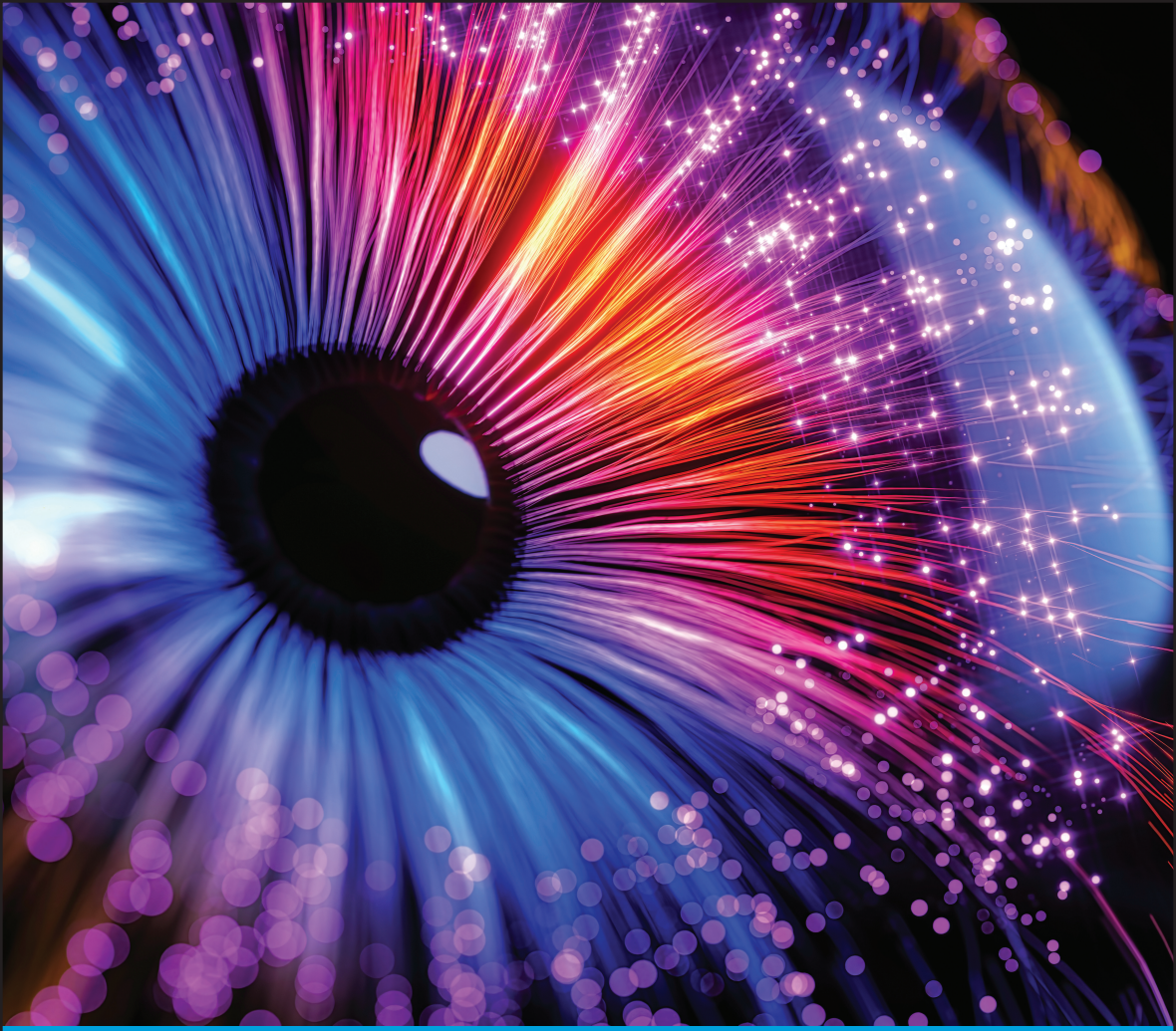

Contemporary Issues in Science Communication

Race and Sociocultural Inclusion in Science Communication

Innovation, Decolonisation, and Transformation

Edited by Elizabeth Rasekoala

Contemporary Issues in Science Communication

Series editor: **Clare Wilkinson**, University of the West of England, Bristol

---

As science communication continues to establish itself as a discipline in the 21st century, this book series links the present with the past to develop our understanding of its history, both in practice and as an academic discipline.

Out now in the series:

Queering Science Communication; Representations, Theory, and Practice
Edited by **Lindy A. Orthia and Tara Roberson**

Find out more at

bristoluniversitypress.co.uk/
contemporary-issues-in-science-communication

International advisory board:

Alison Anderson, University of Plymouth, UK
Ayman Elsayed, Grand Egyptian Museum, Egypt
Birte Fahnrich, Berlin-Brandenburg Academy of Sciences and Humanities, Germany
Carla Almeida Museu da Vida, Fundação Oswaldo Cruz, Rio de Janeiro, Brasil
Daria Denisova, Information Technologies, Mechanics and Optics University, Russia
Elizabeth Rasekoala, African Gong, South Africa
Emily Dawson, University College London, UK
Erik Stengler, The State University of New York College at Oneonta, US
Jenny Martin, University of Melbourne, Australia
Lesley Markham, Center for Open Science, US
Marina Joubert, University of Stellenbosch, South Africa
Padraig Murphy, Dublin City University, Ireland

Find out more at

bristoluniversitypress.co.uk/
contemporary-issues-in-science-communication

CONTEMPORARY ISSUES IN SCIENCE COMMUNICATION

RACE AND SOCIOCULTURAL INCLUSION IN SCIENCE COMMUNICATION

Innovation, Decolonisation, and Transformation

Edited by
Elizabeth Rasekoala

BRISTOL UNIVERSITY PRESS

First published in Great Britain in 2023 by

Bristol University Press
University of Bristol
1–9 Old Park Hill
Bristol
BS2 8BB
UK
t: +44 (0)117 374 6645
e: bup-info@bristol.ac.uk

Details of international sales and distribution partners are available at bristoluniversitypress.co.uk

© Bristol University Press 2023, excluding Chapter 12 © Tibisay Sankatsing Nava, Roxanne-Liana Francisca, Krista T. Oplaat, and Tadzio Bervoets 2023

The digital PDF and EPUB versions of Chapter 12 are available Open Access and distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International licence (https://creativecommons.org/licenses/by-nc-nd/4.0/) which permits reproduction and distribution for non-commercial use without further permission provided the original work is attributed.

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN 978-1-5292-2679-9 hardcover
ISBN 978-1-5292-2681-2 ePub
ISBN 978-1-5292-2682-9 ePdf

The right of Elizabeth Rasekoala to be identified as editor of this work has been asserted by her in accordance with the Copyright, Designs and Patents Act 1988.

All rights reserved: no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior permission of Bristol University Press.

Every reasonable effort has been made to obtain permission to reproduce copyrighted material. If, however, anyone knows of an oversight, please contact the publisher.

The statements and opinions contained within this publication are solely those of the editors and contributors and not of the University of Bristol or Bristol University Press. The University of Bristol and Bristol University Press disclaim responsibility for any injury to persons or property resulting from any material published in this publication.

Bristol University Press works to counter discrimination on grounds of gender, race, disability, age and sexuality.

Cover design: Liam Roberts Design
Front cover image: Liam Roberts Design
Bristol University Press uses environmentally responsible print partners.
Printed in Great Britain by CPI Group (UK) Ltd, Croydon, CR0 4YY

12

Decolonising Science Communication in the Caribbean: Challenges and Transformations in Community-Based Engagement with Research on the ABCSSS Islands

Tibisay Sankatsing Nava, Roxanne-Liana Francisca, Krista T. Oplaat, and Tadzio Bervoets

Introduction

Effective public engagement and science communication are some of the cornerstones of translating and applying science into real-world applications. Whether it is in terms of communicating the efficacy of vaccines or the role of protected areas in biodiversity conservation efforts, it is a critical yet often neglected component of those involved in the field of STEM (science, technology, engineering, and mathematics). 'Science and engineering lack a culture of explanation' (Meredith, 2010, p 6), and this is further compounded when additional factors are considered. Scientists often ascribe to the myth of universal applicability of their research and fail to consider historical and sociocultural complexities (Meredith, 2010; Mbembe, 2016). They appear 'arrogant and aloof when talking about their subject, especially when discussing with disenfranchised communities' (Olson, 2009), while those communities have relevant knowledge and perspectives for science and could often benefit from integrating peer-reviewed scientific results to guide policy decisions. Orthia (2020) argues that 'science communicators must take steps to radically reform their understandings of [science communication] so that people from diverse cultures, nations and traditions can genuinely own it as theirs'.

Science communication and public engagement in the ABCSSS islands

The six Caribbean islands of Aruba, Bonaire, Curaçao, Saba, Sint Eustatius, and Sint Maarten are part of the Kingdom of the Netherlands. The islands are collectively referred to as the ABCSSS islands. In the ABCSSS islands, contemporary science communication initiatives of STEM research mainly engage White, highly educated, Dutch- or English-speaking audiences. This echoes similar findings in Europe (Dawson, 2014) and can be traced directly to who funds, designs, leads, executes, communicates, and benefits from scientific research and its results. In the ABCSSS islands, many science communication activities are carried out according to the 'deficit' model, which assumes a lack of knowledge in the target audience that can be remedied by unilateral, top-down communication of research goals, processes, methodologies, and results (Horst et al, 2017; Burns, 2018). While some important exceptions are highlighted in this chapter, STEM initiatives that prioritise public engagement that is participatory, reciprocal, and community-based throughout the research process are less common (Palmer and Schibeci, 2014; Horst et al, 2017; Sankatsing Nava and Hofman, 2018). In contrast, many locally led social science and humanities projects in the Caribbean are deeply grounded in and informed by community-based research and engagement (Allen, 2018; CaribResearch Research Agenda, 2022).

