Coral reef conservation in Solomon Islands: Overcoming the policy implementation gap

WorldFish

WCS

Network

Coral reef conservation in Solomon Islands: Overcoming the policy implementation gap

Authors

Jan van der Ploeg, Stacy Jupiter, Alec Hughes, Hampus Eriksson, Delvene Boso and Hugh Govan

Citation

This publication should be cited as: van der Ploeg J, Jupiter S, Hughes A, Eriksson H, Boso D and Govan H. 2020. Coral reef conservation in Solomon Islands: Overcoming the policy implementation gap. Penang, Malaysia: WorldFish; Honiara, Solomon Islands: Wildlife Conservation Society and Locally Managed Marine Area network. Program Report: 2020-39.

Acknowledgments

This work was undertaken jointly as a policy gap analysis conducted on behalf of the Wildlife Conservation Society and as part of the CGIAR Research Program on Fish Agri-Food Systems (FISH) led by WorldFish. Funding was provided to WorldFish by SwedBio, a program at the Stockholm Resilience Centre and by the Australian Government through the ACIAR project FIS/2016/300. Funding was provided to the Wildlife Conservation Society by the Flora Family Foundation (grant 2019-3308) and the Tiffany & Co. Foundation.

Rob Howard and Faye Siota provided valuable comments on an earlier version of the text. Miriam Bhurrah prepared the maps. Matthew Isihanua, Tessa Minter, Emily Darling, Ezekiel Leghunau, Zo Eugene Olangi, Wade Fairley, Janet Leamae, John Eke and Biriau Wilson Saeni shared their photographs.

Disclaimer

The views expressed in this document are those of the authors only and do not necessarily reflect the position of the Wildlife Conservation Society, WorldFish or the Locally Managed Marine Area network.

Contact

WorldFish Communications and Marketing Department, Jalan Batu Maung, Batu Maung, 11960 Bayan Lepas, Penang, Malaysia. Email: worldfishcenter@cgiar.org

Table of contents

List of abbreviations

ACMP	Arnavon Community Marine Park
CBD	Convention on Biological Diversity
CBO	community-based organization
CBRM	community-based resource management
CBSI	Central Bank of the Solomon Islands
CFMP	Community Fisheries Management Plan
CGGM	Community Governance and Grievance Management Project
CITES	Convention on International Trade in Endangered Species
COTS	crown-of-thorns-starfish (*Acanthaster planci*)
CTI-CFF	Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security
ECD	Environment and Conservation Division (of MECDM)
EEZ	exclusive economic zone
EIS	environmental impact statement
FAD	fish aggregating devices
FFA	Forum Fisheries Agency
GPPOL	Guadalcanal Plains Palm Oil Limited
LALSU	Landowners' Advocacy and Legal Support Unit
LMMA	locally managed marine area
MARPOL	International Convention for the Prevention of Pollution from Ships
MCT	Ministry of Culture and Tourism
MDPAC	Ministry of Development Planning and Aid Coordination
MECDM	Ministry of Environment, Climate Change, Disaster Management and Meteorology (formerly MECM)
MFAET	Ministry of Foreign Affairs and External Trade
MFMR	Ministry of Fisheries and Marine Resources
MFT	Ministry of Finance and Treasury
MHMS	Ministry of Health and Medical Services
MID	Ministry of Infrastructure Development
MJLA	Ministry of Justice and Legal Affairs
MMERE	Ministry of Mines, Energy & Rural Electrification
MOFR	Ministry of Forestry and Research
MPA	marine protected area
MPGIS	Ministry of Provincial Government and Institutional Strengthening

MSC	Marine Stewardship Council
MSG	Melanesian Spearhead Group
NAPA	National Adaptation Programmes of Action
NBSAP	National Biodiversity Strategic Action Plan
NFD	National Fisheries Development Ltd.
NPOA	national plan of action
PER	public environment report
PGSP	Provincial Government Strengthening Programme
PIFACC	Pacific Islands Framework for Action to Climate Change
PIROP	Pacific Islands Regional Ocean Policy
PNA	Parties to the Nauru Agreement
RAMSI	Regional Assistance Mission to Solomon Islands
RCDF	Rural Constituency Development Fund
RLRF	Regional Legislative and Regulatory Framework for Deep Sea Minerals
RSIPF	Royal Solomon Islands Police Force
SAMOA	Small Island Developing States Accelerated Modalities of Action
SDG	Sustainable Development Goals
SICCP	Solomon Islands Community Conservation Partnership
SICED	Solomon Islands Customs and Excise Division
SIG	Solomon Islands Government
SILMMA	Solomon Islands Locally Managed Marine Area Network
SIMA	Solomon Islands Maritime Authority
SINOP	Solomon Islands National Ocean Policy
SOE	State of Environment Report
SPC	Secretariat of the Pacific Community
TDA	Tetepare Descendants Association
TNC	The Nature Conservancy
TRH	Timber Rights Hearing
UNCLOS	United Nations Convention on the Law of the Sea
UNFCCC	United Nations Framework Convention on Climate Change
WCPFC	Western and Central Pacific Fisheries Convention
WCS	Wildlife Conservation Society
WGI	Worldwide Governance Indicators
WTO	World Trade Organization
WWF	World Wide Fund for Nature

Executive summary

This policy gap analysis identifies threats to coral reefs, evaluates the effectiveness of the existing legal framework to address these threats, and formulates recommendations to strengthen community-based natural resource management in Solomon Islands. Coral reefs are of crucial importance for food security and rural livelihoods in the archipelago. Logging is a major, yet often overlooked, threat to coral reefs in the country. Large-scale logging operations cause massive erosion, which has a detrimental effect on water quality. The shipping accidents, oil pollution and uncontrolled construction of log ponds associated with the logging industry also have a significant impact on coastal ecosystems. Overfishing is particularly problematic on narrow fringe reefs in densely populated areas, such as the northwest coast of Malaita and the west coast of Guadalcanal. Nonetheless, coral reefs in Solomon Islands remain in fairly good condition and seem relatively resilient to global climate change impacts. The existing legal framework is in principle adequate to address current threats to coral reefs. The key challenge is to enforce these laws on the ground. But provincial governments, which play a pivotal role in implementing environmental legislation, remain structurally under-resourced. Civil society organizations, government agencies and donors are actively promoting community-based resource management (CBRM), and substantial efforts have been made over the past 20 years to build an enabling policy framework to support conservation action at the grassroots level. However, these initiatives have little impact on wider development trajectories in the country. In most cases, customary authorities are unable to address supra-local threats, such as logging-induced sedimentation, shipping accidents or the harvesting of marine resources for export markets. Only government agencies can effectively address these threats. New investments to conserve coral reefs should therefore primarily focus on the following:

- **Strengthen the enforcement of existing environmental legislation**, for example by ensuring adequate operational budgets and by enabling legal action against environmental crime, fraud and corruption.
- **Provide essential information to improve CBRM**, for example by disseminating awareness materials to coastal communities, and by developing paralegal referral systems to report and respond to violations of environmental legislation.
- **Mainstream environmental conservation in rural development programs**, for example by building a broad civil society coalition to campaign for structural reforms of the logging industry.

Photo credit: J. van der Ploeg

Coral reefs are critically important for food security.

Introduction

This report aims to identify key threats to coral reefs, evaluate the effectiveness of the existing legal framework to address these threats and formulate recommendations to strengthen CBRM in Solomon Islands. It is based on a comprehensive literature review of scientific publications and policy documents, complemented with experiences from the field.

Threats to coral reefs in the archipelago have been well documented (Sulu et al. 2000; Lovell et al. 2004; Sulu et al. 2012; Burke et al. 2012; Sulu et al. 2014; Jupiter et al. 2019). Likewise, there have been several comprehensive reviews of the country's environmental legislation (Hauirae 2003; Goby et al. 2012; Moore 2015; LALSU 2015; Muldoon et al. 2016; SPREP and EDO 2018). But these studies do not systematically map anthropogenic threats to the existing legal and policy framework. Nor do they document how these laws and policies are actually implemented on the ground. This report aims to address that knowledge gap.

Another reason to publish yet another report is that drivers of coral reef degradation are intensifying worldwide (Hughes et al. 2017; Bellwood 2019; UNEP 2019). Governments around the world are struggling to deal with these accelerating threats (Morrison et al. 2020; CBD 2020), and Solomon Islands is no exception. The impacts of overfishing, logging-induced sedimentation, pollution and climate change on coral reefs are mounting, with detrimental and unprecedented consequences for food security, rural livelihoods and well-being (SPREP 2019). The country's population continues to grow rapidly, log exports are booming, customary governance systems are under increasing strain, and lifestyles and worldviews are changing (World Bank 2017a). At the same time, it is becoming increasingly clear that current environmental laws, policies and projects do not to adequately address these threats. National targets, such as improving fisheries management in 50 percent of the country's coastal areas through community-based approaches by 2020 (MECDM and MFMR 2013) and protecting at least 15 percent of marine ecosystems by 2020 (MECDM 2016), have been missed.

Over the past 10 years, the Solomon Islands Government (SIG) has made significant progress in developing new legislation and policies to manage the country's marine resources in a sustainable way, most notably the Protected Areas Act (2010) and the Fisheries Management Act (2015). With this legal framework in place, it might seem that the coral reefs of the country are well protected. In fact, the hard work is only starting. The key challenge is to ensure that these intentions are turned into action. We hope that this report will stimulate reflection and discussion, and guide strategic investments in mechanisms to effectively implement environmental laws and policies on the ground. This is particularly important as funding for coral reef conservation and coastal fisheries management is likely to decrease significantly in the coming years (UNEP-WCMC 2018).

The principal focus of the report is on coral reefs. Clearly, much of it is relevant for other coastal ecosystems, such as seagrass meadows, mangrove forests, saline swamps and estuaries. The report is structured as follows: First, we categorize the main threats to coral reefs in the country. We then review the key components of the legal framework. Next, we evaluate the effectiveness of these environmental laws, policies and governance mechanisms. Finally, we formulate several recommendations to strengthen coral reef conservation. This report is primarily written for an expert audience, so we deliberately have not included background information on the geography, biology, history, economy and polity of the country. The list of references provides an entry point for more detailed information on specific topics.

Photo credit: J. van der Ploeg

Fisher with a green humphead parrotfish.

Threats

Solomon Islands has one of the most diverse coral reef systems in the world, with 485 coral species and 1019 fish species recorded in its waters (Sulu et al. 2012). Coral reefs cover around 5750 km^2 (Gassner et al. 2019), and compared to other countries in the region they remain in relatively good condition (Green et al. 2006; Jupiter et al. 2019). Nevertheless, coral reefs are under increasing pressure from overexploitation, habitat loss and land-based runoff and pollution, driven by a rapidly growing human population and changing production and consumption patterns.[1] It is expected that climate change will exacerbate these threats. Below we identify the main threats to coral reefs in Solomon Islands. Appendix 1 matches these threats against existing environmental laws and policies.

Overexploitation

Coral reef fisheries

Fishing can have a detrimental impact on the structure, functioning and resilience of coral reefs. For instance, overharvesting herbivorous fish can boost macroalgal growth, which in turn suppresses the survival of corals (Hughes et al. 2007). It is, however, important to note that these complex ecological interactions are little understood, and that it is difficult to quantify the impact of overfishing on coral reefs (Bruno et al. 2019).

Coral reef fisheries are an important contributor to food security and rural economies (Bell et al. 2009; Andersen et al. 2013; Arena et al. 2015). Reef fish is primarily harvested by fishers using a variety of fishing methods, with spearfishing and handlines being the most common. Shellfish is primarily harvested by women (Ride 2014; Rabbitt et al. 2019). About 40,000 households are engaged in fishing, amounting to 37.5 percent of households in the rural areas (SINSO 2019). Fishing is generally a component of a diverse livelihood portfolio—relatively few rural households (2.5 percent) depend completely on fishing. Fish are consumed directly in the household or bartered or sold in the village. A few specialized commercial fishers and traders supply fish markets in Honiara, Gizo and Auki with reef fish and shellfish, often sourced over relatively large distances (Brewer 2011; Sulu et al. 2018; Rhodes et al. 2019). Most reef fish in the Auki market, for example, are caught on offshore reefs, such as Alite and Anogwau Island.[2]

Reef fisheries throughout the archipelago are under increasing pressure, and there is widespread acknowledgment among fishers that coral reef fisheries are less productive than in the past (Sulu et al. 2012; Albert et al. 2015; Gillett and Tauati 2018). Spearfishing at night poses a significant threat to green humphead parrotfish (*Bolbometopon muricatum*) and Maori wrasse (*Cheilinus undulatus*) populations, as well as grouper spawning aggregations (Hamilton et al. 2012; Hamilton et al. 2019; Hughes et al. 2020). Marine turtles are hunted intensively for meat, which has detrimental impacts on turtle populations (Votu et al. 2019). Gleaning has depleted several shell species that are important for food security and livelihoods, such as giant clam (*Tridacna gigas*), jewel box clam (*Chama pacifica*) and halfround cardita (*Beguina semiorbiculata*) (Govan et al. 1988; Fidali-Hickie and Whippy-Morris 2005). There is a lively interisland trade in shells for producing shell money on Malaita (Guo 2006). The use of gill nets and trammel nets is impacting fishstocks in many areas (Quinn and Daudau 1999; Schwarz et al. 2013). Dynamite fishing has been reported since the end

Plate 1. Night spearfishing.

of the 19th century (Somerville 1897). In the 1960s, colonial government officials reported "that the tendency to use dynamite is tailing off as supplies, some of which were formerly obtained from post war dumps, are more difficult to come by" (op cit. Aylett 1961). The use of dynamite continues to be occasionally reported but seems relatively rare and localized (Foale and Manele 2004; Brewer 2013; Iroga 2014). Historically, people used roots and leaves to poison fish, but this fishing method has become rare as well and seems to have little lasting impact on coral reefs (Buga and Vuki 2012). Overfishing seems particularly problematic on narrow fringe reefs in densely populated areas, such as the northwest coast of Malaita and the west coast of Guadalcanal (Gassner et al. 2019).

Exporting marine commodities

International trade is driving the depletion of several species that play an important role in sustaining the functioning and resilience of coral reefs. Sea cucumbers are heavily overexploited (Pakoa et al. 2014). The green snail (*Turbo marmoratus*) has become locally extinct in many areas (Green et al. 2006). Other important export commodities, such as trochus and pearl oyster shell, are heavily depleted (Richards et al. 1994; Lasi 2010). In the 1990s, live fish (groupers and Maori wrasse) from Vella Lavella were exported to Hong Kong, but this commercial fishery has ceased (Johannes and Lam 1999). Shark fin exports from Solomon Islands are at present small and intermittent (Hylton et al. 2017).[3]

Plate 2. Curio trade in black corals.

In the early 2000s, concerns were raised about collecting live corals for export (Kinch 2004; Teitelbaum 2007). Efforts to farm and export coral have proved economically unfeasible, largely due to the high transportation costs (Lal and Kinch 2005). The export of live corals seemed to have ceased in 2016. Raw (dead) corals, mainly sourced from the Ngellas and Marau Sound, continue to be legally exported, including large shipments of blue coral (*Heliopora coerulea*), thin birdsnest coral (*Seriatopora hystrix*) and cauliflower coral (*Pocillopora damicornis*), primarily to the United States.[4]

Coral mining

Sand, gravel and rocks collected from coral reefs are an important source of construction materials for coastal villages (Albert et al. 2015). The construction of artificial islands in the mangroves and lagoons of Malaita is an often-cited example, but throughout the archipelago people use corals to construct houses, pave roads or erect sea walls. Crushed coral is also used to build public and logging roads as well as airstrips. Generating quantitative information on the scale of coral mining in the archipelago is an important research priority.

Plate 3. An artificial island in Langalanga Lagoon.

Lime production

Harvesting corals for producing lime powder to be chewed with betel nut is widely considered a significant threat to coral reefs in Solomon Islands (Tungale 2008; Sulu et al. 2012; Albert et al. 2015).

However, reliable quantitative data on the scale of lime production and its impact on coral reefs is not available. Sabetian and Afzal (2007) estimated that about 10 million kg of live staghorn corals (*Acroporidae*) are harvested per year. This seems like an overestimation, as lime powder is also sourced from a variety of freshwater shells.

Plate 4. Lime production.

Offshore fishing

The offshore tuna industry is a substantial source of revenue for the SIG. Most tuna is caught by foreign-based vessels. However, they operate far from shore, so they have limited impact on coral reefs, apart from pollution and the damage of abandoned, lost or discarded fishing gear, such as nets and fish aggregating devices (FADs) (Gilman et al. 2016). The domestic tuna fishing fleet, in contrast, is based out of Noro in Western Province and mainly fishes in archipelagic waters. In 2017, the National Fisheries Developments Ltd. (NFD) operated five pole-and-line fishing vessels, which use baitfish to catch tuna.[5] It is estimated that about 32.5 t of baitfish are caught annually in coastal areas (Gillett and Tauati 2018). There remain serious concerns about the sustainability of this fishery (NFD 2016). Baitfish species, such as sardines, scads and fusiliers, are prey for numerous reef fish species, so catching them on a large scale could affect food webs and thereby coral reefs. However, these trophic interactions are poorly understood. Johannes et al. (2000) document the detrimental impacts of bait fishing on subsistence fishers in Western Province.

There are regular reports of illegal fishing taking place in remote reef systems of the country. Vietnamese fishing boats, so-called "blue boats," occasionally enter the territorial waters of Solomon Islands illegally to harvest high value species, primarily sea cucumbers and sharks (for their fins), on remote offshore reefs, such as the Indispensable Reefs (Song et al. 2019).

Habitat loss

Log pond construction

Log ponds are areas where logs are stored and loaded into logging barges. The haphazard construction of these ponds along the shoreline by logging companies is leading to the physical destruction and degradation of coral reefs (Hamilton et al. 2017; Minter et al. 2018). In most cases, these log ponds are poorly engineered and used for only

Plate 5. A Vietnamese blue boat confiscated by the RSIPF.

Plate 6. Log pond construction on the east coast of Malaita.

a relatively short period of time. New log ponds are often constructed near existing ones, causing additional and avoidable environmental damage.

Ship groundings

Shipping is the main mode of transportation and is very important for the Solomon Islands economy. Maritime infrastructure, such as wharves, jetties, mooring buoys and leading marks, is in poor condition or in many areas entirely absent (MDPAC 2012). As a result, boats occasionally run aground on coral reefs, destroying them. Preston et al. (1997) document 16 groundings of large vessels in Solomon Islands in 20 years, but note that most groundings remain unreported. More recent information is lacking, apart from high-profile cases, such as the cruise ship MS World Discoverer that hit a reef in the Sandfly Passage in Central Province in April 2000 and the two tuna fishing vessels that got stuck on the reefs of Ontong Java in 2019 (Kaukui 2019). Sulu et al. (2000) report that logging vessels and barges often cause massive damage to coral reefs. In April 2018, for instance, a logging barge loaded with timber got stuck on the reef in Mararo on the east coast of Malaita. Likewise, anchoring is causing structural damage to coral reefs, but little information is available on this threat (Peterson et al. 2012).

Plate 7. Round logs are loaded for export.

Coastal development

Compared to neighboring countries, the direct physical impacts on coral reefs from urbanization, tourism, road construction, aquaculture and other infrastructure remains relatively limited in Solomon Islands (Lovell et al. 2004). There are only a few, small-scale tourism facilities in the country (Sulu et al. 2010). The rapidly growing cruise industry potentially has localized detrimental effects on coral reefs (Crabtree 2011). The existing road network is small, with about 1700 km of roads, most in poor condition (MDPAC 2016). Nevertheless, the SIG has ambitious plans: the National Transport Core Initiative aims to upgrade existing road and sea infrastructure (Vunagi 2019). China's Belt and Road Initiative offers significant funding possibilities, made possible by the diplomatic recognition of the People's Republic of China in 2019. Planned large-scale development projects, such as Bina Harbor in Langalanga Lagoon, will likely have a major impact on coral reefs.

During the tensions, most aquaculture facilities in the country were destroyed, including the Ruaniu prawn farm and the International Center for Living Aquatic Resources Management's giant clam hatchery in Aruligo (MFMR 2018a).[6] Currently, the Ministry of Fisheries and Marine Resources (MFMR) and nongovernmental organizations (NGOs) are actively promoting seaweed farming as an alternative livelihood activity. Seaweed (*Kappaphycus alvarezii*) production totaled 1520 t in 2014 and is projected to grow rapidly (Gillett and Tauati 2018). Hehre (2016) documents that seaweed farming can have detrimental impacts on the diversity and abundance of coral reef fish and can lead to the spread of algae. But so far, no negative environmental impacts have been documented in the main seaweed production areas, such as Wagina on Choiseul, Lau Lagoon on Malaita, the Marau Sound on Guadalcanal and Saeraghi in Western Province.

