Multiple forms of communal management*

So far communal management has been treated as a single form. It now appears to me to be the case that there are at least three forms of communal organization – Common Property, Municipal, and District. I have in the past claimed that communal irrigation systems were common property forms of organization, and I now think that that is not true.

Many communal irrigation systems are Irrigation Communities. They are common property managers, whose members are all those who have water rights, and only those who have water rights. In the vast majority of cases the users are defined by owning land which has rights to the water, but other forms are possible. In the vast majority of cases these systems are run as democracies, with each user, or each water share, having a right to vote, and each user (or water share) having correlative duties (paying dues, providing a worker for maintenance, participating in the rituals). All the users, and only the users, are members, and many rights and duties are attached to membership.

The organization has internal juralty, including the right and duty to restrain the activities of the members. On rivers with two or more such systems there is external juralty as well, for these systems have to deal with each other with respect to the benefit stream from the river. The property held in common may well include water, water rights, some irrigated land, reservoirs, dams and canals, roads, equipment, buildings, cash, temples, and perhaps even the rights to a certain amount of labour of the members. Irrigated land is for the most part owned individually by members (and members may include corporate groups or government territories.) These systems are almost always staffed by irrigators.

The Municipal form is organized by a municipality, a low-level territorial jurisdiction of the state. The irrigators may vary from a large number of town residents (as in Highland Peru – see Guillet 1992) to a small percentage of the town residents (as in San Juan, Mexico in the early 1960s – see Hunt and Hunt 1974). In this form there is clearly local control over the irrigation, but that control is in the hands of the municipal administration. How strongly that administration is influenced, or controlled, by the local elite, by large land-owners, or by irrigators, is an empirical question worth pursuing. The irrigation system itself may well be viewed locally as being municipal property. The staffing is provided by the municipal government.

The District form of organization is less well understood. It was suggested by some systems in California. There, the political culture of the province permits (indeed encourages) the creation of special-purpose government entities, in this case dedicated to operating an irrigation system. It is the voters of the territory, not the irrigators, who are the members, for it is they who vote for or against the creation of the district, and then vote for or against the taxes and fees that support the district. The district has powers of taxing and eminent domain,

and has internal and external juralty. In California, at least, these can be very large (the Imperial Valley Irrigation District has 222,000 hectares of irrigated land, Westlands is supposedly much larger). They are run neither by the state, nor by the province, but are a local organization, albeit territorial rather than irrigator in membership. The staff often forms a full-time permanent bureaucracy, reminiscent of the large agency systems in other parts of the world.

Because this distinction has only recently been formulated it is uncertain how it will apply to the cases of communal irrigation we have. Valencia, Unidades de Riego in Mexico, many of the systems in Colorado and California, and the *subak* of Bali are all Irrigation Community examples. How many communal cases are actually municipal rather than common property is uncertain. The distribution of districts is an unknown.

It is certain that the common property form can be of very large size (King's River near Fresno California is 448,000 hectares). Unless the municipal territory is very large, which most are not, it would seem that the municipal form would be confined in size. The district form can be very large.

### *Sustainability*

Some common property forms of communal irrigation have been in existence for millennia (Valencia, 12-Go in Japan, Balinese *subak*) and are therefore sustainable. These are also cases of common property management. I suspect that irrigated agriculture must be economically viable as well. The *acequias* in New Mexico (small-scale irrigation systems in Hispanic regions of northern New Mexico – see Northern New Mexico 2000) have been threatened with loss of water because the small-scale agriculture they supported has become uneconomic. Something similar has been reported for an agency-managed system in the Philippines, where the price of rice has fallen while the price of inputs has not, putting the agriculturalist in an economic dilemma and the irrigation system at risk (Hayami and Kikuchi 2000).

One has to presume that an irrigation system existing for 1,000 years or more is environmentally sustainable. Whether it will continue to be so with industrial technology is perhaps a different question. But as long as it is economically sustainable, the common property form of management is without any doubt politically sustainable. As long as irrigated agriculture is economically viable, there should be a strong interest on the part of the farmers to keep the irrigation system going. This is probably enhanced by the single-purpose nature of the organization. Whatever factional disputes arise in the region they apparently can be partitioned off from the irrigation system.

The municipally governed systems may not be as sustainable in organizational terms. Municipal organizations have many purposes and tasks, and are prime targets for factionalism. A dispute over who holds the mayor's office, based on some external consideration (such as national road policy, for exam-

ple) may well be a factor in the municipal arena, and thereby distract attention from irrigation, or even involve irrigation matters in extraneous disputes. It is plausible, in other words, that the municipal form of organization is more vulnerable, and therefore not as easily sustained. We know too little about the district form to see how sustainable they might be. It may well depend upon the ratio of those involved with irrigated agriculture to those who are not. A high ratio of irrigation folk might mean a higher degree of sustainability.

### *Occidental despotism*

Karl Wittfogel's *Oriental despotism* (1957) is an analysis of water management and power which is widely known and often referred to. It was not an irrigation hypothesis (as was clearly spelled out by Mitchell in 1973). It was an hypothesis concerning protective as well as productive hydraulic works and their relationship to scale and political centralization. It was also located in the orient.

Thierry Ruf (of IRD in Montpellier, France) has proposed the concept of 'occidental despotism' (Ruf 2001). The UK, France and the USA, all occidental, organized irrigation systems overseas during the Industrial era. At home they have many communally organized water management systems. Overseas they organized vast centrally controlled bureaucratic systems. The same may be said of Japan with respect to Taiwan, and in this regard one may suppose that an Industrial Japan may be part of the occident. Thus the major examples of centrally managed irrigation systems today are direct descendants of an occidental diffusion (Egypt, Iraq, India, Office du Niger, Philippine agency systems).

### *Unanswered questions*

In this, the third part of this article, I will accentuate some questions to which we do not currently have effective answers. The spirit is one of encouraging future field work.

### *Cost of operation and maintenance*

There is no doubt that sustaining an irrigation system is costly. Construction is expensive, and so is fighting entropy. It requires organizational attention, quickly mobilized emergency work, and the drudgery of regular maintenance. Somebody has to keep track of rights, and the performance of duties. The costs always include paying attention, and humans performing work. It also involves materiel, and often money. Where rituals are involved there is another drain on resources. We have almost no information on the scale of resources needed for all this work. In my comparative work on agricultural productivity, comparing swidden with sawah rice systems in Southeast Asia (Hunt 2000), I looked with great care at whether or not work on the irrigation

system was included for the *sawah* cases. Only one field report paid attention to it specifically, and then did not include all the work.

There are mountainous areas with extensive terraces used for irrigation agriculture. The Andes, Himalayas, and the Philippines are the most often photographed, but they undoubtedly exist elsewhere. I have found no satisfactory detailed account of the amount of work needed to construct or maintain these terraces (Conklin's account (1980) needs amplification).

Surely the sustainability of communal systems is a function of their cost, at least in part. For many centuries some communal systems have been able to provide that cost, and continuously. The cost must have some relationship to their resources and their incomes. Surely it would be good to be better informed on this matter than we are.

#### *Acephalous systems*

I reported in 1988 that there were a tiny handful of irrigation systems without any authority system whatever, including some in the Philippines. I remarked at the time that these are a mystery given what we imagine we know of the necessary conditions for running an irrigation system. Our models focus on coordination and conflict, and therefore the need for an authority system to manage both of them. Achieving coordination and conflict resolution without an authority structure is unimaginable. And yet, according to Robert Netting (1974), such systems actually exist, and in the Swiss Alps have been in existence for hundreds of years.<sup>8</sup>

These acephalous systems are a profound challenge to our assumptions about how things work, and should be the subject of a dedicated field project. The gain for social science could be very large.

#### *Effectiveness of irrigation systems*

Many of us who study irrigation are prone to say that the agency or national systems do not work, whereas the communal ones do, and are effective. This is an assertion rather than an empirical finding, and it is very easy to make. It is almost impossible to convert it into an empirical result. A prime reason for this is the lack of an operationalized concept for dimension of effectiveness of an irrigation system. The challenge is great, especially now given the withdrawal of the state and the move to change the conditions under which irrigation systems operate (market, privatization).

Part of the difficulty is in separating out the effectiveness of the irrigation system from that of the irrigated agriculture that it supports. In any judgement of effectiveness the goals or targets against which one is measuring performance must be stated clearly. Only then can one see how close to the target the performance is. This needs to be spelled out, and it has so far not been successful.

<sup>8</sup> Personal communication.

### *Drainage systems*

My assigned task was to consider communal irrigation. If irrigation is a kind of additive act (adding water when it was not present before), there is also the subtractive act of drainage (removing water when it is present). Many irrigation systems are also equipped to drain excess water, and this function of irrigation is almost never addressed in the social science literature. However, there are large systems of water management which are devoted principally to drainage. There are substantial numbers of them along the Mississippi River (Stewart 1993), in the UK, and certainly in the Netherlands. I have looked at a few UK Drainage Boards, and can report that they are single-purpose common property managers under the local control of the users. The same seems to be true of the Drainage Districts along the Mississippi River. Presumably many of these drainage systems are under communal control. We should support detailed historical and field studies of at least a handful of these systems.

### *Conclusions*

My task has been to consider communal irrigation in a comparative perspective. My stance is that of a social scientist. In order to carry out systematic comparative study I have argued that concepts need to be clear, unambiguously named, and operationalized. The first section of this paper discusses some concepts.

The second section presents the results of comparative efforts. Communal irrigation is found in nearly every country, and there may be as many as 1,000,000 of these systems in existence. Now all communal systems are embedded in a state, and the role of the state varies considerably. Communal and state spheres of influence are dynamic and at times contested. Comparative research has demonstrated that there is little relationship between size and structure of authority. There are very large communal systems, and small state ones. Three forms of communal management have been isolated – Irrigation Communities (composed of all and only the irrigators); Municipios (where the local administration does the management); and Districts. Communal systems are environmentally sustainable, but only when they are economically viable as well. Finally, ‘occidental despotism’ is the curious phenomenon whereby colonizing nations, with communal management at home, impose state management of water on their colonies.

The third raises some problems and makes some suggestions for field investigations that might be productive to undertake.

We do have a large number of concepts that are under pretty good control, and we have learned a fair amount about communal irrigation, thanks to the efforts of a large number of investigators. Fortunately we still have much to learn.

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WILLEM WOLTERS

# **Geographical explanations for the distribution of irrigation institutions**

## **Cases from Southeast Asia**

### *Introduction*

Rice, the staple food in most of monsoon Asia, is a versatile plant, with a large number of varieties adapted to specific geographical and soil conditions. Some varieties grow as a dryland crop, many others as a swamp land crop in inundated fields, while some varieties are adapted to high-rising floodwaters and are known as deepwater rice or floating rice. Water is a critical factor in rice cultivation. A regular flow of water is required to nurture the plant to the flowering and ripening stages. The water level needs to be sufficient to create soil conditions in which bacteria produce the nitrogen needed for plant growth, and the water needs to be flowing in order to remove toxic materials. Keeping the plants inundated has a further benefit for farmers, as it suppresses weed growth, a perennial problem in the tropics. If the fields are watered from a surface source, the water flow also brings nutrients. Although monsoon Asia is known for its torrential rains, rainfall is highly unequally distributed in the region; there are areas receiving only small amounts of rain, and experiencing six or more dry months. In these areas irrigation is crucial for rice cultivation. Whether irrigation is possible depends on the local geographical conditions.

In the course of time a wide variety of irrigation structures have been built in Southeast Asia, ranging from small-scale systems with simple weirs and off-take canals, to large-scale canal systems branching off into many smaller canals. Irrigation associations managing these systems equally show a variation. The distribution of different types of waterworks and accompanying institutions in Southeast Asia is not random. A closer inspection of irrigation structures in comparative perspective, shows that geographical variables, such as climatic and geomorphological or topographical conditions, play an important role in their distribution.

Climatic conditions to a large extent determine the irrigation requirement. The amount of water needed to raise a crop depends on water availability, which is the result of local rainfall (P) minus potential evapotranspiration (PET), that is, the water that potentially evaporates from the leaves of the plant and from the soil. Depending on the result of this equation, the irrigation requirement can be large or small.

Topography of the area influences the scale of irrigation systems and the possibility of creating storage reservoirs. In mountainous areas local communities can establish small-scale irrigation systems. In larger floodplains, larger management systems are needed. In river deltas, with an abundance of water during the wet season, and drought during the dry season, technologically more complex irrigation systems are required.

These two factors are broad constraints, setting the framework for specific irrigation structures. Although temperature is in principle a limiting factor as well, I will not take it into consideration, as I will limit my discussion to areas lying within the tropics (minimum temperature of the coldest month 18 degrees Celsius).

Wittfogel formulated his much criticized theory of hydraulic society on the basis of rainfall patterns. He distinguishes three basic levels of water management, each fitting a specific pattern of rainfall, namely, 1. rain-fed agriculture, where cultivation is dependent on natural precipitation, to be found in areas with abundant rainfall; 2. hydro-agriculture, where cultivation is based on small-scale irrigation or local community-based water management, prevalent in areas with both a wet and a dry season; 3. hydraulic agriculture, characterized by the development of large-scale irrigation works, managed centrally by a bureaucracy, found in arid regions (Wittfogel 1931:188-291, 1957:18, 23).

Wittfogel's theory is based on a causal sequence, theorizing that the development of large-scale irrigation works led to the development of a large bureaucracy, which formed the foundation of a managerial state, with its particular Asian variety of 'oriental despotism'. Wittfogel argues that the construction and maintenance of large-scale waterworks required the deployment of a massive labour force, which could only be mobilized by an authoritarian and centralized state.

Critics of his theory have mustered empirical case studies to argue that state centralization is not a necessary concomitant of large-scale irrigation works. However, critics have often disregarded the fact that Wittfogel has consistently maintained that the classic 'hydraulic state' was to be found in arid regions (Hunt and Hunt 1976:390). The argument that in certain regions irrigation was not large-scale and the state was not centralized, is not a valid counter-argument, if that region had sufficient rainfall for hydro-agriculture.

A methodological problem of Wittfogel's hypothesis is, as several anthropologists have pointed out, that the issue of state centralization is ambiguous

and difficult to operationalize (Kelly 1983; Hunt 1988). It is not clear whether the concept refers to centralization of irrigation management or of the state structure at large. At issue is the division of power in the government structure and the relationships between the levels of organization. Kelly (1983) has suggested using the distinction centralization versus decentralization for the internal structure of the irrigation organization and to use another dichotomy, namely, articulation versus autonomy to indicate whether the irrigation organization is integrated into the state structure or independent of it. Testing the hypothesis comparatively is hampered by the fact that there is not enough empirical material. As Hunt (this volume) has observed, there are more than one million irrigation systems in the world and we have empirical descriptions of no more than 200 of these.

One group of geographers and archaeologists (Rigg 1992) criticize Wittfogel's theory on the basis of a number of cases of irrigation systems in Southeast Asia. The most pertinent cases are from semi-arid regions on the continent. Geographer Stott (1992) shows that the Angkor temple complex in Cambodia, with its large system of canals, was not a hydraulic state, as the water from the canals was not used to irrigate the fields. Farmers acquired the water they needed for agriculture in another way. The religious use of water was totally separate from farmers' use of water. Similarly, archaeologist Stargardt shows for central Burma and southern Thailand that irrigation was organized by farmers. Completely reversing Wittfogel's argument, these authors attribute irrigation systems not to state interference, but to 'local irrigation associations', 'autonomous local groups' or 'irrigation communities' (Rigg 1992:4, 55, 69).

While their refutation of Wittfogel's theory of the centralized state is convincing, the alternative theory, attributing all irrigation systems to local farmers' communities, overlooks a serious problem. Under certain geographical conditions irrigation works require a large-scale outlay and this necessitates a high level of coordination and centralization both during the construction phase and in day-to-day management. This level is beyond the grasp of a local village community; it requires the cooperation of a large number of villages. Wade has criticized social scientists advocating small-scale irrigation structures in arid or semi-arid tropics. Wade (1995:2047) writes: 'In so arguing they overlook the qualitative difference in the context of farmers' behavior as between small-scale, communal systems in the semi-humid tropics, and large-scale, government-operated systems of the semi-arid tropics – a difference likely to make the application of organizational principles derived from the first context arduous in the second'.

Following Mitchell's suggestions (1973), we can split Wittfogel's hydraulic hypothesis into two separate hypotheses: 1. large-scale irrigation systems in arid or semi-arid regions require coordinating and directing activities at a higher level of organization than the village community; 2. if there is cen-

tralized direction of irrigation activities in an arid or semi-arid environment, there will be a corresponding increase of centralization in other areas of social life. This paper focuses on the first hypothesis.

American political scientist Elinor Ostrom (1990, 1993) has formulated a general approach to the problem of cooperation in irrigation systems, by using the term impure collective good or common pool resource (CPR), defined as a resource that is diminishable in use, while it is difficult to exclude potential appropriators. Common pool resources are prone to collective action problems, which occur when users prefer to free-ride on the resource, rather than cooperate in order to ensure its sustainable productivity. Ostrom is interested in the question under what conditions users are able to overcome this collective action problem and manage to institute norms and rules for the sustainable use of that particular resource. Ostrom (1990, 1993) has found that long-enduring irrigation systems are based on a number of design principles, such as clearly defined boundaries, collective-choice arrangements, and rules for monitoring users' behaviour. An important principle is that these systems are usually divided into many tiers of nested structures. Several levels can be distinguished, each with its own rules. The lowest layer consists of workteams in small parts of the system, monitoring each other's behaviour on the basis of operational rules, such as water-allocation arrangements. Those using a particular branch of the system form a higher level of organization. A third layer may involve all farmers served by one headwork. A fourth layer may involve all systems served by the same river.

The different levels of organization are attuned to the problems and activities on different geographical scales. Small-scale workteams can overcome free riding, because monitoring is facilitated by the fact that all activities are visible. The higher levels of organization deal with the problems of managing water distribution on a larger geographical scale. Ostrom (1993:1910) writes: 'By utilizing more than a single scale of organisation, many farmer-managed irrigation systems have sustained large-scale irrigation works for long periods of time relying primarily on their own resources without extensive help from external agencies'.

Ostrom shows in her studies that irrigation associations having these characteristics represent a form of communal property, that is, the organization manages a common pool resource (water) as a common property and maintains a complex and multi-tiered system of management practices and rules for this purpose. Anthropologist Lewis (1991:9) calls this type of irrigation associations 'corporate groups' defined as 'social groups that control the use of and inheritance of property, meet more or less regularly, and have representative leadership'. He points out that irrigation groups constitute a different kind of social organization than farming villages. A village is a residential group of farming families who own or lease land in private property. An irri-

gation association has the collective ownership of resources, such as water rights, dams, canals, and, in some instances, land.

Lewis (1991:99) makes a broad distinction between two kinds of irrigator groups. The first is a loose form of cooperation between farmers from a local village community who have joined forces in local water management, without formal organization, remaining within and relying on the social relations in their community ('community based'). The second is an irrigation association that is independent of existing village institutions, and that has a corporate basis and communal ownership, distinct from the village community ('communally based').

This article attempts to show, on the basis of a number of case studies of traditional Southeast Asian irrigation systems, that under certain geographical conditions, the need for irrigation and topography of the area require the construction of large-scale irrigation works, and that the concomitant irrigation association is a form of communal property and represents a corporate group. Sometimes the higher-level organizations are articulated with the state structure. The case studies selected include both ancient and still functioning irrigation systems. Irrigation systems based on modern infrastructure and state bureaucratic management are not included.

### *Climatic conditions*

The main biophysical determinants of agriculture are sunlight, precipitation and soil type. The main aspect is the distribution of rainfall or the availability of water throughout the year and the topography of the landscape determining the degree of runoff or retention. In temperate regions, seasonal variations are usually identified on the basis of temperature differences, but in the tropics rainfall is the important criterion, since mean temperatures vary so little from month to month. Thus in most tropical areas, the year is described in terms of wet and dry seasons.

Both wet and dry rice cultivation are largely concentrated in the monsoon region of Asia, where rice is a staple food. Wet rice cultivation requires the following conditions: 1. a constant water supply during most of its growth period, either in the form of rain (10 mm per day) or in the form of irrigation water; 2. a warm humid atmosphere (temperature above 18 degrees Celsius); 3. flat land for rice fields; 4. a dry period in the last phase of the plant's growth, particularly during ripening. This means that the best conditions for rice are found in areas with both wet and dry months.

The amount of irrigation needed for agriculture depends on the amount and distribution of local precipitation (P) on the one hand, and on potential evapotranspiration (PET) on the other. PET is the water that potentially evaporates from the leaves of a crop and from the land. PET is determined by

climatic factors such as temperature, wind and air moisture. When total water supply (rainfall, soil moisture, irrigation) is sufficient to satisfy the amount of PET needed, crops can be grown (Wade 1995:2041).

We can get a rather clear picture of the need for irrigation in a region by comparing the rainfall distribution over the year (by month) (P) with potential evapotranspiration (PET) by month. The greater the shortage of rainfall in relation to PET during a certain period of the year, the greater the need for irrigation. Where rainfall is greater than or equal to PET, little irrigation is needed. When rainfall is significantly less than average PET, irrigation is necessary for harvests during deficient months. Wade (1995:2042) has proposed using the monthly figures of P minus PET as an indicator for water shortage and the need for irrigation.

Rain-fed rice cultivation is only possible in areas where P minus PET is positive for the duration of the growing season. If we take the requirement of 10 mm of rain per day as a starting point, an amount of water equivalent to precipitation of about 300 mm per month is required. PET usually is at a level of 100 – 130 mm per month, leaving about 170 – 200 mm for plant growth. If the P minus PET amount sinks much below that level, water has to be supplied from irrigation.

If we look at rainfall patterns in Southeast Asia, we can broadly distinguish three regions, high, moderate and low rainfall areas. High rainfall patterns with a short or no dry season (humid climate types) are located close to the equator and in mountain areas. Moderate rainfall patterns with a dry season (semi-humid climate types) lasting several months can be found in East Java and Bali, and the western and central parts of the Philippine islands. Low rainfall patterns with a very long dry season (semi-arid and arid climate types) can be found on the inland plains of continental Southeast Asia.

### *Topography*

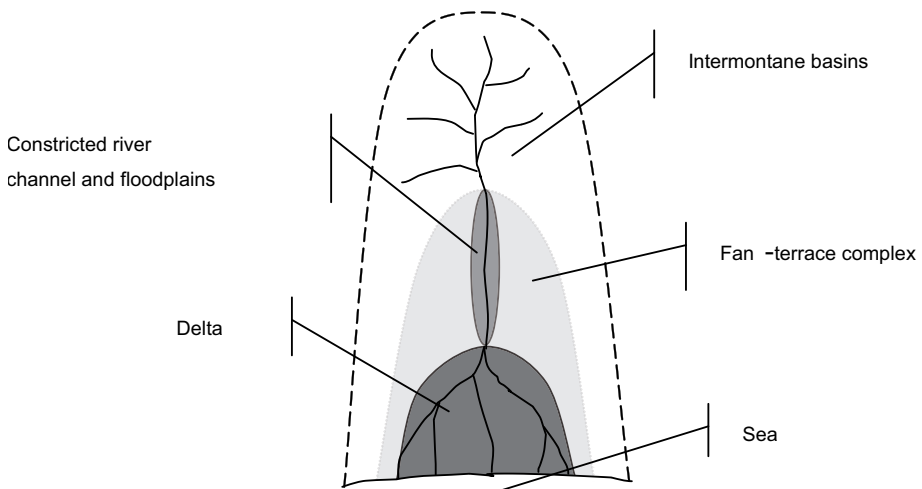
Southeast Asia presents a wide array of geomorphological forms, which have provided widely varying settings for irrigation facilities. Topographical factors play an important role in explaining the prevalence or absence of waterworks. For instance, the landscape can be flat, undulating with gently sloping hills, or sliced by steep ravines. As rainy mountain areas function as catchment areas, supplying the plains with a strong and often perennial flow of water, geomorphology deserves our attention.

The great river plains of the mountain-building zone of Southeast Asia all have similar topographical structures. The main rivers, Irrawaddy, Salween, Chao Phraya, Mekong and Red River, originate in the geologically active tertiary Himalaya mountain range and the geologically older extended ranges stretching to the south.



In insular Southeast Asia a number of rivers have a similar structure, although they are much shorter than their continental counterparts. On the island of Luzon the Pampanga River, originating in the Sierra Madre mountain range, and on the island of Java the Brantas and Solo rivers have similar structures. These rivers have a basic dendritic structure: many small tributaries in the mountain areas converge to form a powerful main stream flowing through a plain, later dividing into various river arms flowing through a low-lying flat delta. Japanese geographers, geologists and agrarian historians from Kyoto University, carrying out research in Thailand in the 1960s and 1970s, have developed a model of the structure of Southeast Asian rivers, particularly of the continental ones (Ishii 1978). According to Japanese geologist Yoshikazu Takaya (1978) three topographically distinct sections of a river can be distinguished, a drainage region, a floodplain and a delta (see Figure 1).

Figure 1. Topographical divisions of Southeast Asian large rivers (after Takaya 1978:173)



- a. The drainage region is located in the mountains, where streams erode the slopes, forming relatively flat intermontane valleys and basins, making agriculture possible. These basins have relatively large water-catchment areas, so that there is ample water for rice cultivation. Both the topography and the small scale of the rivers allow for the construction of relatively simple dams and off-take structures, providing irrigation during the rainy season. The mountainous section of the river is suited for the construction of small dams, but often not for the construction of water reservoirs, as the

- small steep valleys would be able to hold only small amounts of water. It is here that one finds the oldest settlements and irrigation works.
- b. Leaving the mountains, the river flows onto a wide plain, bounded by mountain ranges on both sides. The main stream flows through the centre of the plain and is bordered by floodplains from ten to twenty kilometres wide. Beyond the floodplains the land slopes gently upwards to the foothills of the mountain ranges along its flanks. Takaya (1978:172-3) calls this section of the river the constricted river channel, bordered by floodplains and surrounded on both sides by the upward-sloping plains of the fan-terrace complex. In the areas bordering this section of the river one finds the remnants of old civilizations.
  - c. In its lower reaches the river divides into various river arms, forming a low-lying delta area, where elevations alternate with extensive swamps. The lowest part of the delta closest to the sea is a tidal area, where during spring tides seawater penetrates upstream. During the wet season the amount of water flowing through the delta is huge. Because this water flow is unmanageable, the low-lying deltas of the large rivers of Southeast Asia were not brought under cultivation until late in the colonial period, in the late nineteenth and the first decades of the twentieth centuries. The modern (colonial) state, using modern technology, constructed the large-scale irrigation and drainage works presently to be found in the delta section of rivers.

After the river leaves the mountains its large volume precludes small-scale irrigation structures. In the words of Japanese agricultural engineer Yoshihiro Kaida (1978:215): 'In the delta and the constricted river channel area individual or communal water control is impossible. The water is too powerful, and any local efforts to control it are likely to be wrecked by the slightest quirk of nature. Only large-scale government-sponsored works can be expected to have any effect at all. [...] In contrast, the conditions in the intermontane basins and the valleys bottom paddy fields at the apex of the fan-terrace complexes allow individual and communal approaches to water control.' Kaida (1978:209) is so convinced of the importance of these structures that he writes: 'The mode of irrigation and drainage of a paddy area is strictly dictated by its topography'.

#### *Water control infrastructure*

Waterworks are built for three different purposes: irrigation, drainage, and flood control. In the past, in rice-growing regions in monsoon Asia irrigation and drainage systems were constructed independently of flood-control dykes and canals (Bray 1986:68). Today, given the vastly increased financial and technical resources available, it is possible to construct water control systems integrating all three functions.

We can distinguish different types of water control infrastructure:

1. Run-of-river systems, namely, a gravity system in which water is diverted from rivers and led through a transmission system of primary and secondary canals, incorporating weirs and gates as control structures. There are three subtypes:
  - a. Simple off-take constructions, whereby water is diverted from rivers by means of small dams and weirs, and led to the fields via 'contour canals' (Bray 1986:80) or bamboo pipes. These constructions are built and maintained by local farmers. Materials used are bamboo poles, rolling stones from the river bed, wood and leaves. These small-scale systems have the purpose of regulating the supply of water to rice fields during the wet season. As rivers run dry during the dry season, and water cannot be collected behind these makeshift dams, irrigation during the dry season is not possible.
  - b. Canal irrigation, whereby water is diverted from rivers via weirs or small dams into long canals that may run for dozens of kilometres, before reaching the fields. The construction and maintenance of the system of weirs and primary and secondary canals is a task that transcends the capabilities of a local village community. It involves several levels of organization, and various sets of rules for the allocation of water to users, for maintenance and for the resolution of internal conflict (Hunt and Hunt 1976).
  - c. During the twentieth century civil engineers constructed more complex irrigation constructions, made of cement or reinforced concrete, able to withstand heavy river discharges. The purpose is the same as that of smaller constructions: to regulate the flow of water during the rainy season, and thereby to control water delivery during the crucial period of crop growth, and to protect the crop from occasional periods of drought during the wet season.
2. Water storage systems can be found in both simple and complex forms. Older storage systems are the tanks found in semi-arid and arid regions of Thailand, upper Burma, India and Sri Lanka. Local farmers can construct these tanks, using locally available materials. Archaeologist Stargardt (1992:66) has shown that the large-scale tanks in Thailand and Burma were constructed by local farmers, using labour and materials in a very economic way, by choosing natural depressions in the landscape, which could be inundated effectively via a system of bunds, feeder canals, and sluices, and could be used to irrigate the fields via distributaries.

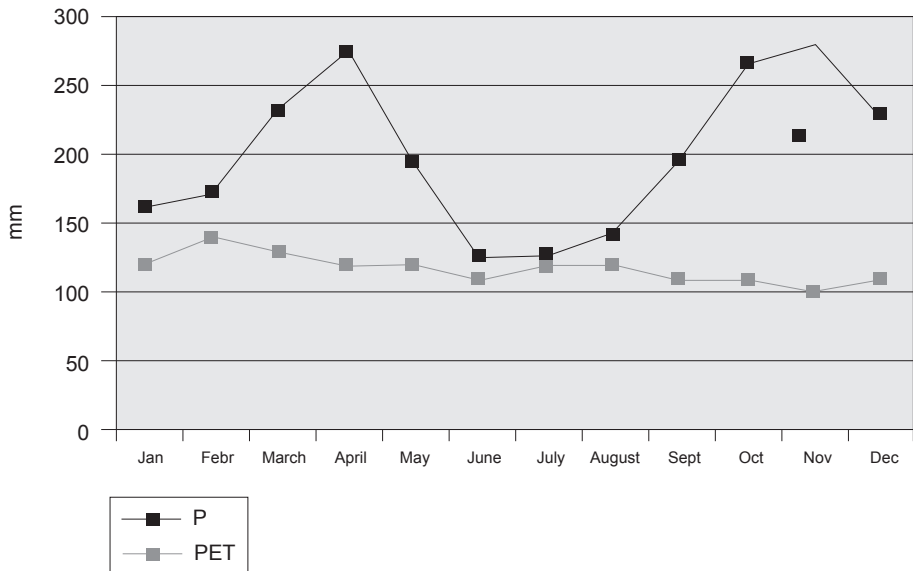
Technologically complex storage systems can be constructed by building a large dam in the river, creating a water reservoir for controlled releases, via a system of primary and secondary canals. These constructions are primarily designed for hydroelectric power generation and secondarily for other func-

tions such as water supply, irrigation and flood control. Such systems were constructed on many rivers in the second half of the twentieth century, as large civil engineering projects involving huge costs.

*High-rainfall regimes in upland and mountainous areas of insular Southeast Asia*

In Southeast Asian areas where rainfall is abundant and (almost) year round, agriculture is mainly rain-fed and irrigation works are small-scale and local, used mainly to regulate the flow of water during the wet season, and where possible to provide water during the drier months. Local farmers, within the confines of the village community, manage the irrigation works. Such systems are found in the always-humid tropics, close to the equator, but also in mountain areas at higher latitudes. Annual rainfall is high, ranging from 2,000 to 4,000 mm, and there is no dry month (with monthly rainfall below 100 mm). Throughout the year precipitation is higher than potential evapotranspiration. This means that people can cultivate the land, while depending solely on the rains for water.

Figure 2. Monthly averages for rainfall (P) and potential evapotranspiration (PET) for Kuala Lumpur, Malay Peninsula



Source: rainfall data from World Climate Data: [www.worldclimate.com](http://www.worldclimate.com); potential evapotranspiration data: Papadakis 1961:101

In pre-colonial states on the Malay Peninsula wet rice cultivation was predominantly rain-fed, not on an irrigation basis (Halib 1985). It was only in the region of Negeri Sembilan and parts of Malacca that migrants from Minangkabau (Sumatra) constructed wet rice fields with simple irrigation structures. Water was obtained from brushwood dams in rivers and led via off-take canals to the fields.

In most parts of the island of Sumatra annual rainfall is high, ranging from 1,600 to 4,000 mm. The highest rainfall is recorded along the west side of the Barisan mountain range, which is directly exposed to the humid air masses of the southwest monsoon. The oldest wet rice areas can be found, as historian Reid (1997) has shown, not in the river deltas or coastal plains, but in the intermontane basins of the highlands above 500 metres, in the Batak highlands, Minangkabau, Rejang and a few other small areas. The coastal plains were avoided because of uncontrollable flooding, unhealthy conditions, and dangers from maritime raiding expeditions.

Anthropologist Lando (1979) has studied Toba Batak social structure and irrigation associations. In some areas irrigation activities are carried out as part of village life; in other areas relatively independent units exist. In former times the associations were managed by descent groups, but at present voluntary groups from the villages are in charge. Although Lando describes a large irrigation system (with 206 members, covering 120 hectares), this association and other ones do not form an independent corporate unit, with communal property and an authority structure separate from the village structure.

The famous Ifugao rice terraces on the slopes of the Cordillera mountains in northern Luzon (Philippines) have an annual precipitation of over 3,000 mm. This terraced landscape has been brilliantly described, photographed and mapped by anthropologist Harold Conklin (1980). Critics of Wittfogel's theory have used these impressive irrigation structures as an example of local farmers' creativity that did not require a complex bureaucratic structure. However, this is not a valid counter-argument, as rainfall is abundant and the terraces are kept inundated all year by local farmers' associations. The construction of these terraces did not require higher-level coordination. Conklin (1980:38) writes: 'There are no signs of a single prime mover or of a master plan for the development of Ifugao valleys [...]. Instead, all available cultural and environmental evidence indicates that the contemporary form of land use in Ifugao was developed in small increments by the forebears of the present inhabitants, over a period of many centuries, within this and adjacent regions of northern Luzon.'

In high rainfall areas most of the water needed for agriculture falls directly on the field. Waterworks are a supplementary facility adjusted to the topographical features of the landscape, meant to regulate the flow of water, and to drain the area. Irrigation is small-scale and the local community organizes the

irrigators' groups. Larger associations of a communal and corporate nature are absent.