Research, funding, and science communication infrastructures of the ABCSSS islands

Since 10 October 2010, the Kingdom of the Netherlands consists of four autonomous countries: Aruba, Curaçao, Sint Maarten, and the Netherlands. Besides the European territory, the Netherlands includes three islands in the Caribbean region: the 'special' municipalities Bonaire, Saba, and St. Eustatius. There are a variety of organisations and individuals involved in and various approaches to science and science communication in the Caribbean part of the Kingdom of the Netherlands. Aruba, Curaçao, and Sint Maarten have their own universities, and each island has its ecosystem of (independent) researchers and research and higher education institutes and organisations. The knowledge centres are small and have (comparatively) small budgets, prioritise education over research, are only partly locally staffed, and generally do not have specialised science communication departments. At the same time, these organisations have an important role in engaging island communities with science. ABCSSS researchers are dependent on foreign universities, foreign research funding bodies, and ad-hoc government funding. To illustrate, it is only since 2019 that researchers and universities in the Caribbean islands of the Kingdom of the Netherlands have qualified

for funding from the Dutch Research Council to lead their own research projects (NWO, 2019). And even when islanders qualify, the conditions attached to international funds are often so specific that it is virtually impossible for locally based non-governmental organisations and researchers to succeed independently.

One often overlooked factor in science and its communication is the role that Black, Indigenous, and People of Colour (BIPOC) communities play in integrating scientific results to effectively foster positive community change. Science communication often excludes the geopolitical, socio-economic, and cultural realities of the communities in the ABCSSS islands. This echoes Saran Stewart's observation that 'common to the Caribbean is an understanding of how colonial legacies of research have ridiculed oral traditions, language, and ways of knowing, often rendering them valueless and inconsequential' (Stewart, 2019, p ix). These colonial legacies and the particular entanglements of colonialism, scientific research, nature conservation, and (mental) health care in the Caribbean are reflected in significant challenges in public engagement with science, and are key themes tackled in this chapter.

Decolonising science communication means decolonising science

This chapter reflects on opportunities to decolonise science communication in the ABCSSS islands. With this in mind, the authors (whose biographies in this book include a brief positionality statement) began by considering the word 'decolonising' tentatively with regard to science communication, because decolonisation is not an umbrella term for all social justice, anti-racism, or diversity and inclusion efforts. In fact, decolonisation 'is not a metaphor' for actions that do not 'bring about the repatriation of Indigenous land and life', and cannot be used for all the positive changes we want to make in our societies (Tuck and Yang, 2012). Decolonisation *unsettles* and is uncomfortable. Thus, when speaking about decolonising science communication, the chapter refers to what Bagele Chilisa defines as self-reflectively 'centring the concerns and worldviews of the colonised Other so that they understand themselves through their own assumptions and perspectives' (Chilisa, 2019). The authors use Chilisa's understanding of what 'decolonising' can mean to explore some pitfalls of science communication in the Caribbean and share examples that amplify voices and centre the needs of those who are excluded or unheard. Throughout this chapter, the focus is on science communication; however, the analysis also touches upon science and research practice more generally. This is inevitable, as it is impossible to consider 'decolonising' science communication without critically reflecting upon the structures and practices that academic research in the Caribbean is built on and continues to perpetuate.

Using this theoretical lens, the authors illustrate the challenges described in this introduction through an in-depth exploration and analysis of two case studies in the fields of nature conservation and mental health care. This chapter focuses on these two disciplines and as such does not reflect the broad range of social science and humanities research, including community-embedded research projects led by universities and independent researchers in the ABCSSS islands in disciplines of heritage, culture, gender, law, healthcare, and beyond.

The cases highlight the lack of community-engaged research in nature conservation and mental health care in the ABCSSS islands. The analysis of the challenges in nature conservation and mental health care communication lays the groundwork to present transformative practices to build a more embedded engagement with science in the ABCSSS islands. Finally, the chapter concludes with a reflection on the (im)possibilities of decolonising science communication and offers an alternative vision of community-based engagement with science in Aruba, Bonaire, Curaçao, Saba, Sint Eustatius, and Sint Maarten.

Challenges in public engagement with nature conservation in the Caribbean

'Helicopter science' in conservation research

The research and conservation agendas in the ABCSSS islands are primarily dictated by the interests of the European Netherlands and other foreign institutions by way of their access to funding opportunities and technical skills. For example, inhabitants of Bonaire, Saba, and Sint Eustatius were long excluded from Dutch subsidies to accelerate the transition to renewable energy (Milieu Centraal, 2022; Rijksoverheid, 2022). In 2022, the Dutch government reserved the first significant budget for nature and the environment for these islands since they became part of the Netherlands. This shows that there is 'a dependency on post-colonial powers to guide conservation actions of former colonies' in Caribbean nature conservation (Hall and Tucker, 2004). As a result, the emphasis is often on current trends in academia. This makes it difficult to get and maintain long-term support and involvement from the local population. Bonaire is a clear example. Each year, academic research is published about the state of the reef, foraging dynamics of various species, and the island's geology. However, important needs such as fisheries research, stock assessments, and climate change adaptation and mitigation are rarely addressed. It is therefore pertinent to question the extent to which the interests of foreign researchers align with local interests and the topics that most affect daily life for the inhabitants. On top of that, the islands often deal with so-called 'helicopter science', where, once a research plan has been established (often by foreign researchers), researchers fly in,

do their research, and leave without engaging with local communities, universities, or government in any meaningful ways. Mac Donald (2022) also highlights this when she describes the wariness of fisherfolk and other stakeholders to collaborate with researchers as they require much time and information and provide little to no follow-up on their findings.

A glimpse into the scientific literature on nature conservation in the ABCSSS islands dating back from 1901 shows the imbalance in the recognition given to on-island knowledge and expertise that is often crucial to the execution of the research. This is a widely recognised phenomenon, for which Indigenous scholar and librarian Lorisia Macleod designed citation templates to 'find a better way to acknowledge [Indigenous] voices and knowledges within academia' (Macleod, 2021). For example, within nature conservation research, the names of 'on-island' contributors are rarely included in the author list, even though it is often their knowledge of local conditions, history, and phenomena being studied that form the basis of most research. This is without considering the expertise that goes into logistics, site selection, navigating the social and political climate, and other intangibles that local researchers and community members contribute, and without which the research would not succeed. While foreign researchers often rely heavily on input in the data collection phase of their work, they rarely request this when deciding on the topics, analysis, or communication of their research. But when they do, the on-island contributors are usually still excluded from the research funding for projects that contain their ideas.

Nature parks and the fortress model in the ABCSSS islands

In 'Dutch' Caribbean nature conservation, science has been used to establish protected areas without the input of local communities, which often results in reduced efficacy of the protected area to enhance biodiversity (Zaitchik, 2018). To illustrate, many of the nature parks in the islands were established without taking local stakeholders into account. This is the case for Washington Slagbaai National Park (1969), Christoffel Park (1978), Bonaire National Marine Park (1979), and Saba National Marine Park (1987) (Dutch Caribbean Nature Alliance, 2021). The resulting model relies on 'fortress conservation' based on the belief that biodiversity protection is best achieved by creating protected areas where ecosystems function in isolation from human disturbance. This model assumes that local people use natural resources in irrational and destructive ways (Rai et al, 2021). Such protected areas exclude local people dependent on the natural resource base through a 'fines and fences' approach enforced by park rangers and consider tourism and scientific research as the only appropriate uses for protected areas (De Santo et al, 2011). These disenfranchising approaches result in

conservation conflicts, as local people are labelled as criminals, poachers, and squatters on lands they have historically occupied (Robbins, 2007) and have a negative impact on public engagement with nature conservation on the islands. The establishment of nature parks on the ABCSSS Islands emphasises the continuities between environmentalism and the colonisation of the Caribbean, described eloquently by Martinican thinker Malcom Ferdinand (2021). These analyses of science communication efforts in conservation on the ABCSSS islands are informed by global conversations on decolonising conservation through the work of Indigenous conservationists and other scholars (Connell, 2017; Blair, 2019; Canon, 2019; Zanotti et al, 2020; Ferdinand, 2021; Mabele et al, 2021). Particularly with regard to the example of protected nature areas, there is an element of what Chilisa describes as scientific colonialism:

> [R]esearchers travelled to distant colonised lands where they turned resident people into objects of research. This carried with it the belief that the researchers had unlimited rights of access to any data source and information belonging to the population, and the right to export data from the colonies for purposes of processing into books and articles. (Chilisa, 2019, p 7)

Strategies and language in communicating nature conservation

In nature conservation research in the ABCSSS islands, many research proposals include the words *capacity building* and *increasing awareness*, yet these actions are often an afterthought and are rarely tailored to the local situation. Scientific results are often published in language and media largely inaccessible to the general population. An example from the ABC islands is the lack of communication products produced or presented in the islands' languages (Papiamento/u). It is a simple, yet often overlooked, strategy to understand how local populations communicate before designing any communication or engagement campaign. In many cases, it is not necessary to reinvent the wheel: there are plenty of individuals and organisations 'on island' with experience working with communities that are hard to reach for others. These organisations can support researchers in building their own capacity to plan societally embedded research and engage with island communities effectively. Through an annual student exchange programme, the University of Aruba encourages the development of community-engaged student research. Such locally led training is crucial in building skills and experience in the future research population (Mijts et al, 2022).