Sedimentation and eutrophication

Logging

Large-scale, commercial logging operations cause massive erosion, which has a detrimental effect on water quality and thereby threatens coral reefs in the archipelago (Cooper et al. Halpern et al. 2013; Albert et al. 2014; Hamilton et al. 2017; Wenger et al. 2018). Over the past 40 years, logging companies have constructed more than 12,000 km of logging roads, in most cases poorly engineered and unpaved, causing massive runoff (Global Witness 2018). In 2018, the

country exported 2.822 million m^3 of unprocessed round logs, with a total value of SBD 2997 million (USD 361 million), mainly to China (CBSI 2018). Current timber extraction rates are unsustainable. Wood exports are more than 10 times the annual sustainable cut as estimated by the Ministry of Forestry and Research (MOFR), forest cover is declining and average log-size is rapidly decreasing (Katovai et al. 2015). The logging industry is highly opaque, as subcontracting makes it unclear how many logging companies are operating in the country. Allen and Porter (2016) estimate that there were more than 100 active licensed logging operations in 2012. Logging currently accounts for approximately 15 percent of SIG revenue and 32 percent of foreign exchange earnings (World Bank 2017). For many people, logging is an important source of cash, but the rents are unequally divided. Logging operations cause social friction throughout the country and are threatening rural livelihoods and food security (Minter et al. 2018). Boso et al. (2018) document several examples of how logging operations undermine coral reef conservation efforts. At present, corporate logging operations, and associated sedimentation, pollution, habitat destruction and ship groundings, form the principal threat to coral reefs in the country.

Plantations

There are relatively few large-scale agricultural plantations in the country. Several plantations, such as the Russell Islands Plantation Estates Ltd. coconut plantation, closed down during the tensions. The Guadalcanal Plains Palm Oil Limited (GPPOL) plantation is currently the largest agricultural plantation (MDPAC 2016).[7]

Plans to develop more oil palm plantations have caused concern about the impacts of increased sedimentation, chemical pollution and nutrient load on fragile lagoon systems (Sulu et al. 2010). But in several cases, these ambitious agricultural development plans have not materialized.[8]

Mining

The SIG aims to develop a large-scale mining industry to diversify the economy and to replace the predicted decline of logging revenues (World Bank 2017a). Currently, the only operational mine in the country is a bauxite mine on Rennell (Box 1). Several companies have prospected for nickel on Isabel, but legal claims have so far halted large-scale mining operations. Small-scale alluvial mining activities are taking place on Guadalcanal. The Gold Ridge mine on Guadalcanal closed after a tailing dam containing toxic sludge almost collapsed during flash floods in April 2014, which would have caused an unprecedented environmental disaster. The toxic tailings continue to pose a severe threat to people and the environment (Albert et al. 2017; Jacob-Tatapu 2018). Given the poor track record of mining companies in Melanesia, and the limited regulatory capacity of the SIG, there is growing concern about the environmental and social impacts of expanding mining activities (Allen and Porter 2016). In 2015, more than 20 companies submitted applications for exploration and mining licenses to the Ministry of Mines, Energy and Rural Electrification (MMERE) (Gassner et al. 2019).

Subsistence agriculture

Farming is the primary source of food and income for most rural households in Solomon Islands. Over

Plate 8. Coral reef near a log pond.

Plate 9. Algae on a reef in Western Province.

Box 1. The Rennell oil spill

In February 2019, a vessel loading bauxite ran aground on the Kongobainiu reef on Rennell Island. Despite international efforts to salvage the ship, more than 100 t of heavy fuel oil leaked into the sea, creating the worst oil spill in the history of the country. The MECDM and the Solomon Islands Maritime Authority (SIMA) investigated the Rennell oil spill, but have not yet pressed any legal charges against the mining company or the owners of the vessel. The numerous companies and subcontractors involved in the Rennell oil spill allegedly make it difficult to hold anyone accountable, as the company APID Ltd owns the bauxite mine. APID subcontracted the operations to the Indonesian miner Bintan Mining Corporation, which chartered the MV Solomon Trader owned by the Hong Kong-based company King Trader Ltd (Wilson 2019). In 2015, APID, owned by a Chinese-Australian businessman, was found guilty of illegal logging in a high-profile High Court decision. It is a clear example of the highly opaque activities of extractive industries in Solomon Islands (Baines 2015).

In a report to the World Bank and the SIG in 2015, 4 years before the environmental disaster, Tony Hughes and Ali Tuhanuku wrote that the situation on Rennell is "a particularly clear example of the effect of official inaction and/or incompetence, encouraged and made worse by corruption." They prophetically warn that without efforts to enforce existing environmental legislation "the future is full of trouble" and call for a moratorium on logging and mining in Rennell. Unfortunately, their recommendations were ignored.

Plate 10. A team from the MECDM cleaning up oil slicks on Rennell.

the past 50 years, growing demand for food crops and agricultural commodities has led to a drastic reduction of fallow periods and the expansion of agricultural areas, which is leading to soil degradation and erosion (MDPAC 2007). However, the impact of smallholder agriculture on coral reefs seems relatively small, also because less than 5 percent of farmers use chemical inputs, such as fertilizers and pesticides (SINSO 2019).

Pollution

Oil spills

There are no offshore oil or natural gas drilling operations in Solomon Islands. An oil spill on Rennell in 2019 generated much international media attention, primarily because it occurred near Lake Tengano, an UNESCO World Heritage Site (Box 1). In fact, most oil pollution is much smaller in scale and tends to be neglected. Oil pollution in the marine environment is common due to poor infrastructure, old boats and neglect (Comfort 2018; Laungi 2019). Minter et al. (2018) report that oil pollution in logging concessions is threatening drinking water sources and gleaning grounds. This is an important conservation priority, particularly as most oil pollution can be easily avoided.

During World War II, more than 100 large warships were sunk across the archipelago. The oil, chemicals and unexploded ordinances seeping from these vessels pose a serious threat to coastal ecosystems and fisheries, particularly in the Iron Bottom Sound. But the responsibility for salvaging these warships, and mitigating the environmental impacts they cause, remains contested (Cervi 1999).[9]

Plate 11. Oil pollution in a logging camp on Malaita.

Solid waste

Solid waste management is a serious problem, particularly in and around the rapidly growing urban centers (MECDM 2017). Existing landfills in Honiara, Gizo and Auki are inadequate, and waste is either burned or dumped in public areas. In rural areas, waste is burned or thrown into the river or sea. Most people are aware of the environmental and health effects of dumping waste, but often have no other options. Solid waste, particularly plastic debris, can pose a significant threat for coral reefs through light deprivation, toxin release and anoxia (Lamb et al. 2018).

Plate 12. Beer cans disposed in the sea in Gizo.

Wastewater

Around urban areas, such as Honiara, Auki and Gizo, sewage water is likely a major stressor of coral reefs (Wear and Vega Thurber 2015). None of the urban centers in the country has sewage treatment facilities. Most households rely on improperly designed septic tanks, and much wastewater leaks into the sea (SOPAC 2007). In rural areas, open defecation in mangroves, on beaches or directly in the sea is common, which is a public health concern. The environmental impacts of the lack of sanitary facilities are largely unknown, but sewage water is a known cause of several coral diseases (Redding et al. 2013). The MECDM (2017) identifies the wastewater of extractive industries, particularly the Gold Ridge mine, as a major environmental threat (see page 11). There is a lack of reliable information on persistent organic pollutants, inorganic nutrients, heavy metals and other toxins in wastewater, and their impacts on coral reefs.

Seabed mining

In the past, MMERE has issued 118 offshore mining prospecting concessions, most of them in Western Province and Temotu (Gassner et al. 2019). Seabed mining and dredging poses significant risks to marine ecosystems, such as the release of toxic waste water, physical destruction, sedimentation and the disruption of poorly understood biochemical processes that sustain microbial life in the ocean (Howard et al. 2020; Drazen et al. 2020). This could have irreversible impacts on the marine food chain and disrupt the economically significant offshore fishing industry (Govan 2017; World Bank 2017b; Chin and Hari 2020).

Invasive species, pests and diseases

Ballast water

Discharged ballast water from commercial shipping vessels is one of the pathways for spreading aquatic invasive species. No information is available on the volume of foreign ballast water being discharged in Solomon Islands waters (Sulu et al. 2000). But Sulu et al. (2012) identify the need to monitor the presence of invasive species in the country's main ports, Honiara and Noro.

Crown-of-thorns starfish

Green et al. (2006) report high numbers of crown-of-thorns starfish (*Acanthaster planci*) (COTS), with significant coral mortality at several survey sites in Solomon Islands. COTS outbreaks have been associated with high levels of terrestrial runoff (Pratchett 2005). Carlton et al. (2020) document COTS outbreaks in Western Province and Temotu.

Plate 13. Crown-of-thorns starfish.

Coral diseases

Coral diseases, such as white syndrome, stony coral tissue loss disease and white band disease, are an underreported cause of global coral loss (Wenger et al. 2020). Very little is known on the pathogens, prevalence and spread of coral diseases in Solomon Islands. The only coral disease surveys were conducted in Roviana and Vonavona Lagoons in 2011, in which few coral diseases were actually observed (Albert et al. 2010). Coral disease is closely associated with terrestrial runoff and sewage water, which lead to increased levels of microorganisms in the water that cause diseases (Woodley et al. 2015). Information is also lacking on diseases and mass mortality of other reef organisms in Solomon Islands.

Algal blooms

Albert et al. (2012) have documented a large algal bloom in 2011 in Marovo Lagoon, with detrimental impacts on live coral cover. But it remains unclear whether this dead zone was caused by eutrophication due to logging-induced sedimentation, increased water temperatures, overharvesting sea cucumbers or a combination of these threats. (Duke et al. 2007; UNEP-WCMC 2015).

Climate change

Greenhouse gas emissions

Solomon Islands contributes relatively little to global greenhouse gas emissions. Transportation, electricity generation, solid waste management and land use change (logging and land clearing for agriculture) are the main sources of emissions, though no quantitative data is available (MECDM 2017b). The Tina River hydropower facility, which is envisioned to be operational in 2024, will significantly lower the country's emissions.

It is predicted that climate change will impact coral reefs in Solomon Islands through higher water temperatures and ocean acidification, and will exacerbate other pressures on coral reefs (MECM 2008; Wickham et al. 2012; Jupiter et al.

2019; Gassner et al. 2019). Prolonged marine heatwaves can trigger mass coral bleaching events (Fordyce et al. 2019). In 2000, there was widespread coral bleaching in Western and Central Province (Green et al. 2006) and in 2011 in Temotu Province (Peterson et al. 2012). But compared to other countries in the region, coral reefs in Solomon Islands show high levels of resistance against coral bleaching events (McClanahan et al. 2020). Johnson et al. (2015) highlight that Solomon Islands is highly vulnerable to ocean acidification. Projected declines in pH levels in the ocean will have dramatic effects on corals and shellfish, with far reaching consequences for food security, rural livelihoods and coastal protection.

The Intergovernmental Panel on Climate Change (IPCC) predicts that a 1.5 degrees Celsius increase in global mean temperature will cause a dramatic (70 to 90 percent) decline of the world's coral reefs (IPCC 2018). In this global context, local efforts to conserve coral reefs might seem futile. However, healthy coral reefs are more resilient to the impacts of climate change. Compared to neighboring countries, coral reefs in Solomon Islands are relatively undisturbed, which offers hope to sustain ecosystem functioning. It is therefore critical to reduce local stressors of coral reefs, such as overfishing, pollution and sedimentation (UNEP 2019). Addressing these threats will also reduce the vulnerability of people to the long-term impacts of climate change (van der Ploeg et al. 2020).

Natural disasters

Solomon Islands is highly vulnerable to natural disasters, such as cyclones, earthquakes, tsunamis and volcanic eruptions. David Ross Stoddart (1969) and Jon Weber (1973) highlight the role of tectonic activity and tropical storms to explain the "dead reef problem": the widespread mass mortality of shallow-water corals noted by the Royal Society Expedition in 1965, the first systematic survey of coral reefs in the archipelago.

Earthquakes can have detrimental effects on coral reefs. In October 1931, for example, an earthquake caused massive destruction along the west coast of Malaita (BSIP 1931). In April 1977, an earthquake raised coral reefs more than 2 m out of the water in some areas on Guadalcanal (Webber 1978). And Schwarz et al. (2007) document similar damage to coral reefs after an earthquake and tsunami in Western Province in April 2007. The impact of tropical cyclones on coral reef ecosystems has been poorly documented but is likely significant (Sulu et al. 2012). Tropical Cyclone Namu in May 1986, for example, the worst tropical cyclone to have affected Solomon Islands on record, caused massive runoff and sedimentation (Bell et al. 2011). And in April 2014, extreme rainfall during cyclone Ita triggered flash floods that killed 22 people in Honiara and overflooded the Gold Ridge gold mine tailings dam. Carlton et al. (2020) report massive damage to coral reefs caused by the eruption of the Tinakula volcano in 2012 in Temotu Province.

Plate 14. Silt on a coral reef.

Plate 15. Mass mortality on a shallow water coral reef.

Photo credit: Zo Eugene Olangi

Children play in the estuary of Mataniko River in Honiara.

Legislative framework

This section reviews existing laws that aim to address key threats to coral reefs in chronological order. Appendix 2 provides a timeline of environmental legislation in the country.[10]

Plate 16. A coral reef in Lau Lagoon.

Environmental legislation

Forest Resources and Timber Utilization Act (1969)

The Forest Resources and Timber Utilization Act originally aimed to regulate logging on government land (NEPCon 2018). It has been amended extensively over the past decades, but the act, administered by the MOFR, remains "a complex, unwieldy instrument" with "potential for misinterpretation" (ADB 1998: 53). There have been several efforts to repeal the act and the myriad of subsidiary legislation, regulations and exemptions. In June 1999, Parliament passed the new Forest Act, but in the subsequent civil unrest and coup d'état the act was never gazetted, so it did not become law (SPREP and EDO 2018). Another reform effort in 2004 stranded in Parliament. The poor enforcement of forestry legislation is a longstanding problem (Boer 1996; Frazer 1997; Allen 2008; Allen and Porter 2016; NEPCon 2018). In most cases, logging licensees and logging companies operate with blatant disregard for forestry regulations, such as the Felling Regulations (2005). According to the Revised Code of Logging Practice (2002), logging companies are required to maintain a 50 m buffer zone along rivers, refrain from logging on slopes steeper than 30 degrees and rehabilitate logged forest to minimize erosion. But in practice, riparian forest is heavily exploited, trees are harvested on steep slopes, and tree planting does not take place, which leads to massive erosion and threatens coral reefs. Required procedures, such as Timber Rights Hearings (TRH), in which free, prior and informed consent ought to be obtained from customary rights holders, are rushed and sometimes even foregone (Minter et al. 2018). The failure of the MOFR and other government agencies to regulate the logging industry is widely attributed to corruption (Katovai et al. 2015; Hughes and Tuhanuku 2015; Dawea and Cannon 2017; Global Witness 2018; Beck 2020).

Plate 17. Logging induced sedimentation is a major threat to coral reefs.

Environmental Health Act (1990)

Under the Environmental Health Act, the Ministry of Health and Medical Services (MHMS) is tasked to work with provincial governments to prevent marine pollution that forms a risk for public health. However, the act and most associated regulations and penalties are out of date and should be revised (LALSU 2015). All provinces have an Environmental Health office.

Mines and Minerals Act (1996)

The Mines and Minerals Act aims to regulate the mining industry by prescribing the necessary

procedures for the issuance of mining licenses by the MMERE. The act itself does not contain extensive environmental protections, but the Mines and Minerals Regulations (1996) specify that a mining company must carry out operations with due diligence to minimize ecological damage, prevent pollution and avoid harm to marine life (LALSU 2015). The regulations also prohibit using explosives, mechanized equipment, such as bulldozers, and using cyanide and mercury for alluvial miners. In addition, all mining operations need a development consent issued by the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM), a business license issued by the provincial government, and a surface access agreement with the customary rights holders (LALSU 2015). Experiences with the logging industry demonstrate that implementing these regulations will be highly problematic. In 2015, the National Mining Forum called for a review of the Mines and Minerals Act and relevant regulations (James 2015).[11]

There remains much confusion about the ownership of minerals. The Mines and Minerals Act states that the SIG has the sole authority to allocate mining rights, which seems to contradict the preamble of the Constitution that states that "the natural resources of our country are vested in the people and government of Solomon Islands." In most cases, this preamble is interpreted in a way that customary rights holders own natural resources (reefs, land, timber and minerals). The Land and Titles Act (1978), however, vests ownership of "substances in or under land" in the state. The Mines and Mineral Regulations (1996) stipulate that alluvial miners must not mine more than 2 m below the surface of the ground. As a result, many people think they have rights to minerals to this depth (the "six-feet rule").

Environment Act (1998)

The Environment Act is the central piece of environmental legislation in the country. The act established the Environment and Conservation Division (ECD) within the MECDM. At present, the MECDM has about 100 staff, of which 18 are in the ECD.[12]

The Environment Act requires logging, mining, agribusiness, tourism and industrial companies to conduct an environmental impact assessment (EIA) before starting a commercial operation. The results of the EIA are presented in a public environment report (PER) or an environmental impact statement (EIS), which forms the basis for the MECDM to issue a "development consent." Crucially, the director of the ECD has the authority to decide whether a planned development needs an EIS or a much less rigid PER. The LALSU (2015) reports that many companies operating in the country do not have the required development consent.

The Environment Act also contains specific provisions relating to waste management and pollution. The ministry's Waste Management and Pollution Control Strategy 2017–2026 specifically aims to reduce pollution in the marine environment, for example by ensuring that all provinces have a designated landfill and a waste collection system (MECDM 2017a). In addition, the strategy calls for developing specific guidelines for oil spillage associated with shipping, and legislation banning the use of all plastic bags.

Under the Environment Act, the MECDM is tasked to ensure compliance with international environmental conventions and multilateral treaties, such as the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC). The National Biodiversity Strategic Action Plan 2016–2020 (NBSAP), a requirement under the CBD, identifies marine biodiversity as a priority area for the ministry. It also includes specific targets on sustainable fishing (Target 6), deforestation (Target 8), waste management (Target 9), invasive species (Target 10) and marine protected areas (MPA) (Target 12). More specifically, the NBSAP aimed to protect at least 15 percent of coastal and marine areas of the country by 2020 and to ensure that 25 percent of villages in the coastal area were managing their fisheries through CBRM by 2015 (MECDM 2016). These targets have not been met (MECDM 2019). Along similar lines, the National Adaptation Programmes of Action (NAPA 2008) and the succeeding National Climate Change Policy (2012), obligations under the UNFCCC, prioritize the protection of coral reefs and mangroves as buffer zones against the effects of climate change (MECM 2008; Wickham et al. 2012; MECMD 2012; MECDM 2017).

Under the act, the MECDM is also required to publish a State of Environment (SOE) report every 3 years. The SOE 2019 recommended the following actions to conserve coral reefs (SPREP 2019):

- Develop a coral, sand and gravel mining management plan.
- Implement a COTS eradication program.
- Scale up CBRM.
- Strengthen the EIA system, especially for the forestry and mining sectors.
- Develop a national coral reef management plan.
- Support the establishment of MPAs, locally managed marine areas (LMMA) and *tabu* areas (targeting 15 percent of coastal waters).
- Monitor the status of coral reefs and coastal water quality.
- Provide financial support to improve monitoring of logging companies and to enforce environmental legislation.
- Deploy FADs to reduce pressure on coral reefs.
- Implement sale (and export) restrictions for vulnerable and iconic species, such as marine turtles, green humphead parrotfish and Maori wrasse, and also for species important to ecosystem maintenance, like sea cucumbers.
- Implement size limits and gear restrictions (prohibit small mesh sizes).
- Implement a temporal restriction on sales for species (groupers) during spawning times.
- Promote sustainable land-use planning.
- Fund the implementation of the National Waste Management and Pollution Control Strategy 2017–2026.

Wildlife Protection and Management Act (1998)

This act implements the country's obligations under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (SPREP and EDO 2018). The act contains two schedules with animals and plants for which export is either prohibited, such as anemone fishes and marine turtles (Schedule 1), or regulated, such as clams, pearl oysters and sea cucumbers (Schedule 2). Notably, the high-value sandfish (*Holothuria scabra*) is listed on Schedule 2 of the Wildlife Protection and Management Act. The listing of black teatfish (*Holothuria whitmaei*) and white teatfish (*Holothuria fuscogilva*) on CITES Appendix 2 in August 2019 provides an additional opportunity to manage these high-value export commodities sustainably and reconsider the way the country engages with international trade of these species. The MECDM is the mandated government agency to enforce the act in coordination with the MFMR, the MOFR and the Solomon Islands Customs and Excise Division (SICED).

Maritime Safety and Administration Act (2009)

The aim of the Maritime Safety and Administration Act is to regulate domestic shipping, manage maritime infrastructure and adhere to international maritime conventions and agreements, such as the International Convention for the Prevention of

Plate 18. Woody debris and sedimentation at the estuary of Wairaha River after a cyclone.

Plate 19. Hawksbill turtle (Eretmochelys imbricata).

Pollution from Ships (MARPOL). The act is meant to address marine pollution, such as dumping ballast water and oil spills. Under the act, SIMA is tasked to prevent marine pollution.

Protected Areas Act (2010)

This act enables the MECDM to declare areas with high conservation value as protected areas. In May 2017, the Arnavon Community Marine Park (ACMP) became the first MPA to be declared under the Protected Areas Act.[13]

The Protected Areas Regulations 2012 specify the process to register customary land as a protected area (LALSU 2013). This requires the registration of a management committee, the formulation of a management plan, agreements with customary rights holders and neighboring tribes, a map and a budget. In most cases, this requires the technical and financial support of an external NGO. In fact, few tribes are interested in registering their lands as a protected area because the benefits of the process remain unclear (Rohe et al. 2019). For small-scale marine conservation initiatives, the MEDCM advocates legal recognition under the Fisheries Act instead of under the Protected Areas Act. This became evident when the MECDM did not endorse the registration of five LMMAs in Western Province under the Protected Areas Act because of the limited relevance for biodiversity conservation (Martin 2013).