*Moderate and seasonal rainfall regimes in insular Southeast Asia*

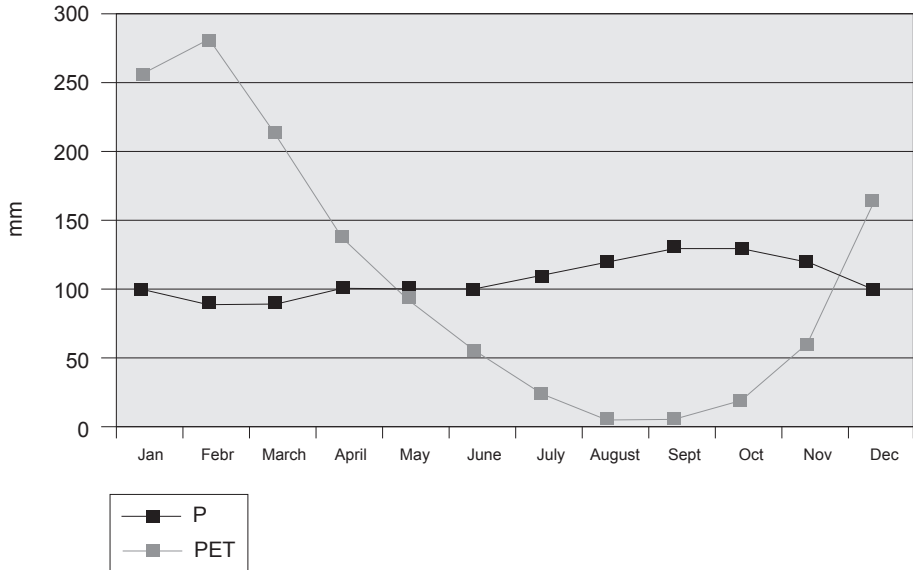
In foothills and plains where annual rainfall is moderate and the dry season lasts for several months, rain-fed agriculture is possible during the wet season. Yet small-scale irrigation works are constructed to regulate the flow of water evenly during the wet season. If rivers are available that bring water from high-rainfall mountain areas, and the topography allows for the construction of irrigation canals, chances are that people will have built waterworks of some kind. Large parts of the Indonesian and Philippine archipelagos as well as the coastal regions of continental Southeast Asia fall into this category. We find in these areas both small-scale irrigation works and larger canal systems with multi-layered irrigation associations. I will discuss examples from Central and East Java, Bali (Indonesia), and the Ilocos region in northern Luzon (Philippines).

Central and East Java and Bali typically have a bimodal rainfall pattern, while topography and geomorphology are favourable for irrigation works. Annual rainfall is moderate, in the range of 1,200-2,000 mm. The range of volcanoes stretching over the length of Java, rising from 1,500 to close to 4,000 meters above sea level, surrounded by hilly lands, create a large number of natural catchment areas varying in scale, most of which drain to the Java Sea. The rivers are relatively short, descending crosswise on the island's longitudinal axis. During the wet season (west monsoon) a tremendous amount of water flows downward, flooding large areas and causing significant damage, a phenomenon known and feared as *banjir*. During the dry season (east monsoon) eastern winds bring dry air, rainfall is reduced substantially, and rivers often fall completely dry.

For many centuries Javanese farmers have built simple small-scale irrigation systems. They constructed dams in rivers and led water via small canals to their fields. On mountain slopes people used hollow bamboo pipes to transport water over somewhat larger distances. The weakness of these simple structures was their makeshift character; during the wet season the dam was often swept away by strong currents.

Archaeologist Jan Wisseman Christie (1992 and this volume) has shown on the basis of the epigraphic record and archaeological findings, that large-scale irrigation works were absent in Central and East Java. State bureaucracies were not involved in irrigation management. To explain this, she points to topographical factors: the abundance of water coming down the slopes of the mountains, the relatively flat or undulating landscape of the foothills, and the gentle slope of these hills and of the small waterways. She writes: 'On Java the territory held by a community was relatively large, normally encompassing

Figure 3. Monthly averages for rainfall (P) and potential evapotranspiration (PET) for Pasuruan in East Java



Source: rainfall data: Lekkerkerker 1938: 85; potential evapotranspiration data: Papadakis 1961:92.

much of the water used by its members, and the technical difficulties connected with the use of the water sources appear to have been minor, at least in the upland regions' (Christie 1992:16).

The island of Bali has a similar climate to East Java, with four to five months of dry season, but along the volcanic mountain slopes there is still some rain during the dry months (although less than 100 mm). Aside from rainfall, agriculture can be irrigated from mountain lakes and underground outlets. The gradually downward slope from the mountain to the coast facilitates the draining off of water. The sloping terrain also facilitates the laying out of terraces. The rivers running down the mountain have cut deep gorges in the landscape, which hampers movement and communication along contour lines.

While Central and East Java had almost no large-scale irrigation systems in earlier times, Bali has had extensive irrigation systems for at least several centuries. Differences in topography explain this diverging development, as Christie (1992:12, 16) has pointed out. Central and East Java's landscape, with gradual slopes, allowed farmers to manage water flows with small-scale waterworks. Along Bali's mountain slopes streams and rivers have cut deep ravines and gorges in the land, slicing the land into segments, running



from the top to the plain. These ravines formed political boundaries between villages and between the old states. As the river down in the ravine lies far below the adjacent rice fields, farmers had to tap sources situated higher up the slopes, and bring the water to their fields via canals.

Balinese farmers formed cooperative groups, called *subak*, for the management and distribution of water. Observers during the colonial period often noted that Balinese were more sophisticated builders of waterworks than the Javanese. Balinese were able to construct long canals and tunnels through which water could be conducted, with very little loss over long distances (Liefcrinck 1969:49). Presently, there are about 1,300 *subak* in Bali, covering approximately 110,000 hectares, while the size of one *subak* ranges from a few ha to almost 800 ha, with an average of about 100 ha (Horst 1996:36).

Balinese *subak* are decentralized and independent units, not controlled by a state bureaucracy. They are corporate organizations, based on the control of communal property, consisting of dams, canals, dikes, dividers, tunnels, aqueducts, reservoirs, and the water flowing through these structures. Geertz (1980) has pointed out that settlement units are distinct from irrigation units. Farmers in one hamlet can be members of different *subak*, while a *subak* has farmers from different hamlets among its members. The *subak* not only manages water flows, but also functions as a religious organization, performing rituals at the *subak* water temples.

Anthropologist Lansing (1987, 1991) has shown that the function of higher level coordination, above the *subak*, is carried out by a religious institution, namely, the network of water temples spanning entire watersheds, with the Temple of the Crater Lake standing at the summit of the system. The Temple, supervised by the high priest, is associated with the Goddess of the Lake and claims authority over the water in all of the irrigation systems of central Bali. The water temple system is separate from the state. Lansing argues that the water temple system has a practical function as well: scheduling the planting scheme, coordinating irrigation flows, and imposing a two-week fallow-period to control pests. The temple system does this on a watershed basis. Lansing has supported his theory with an ecological simulation model of hydrology, rice growth, and pest population dynamics. Anthropologist Falvo (2000), who doubts the validity of this modelling effort, has proposed an alternative explanation, arguing that the most important function in the past might have been keeping upstream *subak* from blocking the downstream flow of water, thus overcoming possible asymmetries among farmers using the same watershed.

The Ilocos region, on the northwest coast of Luzon (Philippines), is a small strip of land between the Cordillera central mountain area in the east and the China Sea in the west. The region has a row of mountain ranges running in an east-west direction, interspersed with small rivers and plains. A series of turbulent rivers descending from the Cordillera cross the coastal plains. The

region thus comprises a number of small, flat river valleys separated from one another by intervening hills and ridges. Climatically the region falls under the semi-arid climate type, with a rainy season of three to four months and a dry season of six to seven months. The northern part of the Ilocos region is a major water-deficient area.

In the Ilocos region irrigation has traditionally been provided by river-valley off-take systems, irrigating large parts of the valley. Irrigation is organized on a cooperative basis, whereby farmers form a *zanjera*, a water users association, consisting of a few to several hundred farmers who take their water from inlets connected with dams in the nearby river. The anthropologists Lewis (1971, 1991) and Siy (1982) have given detailed descriptions of these irrigation systems and associations. There are almost 1,000 *zanjeras* in Ilocos Norte, ranging in size from a few hectares to more than 900 hectares, covering a total of 18,000 to 20,000 hectares. The *zanjeras* are communal systems, based on membership and regulations requiring the members to contribute to the maintenance of the system. The main function of the irrigation societies is to provide a stable, reliable supply of water during the wet season (Lewis 1971:128).

The dams are constructed with communal labour, from bamboo and rocks, leading the water into complex systems of canals, small reservoirs, and drains (Lewis 1971:129). Traditionally the dams were made of simple materials. Lewis (1971:145) quotes the American engineer Christie, writing in the 1910s, who complained that these 'crudely constructed dams' were either completely destroyed or damaged each year. However, Lewis in retrospect rejects this judgment, and argues that the stone and bamboo dams were very practical under the prevailing conditions. The problem with the major rivers in the Ilocos region is that they have a very wide riverbed and consist of constantly shifting river channels and banks. Fixed concrete structures would not work under these circumstances, as they are vulnerable to turbulent floods during the wet season. When the simply constructed dams are washed away, it is relatively easy to build new ones, adjusted to the new river bed (Lewis 1991:73). A general feature of the traditional irrigation system in the Ilocos region was that it lacked water storage capacity (Wernstedt and Spencer 1967:335). As a consequence, on most rice fields only one crop per year was possible.

Lewis (1991:37-49) characterizes the *zanjeras* as well-defined corporate entities, possessing bounded organizational structures, having been legally incorporated with charters recognized by the state, with a clearly defined membership, and communal ownership of water, infrastructural facilities, and sometimes land. The *zanjera* is independent of the local residential units, hamlets and villages.

*Low rainfall areas in mountainous areas in continental Southeast Asia*

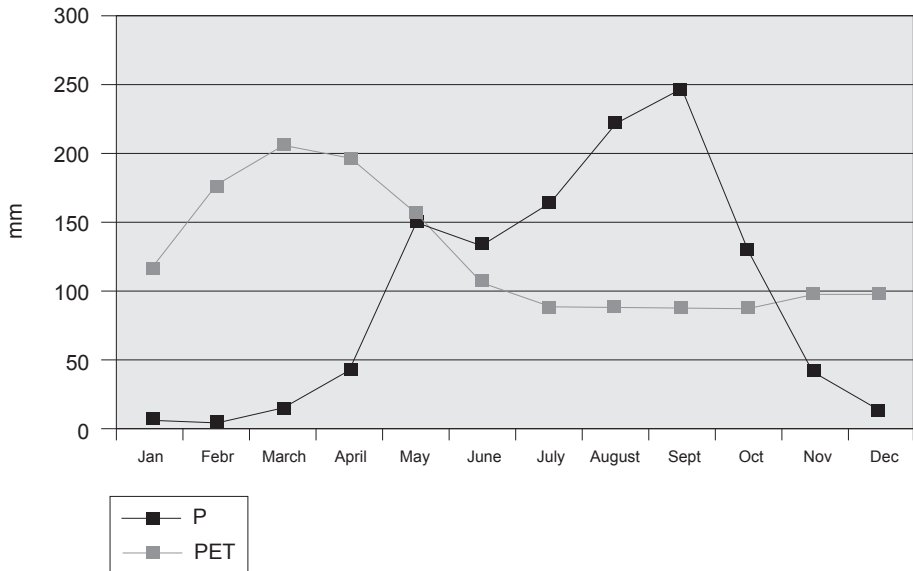
The interior areas of mainland Southeast Asia, including South Vietnam, south and central Thailand and central or upper Burma, have a semi-arid climate. Annual rainfall is low, ranging from about 750 to 1,200 mm, while distribution over the year is determined by the monsoons, with distinct wet and dry seasons, with a long dry period of five months or more. In some areas rainfall during the wet months hardly exceeds potential evapotranspiration. This means that in many areas climatic conditions are not suitable for rain-fed rice agriculture. Rice cultivation is only possible if water is secured from other sources, such as rivers, via extensive irrigation structures. Remarkably, it is in these low-rainfall zones that pre-colonial civilizations, with elaborate urban centres and state structures, arose. In other areas seasonal floods are so overwhelming that drainage is necessary. In these areas specific forms of agriculture, adjusted to the flood conditions, developed.

The intermontane basins of northern Thailand are part of much larger region, encompassing similar areas in southern China, Laos, Vietnam and Burma, all having common characteristics: centuries long histories of wet-rice cultivation, large-scale irrigation systems, stable social structures, and 'ancient' states. The Japanese researchers from Kyoto University who have studied northern Thailand (Ishii 1978) strongly emphasize the importance of climatic and topographical factors. Annual rainfall is low, and the dry season lasts for six months (see Figure 4).

Characteristic of this region is the presence of gravitational irrigation systems utilizing the natural flow of rivers and traditional diversionary weirs. In northern Thailand these systems are called *fai-muang* irrigation systems (*fai* are weirs and *muang* are canals) (Kaida 1978:211). These systems range from a few hectares to about 2,500 hectares. The local population makes the dams by driving bamboo stakes into the riverbed and filling the spaces between them with bamboo baskets containing rocks and stones (Ishii 1978:20).

In their studies of these irrigation systems, the Japanese researchers hark back to Wittfogel. Ishii (1978:18-9) argues that in regions having no available water sources, technological adaptation is needed to utilize the water coming from distant areas. Large-scale engineering works with trunk canals and reservoirs need to be constructed. Ishii (1978:18) writes: 'Such projects are beyond the capacity of the household or village, in terms both of the materials and manpower needed, and must be managed at a regional or national level'. Ishii (1978:19) refers to Wittfogel's theory of 'hydraulic agriculture', but realizes that the theory is 'inapplicable in its full sense' and softens it to 'quasi-hydraulic agriculture', in which the state participated in water control. He gives a number of historical examples where local rulers in northern Thailand ordered the construction of large-scale trunk canals, deriving their water from

Figure 4. Monthly averages for rainfall (P) and potential evapotranspiration (PET) for Chiangmai, northern Thailand



Source: rainfall data from World Climate: [www.worldclimate.com](http://www.worldclimate.com); potential evapotranspiration: Papadakis 1961:114

the main rivers. These rulers mobilized *corvée* labour, to carry out projects, needing years to be completed. Ishii (1978:20-1) is sceptical about anthropological studies describing water management as practiced by the village community, because, as he writes, the basic structures were constructed under government supervision and financing. Ishii (1978:21) makes a rough calculation about one 34-kilometre-long canal (constructed in 1281) which supplied water to about 10,000 hectares of paddy fields, which at that time produced an amount of rice sufficient to feed a population of about 100,000 people, 'a figure clearly in excess of a village population'.

American anthropologist Potter (1976) has done fieldwork in a village in the Chiangmai valley in northern Thailand. He describes the large-scale irrigation works in the region as a segmented system, managed by a multi-tiered irrigation organization, coordinating the supply of water to a large number of villages (Potter 1976:81-102). He describes in more detail one irrigation system taking off from Ping River, where the members have constructed a weir, leading the water into a main canal, which splits into two large segments, which in turn split into seven major canals, each serving one or more villages, splitting again into minor canals, serving hamlets, splitting again into myriads of minor canals. The total number of farmers served by this system is about 1,600.

The irrigation association managing this system closely parallels the physical outlay, with officials assigned to each of the levels of organization, with a headman at the top. Although Potter does not use the term 'corporate group', his description of the association clearly suggests its corporate character, with its well-defined membership, rules prescribing the rights and duties of the members, communal ownership of the weir and the canals, authority of association officials over the members, and their supervision of all labour and their right to inspect the work done. The farmer members of the association are obliged to clean the irrigation canals at all levels, and to rebuild the weir every year. The higher level of leaders manages conflicts between parts of the system. Higher state authorities manage conflicts between systems off-taking from different headworks at the river. With his analysis Potter (1976:102) supports, as he says, 'essential parts of Wittfogel's and Steward's theory'. The way he depicts the relationship between the irrigation organization and the state can best be characterized by using Kelly's term 'articulation' (which Potter does not use), denoting that the irrigation association is a bottom-up farmers' activity, while a state-level authority is needed to organize and mediate when conflicts between irrigation systems arise. In former times the Chiangmai kingdom performed this function; since its downfall, the Thai government has had to furnish this 'necessary central control'.

*The constricted river channel and the floodplains*

The floodplains around the constricted river channel in the middle reaches of the river and in the lower delta present a different ecological context. During the rainy season tremendous amounts of water come down the river from the mountainous catchment areas, and during the dry season the region is hit by drought. Throughout the centuries the farming population has found it impossible to control the floodplain through water management. Yet one finds in these regions the centres of old civilizations.

The farming population in these regions has adapted to the ecological conditions by developing particular forms of floodplain agriculture. One form of adaptation is growing floating rice varieties in areas covered with floodwater. Floating rice is a rice variety, which can grow rapidly, up to twenty centimetres a day, if floodwaters rise quickly and can thus avoid submersion even if water levels rise to three to four metres. When the water level falls, the long stem of the rice plant 'kneels down' and where the stem hits the soil, it starts rooting. Harvesting normally takes place a short time after the recession of the floodwaters.

Another form of adaptation is practicing 'receding flood' agriculture (Van Liere 1980), where farmers use the floodwater from rivers to inundate the fields. These rivers start to rise with the wet monsoon in July and begin to

recede in November. Throughout the centuries farmers have constructed flood-retarding dikes and bunds, as well as small reservoirs using natural depressions in the landscape, to catch the water. Farmers can transplant or broadcast rice immediately after the retreat of the flood, and harvest in February or March. Archaeologist and irrigation engineer Van Liere (1980) has described 'receding flood' agriculture for the area around Angkor, bordering the Great Lake in Cambodia, where farmers used the annual incursion and retreat of water from the Siem Reap River (a tributary of the Mekong River) and the lake, and for the floodplains of the Mun and Chin rivers (tributaries of the Mekong River) in northeast Thailand.

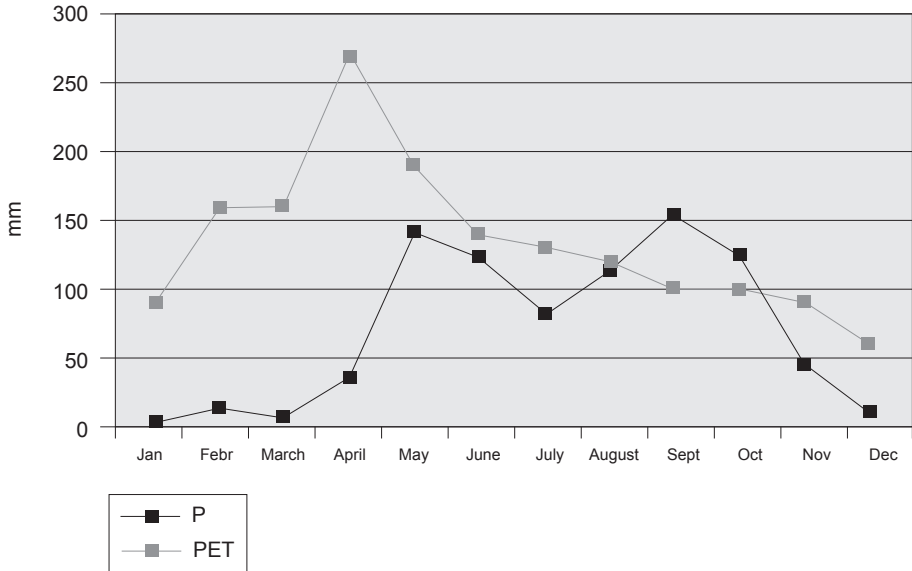
Van Liere (1980) has shown that the theocratic superstructure of Angkor, the system of a divine king, a large priesthood, sacred temples and monasteries, temple ponds and canals, moats around the city, in short the whole system of theocratic hydraulics, was totally disconnected from agriculture. The canals supplying water to the temples did not bring water to the fields. Van Liere argues that theocratic hydraulics was technologically limited, as it was not possible to build permanent weirs in monsoon rivers or clay dams around reservoirs. The dams were small earthworks on minor streams in the foothills nearby.

Generalizing from Van Liere's analysis, geographer Stott (1992) has argued that Wittfogel's hydraulic paradigm must be replaced by a new paradigm of local management of water. He considers flood-retreat agriculture as a brilliant farmer-level response to a distinctive set of environmental conditions, a form of hydro-agriculture. Angkor was not, as several historians have said, a 'hydraulic state'. Stott includes in this view the *muang fai* systems of northern Thailand and the irrigation systems of the Burmese dry zone, and a number of other irrigation works. While Stott's argument is correct in rejecting Wittfogel's theory for Angkor, and in highlighting Van Liere's discovery of a specific form of hydro-agriculture, his generalization is unwarranted, because he underestimates the importance of topography and the need for large-scale waterworks in certain types of landscape and the organizational problems farmers encounter when they try to build such works. Besides, it should be remarked that Wittfogel has presented a theory or hypothesis, not a paradigm. Stott's suggestion that the Angkor state was based on a farming population practising flood-retreat agriculture, and that this form of agriculture 'was probably producing a rice surplus' before the state was established, is another hypothesis, not a 'new paradigm'. A hypothesis is a statement that can be empirically tested; a paradigm is a conceptual and methodological approach.

Upper Burma, also known as the Dry Zone, has a mean annual rainfall of 500 to 800 millimetres, while some areas receive not more than 200 mm (see Figure 5). This area was therefore not suited for rain-fed agriculture. Topographically the area falls within what Takaya has called the 'constricted river channel' of the Irrawaddy River and its tributaries. This means that the peren-

nial river brings water from an enormous catchment area including the mountain regions in the north and on the sides of the plain. During the rainy season water rises rapidly in the area and large parts of the riverbanks are flooded.

Figure 5. Monthly averages for rainfall (P) and potential evapotranspiration (PET) for Mandalay, Burma



Source: rainfall data from World Climate: [www.worldclimate.com](http://www.worldclimate.com); potential evapotranspiration: Papadakis 1961:73

Remarkably, this Dry Zone was the heartland of pre-colonial states for almost two millennia (with the exception of a brief period in the sixteenth century, when a dynasty moved the seat of government to Lower Burma). The Dry Zone was strategically located, for it allowed the rulers to control Lower Burma as well. In the second half of the nineteenth century the British colonial government established itself in Rangoon in the delta region. The low-lying delta was opened up and brought under cultivation, and turned into a major rice-producing area. Large numbers of migrants from Upper Burma moved to the south, undermining the population basis of the Upper Burmese states.

The highly developed ancient states of Upper Burma had been based on wet-rice agriculture. The rivers running through the region originate in mountain areas with heavier rainfall, and bring water to the plains throughout the year, and could be tapped for irrigation. Remarkably, the old centres were not located directly near the Irrawaddy River, but along its tributaries. The reason is probably that the water flow in these relatively smaller rivers,



although uncontrollable as well during the wet season, was more predictable than the flow in the Irrawaddy River. After the beginning of the wet monsoon the rivers brought huge amounts of water from the mountains and flooded parts of the floodplain.

In the Dry Zone, wet-rice cultivation was possible in different ways. One was the system of flood-receding agriculture, described for Thailand by Van Liere (1980). This system was practised on riverbanks flooded during the rainy season. A special variety of rice, 'a cold and dry weather rice' (Aung-Thwin 1990:9), was sown in November or December on lands from which the water was subsiding, and harvested in March. On irrigated land other rice varieties were planted in June, and harvested in November. Fast-ripening varieties could be planted in March and harvested in June.

During the two millennia rule of the early states, large-scale irrigation systems were constructed in the region. From 1890 onward the British modernized and changed Upper Burma's irrigation systems. Historian Aung-Thwin (1990) has given a detailed description of the old systems, based on historical documents. The origin of some of the systems can be traced back to the first century BC. Throughout the centuries new systems were built and existing systems were expanded. Aung-Thwin (1990) shows, on the basis of historical records, that kings often took the initiative in constructing canals, reservoirs, tanks, and large dams. Farmers probably constructed the secondary and tertiary structures.

The irrigation systems were built with traditional technology using local materials. British irrigation officers reported that the weirs were constructed with skill, but that they constantly required repair (Aung-Thwin 1990:16-7). The purpose of the weir was not to raise the level of the water, but to direct the flow into diversionary canals. These canals then split into smaller canals, which eventually delivered the water to the fields. Each irrigation system was named after the major weir at the headworks. The irrigation systems served areas varying from a few hundred to a few thousand hectares.

Stargardt (1992) discusses the role of irrigation associations in the old Upper Burmese states, on the basis of archaeological findings and the late nineteenth-century records of British engineers inspecting the systems. She characterizes what she calls 'local associations' as cohesive structures, with very detailed regulations and procedures relating both to irrigation and the irrigation communities. Stargardt (1992:63) writes: 'The local irrigation associations that were at times integrated into larger political units [...] retained a degree of autonomy at all times, and were thus able to function during the recurring periods of civil war, or the collapse of central authority through some other cause.' The term 'local' probably underestimates the scale of operations of these associations. It would be interesting to find out whether these irrigation associations functioned as corporate organizations, with communal ownership of water flows and irrigation infrastructure, including the large canals.

### Conclusion

This article attempts to show that geographical factors, particularly rainfall distribution and the topography of the landscape, can to a large extent explain the distribution of the various forms of irrigation organization in Southeast Asia. With regard to rainfall three broad patterns can be distinguished, high, moderate, and low rainfall regimes. With regard to topography, a crucial distinction is that between the different sections of the large rivers, the intermontane basins upstream, the mid-section of the constricted river channel and adjacent floodplains, and the huge floodplains of the delta downstream. Another topographical distinction is between the gradually sloping mountains in Java and the heavily sliced landscape of Bali. Broad correlations are made between the geographical factors mentioned and the different types of irrigation organizations.

In summarizing the argument, I distinguish between insular Southeast Asia, including the Malay Peninsula, and continental Southeast Asia with adjacent South Asia.

Insular Southeast Asia has high to moderate rainfall regimes, while certain regions experience a short dry season. Topographically the landscape has relatively short rivers. In the upland and intermontane basins of the Malay Peninsula and the west coast of Sumatra, irrigation systems are absent or little developed, and irrigation associations are village based. Rainfall pattern and landscape make large-scale waterworks superfluous.

In the moderate rainfall areas, we find that early states in Central and East Java did not have extensive large-scale waterworks. Bali, on the other hand, has a centuries-old tradition of complicated irrigation works and irrigation associations, *subak*, with a corporate character. This difference between Java and Bali can be explained by differences in topographical conditions. The *zanjeras* in Ilocos Norte (Philippines) are situated in a moderate rainfall area, along the banks of rivers in the foothills between the mountains and the very small floodplains along the coast. As Lewis (1991) has pointed out, these irrigation associations have a very strong corporate organization, with communal ownership of water rights and facilities. Geographical factors explain these features. Rainfall is seasonal and irregular, and farmers have to make good use of the water flow in the rivers coming down the mountains. The topography allows the construction of long canals.

Continental Southeast Asia has rainfall regimes varying from moderate to low. Topographically, extremely long rivers, flowing north-south characterize the region. The large rivers originate or have tributaries originating in the Himalayas. Here we have to distinguish between the three river sections.

In the intermontane basins upstream in northern Thailand one finds the

*muang fai* irrigation systems, managed by irrigation associations with a corporate character. The low rainfall makes it necessary to use water from the river, the moderate flow of the rivers makes it possible to construct weirs, and the landscape makes it possible to construct long canals. Interestingly, the traditional technology of weir and canal construction in northern Thailand is very similar to that of Ilocos Norte in the Philippines.

The middle section of the large continental rivers, with a constricted river channel and floodplains, has a very different character. These areas receive little rainwater, even during the wet season, but huge amounts of water come down from the mountains. Here one finds different systems side by side. Near the river and the lakes, where the land is flooded during the rainy season, receding-flood agriculture is practised at the end of that season. An alternative system is using floating rice, which is sown just before the floods, and harvested when the waters are still high. Another way of getting water is by constructing large-scale canals, taking off water from the rivers and leading it to the fields.

In the third river section, the low-lying delta near the coast, rainfall is much higher and large amounts of water come down the river during the wet season. These areas have been uninhabited for centuries and were opened up starting in the nineteenth century. It was the late colonial state or (in the case of Thailand) the modern state that undertook the construction of large-scale drainage canals, irrigation works and, where necessary, large dams on rivers.

A number of studies during recent decades have shown that Wittfogel's hypothesis of a hydraulic bureaucracy of ancient states managing large-scale irrigation systems cannot be empirically corroborated. In many cases farmers, on the basis of their knowledge of geographical conditions, have managed irrigation associations, under community or communal management. However, this does not mean that community management has historically been the rule. Some authors have too easily concluded that irrigation was everywhere small-scale and carried out by local farming communities. This characterization fails to take into account the dimensions of water problems and the scale of operations necessary for water control. Especially in the larger floodplains, larger management systems were needed. Corporate irrigation associations were found locally with a legal character (recognized by the state), as the lowest units in a multi-tiered system involving regional and state institutions as well.

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JAN WISSEMAN CHRISTIE

## Water and rice in early Java and Bali

### *Water-management and early rice cultivation in Southeast Asia*

The management of water has deep historical roots in island Southeast Asia. The oldest manifestation of agricultural water management in the maritime region appears to have taken the form of modification of natural swamps. Archaeological data suggest that such managed swamp cultivation, possibly of indigenous strains of *taro* (*Colocasia esculentum*, Schott.), was under way in the New Guinea highlands by about 9000 years ago (Golson 1977). Similar management of swamps and wet areas for such crops has continued in all parts of the maritime Southeast Asia into the present. During the early historic period in maritime Southeast Asia, however, systems for the irrigation of seasonally or permanently dry land were overwhelmingly associated with the cultivation of the non-indigenous grain, rice (*Oryza sativa* L.).

Asian domesticated rice, on the basis of data available at present, is believed to have been developed from wild rices native to the mountainous region of the upper Irrawaddy, Mekong and Yangzi river systems. The earliest evidence of its intensive cultivation comes from the middle and lower reaches of the rivers just to the west, east and south of this mountainous origin area, in a band stretching from the Brahmaputra valley in northeastern India to the Yangzi valley in central China, on the southern edge of the millet belt. The oldest known site connected with intensive rice cultivation is that of Hemudu, on the fringes of Lake Taihu, near the mouth of the Yangzi River, from which very large quantities of rice have been recovered. At least 8000 years ago, the inhabitants of this and neighbouring settlements practiced what appears to have been 'receding-flood' cultivation of rice on a fairly substantial scale (Glover and Higham 1996). Under these receding-flood conditions it was possible to grow rice using the digging sticks and stone tools available to Neolithic farmers.

Rice was almost certainly brought to the islands of Southeast Asia by Austronesian-speaking peoples during the later Neolithic period (Bellwood 1997:110): the maritime Southeast Asian strain, recognized by some as *Oryza sativa* var. *javanica* (Chang 1976), appears to have been derived from the japoni-



ca strain that was first developed in central China (Oka 1988; Glover and Higham 1996). The paucity of archaeo-botanical data from island Southeast Asia has made reconstruction of the earliest phases of rice cultivation in the region difficult. However, there is archaeological evidence for the presence of rice in northwestern Borneo by about 4000 years ago (Glover and Higham 1996:426), and in Bali by at least 2000 years ago (Bellwood et al. 1992). Since the climate, the soil conditions and the latitude of Bali and Java favour rice cultivation to a far greater extent than do those of northern Borneo, it seems probable that rice was cultivated on the two islands at least as early as it was on Borneo.

The antiquity of irrigated rice cultivation in Java and Bali is less certain. Palynological data suggest that burn-offs associated with swidden cultivation of grains – possibly both rice and millets – began in western Indonesia between 5000 and 3000 years ago (Bellwood 1997:233). In much of the region, the pattern of settlement mobility established at this early stage appears to have persisted into historic times. However, in Java and Bali the transition to more permanent regimes of rice cultivation may have begun before the end of the Neolithic period. Indeed, on the margins of some lakes and along the lower courses of rivers, as in mainland Southeast Asia (Van Liere 1985), the earliest system of rice cultivation was probably ‘receding-flood’ cultivation. Under these conditions, stable settlements of modest size would have been possible. Palynological evidence suggests that if such regimes developed at an early stage in Java, they did so at moderate altitudes rather than in very low-lying areas (Sutikno 1989:8). This early phase of seasonally-flooded agriculture has, unfortunately, yet to be recovered archaeologically.

Flooding of areas other than seasonally inundated lake and river edges requires both a greater input of labour and metal tools, since such cultivation involves land clearance, the creation and maintenance both of bunded, terraced, ploughed and ‘bottomed’ fields, and of a system of dams and water conduits for distribution of water. Although no direct data are available at present concerning the methods or geographical distribution of rice cultivation in Java and Bali during the later prehistoric period, the presence of iron, buffalo and cattle by the beginning of the first millennium AD suggests that, as in mainland Southeast Asia during the same period, the conditions existed for bunded rice-field systems to have spread outwards from the lake and river margins. This does not, however, rule out dry-field rice as an important subsistence crop in mixed upland cultivation systems.

The earliest solid and detailed information concerning Javanese and Balinese rice-growing regimes is that found in historical sources. The most important of these sources are the several hundred surviving Old-Javanese and Old-Balinese language tax charters inscribed on stone or copper plates during the later first and early second millennia AD. These sources indicate that

by the ninth century AD, rice was not only the major subsistence crop on these islands, but it was also both a market commodity and the basis of state agricultural tax systems. These records further indicate that both dry and irrigated rice fields were already an established feature of the landscapes of the two islands at this time. The Javanese and Balinese of the period had already developed specific terms, not only for irrigated rice fields (*sawah* in Old Javanese, *huma* in Old Balinese), but also for dry or 'hill' rice fields (Old Javanese *gagā*, Old Balinese *parlak*), these latter distinguished from the dry fields planted with other crops (Old Javanese *tgā*, Old Balinese *mmal*). Although the same term (*pari*) was used for both wet-field and dry-field rice plants in the straw, Balinese charters and early Javanese literature distinguished the husked grains of the non-sticky types of rice grown in sawah fields (Old Javanese *wēas/bras*, Old Balinese *bras*) from the sticky rice grains (*lakētan*, *kētan*) – red, black and white – of most of the hill-rice crops.

The inscriptions further indicate that, on both islands, states had a particular interest in encouraging communities to shift away from swidden-based dry-field agriculture towards greater investment of time and effort in creating banded and irrigated wet-rice fields. This state-encouraged expansion of irrigation began to increase significantly in the early second millennium AD. By the eleventh century, as the expansion of wet-rice cultivation accelerated, the manner in which irrigation systems were managed on the two islands appears to have begun to diverge. These divergences reflected the differences in geography that shaped the religious and political economies of the two islands (Christie 1992).

### *The geographical contexts of irrigation*

Both Java and Bali lie just below the equator, within the tropical maritime region. The mean annual rainfall of what were, in the past, the most densely populated portions of the islands – that is, central and east Java, and southern Bali – is moderate, and the climate of the region is monsoonal. The heaviest rains fall between November and February, and these portions of the two islands experience a dry season of a month or more between June and September. Although, in general, the climate grows progressively drier as one moves eastwards from central Java to southern Bali, the local patterns and volumes of rainfall differ more within each island than they do, on the whole, between these portions of the two islands – depending both upon where the islands lie in respect to the rain shadows cast by Australia and Borneo, and upon the placement of different sub-zones with respect to the sea and to major mountains.