Often, local researchers also do not prioritise engaging the public, nor link their research to the existing universities on the islands. Local

researchers lack the funding and infrastructure required to support effective engagement. Most researchers are therefore willing to do a public presentation, and some will engage policy makers, but few make efforts beyond this. It is therefore also important for researchers from the islands to reflect on their public engagement activities. Being local does not automatically make researchers good community partners or communicators, and the divide between academics and non-academics remains within Caribbean society as well. In contrast, Brenchie's Lab is a community maker space in Aruba that organises long-term citizen science initiatives in which community members are actively involved in environmental research and monitoring. These initiatives support communities to collect environmental data themselves, to initiate research projects, and identify local issues to be included in the global conversation (Sevold, 2020). Brenchie's Lab projects include collecting beach sand samples to measure microplastics, mapping coastal changes using Google Earth, and measuring ocean acidity together with islanders. In the ABCSSS islands, however, the governments often rely on the insights of foreign academics rather than those of local experts. This remains a challenge, especially for local organisations that involve non-academic communities in research or collect data in non-traditional ways.

Despite these challenges, there is an increased and concerted effort to raise awareness, involvement, and ownership in conservation among island residents. On the islands, there are various programmes that focus on community engagement and involvement (DCNA, 2021). One example is the use of emblematic species that have a cultural and historical significance to local populations to frame conservation messaging. In 2011, the Sint Maarten Nature Foundation launched its Pelican Conservation programme. Despite there being no significant pressure on the species, this programme engaged island populations in citizen science to build ownership for a national symbol and its associated habitat. Participants were not only introduced to species-specific conservation and the conservation of associated habitat but were also sensitised to the environmental pressures on said habitat, resulting in the establishment of an important Bird and Biodiversity Area for one of the locations monitored. The communication of this project was done on a community level, with community-focused dialogues, presentations, and dissemination using traditional and social media (Sint Maarten Nature Foundation, 2011). The fisheries cooperative PISKABON on Bonaire is another example. The cooperative was established in 2017 to actively involve local fishermen in the management procedures of the marine environment of Bonaire. By investing in the fisher community through the cooperative, local fisherfolk regain a sense of ownership and responsibility of the marine environment (Mac Donald, 2022).

Mental health care communication in Bonaire, Saba, and Sint Eustatius

Mental health care on the ABCSSS islands is confronted with similar challenges as described for nature conservation. For example, organised mental health care in Bonaire, Saba, and Sint Eustatius has been financed by the Dutch Ministry of Health since 2010 and was reshaped and expanded from the former foundations to the current Mental Health Caribbean Foundation. This foundation was initiated by a Dutch institute for mental health in close cooperation with the Dutch academic medical centres of the Vrije Universiteit Amsterdam/UMC, which also provide health care specialists. Similar constructs with Dutch (academic) institutions are also found in Aruba, Curaçao, and Sint Maarten, in both somatic and mental health care.

Concurrently, the rich and varied cultural intricacies of the ABCSSS islands also carry with them Afro-Caribbean beliefs, rituals, and spiritual elements, including Indigenous and Euro-Christian religious practices, that offer traditional healing methods for mental illnesses, such as Brua or Obeah (Blom et al, 2015). Despite being poorly researched, these methods are commonly known on the islands by the local communities and are intrinsically linked to psychiatry (Allen, 2010). It is important to note that the many different groups of people living on the islands ascribe themselves in varying degrees to traditional methods of healing and (sometimes at the same time) to (Western) biomedical methods. The two methods are not mutually exclusive in seeking care (Punski-Hoogervorst et al, 2021), yet an integrative approach combining the methods to optimise mental health care is still missing on the islands (Lynch, 2021). However, an integrative approach can also favour Western knowledge above traditional knowledge if there is no conscious effort to dismantle the power dynamics at play. Deliberately and thoughtfully integrating the healing practices that already exist within a community is a way of centring the worldviews of local communities so that they recognise themselves in health care communication.

Challenges to mental health care communication

Effective and genuine communication between individuals and health care providers is vital when discussing mental health issues. Explaining moods, thoughts, integrative aspects of behaviour, and possible treatment methods is impossible when there is doubt and ineffectual transmission of information (Satcher, 2001). The disparity in public access and level of health of BIPOC communities has been well documented (see example from the United States in Fiscella and Sanders, 2016). While on Bonaire, Saba, and Sint Eustatius access to allopathic mental health care is not limited by individual financial

constraints, a barrier is perceived in the access and effectiveness of mental health care.

As underlined in the Post-Disaster Needs Assessment of Bonaire, there is a high demand for organised mental health treatment (World Bank, 2021). Health care providers observe that clients reach out to mental health care as a last resort in an often desperate situation. BIPOC communities are initially deterred from accessing mental health care due to mistrust, fear of treatment or discrimination, and differences in culture, language, and communication with the (often Dutch) providers. This mistrust can historically be traced to the criminalisation of mental illness and unethical experimental 'health care' practices performed on BIPOC communities (Gary, 2005; Vergès, 2020). For the ABCSSS islands in particular, the mistrust is rooted in colonial and postcolonial histories (Allen, 2010; Blom, 2015; Ansano, 2019). On the islands, mental health is strongly linked to spiritual well-being and religious belief systems. Traditional medicine and healing, as practised by the ancestors of current BIPOC communities, has been persecuted, considered invalid, and stigmatised by lawmakers and dominant religions and still has a complicated relationship with (Western) conventional medicine (Lynch, 2021). This history, along with the (universal) stigma on mental health, forms a significant barrier for mental health care communication and access to adequate and timely health care. The local communities' alienation from the predominantly Dutch and Dutch-speaking health care system has been reported in Faraclas et al (2022).

Additionally, ethnic disparities exist in how clients perceive their mental health care providers' cultural competence (Eken et al, 2021). Culturally competent care acknowledges and incorporates culture, cross-cultural relations, and 'vigilance towards the dynamics that result from cultural differences, and the adaptation of services to meet culturally-unique needs' (Cross, 1989). Eken et al (2021) elaborate by stating that adults from BIPOC communities 'were more likely to value seeing providers who shared or understood their culture'. These findings highlight the role of inclusion in mental health care and its communication and emphasise the importance of ensuring that mental health care providers have the competences to provide quality care. On the ABCSSS islands, a disparity can exist between the local BIPOC clients and their mental health providers, when (a large part of) the chief practitioners are, for example, White, from the European Netherlands, and lacking cultural competences. Further exacerbating this problem is the lack of opportunities for local training in mental health care professions. In a landmark collaboration in 2021, the ABCSSS islands' mental health institutions pledged to develop educational opportunities in mental health for local employees (Koninkrijk.nu, 2021).

E-health and language in mental health care communication

At Mental Health Caribbean (MHC) in particular, there is increasing attention paid to the cultural balance of the organisation and how this affects the quality of care. Besides investing more in strategy and recruitment for a personnel base that reflects the community it serves, MHC is developing culturally adapted e-health modules. This development in mental health care communication is a first for the ABCSSS islands. E-health is the use of the internet and digital resources alongside traditional face-to-face therapy to support treatment. Online, the patient can read about their treatment method, prepare for the next session, and chat with their therapist. E-Health has been a proven method of treatment, including in non-Western countries (Fu et al, 2020). Previous attempts at incorporating (Dutch) e-health in private mental health care practices in Curaçao have led to the exclusion of local and BIPOC communities. To reach island communities, MHC endeavours to translate the Dutch e-health modules into Papiamentu, the local language. This goes beyond literal translation and also involves sociocultural adaptations of texts and videos to appropriately reach the target audiences, such as visualising textual information, including storytelling, and changing examples to reflect Caribbean societies. This process is led by local therapists, content editors, and translators from the BIPOC communities that the modules are developed for. In this way, the project recentres Caribbean epistemologies 'through native language and dialects as a mode of decolonising' (Stewart, 2020, p 27). In Bonaire, Papiamentu has a long history of being neglected in education in favour of Dutch, but efforts to foreground Papiamentu in the education system have shown positive effects in school engagement and results (Beukenboom, 2021). Such effects are also expected when using Papiamentu instead of Dutch in mental health care communication and e-health in Bonaire.

Transformations in science communication practices and community-based engagement

The challenges of delivering inclusive and decolonised science communication in the ABCSSS islands have been illustrated in the previous sections with case studies from nature conservation and mental health care. The following sections build on the concepts introduced in this chapter and offer transformative practices in science communication that address the identified challenges. As this chapter shows, researchers, funders, and communicators can reflect on a number of practices in their work: (1) investing, supporting, and facilitating research and communication that is Caribbean-led; (2) recognising local knowledge and building long-term reciprocal collaborations; (3) reflecting on the

dynamics of decision-making and implementing multi-vocality and co-creation in science communication; and (4) asking difficult questions and, in response, sometimes refusing to participate in research (Tuck and Yang, 2014). These practices can transform research and communication practices and build a more embedded and community-based engagement with research in the ABCSSS islands.

Caribbean-led research, nature conservation, and mental health care communication

On April 24, 2014, the Dutch Ministry of Education, Culture, and Science established the Caribbean Netherlands Science Institute, a facility that provides accommodation and infrastructure for researchers and students in the marine sciences. Following discussions on the role of this institute for the so-called 'Dutch Caribbean communities', the Dutch Research Council commissioned a report on the sustainable strengthening of knowledge systems in the Caribbean, in which the interviewed stakeholders reflected on the need to 'bring science closer to society' (Bijker and Wuite, 2021, p 6). The report emphasises that the organisation 'can only succeed if the people and institutions of those islands can claim ownership'. In the previous sections, the challenge of involvement and ownership arose repeatedly across examples in research and communication of nature conservation and mental health care. So, what is required to establish local ownership?