The Protected Areas Act gives enforcement powers to "rangers." The Tetepare Descendants Association (TDA) and ACMP are employing rangers to patrol the protected areas, monitor coral reefs and guide tourists. There is much enthusiasm for this community-based conservation approach, as it can generate employment and income for people in remote rural areas (Pikacha et al. 2016). But given the limited financial resources of the MECDM, there are serious concerns about the sustainability of paying rangers.

Biosecurity Act (2013)

The aim of the Biosecurity Act is to prevent the spread of invasive species and diseases. The act is implemented by Biosecurity Solomon Islands, a department of the Ministry of Agriculture and Livestock, which focuses primarily on agricultural pests. In 2018, the MFMR published the National Strategy on Aquatic Biosecurity for the Solomon Islands, which aims to improve the regulatory framework to prevent aquatic diseases and invasive species (MFMR 2018a).

Fisheries Management Act (2015)

The objective of the Fisheries Act is to ensure the sustainable use of fisheries and marine resources. The MFMR is the mandated government agency to regulate fishing, issue commercial fishing licenses, develop aquaculture, create MPAs and prevent marine pollution. The Inshore Fisheries Division of the MFMR facilitates the sustainable management of coastal fisheries for livelihoods and food security (MFMR 2017). The MFMR currently has about 150 staff members, including provincial fisheries officers (PFO) who are seconded to the nine provincial governments. The Fisheries Act states that provincial governments have the primary responsibility for managing and developing reef fisheries in provincial waters—3 nautical miles from the shoreline. All provinces, except Rennell and Bellona, have passed a fisheries ordinance (see page 23 under Provincial Government Act).

The Fisheries Management Act explicitly prohibits fishing with dynamite, poison or electricity. A hefty fine (5 million penalty units) is specified for polluting fisheries waters, and the culprit is "liable for full compensation of any resulting loss or damage, as well as the full cost of restoring the affected habitat to its previous state" (Moore 2015: 159). The Fisheries Management (Prohibited Activities) Regulations 2018 covers the following measures:

- Set size limits for specific species, including mud crab (*Scylla serrata*), bumphead parrot fish, Maori wrasse, cray fish (*Panulirus* sp.), coconut crabs (*Birgus latro*) and oyster shells (*Pinctada* sp.).
- Prohibit the collection of specific corals (*Acropora humilis*, *Euphyllia glabrescens* and *Fungia fungites*), green snail, golden cowrie (*Lyncina aurantium*), dugong (*Dugong dugon*), leatherback turtle (*Dermochelys coriacea*).
- Ban the sale of shark fins, glory-of-the-sea cone (*Conus gloriamaris*), triton shell and marine turtles.
- Prohibit the use of nets with small mesh sizes.

Box 2. Community-based resource management

The MFMR and MECDM have identified CBRM as the principal strategy to address threats to coastal ecosystems in Solomon Islands (MECM and MFMR 2010). This was done in recognition of the customary tenure, local ecological knowledge and direct dependency on marine resources for people in the rural areas, as well as the limited capacity of the government to provide basic services in the remote parts of the country. The National Plan Of Action (NPOA) of the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) describes CBRM as an integrated conservation and development approach that covers biodiversity conservation, climate change adaptation, food security and rural development (MECDM and MFMR 2013). The MFMR now has a CBRM section that provides essential information and technical support to villages on marine resource management and serves as a liaison between people and relevant government agencies.

NGOs working in the country have published various guidelines, toolkits and manuals on CBRM over the past decade (Govan et al. 2008; SPC 2010; Alexander et al. 2012; WorldFish 2013; TNC 2017; WWF 2017a). The goal of most CBRM projects is to set up an LMMA. A CBRM project process generally starts with an Expression of Interest: a request of a village to the MFMR or MECDM for external support. In cooperation with these ministries, NGOs then organize community meetings, disseminate information and set up a management committee to coordinate conservation activities in the village. The MFMR and MECDM are advocating registering these management committees as community-based organizations (CBOs) at the Kompany Haus of the Ministry of Commerce, Industry, Labor and Immigration to facilitate the conduit of potential funds from the government (Francis 2012). Conservation NGOs usually also invest in alternative livelihood projects to mobilize broad public support for conservation action and to reduce fishing pressure on coral reefs (see for example Lowrey 2017; Foale et al. 2017; WWF 2017b).

At the regional level there are several policy initiatives, such as the New Song for Coastal Fisheries – the Noumea Strategy (SPC 2014), the Regional Framework for Nature Conservation in the Pacific Islands Region 2014–2020 (SPREP 2014), the Melanesian Spearhead Group's (MSG) Roadmap for Inshore Fisheries Management and Sustainable Development 2015–2024 (MSG 2015), and the Future of Fisheries – Regional Roadmap for Sustainable Pacific Fisheries (FFA and SPC 2015), which explicitly call for more financial and institutional support for CBRM.

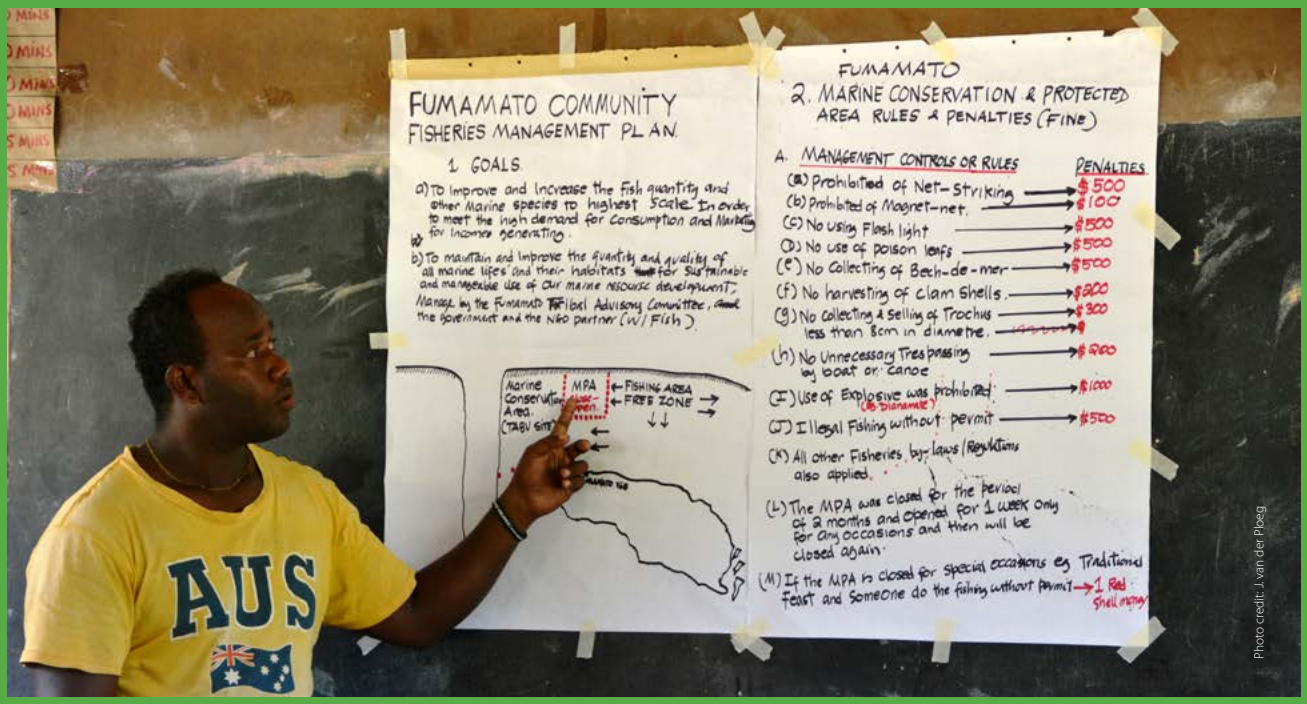


Plate 20. The community fisheries management plan for the village of Fumamato'o.

Under Section 18 of the Fisheries Management Act, customary rights holders can adopt a community fisheries management plan (CFMP) to manage their fisheries (Schwarz et al. 2020). These CFMPs form the legal basis of the CBRM strategy of the ministry (Box 2). The idea is that by registering a CFMP, customary authorities can receive institutional support to enforce rules and so better address external threats, such as sea cucumber poaching. In theory, a CFMP, subject to approval by the Provincial Assembly as well as the director of fisheries, and upon publication in the Gazette, has a legal status. In practice, however, the process is complex and expensive, which inhibits its application at scale. Schedule 2 of the act, for example, prescribes that a CFMP needs to contain, among others, a description of the fishery including the boundaries and the status of the fishery, appropriate indicators to assess the effectiveness of the proposed management area, and a risk assessment of the immediate and potential threats to the ecosystem. Such requirements pose an insurmountable obstacle for most villages. The added value of a formal approval of a CFMP is very limited for fishing communities, as it is unlikely that registered CFMPs will receive additional support to enforce the rules (Rohe et al. 2018).[14] At present, the MFMR has not approved any CFMPs.[15]

The Solomon Islands National Fisheries Policy 2019–2029 specifies that management plans will manage all commercial species of interest (MFMR 2018b). The National Sea Cucumber Management and Development Plan was drafted in 2014 (SIG 2014), and the Tuna Management and Development Plan in 2017.[16] Other relevant plans include the National Baitfish Management Plan and the National Aquaculture Management And Development Plan 2018–2023 (MFMR 2018c). The office of the attorney general is currently finalizing a coral management plan. Other plans, such as a trochus management plan are still in preparation.

Plate 21. Fisheries regulations on a billboard at the Auki fish market.

Other relevant legislation

Constitution (1978)

The Constitution states that "the rules of customary law" are an integral part of the country's legal framework, except when these traditional rules are inconsistent with the modern law. This legal pluralistic system is a safeguard of the country's natural heritage and subsistence livelihoods, as well as a permanent source of much confusion and conflict. There remains, for example, a persistent lack of clarity about the legal ownership of coral reefs. In practice, customary (or tribal) rights extend to and include reefs (Kabui 1997). However, these local practices have not been reflected by the British colonial government in statutory law such as the Land and Titles Act of 1969, which implicitly considers the sea the property of the Crown, as is the case in the UK. This has resulted in a number of high-profile court cases, such as the Combined Fera Group versus Attorney General case on the Auki market reclamation and the Allardyce Lumber Company Ltd versus Laore case on the damage a log pond caused to reefs in the Shortland Islands (LALSU 2015). The legal debate on the "law on land below the high-water mark" remains unsettled. The Solomon Islands Law Reform Commission (2015) therefore extended customary landownership to the provincial boundaries (3 nautical miles from shore), but this remains highly contested.

The Land and Titles Act (1978)

The Land and Titles Act covers government registration of customary land. Under the act, customary land can only be registered in the names of up to five people, who in theory represent all members of the clan (tribe). This creates much friction, as these so-called "registered landowners," who are nearly always elderly men, often make agreements with extractive industries without consultations and without sharing benefits equally (Hauirae 2003). Customary landownership remains a highly contentious issue in Solomon Islands and lies beneath many conflicts surrounding coral reef conservation, fisheries management and extractive industries. There is much debate about reforming the country's land laws to better reflect customary rules (McDonnell et al. 2015).

Plate 22. A dumpsite in the mangroves in Auki.

Town and Country Planning Act (1979)

Amendments to the Town and Country Planning Act devolve responsibilities for land use planning to the provincial governments and the Honiara Town Council. The act only affects government land. As such, it enables provincial governments to manage solid waste and sewage.

National Disaster Council Act (1989)

The MECDM also plays an important role in coordinating the SIG's response to natural disasters. The National Disaster Management Plan 2018 identifies marine pollution as a possible threat to people's lives and livelihoods that needs to be addressed. However, it does not mention the impacts of natural disasters on coral reef resilience, so it has little relevance for conservation.

Provincial Government Act (1997)

In principle, all reefs in the country, including offshore ones like the Roncador Reef and the Indispensable Reefs, fall under a provincial government (Ceccarelli et al. 2018). Responsibilities for environmental management, coastal fisheries, domestic shipping, land use planning, wildlife conservation and solid waste disposal are devolved to the nine provincial governments.[17] Provincial ordinances are laws passed by the Provincial Assembly, approved by the Ministry for Provincial Government and Institutional Strengthening (MPGIS), and published in the Gazette. Over the past 20 years, Provincial Assemblies have enacted several provincial ordinances that conserve coral reefs in provincial waters (3 nautical miles from shore):

- Choiseul Province Resource Management Ordinance (1997)
- Isabel Province Resource Management and Environmental Protection Ordinance (2005)
- Makira Ulawa Province Fisheries Ordinance (2009)
- Guadalcanal Province Fisheries Ordinance (2009)
- Temotu Province Fisheries and Marine Protection Ordinance (2010)
- Moli Ward Chiefs Council Ordinance (2010)
- Choiseul Province Fisheries and Marine Environment Ordinance (2011)
- Western Province Fisheries Ordinance (2011)
- Central Province Fisheries Ordinance (2012)
- Makira Ulawa Province Wildlife Ordinance (2014)
- Malaita Province Fisheries Ordinance (2015).[18]

Perhaps even more important from an environmental conservation perspective is that all provinces have enacted business license ordinances that enable the provincial governments to collect annual fees from commercial enterprises operating in the province.

Plate 23. Provincial fisheries officer.

Box 3. The National Development Strategy 2016–2035

The National Development Strategy identifies the long-term goals to which all government agencies and development partners should adhere. The medium-term strategy 11, "manage the environment in a sustainable resilient way and effectively respond to climate change," is perhaps the most relevant for coral reef conservation (MDPAC 2016: 14). It identifies several priorities, including the following:

- Promote a holistic approach to natural resource management addressing forestry, marine resources and waste management.
- Minimize environmental degradation and promote biodiversity conservation.
- Review and reinforce relevant laws concerning the protection of marine resources and coastal ecosystems.

In addition, the strategy calls for efforts that can greatly benefit coral reef conservation. These include identifying maritime areas where there are significant risks to maritime transport, protecting remaining forest resources, and reviewing the Mines and Mining Act to ensure companies are held accountable. They also include developing sustainable subsistence-based farming systems, preventing corruption and strengthening law enforcement.

At the same time, the NDS calls for several investments that can potentially have detrimental effects on coral reefs in the country. Among these are developing the natural resource base to increase economic growth, identifying the potential of offshore mineral and hydro-carbon resources and developing industrial parks. They also include expanding the road and shipping networks, facilitating the exploitation of mineral prospects and developing large-scale commercial agricultural plantations. Of particular concern is the statement that customary land rights are "an obstacle to development" and that customary land needs "to be made available for commercial and agricultural development" (MDPAC 2016: 12). Customary tenure forms the cornerstone of CBRM initiatives and is instrumental to safeguard food security, rural livelihoods and biodiversity.

The Choiseul Province Business License (Fees) Regulations of 2016, for example, specify an annual fee of SBD 5000 (USD 600) for commercial bait fishing companies, SBD 5000 for bêche-de-mer traders, SBD 350,000 (USD 42,000) for logging companies, and SBD 1 million (USD 120,000) for mining operations. In theory, these fees give the provincial governments a powerful tool to regulate extractive industries and at the same time generate much needed revenues for the province. In practice, however, business fees are seldomly or only partially collected (LALSU 2015).[19]

However, implementing these ordinances is highly problematic (Healy and Hauirae 2006). The Malaita Fisheries Ordinance, for example, establishes a Fisheries Advisory Committee to advise the provincial fisheries minister and the PFOs on issuing permits, enforcing regulations and approving CFMPs, but committee members have never met.

Customs and Excise Act (2003)

The Customs and Excise Act regulates the collection of duties on export products by the SICED. To export round logs and bêche-de-mer, approval is needed from the Central Bank of the Solomon Islands (CBSI). In 2019, the CBSI issued 40 "specific authorities" to export bêche-de-mer and 922 specific authorities to export round logs (CBSI 2019).

Foreign Investment Act (2005)

Hameiri (2012) describes how after the tensions the SIG with support of the Regional Assistance Mission to Solomon Islands (RAMSI) actively promoted foreign investment to generate rapid economic growth. The Foreign Investment Act is meant to enhance the business environment, for example by providing tax-based incentives to companies. But the perverse outcome of the act is that Malaysian logging companies receive generous tax cuts and export duty exemptions (World Bank 2005; WTO 2016).

Police Act (2013)

The Royal Solomon Islands Police Force (RSIPF) is tasked to prevent and detect crime, enforce legislation and apprehend offenders. There are 29 police stations and posts in the country, most of them in urban areas (UNDP 2018b).

The Ministry of Justice and Legal Affairs (MJLA) is responsible for justice and legal affairs. The Office of the Director of Public Prosecutions is tasked to undertake criminal prosecutions. Prosecutors are located in Honiara, Auki and Gizo. Private individuals can file a civil lawsuit, for example when customary rights holders claim compensation from a logging company for destroying a sacred site. In such civil cases, the Public Solicitors Office (PSO) can provide legal aid to disadvantaged groups. The Landowners' Advocacy and Legal Support Unit (LALSU) of the PSO raises awareness of customary rights owners on their land rights and provides legal support to enforce environmental legislation.

Local courts primarily deal with customary land disputes. The Magistrates' Courts in Honiara, Auki, Kirakira, Gizo and Lata are the courts of first instance for most civil and criminal cases. Parties can appeal decisions of the Magistrates' Court in the High Court. Complex cases can also be immediately deferred to the High Court. The Court of Appeal hears appeals on decisions of the High Court.

In addition, the MOFR, MFMR, MMERE, SIMA, MHMS and MECDM have specific enforcement powers relating to crimes committed under their jurisdiction. These ministries have the power to appoint specific "authorized officers" to enforce legislation.

Anti-Corruption Act (2017)

The objective of the Anti-Corruption Act and the Whistleblowers Protection Act (2016) is to prevent corruption and abuse of office. Extractive industries such as logging, mining, bêche-de-mer trade and commercial tuna fishing are known drivers of corruption (Chêne 2017).

The RSIPF and MFMR confiscate illegally harvested bêche-de-mer in Auki.

Implementation challenges

There is widespread consensus that the key problem for coral reef conservation is the actual implementation of these laws on the ground. In a seminal article, Lane (2016: 421) speaks of the "systemic failure of coastal governance in Solomon Islands."

National government

The SIG is above all notable for its *absence* in the everyday lives of most people in the coastal areas (Cox 2009; Dinnen and Allen 2015). The provision of basic public services in the rural areas, such as health care, infrastructure, education and agricultural extension services, is very poor (Wairiu and Tabo 2003; SINSO 2019). Few fishing communities receive support from government agencies to manage their reef fisheries (Govan 2013; Rohe et al. 2019; Schwarz et al. 2020). Likewise, the government is unable to enforce environmental legislation in the rural areas (Cox 2009; Evans 2019).

Geographical challenges, overlapping mandates, the lack of technical expertise, weak inter-agency cooperation, rigid bureaucratic procedures and limited operational budgets are usually cited as reasons why national government agencies have difficulties to effectively implement existing laws. The SIG's budget remains low compared to other countries in the region.[20] Annual government revenues are about SBD 3500 million (USD 421.7 million), mainly sourced through taxes on goods and duties on exports (SIG 2019). An additional SBD 283.5 million (USD 34 million) of revenue is provided through direct budget support from international donors, but overseas development aid has significantly declined in recent years. The Public Financial Management Act (2013) imposes strict fiscal discipline on the SIG by prohibiting loans to fund recurrent budget deficits: annual government expenditures are therefore also about SBD 3500 million. Approximately one third of annual government expenditures goes to salaries, primarily to the Ministry of Education and Human Resources Development, the MHMS and the RSIPF.

The MFMR and MECDM, the two ministries mandated to conserve coral reefs, are under-resourced, with 0.6 and 0.8 percent, respectively, of total payroll expenditure (MFT 2019). Similarly, the budget of these two ministries for implementing specific projects and programs amounts to roughly 1 percent of the development budget.[21] Despite recognizing the important role of coral reefs for food security, rural livelihoods and coastal protection, there are very little resources available for coral reef and coastal fisheries management. Approximately 21 percent of the MFMR's budget is allocated to coastal fisheries management and development. In fact, the coastal fisheries budget as a function of inshore fishing area is the lowest for all Pacific Islands Countries and Territories, at an estimated USD 12.7 per km^2 per year (Govan 2015b). The legislation protecting marine ecosystems is in most cases not linked to financial mechanisms to help fund implementation.

These financial constraints mask more fundamental political problems and struggles. Ministers enjoy far reaching discretionary powers, a remnant of the colonial administration, so decision-making processes can be highly politicized and override the initiatives of public servants (Frazer 1997; CCIF 2003).[22] As a result, national government agencies such as the MOFR, MECDM and MFMR are struggling with low staff morale and inaction (MDPAC 2016). Corruption remains a major challenge for the country, particularly the undue influence of foreign-owned extractive industries on elected officials (Hughes and Tuhanuku 2015; Porter and Allen 2015). More than half of the public thinks that public officials and civil servants are corrupt (Baines 2015; Chêne 2017). Particularly the rapid growth of the Rural Constituency Development Fund (RCDF) has become a point of growing contention (Box 4). Allegations of fraud and political interference also plague the MFMR and MECDM (Aqorau 2007; Hanich and Tsamenyi 2009; Mataki 2011; Mapuru and Naz 2013; Pakoa et al. 2014; Brown 2016; John 2017). The controversy surrounding the lifting of the bêche-de-mer ban in 2017 is an apt illustration (Box 5).