Both Java and Bali lie within the so-called Pacific 'ring of fire'. Their landscapes are dominated and shaped by living and extinct volcanoes. These

mountains trap rain clouds, watering most generously their southern flanks. Since this effect is noticeable to a degree even outside of the rainy season, increases substantially the available surface water on these mountain slopes. The agriculturally important rivers of the islands, most of which flow southwards initially, rise from waters that percolate through into the spring lines encircling the volcanoes, providing year-round flows. Most of the rivers flowing out of the Perahu and Merapi-Merbabu massifs in central Java, and out of the central Balinese peaks, remain small, draining separately through sloping uplands towards the relatively narrow southern coastal strip, some converging near the coast.

The agricultural environment to the south of the volcanoes in central Java – generally the wettest portion of the region in question – is relatively stable, with moderate seasonal shifts, many small and medium-sized rivers fed by numerous volcanic springs, and relatively shallow inclines across much of the area. However, the two major rivers of Java – the Solo and Brantas – empty into the sea on the northeast coast of east Java. They rise, respectively, in the waters draining off the east side of Merapi and off Mount Lawu in central Java, and those draining the Malang highlands of east Java. They owe their length, direction of flow, and ultimate volume, to the limestone hills near Java's south coast, which block their immediate exit into the sea, deflecting them first northwards and then eastwards, collecting water from numerous smaller tributaries along the way. The large delta formed by the Brantas River near east Java's coast has long been of considerable agricultural importance, although the waters have not been as easy to harness as those of the smaller rivers of central and east Java's uplands.

Southern Bali's landscape, although similar in some ways to that of central Java, is much more dissected. The volcanoes are larger in respect to the island's size, so inclines in many areas are steeper, and the coastal strip narrower. Thus, areas that are both well watered and reasonably level are more restricted than on Java. In addition, the land through which much of the water flows is composed of deep layers of soft *lahar* (volcanic mud) ejecta. Over the millennia even small trickles of water have cut very deep and narrow ravines through the Balinese landscape. These ravines, which obstruct east-west movement, developed into political boundaries, first between communities and later between states.

Water is not the only gift of the volcanoes of Java and Bali. The active volcanoes of the two islands have played an additional role in agriculture: they produce large quantities of neutral-to-basic, mineral-rich volcanic *lahar* (volcanic mud) and *ladu* (volcanic ash) ejecta. These active Javanese and Balinese volcanoes, which produce mineral-rich ejecta regularly, but usually not violently, directly affect the fertility of land on their slopes, and indirectly – through the action of water – that of the land below them. The volcanoes themselves do

not directly fertilize, on any regular basis, the land surrounding the majority of known early occupation sites, which lie at some distance from the volcanic slopes, often on ground too high to be inundated naturally. In order to make use of the annual build-up of volcanic ejecta that is washed down the slopes of the volcanoes and into the rivers that rise on their flanks, the water that carries this silt needs to be captured, first in weirs, and then in channels connected to the fields. Such systems collect, and distribute to fields, both water and fertilizing silt. However, the creation and maintenance of these systems require regular and organized labour input. It is on this basis that the area around Mount Merapi in central Java, still supports one of the greatest densities of agricultural population in the world (Hugo et al. 1987:56).

The early states of Java proper and of Bali all developed in the shadows of living volcanoes. Because living volcanoes can be harnessed in order to enhance the productivity of the fields that surround them, farming populations – in the past as in the present – have clustered most densely around these mountains. However, settling in close proximity to living volcanoes is dangerous. The volcanoes that give life and fertility can also bring death and destruction. Thus volcanoes have occupied a central position in the indigenous religions of Java and Bali, first linked to the spirits of ancestors, then also with the imported Hindu god Śiva, whose nature and attributes might have been designed with volcanoes in mind. Religion, in turn, provided an important focus for the organization of the agricultural calendar. In the dissected landscape of southern Bali, in particular, religion tended to bridge the gap between the organizational capabilities of the somewhat fragmented political hierarchy and the cooperative and technological needs of farmers.

#### *The archaeological evidence for the distribution of early farming settlements*

Early farming settlements encircling the volcanoes of Java and Bali appear to have been located below the spring line, and away from the areas affected on a regular basis by potentially catastrophic *lahar* flows. Although profiles of early settlement layers at the site around Borobudur, which is located at some distance to the southwest of Mount Merapi in central Java, indicate several minor episodes of volcanic ash deposition during the period of occupation – each episode delivering layers of ash a few centimetres thick – such ash deposition was too infrequent and irregular to be relied upon for the purposes of enriching farmer's fields. The situation elsewhere in the region appears to have been similar. During the earliest phases of occupation of the region, swidden farming, dependent upon vegetation-ash fertilizing, must have been the norm.

In those areas of central Java that have been surveyed, the distribution of early historic remains seems to indicate that most early settlement was lo-

cated nearer to the mountains than the coasts, on gently sloping fluvio-volcanic plains between about 50 and 400 m above sea level (Mundardjito 1993; Sutikno 1989:9). Pollen samples from the site of Borobudur indicate that by the ninth century AD the region surrounding the monument was reasonably well settled, and that the landscape supported a mixture of grain fields, house gardens, palm groves and forest similar to that of recent centuries, although in somewhat different proportions (Nossin and Voûte 1986:858). Much of the land below 25 m appears at that time to have been under swamp-forest or constituted uncultivated flood plain (Sutikno 1989:7-8). Early farmers apparently chose, by preference, land with moderate ground-water potential, and possibly that surrounding lakes in the uplands; it seems, on the basis of present evidence, that low-lying wet areas were not the first parts of the landscape to be exploited by farming settlements for the planting of rice.

The earliest archaeological remains mapped in east Java are found in the Malang highlands and on the slopes of the surrounding major volcanic massif. There is less evidence for dense early farming settlement of the lowlands closer to the east coast. Harnessing the water in east Java's Brantas delta and lower Solo region required not only engineering skills, but also major inputs of labour. This lowland region became more important after the beginning of the tenth century AD.

Evidence from Bali suggests that developing patterns of settlement and agriculture were similar to those of central Java. The Tampaksiring-Pejeng region to the south of the volcanic massif – which falls within an altitudinal band similar to the preferred early settlement area in central Java, but with a steeper incline – was probably the most densely populated region by the mid first millennium AD.

#### *The transition to irrigated rice cultivation*

The size of populations in central and east Java, and in Bali, during the late first millennium AD cannot have been greater than a tiny fraction of the present population of the same regions. Farmers on the two islands, at the end of the first millennium, were thus not likely to have been straining the carrying capacity of the land, nor were they likely to have been under pressure to intensify crop production for purely subsistence reasons. Dry-field rice and other dry-land crops could adequately have fed the farming population of the region, even though growing population density may have made abandonment of wide-scale swidden farming necessary.

These three regions present differing opportunities for irrigation. The fewest obstacles are presented by the landscape of central Java. Here more than eighty percent of sites dating to the later first millennium AD lie within 500 m of at least one river (Mundardjito 1993:14). In the relatively under-populated

landscape of central Java during the first millennium, irrigation appears not to have called for elaborate artificial constructions or administration. If, as seems to have been the case, no more than one irrigated crop was grown annually, even simultaneous inundation of fields watered by the same rivers and streams would not necessarily have taxed the water sources. The rains alone should, in a normal year, have provided much of the water necessary, particularly if transplantation of seedlings was practiced.

Settlement distribution in east Java seems to have altered rather rapidly at the end of the first millennium AD. Most of the known first millennium sites, aside from the remains associated with old ports, are located in the uplands and on the slopes of the volcanic massif. Population build-up in the Brantas delta and lower Solo region appears to have begun rather suddenly after the beginning of the tenth century AD.

Two major factors seem to have acted simultaneously to drive this rapid growth of settlement in this lowland zone. One factor was catastrophic: it appears that the active volcano Merapi, at the heart of settlement in central Java, exploded violently late in 928 or early in 929 AD. Stratigraphic evidence suggests that heavy ash-fall was followed by a partial collapse of Merapi's cone, which sent a major valley-filling pyroclastic flow of *lahar* (hot volcanic mud) into lower-lying areas to the south and east (Newhall et al. 2000). The palace relocated itself near the coast in east Java, which had been annexed some decades earlier by the central Javanese state of Mataram. A large proportion of the surviving population of the region appears to have been resettled, under state direction, in the under-occupied lowlands of east Java, where the state focused upon building up the east Javanese agricultural base.

The other factor driving this growth in settlement in the east Javanese lowlands in general – and in the Brantas delta and Solo river-mouth region in particular – was trade. An Asian sea-trade boom that began early in the tenth century stimulated a rapid expansion of Java's exports to overseas partners. These exports included both east Java's own spices, dyestuffs and other agricultural products, and certain spices, aromatics and dyestuffs imported by the Javanese from eastern Indonesia. This international sea-trade boom had the knock-on effect of increasing east Java's exports of such agricultural products as rice, sugar and pulses, along with salt, to trading partners in its archipelago network.

Demand from the ports for agricultural exports was most easily met by farmers settled along the lower reaches of the two main rivers. Pioneering settlement of the region behind the ports appears to have been a major objective of the distribution of royal tax grants during the tenth and eleventh centuries. Some of these grants were explicitly made to encourage forest clearance and population build-up in order to make the river routes and roads in the region safer for trade. Other grants were made in order to provide for the



maintenance of major dams and flood barriers. The policy of using tax incentives to attract settlement into this region seems to have been successful, since by the fourteenth century the east Javanese lowlands supported the densest concentration of substantial settlements on the island.

During the same period, population build-up on the slopes of southern Bali presented somewhat different changes to would-be irrigators, and called for rather different relations between settlement and river.

*Incentives for the conversion to irrigated rice agriculture*

Conversion to wet-rice farming regimes was labour-intensive, even in areas where the local conditions made it easy. At the same time, although such intensification of agriculture was manifestly in the interest of the administrations of the early states of Java and Bali, there is no evidence that these states were ever in a position to enforce such changes in agrarian practice. Rulers did not own the land of their states by right of office. Nor could these states afford to provide tax incentives for the development of all wet-rice fields. Therefore, inducements must have operated powerfully enough at the community level to begin the process of conversion from dry-rice to wet-rice farming.

Three such inducements seem probable. The added fertility of fields delivered by irrigation waters that carry captured volcanic run-off must have been one major incentive. The increase in volume and predictability of rice crops must, at some point, have promised to offset the labour involved in setting up such a field and channel system. The other inducement was probably related to a combination of population increase, community ownership of territory and structural changes in patterns of land tenure within communities.

Javanese and Balinese communities of the late first millennium AD (*wanua* in Old Javanese and *banua* in Old Balinese) appear to have owned territories larger than the fields and other types of land under immediate cultivation or other use. This territory was probably originally that which each community controlled for swidden-farming purposes, including fields that were fallowed for a number of years. As the population of each community increased, the original communities appear to have undergone a process of fission, with daughter villages hiving off to create pioneering settlements on the margins of the old territory. However, by the end of the first millennium AD, this process had apparently proceeded as far as it could, without major restructuring of inter-settlement and settlement-state relations, in the heartlands of central Java and possibly southern Bali. This was not the case, however, in east Java, where the contents of inscriptions indicate that the pioneering process carried on into the eleventh century, and even later in some areas.

The contents of Javanese and Balinese inscriptions of the ninth to fifteenth century indicate that farming practices of the early occupants of the islands



had become complex. Types of farmed land listed in these charters included not only dry fields (including swidden), fallowed swidden land, house land (planted with trees and perennials), orchards and betel gardens, but also irrigated rice fields and such mono-crop fields as *taro* gardens and cotton fields. Other types of productive land included pasture, forest, marshes, riverbanks, caves and salterns. Of these all, however, it is clear from the inscriptions that irrigated rice fields were, by the ninth century, the most valuable in terms of sale-value, and the most valued by the state as tar-producing resources.

The epigraphic record suggests that, by the ninth century, communities in the heartlands of central Java and southern Bali had come under pressure to intensify farming within their boundaries. Given the fact that irrigation is only effective if a network of water channels is first built and then regularly maintained, any conversion to wet-rice farming is unlikely to have been undertaken by individual community members in isolation. Nor would such a conversion have been worthwhile for individuals under a land-tenure system appropriate for swidden farming, in which land is held communally, but worked individually on a rotation basis. Some change in land-tenure must have accompanied the shift, possibly based upon existing regulations concerning inherited ownership of structures built, and productive trees and perennials planted, by individual community members.

It is clear that by the time tax documents were issued on permanent materials in local languages – early in the ninth century in Java and late in the same century in Bali – not only did wet-rice fields exist in large enough numbers to provide much, if not most, of the agricultural tax income of the states that issued the charters, but these fields were individually owned, heritable, and alienable. Sale of land is mentioned in a number of ninth and tenth century Javanese inscriptions. Although most types of land within a community's territory were sold by the community council as a group, three types of land – house land (planted with trees and perennials), orchards and *sawah* (irrigated rice fields) – were sold by individuals. By the tenth century, *sawah* fields were those most often cited as having been pawned or leased. They formed the major capital holdings of farming families.

Chinese reports of the eleventh and twelfth centuries mention rice as the major crop of Java (Hirth and Rockhill 1966:77, 83). However, although short-season rice had been developed in Southeast Asia by the eleventh century (Ho Ping-Ti 1956-57), double cropping of rice is not mentioned in Java until the fifteenth century (Mills 1970:91), and even then only in the Brantas delta region. None of the Javanese or Balinese inscriptions written before the fifteenth century makes any reference to double cropping of rice. Yields from single annual rice crops were then, as they still were early in the nineteenth century, sufficient not only for subsistence purposes, but also to provide surpluses substantial enough to underwrite both the palaces, with their atten-

dant bureaucracies, and at times very large monumental building projects that stretched over decades.

*Diverging approaches to the administration of irrigation*

The three regions under discussion provided varying opportunities for state involvement in water management (on this topic, see also Hunt, Wolters in this volume). Farming communities in ninth-century central Java had existed in long-term proximity to an increasingly powerful court, which was underwriting the most substantial and costly monumental building campaign in the island's history, and which was at the same time sufficiently strong by the mid-ninth century to annex its major sister-state in east Java. Both undertakings required the control of substantial rice surpluses. At the same time, there was clear pressure to settle and open landscapes along the major trade routes linking south central Java to the ports of the north coast. In southern Bali, during the late ninth and tenth centuries, not only did farmers live in even closer proximity to their court, but they also encountered greater technical obstacles to irrigation that required high levels of inter-community cooperation, which might have invited state intervention. During the tenth century, the Brantas delta and Solo mouth region of east Java probably provided the greatest opportunity for royal involvement in water management, since in these lowlands pioneering occurred late, with royal encouragement, in areas where rivers were large and difficult to manage, and where there was pressure to produce surplus rice for export.

There were, thus, both opportunities and incentives in all three regions for some sort of state involvement in water management during the ninth and tenth centuries AD. The responses of the Javanese and Balinese states to these opportunities, as reflected in the epigraphic record, reveal a good deal about the political organization of those states.

Inscriptions provide both direct and indirect information concerning early water management in Java and Bali. Most of the surviving Old-Javanese and Old-Balinese language inscriptions are tax charters that record in some detail the economic underpinnings of the communities concerned and the levels and types of tax payments and labour duties extracted by the state. Since, by the ninth century, irrigated rice cultivation provided the largest single source of tax income, one might expect that the tax charters would devote a good deal of attention directly to irrigation. Yet that is not the case. Only a handful of charters mention specific waterworks of any kind, and most of these were apparently constructed for religious, rather than agricultural, reasons. However, although little direct mention is made of water management in the majority of charters, it is alluded to indirectly: in references to officials connected with water and to technicians specializing in water control, in references to minor

taxes connected with irrigated rice agriculture, and to tax breaks designed to encourage communities to expand the area of fields under irrigation.

#### *Water management in early central and east Java*

By far the most common reference to water control in Java and Bali is found in lists of officials. In ninth and early tenth century inscriptions from central Java, mention is made of several officials who appear to have had some connection with water: the *hulu air/er* (water official), the *air warangan* (water 'marriage' official), the *matamwak* (dike/balk official), the *air haji* (royal water official), and the *jukut air* ('water-greens' official). Significantly, these were all either community officials or religious officials.

Of these officials, the first three are found listed amongst community officers in charters issued during the ninth and early tenth centuries in central Java. These local officials are the only ones connected with water to be mentioned in charters during this period. Although, after that time, a reorganization of the contents of the inscriptions excluded such lists, there is no reason to doubt that community officials continued to fulfil similar roles until at least the fifteenth century. Community water officials were chosen from amongst the land-holding heads of household belonging to the community council. The most important, and the most frequently mentioned, of these community officials was the *hulu air* (irrigation official). The office was of moderate importance, in the same class as the *hulu wras* (rice official), the *hulu alas* (forest official), the *hulu buru* (hunting official), and the *hulu pkan* (market official). The number of *hulu air* within a single community appears to have depended upon the size of its farming population and the spatial distribution of its fields in relation to water sources. Up to eight *hulu air* have been recorded for a single community, all apparently of equal status (Jurungan 876 AD; Machi Suhadi and Soekarto 1986:2.7.3). The activities of the *hulu air* and the two other community water officials appear to have been undertaken at a very local level, their authority being limited to the community of which they were members. All, with the possible exception of the *air warangan*, appear to have been involved in the practicalities of water control and distribution.

Both the *air haji* and *jukut air*, mentioned in ninth and tenth century inscriptions, were connected more clearly with the state administration. Judging by the epithets attached to their names, however, they were lower-level officials. The *jukut air* is mentioned once, early in the tenth century, in the surviving record (Lintakan 919 AD; Boechari 1986:E 13 a-c), but the *air haji* is mentioned regularly, in inscriptions issued between the ninth and thirteenth centuries, in lists of minor royal tax collectors (*mangilala drabya haji*) who acted as small scale tax farmers. Both of these minor state officials appear, however, to have been religious officials rather than members of the lay administration. The

exact nature of their connection with water is uncertain, but the cult of holy water, which is central to modern Balinese religion, was already in existence in both Java and Bali by the ninth century, and was probably very old indeed on both islands.

Aside from the dam (*dawuhan*), possibly on the Opak River or one of its tributaries that was beneficiary of the Rumwiga charter of 904 AD (Machi Suhadi 1986), no other mention is made, in the surviving central Javanese charters of the ninth and early tenth centuries, of water management.

The situation in east Java was somewhat different. Because of changes made during the tenth century in the contents of charters – enlarging the clauses dealing with commerce at the expense of lists of local officials attending the ceremonies – fewer mentions are found in east Javanese inscriptions of officials connected with water. A small number of charters from east Java, dating to the thirteenth century and later, do however mention an official called the [*pang*]hulu *bañu* (water official) in connection with for instance, the Sarwadharma charter of 1269 AD (Pigeaud 1960, I:101) and the Trailokyapuri charter of the late fifteenth century paying the charges (literally ‘buying’ water) were religious establishments, and the collectors were members of the community from which the religious establishments received their water, these officials appear to have been the successors to the *hulu air* of the ninth and tenth centuries.

None the less, irrigation clearly was a matter of importance to early Javanese state administrations, at least to the extent that much of their tax revenue was derived from the production of rice under irrigation. Encouraging farmers to open wet-rice fields (*sawah*) had the beneficial effect of anchoring the population in place, allowing greater density of settlement, and making subjects easier to count and tax. It also made their harvests both more generous and more predictable. Rulers, in addition, recognized the importance of irrigated rice fields in settling and ‘domesticating’ certain key areas of countryside, where security was important for other reasons.

A number of grants issued during the later ninth and early tenth centuries, both in central and in east Java, were made explicitly in order to encourage conversion of forest and swidden land to wet-rice fields. Grants of this type were made largely on the fringes of settled territories, especially along major road and water connections between the interior and the coast. In central Java, between 872 and 882 AD, a series of at least ten tax grants was made to several temples in the region to the north of Magelang, along the main route to the north coast. In many cases, these grants – made at the behest of local apanage-holders, but given royal sanction – involved dry swidden land (*tgal*) or fallowed swidden land (*sukēt*), which was to be converted to wet-rice fields (Christie 1991:31; Boechari 1986: E5, E6, E7, E9, E10, E15, E18; Machi Suhadi and Soekarto 1986:2.7.1, 2.7.3, 2.7.4, 2.7.6). At the beginning of the tenth century, during a period of expansion and consolidation along the road to the

north, another such grant was issued in respect to forested land on the slopes of mounts Sumbing and Sundoro, for the stated purpose of protecting the high road road (Sarkar 1971:lxx).

During the same period, in east Java, similar grants were issued. The Balin-gawan charter of 891 AD (Sarkar 1971:lvii and lviii) concerns a grant made for the conversion of swidden land to wet rice fields along the route between the Malang uplands and the coast, the stated reason being the need to reduce the danger presented to travellers by the swidden fields along the road. Early in the tenth century a grant was made in the delta region, again concerning forest land to be converted into wet-rice fields, because the forest presented a danger to traders and coastal people (Barrett Jones 1984:181).

However, in none of the cases above did the rulers in central or east Java involve themselves directly in the process of land clearance or water control. They merely provided tax incentives for others to do so.

There are a few recorded cases in east Java of royal association, of a sort, with specific water works. These inscriptions fall into two groups. One group comprises a collection of charters from the uplands and mountains around Malang along with one from the Brantas delta region, which span a period from the early ninth century to the mid fourteenth century. The other group includes two charters from the lowland Brantas-delta and Solo-mouth region, both of which were issued during the reign of Airlangga in the eleventh century.

The upland inscriptions all relate to water temples associated with the mountain sources of certain rivers. The series of three linked inscriptions from Hariñjing (Callenfels 1934) concerns a dam (*mula dawuhan*) and channel (*dharmma kali*), both of which were constructed in 804 AD explicitly for religious reasons. The projects were carried out by a religious figure, in connection with his religious foundation, for which a royal tax grant was made. The ownership of the foundation, its associated water systems and lands, and its tax-free benefice status, were to devolve upon the descendants of this religious personage. Since his water works flooded land belonging to others, he provided land in replacement. The two later Hariñjing inscriptions deal with reconfirmations of the original benefice grant. Similarly, a sacred dam foundation (*sang hyang daw[u]hhan*) at Pamwatan was the focus of the Kētanan I charter of 904-905 AD (Sedyawati 1994:322).

The Air Kali inscription of 928-929 AD (Boechari 1986:95-7) also concerns a royal tax benefice set up to support a religious foundation, this one on the slopes of Mount Kawi to the west of Malang. It was connected with the offering of holy water (literally Śiva water). The Turyyan inscription that was issued a few months later in 929 AD, to the southeast of Malang, concerns the sacred dam of a water temple that was constructed on a small tributary of the upper Brantas River. The Wulig charter of 935 AD (Brandes 1913:xliv), deals with a grant made by a queen, involving the community councils of Wulig

and five other communities, for the upkeep of three dams (*dawuhan*), built on the slopes of Mount Welirang – apparently on the upper reaches of the River Bangsal – at Kahulunan, at Wuatan Wulas and at Wuatan Tamyā. The dams mentioned in the Wulig charter were, like the water works of Hariñjing, connected with a water temple, in this case the Śaivite holy Amrita (Elixir of Life) temple. In all three of these inscriptions of the 920s-930s AD, the primary object of the water control project was religious.

The much later edict of Kusmala (Callenfels 1919) issued in 1350 in the same region, also concerns a Śaivite temple. Like the other mountain temples in the mountains of east Java, this pious construction was modest in size and, like a number of other such temples, it was undertaken by a person other than the ruler, who then approached the ruler to obtain benefice status for the supporting community. The subjects of all of these upland charters were water channels and dams built as part of water temples of the type that was common in the mountains of east Java. None of them relates directly to agricultural irrigation, and none implies direct royal involvement in water management.

Of the two eleventh-century charters from the Brantas delta region, one – the Cane charter issued in 1021 AD (Brandes 1913:lviii) – also relates to a water temple. This temple was already in existence when the ruler Airlangga granted additional tax-relief to the community of Cane. It is interesting to note that the community included pioneering settlements (*babad*).

The other inscription of this group – the benefice charter of Kamalagyan, issued in the delta region by the same king in 1037 AD (Brandes 1913:lx) – concerns the repair of a major dam (*dawuhan*) at Kamalagyan and a related dike (*tambak*) at Waringin Sapta. This document is unique in the surviving corpus of Old Javanese language inscriptions, in that it alone concerns a water control project that involved direct royal action. It is also the only case on record in which the primary purpose of the project was not religious, although the community involved had a connection with a local water temple named the Lake of Dharmma (*ranu ring dharmma*). The circumstances under which the project was carried out appear to have been unusual:

(7) ... The reason [for the the reductions] is that his majesty built the dike at Waringin Sapta on land belonging to residents of the community of Kamalagyan, (8) as an unselfish meritorious act, to improve the well-being of all communities located downstream: Lasun, Paliñjwan, Sijanatyēsan, Pañjiganting, Tālan, Daśapangkah [and] Pangkaja, including the benefices (*sīma*), the *kalang* religious groups, the *kalagyan* religious establishments, the *jumpu* communities, monasteries, religious halls, (9) ancestor temples, spirit sanctuaries [and] hermitages of ascetics, the foremost among those affected being the holy religious foundation at Surapura, called the Abode of Śiva.

These were all of the communities that had suffered from flooding [that washed out their wet-rice field bunds (*carik*), caused by the shift [in the course of] the great river (*bangawan*), [which] had broken through [the dike] at (10) Waringin



Sapta. This caused a shortfall in royal taxes [due to] the disappearance of their banded wet rice fields. Because of the difficulty experienced by the whole [local] populace, who tried repeatedly to [rebuild] the dike against the great river, (11) without meeting with success, his majesty took action by summoning all of the dependent members of the communities with skill in moving earth. His majesty ordered all [of those who were] at his command to undertake, as royal corvée duty, the building of [a replacement] dam.

The dam, now successfully completed (12) by his majesty, stands firm, permanently blocking the flow of the water, deflecting the current of that great river to the north. This has eased the minds of the boat-handlers [and] all heads of groups who carry merchandise from [the port of] Hujung Galuh, including (13) ship captains [and] merchants from other lands, all coming to Hujung Galuh.

The residents of the farming communities were all very happy that the floods covering their [area of] wet-rice fields – both current and planned – had been brought to an end through the meritorious (14) damming of the flow of the great river at Waringin Sapta by the king. That is why his majesty's dam was connected with the dike at Waringin Sapta.

At that time, his majesty was concerned that the dam might not be kept strong, (15) because some people might wish to destroy the meritorious structure, or, at the proper time, those who dwell there might neglect to guard it. Therefore [the edict was sent] to Kamalagyan, including its *kalagyan* religious foundation, designating the households in the vicinity of the dam at Waringin Sapta (16) as a benefice (*sīma*) of his majesty's dam, [established] for the maintenance in good order of the sacred dam. At the same time, royal taxes from Kamalagyan were reduced to 10 suvarṇa in gold ...

(18) ... The dam was built by his majesty in order to bring about prosperity in the world, and the revival of the well-being of all of the sacred religious foundations ... (19) ... The king ... visibly showers the world with the elixir of life (*amṛta*) ...

It is notable in this case that, although the ruler used his royal corvée rights to rebuild the dam, he did so only after the local populace, having failed in their attempt to make repairs, had approached him for aid. Following the rebuilding of the dam, the ruler, worried about provision for the long-term upkeep of the flood-prevention works, placed the dam under the supervision of a local religious establishment, consigning it to the care of designated households in the community closest to the dam, and funding its upkeep through the grant of a religious benefice. The civil engineering construction thus became a religious foundation.

Several points of interest arise from this inscription. The ruler apparently considered the circumstances unusual enough to call for an extended explanation in the text of the charter. The contents of the charter suggest that the ruler's involvement in even major water works was not automatic. Indeed, no reference is made to royal involvement in the building of the original dam. When the dam gave way, causing a regional disaster, the local communities had, in fact, exhausted their own resources before calling upon the king for



aid, suggesting that local solutions to such problems were the norm. However, it is also possible to infer from the text that these communities, although working together in their attempt to remedy the situation, had no local or regional, supra-community institution to organize them. In addition, it appears that, in connection with water works that affected more than one community, there was no institution – at either regional or state level – that could automatically be expected to maintain them. It was for this reason that the care of the dam was placed under the supervision of a religious community, and supported by a religious benefice. The ruler, in fact, presented his work as a religious act.

In sum, the inscriptions from both central and east Java suggest a remarkably low royal profile in respect to the pragmatic aspects of water management. Only one charter in the surviving corpus records direct royal involvement in the construction of a secular water-control project, and this dam was rebuilt in order to maintain the accustomed flow of the river rather than to create new access to water. The dam was subsequently converted into a religious site, joining the list of water temples already patronized by royalty.

#### *Water management in early Bali*

The situation in Bali differed from that in Jawa. By the end of the first millennium AD, intensive landscape alterations of the type associated with rice terracing had begun in the southern Bali (Scarborough et al. 2000:80). Mentions of professional irrigation-tunnel engineers (Old Balinese *undagi pangarung*) appear as early as 896 AD (Bebetin AI.II.b.4); Goris 1954:55). Tunnel excavation developed in response to the very dissected nature of the Balinese landscape, in which surface water was often located in ravines at some depth below the level of the adjacent fields. Tunnels allowed the Balinese to tap upstream sources, route the water through the ridges flanking the ravines, and use this water to irrigate slightly lower slopes on the other side. Successful tunnel excavation requires engineering expertise. The Old Balinese-language Bebetin AI inscription treats the tunnel engineer in the same manner as other high-level professional artisans – such as boat builders and stonemasons – who made a living by selling their services. It thus appears that not only were irrigation tunnels already being excavated by the late ninth century, but that there was enough such work available to support a class of professional specialists. Yet this Balinese professional class appears to have been linked neither to the courts nor to the community administrations.

The early Balinese royal courts do appear to have had a hand in some aspects of water management. The Manukaya charter, issued in 962 AD (Goris 1954: no. 205), refers to a royal order to repair a dam that had been damaged by floods. Although the primary purpose of the dam may have been to enclose a sacred bathing place, the present dam at this spot provides irrigation for over

200 hectares of wet-rice fields (Schoenfelder 2000:43). Charters of the eleventh century indicate that the palace did have it within its gift to grant those communities supporting religious foundations certain releases from customary law restrictions, including privileged access to water as in the Tengkulak A charter, issued in 1023 AD (Ardika and Beratha 1998:95):

(VI.a.3) ... The community council is permitted to extend [without fine] the main irrigation channels (*kali*) within their community territory, (4) across all sorts of land, to take water [from a shared source?] in order to fill their channels and weir (*dawuhan*), and to relocate channels supplying rice-fields ...

A few charters mention grants of tax relief upon the extension of community irrigation infrastructure in order to expand wet-rice production, but in these cases the tax involved was a tax on harvested rice rather than one levied directly upon the water or irrigation infrastructure. There is no evidence of the involvement, at this early period, of any class of official equivalent to the later *sedahan* (labour-mobilizing officials), noted in late pre-colonial documents by Schulte Nordholt (1996:58), who appear to have coordinated water allocation and collected *sawah* tax in some areas.

There appear also to have been no major irrigation taxes levied by the early Balinese courts. Two minor levies do appear very occasionally in inscriptions of the eleventh century and later in relation to water: the *pa-er* and the *rotting bañu*. The *pa-er* (water) tax, mentioned in the Banjar Sangguhan A charter of 1072 AD in connection with irrigated rice land in Bañu Rara that was linked to the *kasuwakan* (*subak* grouping; see below) of Rawas (Callenfels 1926:60), appears in connection with a number of other minor taxes levied upon such local enterprises as the snaring of animals. This tax is also mentioned in the Tengkulak A inscription of 1023 AD and the Klungkung A inscription of 1072 AD (Ardika 1994:26). The tax was too minor to provide evidence for any substantial interest of the court in irrigation.

The *rotting bañu* (water purchase compensation) provides even less evidence for major royal involvement in irrigation management. The contents of the Dawan charter of 1053 AD (Ardika and Beratha 1998:134-5) suggest that it was a private payment

(I.b.4) ... It was ordered by the king (*paduka raja*) that wet-rice fields (*sawah*) should be created from land that had formerly been forest in Tabaran. The measurement of the *sawah* to be created (5) was 2 *tembuku*, 74 *galěng*, 12 *pangdingding*, carrying an established royal corvée duty of 62 units in rotation, ... (6) the total [water depth?] being 8 *kilan* (span). This was bought/paid for by the king on behalf of the god *bhātara punta hyang Sinanghala*, to provide paraphernalia for Śaivite ritual, as an indication of the king's devotion. The *sawah* land was to be entrusted to the care of the community council, to be farmed on an annual basis. Each person who farms the *sawah* of the god must make (II.a.1) an annual water-payment (*rotting bañu*) to the representative of the god ...

The water payment made here appears to have been, not a royal tax, but a tenant's payment to a landlord who owned the land through right of purchase. An interesting aspect of this passage is the manner in which the wet-rice fields to be created were measured. The term *tembuku* (Modern Balinese *temuku*) refers to a dividing block for irrigation channels (see Geertz 1980:70); a *galëng* is an irrigation channel wall or dike; and a *pangdingding* is a lift-lock. While the Javanese of the eleventh century were measuring *sawah* land by square measure of area, the Balinese were already calculating the size of *sawah* in terms of the irrigation network and its water capacity.

Similar measurements appear in other inscriptions, most notably in an incomplete Balinese inscription, probably dating to the late-eleventh or twelfth century, that is deposited in the Museum Mpu Tantular in Surabaya (Machi Suhadi and Richadiana Kartakusuma 1996:12-3). This middle plate of a longer inscription bears part of a list of named areas of *sawah* and their measurements:

(XI/7.a.1) [2] *galëng*; in Sisihaji their labour duty (*butajinya*) [is] 11 *galëng* (irrigation channel [units?]) for 4 irrigation channels with lift-locks (*pangdingdingnya* 4 *galëng*); in Tupi their labour-duty [is] 7 *galëng* for [1] irrigation channel with lift-locks; in Manambihan their labour-duty [is] 10 *galëng* for 2 irrigation channels with lift-locks; (2) in Tngulan their labour-duty [is] 6 *galëng* for 2 irrigation channels with lift-locks; in Pindim their labour-duty [is] 6 *galëng* for 2 irrigation channels with lift-locks; in Tiri their labour-duty [is] 4 *galëng* for [1] irrigation channels with lift-locks of the (3) *sungthadi balusangan* type, with 4 *tambuku* (irrigation channel dividing blocks); *subak* in [...]ya: their labour-duty [is] 8 *galëng* for [1] irrigation channel dike with lift-locks; in Rapuhbis their labour-duty [is] 4 *galëng* for [1] irrigation channel with lift-locks; (4) in Tapabe their labour-duty is [4] *galëng* for [1] irrigation channel with lift-locks; the *subak ligundi* in Kung: their labour-duty [is] 2 *galëng* for [1] fenced irrigation channel (*?teda pangdingdingnya*) with lift-locks of the *sungthadi pada kundangan* type, with irrigation channel dividing block ...

Further types of irrigation channels with lift locks listed in this inscription include: *sungthadi manabe*, *sungthadi [bu]luhan* (upstream) *tngah air tambuku*, *jibuluh*, *sungthadi saman air tambuku*, *sungthadi er tambuku*, *sungthadi balubungan*, *sungthadi maranda tambuku*, *sungthadi sada subak*. The list suggests a complex technology involving a variety of named types of water channels, lift-locks and dividing blocks, attuned to a carefully engineered landscape. This charter fragment also makes it clear that *subak* groupings played a role in the irrigation network.

