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Routledge Handbook of Ocean Resources and Management

Edited by Hance D. Smith, Juan Luis Suárez de Vivero and Tundi S. Agardy

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INTRODUCTION

Hance D. Smith, Juan Luis Suárez de Vivero and Tundi S. Agardy

The concept of resources is primarily economic and, in the case of the world ocean, environmental, thus focusing on the interrelationships between human activities concerned with the uses of the sea on one hand, and the 71 per cent of the Earth's surface covered by the sea on the other. This is, of course, a vast subject, and this Handbook thus necessarily deals with selected themes, which have been chosen with particular reference to the current stage of economic development of the world ocean. There are three first-order themes corresponding to the three major sections of the book, with selected second-order themes within these. First is the human dimension of globalisation of economic activity, understanding and management of marine environments. Second are the uses of the sea, considering in turn living resources, energy and materials, ocean space and the marine environment considered as a resource. Finally attention turns to the complexity of regional patterns engendered by the first two themes – the geography of the sea in terms of spatial organisation and development of both core and peripheral maritime regions of the global economy.

A first priority throughout is to place the book firmly in the present geographical and historical context of the world ocean, in the belief that humankind's relationship with the sea and, for that matter, the Earth as a whole, is passing through a crucial juncture in its development on at least two timescales, with characteristic regional development patterns linking land and sea. This is in part the focus of the first chapter in the book. With this in mind, the final chapter looks forward with particular reference to trends in the major fields considered in various chapters. In between are the three themes, further elaborated below.

The world ocean

The world ocean encompasses many human worlds – environmental, technological, economic (the main focus of this Handbook), social and political – as well as the historical and geographical worlds that link all these together. At the present juncture in human history the sea above all represents the power of globalisation that permeates all these worlds, exemplified by the conclusion of the United Nations Conference on the Law of the Sea in 1982, and its entry into force in 1994. It is thus with globalisation that the Handbook begins. The primary focus is concerned primarily with ocean governance with particular reference to the system of states, and the relationships of governance on the one hand with the management and protection of

biodiversity and ocean ecosystems. Thus Chapter 2 highlights the relatively dynamic world of changing geopolitical scenarios at the turn of the twenty-first century. Chapter 3 then focuses on the open ocean through discussion of state ocean strategies with especial reference to the international dimensions of treaties and organisations concerned with the sea. Chapter 4 then deals with the implications of this governance system for the protection of biodiversity; while Chapter 5 underlines the critical regional ecosystem-based dimension of governance that is needed to manage the increasingly stressed ecosystems of life in the world ocean.

The challenge that naturally follows that of governance is that revolving around knowledge and understanding. This challenge, which is based on scientific understanding, has many dimensions, including those concerned with the ocean–atmosphere system and its relationships with the Earth itself; life in the ocean, which is a major theme in the foregoing section on governance as well as the fisheries and aquaculture chapters in Part 2; the human impacts that result in substantial modification of the ocean environment; and the driving force of marine scientific research that is necessary not only to extend knowledge, but also to prioritise management issues. Chapter 6 begins the section by focusing on the ocean itself and its relationships with the atmosphere and life, as well as the implications for climate change, which has always been a central characteristic of what is an integrated ocean–atmosphere system – the Blue Planet. Chapter 7 highlights the relatively new concept of ocean health as a means of measuring the profound changes wrought by human influences on the ocean environment. Chapter 8 provides an overview of marine scientific research that underpins human understanding, including the nature of objectives; the issues with which research is concerned; and the programmes through which the research is accomplished.

The permutations and combinations of politics and governance allied to understanding lead to the practical challenges of management. Many would regard marine conservation, which is the topic of Chapter 9, as the most pressing issue in the pantheon of management activities. However, underlying all of these management concerns is the 'gyro' of science and policy which heavily influences and to a substantial extent steers management priorities, and which is the subject of Chapter 10. Many understand ocean science simply as being concerned with the natural sciences: Chapter 11, dealing with ecosystem services and their economic and social value, demonstrates the crucial importance of social science inputs. Chapter 12 on strategic environmental assessment then considers an all-important technical management dimension through which practical management must be attained. Finally, Chapter 13 on greening the ocean economy provides something of an audit of human activity and impacts on the ocean environment, primarily from the point of view of uses of the sea, leading naturally to the second main part of the book.

The uses of the sea

The uses of the sea section deals with four main themes. The first of these is living resources – the provision of food from the sea by exploitation of marine ecosystems through both the catching of wild fish and the enormous expansion of fish farming or aquaculture in the marine environment that has characterised the last several decades. The second theme is that of energy and materials: these are best considered together for a number of reasons, including the large capital investment, mainly transnational companies, and advanced technologies required: marine genetic resources, while living in the strict sense, are primarily the use of living resources as materials, rather than food. The use of ocean space is perhaps the best indicator of the geographical and economic globalisation of the world ocean; while the final section on the marine environment as a resource highlights the importance of the 'total', integrated and functioning ocean environment for material waste disposal, marine recreation and heritage.

The four principal large-scale geographical patterns in the use of marine resources are considered, beginning with Chapter 14, which deals with what is by far the greatest part of the world fishing industry – that concentrated over the continental shelves and, since the advent of the negotiations leading up to the 1982 Law of the Sea Convention, falling directly within coastal state jurisdiction. Chapter 15 then considers the fisheries of the High Seas beyond coastal state jurisdiction, where Illegal, Unreported and Unregulated (IUU) fishing remains rampant – perhaps the most graphic downside to current human impact on and mismanagement of the world ocean. The vast majority of the world's fishers are to be found in the small-scale fisheries of the developing world, the subject of Chapter 16. Finally, Chapter 17 highlights mariculture in the marine environment, which has been regarded wrongly by many for a long time as the ultimate antidote to overfishing.