Box 4. The Rural Constituency Development Fund

The RCDF allocates funds to all constituencies in the country. In principle, funds are to be spent in support of constituency development plans. But in practice, Members of Parliament use these funds to reward their voters, mainly in the form of cash handouts, scholarships and consumption goods. The Office of the Auditor General concluded that the "transparency, accountability and governance of the RCDF falls well short of that expected with regards to public finances" (OAG 2018). At the same time, budget cuts have reduced public investments in many key economic and social sectors, including extension services for coastal fisheries and environmental management (UNDP 2018a).

Plate 24. Dynamited reef in Langalanga Lagoon.

As such, the RCDF undermines the ability of state institutions to deliver public services in the rural areas (Cox 2009; Wood 2017; Barbara 2019). In recent years, the RCDF has made up almost half of the national development budget, and current RCDF spending is higher than the budget allocations for the provincial governments (IMF 2020). In theory, the RCDF could be used to improve environmental governance in the remote rural areas. But as the RCDF is highly politicized, the conservation outcomes of such a strategy seem tenuous.

Since the end of the tensions, international donors have invested significant resources in building the capacity of national government agencies. Solomon Islands is now one of the most aid dependent countries in the world (Dornan and Pryke 2017). But overseas development aid has not structurally enhanced the performance of the civil service, and might actually have delayed much needed political reforms (Sahin and Sahin 2020). For instance, despite the support of RAMSI, the RSIPF and the judicial system remain largely focused on Honiara and have little relevance for people in the rural areas (Kelly et al. 2015; UNDP 2018b). People have little trust in the judicial system. Court cases are often delayed or adjourned due to logistical problems or the unavailability of staff.

As such, there is a large backlog of court cases, some dating from the 1990s. Moreover, the RSIPF and the courts are widely perceived by villagers to side with extractive industries in disputes (Dinnen and Allen 2015). The LALSU has only a few staff members and a limited budget and is often unable to respond to questions and complaints.

Nevertheless, there are several cases in which the RSIPF effectively responded to a local request for assistance. In 2017, for example, 50 kg of illegally harvested bêche-de-mer was confiscated on Malaita (Saeni 2017b), and in 2018 a fisherman was arrested in Central Province for fishing with dynamite (Ragaruma 2018). It illustrates that strengthening communication and cooperation between customary authorities and the RSPIF, provincial governments, the MFMR and MECDM can strengthen law enforcement significantly. The World Bank-funded Community Governance and Grievance Management Project (CGGM) has demonstrated the benefits of appointing community officers to bridge the gap between people and government agencies (Box 6).

Provincial governments

In theory, provincial governments play a pivotal role in implementing policies that protect coral reefs. But in practice, provincial governments do not consider environmental conservation a core task. There remains considerable uncertainty about the division of responsibilities between national and provincial authorities (Lane 2016; Foukona

Box 5. The bêche-de-mer ban

Sea cucumbers play an important role in coral reef ecosystems (Purcell et al. 2016). Thirty-one sea cucumber species have been recorded in Solomon Islands (Pakoa et al. 2014). Selling dried sea cucumbers, *bêche-de-mer* or *trepang*, is an important source of income for rural households and can generate substantial government revenues if properly managed. However, sea cucumbers are severely overfished. In 1992, Solomon Islands exported 715 t of bêche-de-mer, worth SBD 10.2 million (USD 3.4 million) (Richard et al. 1994). Since then, catches have been declining rapidly. A steep decrease in exports in 2004 and 2005 forced the MFMR to issue a moratorium on harvesting sea cucumbers (Arena et al. 2015). Since then, the bêche-de-mer ban has become one of the most prominent and controversial environmental regulations in the country.

Plate 25. Harvesting sea cucumbers.

The National Sea Cucumber Management and Development Plan specifies that the MFMR can declare a "sea cucumber open fishing period" and regulate bêche-de-mer exports through issuing export licenses (SIG 2014). The management plan includes several other fisheries management tools, such as size limits and a prohibition on night diving, but in practice these are largely ignored. In 2007, the bêche-de-mer ban was lifted to support rural people in the aftermath of the Gizo earthquake. The ban was also temporarily lifted in 2013, when 305 t of bêche-de-mer was exported from the country with a total export value of SBD 33 million (USD 457 million), and the SIG collected SBD 2 million (USD 277,000) from license fees. However, mislabeling (identifying a high-value species as a low-value species) and under-pricing (declaring low market values) are common. It is estimated that tightening the oversight of exporters and enforcing size limits could at least double government revenues (Lee et al. 2018).

In 2017, the Cabinet decided to open the bêche-de-mer fishery again, despite the fact that the MFMR's sea cucumber stock assessments had not been completed. Export licenses were subsequently issued to four Chinese traders in a highly opaque process (Kafo 2017). During an investigation of the RSIPF, three of these traders were found to have illegally stockpiled bêche-de-mer in anticipation of the lifting of the ban, and their stocks were confiscated. The traders filed a court case against the RSIPF, but in 2018 the High Court ruled that the police had acted lawfully.

To add to the confusion, the MFMR filed a court case against a prominent businessman from Ontong Java for illegally harvesting sea cucumbers, who was later acquitted (Buchanan 2017). This legal pandemonium led to various allegations of corruption on social media and the newspapers and calls to suspend the permanent secretary of the MFMR (Laungi 2018). The public turmoil forced to the CBSI to step in and require a specific authority to export bêche-de-mer to maximize government revenues. In theory, this could improve the transparency, accountability and independence of the licensing process (CFWG 2018).

and Timmer 2016). Provincial government staff and Members of the Provincial Assembly are often unaware of their legal responsibilities and the existence of provincial ordinances (McDonald 2006). Annual plans are unrealistic, bureaucratic procedures are rigid, and scarce financial resources are often misallocated. Offices have fallen into disrepair and computer facilities are poor.[23] The main problem, however, is that provincial governments are structurally underfunded. For

example, Malaita, the most populous province in the country, had a total budget of SBD 18 million (USD 2.2 million) in 2019. SBD 15 million was derived from service grants from the national government and SBD 3 million from business licenses, market fees and passenger levies. Revenue collection by provincial governments is problematic, as many logging companies or bêche-de-mer traders simply do not pay the required provincial duties. As such, the provincial governments are highly dependent on the national government.

Nevertheless, most provincial governments have adequate technical capacity and could effectively implement environmental policies if given appropriate financial resources (Philips 2020). The PFOs, for example, often have detailed knowledge of the local context and could provide basic CBRM support to communities but lack the financial resources to travel to remote areas (Govan 2013; Govan and Bennett 2014). Several pilot projects have demonstrated that providing relatively small operational costs, such as fuel, enables PFOs to perform their duties (van der Ploeg 2018). In principle, the provincial governments allocate an annual budget for the PFO, but there are often other priorities or fiscal shortages. Most money goes to salaries, and as a result there is almost no money for operations.

Particularly in and around urban areas, provincial governments can play an important role in mitigating threats to coral reefs, such as solid waste and sewage management and monitoring fish markets.[24] A promising initiative is the ban on plastic bags in the Gizo market in Western Province (Gina 2019). There is broad societal support for such environmental regulations, especially as the ban on plastic generates income for women who are producing coconut leaf bags. Another potential pathway to engage provincial governments in marine resource management, and at the same time break the vicious circle of weak governance and tax evasion, is to improve revenue collection capacity. Supporting provincial governments to implement their provincial business license ordinances can strengthen oversight of extractive industries while maximizing revenue collection. Ideally, this creates a mechanism to financially sustain monitoring and enforcement activities. The Provincial Government Strengthening Programme (PGSP) could serve as a model to enhance the capacity of provincial governments to manage natural resources in a transparent, participatory and sustainable way (Box 7).

Customary authorities

Coral reefs are principally governed by a variety of local institutions. Much fishing lore, methods and beliefs have been lost over the past 100 years (Sulu et al. 2012). But other practices seem remarkably resilient. Throughout the archipelago, people observe specific prohibitions on harvesting and eating certain marine species, such as octopus, crocodiles, sweetlips, clams and sharks. On Malaita, for example, many coral reefs are considered sacred (*tambu* or *tabu*) sites and essentially function as permanent closures. Clans or in some cases individuals own the reefs, and there are stringent rules on who is entitled to fish in specific areas. In many areas, customary authorities can temporarily close the fishery by placing a stick on the reef (Cohen and Foale 2013). In addition, there is a variety of local norms on what, when and where to harvest. These socially sanctioned mores are typically highly diverse, context-dependent and informal.[25] Analyzing

Box 6. Community Governance and Grievance Management Project

The CGGM project of the MPGIS aims to strengthen the rule of law by improving communication between the government and people in remote, rural areas on a low-cost basis. The project builds the capacity of community officers, who help resolve conflicts, provide paralegal information and advice, and assist people in communicating with the RSIPF, government agencies or civil society organizations (Allen et al. 2013; UNDP 2018). At present, the community officers mainly focus on maintaining peace, but much can be gained when such existing community-based referral systems networks are used to report on and respond to environmental crimes.

Box 7. Provincial Government Strengthening Programme

The PGSP aims to build the capacity of provincial governments in public expenditure management. The program, administered by the MPGIS, provides provincial governments with discretionary funds to improve the delivery of basic public services in the rural areas, through the Provincial Capacity Development Fund. Crucially, the PGSP gradually expands the flow of funds based on the actual performance of the province. Under the "pass-through funding modality," provincial governments have to submit financial reports and realistic workplans to qualify for additional funding. In 2016, the MPGIS disbursed SBD 50 million to nine provinces after a thorough performance assessment and trained provincial treasurers in accounting procedures (PGSP 2016).

Coastal fisheries management and environmental conservation have so far not been integrated in the PGSP (Weimer et al. 2012). Much can be gained by mainstreaming environmental enforcement and resource management functions in the activities of the PGSP and similar institutional strengthening and rural development programs, such as the Rural Development Programme. This could be done by providing technical expertise to the PGSP or by creating a specific performance-based fund (a Provincial Natural Resource Management Fund) under the supervision of the PGSP, which provincial governments can access to improve marine resource management.

data from 1075 villages across the country, Brewer (2013) found that 35 percent (389) imposed temporary spatial closures, 24 percent species restrictions and 20 percent gear restrictions.[26]

Historically, most societies in Solomon Islands did not have leadership structures above the clan. People lived in small, isolated and self-sufficient hamlets with little hierarchy or social stratification. Men with outstanding skills could gain influence over their kin and others in their immediate surroundings, but the power of these "big men" was primarily based on persuasion, consent and respect, and they had only informal and temporal standing.[27] In the 1930s, the British colonial government established "local area councils," and appointed "village headmen" or "chiefs" to act as leaders. Austerity measures in 1997 led to abolishing the local area councils, leaving an administrative void below the provincial level (Dinnen and Allen 2015). Most villages in the coastal areas are relatively recent constructs: in the past most people lived in small, scattered hamlets in the uplands. In the early 20th century, encouraged by the colonial government and the missions, people settled in large permanent villages in the coastal areas to have access to education, health services and emerging markets. As a result, many coastal villages consist of many different clans that do not necessarily have ownership or usufruct rights over coral reefs. In many villages, people elect a chief, who is more regarded as a spokesperson than a decision-maker. Church elders, teachers or nurses often play an important role in communal activities.

Nowadays, most rural communities are highly diverse, politically fragmented and well connected to urban centers—not isolated, homogenous, traditional, subsistence-oriented fishing communities as is often assumed. Customary rules are increasingly contested, which has important implications for CBRM (Hviding 1998; Aswani et al. 2017). Customary authorities are often unable or unwilling to address threats to coral reefs, such as overfishing and commercial logging. Above all, the need for cash tends to override customary rules and cultural values such as cooperation, reciprocity and respect for *kastom* (McDonald 2003). Customary rules that regulate subsistence use of marine resources are typically considered irrelevant for commercial activities such as harvesting sea cucumbers or catching fish for urban markets, which people see primarily as the responsibility of the modern state. In some places, customary governance systems have broken down completely (Allen et al. 2013; Dinnen and Allen 2015). Many rural areas are coping with a range of social issues, such as alcoholism, petty crime and domestic violence, which inhibit collective action (Madgwick 2013). And many rural communities are struggling with a number of interconnected

social problems, such as youth unemployment, poor healthcare and education and land tenure disputes, which often distract attention from environmental issues and make addressing these more problematic.

CBRM aims to build on the local ecological knowledge, customary tenure and governance mechanisms of coastal communities. However, the limits of this approach are increasingly becoming clear. First, despite the grassroots rhetoric, most CBRM projects remain strongly donor-driven and participatory processes are often highly manipulative (PCEDS 2011; van der Ploeg et al. 2020; McNamara et al. 2020). In practice, people have little ownership of decision-making processes and budgets in most marine conservation projects. Second, expectations of direct material benefits are what primarily motivate people's participation in CBRM projects (Schoeffel 1997; Gegeo and Watson-Gegeo 2002; Ha'apio et al. 2014). In many cases, people simply "play along" to obtain material benefits (Foale 2001: 57). In many cases, this has fostered aid dependency and led to frustrations when the "promises" did not materialize (Evans 2019) or to disputes over ownership rights (Lauer 2016). Third, customary authorities often do not represent the interests of women and youths, which raises serious concerns about the legitimacy and effectiveness of CBRM (Hilly et al. 2012; Schwarz et al. 2014; Lawless et al. 2019). Fourth, customary authorities are often unable to address the most serious threats to coral reefs and rural livelihoods, such as logging, oil spills and harvesting marine commodities. These activities are either happening in other (upstream) areas over which other people have customary land rights, are conducted by external actors with political backing, or are so lucrative that customary rules and social pressure will simply not deter people. In practice, most CBRM projects cease when a logging company starts operating in an area (Minter et al. 2018: Boso et al. 2018). Finally, despite efforts to emphasize the importance of coral reefs for food security and rural livelihoods, most people equate CBRM with biodiversity conservation, and LMMAs with MPAs (Cohen et al. 2014). It is important to emphasize that the priorities and problems of people in the rural areas often differ radically from the aims of international conservation NGOs and government agencies (Foale et al. 2016; Jupiter 2018). One possible solution is to explicitly link coral reef conservation efforts to sustainable livelihoods and cultural heritage (Walter and Hamilton 2014; McCarter et al. 2018).

The aim of CBRM is to enable rural communities to make informed decisions on how to manage their natural resources. Over the past 10 years, NGOs and regional organizations have developed numerous educational materials to raise public awareness on coral reef ecology, fisheries management and national legislation.[28] However, ensuring that this information actually reaches people in the remote rural areas remains a major challenge. In many cases, customary authorities do not have access to legal, financial or ecological information or advice (MECDM and MFMR 2013). Providing essential information to all coastal villages in the country remains a priority for coral reef conservation (Alexander et al. 2011; Govan et al. 2011).

Civil society

Over the past 20 years, international conservation NGOs, such as the WWF, The Nature Conservancy (TNC) and the Foundation of the Peoples of the South Pacific International (FSPI), have filled the "environmental governance gap" (Govan 2017). There have been notable success stories, such as the formation of the TDA in Western Province (Read 2011), the creation of a network of community-conserved areas on Choiseul by the Lauru Land Conference (Kereseka 2014) and the declaration of the ACMP on Isabel (Foale et al.

Plate 26. Coral reef conservation educational materials displayed in a village.

2017). In most cases, NGOs focus on raising public awareness on coral reef conservation, formalizing customary marine tenure and diversifying rural livelihoods (Box 8).

However, these marine conservation efforts remain relatively small in terms of total area covered and number of people involved, and they have no impact on wider development trajectories. Most conservation projects are clustered on a few localities, such as Western Province, the Arnavon Islands between Isabel and Choiseul, and the Marau Sound on Guadalcanal (Cohen et al. 2012). It is important to note that these are not the areas where coastal fisheries are under the most pressure, such as the northwest coast of Malaita and the west coast of Guadalcanal (Gassner et al. 2019). They are also not the largest coral reef systems in the country, such as the reefs around Anogwau Island, the Indispensable Reefs in Rennell and Bellona Province and the Reef Islands in Temotu (Kool et al. 2010; Ceccarelli et al. 2018) (Annex 3). As such, current conservation projects are not particularly representative of the coastal areas, where the majority of people live and where the need for resource management is greater (Sulu et al. 2015; Sukulu et al. 2016).

It is estimated that about 350 communities have collaborated at some point in time with NGOs and government agencies to manage their fisheries, covering approximately 1000 km^2 (Govan 2015a). But communities only maintain about 10–20 percent of LMMAs after external support ends (Schwarz et al. 2017). For example, in most of the 23 MPAs established in the Roviana and Vonavona lagoons in Western Province in 1999–2006, the rules are no longer followed (Aswani and

Box 8. Alternative livelihood projects: Ecotourism

NGOs actively promote ecotourism as an incentive for coral reef conservation in the Pacific Islands (Huang and Coelho 2017). The idea is that income generated from tourists, for example through operating a homestead or asking an entrance fee from divers, can financially sustain the management of an MPA or provide an alternative livelihood for rural people (see for example: SPC 2016; Lowrey et al. 2017). In some instances, such as the TDA, this has proved a viable strategy. In other cases, community-based ecotourism enterprises struggled to make a profit, led to frictions in the village or did not result in positive conservation outcomes (Foale 2001; Gillett et al. 2008; Aswani et al. 2017).

Compared to neighboring countries, such as Fiji and Vanuatu, the tourism sector in Solomon Islands remains small and undeveloped. Tourism contributes roughly SBD 500 million per year (USD 62 million) to the national economy, approximately 4 percent of gross domestic product. Arena et al. (2015) estimate that 22 percent of this amount is related to the use of marine ecosystems. The Solomon Islands National Tourism Development Strategy 2015–2019 aims to develop the tourism industry to foster economic growth, create jobs in rural areas and "contribute to the management and retention of the country's outstanding natural resources" (PRTCBP 2015). The strategy specifically identifies scuba diving and sport fishing, which depend on healthy coral reefs, as important niche markets for the country to develop. The World Bank (2017a) affirms that tourism can play an important role in the country's economic growth, but warns that this is unlikely as long as problems such as pollution, logging-induced sedimentation and the deplorable state of infrastructure are not addressed first. Particularly, the logging industry seems incompatible with nature-based tourism (Crabtree 2011; WorldBank 2017a).

Francis (2012) proposes creating a trust fund to finance protected areas in Solomon Islands. Imposing a USD 15 fee on all foreign tourists could provide assets. With about 24,000 visitors per year, this would amount to USD 360,000 annually. The SIG has so far not taken up the recommendation, and there remain many questions on how to administer such a trust fund. The COVID-19 pandemic has highlighted the economic vulnerability of the tourism sector and the importance of identifying other nontourism sources of funding to sustain coral reef conservation.

Furusawa 2007; Bennett et al. 2014). Currently, there are perhaps 80 to 120 functioning LMMAs, a fraction of the 4000 coastal communities in the archipelago. By concentrating financial resources in a few villages, CBRM projects in effect risk undermining existing customary governance structures in other areas (World Bank 2017a). Marine conservation projects remain highly dependent on external funding cycles (Abernethy et al. 2014). Funding typically lasts less than 5 years, which raises serious concerns about the financial sustainability and continuity of these interventions (Wairiu and Tabo 2003; van der Ploeg et al. 2016).[29] A major challenge for coral reef conservation in Solomon Islands is thus to identify mechanisms to sustain and expand CBRM to achieve impact at scale (Govan et al. 2011; World Bank 2017a).

It is clear that to effectively address the root causes of coral reef degradation, conservation efforts have to go beyond ad hoc pilot projects in a few remote locations (Keppel et al. 2012). The anti-logging

Box 9. The Solomon Islands National Ocean Policy (2018)

The Solomon Islands National Ocean Policy (SINOP) aims to set up an integrated, cross-sectoral approach to the sustainable development and conservation of marine resources. Government officials from 12 ministries formed a working group, the Ocean12, to identify gaps in ocean governance, harmonize policies and develop appropriate new legislation (Keen and Masu 2019). The ministries included the MECDM, MFMR, MOFR, MMERE, MJLA, the Ministry of Development Planning and Aid Coordination (MDPAC), the Ministry of Infrastructure Development (MID), the Ministry of Foreign Affairs and External Trade (MFAET), the Ministry of Lands, Housing and Survey, the Minister for Police, National Security and Correctional Services, and the Ministry of Culture and Tourism (MCT).

The SINOP makes several recommendations to improve ocean governance that could strengthen coral reef conservation, including the following:

- Adopt community-based ecosystem approaches for protecting marine resources.
- Develop a valuation system to account for damages to coastal ecosystems.
- Restore damaged marine habitats to their near-natural state.
- Strengthen existing monitoring systems to track the impacts of land-based development activities.
- Establish effective cross-sectoral compliance systems to enforce existing legislation.
- Recognize customary marine tenure and involve people in marine spatial planning processes.
- Develop proper sewage and waste management systems.
- Enforce compliance with national laws and international agreements.