The earliest surviving mentions of irrigation societies (*subak/suwak*), and of *subak* groupings (*kasubakan/kasuwakan*), in Balinese inscriptions appear in the eleventh century. By this time population build-up seems to have precipitated a restructuring both of the physical and of social landscape. The spatial distribution of Balinese irrigation tunnels – which by their nature cross community boundaries – made it impossible for irrigation to be handled at a purely com-

munity level, as seems normally to have been the case in Java. Balinese charters, written either in Old Balinese or in Old Javanese, make no mention of a recognizable community-level official equivalent to the Javanese *hulu air*, or later *hulu bañu*. Instead, by 1022 AD, when the Old-Javanese language Baturan inscription (Goris 1954, I:15-6, II:167-73, 200, no. 352; Soekarto 1986:60) was issued in Bali, an official called *makaser* (Modern Balinese *pakmek*), had begun to appear in connection with the distribution of water:

(V.b.4) ... In addition, (5) the community council of Baturan follows the *makaser* of Air Gajah (modern Goa Gajah), receiving from Pujung Ngaji [water] to a measure of 2 *kilan* (about 40 cm), [with] 10 *kilan* going to Air Gajah, [and] 8 *kilan* going to the *makaser* ...

In this case, it appears that the whole of the community of Baturan was linked to water distribution from Pujung Ngaji, under the direction of an official at Air Gajah.

Later in the same century the court was called upon to settle a dispute, recorded in the Er Rara inscription of 1072 AD (Soekarto 1986:34-5), over the distribution of water:

(I.a.1) ... That was the time of the handing down of the instruction of the youngest son of both the Goddess enshrined at Burwan (2) and the God enshrined at Bañuwka, to measure the wet-ricefields (*huma*) in Kadandan [and?] in Er Rara, in the *kasuwakan* of Rawas. The wet-rice fields were to be remeasured upstream, as of old, so that the measurement will stand (3) permanently. [The remeasured fields were]: in Tal, upstream from Pakudungan; in Poh Raya, upstream from Rapuh; in Tampuyak, upstream from Kaleburan, from Hanunang, [and] from Sabo; in Purut Tung, upstream from Rñu(4)nten; in Siring, upstream from Timbul, from Kurtu [and] from Poh; in Bunut, upstream from Jumpari; in Srihijit, upstream from Punaga; in Parlak, upstream from Burit Tabar; (5) in Parukpuk, upstream from Baru, from Calagi, from Dahyang [and] from Yanaker; in Kling, upstream from Suka Talun [and] from Sitem; in Tasik Tama, upstream from Tingkir; in Nali(6)nti, upstream from Er Bidik; in Kacancang, upstream from Er Kupa; in Juhet, upstream from Dawa; in Jeruk, upstream from Timbul Di(I.b.1)kit; in Galumpang upstream from Galagah; in Poh Dikit, upstream from Ligundi; in Titils, upstream from Samuraga; in Er Těngah upstream from Brigidi. (2) This was the whole number of upstream wet-rice fields in the *kasubakan* of Rawuas.

Fields in at least 27 named hamlets, belonging to 18 different communities, are listed in connection with the *kasuwakan* of Rawas. This *kasuwakan* or *ka-subakan* appears to have been large by comparison to modern Balinese *subak* groupings. Since the modern society includes in its membership all farmers sharing a single water source for irrigation, it crosses community boundaries. The same appears to have been the case in the past.

The charter of Udayapatya, issued in 1181 AD (Soekarto 1986:41-2) refers to 19 separate *kasuwakan* connected with the community:

(III.b.2) ... Not to be subject to [tax?] are the wet-rice fields (*sawah*) in the farming community (*thani*) of Udanapatya: in the *kasuwakan* [of] (3) Padang Aruna, in the *kasuwakan* of Dadap, in the *kasuwakan* of Den Rumah, in the *kasuwakan* of Parumahan, in the *kasuwakan* of Padang(4)ni, in the *kasuwakan* of Teger, in the *kasuwakan* of Air Batu, in the *kasuwakan* of Padang, in the *kasuwakan* of Kampinis, in the *kasuwakan* of Lod (5) Rumah; in the *kasuwakan* of Sak, in the *kasuwakan* of Burwan, in the *kasuwakan* of Pande, in the *kasuwakan* of Sawan, in the *kasuwakan* of Paryya(6)da, in the *kasuwakan* of Ankarpi, in the *kasuwakan* of Tatlu[.], in the *kasuwakan* of Air Malet, in the *kasuwakan* of Dapet. These are the wet-rice fields (IV. a.1) belonging to the council of Udanapatya, in their community territory. At that time the boundaries of the community were established: to the east the ravine (2) of Air Manis; to the south, Kala [...] connected with the community of Alang Batu; to the west, Ra(3)ningan, connected with the community of Sakaran; to the north, Buyung Hyang [and?] Tambang, connected with the community of Kdisan ...

Soekarto locates these *kasuwakan* names across the region stretching from Batur lake in the north to Gianyar in the south. The *kasuwakan* names differ from the communities named in the same document, and it remains unclear just how these *kasuwakan* groupings interlocked with the named communities. However, the number of *kasuwakan* involved suggests a local irrigation network of considerable complexity and more than one water source, used by a community spread over a somewhat awkward landscape.

The early use of the term *makaser* (chief) to designate the *subak* official in charge of allocating water – as in the Baturan charter of 1022 AD (Goris 1954:352.5b5) – rather than the term *klihan*, as at present, might suggest that the holder of the office had rather more power in the past. Otherwise, from the fragmentary evidence available, it appears that the eleventh-century Balinese *kasuwakan*, or *suwak* group, functioned in a manner similar to the modern *subak*. In addition, a strong link between religion and water, still central to Balinese watermanagement administration, is evident from the Balinese inscriptions. The *air haji*, a religious official known from Javanese inscriptions, appears in Bali, but only in Old-Javanese language inscriptions issued after 993 AD. From the contents of these charters, this figure appears to have been a Śaivite priest, as was apparently the *nayaka air* (water chief), who is mentioned at least once in Balinese charters, in Bangli Pura Kehen B, of the early eleventh century (Goris 1954:356.9). The mention made in the Trunyan A1 inscription, issued in 891 AD (Goris 1954:57), of an official called *ser danau*, apparently associated with the holy lake Batur, suggests that the hierarchy of water temples, to which modern *subak* societies are connected (Lansing 1991), may have begun to form as soon as the irrigation networks were established.

The modern Balinese *subak* tradition thus appears to have a historical depth of nearly a millennium. As noted above, it was first mentioned in inscrip-

tions of the eleventh century, apparently during a period of rapid population growth, which put pressure on the more easily accessible water sources. This forced communities into greater levels of cooperation, not only in creating and maintaining irrigation systems, but also in regulating the distribution of water (Schoenfelder 2000:41). The main difference between the situations in early Java and early Bali was the fact that the Balinese needed a supra-village institution to coordinate water sharing. The states appear not to have taken on this role. Instead, the Balinese invented the *subak*.

### Conclusion

In neither early Balinese kingdoms nor those of early Java was the state centrally involved in irrigation. The driving factors for the development of irrigation systems appear, both in Java and in Bali, to have come from below rather than from above. In central Java and the uplands of east Java – with relatively under populated landscapes, gentle inclines and easily accessible surface water – farmers were never placed in the position of needing to create institutions to coordinate inter-community irrigation systems. The water used for irrigation by early farmers in these areas appears to have been sourced within areas controlled by their communities. Even in the delta region of east Java, communities seem not to have formed institutions outside of themselves to handle water control. There were never, pace Van Setten van der Meer (1979:42), any *subak* societies formed in early Java (Christie 1992).

However, the link between water and religion is a persistent thread that runs through Javanese and Balinese inscriptions – a link that is particularly noticeable in connection with engineered water works that needed long-term maintenance. The palaces of both islands appear to have linked themselves to water through their connection with the gods and ancestor spirits of the mountains that were the sources both of water and of fertility. But the practical organization of agricultural irrigation was handled, on both islands, at a lower level. It is at this level of pragmatic organization of water management that the differences in the practices of the two islands are clearly evident by the ninth century – differences which become more apparent as population growth and the demands of trade began to place increasing pressure upon the island landscapes by the eleventh century. These differences are still visible today.

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FRANZ VON BENDA-BECKMANN

## **Contestations over a life-giving force Water rights and conflicts, with special reference to Indonesia**

### *Introduction*

Water is a life-giving force. It is vital as drinking water, for growing food, for a healthy environment, and for energy and industrial production. Water is essential for life. To deny people water is to sentence them to certain death. And there is no substitute for water. As an essential requirement for life, it is similar to air. But unlike air, it is far more restricted in space and time. This makes it a unique resource. Because of its importance, water, especially under conditions of scarcity, becomes the subject of legal regulations under which the appropriation, use, and control of water are structured and legitimated. In most contemporary post-colonial states, various legal regulations, based on and legitimated by state legislation, coexist with religious laws or traditional local laws, a condition frequently summarized as 'legal pluralism' (Griffiths 1986; F. von Benda-Beckmann 1997). Since water courses often cross national borders, regulations are also included in international law and treaties. Given its life-giving force, it has recently even been suggested that a collective right to water should be brought under human rights mechanisms.<sup>1</sup> For the same reason, water and rights to water are often contested and trigger conflicts. Some of these conflicts are temporary, merely concerned with having sufficient water for irrigating a rice field at the right time; once the situation has passed, it is too late to change things. Other conflicts are seasonal, as are many water needs, and subside when water no longer is needed. But many conflicts are structural, and concern the distribution of water in both the present and the future. Since law, and rights to water defined in law, are a crucial legitimation of claims to water, water rights are an important resource in economic and political struggles over water. Under conditions of legal pluralism,

<sup>1</sup> The human right to water is generally derived from the human right to life, including food, drinking water, health, clean environment (see, for example, McCaffrey 1997; see also Baehr and Van der Wal 1990). It remains disputed whether such a right would be considered an individual or a collective human right, see Donnelly 1990 and Burgers 1990.

conflicts over water are often played out as conflicts between different legal orders, between the law of the state and local (traditional, customary) legal forms.<sup>2</sup>

In this article I discuss some of the characteristic properties of water rights and of conflicts over water and over water rights. I start with a little story about a water conflict in West Sumatra. This story is used later to illustrate some of the complexities of conflicts over water and water rights, in Indonesia and elsewhere.

### *The spring of Sungai Tenang*

In the middle of the nineteenth century, Fort de Kock became the most important military and administrative post of the Dutch East Indies colonial government in the recently conquered Padang highlands in Minangkabau, West Sumatra. The increasing demand for clean drinking water for Dutch civil servants and for the soldiers stationed at Fort de Kock was satisfied by constructing pipelines from the village of Sungai Tenang located on the slopes of Gunung Singgalang, one of the three volcanoes dominating the Padang highlands. Before 1875, the water had mainly been used in Sungai Tenang but had also been shared with the other villages in *laras* Banuampu, a federation of villages, but not with the people of Kurai, the neighbouring *laras* where Fort de Kock was. The Dutch request to construct pipelines to Fort de Kock had met with resistance. A local adat leader wanted to use the water for expanding the area of wet-rice cultivation. After the Dutch had suppressed the local protest – the adat leader was allegedly poisoned – the pipelines were built. But it was not until 1906 that the water connection really started. After Indonesia's independence, the city, now named Bukit Tinggi, grew and its demand for water increased. New pipelines were constructed. Now, there are altogether six pipelines. A regional parastatal company, a PDAM, Perusahaan Daerah Air Minum, in Bukit Tinggi manages the distribution of the water.

The people of Sungai Tenang never received any compensation for their water. They had complained about this for a long time. For them, the water was and always had been part of their *ulayat*, their village territory. According to Minangkabau (adat) law these resources were under the control of the village government. Outsiders could get access and use rights to *ulayat* resources, but had to acknowledge the right of the village and had to give a share of the profits to the holders of the right, in colonial times usually 10%. But it was not easy to enforce these claims. Especially under the Suharto regime, the rural population had learnt, often the hard way, that openly questioning or even contradicting the government's interpretation of the legal order was a dangerous affair. And the government regarded these resources as state resources

<sup>2</sup> See Boelens and Dávila 1998; Bruns and Meinzen-Dick 2000; R. Pradhan, F. von Benda-Beckmann and K. von Benda-Beckmann 2000.

under the constitution and the Basic Agrarian Law of 1960.<sup>3</sup> So whatever the people of Sungai Tenang and the surrounding villages thought of the exploitation of their water by the drinking water company, they kept quiet about it.

This changed after the fall of the Suharto regime in 1998. The new *orde reformasi* had led to more political freedom. Moreover, the government was planning a policy of decentralization, which in West Sumatra was to lead to a renewed strengthening of adat-based forms of village organization and resource rights (see F. and K. von Benda-Beckmann 2001a,b). In this new spirit, the people of Sungai Tenang in 1998 started to discuss how they could assert their rights over water and get a share of the PDAM profits. They tried to enter negotiations with the PDAM and the mayor of Bukit Tinggi. The latter refused. So in 2000 they decided to cut off the water. This had been decided in a series of mass meetings in which young and old had participated, and in which some prominent sons of the village, among them a doctor and lecturer at the university, had taken an active role. They had carefully prepared the move for some time, announcing several times in the local newspaper that they would cut off the water supply if their demands were not met. When the water was indeed cut off, the police came to Sungai Tenang. But there was a demonstration going on. About 1,500 young men, from all over Banuampu, prevented the police from entering the village. When the PDAM realized that the mobilization of these state forces would not succeed, it was ready to negotiate. The eventual outcome was that Sungai Tenang would receive 6% of the PDAM's profits from water sales. This was accepted and one payment has already been made. Discussions continue over a further one percent, which had been agreed upon in principle, but it was unclear whether it would be paid by the city or the PDAM. These payments were still being made when my wife and I visited Sungai Tenang in early 2005. This little story tells a lot about the nature of water rights and of conflicts over water.

### *Legal and political pluralism*

Let me start with the obvious. The conflict over water in Sungai Tenang is a classical case of legal pluralism in action. The people of Sungai Tenang challenged the rights held by the state, and the rights derived from concessions or licenses given by the government to the PDAM. They mobilized adat, or adat law, as an alternative source of legitimacy for claims over water. And they mobilized local manpower to enforce this claim. In West Sumatra, and in Indonesia in general, such a case is not an isolated one; they have become quite frequent in recent times, although their outcome varies.<sup>4</sup> For instance,

<sup>3</sup> Like most post-colonial states, the Republic of Indonesia had more or less taken over the rights to so-called wastelands (*woeste gronden*) under the Domain Declaration of 1870. See F. von Benda-Beckmann 1979; Hardiyanto 1997; Fitzpatrick 1999.

<sup>4</sup> F. and K. von Benda-Beckmann 2001a,b; Li 2000; Acciaioli 2001.

not far from Sungai Tenang, between Gunung Singgalang and the coast, lies Lake Maninjau, a big crater lake. At the flow-out point, there is a hydroelectric plant of the State Electricity Company PLN (*Perusahaan Listrik Negara*). Here also, villages have started to claim a share in the profit of the electricity company, basing their claims on village rights to the lake as their *ulayat*. Similar negotiations are taking place between the PLN and the villages bordering Lake Singkarak, where another hydroelectric plant is located. This struggle has not yet been concluded. Similar contests, sometimes taking the form of violent conflict, sometimes of negotiations or court proceedings, also occur with respect to land, forest areas, and plantations, and the land on which the cement factory close to Padang is located and the resources used by it (see F. and K. von Benda-Beckmann 2001b; Sakai 2003). The West Sumatran newspapers are full of reports of such incidents.

#### *Multifunctionality, scarcity and conflict*

The Sungai Tenang case also points to the multifunctionality of water. Water can be used for many different things. While the Sungai Tenang village wanted to use the water for expanding the irrigated area, the city wanted it as drinking water. Here, only two different uses or functions came into conflict. But the range of uses of water is much wider.<sup>5</sup> It can be used as drinking water, as a means of subsistence or for commercial agriculture, for generating energy through hydropower, as a strategic resource for military purposes, for transportation, for trade, and last (and often least) as 'nature'. Lakesides can be used for fishing and tourist development (see Simbolon 1998). Moreover, water can be, and often is, a political resource, a 'strategic political commodity' (Derman 1998:75). Granting or withholding access to water can be used for creating or maintaining political dependence. Many conflicts, like the one in Sungai Tenang, are not only about the rights to water as such, but mainly about which use a given water resource should have.

The multifunctionality of water is also related to scarcity. Water scarcity is relative. Indonesia, like most areas of Southeast Asia, is blessed in most of its regions with abundant fresh water. In terms of absolute numbers, the availability of water still easily meets present needs. But such averages do not tell us much, because the actual accessibility and distribution of water is always mediated by hydro-geographical and climatic conditions as well as popula-

<sup>5</sup> See F. von Benda-Beckmann, K. von Benda-Beckmann and Spiertz 1997. Falkenmark (1997:26) distinguishes four major functions, a health function, a habitat function, a carrier function, and a production function. Concerning the production function, he distinguishes 1. biomass production, operated by a flow of 'green' water, entering through the roots and leaving through the foliage; and 2. societal production in households and industry, based on "blue" water, withdrawn while passing through the landscape and delivered to cities and industries through water supply systems,

tion density.<sup>6</sup> Within hydro-ecological regions, political, economic and social organization lead to differential possibilities to access and use water, varying with rank, class, age and gender (Johnston and Donahue 1998:2). And even where water is not scarce in terms of hydrological availability, it can be made scarce because of political organization and decisions.

But overexploitation of water through new extraction technologies, the intensification of agriculture, and new consumptive demands of an ever-growing population and consumption standards have led to severe scarcity. Under conditions of (absolute and relative) scarcity, conflicts over water with the same function, for instance irrigation, tend to increase. The intensification of irrigated agriculture has decreased the availability of water for downstream users of irrigation water. In 1999, upon returning to Candung Kota Lawas, the West Sumatran village where my wife and I did research in the mid-1970s, we observed such a change. The house we had lived in then had been right in the middle of wet-rice fields, with one regular and another occasional rice season. In recent years, there has not been sufficient water for even one rice harvest. In the major cities, the distribution of drinking water is dramatically uneven between the richer inhabitants, business areas and hotels, and the poorer people living in *kampung* or squatter settlements. There are similar problems in the coastal and pelagic waters with which Indonesia is blessed, which are the habitat of important marine resources. But fishing efforts have increased, stocks decreased, and local artisanal fishers have to compete with commercial and industrial fishing enterprises, national and foreign, legal and illegal. Moreover, water is increasingly polluted (see Osseweijer, this volume; Pannell and F. von Benda-Beckmann 1998). Conflicts over the functions of water have also increased. In West Sumatra, for instance, hydropower projects compete with irrigation needs. The level of the two lakes Singkarak and Maninjau has gone down dramatically, at the same time affecting water supply for irrigation, fishing, and the production of electricity at the same time. Such conflicts are also common in other parts of Indonesia and Asia.<sup>7</sup>

So, even in water-rich Indonesia, water scarcity (or relative scarcity) increasingly leads to conflicts in the context of an ever more complex constellation of actors interested in controlling and using water. Conflicts need not be only between local political organizations and their law and the state and state regulation, or between public organizations and private economic interests. Clashes can also occur within the state apparatus. Given the multi-functional uses of water, public works, irrigation departments, the ministry of agriculture, of forestry, of fisheries, or tourism and the environment, may

<sup>6</sup> See Saeijs and Van Berkel 1997 and Falkenmark 1997 on the scarcity of fresh water on a global scale. See also Postel 1992; Gleick 1993; Johnston and Donahue 1998.

<sup>7</sup> See Syed Zahir Sadeque 2000 on rural Bangladesh; see Kurnia, Avianto and Bruns 2000 for West Java, Wiber 1991 for the Philippines.



have very different ideas about the uses of water (see Simbolon 1998 on Lake Toba). Moreover, political and economic interests at the central level and at the regional level of the state organization may vary considerably and lead to conflict. This plays an increasingly important role in the current process of decentralization, where there is a tug of war between the political centre, which does not want to lose control over natural resources, and the districts and villages, which argue that this control should be decentralized.

### *Water rights*

This leads to a closer examination of the complexities of water rights stemming from the physical properties of water, its fluidity, and its multifunctional potential. Because of its fluidity, the same source of water is generally used by more than one user. The multifunctionality and the fluidity of the resource require that rights be defined relationally, in relation to other rights, uses in relation to other uses and in relation to other users (see Hammoudi 1984; F. and K. von Benda-Beckmann 2000; Roth, Boelens and Zwartveen 2005). And because of its fluidity, water rights cannot be 'fixed' in time and space as easily as, for instance, rights to land. Moreover, water is always on, under, or adjacent to land. It is frequently captured and stored in artificial structures, material artefacts such as ponds, tanks, wells, or behind dams, and is transported and delivered through pipelines or canals. This raises the question how the different aspects of legitimate control and use of water in relation to land and to material artefacts are expressed and allocated. Generally speaking, water rights rarely isolate water as an object of rights as distinct from rights to the land or the physical structures through which it flows (F. von Benda-Beckmann et al. 1997:224). In the case of springs, groundwater, and water in wells, rights to water are usually directly linked to rights to the surrounding land.<sup>8</sup> This is also quite typical for adat systems in Indonesia.<sup>9</sup> Land and water are seen as more or less one object of property rights, although the exclusive character of water rights is often softened by relational legal, moral and religious principles that oblige holders of water rights to use only as much as they need and to share with those in real need. The geographical scope of such relations, however, is usually bounded. This is less a matter of hydrological boundaries than of socio-political ones. In the Sungai Tenang case, for instance, the water on the *ulayat* of Sungai Tenang was also shared with the other villages of their *laras* Banuampu, but not with neighbouring Kurai.

<sup>8</sup> Such land may be private land, the land of descent groups, clans or villages, see Ambler 1989.

<sup>9</sup> This is government law in most states that have been influenced by English common law. See Ambler 1989; Willinck 1909 for Minangkabau; see the *Pandecten van het Adatrecht* 1914, see Van Vollenhoven's (1918) descriptions of adat laws in Indonesia.

With regard to flowing water, many legal systems, including traditional laws, usually recognize so-called riparian rights, rights of landowners to take water from the water courses bordering their lands. When water courses have been altered and improved through artificial physical structures, for instance the construction of an irrigation system, the labour investment is seen as creating rights to the water. For Minangkabau, Ambler (1989) has given a detailed description of Minangkabau adat concerning irrigation systems, dealing with the headworks, distribution weirs, and canals. The general principle is that those who have built a headwork of an irrigation system are the owners of that physical structure. This is the Lockean idea of the emergence and legitimation of private rights out of what is common to all. Those who have first used water in this way have prior rights; newcomers to the system will have to negotiate access to water. It is, however, not so much the actual labour which counts, but the control over labour. Many irrigation systems that are romantically labelled 'farmer built and managed' were created by landlords with the labour of slaves or bonded labourers (see R. Pradhan et al. 2000). But it is not only labour; capital investment is also important. This becomes more important the more sophisticated and costly the water delivery technology is. Control over technology and capital thus can become more important than the actual labour input, and often leads to conditions whereby those who control and command technology and capital also command labour and acquire priority rights to water. These ideas probably also colour the attitude of donor agencies towards the irrigation systems they help to create or rehabilitate. The money invested (although it may simply be donor money and thus actually raise the debt of the receiving country) gives a sense of ownership and the right to dictate how control and use rights to water should be distributed.

The advances of water-related technology have led to new types of conflict and raised new legal problems. One dramatic development has been the advance in the construction of large dams, leading to the displacement of large populations and dramatic changes in the environment, greatly changing the agro-ecological landscape and the economic life chances of the population depending on water. This has led to local, national and world-wide protests. In Indonesia, perhaps the most well-known case is Kedungombo, where the construction of a large dam required the use of approximately 6,127 hectares of land inhabited by about 60,000 families.<sup>10</sup> Another major development has been the technological advance in borehole drilling. This has affected underground water tables significantly, often over quite considerable geographical distances.<sup>11</sup> Through the legal fusion of ownership rights to pieces of the

<sup>10</sup> See Aditjondro 1998; Fitzpatrick 1999. See Simbolon 1998 on the Asahan project in North Sumatra. See also Editorial 1999; Shiva 1999.

<sup>11</sup> Even in states like Bangladesh, which historically have suffered from floods and water abundance, the increased capacity of pumps and the increasing extraction of groundwater has led to shallow water tables and to water scarcity (Syed Zahir Sadeque 2000: 275 ff.).

earth's surface and to the water below it, or at least the water collected in tube or bore wells, the social and economic significance of groundwater has dramatically increased and led to an increasing commodification of and trade in water (see Rosegrant and Binswanger 1994).

The notion that water is something whose use is not, and cannot be, exclusive to individual control and appropriation but rather is a common-pool resource therefore is quite prominent. Water, more readily than land, is perceived and legally treated as a common good over which socio-political organizations such as the state or village claim the right to regulate and distribute it. So while there usually is a close connection between water rights and land rights, water rights have a different character. The rights to appropriate water are tied to land rights, but the actual specification or 'fixing' of water rights in terms of volume or time share is dissociated from the land through processes of socio-political decision-making about water as an object of communal rights and processes of allocation. Individual rights thus remain contingent on socio-political decision-making processes. These rights therefore rarely reach the level of economic power encapsulated in ownership type of rights (see Zwarteveen 1997:1339; F. and K. von Benda-Beckmann 2000). The right to the water which has been appropriated, on the other hand, is very similar to a normal private property right.

Given the political and economic value of water, controlling water is an important element in socio-political organization. State intervention through the creation, control, and often management of technical infrastructures such as dams and irrigation systems, and through the establishment of powerful water bureaucracies, are important ways in which state structures are consolidated.<sup>12</sup> In Indonesia, we can see quite different historical developments in different regions, largely conditioned by hydro-geographic and economic characteristics. On Java, for instance, colonial irrigation development took off at a much earlier date. It was introduced in areas for rice and sugar cultivation under the Cultivation System, or *cultuurstelsel*, largely located in relatively flat lands with larger streams.<sup>13</sup> State intervention in West Sumatra was later, and much less intense. Here the Cultivation System was used for coffee production, and rice cultivation took place under conditions of a hilly topography, a wealth of small streams, and adequate rainfall, which had fostered the

<sup>12</sup> Forest control and management has been perceived as an important element in processes of state formation, indicating the state's 'outreach'. Control and regulation of inland water resources seems to be more important for the consolidation of state power in the territory, although there are many examples in which the development of water management and irrigation in frontier zones also considerably aids the increasing outreach of the state; Nepal's colonization and development of the Terai in the Gangetic plains is a good example (K. von Benda-Beckmann et al. 1997).

<sup>13</sup> See Ravesteijn 1997. See also Christie, and Wolters, both in this volume. Hartveld 1996: 77 describes how in 1905 two large irrigation projects in the upper Brantas watershed were constructed for the concession area of sugar mills.

development of a large number of small, gravity-flow and farmer-managed irrigation systems (Ambler 1989:35). Control over labour and production was much more important than control over land and water (see Ambler 1989), and the Dutch largely kept rice production on a subsistence level. While in Java detailed land records to support taxation assessments were established, in West Sumatra state taxation was based on production quotes for coffee and later on a head tax (Ambler 1989:323). This was similar on Ambon: with its cultivation of cloves before, during, and after the Cultivation System, inland water problems were even less important.

Political and economic control is even more clearly evident in relation to coastal waters and the open seas, economically important as habitat for a number of marine resources, such as fish, sea cucumbers, and shrimps. Moreover, there are economically important underwater resources, for instance gas, oil, and minerals. Here again, the multifunctionality of water creates difficulties. The question arises how the rights to access, enter, or traverse the water territory interconnect with rights to exploit the habitat for marine resources, and underwater resources. Coastal and pelagic waters are also the territory of political organization, communities, or nation-states.<sup>14</sup> Rights concerning this territory nearly inevitably become an aspect of sovereignty rights and claims (see Byers 1991; Cullen 1997). These problems are regulated by the international law of the seas, concerned with the regulation of the territorial boundaries of states, the creation of economic interest zones, and access to underwater resources and fishing, and other rights in the global commons (Vogler 1992; Brans et al. 1997). But besides state and international law, adat may also play a role. For in adat, the territory of villages extends into the sea and to fishing grounds close to shore.<sup>15</sup> This means that adat rights with respect to management and use of coastal and marine resources, the uses of coral stone, sand, and fishing rights, also play a role. The best-known example of such management is probably the Moluccan institution of *sasi laut*. *Sasi* refers to an originally adat-based periodic harvest prohibition on terrestrial or marine resources that had been incorporated into colonial Dutch regulations on village government. In the 1990s, it was revitalized as a 'traditional' institution and discovered as a potentially useful traditional environmental regulation by environmentalist NGOs as well as by the Ministry of Environmental Affairs.<sup>16</sup>

Potential problems and the potential for conflicts over water increase with the spatial extension of water resources. Depending on the length of the watercourse, a stream, an irrigation system, a river, a lake, water is a trans-

<sup>14</sup> See Osseweijer, this volume; Pannell 1997b; Peterson and Rigsby 1998.

<sup>15</sup> Ohorella 1984; Pannell 1997b; Peterson and Rigsby 1998.

<sup>16</sup> See the description of Ambonese land and water law by Ohorella 1994. For critical analyses of the 'reinvented' character of *sasi* see Zerner 1994; Pannell 1997a; Soselisa 2001. See also F. and K. von Benda-Beckmann and Brouwer 1995.

boundary resource that flows through many communities and even nation-states.<sup>17</sup> This necessitates agreements, rules, principles, and negotiations between the different riparian communities or even states, by communities, state governments, and in the arena of international law making.<sup>18</sup> These discussions and rule-making activities mainly relate to international rivers and river basin management between states, but they also feed into discussions of underground aquifers (McCaffrey 1997; Neda 1998:63).<sup>19</sup> Problems often lead to water wars (Brans et al. 1997).

### *Political and legal pluralism*

This leads back to Sungai Tenang and political and legal pluralism. I have mentioned that rights to control, own, and allocate water and other natural resources are usually interwoven with political organization and define who has the right of socio-political control over water, who has the right to allocate water over different uses and users, and who has the right to use water. They also define obligations of the different holders of water rights. This goes for local communities as well as for nation-states. Final control over a state's water resources is one element of the internal sovereignty of states.<sup>20</sup> In Indonesia, the right of the state to control and regulate the allocation, use, maintenance, and provision of water is firmly embedded in the constitution, the Agrarian Basic Law of 1960, and the Water Laws of 1974, and Government Regulation 22

<sup>17</sup> Moreover, this is not confined to the actual watercourse but increasingly applies to for the river basin or catchment area.

<sup>18</sup> International legal principles are elaborated by the International Law Association – an NGO which formulated the Helsinki Rules in 1996, the International Law Commission, a UN Commission, and the Committees of the General Assembly of the UN (see ILA 1996; Neda 1998:41; Kroes 1997; McCaffrey 1997).

<sup>19</sup> 'While the international community, as well as individual states, has an obligation to come to the assistance of those deprived individuals, it does not appear that as a practical matter human rights law presently offers much hope to the vast majority of those in grave need of access to potable water and adequate sanitation services' (McCaffrey 1997:55). These principles do not formally refer to underground aquifers that do not have a surface water component. There is, however, a growing awareness that similar principles should apply to underground waters in shared aquifers (Neda 1998:63, note 27).

<sup>20</sup> Where states are strong (in the civil law tradition), water may be declared a public good to be wholly administered by the state, and water rights be distributed by public allocation or via licenses (see also Neda 1998:44). Irrespective of the value of a general theory like Wittfogel's (1957) about the relation between irrigation control and the emergence of powerful hierarchically organized state organizations (see Boomgaard, this volume), it is clear that the establishment of water management schemes, often around canal or tank irrigation, can be and often is an important element in processes of the formation of large and hierarchically organized political organizations. Even if the state does not actually get involved in water management, the possibility is there and can be activated, for whatever purpose. So political and economic power relations, even where not established to ensure control over water, affect relations to water. The relation between small, poor, and landlocked Nepal and huge, richer, and more powerful India is a good example.

of 1982. In principle, everybody may use water for the necessities of their livelihood (*keperluan pokok kehidupan*, art. 16). Other uses require a permit from the government (art. 19). The rhetoric of the Agrarian Basic Law, that the relevant law is based on adat law as long as this does not contradict the public interest, in reality has been as spurious and misleading as it has been for land and local rights to natural resources, where adat rights have largely been disregarded to the benefit of the political and economic elite (see Fitzpatrick 1999).

We have seen in Sungai Tenang that this can change. The case illustrates that there is no clear unilineal development in the relative significance of the different bodies of law within a pluralistic legal system. While during the Suharto regime the strength and efficiency of adat law had declined, we now observe a revitalization of adat as legitimation of rights to natural resources. The new freedom and political instability under the *reformasi* governments of Habibie, Wahid, Megawati Soekarnoputri, and Yudhoyono have given a new impetus to this, especially since the official promulgation of the Decentralization Laws in 1999. In West Sumatra, developments are even more dynamic than in other parts of Indonesia, for here decentralization has been used to reform the organizational structure of village government. Until the early 1980s, when the 1979 Law on Local Government became effective in West Sumatra, the lowest unit of local government had been the *nagari*, the Minangkabau name for the former and originally pre-colonial 'village republics'. In the early 1980s, these had been replaced by the Javanese village model of *desa*. This meant that the *nagari* were split up into several smaller *desa*. With the decentralization law and the move towards regional autonomy, the provincial government has decided to opt for a policy of 'going back to the *nagari*'. Although at present it is far from clear where this process – which has different dynamics in different parts of Minangkabau – will end, and what going back to the *nagari* eventually will mean, this policy has already led to an official and legal rehabilitation of adat and adat law.<sup>21</sup> Provincial Regulation 9 of 2000, through which the 'back to the *nagari*' policy is structured, now explicitly mentions in section 7(d) as 'property and wealth of the *nagari*' 'the land, forest, rivers, ponds, lakes and sea' that are *ulayat* of the *nagari*. This not only concerns rights to resources, but also the principles according to which representative village councils are to be formed (see F. and K. von Benda-Beckmann 2001a,b, 2004).

In the view of the government, this recognition of adat may be largely rhetorical.<sup>22</sup> But the people take it seriously. And the people, as the example

<sup>21</sup> These notions are replicated in the new regulations at district and village levels. The same formulations had already been used in the regulation of 1983, which recognized and legally established the Adat Village Council (*Kerapatan Adat Nagari*) in addition to the *desa* (F. and K. von Benda-Beckmann 2001b).

<sup>22</sup> Peraturan Menteri Negara Agraria/Kepala Badan Pertanahan Nasional Nomor 5 tahun 1999 on the right of avail, the *beschikingsrecht*, makes clear that village control over natural resources excludes those resources that had been converted into state rights earlier.



of Sungai Tenang and also of West Sumatran legal politics generally shows, are not necessarily old-fashioned traditional leaders pursuing nostalgic goals. They are largely modern, well-educated people, and their concern is not so much *adat per se* but the economic resources and political power that can be legitimated by reference to *adat*. The Association of Adat Councils, LKAAM, has become a strong lobby for a wider recognition of *adat*. Until shortly before the last elections still a part of GOLKAR and generally regarded as an instrument to contain *adat* aspirations, LKAAM has become the strongest *adat* voice, very much to the irritation of the provincial and regency governments. The LKAAM leadership does not consist of simple traditionalists; they are mainly academically trained; they hold jobs at the university or are retired government officials (F. and K. von Benda-Beckmann 2001b).