Ownership is fostered when people are involved as equitable partners from the beginning, and not (as in the case of the national parks) as an afterthought. The lack of access to opportunities for local researchers and mental health care professionals and their dependence on foreign universities and funding shown in this chapter are tackled by initiatives such as the PISKABON fisheries cooperative, the training for local health care professionals, and the hiring of Caribbean professionals. Local leadership in health care, research, and communication is critical. For example, island-based researchers from the ABCSSS islands initiated CaribResearch, a research foundation that aims to contribute to the resilience, progress, and sovereignty of their own communities. According to CaribResearch, it is the privilege and responsibility of local experts to initiate, realise, coordinate, and interpret local research. Led by local academics, the organisation has prepared a research agenda for the ABCSSS islands (CaribResearch Research Agenda, 2022). This is an important first step and an opportunity to include public engagement with research as one of the pillars of the research agenda for the islands.

As much as possible, Caribbean research projects and funding institutions should also involve researchers from and on the islands in paid leadership, research, and communication positions.

Recognising local knowledge and building long-term reciprocal collaborations

Caribbean institutions of higher education, health care, and research have the challenge to provide leadership in care, research, and education where traditional and local knowledge are just as valued.

Researchers, both local and non-local, are primarily trained in Western research methodologies that are not adapted for and do not take island contexts into account. As Walter Mignolo writes: 'We must confront the reality that our modes of questioning and even the answers they provide, often continue to be modelled after Western ways of thinking and interpretation' (cited in Stewart, 2019, p 66). This requires extra efforts on the part of researchers and health care institutions, both from and outside the Caribbean. By incorporating Indigenous and local methodologies and ways of knowing and communicating into research projects, local and non-local researchers can include communities in more equitable ways and 'broaden the imaginary of who can make a claim on science communication' (Orthia, 2020). For research and communication, this also means recognising oral traditions and local knowledge, appropriately valuing and remunerating knowledge providers, and practising humility when building long-term, reciprocal collaborations. Challenges like the lack of communication in Papiamentu and the inaccessibility of scientific results can be addressed by a tailored approach through long-term collaborations with experienced partners. There is an important role for local contributors as equal partners throughout the research process: not only in communication projects and products but also in project design, data collection, analysis, and academic publications. Caribbean research projects should also create space for all researchers to critically reflect on their own background, position, and training and how this influences their work (Trisos et al, 2021).

Reflecting on dynamics of decision-making and co-creation in science communication

To restructure unequal power relationships, researchers can employ multi-vocality in decision-making with regard to research and public engagement with science. Thus, pitfalls such as the profound disconnect between mental health communication and BIPOC communities, 'helicopter science' practices, or the lack of local impact of nature conservation research can be avoided. Engagement and ownership are also embedded through long-term co-creation strategies for public engagement (Sankatsing Nava and Hofman, 2018), as is the case in the Pelican conservation citizen science programme that led to the Important Bird and Biodiversity Area, or in Brenchie's Lab community maker space citizen science initiatives.

It is critical to reflect on the dynamics of decision-making in these collaborative projects: who has the power to decide? Whose timeline do

we follow? Transparency in sharing agendas and goals is also vital to foster reciprocal collaborations. Well-written community engagement statements on proposals can successfully get research projects funded. However, it quickly becomes clear to the islanders when community consultation and engagement are genuine and when their sole purpose is a tokenistic 'box-ticking' exercise, getting pre-existing plans passed, or simply looking good (a public relations exercise). This then means that, when engagement is the goal, science communicators, researchers, and funders must plan and budget for genuine community engagement before designing projects (and calls for proposals) and build in flexibility and resources for multi-vocality, community wishes, needs, and subsequent project changes as a result of these collaborations.

Refusing research and asking the difficult questions

In her seminal book *Decolonising Methodologies*, Linda Tuhiwai Smith points to pertinent questions that can also be asked about research and science communication in the ABCSSS islands: who is the research for? Who are the owners of the research? Who will carry it out? Who will disseminate it? (Smith, 2021, p 10). From this chapter, additional questions can be added: who will design the public engagement plans? Who will benefit, but also, who defines what those benefits are? And finally, what are the conditions for this research to take place? Caribbean communities should be able to consider 'refusal' to participate in research as a viable option (Tuck and Yang, 2014). In 2020, Xiomara Balentina expressed one possible condition for participating in research. After a consultation session for a new research project, she wrote that 'keepers of traditional knowledge should only participate in research initiated by researchers from the Western university if the encounter results in decolonised spaces – Spaces in which the curriculum is reflective of different, yet equal voices from different geographical places' (Balentina, 2020). Communities of the ABCSSS islands can take Balentina's lead and formulate their own conditions for collaboration with foreign researchers.

Conclusion: Looking towards the future, imagining Caribbean ways to foster and exchange knowledge outside the academy

In the ABCSSS islands, science communication about nature conservation and mental health is often done by researchers and organisations from Europe and North America. With a number of notable exceptions, communication of mental health care and of nature conservation in the Caribbean has been a one-way street. These legacies shaped the exclusionary practices that have had a long-term impact on public engagement with science on the islands,

in which both *science and science communication are done to us instead of done with us*. Therefore, a critical step in 'decolonising' science communication on the islands is to write 'our stories by us, for us, and for the world, rather than having stories written about us' (Stewart, 2019, p 17). In order to interrupt the existing relationship between science and society on the islands, there is an imperative to develop individual and institutional capacities for the decolonised production of knowledge together with and in service of the island communities. However, this also entails asking whether it is possible to decolonise science communication at all. This requires the critical interrogation of the role of science communication in strengthening scientific research and perpetuating its underlying structures. Changing how science is communicated does not necessarily change the nature of science itself, and recognising that 'easy absorption, adoption, and transposing of decolonisation is yet another form of settler appropriation' (Tuck and Yang, 2012; Hlabangane, 2018) is a crucial aspect of this process. Instead, Caribbean islanders should continue to take the lead in imagining and investing in alternative spaces and ways of fostering and sharing knowledge outside of the academy.

Engaged researchers in the Caribbean are moving away from the 'deficit model' that assumes a lack of knowledge about science that needs to be rectified. For science communication to be effective, it requires reframing not only from a monologue to a dialogue (Horst et al, 2017) but into a practice that fosters collaborative spaces where participants become co-researchers (Stewart, 2019, p ix). This is not easy to achieve within the current academic structures. In fact, it is not meant to be easy: these practices will unsettle our work and restructure not only science communication but also the underlying research practices. As Caribbean researchers and science communicators, we should continuously ask ourselves how we can build a research and communication practice that is more grounded locally, is embedded in questions relevant to islanders, and equitably involves stakeholders outside academia. The end-goal is to no longer have to communicate research back to non-academic island communities but instead to imagine, develop, and implement research and public engagement together with local communities. These profound changes can lead to more inclusive and locally contextualised scientific research and communication, whereby Caribbean communities play an active role in agenda-setting, formulating ethical frameworks, and designing and leading community-based public engagement with research in Aruba, Bonaire, Curaçao, Saba, Sint Maarten, and Sint Eustatius.

Acknowledgements

We would like to thank the following people for the conversations, reflections, and valuable contributions to this chapter: Antonio Carmona

Báez, Xiomara Balentina, Lysanne Charles, Alison Fischer, Corinne Hofman, Rosalba Icaza Garza, Joseph Sony Jean, Durwin Lynch, Luc Alofs, Stacey Mac Donald, Jurio Maduro, Eric Mijts, Emma de Mooij, Gert Oostindie, Pedro Russo, Taariq Ali Sheik, and the 'Under Construction' participants at the Royal Institute for South East Asian and Caribbean Studies. This chapter is part of the ongoing PhD research of the first author about public engagement with research in the Caribbean.

References

Allen, R.M. (2010) 'Hende a hasi malu p'e: popular beliefs in Curaçaoan culture', in N. Faraclas, R. Severing, C. Weijer, and L. Echteld (eds) *Crossing Shifting Boundaries: Language and Changing Political Status in Aruba, Bonaire and Curaçao*, Willemstad, Curaçao: Fundashon pa Planifikashon di Idioma, University of the Netherlands Antilles, pp 221–9.

Allen, R.M. (2018) 'Negotiating gender, citizenship and nationhood through universal adult suffrage in Curaçao', *Caribbean Review of Gender Studies*, 12: 299–318.

Ansano, R. (2019) 'Advances and challenges in safeguarding traditional medicine in Curaçao', in E. Falk (ed) *Traditional Medicine: Sharing Experiences from the Field*, np: ICHCAP, pp 106–15, Available from: https://ichlinks.geunnam.com/archive/materials/publicationsV.do?nation=KR&page=&ichDataUid=13829988369390600390

Balentina, X. (2020) 'The Western university in "exotic" spaces', *The Daily Herald*, 9 March.

Beukenboom, E. (2021) 'Het Papiaments treft geen blaam', *Antilliaans Dagblad*, 10 November.

Bijker, W. and Wuite, J. (2021) 'Dutch Caribbean research platform: towards the sustainable strengthening of the knowledge system in the Caribbean part of the Kingdom of the Netherlands', NWO, Available from: https://www.rijksoverheid.nl/documenten/kamerstukken/2021/06/16/eng-report-dutch-caribbean-research-platform

Blair, M.E. (2019) 'Toward more equitable and inclusive spaces for primatology and primate conservation', *International Journal of Primatology*, 40: 462–4. doi: https://doi.org/10.1007/s10764-019-00093-y

Blom, J.D., Poulina, I.T., van Gellecum, T.L., and Hoek, H.W. (2015) 'Traditional healing practices originating in Aruba, Bonaire, and Curaçao: a review of the literature on psychiatry and Brua', *Transcultural Psychiatry*, 52(6): 840–60.