The second theme is that of energy and materials. This section begins in Chapter 18 with offshore oil and gas, which is by far the most important, and remains at the leading edge of ocean technology; while Chapter 19 focuses on marine renewable energy which, by comparison, is hardly developed at all, although in some regions has great promise. The next two chapters deal respectively with minerals in Chapter 20, where there is a long history of exploitation of a range of minerals as well as considerable potential, most famously focusing during the Law of the Sea negotiations on ferro-alloy minerals from the deep sea bed; and marine genetic resources in Chapter 21, the exploitation of which, like marine renewables, would appear to lie mainly in the future.

The section on ocean space considers the three most critical components in the open ocean, beginning with Chapter 22 on shipping and navigation, now principally concerned with the movement of goods among the geographical nodes of the world economy, as well as being, together with living resources, the earliest use of the sea. By contrast, subsea telecommunications considered in Chapter 23 is one of the relatively recent major uses, with origins in the nineteenth century, and also primarily reflects the geographical organisation of the global economy. Chapter 24 on seapower merges the themes of geopolitics and shipping links, as seapower depends as always upon ships, both on and below the sea surface, albeit since the Second World War ever more closely integrated with the land and air dimensions of military activities in both peace and war.

The section on the marine environment considered as a resource emphasises the importance of the world ocean considered as an integrated functional natural environment. The first dimension of this is material – the use of the sea for waste disposal: the world's ultimate sink, and the implications for marine pollution, all considered in Chapter 25. Chapter 26 then deals with marine leisure and tourism, probably the world's biggest marine industry measured in terms of employment and participation, and certainly the biggest in many marine regions, albeit in coastal waters. Chapter 27 highlights the increasingly important world of maritime heritage – important not only as a component of the leisure and tourism business, but also the bedrock of a diversity of maritime cultures around the world.

The geography of the sea

The true complexity of human–ocean interactions is perhaps best demonstrated by the geography of the sea. This has been done in this book by considering three themes, beginning with spatial organisation of state governance and law; the practicalities of surveying the sea upon which the law and governance depend; and the challenges of place-based management that have emerged largely since the 1990s in the form of Marine Protected Areas and marine spatial planning. There follows the twin themes of regional development, which brings the reader back to the centrality

of economic affairs, dealing respectively with developments in key regions, both in the urban industrial cores of the world economy and the far-flung peripheral regions.

The Law of the Sea Convention of 1982 has provided the contemporary framework for the agreement of state maritime boundaries discussed at length in Chapter 28, although a little over one-fifth of all the possible boundary settlements have been made. The most significant starting point is that coastal states' maritime rights in effect extend over most of the continental shelves, which is where most of the living, mineral and energy resources are located, not to mention the greatest overall intensity of sea uses generally. In the past decade much attention has accordingly shifted to the deep ocean beyond the limits of coastal state jurisdiction under the 1982 Convention, which is the focus of Chapter 29. This includes the extension of coastal states' jurisdiction beyond 200 miles under Article 76; as well as the problems of IUU fishing (Chapter 15); the maintenance of marine biodiversity (Chapter 4); management of ecosystems (Chapter 9); exploitation of minerals (Chapter 20); and marine genetic resources (Chapter 21). The technical management starting point is the surveying of the sea considered in Chapter 30. The technical management endpoint is the spatial management of areas with complex patterns of use, pioneered in the development of Marine Protected Areas and marine spatial planning, the latter now being actively developed by a significant number of coastal states, as discussed in Chapter 31.

The consideration of core maritime regions is based upon a limited selection of key case studies that exemplify the themes considered not only in individual chapters earlier in the book, but also the complex interrelationships of these themes. Thus Chapter 32 deals with maritime boundary delimitation in the Mediterranean, arguably the most complicated part of the world ocean for the settlement of these boundaries. Chapter 33 then shifts the focus to perhaps the most complex field of marine spatial planning, that of federal states with devolved internal responsibilities, using the United States as an example. Finally, in Chapter 34 on the East Asian seas, where the region is at an earlier stage of development, the emphasis is on the political dimensions of competing state influences.

The final subsection of the book focuses on key issues in the vast periphery of the global ocean, beginning in Chapter 35 with Africa, still the least developed global region overall, and underlining the importance of local economic development planning. Chapter 36 then deals with a large part of the world's greatest ocean, in this case the South Pacific, highlighting the issues affecting Small Island Developing States (SIDS). Even more remote – at least in the Southern Hemisphere – and least developed of all are the polar maritime regions of the Arctic and Southern Oceans respectively discussed in Chapter 37.

The final topic is that of the world ocean and the human future dealt with in Chapter 38, which returns to the regional and temporal timescales and patterns introduced in Chapter 1, and focuses upon some of the key considerations concerned.

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SOUTH PACIFIC AND SMALL ISLAND DEVELOPING STATES

Oceania is vast, canoe is centre, village is anchor, continent is margin

Peter Nuttall and Joeli Veitayaki

In this chapter, the discussion focuses on critical aspects of life in Small Island Developing States (SIDS) in the Pacific Ocean, a unique water-based region, ancient home to voyagers, Islanders and villagers, a place where small is still beautiful but where unprecedented levels of change threaten the existence of countries and communities. Pacific peoples are known for their patience, generosity and resilience, traits honed by millennia of close association and intimacy with their ocean and island homes. These traits have allowed them to live with minute resource bases and a changing environment for thousands of years. However, contemporary changes such as global warming, acidification, environmental degradation, globalisation and rampant consumerism promise a gathering tropical cyclone or tsunami of magnitude greater than anything the Pacific Islands have ever faced.