The example also tells us about the different ways in which notions of *adat* rights are restated in a rather 'pure' form and also become enmeshed and partly incorporated in government law. In both cases one could say that we are dealing here with reinventions of traditional legal concepts which no longer reflect political and economic realities. But this is beside the point. *Adat* restated in a supposedly old, traditionalist version, is a good bargaining chip in negotiations over resource rights, as the example shows. This is not confined to West Sumatra, although the return to the *nagari* policy gives a special character to the development there (see Li 2000; Acciaoli 2001).

Increasingly, such combinations of mobilizing *adat* rights in their 'pure form' and merging them with government law are no longer confined to state law and *adat*. A variety of new international or transnational actors have entered the scene during the last two decades, actors such as the World Bank, Asian Development Bank, International Water Management Institute (IWMI), and other donor agencies. They advise governments and also get directly involved in the planning and execution of water management projects, with high ambitions such as making water supply and distribution more efficient, equitable, and sustainable. Wholly new policy and legal discourses debate the value of community-based water resources management but also of tradable water rights. International donor agencies emphasize the need for bottom-up management of natural resources and the need for policy-makers to draw lessons from traditional legal forms of resource management (see Neda 1998:44).<sup>23</sup> Local actors in West Sumatra as elsewhere<sup>24</sup> also use this

<sup>23</sup> Pinstrup -Andersen (2000:15): "Water rights are fundamental. Currently, irrigation accounts for over 70% of water withdrawals world-wide, and even more in many developing countries. The question of how the customary rights of existing water users are acknowledged, and whether new allocation patterns are imposed or negotiated with users, will have a major bearing on rural livelihoods as well as food security." It has become common to say that "legal reform may have some important lessons to learn from traditional legal systems" (Howsam 1996:378).

<sup>24</sup> A well-known instance of the resurgence of traditional water resources management is the Moluccan institution for harvesting of marine resources, *sasi laut*, that has been discovered by a



development policy language of bottom-up development to support their claims. So traditional legal elements – however well or poorly understood – are strengthened and incorporated into global and transnational legal and policy discourses. The international legal dimension has further gained in importance since the right to water, at least to clean drinking water, is increasingly interpreted as a human right, although, as the Water Forum in The Hague has taught us, not everyone agrees

This new legal and political context will also influence future developments in Indonesia. At present, plans for a comprehensive reform<sup>25</sup> are being made in cooperation with the World Bank and World Bank consultants. Solving, or at least minimizing, conflicts between the different economic and political interests, and the different legal orders invoked to legitimate those interests, will be one of the major problems (Hardiyanto 1997). The current policy of decentralization offers great opportunities and at the same time creates additional problems. The tug of war over control over land between the centre's Badan Pertanahan Nasional (BPN, National Land Administration Board), and on the other hand the districts and villages as well as the provinces is still going on, and it will colour the way and the extent to which the reform of the water sector will be carried out. The Land Administration should be decentralized, but some powers at national level do not want this.

### *A final outlook*

It is likely that problems related to water and struggles over water rights will not only continue but increase. Although much public attention is given to these problems, there are few indications of improvement in the extent of exploitation and distribution of water. The question whether water, and especially groundwater, can be left to unrestrained individual appropriation, through market mechanisms or otherwise, has not been answered. The declaration of the right to water as a human right has been important, but mainly only symbolically. Especially the propagation of water as an 'economic' rather than a social good in neoliberal resource policies has led to grave concerns about the availability of water for the poor and to the fear that sufficient water may become a life-giving force reserved for the economically privileged.<sup>26</sup>

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number of national and transnational NGOs. See Zerner 1994; Pannell 1997; Soselisa 2001; F. and K. von Benda-Beckmann and Brouwer 1995.

<sup>25</sup> First steps were the Law on Water 11 of 1974. This was adapted in 1982 by Government Regulation 22 of 1982. Government Regulation 23 of 1982 detailed this further for irrigation.

<sup>26</sup> See Ahmed, Dixit and Nady 1999; Shiva 1999; Shah 1998; Editorial 1999; Middleton 1994.

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**Part Four Pure and impure water**  
**Health and disease**



FOONG KIN

# The role of waterborne diseases in Malaysia

## *Introduction*

Water is one of the essentials for the existence of all living organisms, and early settlements usually proliferated around the various sources of natural water. While water is critical for life and survival, it also poses as a constant threat to human health and wellness because of its role in the transmission and spread of a large group of communicable diseases. Gastro-enteric diseases such as cholera, typhoid fever, dysentery, and other viral diseases such as hepatitis A are major waterborne diseases. In Malaysia as elsewhere, cholera and other diarrhoeal diseases are closely associated with inadequate water supply, improper sewage disposal, poor personal hygiene and unsatisfactory environmental sanitation. It is well known that the important vehicle for the rapid spread of these diseases is contaminated water. Water pollution problems caused by contamination of watercourses with bacteria, parasites and a host of microbial disease vectors is the main contributing factor to the health hazard of waterborne epidemics. Human faeces is the main source of infection. It is well known that cholera outbreaks are related with situations in which the water supply is exposed to the high risk of contamination with human faeces due to unsanitary defecation habits of the people (Bhagwan R. Singh 1972:156; Ismail 1988:399). Unsanitary personal and food habits are largely responsible for the persistence and intensification of epidemics. Typhoid fever, another important waterborne disease is also a result of poor sanitation and standards of personal hygiene as well as contaminated food.

The aquatic environment provides an essential habitat for the mosquito vectors and intermediate hosts of parasites that cause human diseases. Among these diseases, malaria outranks all others in severity and distribution. Vector-borne diseases have always affected humans. Mosquitoes such as the *Anopheles balabacensis balabacensis*, a forest breeder, are the principle vector responsible for transmission of malaria in Sabah, Malaysia (Hii 1984:104). It breeds in small, shady pools in clay soils containing fairly clean seepage or rain water that are stagnant or have a low flow, such as animal footprints

or wallow, wheel ruts along track, or blocked ditches in the forest, in palm oil estates, rubber or coconut plantations, or other shady localities (Scanlon and Sandhinand 1965). The two main mosquito vector species, incriminated in the transmission of dengue fever in Malaysia are *Aedes aegypti* and *Aedes albopictus* (Rudnick 1983). They breed in artificial and natural containers and receptacles which hold clean and clear water. Containers such as earthen jars, flower pots, drums, buckets, bowls, coconut shells and rubber tyres are some of the preferential breeding sites (Cheong 1967; Lee and Cheong 1987:118). Other unusual breeding sites include septic tanks, abandoned housing projects, roof gutters, vacant land and construction sites. The *Culex* mosquito that breeds in stagnant drain water is responsible for the transmission of Japanese Encephalitis, another vector-borne disease in Malaysia. Filariasis (*Wuchereria bancrofti*) is spread by particular species of *Anopheles* and *Culex* mosquitoes, whilst *Brugia Malayi* is transmitted by the *Mansonia* mosquito (Ministry of Health 2000:69). Thus, water plays an indirect role in the transmission of these diseases because it enables the breeding of varying species of disease bearing mosquitoes. Human exposure to these vectors increases the risk of contracting these diseases. In Malaysia, there is a significantly higher incidence of malaria and dengue fever compared to the other vector-borne diseases.

This paper provides a description of the prevalence of waterborne (diarrhoeal) diseases and water-related diseases (such as malaria and dengue fever) in Malaysia and factors influencing their spread as well as measures that were taken to prevent and control them. A brief historical account of the emergence of these diseases in the last century and the efforts undertaken to curtail them during the colonial period is also presented. Strategies and actions taken by the Malaysian government in the early part of the twentieth century and post Independence in 1957 are described.

#### *Prevalence of waterborne diseases in Malaysia*

Waterborne diseases such as cholera, typhoid fever and dysentery were major public health problems in Malaysia for a great part of the last century. Most of these diseases remain endemic although in the last two decades the incidences of some of these diseases have declined significantly (Ministry of Health 1999a). These diseases were not notifiable until a new Prevention and Control of Infectious Diseases Bill was passed in 1988. In the same year, a Communicable Disease Control Information System was established where information was channeled from operational areas to higher managerial levels for programme planning (Ministry of Health 1989:86). Prior to 1988, statistics on all communicable diseases were available from all hospitals throughout the country. It would be of particular interest to examine a few of these diseases in greater detail.

Cholera, is the most devastating and rapidly fatal of diarrhoea diseases. The disease has been in existence in India since time immemorial. The Ganges delta has been often termed as the 'home of cholera'. The world has experienced seven pandemics of cholera and Malaysia has had its share of the epidemics (Chen 1970; Sandosham 1964; Yadav 1981). In the nineteenth century, cholera spread throughout the world, carried along the trade routes by sea and by land. It is noted that in 1817, the disease spread to Malaya, Java and Borneo. The earliest known records of the disease appeared in the 1823-1830 records of the Durian Daun Hospital in Malacca (Sandosham 1964) and in the writings of Innes (1885) who lived in a remote village in Langat, Selangor (Bhagwan R. Singh 1972:149; Yadav and Chai 1990). In the Straits Settlements (1826-1867), cholera was noted as 'a scourge in the crowded poorer quarters' on Penang Island (Turnbull 1972:210). The disease was endemic in the Straits towns Penang, Malacca and Singapore. Several outbreaks of the disease due to the classical *Vibrio cholerae*, were recorded in the nineteenth and the early twentieth century (1910-1915, 1918-1920, 1924-1927) in Malaya (Bhagwan R. Singh 1972:150). It was 'spread partly from the notoriously over-crowded ships which brought pilgrims from Mecca' (Turnbull 1972:218). Pilgrim trade together with an open immigration policy facilitated the importation of waterborne diseases such as cholera. A well known cause of the disease was the 'pollution of water arising from the filth and bad drainage in the Strait town, and this was appreciated at the time, even though the exact nature and cause of cholera were not known' (Turnbull 1972:219). The public expressed the need to improve drainage facilities, but the colonial government at that time lacked the resources to finance such schemes. It was only towards the end of the nineteenth century that the construction and improvement of waterworks in the main townships enhanced health conditions and eventually freed the towns of the scourge of cholera (Chai 1967:202).

In the first half of the twentieth century, suspected cases of cholera that were reported were few, usually notified when a ship arrived at a Malayan port. Other overland infections have occurred via Siam and Kedah (a northern state in Peninsular Malaysia) and also by illegal immigrants when they landed surreptitiously on the coast in small vessels (Institute for Medical Research 1955).

The spread of *Vibrio cholerae* biotype El Tor, from the island of Sulawesi (Celebes) to Malaya was reported in the early sixties, both in the states of Sarawak, in East Malaysia and Malacca in Peninsular Malaysia. It was believed to be due to the shifting of the Chinese population and to troop movements. The epidemic was restricted to the coastal areas, often affecting poor fishermen and their families, who lived under unsanitary conditions. Infections were carried up rivers. The outbreak of cholera in Malacca in 1963 was brought in by sea route from Sarawak. Movement of army and police personnel between Malaya and these territories during the Brunei rebellion was one of the main factors. Another

cause was the severe drought (affecting water supply) that mainly affected the coastal and riverine communities (Bhagwan R. Singh 1972:157; Yadav 1981). Mortality rate in outbreaks from 1900 to 1946 was very high (ranging from 60 to 80 percent). It declined to zero to 30 percent in 1961 to 1970. This partly due to improved medical facilities and treatment, and partly perhaps to the fact that *Vibrio cholerae* biotype El Tor is less virulent than the classical *Vibrio cholerae*.

In addition to contaminated freshwater, marine water is another source of cholera infection. *Vibrio cholerae* has been found to harbour in marine plankton and in molluscs and in fish skin and intestines (Epstein, Ford and Colwell 1993). Vessels that move from one port to another could be a good carrier of the *Vibrio cholerae*. This explains the spread of the disease across continents.

Statistics for the years 1970 to 1997, showed that there were major cholera outbreaks in 1974, 1978, 1983, 1990 and 1995. Outbreaks had occurred in several states such as Sarawak (Yadav and Chai 1990); Kelantan (Abdul Rahman Isa et al. 1990); Perak (Gan 1981); Kedah (Chen 1970) and Malacca (Sandosham 1964). There is a fluctuating peak every five years. A declining trend in cholera has been observed over the last ten years. Outbreaks of cholera in Peninsular Malaysia have been associated with river pollution from human excreta and the fact that river water is usually the source of water supply for all purposes in the rural home (Chen 1970:255). Outbreaks have tended to occur in the dry season (May, June and July) when many are forced to use river water. The disease is prevalent amongst people living in the rural and suburban areas and is associated with ignorance, poverty, insanitary water supply, and sewage disposal, bad personal hygiene and poor environmental sanitation (Bhagwan R. Singh 1972:157).

For the first few decades of the last century dysentery, next to malaria, was the leading infectious disease in Malaysia. The period between 1911-1921 saw more than 47,000 deaths from dysentery in a population of about a quarter million in the part of Malaysia then known as the Federated Malay States (Perak, Selangor, Pahang, and Negeri Sembilan). The number of cases treated in government hospitals between 1900-1930 for dysentery alone, came to 38,444. The number of deaths among these was 11,420 (Ow-Yang 1971:1). Improvement in sanitary conditions of the people has led to a significant decrease in dysentery cases post 1930. From 1981 to 1985, the incidence rate of dysentery cases per hundred thousand population was significantly higher than that for cholera Ministry of Health (1986:43). An overall decline has been indicated in the last two decades.

Typhoid fever was the leading waterborne disease in most years from 1976 to 1998 with a significantly higher incidence rate per hundred thousand population compared to the other waterborne diseases. However, a decreasing trend has been indicated from 1986 to 1997. This disease is endemic in all states and the years 1986, 1987 and 1991 had high incidence rates and deaths (Ambu



2000:499; Ministry of Health 1999a). Outbreaks in local areas were a result of consumption of contaminated water (Soong 1971:28) and food (Narinderpal Singh and Menon 1975:9). Other contributing factors include delay in diagnosis, emergence of antibiotic-resistant strains, problems in identification and management of carriers and the lack of availability of a safe, effective and cheap vaccine. Increase in regional movement of large numbers of migrants is another important factor (Merican 1997:299).

### *Prevention and control of waterborne diseases*

Prevention and control of waterborne diseases such as cholera and typhoid could be achieved through improvement of clean water supply and education regarding personal cleanliness and hygiene. Epidemiological monitoring, investigation of outbreaks and disease pattern, and identifying effective measures are important strategies for control. Systematic approach to control began in the late sixties, with the launching of a pilot rural environmental sanitation programme in 1968 (Ministry of Health 1982:94). This was a response to a survey in eleven selected rural areas in all eleven states in Peninsular Malaysia, that found only 3.6% of the population were supplied with piped water; 85.3% obtained their water from unprotected wells and 11.1% used untreated surface water, for example, streams, rivers, ditches, etcetera. Eleven pilot projects were implemented in West Malaysia. The programme provided clean water supply, built sanitary toilets, encouraged proper disposal of rubbish and sullage waters as well as improvement of cleanliness of the village environments. Programme activities involved community effort and participation, health education, transfer of appropriate technology together with human resource training. In these early years of control, the World Health Organization provided expert advice and recommended various strategies to the Malaysian government. They included the formation of a National Committee for Diarrhoeal Disease Control, use of oral rehydration salt therapy, operational research and setting up of laboratory facilities.

A long term Rural Environmental Sanitation Programme was launched in 1973. It embodies the special task of rectifying problems arising from insanitary water supply, improper sullage water, excreta and refuse disposal and personal hygiene. The programme aimed at reducing the incidence of communicable diseases associated with poor sanitation and this can be achieved by installing proper sanitation facilities. Various strategies have been implemented to achieve the programme target: 1. Encouraging the rural population to adopt good sanitary practices through health education; 2. To ensure full acceptance by the community and optimum results of the programme, actions have been taken to involve the community in the preparation, construction, installation and organization of activities under this programme; 3. To pro-

mote the construction and usage of sanitary facilities such as sanitary water supply system which supply clean, sufficient and easily available water and construction of it at the least cost, installation of sanitary latrines to ensure safe excreta disposal practice and sullage drains and proper refuse disposal to create a clean environment; 4. To identify areas which are affected by outbreaks of cholera, diarrhoeal and other water-related diseases and prioritize them in installing sanitary facilities; and 5. To encourage the participation of state government agencies and voluntary organizations in the programme (Ministry of Health 1985:97). By 1994, 83.5% of the rural households were supplied with proper piped water (Ministry of Health 1995:66).

In addition to improving the quality of drinking water through proper piped and chlorination of water and environmental sanitation, mass vaccination have been implemented during epidemics to prevent further spread of cholera. Oral rehydration salt therapy, the most advanced in the treatment of cholera, was introduced nationwide since 1983.

Decreases in water contamination, improvements in waste disposal, and antibiotic therapy have contributed to the control of infectious diseases such as cholera and typhoid in Malaysia. Incidence of these diseases has been reduced substantially. There is a general decline in trend of the major waterborne diseases, with the exception of the five to seven year trend of cholera epidemics. In recent years, most communicable diseases are more food borne as opposed to waterborne (Ministry of Health 1994). However, there is a constant threat of imported cases that may carry new strains of pathogens, as a result of the increasing influx of migrants into the country in recent years. This necessitates a review of current control strategies to place more emphasis on vigilance, detailed case investigation and prompt appropriate and efficient case treatment and management to prevent and control such diseases.

#### *Water-related vector-borne diseases*

##### *Malaria*

Malaria remains an endemic disease of public health importance in Malaysia. The disease was first reported in Penang, the first British settlement in the early nineteenth century. Malaria had claimed many lives of the immigrant Europeans (Institute for Medical Research 1955). The disease has been reported to spread like 'wild fire in the rubber plantations' during the colonial days (Chai 1967:202). The town areas remained feverfree, but in the 1840s, when Europeans began moving to live on the outskirts of town and convicts were sent to fill in swamps and construct roads in the country, reports of intermittent fevers were high (Turnbull 1972:211).

In Malayan history, malaria has been disastrous to the unprepared community making its first contact with the disease. The early settlers in Penang,

the first planters in the hillcountry, the workers in the first rubber plantations, the ill-fated community of European administrators were some examples. Intensive agricultural activities, unusual combinations of tide and rainfall, development of roads and other such activities that are favourable for vector breeding have caused malaria cases to rise in large numbers.

Prior to 1965, malaria cases recorded were only reflective of trends in areas served by the hospitals, such as plantations, mines, and areas around the town. Incidence of malaria of the rural communities was unknown. The first systematic blood film survey was conducted in 1965 in Peninsular Malaysia. Based on this malaria survey, together with the confirmed malaria cases in hospitals, and the prevalence of malaria among the aborigines, a projected estimate of incidence indicated over three hundred thousand malaria cases per year (Jit Singh and Tham 2005). In the state of Sabah it was estimated that over two hundred and fifty thousand cases occurred in 1955 in a population of 400 thousand.

Malaria control in Malaya began with the work of Watson, a district surgeon, in 1901. Watson was in charge of the Klang, Kuala Langat and Kuala Selangor districts on the coast of the Strait of Malacca. At the time Klang was surrounded by a large area of swamp, year after year for the previous five years the population had been swept by waves of malaria. The death rate of its inhabitants was 160 per thousand. In November 1901, there was an epidemic of malaria of exceptional severity. Watson decided that the only way to control the disease was to control the mosquitoes. He decided to drain the swamps around Klang. The result was spectacular. The epidemic was controlled within a short time. A similar episode happened in Port Swettenham, lying on the estuary of the Hang River. A great majority of government servants and labourers who were brought in to work at the port were stricken with fever. Watson's strategy of drainage was applied and the number of malaria dropped (Watson 1921). Watson's method of clearing the jungle to remove shade and the draining of water collections were applicable to all districts under similar conditions. By 1910 most of the main towns situated on the lowlands of the Federated Malay States were reasonably malaria free. However, this method of drainage for flat land when applied in hilly areas was found to lead to an increase in malaria case because the drainage methods created an ideal condition for the hilly land mosquito vector (*Anopheles maculatus*) to breed. This problem led Watson to experiment with subsoil pipe drains. In 1911 the first subsoil pipe drains were laid in a rubber estate and proved to work well.

A Malaria Advisory Board was formed in 1911 to cope with the increasingly serious malaria problem and was given a free hand, with wide powers to advise and coordinate as well as to order and execute control measures. Watson's subsoil drainage and oiling are still the basis of urban malaria control and may be expected to remain so. Synthetic insecticides were later used

instead of larvicides, because they were cheaper. By 1940 a few of the most malarious estates, where oiling had never been very satisfactory, had adopted mepacrine prophylaxis following the demonstration of its effectiveness (Jit Singh and Tham 2000:13). Residual insecticides were not used extensively until about 1951 when, owing to the emergency, the resettlement of large numbers of people in new villages created an immediate need for malaria control. House spraying began to be used as an alternative to suppressive drugs. Before the Second World War, with the exception of rubber estates, there was no malaria control in the rural areas other than the free distribution of quinine by traveling dispensaries, village headmen, police and post offices. Malaria control was not possible in these areas before the advent of DDT (Jit Singh and Tham 2000:13).

An eradication programme was launched in Peninsular Malaysia in 1967. Spraying of DDT emulsion and case detection and treatment reduced the reported cases of malaria from three hundred to four hundred thousand annually prior 1967 to ten thousand in 1978 and 1979. In the East Malaysian state of Sarawak, the eradication project which started in 1961, succeeded in reducing reported malaria cases from a level of forty to fifty thousand per year in a population of one million to about 1,500 in 1970 and 1971. Malaria control activities started with DDT spraying and mass drug administration in 1958. In 1968 only 11,517 cases were reported. However, between 1974 and 1981, the incidence of malaria in Sabah had reached epidemic proportions (Branding-Bennett 1981; Jit Singh 1985).

The original strategy of malaria eradication was changed to that of malaria control in both Peninsular and East Malaysia (Sabah and Sarawak) in 1980. This was a result of the persistence of factors that demanded a new strategy of control. Deforestation for purposes of land development, road and dam construction increased breeding sites for the malaria vector, *Anopheles maculatus*. Forest clearing for agriculture was cited by Lim (1992) as creating malarial habitats. Population movements of specific populations such as the Orang Asli (aborigines), security forces in and out of jungle areas, movements of people across international borders are contributing factors to increases in malaria cases because of exposure of these people to bites of infected mosquitoes. The increasing incidence of chloroquine-resistant *Plasmodium falciparum* malaria is another factor.

Geographical, occupational and educational factors were found to influence transmission and control of malaria among the Murut of Sabah. Living in remote rural areas and being involved in forest-related occupations were likely to magnify exposure bites of infected mosquitoes and thus malaria (Foong 2000:90). These communities also had inadequate access to modern information on malaria, information that could alter beliefs and attitudes about diagnosis, treatment and personal protection against malaria and about vector

control. Remote rural areas were characterized by traditional beliefs, often associated with lower level of education, and by poor accessibility to modern health services. While some taboos (refusal to have houses sprayed or provide blood specimen for malaria diagnosis) remain as barriers to malaria control in these communities, some traditional practices have value and provide protection from malaria. For example, constructing houses on stilts which reduce mosquito accessibility into homes, rearing of animals near homes for *Anopheles* that prefer animals to humans, and the use of traditional herbs such as *Eurycoma longifolia* (local name is *tongkat ali*) which has antimalarial properties.

The Malaria Eradication Programme was replaced by the Vector-Borne Disease Control Programme in 1986. The objectives of this programme are to reduce the morbidity and mortality of malaria to a level that it does not constitute a major public health problem in the country, and to prevent the recurrence of malaria in non-malarious areas. The major anti-malaria activities include passive and active case detection, mass drug administration for purposes of chemoprophylaxis among high risk populations, case investigation, DDT residual spraying, focal spraying, health education and entomological activities. Currently the spraying of houses with deltamethrin is the main strategy of vector control. Focal spraying is carried out in land schemes, logging camps and in Orang Asli communities in the interior. The use of insecticide-treated bed nets was introduced in 1993 in the malaria prone areas as well as in areas of outbreak (VBDCP 2000:112).

Indoor residual house spraying, using long-acting insecticides, still remains an important strategy in the control of malaria especially in the highly malarious areas. Several factors influence the effectiveness of DDT residual spraying. Incomplete coverage is an important factor. Inaccessibility to remote interior areas is another constraint. There is also public resistance to spraying because of the dislike of the DDT wettable powder that sticks to walls of homes and also poses as a health hazard. In recent years, deltamethrin is also used in addition to DDT (VBDCP 2000:109).

The number of malaria cases detected annually has been on the decline since the 1980s. In 1988, the incidence rate per ten thousand population was 30.3 (or 50,721 cases) and this has declined to 6.1 by 1998 (VBDCP 1990:22, 2000:20). Since 1998 there has been an increase in the number of imported cases. There is also an emergence of malaria in urban areas. For example in 1999, five outbreaks were recorded in urban non-malarious areas such as in housing projects and urban areas that were being developed (VBDCP 2000:27). The people affected were foreign workers (mainly Indonesians) who worked at the construction sites and they were imported cases.

Although there is an overall decline in cases in the country and in most states, malaria remains a major problem in the state of Sabah. Sabah holds the national record by contributing about eighty percent of the malaria cases

in Malaysia since the start of the malaria eradication programme in 1961. In spite of various anti-malaria activities carried out so far to control malaria, it continues to be a scourge in the state as it has been in the past. The standard anti-malaria measures which have been in use for more than a quarter of a century in Sabah, have not been able to stop the resurgence of malaria due to the following reasons: 1. the refractory nature of the main vector *Anopheles balabacensis balabacensis*; 2. the inaccessibility due to lack of communication; 3. nature of terrain; 4. constant population movements; and 5. poor housing conditions. Since effective malaria vaccines remain many years away, the widest scope for reducing malaria in Sabah lies in promoting 'self-protection' measures, in line with the primary health care concept that individuals and communities take greater responsibility for their own health. A special plan of operation was implemented from 1995-1999. Under this programme emphasis was given to enhance early detection and prompt treatment of malaria, particularly at the periphery; providing further support and incentives to primary health care volunteers; creating awareness of the seriousness of malaria; promoting the use of insecticide-treated bed nets; improving epidemiological data collection; improving and strengthening management and supervision and enhancing national and international training capabilities (Ministry of Health 1999b:196-205). With the implementation of the Plan of Operation, malaria cases have declined dramatically by 88%, from 49,865 cases in 1995 to 6,099 cases in 1998. The incidence rate had declined from 279 in 1995 to 22 per ten thousand population in 1998.

The Vector Borne Disease Control Programme is now fully integrated with other control programmes such as tuberculosis, leprosy, AIDS/STD to form the Communicable Disease Control Programme. This facilitates early case-detection, treatment, case investigation, case follow-up and other control measures at the first point of contact.

### *Dengue fever*

Dengue is a febrile viral infection that, in its more serious forms, can cause haemorrhagic fever and shock syndrome. The earliest report of dengue fever in Malaysia was from Penang in 1902. However, the first report of dengue fever with haemorrhagic manifestations was made only in 1962 in Penang Island (George 1987:278). Since then, the disease has become endemic throughout the country. In 1973, there was a major outbreak of dengue haemorrhagic fever. Subsequently, in 1974, a plan of action for the prevention and control of dengue fever and dengue haemorrhagic fever was put into immediate effect and the disease was made notifiable.

The disease is endemic and occurs throughout the country with maximum number of cases reported during the months of July, August and September. The incidence rate of dengue from 1973 to 1991, ranges from a low of 2.4 per



hundred thousand population to a high of 36.4 in 1991 (Satwant Singh 2001:6). Control was successful in maintaining the incidence rate to less than 10.0 per hundred thousand population for most of the years. However, from 1996, an upward trend in incidence rates was observed, the highest in the last three decades. The incidence rates rose from 67.3 in 1996 to 89.7 in 1997 and 123.4 in 1998. This was a result of rapid urbanization and population (both local and foreign) growth in the cities, a different life style (such as throwing of non-biodegradable containers), rapid transportation and poor living conditions (poor water supply in squatter areas). All these gave rise to an increase in breeding habitats for the *Aedes* mosquitoes and thus the easy spread of the virus.

There was a drop in incidence rate per hundred thousand population from 123.4 in 1998 to 43.8 per hundred thousand population in 1999. One of the reasons for this drop was the successful implementation of the National Cleanliness and Anti Mosquito Campaign launched in April 1999. The campaign aimed at increasing awareness among all citizens on the cleanliness at home, workplace and surroundings and its relationship to mosquito borne diseases (Ministry of Health 2000:62).

The strategies used in the control of dengue fever are: 1. epidemiological surveillance through prompt case notification through telephone followed by written notification, case investigation and follow-up; 2. laboratory diagnosis through the use of rapid screening tests and confirmation by standard laboratory technique; 3. improved clinical management through case detection and institution and supportive management of care in hospital; 4. vector control through source reduction, done by search and destroy activities, anti-adult operation through chemical fogging, and legislation; 5. interagency collaboration and co-operation for control of dengue in specific population sub-groups and high risk areas such as schools and construction sites; 6. health education activities including community participation through community involvement in activities related to dengue control (Satwant Singh 2001:2).

Control of dengue remains a great challenge in the future. New initiatives such as reprioritization of areas and targets under *Aedes* surveillance, mass-abating, sequential fogging, use of synthetic pyrethroids, personal protection, increase in enforcement activities, improvement in health education and greater community/inter-agency involvement are given the emphasis.

### *Conclusion*

Waterborne and water-related vector-borne diseases such as malaria and dengue fever remain endemic in Malaysia and persist as important public health problems and major cause of mortality and morbidity. Concerted preventive and control efforts of the Malaysian government in the last four decades have reduced these health hazards substantially through wider dis-



tribution of safe drinking water and improvement of environmental sanitation. Scientific advances in development of techniques for testing and treating water with disinfectants (chlorination) have a great impact on prevention of waterborne diseases such as typhoid, cholera and dysentery. Availability of vaccination for diseases such as cholera and typhoid as well as oral rehydration salt therapy for cholera helped to reduce potential suffering and loss of lives caused by such diseases. While the above efforts were major contributing factors in reducing the prevalence and incidence of these diseases, improved nutrition is also an important factor that led to a reduction of their impact. There is a need to sustain and further improve control efforts especially to certain localities that continue to have poor access to adequate water supply and poor sanitation. Malaria continues to be a threat to certain populations and control measures such as DDT spraying and chemoprophylaxis do not have a significant impact on further reducing incidence of the disease. Current efforts should aim more at reducing suffering through rapid diagnosis and treatment of cases. The resurgence of dengue fever in recent years points to the need to sustain surveillance and improve control efforts. Close epidemiological surveillance is required to monitor the incidence and distribution of both waterborne and water-related vector-borne diseases in Malaysia in view of the changing environmental and human ecological impact on health.

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OKKE BRAADBAART

## **Privatizing water**

### **The Jakarta concession and the limits of contract**

Fresh water is a much-contested resource. Farmers, households and industry make competing demands on available water resources, using these variously as transport medium, source of drinking water and manufacturing process water, industrial coolant, recreational facility, pollution sink, and key resource for agriculture and fish farming. It is largely left to governments to work out acceptable solutions to the knotty problem of water management. The 1990s saw governments worldwide experimenting with market-mimicking devices for water management. One interesting set of experiments was the hand-over of drinking water supply management to private, for-profit operators. Privatization revolutionized the urban water supply industry, hitherto a staid government monopoly.

This article analyses one privatization experiment – the water supply concession granted to two private firms in Jakarta, Indonesia. The Jakarta privatization's launch in 1998 was marred by a host of problems and the concession contract failed within a year.

I analyse the inauspicious start of the Jakarta concession from the contrasting perspectives of 1990s' privatization theory and contract theory. First I provide an overview of water management issues in Jakarta. The next three sections discuss the Jakarta water supply industry, the politics of water privatization, and the evolution of water privatization in Indonesia up to the signing of the Jakarta concession contract. At this point I turn to the academic literature, juxtaposing privatization theory and contract theory. Contract theory spells out five conditions for successful privatization by contract: good governance, genuine competition among contract bidders, manageable risk, a complete specification of services to be rendered, and a realistic possibility of the contract being terminated. I argue that the concession contract fell short on each of these criteria. Key findings are summarized in a final section.

*Water management issues in Jakarta*

Jakarta is the political, economic and demographic centre of the Indonesian republic. With 2.7 million inhabitants in 1960, Jakarta was the 29th largest city in the world. In 2000, 11 million persons lived in Jakarta, which by that time had climbed to the 12th rank. By 2015 the city's population is projected to exceed 17 million (United Nations 2004). Like other metropolises in developing countries, Jakarta experiences many problems in the management of its water resources, despite the abundance of freshwater sources. A monsoon climate ensures an adequate replenishment of water stocks. Rainwater is stored in both surface water bodies and aquifers.

These resources notwithstanding, the Indonesian capital experiences water scarcity. This problem stems from inadequate management of both surface water and groundwater. The government struggles to manage private exploitation of groundwater resources. For the past four decades firms and households have extracted groundwater at higher than sustainable rates. A regulatory permit-and-quota system is in place, but enforcement thereof is piecemeal (Braadbaart and Braadbaart 1997). Consequently groundwater levels drop, driving up pumping costs for exploiters. Over-extraction also spoils groundwater stocks because it causes infiltration of brackish water into freshwater aquifers. Moreover, over-pumping leads to land subsidence (the northern areas of the city have experienced drops of 3-6 cm per year) which causes damage to infrastructure and increases the risk of tidal floods (Foster, Lawrence and Morris 1998:47).

The management of surface water resources is better organized. Up to 1990 Jakarta's manufacturing firms regarded rivers and canals as a convenient sink for industrial wastes. However, these freshwater bodies also functioned as sources of water for drinking and other uses. Over the past decade the Indonesian government has made important progress in cleaning up its rivers (Braadbaart 1995; Rock 2002). But still the effluent of 900,000 household septic tanks is thought to be discharged into Jakarta's surface water (Foster, Lawrence and Morris 1998:14).

Further, Indonesia lacks a structure for water resources management. This creates co-ordination problems at the water basin level. For example, Lake Jatiluhur constitutes a primary source of water for Jakarta. Jatiluhur water is used for downstream irrigation, for the flushing of canals, and, last but certainly not least, as a source of raw water for the Jakarta drinking water industry. An autonomous authority manages the Jatiluhur reservoir. Jakarta depends on this authority, over which it has no formal say, for an adequate supply of raw water to its largest water purification plant at Buaran. The Buaran plant is at the mercy of the Jatiluhur authority when it comes to the quality and quantity of raw water, yet a formal structure for the co-ordination of the authority's activities with those of downstream users in Jakarta does not exist.



*The drinking water supply and the politics of water privatization*

Drinking water provision is a long-term cause of concern in Jakarta (on the problem of drinking water, see also Lucas, this volume). In the 1990s only 40 per cent of the population was supplied by PAM Jaya (Perusahaan Air Minum Jaya), the government-owned water utility. The remainder of the population relied on privately owned shallow wells or on private water vendors. This low coverage rate was difficult to square with PAM Jaya's water management record. Leaking water pipes, water pilfering and administrative errors led to losses in excess of 50 per cent of the purified water that PAM Jaya pumped into its networks.