Burns, M. and Medvecky, F. (2018) 'The disengaged in science communication: how not to count audiences and publics', *Public Understanding of Science*, 27(2): 118–30. doi: https://doi.org/10.1177/0963662516678351

Cannon, S.E. (2019) 'Decolonizing conservation: a reading list', Zenodo. doi: https://doi.org/10.5281/zenodo.4429220

CaribResearch Research Agenda 2022–26 (2022) 'CaribResearch: re-imaging our realities; strengthening our capacity to cope with crises', Foundation for Social Research of the Dutch Caribbean and the Region, Aruba, Bonaire, Curaçao, Sint Maarten, Saba and Statia.

Chilisa, B. (2019) *Indigenous Research Methodologies*, Thousand Oaks, CA: Sage Publications.

Connell, R.J. (2017) 'The political ecology of Maroon autonomy: land, resource extraction and political change in 21st century Jamaica and Suriname', PhD dissertation, UC Berkeley.

Cross, T.L. (1989) 'Towards a culturally competent system of care: a monograph on effective services for minority children who are severely emotionally disturbed', CASSP Technical Assistance Center, Georgetown University Child Development Center, ERIC Number: ED330171.

Dawson, E. (2014) '"Not designed for us": How science museums and science centres socially exclude low-income, minority ethnic groups', *Science Education*, 98(6): 981–1008.

De Santo, E.M., Jones, P.J., and Miller, A.M.M. (2011) 'Fortress conservation at sea: a commentary on the Chagos marine protected area', *Marine Policy*, 35(2): 258–60.

Dutch Caribbean Nature Alliance (2021) 'Annual report', DCNA. Available from: https://dcnanature.org/wp-content/uploads/2022/04/DCNA-YearReport-2021-Digital.pdf

Eken, H.N., Dee, E.C., Powers III, A.R., and Jordan, A. (2021) 'Racial and ethnic differences in perception of provider cultural competence among patients with depression and anxiety symptoms: a retrospective, population-based, cross-sectional analysis', *The Lancet Psychiatry*, 8(11): 957–68.

Faraclas, N., Kester, E.-P., and Mijts, E. (2022) '"We can do better than 'Chambuká'": toward inclusive language policy and practice in Bonaire', final report of the Maneho di Idioma research team, April.

Ferdinand, M. (2021) *Decolonial Ecology: Thinking from the Caribbean World*, Cambridge: Polity Press.

Fiscella, K. and Sanders, M.R. (2016) 'Racial and ethnic disparities in the quality of health care', *Annual Review of Public Health*, 37: 375–94.

Fu, Z., Burger, H., Arjadi, R., and Bockting, C.L. (2020) 'Effectiveness of digital psychological interventions for mental health problems in low-income and middle-income countries: a systematic review and meta-analysis', *Lancet Psychiatry*, 7(10): 851–64.

Gary, F.A. (2005) 'Stigma: barrier to mental health care among ethnic minorities', *Issues in Mental Health Nursing*, 26(10): 979–99.

Hall, M. and Tucker, H. (2004) *Tourism and Postcolonialism: Contested Discourses, Identities and Representations*, London: Routledge.

Hlabangane, N. (2018) 'Can a methodology subvert the logics of its principal? Decolonial meditations', *Perspectives on Science*, 26(6): 658–93.

Horst, M., Davies, S.R., and Irwin, A. (2017) 'Reframing science communication', in U. Felt (ed) *The Handbook of Science and Technology Studies*, Cambridge, MA: MIT Press, pp 881–907.

Koninkrijk.nu (2021) 'Samenwerking geestelijke gezondheidszorg tussen alle eilanden van het Koninkrijk', 30 October, Available from: https://koninkrijk.nu/2021/10/30/samenwerking-geestelijke-gezondheidszorg-tussen-alle-eilanden-van-het-koninkrijk/

Lynch, D. (2021) '"Embracing Brua": toward integrated mental health care in the Dutch Caribbean; opportunities and barriers for collaboration between traditional healers and biomedical practitioners', poster presentation, Dutch Caribbean Research Week, 14–18 June 2021. Funded with Dr Silvia de Groot Fonds/KITLV grant 2016.

Mabele, M., Sandroni, L.T., Collins, Y.A., and Rubis, J. (2021) 'What do we mean by decolonizing conservation? A response to Lanjouw 2021', 7 October, Available from: https://conviva-research.com/what-do-we-mean-by-decolonizing-conservation-a-response-to-lanjouw-2021/

Mac Donald, S. (2022) '"Life in paradise"? A social-psychological and anthropological study of nature conservation in the Caribbean Netherlands', PhD dissertation, Leiden University.

MacLeod, L. (2021) 'More than personal communication: templates for citing Indigenous elders and knowledge keepers', *KULA: Knowledge Creation, Dissemination, and Preservation Studies*, 5(1). doi: https://doi.org/10.18357/kula.135

Mbembe, A.J. (2016) 'Decolonizing the university: new directions', *Arts & Humanities in Higher Education*, 15(1): 29–45. doi: https://doi.org/10.1177/1474022215618513

Meredith, D. (2010) *Explaining Research: How to Reach Key Audiences to Advance Your Work*, Oxford: Oxford University Press.

Milieu Centraal (2022) 'Subsidies verduurzamen woning', 10 March, Available from: https://www.milieucentraal.nl/energie-besparen/energiesubsidies-en-leningen/subsidies-verduurzamen-woning/

Mijts, E., Ballantyne, J., and Rodriguez, C. (2022) UAUCU Student Research Exchange Collected Papers. Available from: https://www.ua.aw/wp-content/uploads/2022/05/UAUCU-BOOK-2022.pdf

NWO (2019) 'More funding available for Caribbean science', 5 February, Available from: https://www.nwo.nl/en/news/more-funding-available-caribbean-science

Olson, R. (2009) *Don't Be Such a Scientist: Talking Substance in An Age of Style*, Washington, DC: Island Press.

Orthia, L.A. (2020) 'Strategies for including communication of non-Western and Indigenous knowledges in science communication histories', *JCOM: Journal of Science Communication*, 19(2): A02. doi: https://doi.org/10.22323/2.19020202

Palmer, S.E. and Schibeci, R.A. (2014) 'What conceptions of science communication are espoused by science research funding bodies?', *Public Understanding of Science*, 23(5): 511–27.

Punski-Hoogervorst, J.L., Rhuggenaath, S.N., and Blom, J.D. (2021) 'Belief in Brua among psychiatric patients from Aruba, Bonaire, and Curaçao: results from an explorative study in the Netherlands', *Transcultural Psychiatry*, 59(3): 249–62.

Rai, N.D., Devy, M.S., Ganesh, T., Ganesan, R., Setty, S.R., Hiremath, A.J. et al (2021) 'Beyond fortress conservation: the long-term integration of natural and social science research for an inclusive conservation practice in India', *Biological Conservation*, 254: 108888.

Robbins, P, (2007) *Encyclopedia of Environment and Society*, Thousand Oaks, CA: Sage Publications.

Sankatsing Nava, T. and Hofman, C.L. (2018) 'Engaging Caribbean island communities with Indigenous heritage and archaeology research', *JCOM: Journal of Science Communication*, 17(4): CN06. doi: https://doi.org/10.22323/2.17040306

Satcher, D. (2001) 'Mental health: culture, race, and ethnicity; a supplement to mental health; a report of the surgeon general', US Department of Health and Human Services.

Sevold, T. (2020) 'How citizen science can help SIDS reach SDGs: experiences of open environmental research in Aruba', Available from: https://medium.com/@tony_87301/how-citizen-science-can-help-sids-reach-sdgs-8ef2920b7e00

Sint Maarten Nature Foundation (2011) 'Brown Pelican monitoring', Available from: https://naturefoundationsxm.org/research/monitoring/brown-pelican-monitoring/

Smith, L.T. (2021) *Decolonizing Methodologies: Research and Indigenous Peoples*, London: Zed Books.

Stewart, S. (ed) (2020) *Decolonizing Qualitative Approaches for and by the Caribbean*, Charlotte, NC: IAP.

Trisos, C.H., Auerbach, J., and Katti, M. (2021) 'Decoloniality and anti-oppressive practices for a more ethical ecology', *Nature Ecology & Evolution*, 5(9): 1205–12.

Tuck, E. and Yang, K.W. (2012) 'Decolonization is not a metaphor', *Decolonization: Indigeneity, Education & Society*, 1(1): 1–40.

Tuck, E. and Yang, K.W. (2014) 'R-words: refusing research', *Humanizing Research: Decolonizing Qualitative Inquiry with Youth and Communities*, 223–48.

Vergès, F. (2020) *The Wombs of Women*, Durham, NC: Duke University Press.
World Bank (2021) 'COVID-19 post-disaster needs assessment: Bonaire socio-economic assessment report', World Bank Group: Urban, Disaster Risk Management, Resilience & Land, Available from: https://bonairegov.com/fileadmin/user_upload/WorldBank-PDNA-SI.pdf
Zaitchik, A. (2018) 'How conservation became colonialism: Indigenous people, not environmentalists, are the key to protecting the world's most precious ecosystems', *Foreign Policy*, Available from: https://foreignpolicy.com/2018/07/16/how-conservation-became-colonialism-environment-indigenous-people-ecuador-mining/
Zanotti, L., Carothers, C., Apok, C.A., Huang, S., Coleman, J., and Ambrozek, C., (2020) 'Political ecology and decolonial research: co-production with the Iñupiat in Utqiaġvik', *Journal of Political Ecology*, 27(1): 43–66.

Index

References to endnotes show both the page number and the note number (236n1).