Pacific SIDS have resource management responsibilities over a significant portion of the world's ocean space. Although they have jurisdictional rights over large ocean areas that are rich in resources including fisheries, gas, seabed minerals and renewable energy, many are vulnerable to the conquest of the sea, which is predicted to worsen with climate change. Many of these states are not benefiting fully from the marine resources within their EEZs due to inadequate technical and management capacity and limited financial and physical resources.

The Barbados Programme of Action (BPOA) from the 1994 United Nations Conference on the Sustainable Development of SIDS outlined priorities for action. It was followed by the Millennium Development Goals (MDGs) in 2000, the World Summit on Sustainable Development (WSSD) in 2002, and the 2005 Mauritius Strategy (MSI) for the further Implementation of the BPOA and the five-year review of the Strategy undertaken in 2010 (www.sidsnet.org). In spite of all plans and commitments, few tangible accomplishments have been witnessed in SIDS. It is evident that the huge marine areas surrounding SIDS present development challenges and vulnerability to natural and environmental disasters (Ashe, 1999).

The Pacific Ocean covers nearly one-third of the earth's surface, and is one of nature's greatest carbon sinks (UNESCAP, 2010, p. 9). It affects the climate, ocean currents and the complex ecosystems it hosts. This engine-room of the earth's climate and mainstay of Pacific Island economies must be cared for and allowed to continually provide ecological and economic services for Pacific Islanders and humanity in the future.

Biodiversity loss in Pacific Island Countries (PICs) is ranked among the highest in the world but little is known of the impacts on marine life despite it being the subject of a number of research initiatives. In many parts of the region, changing conditions are expected to reduce ocean productivity in the future. It is therefore critical that Pacific Islanders better understand the state of their ocean and how it supports life now and in the future to effectively manage and develop it, protect its health and benefit from its potential.

Under the 1982 United Nations Convention on the Law of the Sea (UNCLOS), PICs jointly hold access rights and management responsibilities over 30 million square kilometres of the Pacific Ocean. UNCLOS has enormously increased the maritime areas of the PICs. While the new wealth and resources associated with these extended areas are untapped, the burden that they place on the custodians is overwhelming. Pacific SIDS have established regional organisations to assist them with advice, development activities, education and training on pertinent issues determined by member countries.

Growing population pressures, pollution and alteration of sensitive coastal environments, greater pressures on reef and lagoon fisheries, increasingly lucrative opportunities to give foreign fleets access to the fisheries, dwindling resources, emphasis on economic development, and the development of new technology in aquaculture, postharvest fisheries, ornamental and aquarium trade and energy all increase the demand on trained human capacity.

Pacific SIDS

The Pacific Islands region contains 15 SIDS: Cook Islands, Federated States of Micronesia (FSM), Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea (PNG), Republic of the Marshall Islands (RMI), Samoa, Solomon Islands, Timor Leste, Tonga, Tuvalu and Vanuatu.

Land is scarce, constituting less than 2 per cent of the total area, less than 0.4 per cent if PNG is omitted. Four states have less than 30 square kilometres each. Several are either made up wholly of atolls or largely of atolls and coral islands. There are at least 11 square kilometres of ocean for every coastal Pacific Islander (Anderson *et al.*, 2003, p. 2) making the Pacific one of the most remote and far flung regions in the world (AusAID, 2008, p. 1).

The region is immense and diverse, varying from the larger, mineral and natural resource rich, high volcanic islands of Melanesia, home to fast-growing millions, some of whom will go a lifetime without ever seeing the ocean, to tiny atolls less than five metres above sea level with less than 2000 inhabitants and only a handful of terrestrial flora species. The region is home to a quarter of the world's languages and living cultures. It contains newly independent democratic nation states, ancient monarchies, states of superpowers, territories of Europe, dependencies, military dictatorships and states in 'close association' with superpowers. The region has been fought over repeatedly and, since World War II, has been rained with more nuclear bombs and radiation by the US, France and Britain than anywhere else on earth. It has seen bitter wars of conquest and civil insurrection, minute by global standards but with the heaviest per capita casualties as witnessed in Timor Leste and Bougainville. Pacific SIDS now face the ignominy of being the first region on earth where the carelessness of human beings as a species is proven as whole countries sink because of anthropocentrically generated climate change, little of which has been of their making.

Table 36.1 Physical capital, population, density, growth rate per capita

Country/Territory	*Land Area (km²)*	*Mid Year 2013 Population (estimate)*	*Density (Persons/km²)*	*2013 Growth Rate (%)*	*2013 GDP (US$,000)*	*GDP per capita (US$)*	*Year*
American Samoa	199	56,500	284	−0.3	615,000	9,333	2010
Cook Islands	237	15,200	64	−0.5	272,769	17,565	2011
FSM	701	103,000	147	0.3	310,213	3,031	2011
Fiji	18,333	859,200	47	0.8	3,099,191	3,639	2011
Guam	541	174,900	323	0.3	4,577,000	25,420	2010
Kiribati	811	108,800	134	2.2	170,542	1,651	2011
RMI	181	54,200	299	0.4	173,700	3,158	2011
Nauru	21	10,500	499	1.8	85,337	8,379	2010–11
Niue	259	1,500	6	−0.2	22,857	15,807	2011
New Caledonia	18,576	259,000	14	1.9	9,093,963	36,405	2010
N. Marianas	457	55,600	122	−2.5	733,000	11,622	2010
Palau	444	17,800	40	−1.9	212,903	10,314	2011
PNG	462,840	7,398,500	16	2.3	127,000,000	18,437	2011
Pitcairn	47	60	n.a.	n.a	n.a.	3,385	2005
French Polynesia	3,521	261,400	74	1.8	7,200,000	26,667	2011
Samoa	2,934	187,400	64	0.8	675,729	3,680	2012
Solomon Islands	28,000	610,800	22	2.8	927,390	1,676	2012
Tokelau	12	1,200	98	0.9	–	–	
Tonga	749	103,300	138	0.2	470,669	4,557	2011–12
Tuvalu	26	10,900	420	1.1	38,178	3,407	2011
Vanuatu	12,281	264,700	22	2.5	760,097	3,099	2011
Wallis and Futuna	142	12,100	85	−2.1	183,181	12,324	2005

Source: SPC Pocket Statistical Summary 2013b.