PAM Jaya problems were typical of Indonesia's state-owned water utilities: local government interference in price setting and staffing led to systemic financial problems; capital injections were used for network expansion but not for rehabilitating or upgrading existing systems. The result was poor service, dissatisfied customers, and inadequate cost recovery. As an industry analyst asserted:

The [water companies'] efficiency is typically low [...] Their revenues are limited because of [...] low tariff levels and tariff structures distorting consumption. Strict financial discipline is not enforced [...] As a result, the financial health of most [Indonesian water utilities] [...] is questionable. Finally, most local governments expect revenues from their [water utilities] and extract dividends even if the level of service justifies that any profits be invested to improve and expand the service. *In fairness, [water utilities] cannot really be held accountable for their operating efficiency, because they usually do not have the autonomy needed to make relevant decisions.* (Locussol 1997:56-7, 64.)

It was in these circumstances that the Indonesian government caught on to the idea of involving private firms in water supply management. It was thought that private providers would furnish much-needed capital for investments in new infrastructure and the rehabilitation of existing systems, improve labour and capital productivity in water enterprises, and increase the quality of services. The privatization solution was particularly attractive to Indonesian policy makers as it seemed to provide an answer to two delicate issues. First, improving utility productivity entailed laying off unionized workers in over-staffed utilities in significant numbers. Second, improving the financial health of utilities required increasing water charges, a measure opposed by the local governments that set water tariffs in Indonesia. Policy makers hoped that, by delegating these tasks to private firms, they would limit the unavoidable fallout from these measures.

That said, the drinking water industry is no ideal candidate for privatization. The industry is characterized by a number of features that militate

against outright divestiture, that is, the transfer of property rights to private corporations or individuals. A network of pipes is the most cost-effective way of distributing drinking water in an urban environment. The network solution creates a natural monopoly however – piped networks being costly to construct, it makes no sense to construct two or more parallel water networks. This is why urban households are captive customers of their water utility. Disgruntled customers can only revert to high-priced bottled water, or vote with their feet and move to another utility's service area (Braadbaart 2002; Haarmeyer and Mody 1997; National Research Council 2002).

These realities stymie competition, an important rationale for privatization. Water privatization involves the transfer of monopoly rights from government-owned utilities to private firms. This raises difficult questions: why hand over so much market power to a for-profit enterprise? Can the idea be tolerated that a company makes profits out of an essential good such as water? Or, as the water industry puts it, is water an economic good or a social good?

In the 1990s, Public Private Partnerships (PPPs) were conceived as a defensible solution to this problem. PPPs comprise contracts that transfer limited powers and responsibilities in water provision to private providers for a limited period of time. PPPs range from simple management contracts, where private providers provide management expertise on a fixed-fee, no-risk basis for one or two years, to complicated concession contracts that devolve operations and investment tasks and the associated commercial and technical risks to a private firm for 20 to 40 years (Braadbaart 2005; Kerf et al. 1995).

The idea was that water PPPs would entail competition for contracts, that is, competition for the market rather than in the market. Also, by writing elaborate penalty and reward systems into the contract, PPP supporters expected that such arrangements would mimic efficiency-driven rivalry in the marketplace. Finally, PPPs involved the granting of temporary usufructory rights to private firms rather than permanent divestiture. In this manner the politically sensitive issue of selling off the country's precious water resources could be avoided.

### *The emergence of water PPPs in Indonesia*

The Indonesian government embraced water privatization PPP-style through various ministerial regulations and instructions and a 1994 presidential decree. Water utilities responded by starting exploratory discussions with private consortia, signing memoranda of understanding and commissioning feasibility studies. Private company interests converged on the plums of the water business – service areas offering a combination of low risk, high growth potential, and profitability. Plums included metropolitan areas with their high population densities, rapid growth, and a sizeable customer segment with, as water industry specialists put it, a 'high willingness and ability to pay' for

water services, that is, middle- and upper-class households, large industrial corporations, and tourist resorts.<sup>1</sup>

The first water PPP became operational in Badung District, Denpasar, Bali in 1993. A twenty-year concession contract was granted to a consortium in which the local water enterprise held a 45 per cent interest, three private firms making up the balance. This aimed to serve the tourist areas Nusa Dua and Kuta. The next public-private partnerships concerned Indonesia's most coveted service area, Jakarta and environs, with the Serang Build-Operate-Transfer<sup>2</sup> contract becoming operational in 1995, the Tangerang management contract in 1996, and the Jakarta concession, the jewel in the crown, following in 1997. It is on the Jakarta concession that the remainder of this article focusses.

### *The Jakarta water concession: contract negotiations and contract closure*

The story of the Jakarta water concession contract began on June 12, 1995 with then president Soeharto instructing the minister of Public Works to arrange for a PPP for the Jakarta Special Territory. The presidential instruction stipulates that PAM Jaya, the government enterprise then serving Jakarta, was to contract out the management of the water system to two private firms. The instruction identified these firms as Kekarpola Airindo, which was to contract for East Jakarta, and Garuda Dipta Semesta, which was to take over West Jakarta. On the board of Garuda Dipta Semesta sat a powerful figure, the president's eldest son Sigit Hardjojudanto. Kekarpola Airindo was no lightweight either, being a subsidiary of the Salim Group. In all likelihood it was Sigit who hatched the idea of privatizing Jakarta's water and then convinced his father to push ahead with it. The Salim Group's involvement was a different story. The company was dragged into the concession against its will. It foresaw all manner of problems in the drinking water business, but a presidential request is not lightly refused.<sup>3</sup>

For the World Bank this development was a disappointment. From mid-1994 the Bank had been exploring opportunities for a Jakarta water PPP. A team of consultants had undertaken a pre-feasibility study and plans were made for a follow-up. This never materialized: '[a]s the government decided to negotiate cooperation agreements [...] on a non-competitive basis, the Bank dropped its plans for a follow-up project' (World Bank 1999:177). Subsequent

<sup>1</sup> On this, see Braadbaart and Blokland 1997.

<sup>2</sup> Build-Operate-Transfer (BOT) contracts are akin to the concession contract discussed below but concern Greenfield projects. They often involve the construction of treatment plant by the private party and its operation for a specified number of years. The private party is compensated by the water/waste-water charges it collects with the contract stipulating a minimum quantity of water or waste-water to be procured or delivered by the water utility. For details, see UNIDO 1996.

<sup>3</sup> Author interviews Jakarta 1998.



Map 1. The two concession areas

developments confirmed the Bank's misgivings about the contract. A Bank PPP specialist had the following to say on an early draft of the contract:

In summary, the key elements are missing from this draft concession contract. The proposed regulatory arrangement is not acceptable. [...] I would strongly recommend that [the Government of Indonesia] be assisted by qualified and experienced financial, technical and legal advisors in the negotiations with the operators. [...] Negotiations should probably be led on the Indonesian side by the Minister/Ministry, rather than by [PAM Jaya]. Furthermore, all material changes to the agreements (amendments) should at a minimum be approved by the minister. I don't know PDAM<sup>4</sup> but am not comfortable with the wide powers this body would have under the proposed scheme.<sup>5</sup>

By this time Garuda and Kekarpola had been negotiating with the government for some months. The government team was led by the Jakarta local government but also featured the management of PAM Jaya. Negotiations were proceeding far from smoothly. PAM Jaya management had mixed feelings about the negotiated concession. The Jakarta local government, unfamiliar with this novel form of PPP, was equally ill at ease. On the opposite side of the negotiation table sat Garuda and Kekarpola. Both had meanwhile joined with reputable international water operators. Garuda had teamed up with Thames Water International of Britain and Kekarpola appeared with *Lyonnaise des Eaux* of France at its side.

Negotiations dragged on for almost two years. Then Garuda's patience ran out. In April 1997, Garuda took the concession issue over the heads of the negotiating team to the governor of Jakarta. In an official letter Garuda expressed its unhappiness with the negotiation process, implying that the government team was dragging its feet. In subtle prose it urged the governor to take action:

[...] we feel that technically speaking there is no fundamental problem that still remains to be solved by the Negotiating Team and the private party. [...] Mindful that the negotiation process has been ongoing for almost two years, we kindly request [you] to provide directions so that the ideal of quality water services for the citizens of Jakarta through private participation may be realized shortly.<sup>6</sup>

The letter, bearing the signatures of both Garuda's managing director and Sigit Hardjojudanto, created a dilemma for the governor, for on the same date he received from his negotiating team a report listing a number of unresolved issues. These included the private party's insistence on using imported pipes,

<sup>4</sup> PDAM (Perusahaan Daerah Air Minum) is a generic term for the state enterprises responsible for water supply in Indonesia.

<sup>5</sup> World Bank Office Memorandum, 12-12-1995, p. 7.

<sup>6</sup> Letter to the Governor, 14-4-1997.

which the government team considered expensive and unnecessary. The team also disagreed with the private party's projection of expenditures, arguing these were inflated by an unwarranted deployment of expensive ex-patriot staff and overseas training for PAM Jaya staff.<sup>7</sup>

Sigit subsequently took the issue directly to President Soeharto, who duly intervened. On presidential instruction the Minister of Public Works travelled to London in May to discuss the concession with Thames Water. He then formed a co-ordinating team led by Public Works and comprising the Jakarta administration, the provincial government of West Java, PAM Jaya, and the two private firms. The president also instructed one of his personal assistants to keep a close watch on the proceedings. A memorandum from this assistant to the president written in late May recapitulates the story of the negotiations, and concludes: '[t]he problem: a. PAM Jaya is inclined to postpone the execution of the cooperation; b. PAM Jaya still disputes all agreements that have been reached between the Negotiating Team and the two Private Partners'.<sup>8</sup>

The president next set a deadline for the signing of the contract. Between May 29 and June 4 the negotiating team finalized the concession contract in a marathon meeting. The draft contract was finalized one day later and the contract signed, with PAM Jaya still protesting, on 7 June 1997. The private operators started operations in February 1998. Table 1 provides details on the contract and the two concessionaires.

Table 1. The Jakarta water concession: basic facts

	Eastern zone	Western zone
Contract type: concession		
Contract duration: 25 years		
Contract period: 1998-2023		
Concessionaires	Kekarpola Airindo, since mid-1998 Thames PAM Jaya	Garuda Dipta Semesta, since mid-1998 PAM Lyonnaise Jaya
Major shareholder	Thames Water Plc, UK	Lyonnaise des Eaux, France
Approximate workforce 1998	1,500	1,600
Water produced 1998	183 million m <sup>3</sup>	202 million m <sup>3</sup>
Approximate number of customers served	2 million	2.15 million

Sources: Evaluasi Kerjasama n.d.; author interviews Jakarta October 2000

<sup>7</sup> Report on plenary meeting, 14-4-1997.

<sup>8</sup> Memo Sesdalobang, 27-5-1997, p. 2.

*Theories of privatization and the limits of contract*

At this point it is useful to step back from the arena of Jakarta water politics and assess the arguments for privatization. The literature of the 1990s advanced two principal arguments for privatization—the fiscal argument that privatization would relieve government of the burden of investment financing, and the efficiency argument that financial and operational performance would improve under private ownership.

The efficiency argument merits closer inspection. Economic theorists attribute the efficiency gains to various factors. Private management is held to be inherently more efficient than public management. Privatization is believed to unleash efficiency-enhancing competition. And privatization allegedly creates useful Chinese walls between politics and business.<sup>9</sup>

Much of the economic reasoning in favour of privatization rests on new public choice theories of government behaviour (Mueller 1989, 1997). This has fed into empirical work on the operating problems of state-owned enterprises. Economists observe that state-owned firms operate in environments replete with market and contract failures. They are insulated from markets for property rights (stock markets) because taxpayers, the virtual owners of these firms, cannot sell their stakes and so signal their dissatisfaction with management. State-owned enterprises are also insulated from capital markets—they face ‘soft’ rather than hard budgetary constraints (Braadbaart 2005). Finally, governments are often lax in enforcing contractual penalty and reward systems vis-à-vis state-owned enterprises (Claessens and Djankov 1998; Shirley and Xu 1998; World Bank 1995). This body of work argues that markets do a better job of allocating resources than government. Markets are seen to exert a disciplining force on the managers of private firms. Capital markets punish under-performing firms by denying them loans or lowering the value of their shares. Markets penalize firms that violate contractual promises.

Contracts are a vital element in this train of thought. Contracts are essential because they make up for defects in the market system. Ideally, markets offer instant equilibration of demand and supply: the market of economic theory is a spot market. Real-life markets differ in a number of respects from this ideal of frictionless, instantaneous, and anonymous transacting. The temporal dimension of exchange is one important qualifier. Firms frequently engage in exchanges that last several months or even years. This happens in the construction industry, where it may take several years to construct a new building. The phenomenon also occurs when one firm becomes a repeat customer of another firm. For example, Toyota will buy batches of parts to be fitted onto one of its passenger car models from one and the same automotive supplier

<sup>9</sup> Galal et al. 1994; Sheshinski and Lopez-Calva 1999; Shirley and Walsh 2000; Vickers and Yarrow 1988.



for the duration of the model's production run. It is when exchanges stretch over time in this manner that we call them contracts rather than transactions.<sup>10</sup> Contracts constitute a special type of exchange because they 'promise future performance, typically because one party makes an investment, the profitability of which depends on the other party's future behavior' (Alchian and Woodward 1988:66).

Privatization theorists assumed that contracts would make good substitutes for spot-market exchange. Contract theory is less equivocal on this point. Contract theorists posit that the contract instrument can only function where government upholds the rule of contract law, where economic actors have a minimum level of trust in the functioning of the courts, and where certain norms of conduct prevail in the business community (Granovetter 1992). Apart from this macro-level supply of good governance, the efficacy of the contract instrument also depends on a number of micro-level conditions. The contract mechanism can only make up for market defects when the contract can be auctioned among competing firms, when uncertainty is convertible to risk, when the contracted service can be accurately specified, and when the first party can terminate the contract without suffering major repercussions. Let us take a closer look at this foursome.

First, competition for contracts means uncertainty for both auctioneers (first parties) and bidding firms (second parties). First parties must go through the exercise of organizing the auction and hope for good results: will the winner of the competition be as good in practice as he claims to be on paper? Bidding firms must likewise invest time and effort (in tender document preparation and the like) but are unsure whether they will win the contest. Since organizations share a universal dislike of uncertainty, both first and second parties have reasons to avoid competition. This is why first parties often favour sole sourcing (inviting a single reputable firm to prepare a price offer) and relational contracting (a long-term contractual relationship with a single trusted firm) over competitive tendering.<sup>11</sup> This is also why bidding firms behave opportunistically in competitions for contracts: they bend and break the rules of the game wherever they think they can get away with it. Much to the chagrin of economists, these circumstances distort competition in the real-life marketplace for contracts.

Second, contracts, stretching as they do over time, entail risk. A contract closed at time  $t^0$  in state of the world  $X$  is terminated at  $t^1$  with the world having shifted to state  $Y$ . Between  $t^0$  and  $t^1$  buyer preferences, interest and exchange rates, and many other variables undergo change. These changes may be disadvantageous to contracting parties. No wonder that risk alloca-

<sup>10</sup> Braadbaart 1994; Macauley 1977; Richardson 1972; Scott 1987; Williamson 1985.

<sup>11</sup> On this, see Braadbaart 1994; Bradach and Eccles 1989; Goldberg 1976; Hennart 1993; Kelman 1990; Macauley 1977.

tion is so sensitive a topic in contract negotiations (Lindfield 1998; World Bank 1997). The longer the contract period the more pronounced these problems become. The contract mechanism breaks down when the surrounding environment is so volatile that these shifts are not predictable. Crystal ball gazing will not do when it comes to making promises for future performance with significant financial implications.

Third, the contract instrument reaches its limit when the first party has difficulties defining the specifications of the service they want the second party to deliver. Governments choose to perform many tasks in-house rather than contracting them out for this reason. When task outcome is difficult to link to activities, as in police work or basic research, outsourcing is a problem (Donahue 1989). Contracting parties can address these problems by engaging in relational contracts involving a measure of trust. But trust is not for sale.

Finally, the contract instrument fails when a first party cannot, for whatever reason, terminate the contract and switch to an alternative second party. This happens quite frequently. Private firms that have invested deeply in a joint venture will think twice before terminating the relationship. Governments refrain from contract termination when this is likely to produce serious repercussions in the public domain, for example when termination will drive a state enterprise into receivership.

To recapitulate, 1990s' privatization theories tended to assume that all markets functioned as spot markets and that contracts would provide a cure if they did not. The contract literature tells a different story: it posits that contracts have a limited ability to fix market failures. In order to function at all, the contract instrument requires an enabling environment of strong and clean government, an independent and effective judicial system, and respect for property rights. Even with these conditions satisfied, it is difficult to create and sustain truly competitive markets for contracts. Competition is weakened by the fact that first and second parties often find it convenient to avoid competition. Moreover, the contract instrument can only function when uncertainty is manageable, when the services required are accurately specifiable, and when first parties can afford to terminate. In practice, these boundary conditions are difficult to satisfy.

#### *The Jakarta concession: governance problems and the absence of competition*

In the piped water industry there is no head-on competition. Economic theory proposes competition for contracts as a surrogate. The theoretical solution is that the government organizes an auction, with invited private firms bidding for a concession, that is, the sole right to provide drinking water services in a certain area. In the case of a concession contract, pre-qualification mechanisms and a comparison of technical proposals provide quality safeguards. The bid-

der's financial proposal, that is, the water charge it bids for the right to provide water services, constitutes the price competition element. Private firms thus bid for a contract that grants them monopoly power for a limited period of time. The firm offering the best combination of price and quality wins the contract.

The existence of a long tradition of public tendering in infrastructure might lead one to conclude that this theoretical solution is practicable. But in practice infrastructure tenders feature endemic anti-competitive behaviour. Private bidders collude in price rings; bidders bribe tender committee members; bidders influence the setting of pre-qualification thresholds so as to keep competitors out of the contest; bidders underbid the competition on price to capture the market and subsequently bombard the first party with claims; bidders do not deliver promised quality; and bidders avoid competition by convincing the first party to negotiate an agreement.<sup>12</sup>

The Jakarta water concession offers a classic example. Its design and awarding was beset with governance problems. Under the New Order regime of President Soeharto corruption in the awarding of infrastructure projects was institutionalized (Braadbaart 1996). Connections with key persons in the presidential palace were a *sine qua non* for the winning of major government contracts (Schwartz 1999). The design of the Jakarta water concession started after the president designated two private firms as second parties. In the absence of competition, the Jakarta concession did not produce the cost savings predicted by privatization theory. The tariff at the starting date of the concession was that prevailing in the pre-concession period, amounting to about US\$0.60 per m<sup>3</sup>. This tariff was quite generous, so much at least can be deduced from Table 2, which gives PAM Jaya audited accounts for 1995 to 1997. The combination of moderate operating ratios, high water losses, low labour productivity, and the fact that PAM Jaya's performance was impeded by government regulations suggest that opportunities for efficiency gains existed. However, as the contract was negotiated rather than auctioned competitively, these efficiency gains stood to be reaped by the private providers rather than passed on to water users in the form of lower water charges.

#### *The Jakarta concession: risk and uncertainty*

A contract constitutes a formal promise about future performance. But how can a for-profit firm commit itself to future performance if that future is unknown? It will only do so if it estimates the degree of uncertainty to be manageable and the reward sufficient to justify taking the risk. It is not surprising, then, that the allocation of risk and uncertainty among first and second parties is a key issue in contract negotiations (Kerf et al. 1995). The Jakarta

<sup>12</sup> See Braadbaart 1996; Klitgaard 1988; New York State Organized Crime Task Force 1988; Van Waarden and Unger 1992.

Table 2. Audited accounts PAM Jaya, 1995-1997

	1995	1996	1997
	Rp. billion	Rp. billion	Rp. billion
Operating income	267	296.3	347.9
Operating expenses	132.7	167	191.4
Gross operating profit	134.3	129.3	156.5
General and administrative expenses	113.3	139.6	151
Net operating profit	21	-10.3	5.5
Other income	21.1	3.3	8.1
Other cost	0.3	0.4	2
Accounting adjustment		12.4	
Profit/loss before PPh Badan	41.8	5	11.6
PPh Badan	13.9	2.7	0.4
Profit/loss after PPh Badan	27.9	2.3	11.2
Operating ratio <sup>1</sup>	85.8%	79.0%	87.4%

<sup>1</sup> Calculated as the ratio of operating expenses (minus the item 'cost of loans outstanding') to operating revenues

Source: Audited accounts PAM Jaya, various years.

concession contract documents discuss a large number of risks and uncertainties: that projected water sales and tariffs will not rise according to financial projections; that the private operators will not obtain sufficient supplies of raw water; that local government levies will decrease water revenues, and so on. The contract shifts much of the risk involved to the Jakarta government. It does so by making the private operators' commitments invalid should any of these contingencies arise.

For example, the contract contains elaborate financial projections of internal rates of return over the contract period. Underlying the projections are assumptions about water sales and tariff increases. These are tied to the single most important financial element, the indexation formula for the water charge: '[t]he Water Charge will be adjusted on a semi-annual basis in order to reflect local inflationary pressures on the JVC's<sup>13</sup> cost base and the impact of fluctua-

<sup>13</sup> Joint Venture Company, that is, the second party to the contract.

tions on rupiah-dollar exchange rates on the cost of international loan repayments' (Cooperation Agreement Schedules 1997:IV-9). This formula, which specifies how tariffs are to increase over the life of the contract, is

$$C_n = (C_o \times \{F_n \times G_n + H_n \times O_n\}) + K\$n + K_{in}$$

where

$C_n$	Water Charge to be paid during semester $n$
$C_o$	Water Charge in force at the time of signing the Contract Agreement
$F_n$	Capital expenses for semester $n$
$G_n$	Capital expenditures multiplier (the national cost of construction index)
$H_n$	Operational expenses
$O_n$	Operational expenses multiplier (includes power cost and national chemicals and metal products indices)
$K\$n$	Compensation for exchange rate fluctuation
$K_{in}$	Compensation for interest rate variation

The contract documents provide detailed specifications for each of these parameters. Of particular interest is  $K\$n$ . This formula hedged the private providers against rupiah-dollar currency fluctuations. Likewise, in the original contract document the private operators assumed the sizeable dollar-denominated debt burden of PAM Jaya, but they did so under the condition that they would not be exposed to currency fluctuations. This put the risk of macro-economic shocks on the shoulders of the government. Unfortunately, such a shock occurred almost immediately after the signing of the concession contract. The two private operators Kekarpola and Garuda assumed operations in February 1998, several months into what was by then known as the East Asian financial crisis. They faced an emergency situation. Prices of imported parts and materials were soaring as the rupiah nosedived against the US dollar. The Jakarta government was unwilling to increase the water tariff for fear of protests. PAM Jaya slid into a financial void and went into survival mode, cutting back on operational expenditures and deferring loan repayment schedules.

The financial projections set out in the contract document were invalid from day one. Table 3 illustrates what happened – in dollar terms, receipts plummeted in 1998. According to the contract the Jakarta government would have had to compensate the private providers for the weakening of the rupiah against the dollar. As a retrospective analysis asserts, 'with the 6-monthly tariff indexation system, the gap between local purchasing power and the tariff required for compensating the private parties is ever-increasing. [...] The risk of not achieving this tariff is solely borne by PAM Jaya/the Jakarta govern-

ment' (Peninjauan Kembali 1998:1). The Jakarta government was unable to meet these obligations however: it did not dare to increase the water tariff nor did it have the financial reserves to compensate the private operators for their rupiah-dollar conversion losses. Recognizing that this contractual clause was unenforceable – it would have driven the Jakarta government into receivership – the parties reverted to a negotiated form of contracting. This amounted to an acknowledgement that the contract had failed.

Table 3 Operating revenues, Jakarta water concession, 1995-2000

Year	Operating revenues		Average spot market Rp./US\$ exchange rate
	In nominal Rp. billion	In US\$ million	
1995	267	\$ 117.5	2,272
1996	296	\$ 127.3	2,328
1997	348	\$ 120.4	2,890
1998	219	\$ 21.5	10,233
1999	Data not available		
2000 (Jan-Aug)	277	\$33.1	8,385

Sources: PAM Jaya accounts, various years; Rp/US\$ conversion rates obtained from World Bank Indonesia office web site

### *The Jakarta concession: service specification problems*

An important prerequisite for the functioning of contracts is that the services to be rendered by the second party can be fully specified. From the second party's point of view, an open-ended contract that specifies services vaguely amounts to a license to print money. Whereas privatization debates in the 1990s made occasional reference to the specification problem, it was not accorded a central role. In the real world, however, the specification problem is a very important cause of contract failure (Donahue 1989; Kelman 1990).

The Jakarta contract entailed a number of specification problems. The original contract defined interim and end-of-contract technical targets that the private operators were to meet. A penalty and reward system was attached to these targets to ensure that the operators did their utmost to achieve them. Technical targets in the Jakarta contract pertained to volume of water billed, potable water production capacity, water losses, service coverage ratios and numbers of connections, quality of purified water, and service quality. At first blush these targets appear rather straightforward. Some of them raise questions however.

First, the percentage of non-revenue water (water loss) was to decrease from 53 per cent at contract signing, to 35 per cent after five years, and then

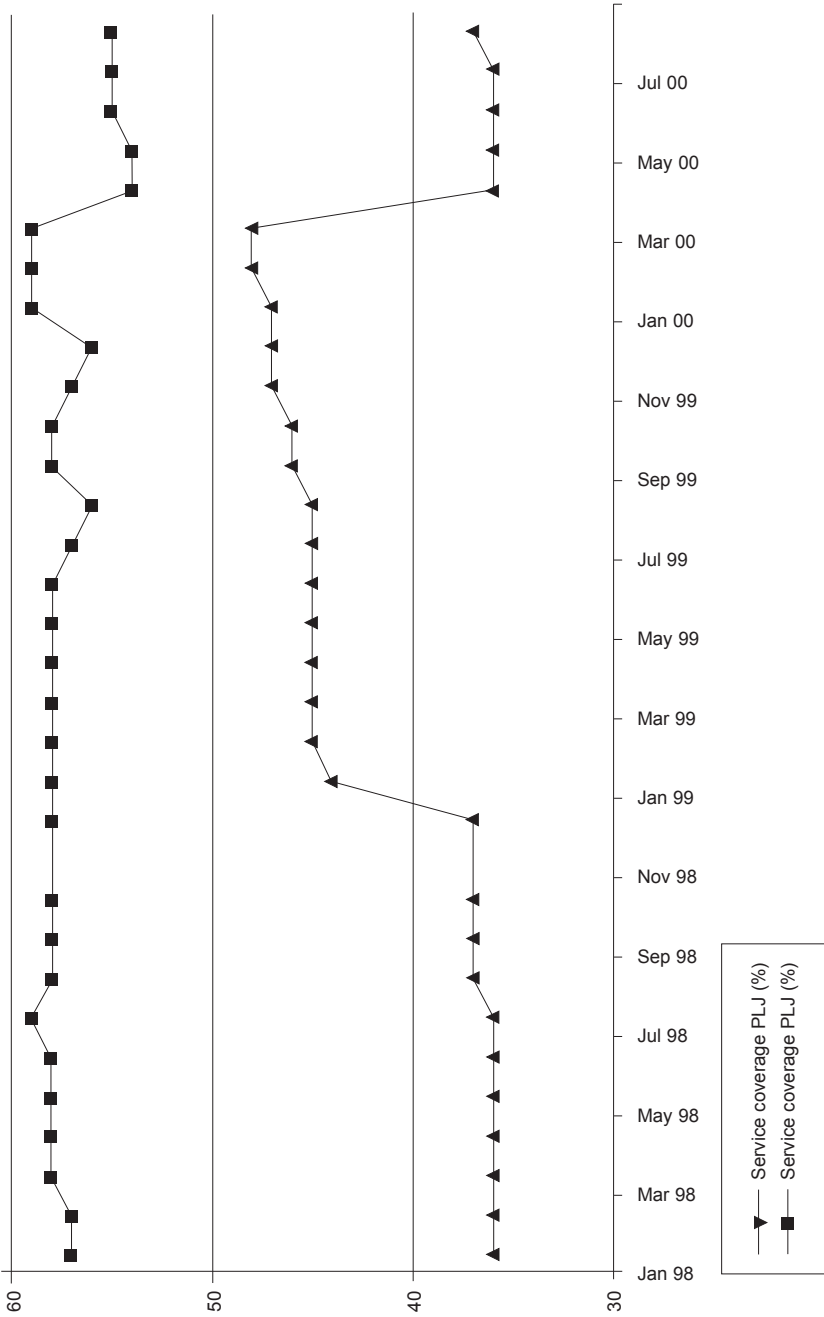


Chart 1. Service coverage PLJ and TPJ, 1998-2000



to 20 per cent after 20 years. This projection assumed that actual water loss in 1997 amounted to 53 per cent. This number was questionable however. Existing documentation on the accuracy of installed water meters was incomplete. Water volume records therefore provided inaccurate information on water loss. Further the state of the network of water-carrying pipes was not known exactly, these assets being buried and therefore invisible. Leakage from pipes is an important source of water loss and fixing leaks often costly. Lacking good estimates of grid quality, no one knew how much rehabilitation and replacement would be required to achieve the contractual water loss target. So the private operators could not accurately project the outlays required for meeting the water loss target.

Second, service coverage was to increase to 100 per cent by the end of the contract. In other words, the private operators were to provide service to all inhabitants within 25 years. The problem in this case was that no one knew how many inhabitants Jakarta had. Government calculations of population size, subject to periodical revision, were known to be inaccurate. Chart 1 illustrates this point. It shows how such a revision early 2000 created a sudden drop in the service coverage indicator.

To complicate matters, in the contract documents all technical targets but the target volume of water billed and purified water quality were preceded by the adjective 'indicative'.<sup>14</sup> This is a crucial qualifier. It meant that the concessionaires were only under a moral obligation to achieve targets. How could this have happened? Recall that the contract was prematurely closed by presidential order. Under time pressure, the Jakarta government and the private providers were unable to finalize their negotiations. They settled the issue by establishing provisional technical targets. By doing so, they invalidated the penalty and reward structure that was supposed to bring the incentives of private providers in line with those of the government.

#### *The Jakarta concession: the impossibility of contract termination*

In February 1998, the two private operators commenced operations. During the dramatic political events of May 1998, British and French staff fled the country. Upon their return they found that PAM Jaya had resumed control of operations. PAM Jaya management refused to hand back the reins to Lyonnaise and Thames, claiming that the contract was invalid because it violated public tendering rules. The French, British and Japanese embassies were involved in the ensuing negotiations, the end result of which was that Lyon-

<sup>14</sup> Cooperation Agreement Schedules 1997:8.2.1. The contract set the penalty for water volume billed and water quality targets as follows. For the first two non-compliance events detected annually, a warning would be issued. Thereafter the concessionaires were to pay a Rp 5 million per additional 'event', about US\$2,000 at pre-crisis exchange rates (Main Contract 1997:118).

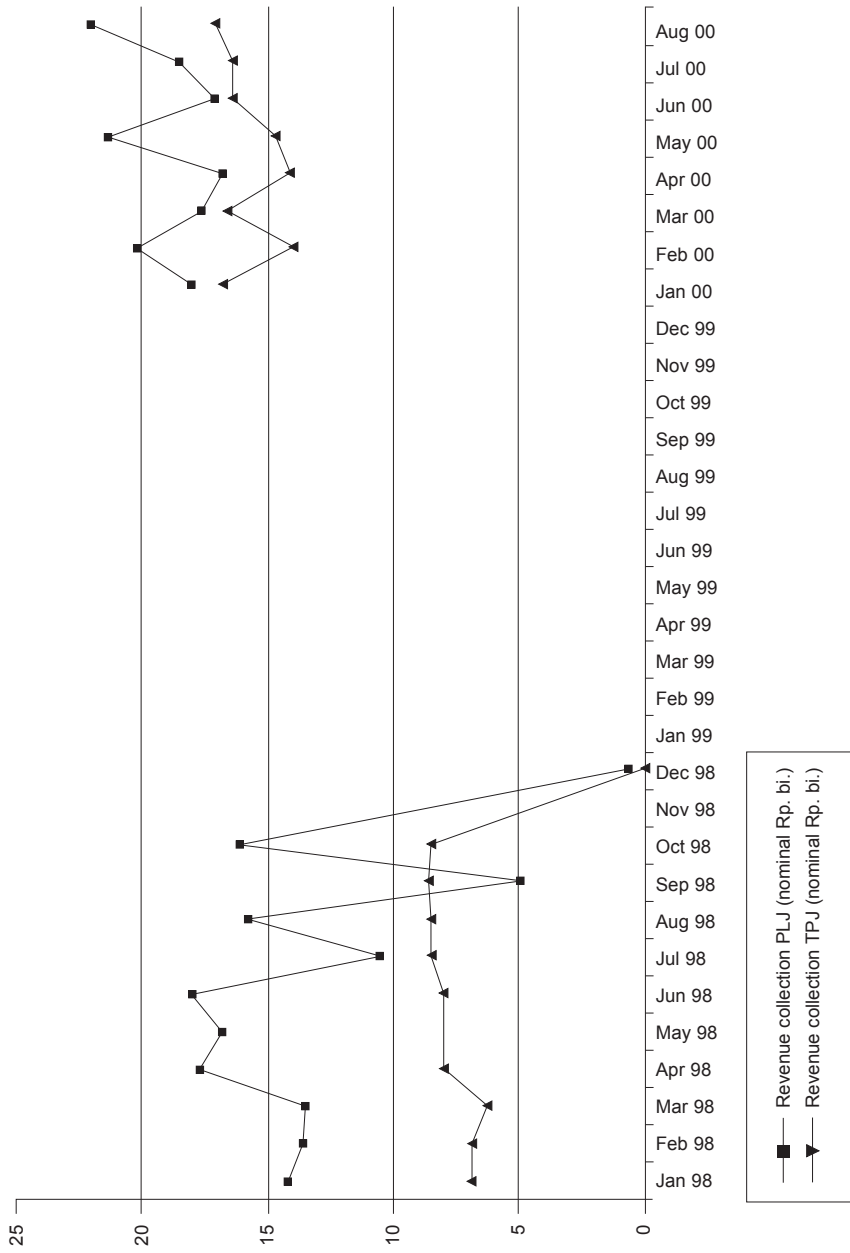


Chart 2. Collection of water charges, PLJ and TPJ, Jan. 1998-Aug. 2000

naise and Thames bought out their local counterparts and resumed operations. This did not end the private operators' problems, however. They now faced labour problems and became embroiled in protracted contract re-negotiations. The Jakarta contract dealt awkwardly with the issue of labour redeployment. PAM Jaya was overstaffed (McIntosh and Yniguez 1997). The water PPP constituted an opportunity to tackle this problem. Many of water PPPs in the 1990s involved downsizing. At the launch of a PPP utility employees would be offered the choice of retirement and a golden handshake or joining the private operator. If they threw in their lot with the private operator, workers forfeited their right to government protection (Braadbaart 2005). The Jakarta government decided not to go this route. When the concession contract came into force, all PAM Jaya workers, except a small minority retained by PAM Jaya itself, were seconded to the two private operators. This created much uncertainty among seconded PAM Jaya staff. Throughout 1999 workers belonging to a labour union, Serikat Pekerja PAM Jaya, staged demonstrations. The union was strongly opposed to the concession and claimed that the contract awarding was tarnished by collusion and that the privatization of water services violated basic laws and Jakarta regulations. Furthermore, the union alleged that some workers had sustained income losses after their secondment (Indonesia Corruption Watch 1999; Schwartz 2000).