A

ABCSSS islands, science communication in 188, 200–1
  and community-based engagement 197–200
  decolonisation of 190–1
  and dynamics of decision-making and co-creation 199–200
  'helicopter science' 191–2
  infrastructures of 189–90
  and local knowledge recognition 199
  long-term reciprocal collaborations building 199
  mental health care communication in 195–7
  and nature conservation research 193–4
  nature parks and fortress model in 192–3
  and public engagement 189, 191–4, 197–200
  and refusal to participate in research 200
  research and conservation agendas in 191–2
  research and funding 189–90
  transformations 197–200
Aboriginal and Torres Strait Islander knowledges 211
Adichie, C.N. 182, 241
Africa Scientifique (AS) Programme 6, 68, 69–70, 73
  and Afrocentricity 71–2
  learning by doing 74–6
  transformation for sustainable impact 72–4
Africa STI News 106
African Gong 7, 15, 66, 69, 77, 79, 81
African Science Literacy Network (ASLN) 106, 114
African Union 65, 101, 112, 177, 180, 184
Afrocentricity 3, 71–2, 119
agriculture 106, 108, 217
  and coloniality 88, 90
  in Nigeria 103–4
Airhihenbuwa, C.O. 42
ako Māori (culturally preferred pedagogy principle) 134
Alves, M.T. 161
Angelou, M. 150
anticolonialism 134, 136, 137, 140, 142, 151
Aotearoa New Zealand 130–2, 135, 138, 140–3, 141
  education sector 131
  Indigenous knowledge traditions 131
  knowledge governance in 132–3
  New Zealand Association of Scientists 133, 137, 139, 144
  New Zealand Science Review (NZSR) 131, 133–5, 137–9, 141–2
  see also Māori; mātauranga (Māori knowledge)
artefacts 8–9, 162–3, 170, 172, 241
artisans 214, 216, 218, 224, 226, 228–9, 232, 233
Aruba 189, 191, 193, 194, 195, 201
  see also ABCSSS islands, science communication in
Asante, M.K. 3, 71
Asia 180–1, 241
  minorities 35, 37, 39
  and SARS pandemic 37, 38, 42
  science centres and museums in 7
astronomy 134, 140, 213, 215, 226, 227
āta (growing respectful relationships) 135
audio recordings, as inclusion tool 57
Australia, and COVID-19 pandemic 39–42
  and Asian minorities 35, 39
  first cases 39
  Indigenous science 211
  issues with the state's response to 41–2
  local government areas (LGAs) 41, 42, 45
  second wave 39–40
  third wave 40–1
  33 Alfred Street tower 40
  and Victorian Department of Health and Human Services 40
Ayangunna, J.A. 122

B

Ba, H. 31
Bailey, B. 168
Balboa Park 152, 153
Baldwin, J. 163, 165
Balentina, X. 200, 202
Baloyi, C. 121
Banerjee, S. 232
Bang, M. 173
Barbican Centre 168
Battala publications 223, 233–4
  rise of 223–30
  role in knowledge democratisation 230–2
Bauer, M.W. 118
Baumgartner, R. 123
Bengal, colonial 222–3, 232–6
  Battala publications *see* Battala publications
  Bhadralok classes 224, 226–7, 230, 232, 236n1
  Calcutta 224–5, 229, 232
  and caste system 223–35
  and hegemony and marginalisation 226–7
  knowledge politics in 226–7
  knowledge-sharing ecosystems 224–6
  sociocultural contexts 224
Bengali language 226, 231
Biyela, S. 182
Black, Indigenous, and Peoples of Colour (BIPOC) communities 150, 152–4, 157, 158, 190, 195–7, 199
Black Africans researchers, and gender 66–8, 171
Black Lives Matter 184
Black movements, and art 168–9
Black Panther (film) 169, 170
blended language programming 56–7
Bonaire 189, 191, 194–7, 201
  see also ABCSSS islands, science communication in
Bonaire National Marine Park 192
Bourdieu, P. 166
Brenchie's Lab 194, 199
Brua 195

C

Calcutta 224–5, 229, 232
Calcutta School Book Society 225
California Building 153
Cameroon 69, 70
Camit, M. 41
Canada
  Royal Ontario Museum (ROM) 167
  and SARS pandemic 35, 36–8
capacity building 12, 56, 243, 245–6
  in the Caribbean 193
  in New Zealand 131
  in South Africa 66, 76, 77, 78
  see also Africa Scientifique (AS) Programme
Carbonnier, G. 10
career advancement 70, 78, 109, 177, 180
Caribbean 94, 124–5, 200–2
  see also ABCSSS islands
Caribbean, nature conservation and mental health in 198
  dynamics of decision-making and co-creation 199–200
  local knowledge recognition 199
  long-term reciprocal collaborations building 199
  and refusal to participate in research 200
Caribbean Netherlands Science Institute 198
CaribResearch 198
cartoon depictions, of SARS 37
caste, in colonial Bengal 228, 231
  dominant groups 223
  lower caste 223, 224, 226–7, 229, 231, 232–3, 234, 235
  and privileges 224
  upper caste 224, 225, 226–7, 230, 232–3
Castro-Gómez, S. 88, 89
chain of accessibility principle 57–8
Chickasaw Nation 151
Chilisa, B. 190, 193
China
  ancient 11, 209
  Haikou Village 125
  Meng Hsi Pi T'an *see Meng Hsi Pi T'an* (Shen Kua)
  and SARS pandemic 2, 36–9
Chivers, J. 115
Christoffel Park 192
Cisse, M. 120
citizen science initiatives 194, 199
citizens
  engagement of 48, 110
  and scientific knowledge 94, 102–3, 111
civil society organisations 13, 95, 168
civilisations 162, 169–70, 171–2, 173, 240
classes
  in China 217
  in colonial Bengal 223, 224, 226, 227, 230–4, 236n1
  and STI ecosystem 67
  Western-educated 100
climate change 108, 191
co-creative approach 32, 59, 116–17, 123, 124, 198, 199–200
colonialism
  in ABCSSS islands 196
  in *Black Panther* (film) 169, 170
  and cultural imperialism 163–4
  epistemic colonialism 87–9, 93
  and exhibitions 161–3, 168, 169
  impact on BIPOC 150
  in *Indiana Jones* (film) 169–70
  justification for 161–2, 171
  in Mexico 85, 86, 96

and museums 149–50, 151, 152–3, 156–8, 164
in Nigeria 103
normativity 166–7
power structure 140
and science communication in Mexico 87–9
science education during 100
scientific 193
socio-psychological perspective 165
in South Africa 66, 67
Spanish architecture 153
see also Bengal, colonial
coloniality
and agriculture 88, 90
cultural 87–8
epistemic 87–9
of knowledge 7, 85–7, 89–91, 94
and scientific knowledge 85, 86, 89–92, 94, 172–3, 181, 209–10, 215, 234, 241–2
community-centred leave 157–8
Compton, L. 122
contextualisation 115–16, 118, 123, 243
copper-plate engravings 229, 233
Cornell, S. 132, 142
COVID-19 pandemic 2, 76, 115
in Australia 35–6, 39–42
and digital communication 121–2
and lockdowns 39–40, 42
in Nigeria 104, 110
and STEM education 20
vaccination development and delivery during 178
craftsmen 223, 226, 228–9, 230, 231–2
cultural archives 9, 161–2, 166, 168, 171
cultural heritage 156, 165–6, 211, 240
cultural imperialism 9, 162–4, 163–4, 166, 167–8
Curaçao 189, 191, 195, 197, 201
see also ABCSSS islands, science communication in

D

Darbel, A. 166
Das, S. 123
Dawson, E. 49, 222
decolonisation 87, 140, 147, 161–3, 167, 173, 239–43
and community-centred leave 157–8
guiding principles 154
of museums 10, 149–59, 241
of science communication 162, 181–3, 190–1, 201
deficit model 8, 36, 90, 110, 116–19, 125, 189, 201
democratisation
of knowledge, Battala publications' role in 230–2
of science 49–50
of scientific knowledge 209–10
Development Communications Network 106
Díaz, P. 90
Digdarshan 225
digital communication 120
discrimination 78n1, 196
and caste system 224
during pandemics 35, 37, 39, 42
and universal design principles 56
Du Bois, W.E.B. 162–3
Durham, J. 161
Durie, M. 133
Dutch Caribbean Nature Alliance 192
Dutta, U. 123

E

Ebola epidemic 105
e-health 197
Eken, H.N. 196
Empinotti, M. 109
epistemic injustice 92
epistemological orientations 173
ethics 9, 46, 97, 170, 186
Ethiopia 124
Etumnu, E.W. 124
Eurocentrism 23, 222, 239–42, 244
and colonial Bengal 225, 227
decolonisation and normalcy 167–8, 172, 210
and Global South 116, 118, 125
and Mexico 88, 95
and New Zealand 142
and Nigeria 101
and South Africa 67, 69, 71, 77
Exhibit B 168–9
exhibitions 57–9, 90, 154–5, 163, 167–9, 171, 242–3
Explainers 21, 219
co-designing demonstrations and programmes 29–31
and cross-departmental collaboration 29–30
definition of 22
experiences, impact of 26–8
habits of mind 29–30
learner-centred pedagogical approach and evaluation 31–2
relationships with science 22–6
and visitor-centred engagement 28
Ezcurra, E. 88

F

Fabian, J. 162
Fab-Ukozor, N. 124
Fafunwa, B. 105
Falade, B. 102–4, 108
Fanon, F. 165
Faraclas, N. 196
Ferdinand, M. 193

Finlay, S.M. 95, 118–19, 121
Fort William College 224–5
Foucault, M. 171
France 168–9, 210
French, H.W. 242
Fricker, M. 92–3
Friend of India, The 226