All PICs are members of the Alliance of Small Island States (AOSIS) and, except for Timor Leste, the Pacific Islands Forum (PIF). Some of these countries are among the poorest in the world, with Kiribati, Samoa, Solomon Islands, Timor Leste, Tuvalu and Vanuatu currently classified as Least Developed Countries.

The estimated population of just over 10 million people in 2013 makes Oceania numerically minute on the global scale. PNG has the largest population with 7.39 million. Half have populations of less than 100,000 and Pitcairn is the smallest with 60 inhabitants (SPC, 2013b). While there was no urban tradition before European colonisation, the region today averages 53 per cent in urban settlements. Nauru, Northern Marianas and Guam are now without any significant rural populations (SPC, 2013a).

A significant proportion of national incomes come from aid and remittances. SIDS suffer from diseconomies of scale in production and exchange of goods and services, remoteness from export markets and high vulnerability to natural disasters and climate change. In addition, there is a high degree of economic and cultural dependence on the natural environment and primary commodities.

The combined value of Pacific SIDS' GDP is around US$156 billion. PNG has the largest economy (US$127 billion in 2011), the second largest is New Caledonia (US$9 billion in 2010) then French Polynesia (US$7.2 billion, 2011), Guam (US$4.5 billion, 2010) and Fiji (US$3 billion, 2011) (Table 36.1, Figure 36.1). PNG accounts for over 80 per cent of the region's GDP. The remaining Pacific SIDS have very small economies ranging from Solomon Islands' US$927 million to Niue's US$22 million (SPC, 2013b).

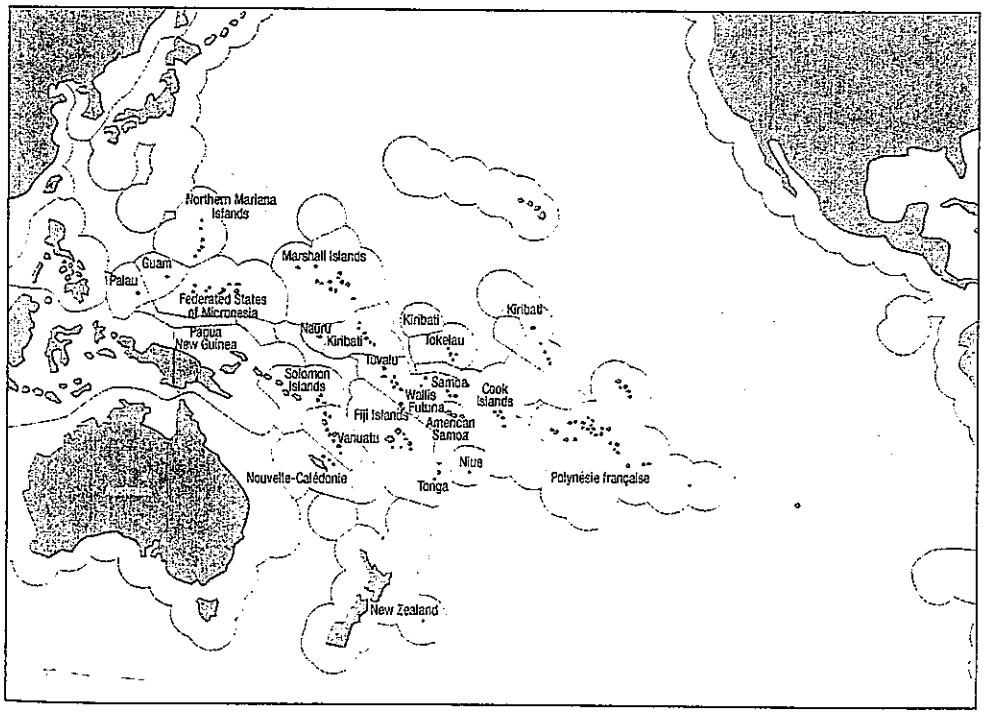

Figure 36.1 Pacific EEZs

Source: Map reproduced with the permission of SPC.

Pacific SIDS will not achieve the MDGs by 2015, particularly the targets for 'universal primary education, reducing child mortality by two-thirds and halving the proportion of people without access to water and sanitation' (AusAID, 2008, p. 3). The MDG framework has been criticised for not recognising 'key underlying determinants of well-being such as family and societal cohesion' and 'neglecting the importance of economic development and the private sector' (Coates, 2009, p. 29). In addition, the exclusion of women's contribution and the failure to account for subsistence productions greatly disadvantage PICs.

Poverty is worsening. More than 80 per cent of the region's population lives in the four poorest countries: Kiribati, PNG, Solomon Islands and Timor Leste. Data on poverty is limited, but alarming. Three national surveys in Fiji show that poverty rose from 11.4 per cent in 1977 to 34.4 per cent in 2002. Underemployment was at 22 per cent for males and 35 per cent for females. This increased to 26 per cent and 45 per cent respectively in rural areas and to 45 per cent and 67 per cent for young men and women under the age of 20 (AusAID, 2008, p. 3).