Clearly, much can be gained by better aligning the plans and policies of different ministries and improving cross-sectoral cooperation (Lane 2016). The limited financial resources of the government require an integrated service delivery strategy. However, instead of consolidating ministries and devolving authority and discretionary funds to provincial governments, the SINOP aims to establish a new centralized coordination body, above the existing ministries. But no additional financial resources are made available for implementing the SINOP. In fact, the policy articulates a clear expectation that international donors will provide financial support (Ocean12 2018). As such, the SINOP largely ignores the limited capacity of the government to actually implement measures (also see Aiafi 2017). Perhaps more troubling is the fact that the SINOP opens the possibility of seabed mining in the country's exclusive economic zone (EEZ).

protests on Pavuvu in 1995 highlight the potential of a broad civil society coalition advocating structural political reforms (Roughan 1997). There are two possible strategies to strengthen the "countervailing power" of civil society in the country. First, litigation action can hold extractive industries, politicians and government agencies to account. This implies strengthening local civil society organizations, such as the Solomon Islands Environmental Law Association, and building the capacity of the LALSU. Second, systematically documenting and publishing the environmental impacts of extractive industries on reefs and rural livelihoods can put public pressure on government agencies, politicians, businesses and international investors. This requires working closely with media companies, such as the *Solomon Star*, *Island Sun* and the Solomon Islands Broadcasting Corporation (SIBC), as well as advocacy groups such as *Vois Blong Mere*, Transparency International and Global Witness.[30]

Another strategy to scale up coral reef conservation is to strengthen cross-sectoral partnerships with other civil society groups in the country (van der Ploeg et al. 2016; McCarter et al. 2018). International development NGOs, such as Oxfam, World Vision and Save the Children, endorse the importance of coral reefs for food security and rural livelihoods, but they generally lack the technical expertise to integrate marine resource management in their activities. This can in fact have detrimental consequences for reefs. World Vision, for example, distributed trammel nets among communities in South Malaita to improve fish catches (J. Faiau, personal communication, 2017), and the Red Cross donated crowbars to help villagers in Lau Lagoon cut coral rocks for building higher artificial islands (Baenisia 2010). Much can be gained by sharing information, expertise and resources (Blythe et al. 2017). Particularly local NGOs, such as the Solomon Islands Development Trust (focused on community empowerment and rural development), the Natural Resources Development Foundation (sustainable forestry) and the Kastom Gaden Association (sustainable agriculture), have essential expertise and skills that are instrumental for integrated, ecosystem-based conservation approaches.[31] Even more important is to foster partnerships with, and provide technical and financial support to, local CBOs like church groups, women's organizations, fishers associations and youth clubs to improve the management of coral reefs (Govan 2013). There have been several initiatives to promote collaboration among international conservation NGOs, CBOs and government agencies, such as the Solomon Islands Locally Managed Marine Area Network (SILMMA) and the Solomon Islands Community Conservation Partnership (SICCP) (Aalbersberg et al. 2012). SILMMA was established in 2003 to build the capacity of CBOs to manage LMMAs, but the network is no longer functional (Cohen et al. 2012). The SICCP is facing structural funding constraints. However, these networks primarily focused on newly formed management committees, not so much on existing civil society organizations.

Plate 27. Sedimentation plume on Vangunu Island.

Photo credit: J. van der Ploeg

Tabu site in Lau Lagoon.

Conclusions and recommendations

Coral reefs in Solomon Islands remain in relatively good condition and seem resilient to the impacts of natural disasters and climate change. However, coral reefs in the archipelago are under increasing pressure from overfishing, sedimentation and pollution. The existing legal framework is in principle adequate to address current threats to coral reefs. But implementing these laws remains a persistent problem. Recognizing the limited capacity to enforce environmental legislation in the remote coastal areas of the archipelago, the country adopted CBRM as the national strategy to conserve coral reefs (MECDM and MFMR 2013). But the limits of this grassroots approach are increasingly becoming clear. In the absence of state services, customary authorities are unable to address critical threats to coastal ecosystems, particularly the physical destruction, sedimentation and pollution caused by large-scale logging operations and the overharvesting of marine export commodities. It is therefore essential to enable provincial governments to provide basic support to CBRM. Here we list a number of recommendations to facilitate this policy implementation gap.

1. **Strengthen the enforcement of existing environmental legislation:**
    - Provide the necessary operational budgets to PFOs, the RSPIF and SICED to enforce the Fisheries Management Regulations 2018, particularly the ban on importing, selling and possessing gill nets with small mesh sizes (less than 8 cm).
    - Provide technical and legal support to provincial governments to regulate and monitor extractive industries. This could include setting up multisectoral teams to ensure that procedures are followed during EIAs and TRHs, and strengthening provincial tax collection capacity to maximize revenue collection.
    - Set up a trust fund to enable local civil society organizations to take legal action against extractive industries in cases of violations of environmental regulations.
    - Build the capacity of PFOs to monitor and control trade hubs, such as markets, wharfs and airports, to regulate trade in commercially valuable marine resources and endangered species.

2. **Provide essential information to improve CBRM:**
    - Invest in far wider dissemination of existing awareness materials on marine resource management and environmental legislation to coastal communities (instead of developing new materials).
    - Work with national media outlets to publicize threats to coral reefs and highlight successful examples of customary marine tenure to mobilize broad public support for reef fisheries management.
    - Assist provincial governments to develop paralegal support and referral systems to report and effectively respond to threats to coastal ecosystems, such as illegal logging or oil spills.
    - Provide technical advice to the MFMR, MECDM and CBSI on the status and market value of bêche-de-mer to improve the transparency, accountability and independence of the export licensing process and to maximize government revenue.

3. **Mainstream environmental conservation in rural development programs:**
    - Build partnerships with government agencies, development NGOs and CBOs to improve the delivery of public services in rural areas.
    - Assist provincial governments to set up cost-effective and self-sustaining waste management systems.
    - Build a broad civil society coalition to campaign for a moratorium on deep sea mining and for effective regulation of the logging and mining industries.

Reef fish on Auki market.

Notes

[1] It is estimated that the country's population will double in the coming 25 years (Toki et al. 2018).

[2] Anogwau Island between Isabel and Malaita is sometimes erroneously called Ramos Island (see Guppy 1887: 206). On Isabel, the island is called Onogou.

[3] Compared to neighboring countries, reef shark populations are still relatively unexploited in Solomon Islands, which offers opportunities for conservation action (Goetze et al. 2018; MacNeil et al. 2020).

[4] Dead corals are also sold in souvenir shops in Gizo and Honiara, but the impact of this local curio trade on coral reefs seems small.

[5] The Marine Stewardship Council (MSC) certified the NFD skipjack and yellowfin pole-and-line and purse seine fishery in 2016.

[6] From 1998 to 2003, civil violence in and around Honiara led to a breakdown of governance and economic collapse. Approximately 35,000 people were displaced and 200 killed in the conflict (TRC 2012). This period is commonly referred to as "the tensions." From 2004 to 2017, an Australian-led peacekeeping force, the Regional Assistance Mission to Solomon Islands (RAMSI), aimed to provide security and rebuild the capacity of the central state (Dinnen and Allen 2016).

[7] The GPPOL adheres to the guidelines of the Roundtable for Sustainable Palm Oil, which commit the plantation to minimize its environmental impact and maintain high value conservation areas.

[8] See, for example, Duke et al. 2007 on the Silvania oil palm plantation scam in Western Province and Saeni 2017a on the Waisisi-Wairokai palm oil plantation controversy on Malaita. The Solomon Islands Agriculture and Livestock Sector Policy 2015–2019 highlights the importance of developing oil palm, rice, cocoa and coconut plantations (MAL 2015).

[9] Under international law, a sunken vessel cannot be salvaged without the permission of the flag states, in almost all cases the United States and Japan (SPREP 2002).

[10] All acts and provincial ordinances can be accessed on the online database of the Pacific Islands Legal Information Institute (www.paclii.org/). The regional overviews of Pratt and Govan (2010) and Govan (2017) are useful to navigate the labyrinth of international treaties, conventions, roadmaps, frameworks, declarations and voluntary guidelines.

[11] The office of the attorney general is currently reviewing the Mines and Minerals Act.

[12] The MECDM has seconded staff to the Provincial Disaster Management Offices. The ministry is currently investigating options to open Environmental Conservation Offices in all provinces.

[13] In 2019, the Sirebe tribe registered their customary land as a protected area under the Protected Area Act, but this area on Choiseul does not include a coastal area (NRDF 2019). Efforts are ongoing to declare Lake Tengano on Rennell, the only World Heritage Site of the country, as a national protected area under the act (Price 2018; Kiddle 2020). Other ongoing efforts to obtain legal recognition under the act are the TDA on Tetepare and the village of Zaira on Vangunu.

[14] Under section 65 (2) of the Fisheries Management act, the director can appoint an "authorized officer" to monitor and enforce the rules and regulations. This is primarily related to observers, port samplers and quality controllers in the offshore tuna industry, but could perhaps also be used to strengthen law enforcement in coastal waters.

[15] The MFMR identifies 231 MPAs in the country (https://www.fisheries.gov.sb/maps/marine-protected-areas), but the status of these community-conserved areas is unclear: many areas are no longer actively managed and recent initiatives are missing. Other databases are also outdated and incomplete: the CTI atlas, for example, lists 291 MPAs in Solomon Islands (http://ctatlas.reefbase.org/about.aspx). In contrast, the MPAtlas includes only 87 areas (MCI 2020). Compiling comprehensive, up-to-date, spatial information on the conservation efforts in the country is a major challenge.

[16] Solomon Islands relies on several multilateral institutions to manage its tuna stocks, primarily the Western and Central Pacific Fisheries Commission (WCPFC) the Forum Fisheries Agency (FFA) and the Parties to the Nauru Agreement (PNA) (McClean et al. 2019).

[17] The MPGIS supports and supervises the nine provincial governments. Several ministries, including the MFMR, MECDM, MOFR and MAL, have seconded officers to the provincial governments.

[18] Before the tensions, several provinces also enacted ordinances under the Provincial Government Act of 1981: for example, the Western Province Preservation of Culture Ordinance (1989), which aims to protect existing taboo sites, the Isabel Province Marine and Freshwater Areas Ordinance (1993), the Isabel Province Conservation Areas Ordinance (1993), and the Isabel Province Wildlife Sanctuary Ordinance (1995).

[19] Note that the imposition of business license fees by provincial governments has been legally challenged (LALSU 2015: 23)

[20] On the World Bank's Worldwide Governance Indicators, which measures key dimensions of good governance, Solomon Islands scores lower than its neighboring countries Fiji, Vanuatu and Papua New Guinea, on the indicators "government effectiveness" and "regulatory quality," and just above Papua New Guinea on the indicators "rule of law" and "control of corruption" (WGI 2019). This poor performance has necessitated the development of alternative nongovernment solutions to service delivery, especially in rural areas (Govan et al. 2015).

[21] The 2018 budget for the MFMR (including recurrent costs, budget support and development budget) was SBD 29.1 million (USD 3.68 million); the total budget of the MECDM was SBD 34 million (USD 4.3 million) (MFT 2019).

[22] Keesing and Corris (1980: 26–38) famously characterized the British colonial administration as legalistic, paternalistic, incompetent and largely indifferent to the needs of the islanders: "a world of whiskey, quinine and coconuts." When Solomon Islands gained independence in 1978, it inherited many of the flaws of the colonial government: a world of wantoks, Solbrew and per diems.

[23] Illustrative of the poor state of infrastructure are the fisheries centers that were built in the 1980s to foster community fisheries management and development. Only a few remain operational. Efforts are ongoing to build new centers in every constituency.

[24] Most reef fish sold at fish markets in Honiara, Auki and Gizo comes from offshore fishing grounds that are currently not being managed (Brewer 2011; Sulu et al. 2018; Rhodes et al. 2019). Provincial governments are pivotal in enforcing national fisheries regulations. In fact, few prohibited species, such as turtles, are sold on these markets.

[25] See, for example, Akimichi 1991 on Lau Lagoon, Hviding 1996 on Marovo Lagoon, and Aswani 1999 on Roviana Lagoon.

[26] Too often government agencies and NGOs do not recognize these customary fishing management practices. In many cases, CBRM projects aim to design new co-management measures, which undermine existing practices.

[27] On some islands, such as Tikopia, clans have hereditary chiefs.

[28] See, for example, SPC 2011, Albert et al. 2010 and Moore 2015.

[29] In fact, much funding is siphoned off through institutional overheads, international consultants, travel costs, inception meetings and training workshops. In the end, relatively little reaches rural villages. The mismatch between publicly announced funds and the actual activities on the ground fuels suspicion of malversation and corruption, and often causes friction between villagers, project staff and government officials (van der Ploeg et al. 2020).

[30] Press freedom is guaranteed by section 12 of the Constitution. Particularly the *Solomon Star* is playing an important role in documenting environmental injustice and exposing corruption in government (Solomon Times 2020).

[31] A particular concern is that local civil society organizations that focus on social justice and rural development generally cannot compete with international conservation NGOs for funding (UNDP 2015; ADB 2017). The CTI-CFF is a clear example: only large, international organizations such as TNC, WWF and WorldFish were eligible for funding, and the MFMR and MECDM had an important say in allocating the budgets.

References

Aalbersberg WG, Avosa M, James R, Kaluwin C, Lokani P, Opu J, Siwatibau S, Tuiwawa M, Waqa-Sakiti H and Tordoff AW. 2012. Ecosystem profile: East Melanesian biodiversity hotspot. Washington, DC: CEPF.

Abernethy KE, Bodin Ö, Olsson P, Hilly Z and Schwarz AM. 2014. Two steps forward, two steps back: The role of innovation in transforming towards community-based marine resource management in Solomon Islands. *Global Environmental Change* 28:309–21.

Aiafi PR. 2017. The nature of public policy processes in the Pacific Islands. *Asia and the Pacific Policy Studies* 4(3):451–66.

Akimichi T. 1991. Sea tenure and its transformation in the Lau of North Malaita, Solomon Islands. *South Pacific Study* 12(1):7–22.

Albert JA, Olds AD, Albert S, Cruz-Trinidad A and Schwarz AM. 2015. Reaping the reef: Provisioning services from coral reefs in Solomon Islands. *Marine Policy* 62:244–51.

Albert S, Aswani S, Fisher PL and Albert J. 2015. Keeping food on the table: Human responses and changing coastal fisheries in Solomon Islands. *PLoS One* 10(7):e0130800.

Albert S, Dunbabin M, Skinner M, Moore B and Grinham A. 2012. Benthic shift in a Solomon Islands' lagoon: Corals to cyanobacteria. 12th International Coral Reef Symposium. Townsville: JCU.

Albert S, Grinham A, Bythell J, Olds A, Schwarz AM, Abernethy K, Aranani K, Sirikolo M, Watoto C, Duke N and McKenzie J. 2010. Building social and ecological resilience to climate change in Roviana, Solomon Islands. Brisbane: University of Queensland.

Albert S, Grinham A, Gibbes B and Tibbetts I. 2014. Indicators of coral reef ecosystem recovery following reduction in logging and implementation of community-based management schemes in the Solomon Islands. *Pacific Conservation Biology* 20(1):75–85.

Albert S, Kvennefors C, Jacob K, Kera J and Grinham A. 2017. Environmental change in a modified catchment downstream of a gold mine, Solomon Islands. *Environmental Pollution* 231:942–53.

Albert S, Tibbetts I and Udy J. 2010. Solomon Islands marine life: Information on biology and management of marine resources. Brisbane: University of Queensland.

Alexander T, Manele B, Schwarz AM, Topo S and Liliqeto W. 2012. Principles for best practice for community-based resource management (CBRM) in Solomon Islands. Jakarta: Coral Triangle Support Partnership.

Allen MG. 2008. The political economy of logging in Solomon Islands. *In* Duncan R, ed. The political economy of economic reform in the Pacific. 277–301. ADB Pacific Study Series. Manila: ADB.

Allen MG, Dinnen S, Evans D and Monson R. 2013. Justice delivered locally: Systems, challenges, and innovations in Solomon Islands. Washington, DC: WorldBank.

Allen MG and Porter DJ. 2016. Managing the transition from logging to mining in post-conflict Solomon Islands. *Extractive Industries and Society* 3(2):350–58.

Andersen AB, Thilsted SH and Schwarz AM. 2013. Food and nutrition security in Solomon Islands. Penang: WorldFish.

Aqorau T. 2007. Governance and development in Solomon Islands: A fisheries case study. *The Journal of Pacific History* 42(2):247–54.

Arena M, Wini L, Salcone J, Leport G, Pascal N, Fernandes L, Brander L, Wendt H and Seidl A. 2015. National marine ecosystem service valuation: Solomon Islands. Suva: MACBIO.

[ADB] Asian Development Bank. 1998. Solomon Islands 1997 economic report. Pacific Studies Series. Manila: ADB.

[ADB] Asian Development Bank. 2017. Civil society briefs: Solomon Islands. Manila: ADB.

Aswani S. 1999. Common property models of sea tenure: A case study from the Roviana and Vonavona Lagoons, New Georgia, Solomon Islands. *Human Ecology* 27(3):417–53.

Aswani S, Albert S and Love M. 2017. One size does not fit all: Critical insights for effective community-based resource management in Melanesia. *Marine Policy* 81:381–91.

Aswani S and Furusawa T. 2007. Do marine protected areas affect human nutrition and health? A comparison between villages in Roviana, Solomon Islands. *Coastal Management* 35(5):545–65.

Aylett ML. 1961. Memorandum 130/1. Auki: BSIP.

Baenisia P. 2010. When the king tide comes. *Red Cross Red Crescent Magazine* 2:18–19.

Baines G. 2015. Solomon Islands is unprepared to manage a minerals-based economy. SSGM Discussion Paper 2015/6. Canberra: ANU.

Barbara J. 2019. Governance and political adaptation: Constituency development funds in Solomon Islands and the construction of a Melanesian state. *In* Lahai JI, von Strokirch K, Brasted H and Ware H, eds. Governance and political adaptation in fragile states. Cham: Palgrave Macmillan. 273–299.

Beck J. January 3, 2020. Logging is corrupting these islands. One village fights back—and wins. *National Geographic*. Digital. https://www.nationalgeographic.com/science/2020/01/deforestation-in-the-solomon-islands/

Bell JD, Kronen M, Vunisea A, Nash WJ, Keeble G, Demmke A, Pontifex S and Andréfouët S. 2009. Planning the use of fish for food security in the Pacific. *Marine Policy* 33(1):64–76.

Bell JD, Johnson JE and Hobday AJ, eds. 2011. Vulnerability of tropical Pacific fisheries and aquaculture to climate change. Noumea: SPC.

Bellwood DR, Pratchett MS, Morrison TH, Gurney GG, Hughes TP, Álvarez-Romero JG, Day JC, Grantham R, Grech A, Hoey AS and Jones GP. 2019. Coral reef conservation in the Anthropocene: Confronting spatial mismatches and prioritizing functions. *Biological Conservation* 236:604–15.

Bennett G, Cohen P, Schwarz AM, Albert J, Lawless S, Paul C and Hilly Z. 2014. Solomon Islands: Western Province situation analysis. Penang: WorldFish.

Blythe J, Bennett G, Cohen P, Moveni M and Kwatelae A. 2017. Five principles for network success in Solomon Islands. Penang: WorldFish.

Boer BW, ed. 1996. Environmental law in the South Pacific: Consolidated report of the reviews of environmental law in the Cook Islands. Federated States of Micronesia, Kingdom of Tonga, Republic of the Marshall Islands and Solomon Islands. Environmental Policy and Law Paper 28. Gland: IUCN.

Boso D, Vave-Karamui A, Masu R, Boseto D, Mauli S, Gomese C and van der Ploeg J. 2018. Proceedings of the 1st Solomon Islands resource management symposium: A decade of learning. Penang: WorldFish.

Brewer TD. 2011. Coral reef fish value chains in Solomon Islands: Market opportunities and market effects on fish stocks. ARC Centre of Excellence for Coral Reef Studies report to MFMR and SPC. Townsville: JCU.

Brewer TD. 2013. Social determinants of the exploitation and management of coral reef resources in Solomon Islands. [PhD thesis] James Cook University, Townsville.

[BSIP] British Solomon Islands Protectorate. 1931. Annual report for the district of Malaita. Tulagi: BSIP.

Brown A. 2016. Reporting challenges facing the Solomon Islands Ministry of Fisheries and Marine Resources. *Marine Policy* 73:181–86.

Bruno JF, Côté IM and Toth LT. 2019. Climate change, coral loss, and the curious case of the parrotfish paradigm: Why don't marine protected areas improve reef resilience? *Annual Review Marine Science* 11:307–34.

Buchanan A. November 15, 2017. Apia and Hagberg acquitted. *Solomon Star*. Digital http://www.solomonstarnews.com/index.php/news/national/item/19677-aipia-and-hagberg-acquitted

Buga B and Vuki V. 2012. The people of the artificial island of Foueda, Lau Lagoon, Malaita, Solomon Islands: Traditional fishing methods, fisheries management and the roles of men and women in fishing. *SPC Women in Fisheries Information Bulletin* 22:42–44.

Burke L, Reytar K, Spalding M and Perry A. 2012. Reefs at risk revisited in the Coral Triangle. Washington, DC: World Resources Institute.

Carlton R, Dempsey A, Lubarsky K, Akao I, Faisal M and Purkis, S. 2020. Global reef expedition: Solomon Islands. Final report. Annapolis: Khaled bin Sultan Living Oceans Foundation.