G

Gascoigne, T. 102, 106
gender 49, 50, 55, 58, 66–8, 73, 74, 101, 171–2, 177, 183, 233
Gerrard, J. 134
Ghana 69, 101, 176, 177
Ghosh, A. 230, 232
Global North 3–4, 9, 10, 13, 182
  and African challenges 177, 179, 183
  science centres in 48
  science communication epistemologies 118, 125
  training programmes in 68–9
Global North–South divide
  bridging through decolonisation 240–4
  complementary/alternative versus traditional medicines 182
  COVID-19 vaccines access 178
  funding divide 180, 181
  and globally inclusive science communication 244–7
  international collaboration partnerships 179–80
Global South 3–4, 9, 10, 13, 94, 115–16, 125–6, 177, 183
  deficit model in 119
  digital communication in 120
  and Eurocentrism 118–19
  inclusive science communication in 121–5
  inclusivity and public engagement 118–19
  participatory inclusive approach 117–18, 121
  public engagement approaches in 117–19, 120–1
  science and technology (S&T) policies in 119
  value of multimodality 124–5
  voices and communication actors, multiplicity of 122–4
globalisation 3, 7, 217, 239, 242
Goldman, A. 92
Gomez, M. 93
Goodhue, B. 153
Guan, D. 38
Guo, L. 209

H

Haikou Village 125
Halhed, N.B. 228
Hargreaves, T. 115
Harris, P. 134
health communication 104, 199
Hendy, S. 139
hermeneutical injustice 92, 93
Hidden Figures (film) 170–1
Hindu caste system *see* caste, in colonial Bengal
Hindu College 225
histories of science communication, significance of 210–12
  see also Meng Hsi Pi T'an (Shen Kua)
Hobson, J.M. 216–17, 220
Hountondji, P. 242
Hsu, E. 182
Hutchings, J. 134
Hyland-Wood, B. 42

I

identities 21, 32, 58, 60, 96, 154
  gender 49
  of museum 165
Igbo-Ukwu artefacts 241
Important Bird and Biodiversity Area 194, 199
In the Heart of Africa exhibition 167, 168, 169
inclusive science communication 239–47
  breaking the silos 50–1
  chain of accessibility 57–8
  and community partnerships 59–60
  and existing strengths 56–7
  in Global South 121–5
  inclusive learning environments 54–5
  and key people and stakeholders integration 58–9
  mission- driven intentionality 53–7
  and multilayered exclusion factors 119–21
  and public engagement 118–19
  strategies 51–3
  universal design principles 55–6
India 123, 222, 224–6, 234
  languages of 225, 228
  see also Bengal, colonial
Indigenous Australian Yorta Nation 95
Indigenous communication systems 120, 122, 124–5
Indigenous knowledge *see* Aotearoa New Zealand; Māori; mātauranga (Māori knowledge); Nigeria
Indigenous languages 8, 75–6, 120, 225
Indigenous peoples 93, 121, 124–5, 136, 139, 142, 150, 151, 153, 155, 182
innovation 53, 115, 122, 124, 179, 181, 183, 217
  in Africa 242, 243
  collective 243
  eco-innovation 180
  in New Zealand 130–1
  in Nigeria 100, 101–3, 106, 108, 111n5
  research-led 176–8

in South Africa 63, 66
technological 225
International Congress of Museums (ICOM) 164, 165
internationalisation 7, 180
intersectionalities 32, 60, 67–8, 142
Ishinaha-Shinere, S. 119
ITESO 93

J

Jackson, A.-M. 130, 134, 137–8
Jensen, P. 118
Jiang, T. 37

K

Kago, G. 120
Kalighat artists 230
Kapa-Kingi, Eru 135
Karmakar, P. 228, 233
kaupapa (collective philosophy principle) 134–5, 137, 141
Kenya 70, 76, 182
Khumalo, N.B. 121
kia piki ake i nga raruraru o te kāinga (socio-economic mediation principle) 134
Kim, Y.S. 217
knowers 91–2, 93, 136
knowledge
coloniality of 7, 85–7, 90–1, 94
governance of 131–2, 141–2
keepers 211, 213
production of 87–9, 100–1, 118, 142, 161, 172, 230, 242
systems 117–19, 121, 133, 140–1, 198, 211, 223, 226–7, 232
knowledge-making 223, 232–6
knowledge-sharing ecosystems 223, 224–6
knowledge-sharing practices 227, 235
Kolkata *see* Calcutta
Kontinen, T. 10
Kukutai, T. 134
Kumeyaay peoples 150, 153

L

Lagos Declaration and Call to Action on Science Communication and the Public Learning and Understanding of Science in Africa, The (2016) 65–6
land, Indigenous 141, 150, 153
language harmonisation 120
Latin America 7, 14, 56, 87, 94–5, 98, 124–5, 181
Lawal, O.A. 104
leadership 30, 32, 51, 102, 111n5, 122, 163, 177, 198–9, 246
learning
asset-based and community of practice approaches to 23
book-based 213, 214, 217
co-creative 124
in colonial Bengal 223, 225, 226
Design, Make, Play approach 21, 26
by doing 71, 74–6
experiences, inclusive 31, 32, 56, 57, 58–60
inclusive environment 24–5, 28, 52, 54–5
informal science learning 48–9, 53
mutual learning 239, 243, 245
science 21, 23, 24–5, 27
scientists and public, mutual learning between 117–18
as social practices 21
STEM 21, 30
learning environment, inclusive 24–5, 28, 52, 54–5
and community partnerships 59–60
key people and stakeholders integration 58–9
Leung, C. 37, 38
local communities 19, 54, 56, 59, 123, 192, 195–6, 201
local knowledge 88, 123, 197, 199
local languages 76, 102, 104, 109, 124–5, 197, 225
Lonetree, A. 149
Lozano, M. 94–5

M

Mac Donald, S. 192, 194
Maina, M. 105, 108
Māngai, R. 134
#Manosalacuenca 95
Manuel, R. 137
Māori 130, 141–2
Kaupapa Māori theory principles 134–5, 141
knowledge *see* mātauranga (Māori knowledge)
lunar and astronomical knowledge 140
Matariki 140
te reo Māori (the Māori language) 130, 131, 135, 136, 142
marginalisation 91, 116, 178, 226–7, 232
marginalised communities 73, 233–5
marine environment 194
markets 217, 231–3
Márquez, M.C. 123
Marsden, M. 143
Martín-Barbero, J. 92
mass media 37–8, 49, 122, 243
mātauranga (Māori knowledge) 130–1, 132, 142
epistemological scrutiny 138–40
governance 132–8
practice 134–6
and science governance practice 136–8
mathematics 69, 70, 73, 76, 210, 217, 226
see also STEM (science, technology, engineering, mathematics)

Maya Museum of Cancún 93
Maya peoples 156
Mayan cultures 93
Mayan Riviera 93
Medin, L. 173
Melbourne 39, 42
Memmi, A. 165
Meng Hsi Pi T'an (Shen Kua) 11, 209–10, 218–19
  jottings 213–16
  and Northern Sung society 216–18
  and science communication histories 212–13
  as a science communication text 215–16
mental health care communication, in ABCSSS islands 190–1, 195, 198, 200
  and BIPOC communities 199–200
  challenges to 195–6
  e-health and language in 197
Mental Health Caribbean (MHC) 195, 197
Mercier, O.R. 133
Mexico, science communication in 85, 86
  and epistemic coloniality 87–9
  and institutional framework 89–91
  recommendations for 94–6
  scientific knowledge and social epistemology 91–3
Mgbenka, R.N. 104
minority ethnic groups, and pandemics 35, 39, 42
Momen, H. 124
Monterey Bay Aquarium 54, 56
Moore, S. 60
Morgan, K. 137
Morris, M. 166–7
Mundy, P. 122
Museum of European Normality 161
Museum of Mayan Culture, Chetumal 93
Museum of Natural History, Mexico 90
Museum of Us 150, 158
  and Brandie 151–2
  and colonial legacy 152–4
  Community-Centred Leave 157–8
  and decolonisation 154–8
  Decolonising Initiatives in Action signs 155–6
  Eurocentrism and White supremacy disruption 157
  and land 150
  membership model 155
  and Micah 152
museums 4, 5, 7, 9, 19–20, 48, 53, 125, 242, 243, 245
  and authority 166
  case studies 167–9
  chain of accessibility 57–8
  co-designing demonstrations and programmes 30
  and cultural imperialism 164
  curators 166, 167, 169, 170, 172
  decolonisation of 150, 154–8, 162–3, 172, 241
  definition of 164
  ethnographic 163
  Eurocentric privilege 167–8
  existing foundation 56–7
  Explainers *see* Explainers
  and external experts 58–9
  gender inclusion in 171
  inclusion in 48–9, 50, 51, 52
  and inclusive community practice 29–32
  inclusive learning environment 54–5
  injustices in 93
  in Mexico 90–1
  mission of 20
  in New Zealand 130–1, 149
  and normalcy 164–5, 170–3
  NYSCI 21, 22
  and personal relationships 22–6
  and popular culture 169–70
  visitor-centred engagement 29
myths 102, 105, 138, 170, 188, 242