It is difficult to look past the enormous obstacles posed by long distances, tiny populations, minute economies and minimal resources. Remoteness has significant economic, environmental and social impacts: high fuel costs and low economies of scale make the cost of developing and maintaining essential infrastructure high. Small populations offer a narrow range of resources and skills that limit capacity. Small populations and land areas create limited markets, reducing people's income earning potential (Redding and Venables, 2004). SIDS are less open to international trade, due either to protectionist policy choices or to remoteness causing transport costs to be a larger source of 'natural protection' and isolation (Gibson and Nero, 2007).

The issues that affect Pacific SIDS include the sustainability of marine resources, vulnerability to natural disasters and climate change, dependence on fossil fuel, and social and economic transition.

Sustainability of marine resources

Sustainable use of marine resources is critical not only to Pacific Islanders and their economies; but also to the coastal habitats and resources that provide food and livelihoods for these communities. Pacific Islanders are heavily reliant on their marine resources. They have fish per capita consumption rates that range between 16.9 kg in PNG to 181.6 kg in Kiribati (Gillett, 2011, p. 83). In Tuvalu, each person consumes about 500 grams of fish per day; the residents of Funafuti alone consume about 730 tons per year (ADB, 1994). Fijians' per capita fish consumption was around 26 kg in 1986, 47 kg in 1990, 50.7 kg in 1997 and 33 kg in 2002 (FAO, 2009). This level of consumption is higher than the global average of 16.5 kg per person, which shows both the importance of fisheries resources to local communities and the threat to the sustainability of fish stocks.

Increasing population in urban areas places intensive pressure on all marine resources. In South Tarawa, Kiribati, with an estimated annual growth rate of 5.2 per cent, the population doubles in 13 years. Given the enormous population pressures, it is inconceivable to see how South Tarawa's economy and environment will cope with an additional 36,700 people in nine years (Haberkorn, 2004). The same situation is faced in Majuro and Funafuti where the population density rivals that of Hong Kong and other cities in Southeast Asia.

People in Pacific SIDS have effective traditional resource management practices but these alone are insufficient to the people who are now staring at depleting resources, altered environments and increasing demands that threaten their food security.

Vulnerability to natural disasters and climate change

PICs are among the most vulnerable regions in the world to natural disasters such as cyclones, earthquakes, floods, drought and tsunami. The sediment load through Rewa River floods was estimated at an average of 107 tonnes/yr (Hasan, 1986). The estimated soil loss in the Rewa River catchment was about 34–36 tonnes/hectare/year (Morrison, 1981; Hasan, 1986; Nunn, 1990). According to Nunn (1990), the losses in the four main tributaries of the Rewa River were: 30 t/ha/yr in the Wainimala, 69 t/ha/yr in Waidina, 24 t/ha/yr in Wainibuka and 79 t/ha/yr in Waimanu. Consequently, the Fiji Government since 1983 was spending about US$6 million annually on dredging to alleviate the problem of flooding in the Rewa and other rivers (Togamana, 1995).

Between 1950 and 2004, extreme natural disasters accounted for 65 per cent of the total economic impact of disasters on the region's economies. Ten of the 15 most extreme events reported over the past 50 years occurred in the last 15 years (UNESCAP, 2010, p. 10). Climate variations and extremes disrupt food production, water supply and economic development. 'Events during the last decade have demonstrated that vulnerabilities remain high and efforts to build resilience have been insufficient' (UNESCAP, 2010, p. 10) so PICs are continuously rebuilding and recovering from disasters, spending millions of dollars otherwise earmarked for development activities.

Projections are bleak as primary sectors (agriculture, fisheries, forest) and water are all being negatively impacted by human activities (UNESCAP, 2010, p. 10). Climate change will worsen these devastating and economically crippling impacts. While Pacific Islanders have historically shown strong resilience and adaptability in the face of environmental threat and change, the immensity and immediacy of the effects of climate change will make adaptation insufficient (Barnett, 2002).

It is the scale and irreversibility of the effects of Greenhouse Gas (GHG) emissions combined with the total inability of any local measures to mitigate the problem that makes climate change a threat over and above all others. The minute contribution of GHG by PICs, estimated by the South Pacific Regional Environment Programme (SPREP) to be 0.03 per cent of global totals (Hay, 2002), makes any mitigation taken by PICs symbolic, no matter how successful.

Unfortunately, Oceania's concerns are almost unheard on the global stage, drowned out by larger states, superpowers and alliances whose consumption-based development and security interests easily outweigh any PIC's voice. Failure to gain international consensus on emissions reduction at Copenhagen, Mexico, Rio+20, Warsaw, Bonn, reinforces the futility of SIDS expecting sufficient response from developed countries. Ironically, Pacific Islanders, along with indigenous communities at the poles, will be the first and the worst affected victims (Barcham *et al.*, 2009; Merson, 2010).

The uniqueness of PICs, which are ocean-centred, non-continental, scattered islands, village-dominated, culturally rich but economically poor, requires adaptation measures tailored to their needs and conditions if they are to be effective and durable. Barnett (2001) warned more than a decade ago that continental-centred or focused solutions may prove inadequate or inappropriate.

Adaptation strategies in Oceania are diverse in range and scope, reflecting the variation in local conditions. At one extreme is potential migration of entire PICs to new (and possibly radically different) homelands (Burson, 2010). Long-term integrated programmes of change for many critical sectors have yet to materialise. According to Nunn (2010, pp. 233–234):

> There has been a failure on the part of most regional agencies serving the PICs to develop proactive plans independent of either international or national agendas that

take into account either the special needs of PICs or the importance of developing adaptive solutions that acknowledge their singular cultural and environmental contexts. Instead such agencies have been largely reactive, uncritically imposing the priorities of international organizations on Pacific Island nations and focusing on short-term pilot studies rather than mainstreaming the lessons learned from these.