Ceccarelli DM, Wini-Simeon L, Sullivan J, Wendt H, Vave-Karamui A, Masu R, Nicolay-Grosse Hokamp A and Fernandes L. 2018. Biophysically special, unique marine areas of the Solomon Islands. Suva: MACBIO.

[CBSI] Central Bank of Solomon Islands. 2018. 2018 CBSI annual report. Honiara: CBSI.

[CBSI] Central Bank of Solomon Islands. 2019. 2019 CBSI annual report. Honiara: CBSI.

Cervi GA. 1999. War wrecks and the environment: Who's responsible for the legacy of war? A case study: Solomon Islands and the United States. *Journal of Environmental Law and Litigation* 14(2):351–99.

Chêne M. 2017. Solomon Islands: Overview of corruption and anti-corruption. Bergen: Transparency International.

Chin A and Hari K. 2020. Predicting the impacts of mining of deep sea polymetallic nodules in the Pacific Ocean: A review of scientific literature. Ottawa: MiningWatch Canada.

[CFWG] Coastal Fisheries Working Group. 2018. A call to leaders: Most urgent actions required for sustaining or increasing the contribution of coastal fisheries to our communities. Suva: SPC.

Cohen PJ, Evans LS and Mills M. 2012. Social networks supporting governance of coastal ecosystems in Solomon Islands. *Conservation Letters* 5(5):376–86.

Cohen PJ and Foale SJ. 2013. Sustaining small-scale fisheries with periodically harvested marine reserves. *Marine Policy* 37:278–87.

Cohen PJ, Schwarz AM, Boso D and Hilly Z. 2014. Lessons from implementing, adapting and sustaining community-based adaptive marine resource management. Penang: WorldFish.

Comfort M. July 25, 2018. Environmental concern following oil spill. *Solomon Star*. Digital. https://www.solomonstarnews.com/index.php/news/national/item/20760-environmental-concern-following-oil-spill

[CCIF] Conservation and Community Investment Forum. 2013. Assessment of the enabling conditions for rights-based management of fisheries and coastal marine resources. San Francisco: The Trust for Conservation Innovation.

[CBD] Convention on Biological Diversity. 2020. Global Biodiversity Outlook 5. Montréal: CBD.

Cooper TF, Lincoln Smith MP, Bell JD and Pitt KA. 2000. Assessing the effects of logging on coral reefs in Solomon Islands. *Proceedings of the 9th International Coral Reef Symposium* 2:1199–1204.

Cox J. 2009. Active citizenship or passive clientelism? Accountability and development in Solomon Islands. *Development in Practice* 19(8):964–80.

Crabtree A. 2011. Coastal/marine tourism trends in the Coral Triangle and strategies for sustainable development interventions. Washington, DC: WWF.

Cravatte S, Delcroix T, Zhang D, McPhaden M and Leloup J. 2009. Observed freshening and warming of the western Pacific warm pool. *Climate Dynamics* 33(4):565–89.

Dawea E and Cannon JC. May 1, 2017. Corruption drives dealings with logging companies in the Solomon Islands. *Mongabay*. Digital. https://news.mongabay.com/2017/05/corruption-drives-dealings-with-logging-companies-in-the-solomon-islands/

Dinnen S and Allen M. 2015. State absence and state formation in Solomon Islands: Reflections on agency, scale and hybridity. *Development and Change* 47(1):76–97.

Dornan M and Pryke J. 2017. Foreign aid to the Pacific: Trends and developments in the twenty first century. *Asia and the Pacific Policy Studies* 4(3):386–404.

Drazen JC, Smith CR, Gjerde KM, Haddock SH, Carter GS, Choy CA, Clark MR, Dutrieux P, Goetze E, Hauton C and Hatta M. 2020. Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining. *PNAS* 117(30):17455–60.

Duke NC, Udy J, Albert S, Love M, Ross A, Tibbetts IR, Roelfsema C, Neil D, Marion G, Prange J, Corrin Care J, Carter W, Dart P, Hough S et al. 2007. Conserving the marine biodiversity of Marovo Lagoon: Development of environmental management initiatives that will conserve the marine biodiversity and productivity of Marovo Lagoon, Solomon Islands. Brisbane: University of Queensland.

Evans D. 2019. Things still fall apart: A political economy analysis of State-youth engagement in Honiara, Solomon Islands. *In* Lee H, ed. *Pacific Youth: Local and Global Futures*. Acton: ANU Press. 79–110.

Fidali-Hickie K and Whippy-Morris C. 2005. No shells, no Langalanga: Hard times in Malaita, Solomon Islands. *In* Novaczek I, Mitchell J and Vietayaki J, eds. Pacific voices: Equity and sustainability in Pacific Islands fisheries. Suva: USP. 27–45.

Foale S. 2001. 'Where's our development?' Landowner aspirations and environmentalist agendas in Western Solomon Islands. *The Asia Pacific Journal of Anthropology* 2(2):44–67.

Foale S, Dyer M and Kinch J. 2016. The value of tropical biodiversity in rural Melanesia. *Valuation Studies* 4(1):11–39.

Foale S and Manele B. 2004. Social and political barriers to the use of marine protected areas for conservation and fishery management in Melanesia. *Asia Pacific Viewpoint* 45(3):373–86.

Foale S, Wini L and Fernandes L. 2017. The Arnavon community marine conservation area: A review of successes, challenges and lessons learned. Suva: SPREP.

Fordyce AJ, Ainsworth TD, Heron SF and Leggat W. 2019. Marine heatwave hotspots in coral reef environments: Physical drivers, ecophysiological outcomes and impact upon structural complexity. *Frontiers in Marine Science* 6:498.

[FFA and SPC] Forum Fisheries Agency and the Pacific Community, and the Secretariat of the Pacific Community. 2015. Future of fisheries. A regional roadmap for sustainable Pacific fisheries. Noumea: SPC.

Foukona JD and Timmer J. 2016. The culture of agreement making in Solomon Islands. *Oceania* 86(2):116–31.

Francis H. 2012. Developing a self-sustaining protected area system: A feasibility study of national tourism fee and green infrastructure in the Solomon Islands. *Journal of Sustainable Finance and Investment* 2(3–4):287–302.

Frazer I. 1997. The struggle for control of Solomon Island forests. *The Contemporary Pacific* 9(1):39–72.

Gassner P, Wini-Simeon L, Masu R, Vave-Karamui A, Nicolay-Grosse H, Westerveld L, Macmillan-Lawler M, Davey K, Baker E, Clark M et al. 2019. Marine atlas: Maximizing benefits for Solomon Islands. Suva: MACBIO.

Gegeo DW and Watson-Gegeo KA. 2002. Whose knowledge? Epistemological collisions in Solomon Islands community development. *The Contemporary Pacific* 14(2):377–409.

Gillett R, Preston G, Nash W, Govan H, Adams T and Lam M. 2008. Livelihood diversification as a marine resource management tool in the Pacific Islands: Lessons learned. *SPC Fisheries Newsletter* 125:32–39.

Gillett R and Tauati MI. 2018. Fisheries in the Pacific. Regional and national information. FAO Fisheries and Aquaculture Technical Paper 625. Apia: FAO.

Gilman E, Chopin F and Suuronen P. 2016. Abandoned, lost and discarded gillnets and trammel nets: Methods to estimate ghost fishing mortality, and the status of regional monitoring and management. FAO Fisheries and Aquaculture Technical Paper 600. Rome: FAO.

Gina U. May 6, 2019. WP endorses plan to ban plastic. *Solomon Star*. Digital. https://www.solomonstarnews.com/index.php/news/national/item/21557-wp-endorses-plan-to-ban-plastic

Global Witness. 2018. Paradise lost: How China can help the Solomon Islands protect its forests. London: Global Witness.

Goby G, Schwarz AM, Pomeroy R and Knight M. 2012. Ecosystem Approach to Fisheries Management (EAFM): A Solomon Islands policy review. Honolulu: The USAID Coral Triangle Support Partnership.

Goetze JS, Langlois TJ, McCarter J, Simpfendorfer CA, Hughes A, Leve JT and Jupiter SD. 2018. Drivers of reef shark abundance and biomass in the Solomon Islands. *PloS One* 13(7):e0200960.

Govan H. 2013. Review of Guadalcanal and Central Islands provincial governments capacity for implementation of the NPOA: Strengthening the role of provincial level governments in community based resource management Part 1: Review. Honiara: MECDM.

Govan H. 2015a. Status of locally managed marine areas in Fiji, Kiribati, Solomon Islands, Tonga and Vanuatu. Suva: MACBIO.

Govan H. 2015b. Preliminary review of public expenditure of the fisheries agencies of Pacific Island Countries and Territories: Policy, operational budget and staffing support for coastal fisheries. Suva: SPC.

Govan H. 2017. Ocean governance: Our sea of islands. *In* Katafono R, ed. A sustainable future for small states: Pacific 2050. London: Commonwealth Secretariat.

Govan H, Aalbersberg W, Tawake A and Parks J. 2008. Locally-managed marine areas: A guide to supporting community-based adaptive management. Suva: LMMA Network.

Govan H and Bennett G. 2014. Towards sustainable resource management in Western Province: Capacity, potential theory of change and strategies for implementation of community-based resource management (CBRM+) in Western Province. Gizo: WorldFish.

Govan H, Nichols PV and Tafea H. 1988. Giant clam resource investigations in Solomon Islands. *In* Copland JW and Lucas JS, eds. Giant clams in Asia and the Pacific. ACIAR Monograph 9. Canberra: ACIAR. 54–57.

Govan H, Schwarz AM and Boso D. 2011. Towards integrated island management: Lessons from Lau, Malaita, for the implementation of a national approach to resource management in Solomon Islands. Honiara: WorldFish.

Govan H, Schwarz AM, Harohau D and Oeta J. 2013. Solomon Islands national situation analysis. Penang: WorldFish.

Green A, Lokani P, Atu W, Ramohia P, Thomas P and Almany J, eds. 2006. Solomon Islands marine assessment: Technical report of survey conducted May 13–June 17, 2004. TNC Pacific Island Countries Report No 1/06. Honiara: TNC.

Guo PY. 2006. From currency to agency: Shell money in contemporary Langalanga, Solomon Islands. *Asia-Pacific Forum* 31(3):17–38.

Guppy HB. 1887. *The Solomon Islands and their natives*. London: Swan Sonnenschein, Lowrey & Co.

Ha'apio MO, Filho WL, Gonzalez R, Holland E and Wairiu M. 2014. Mapping the economic costs and benefits of Coral Triangle Initiative (CTI) and Mangrove Rehabilitation Projects (MRP) in Solomon Islands: A study of two MPAs and one MRP. *International Journal of Sustainable Development and World Ecology* 21(5):414–21.

Halpern BS, Selkoe KA, White C, Albert S, Aswani S and Lauer M. 2013. Marine protected areas and resilience to sedimentation in the Solomon Islands. *Coral Reefs* 32(1):61–69.

Hameiri S. 2012. Mitigating the risk to primitive accumulation: State-building and the logging boom in Solomon Islands. *Journal of Contemporary Asia* 42(3):405–26.

Hamilton RJ, Almany GR, Brown CJ, Pita J, Peterson NA and Choat JH. 2017. Logging degrades nursery habitat for an iconic coral reef fish. *Biological Conservation* 210:273–80.

Hamilton RJ, Giningele M, Aswani S and Ecochard JL. 2012. Fishing in the dark-local knowledge, night spearfishing and spawning aggregations in the Western Solomon Islands. *Biological Conservation* 145(1):246–57.

Hamilton RJ, Hughes A, Brown CJ, Leve T and Kama W. 2019. Community-based management fails to halt declines of bumphead parrotfish and humphead wrasse in Roviana Lagoon, Solomon Islands. *Coral Reefs* 38(3):455–65.

Hanich Q and Tsamenyi M. 2009. Managing fisheries and corruption in the Pacific Islands region. *Marine Policy* 33(2):386–92.

Hauirae J. 2003. National assessment of environment, natural resources and relevant related legislation and regulation in Solomon Islands. Apia: SPREP.

Healy J and Hauirae J. 2015. Solomon Islands' fisheries, marine and coastal legislation and policy gap analysis. Honiara: WWF.

Hehre JE. 2016. Effects of seaweed farming on tropical shallow coral ecosystems. [PhD thesis] University of British Columbia, Canada.

Hilly Z, Schwarz AM and Boso D. 2012. Strengthening the role of women in community-based marine resource management: Lessons learned from community workshops. *SPC Women in Fisheries Information Bulletin* 22:29–35.

Howard P, Parker G, Jenner N and Holland T. 2020. An assessment of the risks and impacts of seabed mining on marine ecosystems. Cambridge: FFI.

Huang Y and Coelho VR. 2017. Sustainability performance assessment focusing on coral reef protection by the tourism industry in the Coral Triangle region. *Tourism Management* 59:510–27.

Hughes AT, Hamilton RJ, Choat JH and Rhodes KL. 2020. Declining grouper spawning aggregations in Western Province, Solomon Islands, signal the need for a modified management approach. *PLoS ONE* 15:e0230485.

Hughes T and Tuhanuku A. 2015. Logging and mining in Rennell: Wishful thinking meets Murphy's Law. Honiara: World Bank and SIG.

Hughes TP, Rodrigues MJ, Bellwood DR, Ceccarelli D, Hoegh-Guldberg O, McCook L, Moltschaniwskyj N, Pratchett MS, Steneck RS and Willis B. 2007. Phase shifts, herbivory, and the resilience of coral reefs to climate change. *Current Biology* 17(4):360–65.

Hughes TP, Barnes ML, Bellwood DR, Cinner JE, Cumming GS, Jackson JB, Kleypas J, Van De Leemput IA, Lough JM, Morrison TH and Palumbi SR. 2017. Coral reefs in the Anthropocene. *Nature* 546(7656):82–90.

Hviding E. 1996. *Guardians of Marovo Lagoon: Practice, Place, and Politics in Maritime Melanesia*. Honolulu, Hawaii: University of Hawaii Press.

Hviding E. 1998. Contextual flexibility: Present status and future of customary marine tenure in Solomon Islands. *Ocean and Coastal Management* 40(2–3):253–69.

Hylton S, White WT and Chin A. 2018. The sharks and rays of the Solomon Islands: A synthesis of their biological diversity, values and conservation status. *Pacific Conservation Biology* 23(4):324–34.

[IPCC] Intergovernmental Panel on Climate Change. 2018. Global warming of 1.5°C. Geneva: IPCC.

[IMF] International Monetary Fund. 2020. Solomon Islands. IMF country report 20/49. Washington, DC: IMF.

Iroga P. July 2, 2014. Concerns over dynamite fishing. *Solomon Star*. Digital. https://www.solomonstarnews.com/index.php/news/national/item/12747-concerns-over-dynamite-fishing.

Jacob-Tatapu KJ. 2018. Investigating the elevated arsenic concentrations in the Gold Ridge Tailings Storage Facility surface water. [MPhil thesis] University of Queensland, Australia.

James R. 2015. Solomon Islands national mining forum October 27–29, 2015. Final report. Honiara: TNC.

Johannes RE, Freeman MM and Hamilton RJ. 2000. Ignore fishers' knowledge and miss the boat. *Fish and Fisheries* 1(3):257–71.

Johannes RE and Lam M. 1999. The live reef food fish trade in the Solomon Islands. *SPC Live Reef Fish Information Bulletin* 5:8–15.

John A. October 28, 2017. Fisheries fraud yet to be reported. *Solomon Star*. Print.

Johnson J, Bell J and Gupta AS. 2015. Pacific islands ocean acidification: Vulnerability assessment. Apia, Samoa: SPREP.

Jupiter S. 2017. Culture, kastom and conservation in Melanesia: What happens when worldviews collide? *Pacific Conservation Biology* 23(2):139–45.

Jupiter S, McCarter J, Albert S, Hughes A and Grinham A. 2019. Solomon Islands: Coastal and marine ecosystems. *In* Sheppard C, ed. *World Seas: An Environmental Evaluation*. 855–74. Cambridge: Academic Press.

Kabui F. 1997. Crown ownership of foreshores and seabed in Solomon Islands. *Journal of Pacific Studies* 21(1):123–44.

Kafo T. October 28, 2017. Why no locals. Ministry explains basis of bêche-de-mer export licenses. *Solomon Star*. Print.

Katovai E, Edwards W and Laurance WF. 2015. Dynamics of logging in Solomon Islands: The need for restoration and conservation alternatives. *Tropical Conservation Science* 8(3):718–31.

Kaukui IM. September 23, 2019. Call for recognition over wreckage damages. *Solomon Star*. https://www.solomonstarnews.com/index.php/news/national/item/21972-call-for-recognition-over-wreckage-damages

Keen M and Masu R. 2019. The Blue Pacific in action: Solomon Islands' national ocean policy. Department of Pacific Affairs Brief 16. Canberra: ANU.

Keesing RM and Corris P. 1980. *Lightning meets the west wind: The Malaita massacre*. Oxford: Oxford University Press.

Kelly L, Woods D and Tuhanuku A. 2015. The mid-term review of the Solomon Islands justice program. Honiara: SSJG.

Keppel G, Morrison C, Watling D, Tuiwawa MV and Rounds IA. 2012. Conservation in tropical Pacific Island countries: Why most current approaches are failing. *Conservation Letters* 5(4):256–65.

Kereseka J. 2014. Successful community engagement and implementation of a conservation plan in the Solomon Islands: A local perspective. *PARKS* 20(1):29–38.

Kiddle GL. 2020. Achieving the desired state of conservation for East Rennell, Solomon Islands: Progress, opportunities and challenges. *Asia and the Pacific Policy Studies*. DOI: 10.1002/app5.311

Kinch J. 2004. Marine aquarium trade in the Solomon Islands. Suva: MAC.

Kool J, Brewer T, Mills M and Pressey R. 2010**.** Ridges to reefs: Conservation plan for Solomon Islands. Townsville: ARC Centre of Excellence for Coral Reef Studies.

Lal P and Kinch J. 2005. Financial assessment of the marine trade of corals in Solomon Islands. Honiara: FSPI, SPREP and DFMR.

[LALSU] Land Advisory and Legal Support Unit. 2013. Protected areas toolkit: A step-by-step guide to creating protected areas in Solomon Islands. Honiara: PSO.

[LALSU] Land Advisory and Legal Support Unit. 2015. Environmental law in Solomon Islands. Honiara: PSO.

Lamb JB, Willis BL, Fiorenza EA, Couch CS, Howard R, Rader DN, True JD, Kelly LA, Ahmad A, Jompa J and Harvell CD. 2018. Plastic waste associated with disease on coral reefs. *Science* 359(6374):460–62.

Lane MB. 2006. Towards integrated coastal management in Solomon Islands: Identifying strategic issues for governance reform. *Ocean and Coastal Management* 49(7–8):421–41.

Lasi F. 2010. Trochus production in Solomon Islands from 1953 to 2006. *SPC Trochus Information Bulletin* 15:24–29.

Lauer M. 2016. Governing uncertainty: Resilience, dwelling, and flexible resource management in Oceania. *Conservation and Society* 14(1):34–47.

Laungi AJ. July 27, 2018. Call to suspend fisheries PS, director. *Solomon Star*. Digital. http://www.solomonstarnews.com/index.php/news/national/item/20781-call-to-suspend-fisheries-ps-director

Laungi AJ. July 11, 2019. MV Takana spills oil. *Solomon Star*. Digital. https://www.solomonstarnews.com/index.php/news/national/item/21677-mv-takana-spills-oil

Lawless S, Cohen P, McDougall C, Orirana G, Siota F and Doyle K. 2019. Gender norms and relations: Implications for agency in coastal livelihoods. *Maritime Studies* 18(3):347–58.

Lee S, Govan H, Wolff M and Purcell S. 2018. Economic and other benefits of enforcing size limits in Melanesian sea cucumber fisheries. *SPC Fisheries Newsletter* 155:29–36.

Lovell E, Sykes H, Deiye M, Wantiez L, Garrigue C, Virly S, Samuelu J, Solofa A, Poulasi T, Pakoa K, Sabetian A, Afzal D, Hughes A, Sulu R et al. 2004. Status of coral reefs in the South West Pacific: Fiji, Nauru, New Caledonia, Samoa, Solomon Islands, Tuvalu and Vanuatu. *In* Wilkinson C, ed. Status of coral reefs of the world 2. Queensland, Australian Institute of Marine Science. 337–62.

Lowrey N. 2017. Ensuring sustainable coastal communities: A case study on Solomon Islands. Honiara: WWF-Pacific.

MacNeil MA, Chapman DD, Heupel M, Simpfendorfer CA, Heithaus M, Meekan M, Harvey E, Goetze J, Kiszka J, Bond ME and Currey-Randall LM. 2020. Global status and conservation potential of reef sharks. *Nature* 583:801–06.

Mapuru D and Naz R. 2013. Compliance of regulations in tuna fisheries in the Solomon Islands. *Journal of Pacific Studies* 33(2):78–94.

[MCI] Marine Conservation Institute. 2020. MPAtlas. Seattle: MPAtlas.

Martin S. 2013. Marine protected areas in Solomon Islands: Establishment, challenges, and lessons learned in Western Province. Jakarta: USAID.

Mataki M. 2011. Solomon Islands national assessment report Rio +20. Honiara: MECDM.