Anti-privatization sentiment radicalized when militant workers refused to collect water charges, temporarily occupied a works office, destroyed business property, and in one instance welded shut doors at a purification works. As a result of this turmoil, the managing director of PAM Jaya, believed to be involved in the opposition, resigned in May 1999. These developments unfolded amidst an atmosphere of violent political unrest in Jakarta. That this was not good for the water business can be read from Chart 2, which shows monthly collections by the two private operators over 1998 and part of 2000. Data for 1999 are unavailable. They may not even exist. Whichever the case, collections petered out completely by the end of 1998.

By mid-2000, the private operators had the labour unrest problem more or less under control. Some months earlier the operators and the Jakarta government had announced the completion of a revised concession contract. Contract re-negotiation talks, ongoing since June 1998, produced the basic elements of a new contract by March 2000. Salient features of this new structure were: an adjusted water charge indexation formula, based on the principle that private operators could not charge a rate to the Jakarta government in excess of the prevailing water tariff; enhanced monitoring and control functions for PAM Jaya, and a partial shift of the risk burden towards the private operators. Finally, the private operators stated that they agreed to accept all PAM Jaya seconded staff on a permanent basis.<sup>15</sup> While this solved some of the most fundamental issues

<sup>15</sup> Global Water Report, 14-4-2000.

in the PPP, negotiations continued after this announcement.

By this time the first and second parties were structurally redesigning the contract. One might surmise that the Jakarta government would be better off terminating the contract. But termination was no option. The Jakarta government was unable to terminate because the national government would not allow it to do so. Termination might provoke extensive media coverage and have repercussions on Indonesia's already tarnished image in the international investor community. Perhaps not even the national government could terminate the contract. One can imagine a scenario where the French and British governments would have thwarted such a decision by mobilizing the support of the International Monetary Fund.

### *Conclusions*

In 1997 the Indonesian government launched an experiment in the privatization of water services in Jakarta. The concession contract was expected to solve the drinking water utility's investment and operational problems. The Jakarta concession however violated many principles of contract design. The contract was negotiated rather than competitively tendered. The contract did not deal adequately with risk and uncertainty, nor did it spell out services unambiguously – in short the contract documents signed in 1997 were essentially unfinished. It did not help that the concession was launched in the worst possible circumstances. When the private operators assumed control, Indonesia found itself in a deep economic crisis. A sharp downturn of macro-economic indicators destroyed the 25-year financial projections laid out in the contract. This was more than the contractual framework could handle. The contract failed within six months, with first and second parties reverting to open-ended negotiating.

The ill-fated launch of the Jakarta concession sits uneasily with economic thinking on the comparative performance of government and market production. Economists argue that markets can, barring exceptions such as military defence or policing, outperform governments. Ultimately, this theorizing rests on a conviction that real-world markets can be made to behave more or less as the virtual and virtuous markets of micro-economic theory. Contracts are an often overlooked but crucial element in this argument. When spot markets fail, as they frequently do, privatization theorists assume that contracts will repair the damage. To be sure, contracts are versatile devices. But, as the Jakarta contract illustrates, they are no panacea for market failure. Launching an ambitious PPP for a monopolistic industry in a high-risk country environment was asking for trouble. The key lesson from the Jakarta concession is that a realistic appreciation of what contracts can and cannot do should be an essential part of guidelines for the design of public-private partnerships.

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ANTON LUCAS AND ARIEF W. DJATI

## The politics of environmental and water pollution in East Java

The story of how the Surabaya River was polluted, and the problems involved in trying to clean them up, is the major focus of this study.<sup>1</sup> The article focuses on the politics of environmental pollution of the Brantas River, so important for East Javanese people, and in particular its estuarine distributaries the Surabaya River and the Kali Mas, which flows through the centre of Surabaya, Indonesia's second largest city. This river system is the main source of drinking water for Surabayan residents and its satellite towns. As the source of drinking water, the quality of the Brantas River and its estuarines are important to ensure an adequate and clean supply of drinking water. How has water become a political issue in East Java and in Surabaya? What have been the responses of government, bureaucrats, communities, factories and water company officials, to the pollution? What action has been taken by local (*kabupaten*) government and by provincial level governments to combat this pollution? There are many political dimensions to the provision of drinking water, and the process through which 'dirty' water in the river becomes 'clean' water supplied to residential houses.

After describing the history of water pollution in East Java, which became a political issue eight years before the national Environmental Act was passed in 1982, we explain how the East Java provincial governor, his subordinates, and local communities handled the pollution problems on the Brantas river and its estuarine distributaries, the Porong River, Surabaya River, and Kali Mas. The bureaucracy, from provincial to municipalities and regencies, did make efforts to eliminate pollution, caused by factories and communities located on the rivers. We describe community reactions to river pollution in Surabaya and the various government programs to keep rivers clean (*Prokasih* and *Proper Prokasih*). In addition, we examine police department initiatives to handle pollution cases according to the new environmental laws.

<sup>1</sup> This article is a short version of Anton Lucas with Arief Djati, *The dog is dead, so throw it in the river; Environmental politics and water pollution in Indonesia*, Clayton: Monash Asia Institute, 2000. [Papers on Southeast Asia 51.]

In the second section we explore the problems of clean drinking water in Surabaya and East Java: the conversion of dirty river to clean drinking water, and the communities' responses to poor quality water. We also examine an alternative source of drinking water, the Umbulan Spring project.

*Water pollution and environmental politics*

Until the last thirty years or so, environmental pollution was an unimportant issue for East Javanese people. The Surabaya River, the primary source of drinking water in the region, was used as a dumping ground for rubbish, as reflected in a popular Javanese jingle:

When the guest is here, roll out the mat,  
 When the mat is torn, patch it with sticky rice,  
 When the rice cake has gone bad, give it to the dog,  
 When the dog is dead, throw it into the river,  
 When the river is flooding, leave the dog on the bank.<sup>2</sup>

Consequently, many factories were allowed to be built along the river in the 1970s without having adequate water waste treatment plants. Their waste products were pumped directly into the river.<sup>3</sup> The impact of this pollution on the quality of the water seemed to go unnoticed until some incidents of heavily polluted drinking water in Surabaya in the mid '70s. These incidents inspired the provincial government to issue regulations protecting rivers from water pollution, and for the first time brought a political dimension to an environmental problem.

The first major factory pollution case in Surabaya occurred in July 1975, when fish died in large numbers as a result of liquid waste from a Korean-owned food additives factory located on the banks of the Surabaya river. As a result of this incident (and a subsequent survey of waste treatment facilities in factories located on the river), Environmental Pollution Control Teams were set up to monitor factories suspected of emptying untreated or poorly treated waste into the Surabaya river. A similar pollution incident two years later saw the temporary closure of four factories, the banning of the construction of new factories on the river bank, and the issuing of a set of quality standards

<sup>2</sup> The Javanese jingle goes: 'E dayohe teka, E beberno klosa, E klosone bedah, E tembelen jadah, E jadahe mambu, E pakakno asu, E asune mati, E buwaken ing kali, E kaline banjir E buwaken pinggir'. Interview with Masdoekie, Surabaya, 14-2-1997. A shortened version is in *Surabaya Post* 1994.

<sup>3</sup> The Balai Teknik Kesehatan Lingkungan (BTKL, Environmental Health Technology Laboratory) estimates that 60 per cent of the pollution of these two waterways comes from factories (Surabaya Legal Aid Institute Director Andik Hardiyanto, personal communication, 28-4-1997). The Department of Industry's Institute for Industrial Research says the bulk of the pollution is from domestic waste from the 92,000 people living within 0.5 kilometres of the river.

for industrial effluent, with compulsory compliance within three years.<sup>4</sup> Pollution scares continued however into the 1980s, with both local and national Dewan Perwakilan Rakyat Daerah (DPRD, Regional People's Consultative Assemblies) becoming involved in the debate about how to respond to the pollution problem. The provincial government also began naming publicly those factories which had been given pollution warnings, and threatened with closure by the Governor of East Java, Soenandar Prijo Soedarmo (*Kompas* 1981; *Merdeka* 1981; *Warta Berita Antara* 1981).

### *Bureaucracy, communities and industrial river pollution*

Today, in the era of *reformasi*, there is discontinuity in East Java between provincial governments of the past and the current provincial government when it comes to the issue of water pollution. Unlike their predecessors, who fought hard against environmental pollution, the incumbent government neglects this issue. Their attention is focussed on political survival, on defending their positions and supporting their parties, with no apparent concern for environmental issues. The current government has ignored what was highlighted by its predecessors. The absence of various environmental programs has worsened environmental conditions in East Java. Consequently, factories that have little concern for the environment have been able to ignore environmental regulations and return to their old polluting ways. Several of them reverted to not using, or using improperly, water waste treatment facilities, and began throwing their waste directly to the river system. Without continual vigilance and monitoring of waste treatment plants, factories that had been blacklisted because of environmental concerns by former regional governments, are polluting the river again. The quality of river water deteriorated until the stage where the quality of drinking water is again degraded. However, communities are still consistently complaining and protesting about environmental pollution. In several current cases, where both land and water pollution have had an impact on local communities, people are protesting again to factories and to the regional government, in much the same ways as they have in the past.

The situation was different fifteen years ago. After several serious cases of water pollution in the 1970s, and the implementation of the national Environmental Act in 1982, the regional government of East Java stepped up its campaign against polluting factories. Government pressure on polluting factories intensified in early 1987, when progressive officials led by the Deputy Gover-

<sup>4</sup> *Tempo* 1977; *Lembaran Daerah* 1977b. The effluent standards covered eighteen heavy metals and other inorganic chemical compounds, four organic chemicals (hydrocarbons, oils, phenols and cyanide). The maximum pollution load measured by Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) levels were set at 30 ppm and 80 ppm respectively for all rivers in East Java (*Lembaran Daerah* 1978).

nor of East Java began a series of new measures: calling factory owners in for meetings, making surprise visits to factories and taking safaris on the river, as well as continuing to expose polluters in the press. River inspection trips were useful, according to Deputy Governor Trimarjono, because you could see the factories' 'backsides' (*pantat pabrik*). By this he meant of course that only by travelling along the river by boat could you see which factories were emptying industrial effluent into the river. Often used in East Java, surprise visits to factories, referred to as *sidak* (*inspeksi mendadak*), were also stepped up. A new word – *gebrakan* – was coined to describe these surprise actions of officials against factories.<sup>5</sup> The term also denotes the increasing community and government frustration with factories that would not comply with water control standards set down, as they were repeatedly reminded, in the local government law of 1978. Also, for the first time, international pressure was brought to bear on East Java environmental issues. The World Bank's offer of a loan to build a new water installation on the Surabaya River was threatened if the provincial government did not take drastic action to clean up the pollution first. Trimarjono, anticipating the forthcoming World Bank visit, called a meeting; it was very poorly attended by junior management staff (the company directors did not appear). Angered by this response, Trimarjono began to make surprise visits to factories suspected of pollution, accompanied by a busload of officials and journalists. Once at the factory, he threatened to enforce compliance through the courts, or factory closures. Trimarjono told factory owners, who warned that such measures would create unemployment, that they only had themselves to blame if their factory was closed.

Trimarjono's example of surprise visits was continued by Assistant Governor H. Masdoekie between 1992-1995. During this period many factories had installed waste treatment plants, but did not operate them, or only operated them when they knew government officials were going to visit. Hence the importance of sudden inspections. Officials knew from the colour of the water near the outlets from the factory that waste treatment plants were not being turned on, particularly during the dry season when the flow of water in the river was reduced. Textile mills and bean curd factories were targeted. What to do with the latter was the same bureaucratic dilemma for officials like Masdoekie and Trimarjono. The untreated water used for making bean curd was pumped out of the Surabaya River, which made the bean curd a health

<sup>5</sup> *Gebrakan* is a Javanese word literally meaning to strike or hit a wooden surface, thus a *gebrakan* becomes a strike or hit at those responsible for river pollution. The local press took up the idea of officials striking at a common enemy (the factories), hence the often used phrase '*gebrakan Trimarjono*' referring to the Deputy Governor's unannounced strikes (surprise visits) to factories. A *gebrakan* has the connotation of an action done directly, immediately, spontaneously, by a high government official, to shock someone. The word can also be used as a verb, for example, 'Deputy Governor of East Java Trimarjono SH without warning struck at (*menggebrak*) both government and privately owned factories polluting the environment' (*Kompas* 1987).

hazard. But bean curd was the only source of protein and part of the basic diet of the population. So bean curd factories were a health hazard because of the polluted water used in making their product, and because the untreated waste emptied into the same river, from which they pumped their water to make the product in the first place. Factory owners said that waste treatment plants were difficult to run. Bribes were offered to officials inspecting the factories.

Polluting factories were exposed in the local press, to embarrass their owners. Officials considered that naming factories would be a sanction they could not ignore, as it would affect their credibility. According to Trimarjono:

I hit them hard in the press. If a factory had undertaken to install a waste treatment plant and then failed, I would announce it and tell them publicly they had broken their promise. Or I would say that I would publicly announce that I was returning on such and such a date to the factory, and this would be in print in the newspapers the next day. In this way I hoped to give them a fright. They would get a kind of social sanction from the community in this way, if it were announced in the press it would make them reluctant (*kapok*). We were faced with a dilemma. People could die after a while from pollution if we tolerated the [untreated] factory effluent [being put into the river]. If the factory were closed then that would 'kill' people's livelihood immediately. So it was a choice of death by disease or a different kind of 'death' from unemployment.<sup>6</sup>

What was pioneered by Trimarjono and Masdoeki at the provincial level was emulated at *kabupaten* level by their subordinates. Between 1982 and 1997, there were many actions taken by municipalities and regency governments to handle pollution in their areas. The Bupati of Nganjuk, for example, acted decisively in 1995, closing concealed effluent drains from a paper mill, and requesting the police to take legal action against the factory (*Surabaya Post* 1995). Meanwhile, the Bupati of Malang closed a cassava factory because it was not complying with the Governor's instruction (*Surya* 1997).

It is interesting to note here factories' reactions against initiatives from government officials. Factories put pressure on both government officials and journalists not to expose their business names if they were breaking environmental laws. Cases of factories intimidating officials using hired henchmen, are difficult to document, although attempts to bribe officials were apparently commonplace. Assistant Governor Masdoekie alludes to factories offering bribes to officials not to take action. But other types of pressure were brought to bear on bureaucrats, what Masdoekie calls the informal politics (*politik tidak*

<sup>6</sup> Interview with Trimarjono in Surabaya, 15 January 1997. Trimarjono was born in Ngawi in East Java on 14 April 1933. After finishing a Law degree at Gadjah Mada University in 1962, he joined the Indonesian navy as a Lieutenant, and was appointed secretary to the provincial government from 1967-1985, when he became Deputy Governor, until 1990. He is at present chairperson of the East Java provincial DPRD, and believes that, in East Java anyway, 'the community is more critical of the work done by provincial assembly representatives and expects greater responsibility from them' (*Apa dan siapa* 1996:229).

*resmi*) of evasion by factories. Journalists warned Masdoekie about bribes and threats of violence from factories. Once a Chinese businessman arrived at his house with a suitcase of money, but they never offered him women.<sup>7</sup>

Besides this kind of indirect intimidation, other more subtle political pressure was brought to bear, exploiting connections between the large conglomerates and their connections with politically powerful decision makers. Again it is not possible to provide evidence of such connections and how they affect provincial governments' attempts to implement pollution regulation and controls. But former East Java Deputy Governor Trimarjono was quite frank about how these connections work in relating an experience he had while in office:

We were having a lot of problems with [paper factory] PT Tjiwi Kimia. They built a lagoon to process the effluent. But the smell became a problem as the lagoon filled up. Finally the local community protested, and Tjiwi Kimia didn't know what to do. They asked my help. I got them to make a pipe from the lagoon to the sea, so the waste could be emptied. But there were more problems. One day [the factory owner] Eka Tjipta Widjaja arrived at my office. He brought a 'powerful letter' (*surat sakti*) from Jakarta which asked for facilities from the police and the provincial government. So in turn I threatened him back (*saya ancam balik*). 'If you have a problem on your hands in the future and there happens to be, say, a fire in your factory, or protest about effluent, the *kabupaten* security authorities (*muspida*) will not act without my instructions.'<sup>8</sup>

As well as pressure from outside, pressure from within the bureaucracy also occurs. This usually happens when an official at a higher level disagrees with or has a different opinion from a subordinate, but for whatever reason the subordinate official refuses to change his opinion or continues to oppose his superiors. The result can be that the more senior official in rank then tries to block or hamper his subordinate or put pressure (direct or indirect) on the recalcitrant

<sup>7</sup> Masdoekie suspects that a new regulation requiring that third level echelon officials (like himself) retire 'early', at 58, was because certain bureaucrats in the provincial government who were close to factories, wanted to see him out of the way. As former chairman of the East Java branch of the government Golkar party, he had expected to be on the election ticket for the national DPR, but this never happened. He is now chairperson of the provincial association of returned pilgrims to Mecca. (Ikatan Persaudaraan Haji Indonesia Propinsi Jawa Timur).

<sup>8</sup> Interview with Trimarjono in Surabaya, 15 January 1997. Under Soeharto's New Order high ranking officials would write notes asking for favours for their 'clients' from local officials. Most officials at the provincial level would find it difficult to resist requests from a man with the power and influence of Eka Tjipta Widjaja, who heads Indonesia's second largest conglomerate business empire, even without a '*surat sakti*'. The environmental NGO Sekretariat Kerjasama Pelestarian Hutan Indonesia (SKEPHI) notes that conglomerates like that of Eka Tjipta represent ersatz capitalism in Indonesia, they disregard laws and official regulations in their business dealings, and are closely aligned with the political power holders. For a useful business biography of Eka Tjipta Widjaja and his CV Sinar Mas group, from an environmental NGO perspective, see SKEPHI 1994:88-90. According to Trimarjono, Tjiwi Kimia finally installed a UPL, although not before being taken to court in the early 1990s. He says that now the factory regards him as their 'saviour' (*dewa penolong*) for forcing them to install proper pollution control equipment.



official. A typical example of internal conflict within the provincial bureaucracy was the case of Assistant Governor Masdoekie, who favoured the '*gebrakan*' approach, while his immediate superior, the new Deputy Governor Harwin Wasisto wanted a less confrontational style, 'not shouting loudly and accusing each other' (*tidak gembar gembor dan saling tuding menuding*) (Surya 1993e).

Unfortunately, these initiatives have ended since the period of *reformasi* in 1998. The provincial government's successors now concentrate on current political issues. With the new political system, the governor and subordinates at regency and municipality level are chosen by the regional parliament (Arief Djati 1999). Therefore the positions of parliament members, who come from various political parties, are important. They can choose to remove mayors or regents according to their own interests. Unfortunately, their interests lie with their parties and they seem to have little concern for environmental issues.

The attitude of factories towards pollution control changed in 1989 after the introduction of the national Clean River Program. The Prokasih program covers all areas of river pollution, including identification of sources, warning, negotiating, monitoring and law enforcement. This included: identifying the main polluted rivers, which factories were sources of pollution (industries and companies), setting targets, and providing information, training and assistance in installing waste water treatment plants. It also included monitoring their waste water effluent – a stumbling block which has proved to be the main problem in implementation of the programme.<sup>9</sup>

The Prokasih program was required to review its performance quarterly and report its results to the governor.<sup>10</sup> Meanwhile, the Proper Prokasih or Business Performance Rating program gave a pollution rating to companies involved in the Prokasih program. The priority targets were the pulp and paper, textile, petroleum, palm oil, rubber and processing industries. Ratings range from gold (companies or business activities who best used available clean technology, had zero discharge of pollutants, and whose environmental impact management efforts were an example to other countries), through green, blue, red, and finally black (for companies or business activities which had no environmental impact management and whose activities caused serious environmental concern). The main objective of Proper Prokasih was voluntary compliance rather than legal coercion. No court actions were taken

<sup>9</sup> The founder of ICEL (Indonesian Centre for Environmental Law), Achmad Santosa (1996a:27) writes that 'Prokasih has been beset by inconsistencies in implementation, particularly in monitoring waste water effluents [...] irregularities in monitoring are compounded by inconsistencies in imposing administrative sanctions, by the involvement of various agencies in the Prokasih ad hoc team and the shortage of financial resources'.

<sup>10</sup> *Himpunan Peraturan* 1995:42-3. Achmad Santosa also notes that Prokasih would not be necessary if the system of water pollution control permits, as stipulated under Regulation No 20/1990 had been implemented. If Santosa here is referring to permits for disposal of liquid waste (that is pollution licenses), as far as the authors are aware, these have never been issued in East Java.

against companies with a consistent black rating for example. In the beginning companies who conducted voluntary environmental audits were exempt from Prokasih ratings, and there were some strange anomalies, as when PT CSI received a green rating in the second audit in December 1996.<sup>11</sup> Another heavily polluting paper mill, PT Tjiwi Kimia, saw its blue rating downgraded to red (Environmental Impact Management Agency 1997:9). None of the six heaviest polluters with black ratings over the period in which the ratings were given were located in East Java, but neither did the province have any companies that were in the green rating band (except PT CSI in March 1997). All were either blue (companies that complied with all regulations) or red (companies that have made efforts to control effluent but do not achieve compliance with allowable discharge levels).

Thus, the objective of those programs encouraged factories to be environmentally friendly by using water waste treatments plants. Unfortunately, during the period of economic crisis after 1997 all these programmes ended. If not officially, at least they were no longer being implemented. Without these programmes, factories are again free to throw their effluent in the rivers.

As a consequence, since the era of *reformasi* began, environmental issues have been forgotten by the East Java political elite. The quality of water from rivers has deteriorated. Perfect examples of the neglecting of environmental problems are recent cases of water pollution in East Java. PT CSI, for example, has had many environmental problems since its establishment in the 1990s. For example, pollution from its factory in early 2001 seeped into neighbouring aquaculture ponds (*tambak*) in Pasuruan, killing shrimp and fish (*Surya* 2001a). Shrimp farmers have protested to the local assembly and to the Bupati of Pasuruan. The Bupati promised to be the mediator in this case (*Surabaya Post* 2001a), but he did nothing. Farmers then protested to the Bupati that he was a liar (*Memorandum* 2002). A similar incident occurred in Surabaya. The Surya Agung Kertas company (SAK), which also had environment problems during the 1990s, polluted the Surabaya River in September 2001. There was no serious response from the Surabayan municipality or Gresik regency in the face of this pollution, even though peasants close to the factory were seriously affected. Their rice fields were damaged by the polluted water. Two months later, in November 2001, the same factory released more pollution into the river. This time, the Gresik regency parliament invited factory representatives

<sup>11</sup> Shrimp aquaculture farmers had protested violently against PT CSI (Cheil Samsung Indonesia) in November 1995, accusing the company of polluting their shrimp ponds. According to the Badan Pengendalian Dampak Lingkungan (Bapedal, Environmental Impact Management Agency), this company had achieved a green rating because their liquid waste analyses were 50% below the allowable standard, 'it performed good housekeeping, the park around the factory was nice, and well ordered, and the company reported its liquid waste analyses and flows regularly to Bapedal as required' (Environmental Impact Management Agency 1997:10).

to attend their meeting. At that meeting, they accused the factory of water pollution in the Surabaya River. However, instead of being punished, the factory was given a six-month period to improve its water waste treatment facilities (*Surabaya Post* 2001b). This disappointed the local NGOs so much that one of them, Ecoton, then tried to take the factory to court, without success. In another case, Ngadiredjo sugar mill in Kediri also polluted the Brantas river system. The effluent from this factory overflowed and water in the river became black, as did the drinking water of local residents, but again there was no serious reaction from the Surabaya municipality (*Kompas* 2001). Even when the police took the Ngadirejo sugar mill to court, the case failed because 'no evidence of proof was found' (*Surya* 2002). All these cases show that regional governments are not taking environmental and water pollution as seriously as their predecessor did, and are doing little to protect the people's source of drinking water.

The regional government's reaction, however, was far different from the response of local communities to environmental pollution. As victims of environmental pollution, communities still continue with their complaints and protests against pollution from factories. The forms of community protest are similar to those of the 1990s. The political context of this protest is often to focus on the cause of the pollution (for example a particular factory) in an attempt to put pressure on the authorities to help resolve the environmental issues. Even if authorities react positively to protests, the real problem is getting the factory to change its effluent treatment facilities. On the other hand if the community that is protesting feels that it does not get a positive response, they will go to the next highest authority, or if increasingly under pressure, public demonstrations (*unjuk rasa*) may occur, which may be peaceful protests, or may involve violence.

More often than not, media reports indicate that repeated written and verbal protests to local officials received no response at all. Attempts to meet with factory management were often unsuccessful. In many cases, local citizens took their protest to the local DPRD, but no positive responses were reported, except a commitment of these local assemblies to be mediator. The best example is the pollution of PT Semen Gresik in Tuban recently. The farmers who were the victims of this pollution held protests at the factory. They also went to the factory and regency office to appeal for their cause. On the way to their destination, police blocked the demonstrations and asked farmers to stop their protests (*Surya* 2001b).

### *The role of the police*

The role of community protest against pollution has been an important factor in the development of environmental protection policies in East Java since

the first water pollution cases in the mid-1970s. However, not all the groups who worked against environmental pollution in the past are still active. The role of the police is crucial as it is their task to uphold the environmental laws enacted by governments. As we will see, the police, who were active in environmental protection during the early 1990s, ceased their efforts in the period prior to reformasi. From 1998, police operations against polluting factories were reduced, and since that time there has been no reporting of police involvement in environmental issues.

The police in East Java played an important role in making the community aware of Prokasih (Clean River Program) in its early stages. This was due mainly to the role played by East Java's progressive police chief at the time, Major General (Police) Koesparmono Irsan (now a member of Indonesia's Human Rights Commission). This campaign, which began in December 1990, produced some interesting statistics in its first year of operation. The role of the police in tackling industrial pollution of the Brantas River, specifically in the implementation of Prokasih, has as its legal background the Environmental Management Act of 1982 (UULH 1982). In order to implement this legislation a number of 'implementation acts' (*peraturan pelaksana* or PP) had to be passed, one of which was PP 29/1986 concerning AMDAL (Environmental Impact Analysis)<sup>12</sup> which made it possible to bring polluting factories to court, if necessary on a charge of subversion (*Surabaya Post* 1987).

Before his appointment as East Java's police chief, Koesparmono Irsan had already been involved in an important pollution case in his previous position as national Director of Police Intelligence (the Indonesian equivalent of a Criminal Investigation Bureau) in Jakarta from 1986 to 1990. During that time he investigated the importing of 'hundreds of drums' of 'dangerous and poisonous or toxic material' (known as B3: *bahan berbahaya dan beracun*) by an Indonesian company owned by Tantyo Sudharmono, a son of then Vice-President Sudharmono. Tantyo Sudharmono's company was reportedly being paid \$553,000 per imported drum of B3 waste in the port of Tanjung Uban in Riau province. The drums of toxic waste were stored at a nearby beach. The case went to a local court, which fined the captain of the ship that brought the drums of toxic waste from Singapore, not the importers.<sup>13</sup>

<sup>12</sup> Out of sixteen implementation regulations which Andik Hardiyanto maintains were needed four have so far been passed concerning, apart from Amdal, water pollution, B3 (Bahan Bahaya dan Beracun, toxic waste), and PP No. 5/1990 concerning land and ecosystem conservation (Interview in Surabaya, 9-1-1997).

<sup>13</sup> Interview with Koesparmono Irsan in Jakarta on 1-9-1998. Born in Pematangsiantar in 1940 (where his father worked as an engineer in BPM, the Dutch-owned oil company), Koesparmono was trained in the national Police Academy, and also has degrees in law and business administration. He served in the police force in Irian Jaya, and as head of the West Sumatra police, in the criminal investigation department, and as Governor of the national Police Academy.

Seeing the pollution situation in East Java in 1990, the new provincial police chief decided to initiate the police's own campaign against polluting factories (Operation Kemukus):<sup>14</sup>

I said to my police staff, 'We are going to act on the factory pollution problem'. My officers gave me the details of the cases, but the problem was the Environmental Management Act. You not only have to prove there is pollution, but you have to show where the victims are. I talked to the provincial government environment people [Bureau of the Environment] and the local Attorney General's Department. Our problem was that we didn't have anyone in the provincial-level police who was an environmental expert. So I asked for one from Jakarta. They sent someone from the national police headquarters (MBAK) laboratories. I was told to take water samples upstream and downstream [from the piggery and *tofu* factories], but I didn't know how far upstream or how far downstream. Besides having a polluting piggery [PT Sidomulyo], the Porong River also had a food additives factory which made the source of pollution hard to determine (Koesparmono Irsan, Interview in Jakarta on 1 September 1998).

In preparing cases to go to court, police had to follow strict procedures regarding provision of proof of pollution by particular factories or industries, and the necessity of showing a causal connection between the actual effluent discharge of a particular factory, and the polluted state of the river (*Surya*, 1991b).

The first Kemukus operation in East Java between August and December 1990 was thus designed to compile an inventory of companies polluting the environment (*Surya* 1991d). The police took effluent samples from suspected factories during their official operating hours. Apart from testing liquid effluent, which was sent to the BTKL (the Health Technology Laboratory), the police involved in the Kemukus operation interviewed factory owners and managers, and the Minister for Population and Environment Emil Salim, who publicly supported the police operations, announced that 738 factories had received warnings from the police because of pollution activities. Of these, 212 were told to install waste treatment facilities, 211 factories were 'put in order' (*ditertibkan*), 74 were evaluated as having 'the wrong attitude' (*membandel*) and were threatened with court action, while a further 24 factories received penalties.<sup>15</sup>

<sup>14</sup> The name *kemukus* (from *kukus* meaning smoke or steam) was taken by Koesparmono from the Javanese shadow play where it means a dangerous dark cloud (Interview in Jakarta on 1-9-1998).

<sup>15</sup> *Surya* 1992e. According to this report none of the 74 companies threatened with legal action were actually taken to court because the first Operation Kemukus focused on making an inventory of polluting companies. According to Koesparmono, 219 factories received warnings, and ten were taken to court, but all had the charges dismissed, except the piggery case (see below) which went to the Supreme Court (Interview in Jakarta on 1-9-1998).

The second operation which lasted from July to November 1991 aimed at direct legal action against the factories (*Surya*, 1991c). In this second Kemukus operation, the effluent of 48 factories throughout the province suspected of polluting the environment was tested in the police laboratory. Eight factories were targeted as being heavy polluters in the Mojokerto-Sidoarjo-Surabaya region, but only one was investigated further (*Surya* 1991e); at first the police did not reveal the identity of the factory, but the local press discussed the case openly (*Surya* 1991b). Pakerin was one of factories that was caught by this operation. Although the effluent water samples collected during the Kemukus operation clearly showed that the factory effluent was well above the maximum BOD and COD levels, and although the Operation Kemukus Team worked with the Department of Justice and were supported in public statements by Salim, the case never reached the courts, probably because it was not supported by Governor Basofi Sudirman, because he considered the factory important economically for East Java.

Early in 1995 the third Kemukus operation was launched and seven factories, later reduced to six, were named as polluters. The deletion of PT Avil Asia Tile from the list is an instructive example of the difficulties faced by the police or civil authority in obtaining proof that a factory was polluting the environment. A joint investigating team of police and Bapedal (Environmental Impact Management Agency) members arrived unannounced to examine the waste treatment plant in the tile factory, only to find the factory plant and equipment closed down (*Surya*, 1995a). According to later reports, the Avil Tile factory management not only closed down operations, but ordered all employees to clean up the site, remove all rubbish and also wash the dust of the walls of the factory. This made the joint investigation team's job of finding 'proof' of pollution in the waste treatment plant or in the environs of the factory difficult. This led to the comment by the new provincial chief of police Roesmanhadi that 'a third party had deliberately tipped off the factory about the planned operation, so it could stop its production before the investigation team arrived' (*Surya* 1995b).

### *Legal actions*

The possibility of court actions against factories over industrial pollution was first raised in the local East Java media in November 1982, eight years before the first Kemukus operation. Since then East Java has pioneered legal action against pollution with six out of nineteen environmental cases brought to the courts in Indonesia before 1998.<sup>16</sup> In this context, we will briefly examine some legal actions that arose as a result of the Kemukus operations. The general impression is that environmental cases are hard to prove, and the court

<sup>16</sup> For a summary of these six cases, see Anton Lucas with Arief Djati 2000: Table 3, 120-2.



proceedings are subject to interference from either the government (which wants to keep a particular company operating) or the company concerned.

One such case to come before the courts in East Java was a criminal action brought by Mojokerto district against the paper mill PT Pakerin. Pollution readings showed that the effluent from the company was way above the maximum levels set by the regional government.<sup>17</sup> Under the agreement signed under the Prokasih Program, PT Pakerin had until 31 December 1991 to clean up its effluent. In early 1992, head of the Mojokerto *kabupaten* Department of Justice, Hantoro Soerमारjo, announced that his office was ready to take the case to the Mojokerto district court as soon as possible, but was 'waiting for instructions from his superiors' (Surya 1992c). The Environmental Minister Emil Salim, also wanted PT Pakerin prosecuted as part of the Clean Rivers Program. So did the police, who had identified the factory as one of 566 offenders in the first Kemukus operation. The Environmental Health Technology Laboratory (BTKL) was determined that this time the evidence would lead to a conviction:

For a 'material offence' (*delik material*) you have to prove that effluent [from a factory] has damaged the living environment. We thought that you could prove this by showing how the effluent affects fish with bioassay [English original] tests on the fish. We did bioassay tests for the Pakerin case. We spent Rp 2 million testing 5000 fish. We brought them live into the lab, one thousand at a time, and tested them with different concentrates of effluent we had collected in jerry cans at the factory liquid waste outlets, from 100% down to 12.5% effluent concentration, with 10 fish in each sample. Most fish died in the 37.5-60.5% effluent concentration range. We had to repeat the experiments within this range so we knew at what effluent levels the fish died (BTKL source).<sup>18</sup>

However politics would ensure the case never got to court. First the activist Mojokerto public prosecutor was transferred to South Sumatra. The provincial Justice Department, having previously announced they were ready to prosecute, suddenly dropped the case without any public reason. Governor Basofi, who on 13 September 1993 had publicly asked the local Justice Department to look carefully at the facts in preparing their court brief over the PT Pakerin pollution case, reinforced suspicion of political interference. Using typically Indonesian bureaucratic language, the Governor's message was clear to those who knew the situation:

<sup>17</sup> The pollution load of BOD was 1,190 while COD was 3,101 (see also note 6)

<sup>18</sup> The number of fish that die is also important in toxicity tests, that is if five or less fish survive an effluent is 'out of compliance'. Thus bioassay tests are designed to measure factory effluent toxicity, that is 'the ability of an effluent to kill or interfere with the growth or reproductive processes of aquatic life'. The toxicity of an effluent measures the effects it has on the health of aquatic organisms. However 'it is being increasingly recognised that no single test method or test organism can be expected to satisfy a comprehensive approach to environmental conservation and protection' (EMDI 1993: Appendix H).