Much of the global concern about climate change impacts on Oceania is focused on the plight of atoll dwellers, a view that is often expanded as representative of the whole region. While such concerns are real and pressing, this narrow definition ignores the wide diversity of Pacific Islands and the effects, although it has proved useful in leveraging global attention. Barnett and Campbell (2010, p. 155) argue that 'representation of the Pacific Islands as extremely vulnerable may have created the illusion that adaptation is pointless, and denies the resilience, agency, capacity, and potential that Pacific Island communities have and can be made an adaptation response'.

The Secretariat of the Pacific Community (SPC), SPREP, USAID and ADB have all produced plans for addressing climate change that have been criticised for being top down and insufficiently community/recipient focused. PICs are frustrated by processes that are agency and donor driven, the high degree of overlap and insufficient collaboration. Oxfam highlighted the institutional rigidity of donor organisations that hinders cooperation and interagency collaboration (Maclellan *et al.*, 2012). AusAID's 2012 assessment of multilateral agencies agrees that there is a need to reduce the duplication of programmes. Donor organisations point to the lack of capacity of recipients to absorb available funding, to extend into new areas and expand programmes, and a lack of transparency and accountability (Barnett and Campbell, 2010).

Programmes funded by international donors at times underline the disjuncture between real need and donor priorities. For example, all of the $US535 millions committed by donors at the 2013 Pacific Energy Summit in Auckland to reduce the region's dependence on imported diesel was allocated for electricity generation (which uses some 17 per cent of the region's imported fuel) while transport (which accounts for more than 70 per cent of fuel use) was simply ignored (Holland *et al.*, 2014). This type of recipe for disaster needs to be rectified.

Fossil fuel dependency

The Pacific is the world's most imported-fuel-dependent region with 95 per cent dependency (99 per cent if PNG and Fiji are excluded). Imported fossil fuels account for 8–37 per cent of total imports raising critical issues of fuel price and security of supply (Woodruff, 2007). In 2011, fuel imports cost PICs more than $US1.3 billion, which represents a major drain on economies and has a crippling effect on national budgets and revenues and impacts all key productive sectors in the region (UNESCAP, 2010). Sea transport is entirely dependent on, and is one of the largest users of, imported fossil fuels in the region.

In the past decade there has been an increasing and concentrated effort by PICs supported by international donors to introduce a range of renewable energy technologies to substitute fossil fuel use for electricity generation. Despite the electricity sector being a minority user of fossil fuel for PICs, several donors have seen this as the 'low hanging fruit'. There is insufficient analysis to demonstrate that these measures are ultimately cost effective and sustainable.

Social and economic transition

Pacific Islanders have developed enormous resilience that derives from their access to communal land, strong cultural identity, and systems of community governance. Such resilience is supported

today through strength of kinship ties, sharing of communal resources, and cultural obligations of reciprocity (Bayliss-Smith *et al.*, 1988; Coates, 2009, p. 30; Veitayaki *et al.*, 2011). Unfortunately, this coping strategy and survival mechanism is quickly eroding as a result of the social and economic transformation taking place.

Customary roles and duties are less clear and effective today. Traditional tenure systems and resource management strategies have gradually eroded due to colonisation (Govan, 2009, p. 25) and are now undergoing violent changes of unknown rapidity. While traditional roles and resource-use systems within communities are often still well defined, leadership structures, protocol, respect, practices and beliefs are changing and are increasingly questioned (Vunisea, 2002).

More people are moving into urban centres while those in urban areas are moving to the Pacific margins in Auckland, Brisbane, Los Angeles and further in search of a better life. Exposure to consumerism and international information technology is leading to the replacement of traditional diets with canned and processed foods, traditional materials with throwaway goods and traditional values with populist global cultures.

The erosion of traditional knowledge and culture has led to increased vulnerability and dependency. Historically, sailing technology was an integral part of daily life in PICs, essential for social interaction, transport, warfare, trade and fishing. Sea passages were not feared barriers but exploited highways, the basis of connectivity and maintenance of kinship and exchange. Using learned knowledge of seafaring, navigation and ship design and construction, Pacific people made this ocean their home. These early Pacific Islanders did not see themselves as small, weak or vulnerable. As Hau'ofa (1993, p. 7) chides, Pacific Islanders 'did not conceive of their world in such microscopic proportions. . . . their world was anything but tiny'.

It is ironic that contemporary transport development that now connects the world and supports globalisation has left many Pacific Islanders isolated. Dependence on fossil fuel driven ships, high cost of fuel and loss of traditional sailing culture have made outlying island communities vulnerable and a burden on their resource-strapped governments.

The way forward

In 1993, Hau'ofa's regularly quoted 'Our Sea of Islands' challenged Pacific Islanders to recast themselves as big people at home on a big ocean with a big history. He reasoned that Pacific Islanders were connected rather than separated by the sea and that far from being sea-locked peoples marooned on coral or volcanic tips of land, Pacific Islanders formed an oceanic community based on vessels and voyaging. The people were connected across the ocean.

Pacific SIDS need to determine their own development pathway to allow them to live in their countries with the challenges they face. Some areas suggested for the future development of Pacific SIDS include regional policy development, better use and non use of resources, disaster risk reduction and climate change adaptation, use of renewable energy, partnerships and capacity building.

Regional policy developments

Pacific Island leaders' endorsement of the Pacific Islands Regional Ocean Policy (PIROP) and its presentation at the WSSD illustrate the regional effort to safeguard a 'healthy ocean that sustains the livelihood and aspirations of Pacific Island communities' and provide a principled approach to responsible ocean governance in the region. Sadly, no national ocean policy has been formulated in the region.