McCarter J, Sterling EJ, Jupiter SD, Cullman GD, Albert S, Basi M, Betley E, Boseto D, Bulehite ES, Harron R and Holland PS. 2018. Biocultural approaches to developing well-being indicators in Solomon Islands. *Ecology and Society* 23(1):32.

McClanahan TR, Maina JM, Darling ES, Guillaume MM, Muthiga NA, D'agata S, Leblond J, Arthur R, Jupiter SD, Wilson SK and Mangubhai S. 2020. Large geographic variability in the resistance of corals to thermal stress. *Global Ecology and Biogeography*. DOI: 10.1111/geb.13191.

McClean N, Barclay K, Fabinyi M, Adhuri D, Sulu R and Indrabudi T. 2019. Assessing tuna fisheries governance for community wellbeing: Case studies from Indonesia and Solomon Islands. Sydney: UTS.

McDonald J. 2006**.** Marine resource management and conservation in Solomon Islands: Roles, responsibilities and opportunities. Brisbane: Griffith Law School.

McDonald R. 2003. *Money Makes You Crazy: Custom And Change In The Solomon Islands*. Dunedin: Otago University Press.

McDonnell S, Foukona J and Pollard A. 2015. Building a pathway for successful land reform in Solomon Islands. SSGM Report. Canberra: ANU.

McNamara KE, Clissold R, Westoby R, Piggott-McKellar AE, Kumar R, Clarke T, Namoumou F, Areki F, Joseph E, Warrick O and Nunn PD. 2020. An assessment of community-based adaptation initiatives in the Pacific Islands. *Nature Climate Change* 1–12. DOI:10.1038/s41558-020-0813-1.

[MSG] Melanesian Spearhead Group. 2015. Melanesian Spearhead Group roadmap for inshore fisheries management and sustainable development 2015–2024. Noumea: SPC.

[MAL] Ministry of Agriculture and Livestock. 2015. Solomon Islands agriculture and livestock sector policy 2015–2019. Honiara: MAL.

[MDPAC] Ministry of Development Planning and Aid Coordination. 2007. Solomon Islands: Agriculture and rural development strategy. Washington, DC: World Bank.

[MDPAC] Ministry of Development Planning and Aid Coordination. 2012. Solomon Islands national infrastructure investment plan. Honiara: MDPAC.

[MDPAC] Ministry of Development Planning and Aid Coordination. 2016. National development strategy 2016 to 2035. Honiara: MDPAC.

[MDPAC and UNDP] Ministry of Development Planning and Aid Coordination and the United Nations Development Programme. 2018. Solomon Islands development finance assessment. Honiara: MDPAC.

[MECM] Ministry of Environment, Climate Change, Disaster Management and Meteorology. 2008. Solomon Islands national adaptation programme of actions. Honiara: MECM.

[MECDM] Ministry of Environment, Climate Change, Disaster Management and Meteorology. 2016. Solomon Islands national biodiversity strategic action plan 2016–2020. Honiara: MECDM.

[MECDM] Ministry of Environment, Climate Change, Disaster Management and Meteorology. 2017a. Solomon Islands: Waste management and pollution control strategy 2017–2026. Apia: SPREP.

[MECDM] Ministry of Environment, Climate Change, Disaster Management and Meteorology. 2017b. Solomon Islands second national communication. Honiara: MECDM.

[MECDM] Ministry of Environment, Climate Change, Disaster Management and Meteorology. 2019. Sixth national report to the United Nations Convention on Biological Diversity. Honiara: SIG.

[MECDM and MFMR] Ministry of Environment, Climate Change, Disaster Management and Meteorology, and the Ministry of Fisheries and Marine Resources. 2010. Solomon Islands national plan of action: Coral Triangle initiative on coral reefs, fisheries and food security. Honiara: Solomon Islands Government.

[MECDM and MFMR] Ministry of Environment, Climate Change, Disaster Management and Meteorology, and the Ministry of Fisheries and Marine Resources. 2013. Implementation plan for the national plan of action of the Coral Triangle initiative on coral reefs, fisheries and food security in Solomon Islands 2013–2016. Honiara: AusAID.

[MFT] Ministry of Finance and Treasury. 2019. Solomon Islands budget 2019: Financial policy objectives and strategies. Budget Paper: Volume 1. Honiara: MFT.

[MFMR] Ministry of Fisheries and Marine Resources. 2017. The Solomon Islands Ministry of Fisheries and Marine Resources strategy 2017-2019. Honiara: MFMR.

[MFMR] Ministry of Fisheries and Marine Resources. 2018a. National strategy on aquatic biosecurity for the Solomon Islands, 2018–2023. Noumea: SPC.

[MFMR] Ministry of Fisheries and Marine Resources. 2018b. Solomon Islands national fisheries policy 2019–2029. Honiara: MFMR.

[MFMR] Ministry of Fisheries and Marine Resources. 2018c. Solomon Islands national aquaculture management and development plan 2018–2023. Honiara: MFMR.

Minter T, Orirana G, Boso D and van der Ploeg J. 2018. From happy hour to hungry hour: Logging, fisheries and food security in Malaita, Solomon Islands. Penang: WorldFish.

Moore K. 2015. Solomon Islands environmental crime manual. Honiara: Royal Solomon Islands Police Force.

Morrison TH, Adger N, Barnett J, Brown K, Possingham H and Hughes T. 2020. Advancing coral reef governance into the Anthropocene. *One Earth* 2 (1): 64–74.

Muldoon J, Wini-Simeon L and Fernandes L. 2016. Review of legislation, policies, strategies and plans relating to the use and management of the Solomon Islands' oceans. Report to the Government of the Solomon Islands. Suva: MACBIO.

[NFD] National Fisheries Developments. 2016. Tuna supply and sustainability report. Noro: NFD.

[NRDF] Natural Resources Development Foundation. 2019. First forest protected area in the Solomon Islands declared. December 6, 2019. http://nrdfsolomons.org/first-forest-protected-area-in-the-solomon-islands-declared/

[TNC] The Nature Conservancy. 2017. Capturing and sharing knowledge for community-based marine conservation: The Pacific way. Honolulu: TNC.

[NEPCon] Nature, Economy and People Connected. 2018. Timber legality risk assessment Solomon Islands. Copenhagen: NEPCon.

News Desk. September 25, 2020. Waisisi Warokai palm oil project under spotlight again. *Solomon Times*. Digital. https://www.solomontimes.com/news/waisisi-wairokai-palm-oil-project-under-spotlight-again/10247

Ocean12. 2018. Solomon Islands National Ocean Policy. Honiara: SIG.

[OAG] Office of the Auditor General. 2018. Audit report rural constituency development funds (2009 to 2012). Honiara: OAG.

[PCEDS] Pacific Centre for Environment and Sustainable Development. 2011. Community-based adaptation to climate change: A review of good practices in the Pacific. Suva: USP.

[PRTCBP] Pacific Regional Tourism Capacity Building Programme. 2015. The Solomon Islands national tourism development strategy 2015–2019. Honiara: South Pacific Tourism Organization.

Pakoa K, Masu R, Teri J, Leqata J, Tua P, Fisk D and Bertram I. 2014. Solomon Islands sea cucumber resource status and recommendations for management. Noumea: SPC.

Peterson N, Hamilton R, Pita J, Atu W and James R. 2012. Ridges to reefs conservation plan for Isabel Province, Solomon Islands. Honiara: TNC.

Phillips M. 2020. What we can learn from provincial governments in Solomon Islands: A personal perspective – part 2**.** Using provincial revenue for peace and localised solutions. Department of Pacific Affairs Brief 14. Canberra: ANU.

Pikacha PG, Lavery T, Boseto D, Sirikolo M, Pikacha D and Pollard E. 2016. Solomon Islands ranger skills guide. Brisbane: University of Queensland.

Porter D and Allen M. 2015. The political economy of the transition from logging to mining in Solomon Islands. State, Society and Governance in Melanesia 12. Canberra, Australia: ANU.

Pratchett MS. 2005. Dynamics of an outbreak population of Acanthaster planci at Lizard Island, northern Great Barrier Reef (1995–1999). *Coral Reefs* 24(3):453–62.

Pratt C and Govan H. 2010. Our sea of islands, our livelihoods, our Oceania. Framework for a Pacific oceanscape: A catalyst for implementation of ocean policy. Apia: SPREP.

Preston GL, Gillett RD, McCoy MA, Murrell PA and Lovell ER. 1997. Ship groundings in the Pacific Islands region: Issues and guidelines. Apia: SPREP.

Price SC. 2018. World Heritage conservation in the Pacific: The case of Solomon Islands. Singapore: Palgrave.

[PGSP] Provincial Governance Strengthening Programme. 2016. Provincial Governance Strengthening Programme annual report. Honiara: PGSP.

Purcell SW, Conand C, Uthicke S and Byrne M. 2016. Ecological roles of exploited sea cucumbers. *Oceanography and Marine Biology: An Annual Review* 54:367–438.

Quinn N and Daudau P. 1999. Marine knowledge and subsistence fishing practices, Ferafalu village, Maana'oba island, at Malaita province, Solomon Islands. *Journal of The Pacific Society* 22(3&4):13–29.

Rabbitt S, Lilley I, Albert S and Tibbetts IR. 2019. What's the catch in who fishes? Fisherwomen's contributions to fisheries and food security in Marovo Lagoon, Solomon Islands. *Marine Policy* 108:103667.

Ragaruma M. November 27, 2018. RSIPF warn against dynamite fishing following arrest in Central Province. *Island Sun*. Digital. https://theislandsun.com.sb/rsipf-warn-against-dynamite-fishing-following-arrest-in-central-province/

Read JL. 2011. *The Last Wild Island: Saving Tetepare*. Kensington Park: Page.

Redding JE, Myers-Miller RL, Baker DM, Fogel M, Raymundo LI and Kim K. 2013. Link between sewage-derived nitrogen pollution and coral disease severity in Guam. *Marine Pollution Bulletin* 73:57–63.

Rhodes KL, Tua P, Sulu R, Pitakaka P, Kekete P, Uti M, Funu F and Masu R. 2019. Gear-based characterization of the Gizo, Solomon Islands, inshore commercial finfish fishery. *Regional Studies in Marine Science* 32:100807.

Richards AH, Bell LJ and Bell JD. 1994. Inshore fisheries resources of Solomon Islands. FFA Report 94/01. Honiara: FFA.

Richards E. 2015. Cleaner Pacific 2025: Pacific regional waste and pollution management strategy 2016-2025. Apia: SPREP.

Ride A. 2014. Women have nothing to do with fish, or do they? *SPC Women Fisheries Information Bulletin* 24:42–44.

Rohe JR, Govan H, Schlüter A and Ferse SC. 2019. A legal pluralism perspective on coastal fisheries governance in two Pacific island countries. *Marine Policy* 100:90–97.

Roughan J. 1997. Solomon Island nongovernment organizations: Major environmental actors. *The Contemporary Pacific* 9(1):157–66.

Sabetian A and Afzal DC. 2007. Solomon Islands. *In* Sulu R, ed. Status of coral reefs in the Southwest Pacific: 2004. Suva: USP. 147–204.

Saeni BW. June 30, 2017a. Waisisi palm oil project is far from being real. *Solomon Star*. Print.

Saeni BW. August 10, 2017b. Man investigated for keeping sea cucumber. *Solomon Star*. https://www.solomonstarnews.com/index.php/news/national/item/19129-man-investigated-for-keeping-sea-cucumber

Sahin SB and Shahin E. 2020. Aid supported governance reforms in Solomon Islands: Piecemeal progress or persistent stalemate? *Development Policy Review* 38(3):366–86.

Schoeffel P. 1997. Myths of community management: Sustainability, the state and rural development in Papua New Guinea, Solomon Islands and Vanuatu. State, Society and Governance in Melanesia 8. Canberra: ANU.

Schwarz AM, Andrew N, Govan H, Harohau D and Oeta J. 2013. Solomon Islands Malaita hub scoping report. Penang: WorldFish.

Schwarz AM, Cohen PJ, Boso D, Ramofafia C, Alexander T, Bennett G and Andrew N. 2017. Critical reflections from fostering adaptive community-based, co-management in Solomon Islands' small-scale fisheries**.** *SPC Traditional Marine Resource Management and Knowledge Information Bulletin* 38:14–25.

Schwarz AM, Gordon J and Ramofafia C. 2020. Nudging statutory law to make space for customary processes and community-based fisheries management in Solomon Islands. *Maritime Studies*. DOI: 10.1007/s40152-020-00176-0.

Schwarz AM, James R, Teioli HM, Cohen P and Morgan M. 2014. Engaging women and men in community-based resource management processes in Solomon Islands. Penang: WorldFish.

Schwarz AM, Ramofafia C, Bennett G, Notere D, Tewfik A, Oengpepa C, Manele B and Kere N. 2007. After the earthquake: An assessment of the impact of the earthquake and tsunami on fisheries-related livelihoods in coastal communities of Western Province, Solomon Islands. Gizo: WWF and WorldFish.

[SPC] Secretariat of the Pacific Community. 2011. Guide and information sheets for fishing communities. Noumea: SPC.

[SPC] Secretariat of the Pacific Community. 2014. A new song for coastal fisheries—pathways to change: The Noumea strategy. Noumea: SPC.

[SPC] Secretariat of the Pacific Community. 2016. Eco-cultural tourism in Marau Sound: Feasibility of developing community-based tourism in Marau Sound, Solomon Islands, to encourage conservation. Suva: SPC.

[SPREP] Secretariat of the Pacific Regional Environment Programme. 2019. Solomon Islands state of environment report 2019. Apia: SPREP.

[SPREP] Secretariat of the Pacific Regional Environment Programme. 2014. Framework for nature conservation and protected areas in the Pacific Islands region 2014-2020. Apia: SPREP.

[SPREP] Secretariat of the Pacific Regional Environment Programme. 2002. A regional strategy to address marine pollution from World War II wrecks. Apia: SPREP.

[SPREP and EDO] Secretariat of the Pacific Regional Environment Programme and Environmental Defenders Office. 2018. Solomon Islands: Review of natural resources and environment related legislation. Apia: SPREP.

[SIG] Solomon Islands Government. 2014. National Sea Cucumber Management and Development Plan. Legal Notice No. 112. Honiara: Pacific Printers.

Solomon Islands Law Reform Commission. 2012. Review of the law that applies to land below high water mark and low water mark. Honiara: Ministry of Justice and Legal Affairs.

[SINSO] Solomon Islands National Statistics Office. 2019. Report on National Agricultural Survey 2017. Honiara: MFT.

Somerville BT. 1897. Ethnographical notes in New Georgia, Solomon Islands. *Journal of the Anthropological Institute of Great Britain and Ireland* 26:357–412.

Song AM, Hoang VT, Cohen PJ, Aqorau T and Morrison TH. 2019. 'Blue boats' and 'reef robbers': A new maritime security threat for the Asia Pacific? *Asia Pacific Viewpoint* 60(3):310–24.

[SOPAC] Pacific Islands Applied Geoscience Commission. 2007. National integrated water resource management diagnostic report Solomon Islands**.** Suva: SOPAC.

Stoddart DR. 1969. Geomorphology of the Solomon Islands coral reefs. *Philosophical Transactions of the Royal Society of London. Series B* 255(800):355–82.

Sukulu M, Orirana G, Oduagalo D, Waleilia B, Sulu RJ, Schwarz AM, van der Ploeg J and Eriksson H. 2016. 'Management over ownership': Towards community-based natural resource management in Langalanga Lagoon, Solomon Islands. *SPC Traditional Marine Resource Management and Knowledge Information Bulletin* 37:13–21.

Sulu RJ, Boso DN, Vave-Karamui A, Mauli S and Wini-Simeon L. 2012. State of the coral reefs of Solomon Islands. Coral Triangle marine resources: Their status, economies, and management. Honiara: NCC.

Sulu RJ, Boso DN, Vave-Karamui A, Mauli S and Wini-Simeon L. 2014. State of the Coral Triangle: Solomon Islands. Manila: ADB.

Sulu RJ, Eriksson H, Schwarz AM, Andrew NL, Orirana G, Sukulu M, Oeta J, Harohau D, Sibiti S, Toritela A and Beare D. 2015. Livelihoods and fisheries governance in a contemporary Pacific Island setting. *PLoS ONE* 10(11):e0143516.

Sulu RJ, Hay C, Ramohia P and Lam M. 2000. The status of Solomon Islands coral reefs. *In* Coral reefs in the Pacific: Status and monitoring, resources and management. Noumea: IRD.

Sulu RJ, Leamae J and van der Ploeg J. 2018. Auki fish market survey. Auki: WorldFish.

Teitelbaum A. 2007. Coral uses and perspectives on sustainable development in Solomon Islands. *SPC Fisheries Newsletter* 120:35–39.

Toki B, Leger L, Richards S, Hipkin S, Lorimer J and Coulton R. 2018. Solomon Islands ecosystem and socio-economic resilience analysis and mapping. Apia: SPREP.

[TRC] Truth and Reconciliation Commission. 2012. Solomon Islands Truth and Reconciliation Commission: Final report. Honiara: TRC.

Tungale R. 2008. Livelihoods and customary marine resource management under customary marine tenure: Case studies in the Solomon Islands. [MSc thesis] Lincoln University, New Zealand.

[UNDP] UN Development Programme. 2018a. Solomon Islands development finance assessment. Honiara: UNDP.

[UNDP] UN Development Programme. 2018b. A mapping of justice sector service provision in the Solomon Islands. Honiara: MJLA.

[UNDP] UN Development Programme. 2015. A capacity assessment of CSOs in the Pacific: Six country profiles. Suva: UNDP.

[UNEP] UN Environment Programme. 2019. Analysis of policies related to the protection of coral reefs. Nairobi: UNEP.

[UNEP-WCMC] UN Environment Programme and the World Conservation Monitoring Centre. 2018. Analysis of international funding for the sustainable management of coral reefs and associated coastal ecosystems. Cambridge: UNEP-WCMC.

[UNEP-WCMC] UN Environment Programme and the World Conservation Monitoring Centre. 2015. Review of corals from Fiji, Haiti, Solomon Islands and Tonga. Cambridge: UNEP-WCMC.

van der Ploeg J. 2018. Strengthening community-based natural resource management to safeguard food security in Malaita Province, Solomon Islands. Auki: WorldFish.

van der Ploeg J, Albert J, Apgar M, Bennett G, Boso D, Cohen P, Daokalia C, Faiau J, Harohau D, Iramo E et al. 2016. Learning from the lagoon: Research in development in Solomon Islands. Penang: WorldFish.

van der Ploeg J, Sukulu M, Govan H, Minter T and Eriksson H. 2020. Sinking islands, drowned logic: Climate change and community-based adaptation discourses in Solomon Islands. *Sustainability* 12(17):7225.

Vunagi D. 2019. Speech from the throne. Honiara: SIG.

Vuto S, Hamilton R, Brown C, Waldie P, Pita J, Peterson N, Hof C and Limpus C. 2019. A report on turtle harvest and trade in Solomon Islands. Honiara: TNC.

Wairiu M and Tabo S. 2003. Assessing community perspectives on governance in the Pacific. Honiara: FSPI.

Walter RK and Hamilton RJ. 2014. A cultural landscape approach to community-based conservation in Solomon Islands. *Ecology and Society* 19 (4):41.

Wear SL and Vega Thurber R. 2015. Sewage pollution: Mitigation is key for coral reef stewardship. *Annals of the New York Academy of Sciences* 1355:15–30.

Webber RH. 1978. Guadalcanal earthquake. *Tropical Doctor* 8(3):160–62.

Weber JN. 1973. Generic diversity of Scleractinian reef corals in the central Solomon Islands. *Pacific Science* 27(4):391–98.

Weimer B, Bøttern PW and Roughan P. 2012 Mid-term evaluation Provincial Governance Support Programme (PGSP) Solomon Islands. Honiara: UNCDF.

Wenger AS, Harris D, Weber S, Vaghi F, Nand Y, Naisilisili W, Hughes A, Delevaux JM, Klein CJ, Watson J, Mumby PJ, Jupiter SD et al. 2020. Best-practice forestry management delivers diminishing returns for coral reefs with increased land-clearing. *Journal of Applied Ecology*. DOI: 10.1111/1365-2664.13743

Wenger AS, Atkinson S, Santini T, Falinski K, Hutley N, Albert S, Horning N, Watson JE, Mumby PJ Jupiter SD et al. 2018. Predicting the impact of logging activities on soil erosion and water quality in steep, forested tropical islands. *Environmental Research Letters* 13(4):044035.

Wickham F, Clarke J, Yee D and Pauku R, eds. 2012. Solomon Islands national climate change policy: 2012–2017. Honiara: MECDM.

Wilson C. April 2, 2019. Solomon Islands: Oil stops spilling but environmental toll still being calculated. *Mongabay*. Digital. https://news.mongabay.com/2019/04/solomon-islands-oil-stops-spilling-but-environmental-toll-still-being-calculated/

Wood T. 2018. The clientelism trap in Solomon Islands and Papua New Guinea, and its impact on aid policy. *Asia and the Pacific Policy Studies* 5(3):481–94.

World Bank. 2017a. Solomon Islands systematic country diagnostic priorities for supporting poverty reduction and promoting shared prosperity. Washington, DC: World Bank.

World Bank 2017b. Precautionary management of deep sea minerals. Pacific Possible Paper 2. Washington, DC: World Bank.