N

Nasarawa State University (NSUK) 107
National Advisory Council on Innovation 66
National Centre for Technology Management (NACETEM) 102, 111n2
National Institute of Water and Atmospheric Research (NIWA) Wellington Regional Science Fair, The 131
National Museum of Anthropology 91
National Office for Technology Acquisition and Promotion (NOTAP) 102, 111n2
National Science Foundation 19, 31
natural sciences 235
nature conservation, in Caribbean 190–1
  'helicopter science' 191–2
  nature parks and the fortress model in 192–3
  strategies and language in communication 193–4
Nepote, A.C. 86
Netherlands 167, 189, 191, 202, 205
New South Wales 42
New York Hall of Science (NYSCI) 20, 21, 32
  inclusive communication practices 29–32
  see also Explainers; museums; science centres
Next Einstein Forum (NEF) 108
Ngā Pae 137
Ngata, T. 140
Ngũgĩ, wa Thiongo 165
Nigeria 70, 100–1
  communication channels, diversification and popularisation of 109–10
  Federal Ministry of Science and Technology (FMST) 101, 102

funding adequacy 108
homegrown science culture 100, 103, 105, 106, 110, 111n1
hubris in science communication, addressing 110
Indigenous science communication in 107–10
local languages usage, in science communication 109
local scientists as role models 108–9
National Innovation System 102–3
policy makers and legislators 102
science, technology, and innovation (STI) agenda in 100, 101–3, 106, 111n2
science communication in 103–5
science communication initiatives in 105–7
teaching and practice of science, strengthening 107–8
Nigeria Centre for Disease Control (NCDC) 104
normalcy 160, 172–3
colonial normativity, enjoying 166–7
and cultural imperialism 163–4
and inaccurate narratives 170–2
as a multiplier of 'business as usual' inertia 164–5
popular culture and museums 169–70
North America 3, 7, 180–1, 200
Northern Sung society 216–18
Nyamnjoh, A. 240

O

Okeoma 241
Olukoshi, A. 240
online platforms 106, 122, 197
Oregon Museum of Science and Industry 60
Organisation of African Unity 101
Orientalism 3
Orientalism (Said) 161, 162
Orthia, L.A. 11, 95, 121, 188, 235
ownership
and mental health care 198, 199
of science 49, 102, 107
Oyewo, B.A. 122

P

Palmer S.E. 119
pan-Africanism 65, 69, 71, 100, 101
Panama-California Exposition 152–3
pandemics, and racial minorities 35
COVID-19 in Australia 35–6, 39–42
culturally sensitive communication 38
lockdowns, impact of 39–40
media coverage 37–8
participatory pathway 42–3
SARS in Canada 35, 36–8
see also COVID-19 pandemic; SARS pandemic
Papiamentu 197, 199
Pelican Conservation programme 194
Phalkey, J 222
PISKABON fisheries cooperative 194, 198
popular culture 161, 163–4, 169, 232
Porras, A.M. 123
printmaking practices 222–3, 226, 227–30, 232–4
private sector 57, 181, 217
Project Mātauranga 130
proverbs 74, 105, 124, 134
public communication of science 75, 85, 86, 92
public engagement 32, 95, 117, 239–40, 244
in ABCSSS islands 189–91, 193, 198–202
in colonial Bengal 233
in Global South 117–19, 120–1
in Nigeria 104
in South Africa 64, 69–70, 77–8, 81
public health 103, 104
public understanding 86, 103, 117, 118, 120
Pūhoro Academy 131
Pulido. G. 88

Q

Quijano, A. 87, 89

R

'Race: Are We So Different?' exhibit 154
Raj, K. 227
Ramos, A. 109
Rasekoala, E. 11, 95, 121
Rauika Māngai 134
refugees 12, 42, 58
religions 20, 49, 50, 196, 225
Reynoso-Haynes, E. 86
Robert Bosch Stiftung 107
Robert Bosch's Script project 111n5
Roediger, D.R. 163
role models 74, 108–9
Rosenthal, E. 38
Royal Ontario Museum (ROM) 167–8

S

Saba 4, 189, 191, 192, 195, 201
see also ABCSSS islands, science communication in
Saba National Marine Park 192
Said, E. 3, 161, 162, 164, 172
Samachar Darpan 225
San Diego Museum of Man *see* Museum of Us
Sanskrit 226
SARS (Severe Acute Respiratory Syndrome) pandemic 2, 36–9, 42
Schibeci, R.A. 119
Schiele, B. 102, 106
SciDev.Net 107
science, technology, and innovation (STI) policy 176, 181

in Nigeria 100, 101–3, 106, 111n2
in South Africa 63–6, 67, 68, 69, 71, 77
Science and Civilisation in China (Needham and Ling) 209
science centres 15, 20, 53, 54, 56–9, 165, 172–3, 242, 243, 245
decolonisation of 150, 154–8, 162–3, 165
existing foundation 56–7
gender inclusion in 171
inclusion in 48–9, 50, 51, 52
Science Communication Hub (SciCom Hub) 106
science education 239
in colonial period 100
informal 20, 52
and museums 19, 21
see also museums
in Nigeria 106, 107, 108
Science Museum Group 171
science museums *see* museums
Science Nigeria 106
scientific colonialism 193
scientific knowledge 7, 9–11, 49–50, 172, 225, 234
and citizens 94
and coloniality 85, 86, 89–92, 94, 172–3, 181, 209–10, 215, 234, 241–2
decolonisation of 241, 242
deficits in 117
democratisation of 209–10
institutionalisation of 89–90, 94
in *Meng Hsi Pi T'an* *see Meng Hsi Pi T'an* (Shen Kua)
and NYSCI 32
and social epistemology 91–3, 173
Western 227
Seleti, Y. 119, 121
Serampore Mission Press 225, 228
Sheda Science and Technology Complex (SHESTCO) 102, 107, 111n1
Shen Kua 11, 213–15
see also Meng Hsi Pi T'an (Shen Kua)
Simpson, L.R. 136, 137, 142
Sint Eustatius 189, 191, 195–6, 201
see also ABCSSS islands, science communication in
Sint Maarten 189, 191, 195, 201
see also ABCSSS islands, science communication in
Sint Maarten Nature Foundation 194
Sivin, N. 215
Siyanbola, W. 101, 102
Smith, L.T. 200
Sobane, K. 120, 122
social appropriation of knowledge 94
social media 75, 76, 104, 110, 170, 194, 243
socio-environmental problems 93, 95
Solomon, M. 91
South Africa 63–5, 70, 76–8
African Institute for Mathematical Sciences (AIMS) centres 68, 69, 70
apartheid 66–7, 78n1
colonialism in 66, 67
Department of Science and Innovation (DSI) 63–4, 66, 75
gender analysis 67
human resource capacity 65, 68, 76–7, 78
innovation in 63, 66
National Development Plan (NDP) 63
National Research Foundation (NRF) 63, 66–8
National Science Engagement Strategy (SES) Implementation Plan 64
National System of Innovation (NSI) 63
race and gender intersectionality analysis 67–8
racial analysis 67
science, technology, and innovation (STI) in 63–6, 67, 68, 69, 71, 77
science communication in 66–8
Science Engagement Strategy 66
socio-demographics and cultural characteristics 78n2
STISA 2024 65
'Year of Science and Technology' (YEAST) programme 64
see also Africa Scientifique (AS) programme
Spivak, G. 88
Statesman, The 226
STEAM (science, technology, engineering, arts, and mathematics) initiative 109
STEM (science, technology, engineering, mathematics) 19–20, 21–2, 30, 71, 78, 246
in ABCSSS islands 188, 189
and Eurocentrism 67
Explainers' experiences 27–8, 30, 32
and gender 52, 66, 68, 73, 170–1
professionals 211, 215
and race 68
in South Africa 66, 67
STEMM (science, technology, engineering, mathematics, and mātauranga) 131
Stewart, G.T. 137
strategic partnerships 71, 77, 181, 245
Sydney 39, 40, 41–2

T

Tallon, J. 138, 139
taonga tuku iho (cultural aspirations principle) 134, 135, 136
Te Koronga 138
Te Papa Tongarewa: Museum of New Zealand 130
Te Taiao exhibition 130
Te Tiriti o Waitangi (Treaty of Waitangi) 132, 135

Teaching and Research in Natural Sciences for Development (TReND) 106, 108, 111n5
techno-scientific knowledge 235
testimonial injustice 92–3
Théâtre Gérard Philipe 168
tino rangatiratanga (self-determination principle) 134, 135, 136, 142
Toronto 35, 36, 38
traditional medicine 107, 177–8, 182, 196
training programmes 68–71, 184, 199, 216, 227, 245
  for local health professionals 198
  locally led 193–4, 196
  STEM communication 72
  see also Africa Scientifique (AS) Programme
transformative inclusion 51

U

United Kingdom 168, 169, 171
United Nations Sustainable Development Goals (UN SDGs) 182
United States 5, 21, 22, 24, 48, 53, 54, 60, 157
  imperialism 151
  inclusion strategies in institutions 51
  and Kumeyaay 150
  and Mexico 89
  National Disability Authority's definition of universal design 55
  Public Understanding of Science (PUS) movement 86
  see also New York Hall of Science (NYSCI)
universal design principles 55–6
'unjust enrichment' biases 163

V

Vision Mātauranga (VM) 130–1, 133–4

W

Waitangi, Treaty of (ToW) 132, 135
Waitangi Tribunal 132
Wallerstein, I. 87
Walport, M. 49
Wang, Z. 123, 125
Washington Slagbaai National Park 192
Wekker, G. 161, 166, 167, 168
whānau (extended family structure principle) 134, 135, 138, 142
White Innocence: Paradoxes of Colonialism and Race (Wekker) 166
White supremacy 140, 151, 154, 157
Why, *What*, *How* framework (Cornell) 132–3, 142
Wiles, S. 139
Wilkins, C. 228, 233
women
  building capacity in South Africa 66, 67–8, 73, 78, 80
  and making knowledge visible 232, 234
  in Nigeria 102
  and science museums and centres 171–2
World Health Organization (WHO) 104

Y

'Year of Science and Technology' (YEAST) programme 64
Yopasa, M. 89
#Yoprefieroellago 95, 96

Z

Zambia 70
Zeng, J.-P. 209
Zhang, Y. 209, 214, 218
Zimbabwe 70
Zuo, Y. 214, 216
'Zwarte Piet' (Black Peter) 167