PICs are now focusing on 'Pacific Oceanscape', which emphasises resource conservation triggered by the collaboration between the Government of Kiribati, the New England Aquarium and Conservation International that resulted in the declaration of the Phoenix Islands Protected Area (PIPA) as the world's largest MPA at that time. The competition to declare the world's largest MPA in the Cook Islands, Niue and New Caledonia, the appointment of an Ocean Commissioner at the PIF and the announcement of financial support from Australia and NZ have enhanced the initiatives to better manage the ocean that are important to Pacific Islanders.

There was commitment at both Barbados and Mauritius to implement the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities to reduce, prevent and control waste and pollution and their health-related impacts. The BPOA for the Sustainable Development of SIDS remains the blueprint for national and regional development that takes into account the economic, social and ecological aspects that are the pillars of sustainability.

At the 2012 Pacific Forum, Cook Island's Prime Minster Henry Puna challenged other PIC leaders to consider a rethink of shared identity within the Pacific saying: 'it is time that we break the mould that defines us too narrowly and limits us in any way'. Puna called for a recasting of regional identity to one of 'Large Ocean Island States'.

> Our large ocean island states should demonstrate – now more than ever – renewed commitment to define our future in our own terms. Our intimate and connected relationship is built from a deep spiritual bond and translated across an expanse of ocean in unique and traditional ways.
>
> *(Cook Islands Herald, 21 March 2012)*

The establishment by Fiji of its Green Growth Framework is fascinating because it is aimed at restoring the balance between the three pillars of sustainable development that the Fiji Government fears is under threat with the current approaches that emphasise economic development over social and environmental well-being (Ministry of Strategic Planning, National Development and Statistics, 2014, pp. 4–5). The Framework is to provide the process to ensure that development in years to come is sustainable and maintains Fiji's environment. It offers the opportunity in which government, nongovernment, private sector, faith-based organisations, the media, urban and rural communities and individuals alike can be engaged in the pursuit of sustainable development (Ministry of Strategic Planning, National Development and Statistics, 2014, pp. 4–5). 'The Green Growth Framework is the first of its kind for Fiji' and is the impetus to take the country into the uncertain future.

Better use and non-use of resources

PICs' unique resilience is related to people's close relationship with their environment and with each other. From minerals and forests in PNG and Solomon Islands to fisheries in Kiribati and Tuvalu, the challenge is to determine the optimum level of use that produces the best return in ecological, social and economic terms. Pacific Islanders are taking measures to protect their resources by combining their customary and contemporary resource management arrangements to pursue the type of developments that improve their livelihoods and well-being while ensuring a vibrant environment capable of continually supporting life (Pearce and Warford, 1993, p. 8).

Governments, regional organisations and civil society must work collectively to ensure that the exploitation of natural resources, focus of investment, orientation of technological

development and institutional changes are consistent with present and future needs of PICs and their people (Cicin-Sain, 1993, pp. 15–6). Issues such as corruption, illegal, unreported and unregulated fishing, pollution and poorly planned developments must be appropriately addressed. PICs must be:

> guided by a basic philosophy which emphasises development to improve the quality of life of the people (assuring equity in the distribution of benefits flowing from development) and development that is environmentally appropriate, making proper use (and sometimes non use) of natural resources and protecting essential ecological processes, life support systems and biological diversity.
>
> *(Cicin-Sain, 1993, p. 17)*

Pacific Islanders must pay attention to the assimilative capacity of their environment, which is limited and must not be exceeded. Waste products and toxic substances are affecting the resilience and adaptability of many islands' biotic systems. With the rapid changes taking place across the region, everyone must remember the uncertainties we are dealing with, where ecological change represents the greatest threat to the system, and the extent to which the poor are paying the cost of environmental degradation (Hamilton, 1997, p. 30). Sound ecological, social and economic policies, democratic institutions responsive to the needs of the people, the rule of law, anti-corruption measures, gender equality and an enabling environment for investment are the basis for sustainable development.

Palau is providing international leadership in having vibrant and healthy coral reefs as the centrepiece of sustainable development that supports strong and robust economies. Working under the Micronesia Challenge, a Northern Mariana Islands, FSM, Guam, RMI and Palau initiative to protect 30 per cent of their coral reefs and 20 per cent of their forest resources by 2020 (themicronesiachallenge.blogspot.com) and contribute to global coral reef conservation targets, these countries have heightened marine resource management, solicited much-needed funds to support local initiatives and advocated the importance of taking appropriate action at all levels of governance. In addition, Palau has declared a shark sanctuary because live sharks are worth a lot more to its marine-based tourism industry than the price of the fins to its fishers. In a keynote address to a United Nations meeting on 'Healthy Oceans and Seas' in February 2014, Palau President, Tommy Remengesau Jr. announced his country's plan to outlaw commercial fishing in its waters once current fishing contracts in the country expire (Molland, 2014).

Disaster management and climate change adaptation

Managing natural disasters and climate change is important to reduce the economic, cultural and ecological costs of such events. Although Nunn (2007) highlighted the high resilience that allowed Pacific Islanders to quickly recover from natural disasters, this independence needs to be emulated today if the costs of damages from disasters are to be minimised and the recovery less demanding. As Maclellan *et al.* (2012, p. 6) explain, 'Pacific communities face no option but to adapt if they are to build a resilient future'.

Disaster and climate change adaptation needs to be at levels where important decisions about social organisation are made to be successful (Barnett and Campbell, 2010, p. 178). This is mostly in the villages where 'community-based approaches are likely to offer the most effective approach to adaptation, as these can avoid the pitfalls of externally imposed and top-down projects which underestimate local capacities and ignore local particularities' (Barnett and Campbell,

2010, p178). Adaptation programmes 'must be consistent with the values, needs, and rights of affected communities' while local people should be asked about the 'support they need, rather than being told what they should receive' (Elliot and Fagan, 2010, p. 82).