World Bank. 2019. Worldwide governance indicators. Washington, DC: World Bank. https://info.worldbank.org/governance/wgi/

[WTO] World Trade Organization. 2016. Trade policy review. Honiara: WTO.

[WWF] World Wildlife Fund. 2017a. Best practice guides: Working with communities. Geneva: WWF.

[WWF] World Wildlife Fund. 2017b. Best practice guides: Sustaining community-based conservation and livelihood projects. Geneva: WWF.

WorldFish. 2013. Community-based marine resource management in Solomon Islands: A facilitator's guide**.** Honiara: WorldFish.

Appendix 1. Policy gap analysis

Threats to coral reefs	Anthropogenic activity	Impact	Legislation	Policy	International commitments and voluntary guidelines	Mandated agencies
Overexploitation						
	Coral reef fisheries	Large	Fisheries Act 2015; Provincial Government Act 1997	CTI-NPOA 2010; NBSAP 2016; National Fisheries Policy 2019; Fisheries Management (Prohibited Activities) Regulations 2018	New Song; Future of Fisheries; MSG Roadmap for Inshore Fisheries	Provincial governments; MFMR
	Export marine commodities	Large	Wildlife Protection and Management Act 1998; Customs & Excise Act 2003; Fisheries Management Act 2015	National Sea Cucumber Fisheries Management Plan 2014; Custom Rules 2003; Fisheries Management (Prohibited Activities) Regulations 2018	CITES	MECDM; MFMR; Ministry of Finance and Treasury (MFT) (SICED); CBSI
	Coral mining	Medium	Provincial Government Act 1997; Mining Act 1990; Environment Act 1998	Fisheries Regulations 1972	-	Provincial governments; MID; MECDM
	Lime production	Medium	Provincial Government Act 1997	-	-	Provincial governments
	Offshore fisheries	Small	Wildlife Protection and Management Act 1998; Fisheries Management Act 2015; Customs & Excise Act 2003	Baitfish Management Plan	FFA Blue Boat Strategy (in draft); PNA, WCPFC; MSC certification	RSIPF; MFMR; MFAET
Habitat loss						
	Log pond construction	Medium	Forest Resources and Timber Utilization Act 1969; Environment Act 1998; Provincial Government Act 1997	FRTU (Protected Species) Regulations 2012; Environment Regulations 2008; NBSAP 2016	-	Provincial governments; MOFR; MFMR; MECDM
	Ship groundings	Small	Provincial Government Act 1997; Environment Act 1998; Fisheries Management Act 2015; Maritime Safety Administration Act 2009	Shipping (Marine Pollution) Regulations 2011	UNCLOS; MARPOL	MFMR; SIMA; MECDM; provincial governments
	Coastal development	Small	Environment Act 1998; Town and Country Planning Act 1971; Provincial Government Act 1997	Environment Regulations 2008; CTI-NPOA 2010	SAMOA Pathway	Provincial governments; MCT; MFMR; MECDM

Threats to coral reefs	Anthropogenic activity	Impact	Legislation	Policy	International commitments and voluntary guidelines	Mandated agencies
Sedimentation and eutrophication						
	Logging	Large	Forest Resources and Timber Utilization Act 1969; Environment Act 1998; Provincial Government Act 1997	Felling Regulations 2005; Revised Code of Logging Practice 2002; NBSAP 2016	CBD	MOFR; MECDM; provincial governments; MFT (SICED); CBSI
	Agricultural plantations	Medium	Environment Act 1998	Agriculture and Livestock Sector Policy 2015; National Development Strategy 2016	-	Provincial governments; MAL; MDPAC
	Mining	Small	Mining Act 1990; Environment Act 1998	Mines and Minerals Regulations 1996; National Minerals Policy 2017	SAMOA Pathway	Provincial governments; MERE; MDPAC
	Subsistence agriculture	Small	-	Agriculture and Livestock Sector Policy 2015	-	Provincial governments; MAL
Pollution						
	Oil spills	Medium	Environment Act 1998; Provincial Government Act 1997; Maritime Safety Administration Act 2009; Fisheries Management Act 2015	Shipping (Marine Pollution) Regulation 2011; Environment Regulations 2008	Noumea Convention; MARPOL; Cleaner Pacific 2025	Provincial governments; SIMA; MECDM; MFMR
	Solid waste (including plastic)	Medium	Town and Country Planning Act 1979; Environment Act 1998; Environmental Health Act 1980; Provincial Government Act 1997	Waste Management and Pollution Control Strategy 2017	SAMOA Pathway	Provincial governments; MECDM; MHMS
	Waste water	Unknown	Town and Country Planning Act 1979; Environment Act 1998; Environmental Health Act 1980	Waste Management and Pollution Control Strategy 2017	SAMOA Pathway; Cleaner Pacific 2025	Provincial governments; MHMS; MECDM
	Seabed mining	Not yet existent	Mines and Minerals Act 1990; Environment Act 1998	SINOP 2018	UNCLOS; RLRF	MERE; MFT; MFMR; MECDM
Invasive species, pests and diseases						
	Ballast water	Unknown	Maritime Safety Administration Act 2009; Environment Act 1998; Shipping Act 1998; Biosecurity Act 2013	National Strategy on Aquatic Biosecurity 2018	MARPOL	MECDM; MFMR; Solomon Islands Port Authority; SIMA; BSI

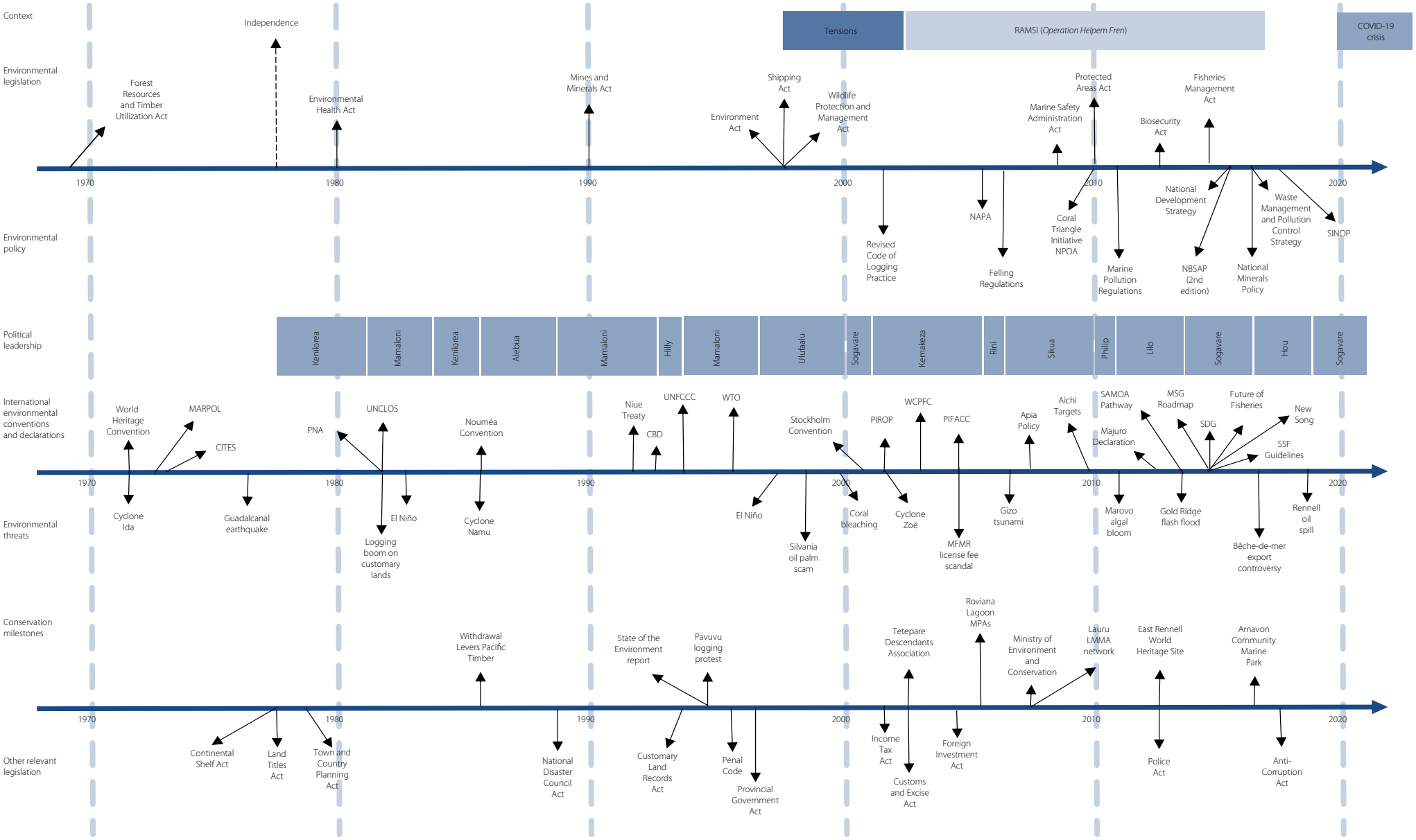
Threats to coral reefs	Anthropogenic activity	Impact	Legislation	Policy	International commitments and voluntary guidelines	Mandated agencies
Climate change						
	Greenhouse gas emissions	Small	-	NAPA 2008	UNFCCC (Kyoto Protocol; Paris Agreement) Montreal Protocol; PIFACC; Majuro Declaration	MECDM
Natural disasters (earthquakes, cyclones)						
	-	Large	National Disaster Council Act 1987	National Disaster Management Plan 2018		National Disaster Management Office

Notes:

- The United Nations Convention on the Law of the Sea (UNCLOS) establishes the sovereign rights of nation states to manage natural resources within their EEZ (1982).
- The International Convention for the Prevention of Pollution from Ships (MARPOL) aims to prevent the pollution of the marine environment by ships (1973).
- The Small Islands Development States Accelerated Modalities Of Action (SAMOA) Pathway is a resolution adopted in 2014 by the United Nations General Assembly. It covers, among other things, the sustainable use and conservation of coral reefs, including a 10 percent commitment to protected areas.
- The Noumea Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (the Noumea Convention) focuses on the prevention of pollution of the marine environment (1986).
- The Cleaner Pacific 2025 is the regional strategy for waste management and pollution control (Richards 2015).
- The Regional Legislative and Regulatory Framework for Deep Sea Minerals (RLRF) aims to coordinate deep sea mining regulations among Pacific Island States (2012).
- The Pacific Islands Framework for Action to Climate Change (PIFACC) aims to build resilience to the risks and impacts of climate change (2005).
- The Majuro Declaration (2013) highlights the commitment of the Pacific Islands to reducing and phasing down greenhouse gas pollution worldwide.

Bêche-de-mer is an important source of income for fishers.

Appendix 2. Timeline

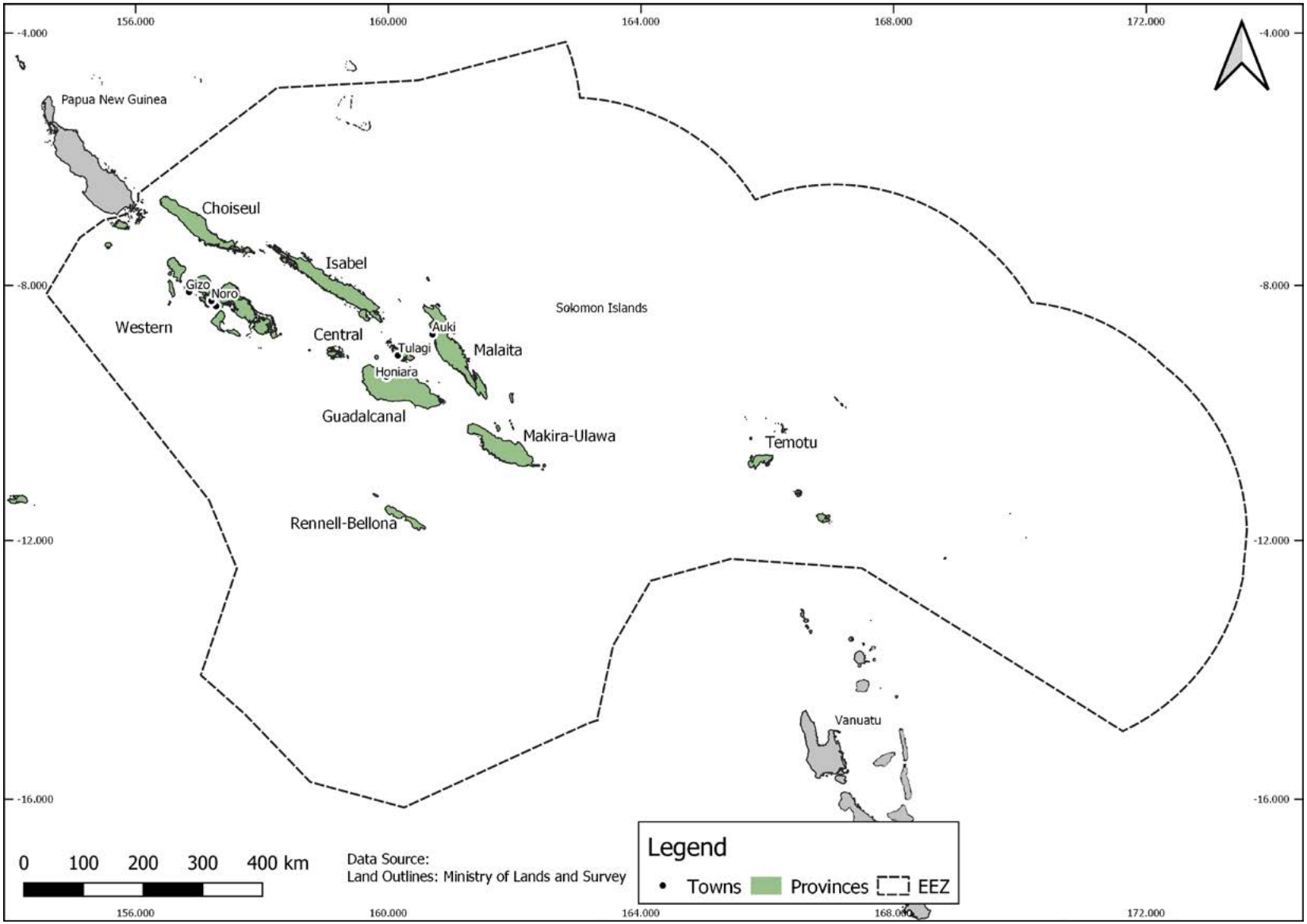


Notes:

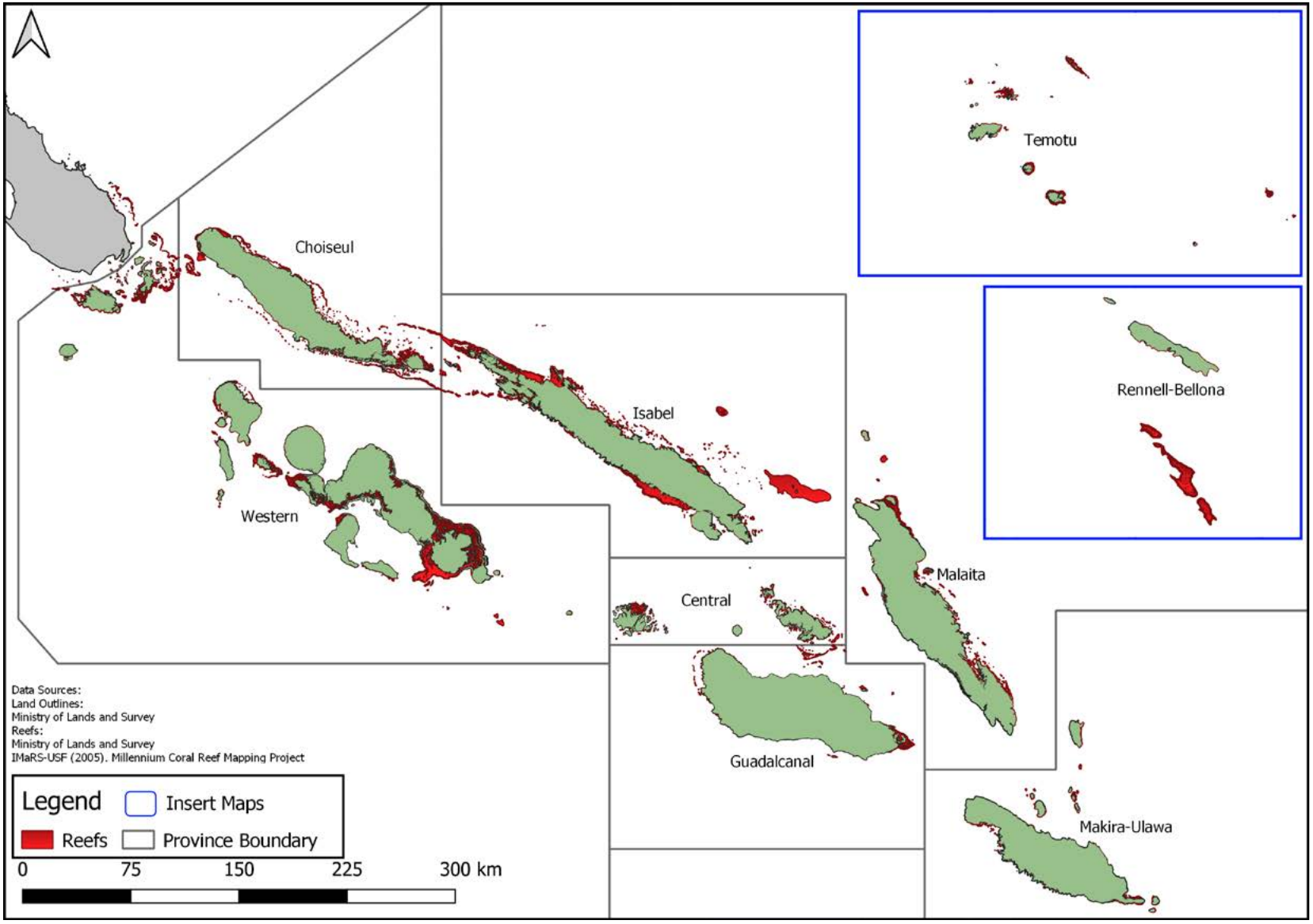
- The World Heritage Convention (1975) aims to identify and conserve cultural and natural sites of outstanding universal value through the recognition of World Heritage Sites by the United Nations Educational, Scientific and Cultural Organization (UNESCO).
- The Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific Region (the Niue Treaty) aims to strengthen the enforcement of fisheries laws of FFA members (1992).
- The World Trade Organization (WTO) is an intergovernmental organization that regulates international trade between nations. Solomon Islands has been a member since 1996.
- The Stockholm Convention on Persistent Organic Pollutants is an international treaty that aims to eliminate the production and use of chemicals that are resistant to environmental degradation (2001).
- The Pacific Islands Regional Ocean Policy (PIROP) was endorsed by Pacific Islands Forum Leaders in 2002. The policy addresses several issues of relevance for coral reef conservation, including the importance of customary processes, the impact of land-based activities and the impact of deep sea mining on marine ecosystems.
- The Pacific Islands Regional Coastal Fisheries Management Policy and Strategic Actions (the Apia Policy) was developed in 2008. It was replaced in 2013 by the New Song for Coastal Fisheries – the Noumea Strategy (SPC 2014) and the MSG Roadmap for Inshore Fisheries Management and Sustainable Development (MSG 2015).
- The Aichi Biodiversity Targets of the CBD, agreed to in 2010, aim to address the underlying causes of biodiversity loss. There are 20 targets, of which target 11 (conserve at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine area by 2020) has generated the most attention.
- The 2030 Agenda for Sustainable Development identifies 17 Sustainable Development Goals (SDGs) (2015). SDG 14, conserve and sustainably use the oceans ("life below water"), is highly relevant for coral reef conservation. The UN has defined 10 targets and 10 indicators for SDG 14, including reducing marine pollution (coastal eutrophication and plastic debris), sustainably manage fishstocks, and conserve coastal ecosystems (10 percent target by 2020).
- The Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (SSF Guidelines) of the Food and Agriculture Organization (FAO) aims to strengthen the livelihoods and rights of small-scale fishers. The SSF Guidelines complement other global policies, such as the Code of Conduct for Responsible Fisheries and the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests.

Reef fish at Takwa market.

Appendix 3. Maps



Map 1. Solomon Islands.



Map 2. Coral reefs.

WorldFish

About WorldFish

WorldFish is a nonprofit research and innovation institution that creates, advances and translates scientific research on aquatic food systems into scalable solutions with transformational impact on human well-being and the environment. Our research data, evidence and insights shape better practices, policies and investment decisions for sustainable development in low- and middle-income countries.

We have a global presence across 20 countries in Asia, Africa and the Pacific with 460 staff of 30 nationalities deployed where the greatest sustainable development challenges can be addressed through holistic aquatic food systems solutions.

Our research and innovation work spans climate change, food security and nutrition, sustainable fisheries and aquaculture, the blue economy and ocean governance, One Health, genetics and AgriTech, and it integrates evidence and perspectives on gender, youth and social inclusion. Our approach empowers people for change over the long term: research excellence and engagement with national and international partners are at the heart of our efforts to set new agendas, build capacities and support better decision-making on the critical issues of our times.

WorldFish is part of One CGIAR, the world's largest agricultural innovation network.

For more information, please visit www.worldfishcenter.org