It is up to the Justice Department, whether the Pakerin case is taken to court or not. But it is clear that the pollution at this factory can be overcome. PT Pakerin is really trying to control the pollution by building the best water treatment it can. If you don't believe me, go there and see for yourself. (*Surya* 1992c.)

This kind of public support for the factory by the Governor, who had already granted the company an extension of time to install a waste treatment plant (*Tempo* 1994:106), meant that the provincial Justice Department had no choice but to withdraw its prosecution of the case.<sup>19</sup>

Another case that came to court, that of PT Surabaya Meka Box paper factory, was initially the result of an industrial accident, an oil and diesel spill into the Surabaya River. The company had earlier been named in the police's 1991 Kemukus Operation, and had been part of the Prokasih Program since 1989. Because company failure to operate its systems properly was clear-cut (or because the factory did not have the same economic clout as did PT Pakerin), this time the East Java Governor threatened legal action and the case went to court with the intention of suing the company directors. Much to the surprise of the government (and the Surabaya LBH which was monitoring the case closely), company directors were not named in the police case file or deposition. Instead, the police named a boiler operator as the defendant. Assistant Governor Masdoekie has expressed his frustration in private that the police had altered the name of the person charged with a criminal offence without instructions from the public prosecutor.<sup>20</sup>

The Kemukus Operation ended after Koesparmono was replaced as East Java's police chief. There are no subsequent reports about the operation or legal actions in the province. This is an indication that the success of police programs and legal action depends to a large extent on the policies of individual police chiefs, not on institutional policies. It is unsurprising that anti-pollution efforts ceased during the period of *reformasi*. Consequently, there has been a deterioration of water in East Java's rivers. Moreover, it has had an impact on the quality of drinking water.

### *PDAM, Jasa Tirta and drinking water*

When it comes to examining the provision of drinking water to households, it is necessary to consider the relationship between PDAM<sup>21</sup> and Jasa Tirta.

<sup>19</sup> *Surya* 1993d. Provincial government unwillingness to act against PT Pakerin, according to a local lawyer academic, was due to four factors. Its export markets which earn foreign exchange are not derived from oil and gas, it is a project which has attracted large investment to East Java, it provides employment for thousands of local people, and its presence promotes regional development (Zaidun 1995:77).

<sup>20</sup> The implication is that, in order to do this, factory management was in collusion with members of the police.

<sup>21</sup> PDAM (Perusahaan Daerah Air Minum) are state-owned water companies, many of which have been sold off to private enterprise by local authorities since 1998.

While the municipal and *kabupaten* PDAMs throughout East Java are responsible for supplying water to households for domestic use, Jasa Tirta is the company contracted to supply the 'untreated' river water. Jasa Tirta is a state-owned company, established under the control of the Department of Public Works in 1990. As Indonesia's only catchment-wide water resources management agency, its main tasks include the management of water resources (including infrastructure), management of water supply, and water quality management 'in the context of the broad objective of water conservation for national development'. This means Jasa Tirta is responsible through a series of contracts for supplying enough water for electricity generation, regional drinking water, industry, agricultural estates and plantations, fisheries and livestock. Jasa Tirta also has responsibility for flushing the Surabaya River (and other rivers) to keep pollution at manageable levels (Perusahaan Umum 1993:4, 8-9). As the company monitoring river pollution loads as part of the Prokasih program, Jasa Tirta operated one of the three officially accredited water sampling laboratories (the others being the BTKL and Department of Industry laboratories),<sup>22</sup> and conducts monthly tests of river water in 50 testing sites where factories are suspected of emptying effluent into rivers.

With these objectives and tasks to fulfil, Jasa Tirta has to manage the entire Brantas river catchment basin, which includes 40 rivers in East Java. This is not an easy task. It levies rates (*iuran*) on water users, to whom it supplies water, namely industry, the Perusahaan Listrik Negara (PLN, State Electricity Company), and municipal and *kabupaten* PDAMs. In Surabaya municipality, the problem arises because PDAM is wholly dependent on Jasa Tirta for providing enough water of a specified 'standard' quality to supply the needs of the entire city. However, PDAM complains that it has no say in the management of the rivers, and has to pay a negotiated fixed contract price, regardless of the quality of the water supplied, which varies according to the flow throughout the year. If consumers protest about the quality, and PDAM blames Jasa Tirta, Jasa Tirta's usual response to PDAM is 'your water treatment facilities are not working properly'. According to a staff member of Jasa Tirta, the provincial government has said that Jasa Tirta is not responsible for municipal domestic water quality.<sup>23</sup> Jasa Tirta does not operate any water treatment facilities, and does not have the authority (nor the manpower or expertise), to enforce water pollution regulations against polluting factories, hotels and hospitals. Neither, of course, does the Surabaya PDAM. Until enforcement of proper waste

<sup>22</sup> Unlike the well-funded BTKL laboratory, in the early 1990s the Jasa Tirta lab has financial and management problems. These include shortages of funds for vehicle maintenance, and repairs to equipment such as a pH reader and spectrometer, while both the Jasa Tirta river monitoring teams 'complained that they monitored in the morning, [but] industries discharge their waste in the evening' (Koffel 1994:12).

<sup>23</sup> Interview with Jasa Tirta official in Surabaya on 22 January 1997.

treatment is improved, every time there is a water quality or supply crisis in Surabaya, PDAM will continue to blame Jasa Tirta, saying that it cannot properly treat the poor quality water Jasa Tirta supplies quickly enough to meet the demand of Surabaya's consumers. Until the installation of effective waste treatment facilities is properly enforced, attempts to shift responsibility for periodic water quality crises in Surabaya are likely to continue.<sup>24</sup>

In addition, the Surabaya municipal PDAM and some, but not all, *kabupaten* PDAM have their own water testing facilities. This reflects a priority within PDAM where quantity has been given priority over water quality. While all the 37 second level local administrations (*kabupaten* and municipalities) have PDAM, not many have a water testing laboratory to monitor and control water quality. The laboratory with the best reputation is the BTKL, because of its independently funded facilities, its relative autonomy, and its effective management.<sup>25</sup> The main problem the laboratory faces is expense in testing for heavy metals such as lead or mercury. Also the BTKL have no control over how water test results are used. For example, factories send water to test, and then write reports to the supervising government agencies, saying the water is clean. Issues such as where, how and when water samples were taken have never been addressed.<sup>26</sup>

It is difficult to improve the quality of PDAM's drinking water. Besides PDAM's lack of technical expertise, there are serious problems arising from PDAM as an institution. Firstly, there is corruption. After former Director Hoesodo was accused of misusing Rp 23 billion in funds earmarked for the upgrading of the Karang Pilang water treatment plant (*Jawa Pos* 1998b), his successor has also been accused of corruption and has since been replaced by the Mayor of Surabaya. This case emerged after the national Badan Pemeriksa Keuangan (BPK, Financial Auditing Board) disclosed their finding that the enterprise lost Rp 31 billion with no clear explanation. Secondly, PDAM became an informal treasury for many activities, especially recreation facilities, for the local government (Pemda).

<sup>24</sup> Since era of reform, the police have been investigating the directors of Surabaya PDAM over the 'disappearance' of 10% of the US\$12.5 billion World Bank loan to expand the Karang Pilang treatment plant water filtering capacity (*Jawa Pos* 1998a, 1998b).

<sup>25</sup> With 500 million rupiah in aid from the Japanese government via the National Development Planning Board (Bappenas), the BTKL completed a new laboratory complex in 1997, and then had an annual government budget of 200 million rupiah plus another 30 million rupiah from projects.

<sup>26</sup> The 1990 water pollution manpower study conducted by the Canadian-funded EMDI project recommended the establishment of a laboratory council to cooperate in scheduling water sampling and analysis, to standardize methods of water sample collection, transport, storage and analysis, to coordinate results of testing and monitoring, and to develop a system of data recording that would eventually lead to the creation of a common data base for water quality (Fraser and Wiriaatmadja 1990:28). The political obstacles to implementation of these policies, in the form of overlapping departmental responsibility for water quality are formidable.

### *Well pollution*

Although the focus of this section is river pollution, the pollution of wells from various sources directly affects what is the only source of domestic water for many residents of Surabaya. Indeed, throughout the province, salination of ground water has been reported for many years, in some cases this is thought to have originated from brackish water shrimp ponds (*tambak*). Pollution of wells of villagers living near factories (including two paper mills) have been reported regularly over the past ten years.

Recent research in East Java shows that a major source of well pollution is nitrate contamination. A survey of households in the province showed that up to one quarter of the population drink water with a nitrate content higher than the maximum 10 mg/l recommended by the World Health Organization (Wetselar et. al. 1996:77). The source of this nitrate build up in groundwater is apparently not what was originally suspected as the cause, namely nitrogen fertilizer applied to rice fields (which has increased enormously in recent years because of the spread of high yielding rice varieties), but rather human excretion of digested food waste and to some extent animal waste. With 'drop' toilets and simple septic systems, nitrates quickly get into groundwater aquifers, and become highly concentrated. High nitrate consumption via domestic well water causes serious health hazards to pregnant women (by affecting the blood's capacity to convey oxygen throughout the body). It also causes diseases such as stomach cancer and diabetes. The problem with nitrate pollution is that being colourless, odourless and tasteless it cannot be detected by villagers or urban *kampung* dwellers, whose criteria for water quality are the colour of the water and its taste. Apparently boiling the water, the traditional method of getting rid of faecal coliform, only increases nitrate concentration.<sup>27</sup>

### *Popular protest against the Surabaya drinking water company (PDAM)*

The poor quality of drinking water in Surabaya has caused much complaint and protest from Surabaya residents. Their complaints and protests about the quality of water supplied by PDAM, Surabaya's domestic water supplier, have always been published (even during Soeharto's New Order), together with the ongoing problem of inadequacy of supply.

In the early 1990s, the morning daily *Surya* ran several newspaper polls and letters to the editor and published short interviews with Surabaya residents about the dirty city water supply. Most complaints were about poor service from PDAM, very poor water pressure, and the water supply being cut off for most of the day (*Surya* 1991a, 1993c). In July 1994, *Surya* invited readers to phone in their complaints about the municipal water supply, which were then published, an unusual initiative by the regional press in those days. They reveal a number

<sup>27</sup> Fox 1996:44. In Lombok, a similar survey showed more than 50 % of wells in 46 locations throughout the island were heavily polluted with nitrates (*Kompas*, 1996d).

of concerns about the problems of providing clean safe water to the residents of Surabaya. People had their own makeshift water treatment facilities at home to try to get rid of the smell, the sediment and the mosquito larvae. People with no wells had to scrub out their water tubs every morning before bathing, because of the muddy sediment. *Kampung* people were installing small pumps to try to increase the flow of water from the PDAM mains supply. People had to buy water from their neighbours. People found tiny larvae wriggling in the water. Water quality had declined compared to previous years and callers referred to the 'trauma' of having what seemed to be worms coming out of the mains supply into their bathing water. Others spoke of broken water mains spilling out onto the street for days, with no sign of any repairs being made. Several callers contrasted the money that PDAM spent on a very grand (*megah*) six-storied municipal office block with the little it was prepared to spend on upgrading the rusty pipes throughout the city. People spoke of having to stay up until the early hours each morning to ensure that enough water was collected in containers for household needs, and of having to buy bottled water for drinking.<sup>28</sup>

This phone-in of complaints of PDAM consumers conducted by *Surya* newspaper generated more water tests, the results of which only added to the debate, which went on for several weeks between environmentalists, PDAM and PT Jasa Tirta, about the causes of the poor municipal water quality and pressure in Surabaya.<sup>29</sup> A *Surya* editorial blamed the high levels of detergent in the Surabaya River on the chemical used in making Indonesian soap powder, which is difficult to remove by existing water treatment processes.<sup>30</sup> PDAM maintained the problems were due to ancient pipes no longer able to cope with higher water pressure, causing the water to become polluted in some areas; the Surabaya municipal DPRD blamed PT Jasa Tirta for supplying such poor quality water to PDAM for treatment. The DPRD also blamed the provincial Badan Lingkungan Hidup (BLH, Environmental Bureau) for not taking harsher measures against factories polluting the Surabaya River. There were also calls for the privatization of PDAM.

Another kind of protest against PDAM water pollution involved residents threatening to withdraw participation in government development programs. This resulted from delays in the connection of new housing neighbourhoods to the Surabaya municipal water supply. After waiting for three years and

<sup>28</sup> These comments from 30 consumers (47 telephoned the newspaper on the first day) were published over five days from 1-5 July 1994 as 'Complaints of citizens about the municipal water supply' (*Surya* 1994a).

<sup>29</sup> At the time Airlangga University Professor of Public Health Faud Amsari said the levels of pollution in the PDAM water supply could cause serious skin diseases and chronic allergies (*Surya* 1994c).

<sup>30</sup> According to the *Surya* editorial, Indonesian detergent is made from ABS or alkyl benzene sulfonate, a chemical imported from overseas, where its use in detergents in the USA, Japan, France and Germany is banned. Its replacement, ALS (alkyl linier sulfonate), can be removed more easily during water treatment (*Surya* 1994b).

filling in three lots of forms registering their households to become consumers, residents of one *kampung* (urban ward) protested 'at PDAM's false promises' and felt that 'PDAM was putting one over them'. Representatives of 152 families complained to *kampung* officials, who passed on their complaints up the administration hierarchy, finally to the Mayor of Surabaya, with no result. Finally the residents, who had won local development awards in their *kampung*, told officials that they would no longer participate in any kind of *kampung* community service (which is considered obligatory for all residents) until they had an answer from PDAM as to whether their registration for water connection 'had been accepted or rejected'. The most influential local official, the head of the *Kampung* Association, supported their protest, saying that waiting for three years without a reply from PDAM made people 'disappointed and unwilling to participate in development'.<sup>31</sup>

#### *Women's voices*

It may seem surprising, given the New Order suppression of political dissent, to find women in Surabaya protesting louder than anyone about environmental issues. However, respect for authority and keeping quiet about social issues has its limits, especially in regard to the issue of clean water, which directly affects women's daily lives. The impact of polluted wells or constant failure of the municipal water supply is felt mostly by poorer *kampung* women in their traditional gender roles of doing most of the domestic work, namely cleaning, cooking and washing.

The state-sponsored Pembinaan Kesejahteraan Keluarga (PKK, Association for Promoting Family Welfare), a semi-official women's organization functioning at all levels of government down to the rural village or urban Neighbourhood Association, is not known for promoting political protest by its members. Altogether a non-political organisation, its office bearers are usually the wives of local officials who loyally support their husbands in implementing government development policy (along with other village-level institutions) at the grass roots level (Eldridge 1995:32). The main activity of PKK is to run educational courses for wives or mothers from the Neighbourhood Association up to the provincial level.<sup>32</sup> But on several occasions in Surabaya in recent years women have protested about polluted water, using the PKK organization as an conduit to make their voices heard.

<sup>31</sup> *Memorandum* 1993a. In the same year another group of 20 residents in two other urban wards in Benowo subdistrict in Surabaya took their complaints about air pollution caused by PT 'KJ' to the Mayor and numerous complaints to the local subdistrict head (*camat*) but got nowhere (*Surya* 1993a). Protests about air pollution and noise from factories have been regularly reported in the Surabaya daily press.

<sup>32</sup> Unlike PKK, membership of the other officially sponsored women's organization, Darma Wanita is obligatory for wives of government officials. On gender politics in New Order Indonesia and the control of women by the State, see Rahayu 1996.



In early 1990 a group of PKK women became involved in a protest when their wells were polluted by effluent from PT SSS in Tembok Dukuh in Surabaya municipality. In March of that year *kampung* residents living near the factory complained that their skin itched after using well water, which had changed to a colour that was the same as the effluent from the factory that spilled out through a broken retaining wall. Residents were forced to start buying PDAM water, paying suppliers Rp 1000 per day. On 4 September 1990, around 11 a.m., fifteen women from the local PKK went spontaneously to visit the PT SSS factory management to ask their opinion about the complaints from residents that had been made in a letter three months earlier, but had not been acknowledged. After the PKK women's visit, the factory tried to discredit them with accusations of 'holding a demonstration' and of stealing a disputed number of bags of cement. The factory also reported the visit to the local *Koramil* (subdistrict military command), as a result *kampung* officials were called up for questioning. It seemed that the local military authorities and the factory were in collusion, and so social protest was being treated by the military authorities as a security issue.<sup>33</sup> However an investigation by the village authorities (the headman and the BABINSA or *kampung* level security) found that in a *kampung* laneway containing oozing effluent, 48 wells were polluted (the water had turned yellow), and subsequent tests from the BTKL laboratory showed high concentrations of zinc and chrome (*Muchayannah* 1992:78-83). What happened to the protest after that is not clear, although in another groundwater pollution case, a protest by 70 'mostly women' residents to the government-owned alcohol factory PT Aneka Kimia resulted in research (between the factory and the Surabaya Institute of Technology) that discovered waste was seeping into the groundwater. After repairs to a leak found in waste-holding lagoons, the factory constructed deep wells for 50 affected households (Koffel 1994:8).

In early 1996 another group of PKK women twice took their complaints to the office of the Surabaya municipal PDAM, in a demonstration concerning the city water supply. Although connected to their homes, water had been cut off for several months. At 7.30 a.m. on 27 March 1996, three cars arrived at the grand front entrance to the office of Surabaya PDAM. Much to the surprise of those already at the office, thirty women emerged wearing the East Java PKK uniform and immediately rolled out their posters, and spoke to the media. The women were cross and their patience had run out. PDAM had promised to supply water to 240 homes already connected to the municipal water supply but nothing had happened. The women had reported the situation to the regional representative of PDAM, and to the head office of the water

<sup>33</sup> The two local leaders were released from detention after the PKK women visited the Surabaya Military Area Command (Korem 084), and the Surabaya Lembaga Bantuan Hukum (LBH) sent a letter of protest to the East Java Military Area Command (*Kodam*), and because of the comments made by the Minister for the Environment (Sugianto 1996:81, note 2).



company but there had been no response. Because the well water was too salinated for use, the community depended on PDAM for domestic water. *Kampung* officials had already made verbal and written reports about this situation. The community had also sent a letter to Box 5000 without result. The main impact of this was that households had an extra monthly expense of between Rp 120-150,000 for buying water. 'Just imagine', she said, 'the cost of buying water for eight months is about Rp 950,000.' The women then met with the Surabaya PDAM Director Hoesodo and several staff. The next day a team from PDAM arrived in the *kampung*, and they were told that if the water were not turned on they would take their complaints next time to the Mayor and to his wife, and if necessary to Governor Basofi. In the meantime Hoesodo told the press that it was a water supply problem (the company needed an extra 1,000-2,000 litres per second to reach outlying areas), and not a matter of employees manipulating the distribution. However, PDAM acted quickly in response to the protest, which got blazing media publicity, and the following day the *kampung* had running water (Surya 1996; Surabaya Post 1996a, 1996b).

In these and other demonstrations women carried protest posters and banners which reflected their concerns: 'The economy is unstable, yet because PDAM water has stopped we have more expenses', 'Help us Pak Hoesodo [PDAM director], PDAM water has stopped because someone is cheating', 'Don't deceive us with your usual reply, low water pressure', 'We complained a year ago to PDAM that the water had stopped, this treatment makes people feel stupid and neglected', and 'the PDAM Director should sack the well known person who is demanding unauthorized payments'.<sup>34</sup>

### *The Umbulan Spring project*

As previously mentioned, there is an alternative resource of drinking water for residents of Surabaya – the Umbulan Spring. The proposals for the development of this project during the New Order is an interesting case study on 'crony' capitalism in Indonesia under the Soeharto regime. Since the colonial period, the spring, located 70 kilometres to the southeast has been an extra source of domestic water supply for the city of Surabaya. The full capacity of this natural aquifer has never been exploited, although Mohammad Noer's dream during his two-term governorship (1967-1977) was to build a new pipeline to connect the spring water to the city water supply. Umbulan Spring, with a reported flow of 5,000 litres per second, was first used in the

<sup>34</sup> The Indonesian is 'ekonomi resah, belanja meningkat, akibat PDAM macet', 'Pak Hoesodo tolong kami, air PDAM mampet karena ada permainan', 'Jangan bohongi dengan alasan klasik, debit air kecil', 'Sudah satu tahun dilaporkan ke PDAM air tetap ngadat membuat rakyat tambah bego dan merana', 'Direktur PDAM segera copot oknum yang melakukan pungli'. The reference to deception is connected to the PDAM distribution manager for West Surabaya, who according to the message on the placards, was demanding illegal payments (Surabaya Post 1996a).

early 1900s when several European houses in Pasuruan were connected to the spring water. Later the Dutch built a pipeline that still exists today to supply water to the European residents of Surabaya, adding an extra 110 litres per second to the city water supply. The rest is used by a neighbouring district town, and empties into a river system which provides irrigation for wet rice, and fresh water for aquaculture ponds (*tambak*).

Control of the Umbulan Spring has been an ongoing issue in East Java. In 1940, the Dutch formally gave control to Pasuruan municipality authority, which had plans to develop the growing harbour as a centre of trade. After the Second World War management of the spring stayed with the regional authorities in practice, although efforts to get the provincial government to formally recognise these local use rights were unsuccessful (*Surabaya Post* 1997). In the 1980s various plans to develop a new pipeline were drawn up but never implemented for lack of finance. (*Surabaya Post* 1982)

In the 1990s, consortiums emerged with proposals to invest in the project by building a much larger pipeline. All had connections with powerful political leaders as well as Jakarta-based economic interests, and reflected the nature of how large government contracts were awarded under Indonesia's New Order government. The East Java regional government in 1996 faced a unique situation. Two of the President's children were both bidding for the Umbulan water supply project against each other. The history of the Umbulan development proposals looks like a who's who of business interests of the children of the New Order political elite. Fourteen investors expressed interest in the project. Bimantara Siti Wisesa (BSW), a subsidiary company of Bambang Trihatmodjo's Bimantara conglomerate, signed the first Memorandum of Understanding in 1989, but subsequent negotiations with the regional government broke down after only three months. One of the problems was that BSW wanted PDAM to build a new water distribution system, the company also wanted the regional government to indemnify the company against any financial losses, as well as guaranteeing the water supply to consumers (*Surya* 1992b).

The next to emerge was the Bromo Consortium headed by Tanyo Sudharmono (son of Lieutenant General Sudharmono, a former Vice President and head of the powerful State Secretariat, SEKNEG, and Golkar chairman in the 1980s). The Bromo Consortium spent the next four years trying to reach agreement with the regional government on the one hand, while securing Bank of America finance on the other.<sup>35</sup> From the start negotiations with the

<sup>35</sup> It consisted of Tanyo Sudharmono's own company PT Duet Comfact, and three British companies, Northwest Water, Matt McDonald and Co, and Coustin and Mowlem, who subsequently withdrew and were replaced by the well known Bakrie Brothers conglomerate, Trans Bakrie. The breakdown of consortium shares was 76.8 pounds sterling (Rp 160 billion) from the British group, Rp 100 billion from money raised from within Indonesia, with the remainder of the total estimated project budget of Rp 302 billion from the World Bank (*Surya* 1991f, 1992a). An Australian based company, Transfield Australia, held 60% of Trans Bakrie shares.

regional government proved difficult, over issues relating to compensation over nuclear attack, sabotage, rebellion, and the problem if the spring dried up. The consortium also wanted the government to bear the burden of losses resulting from *force majeure*. The provincial government not surprisingly refused to be burdened with *force majeure*. There was controversy over an Aid, Trade and Provision Grant (ATPG) of 20 million pounds sterling under which the consortium was obligated to purchase British equipment. Another issue was the price to be charged to PDAM Surabaya for the water, although in July 1992 the company finally agreed to the government's price of Rp 694 per cubic metre, reduced to Rp 638 per cubic metre in October 1992. At this point a 'neutral consultant' was brought in to monitor the total capital costs. Another problem to emerge was the fate of 1,399 hectares of irrigated rice fields if the irrigation water was diverted to Surabaya. There was also the cost to the government of the compulsory acquisition of a strip of land 60 kilometres long by 6 meters wide for the pipeline, estimated to cost between Rp 3-4 billion over three years (*Surya* 1992d). Bakrie Brothers announced it was having second thoughts about the project, Bimantara offered to re-tender, but Governor Soelarso rejected the Bimantara offer, saying that the government was still bound by the Bromo Consortium negotiations. Finally, Governor Soelarso appeared to lose patience and set a final deadline of 10 March 1993 for the conclusion of the negotiations. The British investors failed to meet the deadline, and the government deleted the Bromo Consortium from its shortlist of investors.

In early 1993 a new investor was on the scene, Indonesia's largest real estate company, Ciputra, run by Eka Tjipta Widjaja. The Surabaya branch of the Indonesian Real Estate Institute had already announced that they were interested in the Umbulan Spring development because of the problems that real estate developers were having with providing sufficient quantities of water to their elite housing estate projects. Many developers were building housing without water connections, because they were waiting for Umbulan (*Surya* 1993b). A central issue, which had not been discussed, at least publicly, was 'who is the water for?' The regional government wanted the water for domestic consumption in Surabaya. In April 1996 Governor Basofi announced that the President's youngest son Tommy Suharto's company, Hutomo Mandala Putera, had been given permission to make a feasibility study with a new consortium (consisting of PT Mandala Citra, the Ciputra Group and Beatle Corporation from the USA). A month later the consortium made a new proposal to develop the spring for US\$500 million.

However this was still not the end of the Umbulan saga. In June 1996 another investor, Citra Lamtoro Gung Persada, owned by Mbak Tutut (Tommy Suharto's high profile older sister), announced it was also interested in investing in Umbulan. The East Java regional government was unable to refuse the company's request to carry out a feasibility study and they subse-

quently gave a presentation of their investment proposal to the government. The press quickly picked up on the awkwardness of the situation for the regional government, as Governor Basofi tried various tactical manoeuvres to solve this impasse, including publicly suggesting that the two rivals get together to form a joint proposal. It was a strange forerunner of the Soeharto family rivalry over the Busang gold mine, where Mbak Tutut supported one company and her brother Bambang Trihatmodjo supported the other. Governor Basofi denied that there was any problem about the siblings both tendering for the project, but that is what seems to have happened. The regional government had 'a big headache' (*pusing tujuh keliling*) with two rival siblings' consortiums and, not wanting to fall out with one of the President's children, had no choice but to allow Mbak Tutut's company in on the bid. The problem resolved itself when her company failed to show up to make their proposal presentation to the assembled officials at the Governor's office on 19 November 1996. Mbak Tutut's consortium was politely made 'the reserve investor'. Eventually it withdrew and Tommy Suharto's company was declared the winner of the contract, which was signed on 11 April 1997.<sup>36</sup>

The East Java provincial government's efforts to find a consortium of private investors to develop the Umbulan Spring water resource did not encourage debate about either the constitutional issues (the Indonesian constitution says that all natural resources are controlled by the State) or the equity considerations. This is not surprising. In its push for industrialisation in the province, electricity is always in short supply. Increasingly however water has become a problem for factories. In the case of the Umbulan Spring, the distribution of water to different districts along the pipeline before it gets to Surabaya municipality was a hot political issue. Of concern to the regional Surabaya municipal administration was how PDAM would distribute this increased water capacity for the city. Would priority be given to the 40% of poorer Surabaya *kampung* residents who do not have running water, to residents of the planned elite real estate complexes, or the Dream World entertainment park (proposed by the national real estate developer Ciputra, who also happened to be one of Tommy Suharto's Umbulan consortium partners)? How Umbulan would help the 40% of unconnected residents (mostly *kampung* people who numbered around 1,300,000 in the year 2000) who are at the bottom of the socio-economic ladder

<sup>36</sup> *Forum Keadilan* 1996. After Mbak Tutut's consortium withdrew, it was reported that Ari Sigit (President Soeharto's grandson) was going to build a third water treatment plant at Karang Pilang (*Memorandum* 1997). Mbak Tutut's brother Sigit Hardjojudanto together with the Salim Group (in partnership with two overseas water management consultants Thames Water International and Lyonnaise des Eaux respectively) took control (in the form of a 25 year lease of all plant, equipment and labour) of Jakarta municipal PDAM in early 1998. The leader of the Jakarta PDAM Privatization Team noted that in Surabaya water rates had gone up 400% over the past four years, although PDAM Surabaya 'was not yet privatized' (*D & R* 1998). (On the Jakarta situation, see also Braadbaart, in this volume.)

(given PDAM's apparent reluctance in the past to connect poorer *kampung* to the city mains supply) was not debated publicly. Obviously there would have to be a trade-off between government-owned PDAM's profitability as a high revenue earner – meeting the water needs of industry – and social welfare – providing clean water for urban *kampung* dwellers. Water rates in Surabaya were certainly going to rise, unless the supply is differentiated (consumers connected to the Umbulan supply pay more). In contrast to the price of water charged by PDAM, the water rates which the community were going to have to pay would be much higher. Even though water is a commodity which governs the very lives of so many people, and according to the Indonesian Constitution is controlled by the State for the welfare of its citizens.<sup>37</sup>

### Conclusion

Water pollution is not a new problem in East Java. Surabaya felt the effects of pollution for the first time in 1975 when their drinking water became cloudy, dirty and smelt rancid. Events like these have recurred continually until the present, surprising both the local community and the local government. The community's reaction gave the government a reason to act, to the point that environmental problems, especially water pollution, became a political issue that had to be handled quickly.

The worsening quality of their drinking water was caused by heavy pollution of the source of the drinking water, that is the Surabaya River. The pollution came from the dozens of factories around the Surabaya River, as well as from household waste. Since the events of the mid 1970s, the local government has tried to protect the quality of water sources by enacting local regulations. These efforts were undertaken by Governor Mohammad Noer, and continued by his successors. In 1977 Governor Soenandar Priyosoedarno temporarily closed several factories accused of dumping waste directly into the Surabaya River. However, these actions were in conflict with economic policies to provide jobs, so the closures were not long term.

The progressive efforts of Soenandar Prijoe Soedarno were continued by his successors such as Deputy Governor Trimarjono and Assistant Governor Masdoeki during the 1980s and early 1990s. With their own individual styles, these two bureaucrats forced several factories to install UPL so their waste did not pollute the environment. Besides these measures, the two of them were also

<sup>37</sup> *Jawa Pos* 1997. *Surya* in an editorial echoed these sentiments, saying that the entry of the private sector into what has been the responsibility of a public company, to provide clean water for the community, which under the 1945 Constitution is the responsibility of the State, will mean that the price will be calculated according to business (that is profit) criteria (*Surya* 1996). Finally, the East Java provincial government revoked their contract with Tommy Suharto and fined his consortium for failing to begin construction of the Umbulan pipeline by the agreed date. The fine of one billion rupiah was never paid (*Surya* 1998).

consistent in monitoring and cautioning factories that obstinately resisted implementing local environmental regulations. Trimarjono, for example, seemed committed to force conglomerates of the caliber of Eka Tjipta Widjaja to immediately install waste treatment units in the Tjiwi Kimia paper mill in Mojokerto. During that time, although he didn't receive much guidance from his superiors, Masdoeki was also committed to forcing factories to install and use their UPLs. Even though it is not widely recognized, these two politicians made quite an important contribution to fighting pollution in the East Java region.

Apart from these two players, another person who should be mentioned here is Major General (Police) Koesparmono Irsan. As the head of the East Java regional police force during the 1990s, he initiated efforts to catch environmental polluters and bring them to justice. With the launch of the Kumukus Operation, perhaps the only operation in Indonesia carried out by police aimed at environmental polluters, the East Java police were successful in dragging several environmental polluters to court. Although the results of the prosecutions were unsatisfactory, the actions of the East Java police showed that the issue of pollution could be categorized as a serious offence.

These provincial government efforts to tackle pollution continued by district governments at the *kabupaten* and *kotamadya* levels. Several mayors and *bupati* in East Java without hesitation forced closures on factories that violated the environment. For example, in 1996 the Bupati of Bondowoso closed the Bodindo Abadi factory because they were disposing of untreated waste. Even when the Regional Investment Planning Board recommended re-opening the factory, the *bupati* refused.

At that time, the government also initiated several environmental protection programmes to clean up the rivers of East Java. The first was Prokasih, the Clean River Program, which began in 1989 and was aimed at protecting several rivers in East Java from pollution. This program was then followed by the Program Proper Prokasih, which assigned environmental green, blue, red or black ratings to each factory. Green meant the factory's waste did not pollute the environment, and black meant the waste was very damaging. The programme was not very effective because many companies that polluted the environment obtained a blue rating, which meant that they were not big polluters. However, at the very least, the programme went some way to force factories to be careful with the disposal of their waste; it also raised awareness about who were the heavy polluters.

Indeed, since the mid 1970s, East Java communities have reacted quite strongly to environmental polluters, protesting to government authorities and to factories themselves, over incidents of pollution. Demonstrations and protests ended in a positive way when they were quickly followed up by the government or the factories involved. However, these protests could quickly become riots if they were not treated seriously. One example of this is the pro-



test of fish farmers in Kali Rejoso, Pasuruan, to PT Cheil Samsung Indonesia. The waste material from this food additive/ flavouring company were killing the fish in the farmers' ponds. But PT CSI rejected the accusations, with the result that the factory was attacked in 1995.

Unfortunately, the prolonged economic crisis had a very serious effect on the environment. As people are fully aware, the economic crisis which started the year before Soeharto stepped down, has had serious effects on the Indonesian political system. The emergence of new political parties, with elite parties that prioritize their own position rather than the interests of the people, has resulted in a protracted political struggle in the region. Moreover, in the new political system, the position of the district assemblies (DPRD) is stronger, and they can be obstructive or even bring down the district head (*kepala daerah*). Regretfully, politicians in the DPRD have been more interested in authority and wealth than the people's welfare (Arief Djati 1999). Consequently, issues relating to the people, including environmental issues, are given less attention. Factories which previously had been known to be polluters are now frequently disposing of their waste without using waste treatment. In Surabaya alone, several rivers that were the source of drinking water have been polluted, with no serious attention from government departments.

However, quite recently there have been some fundamental efforts made by the provincial government. They plan to move buildings located on the river banks. The first stage is to remove illegally built houses, and in several areas this has already been done, although in other areas of Surabaya, the houses are still there. These efforts will expand to include removing factories along the Surabaya River. If these plans are successfully realized, there is a possibility that pollution in the Surabaya River will decrease, as the houses and factories along the river are the major causes of river pollution. Although this issue must be handled carefully, if these attempts are successful then Governor Imam Utomo will make a significant contribution to the environmental problems in East Java. The difference with his predecessors is that where they were only treating the symptoms, Imam Utomo will kill the cause of the disease. The problem of where the new homeless are going to live though, has not been addressed.

From the analysis above, it is clear that since the 1970s environmental issues in East Java have also been political issues. A number of policies have been produced by the East Java political elite since the 1970s, making significant steps towards the protection of the environment. Although some of these efforts have not been continued by successive governments, especially after *reformasi*, the present Governor Imam Utomo at least has a policy to clear industrial (and domestic) buildings from the river levees throughout East Java. Whatever the prospects for this policy, its success or failure, we will have to wait and see.



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