At the Sixth Pacific Platform for Disaster Risk Management workshop in Suva, in 2014, with the theme 'The Way Forward: Climate Change and Disaster Resilient Development for the Pacific', the stakeholders used the holistic approach to formulate communication protocol to use during disasters (Naleba, 2014). Sharing national information and experiences will enhance disaster and climate change resilience and sustainable development among PICs.

People must act at all levels to climate-proof their surroundings and activities. President Anote Tong of Kiribati leads the way in calling for all to take a moral responsibility in the fight against climate change to ensure the well-being of all (*USP Beat*, 2012, p. 7). At their level, villagers of Vunidogoloa in Cakaudove, Fiji, have worked with Government to relocate their village away from the encroaching shoreline (Silaitoga, 2014) while others are rehabilitating their coastal habitats and using adaptive arrangements to live with climate change. Pacific Islanders are not giving up and are trying to adapt to prevailing conditions.

Renewable energy and maritime transport

Reducing the region's dependency on imported fuel is more practical and a higher priority than reducing emissions caused by burning that fuel. The available options are to increase the efficiency of current users, reduce fuel consumption (which would come at a high social and development cost), or introduce or increase the use of alternatives. In many cases, there is a serendipitous correlation between the use of alternatives and emissions reduction.

The lack of adequate policy and financing are major constraints to developing more appropriate sea transport for PICs (Prasad *et al.*, 2013; Nuttall *et al.*, 2014). Despite the logic of renewable energy shipping as a priority for adaptation, shipping projects are generally considered only as mitigation measures. Renewable energy shipping does not meet the criteria for many mitigation funds because it would not be displacing fuel used for electricity generation (Nuttall *et al.*, 2014), the current priority set by donors. This needs to be addressed. Investment in research and development to prove commercial viability of renewable energy vessels is a priority.

ADB's 2007 shipping overview is typical of expert opinion that shipping is best left to private investment and the market. The marginal nature of shipping has always meant that financing, either for governments or private operators, is difficult and the current global economic environment has only exacerbated this. The assumption that the private sector acting alone or unaided is best situated to provide services needs to be re-examined. There is room for governments and agencies to provide access to vessel and industry financing (e.g. providing loan security and preferred operator status for renewable energy powered or retrofitted vessels) (Holland *et al.*, 2014).

Although no analysis has been undertaken, we surmise that the largest proportion of emissions from shipping in the Pacific does not come from ships owned by, trading with or otherwise benefiting PICs but from large vessels transiting Pacific waters. It would be logical to argue for a compensation mechanism levied on such shipping to support PICs' move to a lower carbon footprint.

Given the importance of marine transportation in SIDS, having appropriate training is critical to meet human capacity needs in this area. Pacific Islanders are naturally talented and skilled maritime workers who must meet international standards to continue to be a part of the global industry. Training in safety practices can improve performance and efficiency.

Partnerships

South–South cooperation such as practised in PICs is critical at bilateral, sub-regional and regional levels. Areas that benefit from such arrangements include: marine resource management; information and communication technology; trade and investment; capacity building; disaster management; biodiversity; food, water and energy security; health and education; culture; youth and gender equality.

Regional institutions such as PIF, Pacific Islands Forum Fisheries Agency (FFA), SPREP, SPC and The University of the South Pacific (USP) are assisting PICs to meet their needs and obligations in accordance with the agreements, treaties and conventions they have signed and ratified. PIF looks after political and policy matters while FFA guides management and development of the region's valuable fisheries resource and coordinates the array of regional instruments that PICs have formulated to control and manage their maritime zones and resources (Veitayaki, 1994, 2005; South and Veitayaki, 1998). SPREP assists with formulation of programmes to manage, develop and foster appropriate responses to environment issues while SPC advises on social, economic and cultural issues. SPC's marine resources section provides scientific advice on the status of inshore fisheries (Dalzell and Adams, 1995a, 1995b; Dalzell *et al.*, 1996), the state of the region's tuna resources and the status of coral reefs (Grigg and Birkeland, 1999; Wilkinson, 1999). SPC's SOPAC Division assists with EEZ boundary delineation, coastal protection and sustainable living in small island environments while USP offers tertiary education, research and consultancy services (Crocombe and Meleisea, 1998; South and Veitayaki, 1999).

These organisations prioritise the pooling and sharing of resources and adaptive management. PICs also need innovative approaches to optimise their benefits from the use of their tuna resources (Ram-Bidesi, 2011). The successes of the Parties to the Nauru Agreement in markedly increasing their licensing income from the adoption of the Vessels Day Scheme and their closure of the High Seas pockets demonstrate this point.

Capacity building

Capacity building must emphasise the prioritisation of need, identification of appropriate training and education, design and delivery of programmes in a timely fashion, and the rationalisation of training responsibilities and effort. While institutions such as USP must decide on the capacity building programmes they provide, these must be based on countries' needs, which are continually evolving. At the moment, all the regional organisations provide training that is based on organisational priorities. In many cases, donor-funded projects include only superficial capacity building to meet requirements of individual projects. Rather than addressing the problems, this arrangement only perpetuates the lack of capacity.

Capacity building is a cross-cutting issue that is a critical prerequisite to the success of any project. Training institutions must address it with vigour and rigour. They must examine the wide range of issues that confront PICs and provide the conduit between the needs of local communities and governments and scientific research.

Highly qualified tertiary teachers, trainers and researchers are needed to share and gather the knowledge and data needed to support sustainable development in PICs. Marine resources need to be identified, assessed and used sustainably. This demands good understanding of the marine environment and its interrelationships. Maritime zone boundaries have to be delineated and negotiated; and resources must be equitably distributed. International resource management instruments have to be ratified and implemented while governance issues and economic arrangements must be put in place.

Training is needed in areas such as statistics, economics, sustainable technologies, and ocean law and policy. Critical skills demanded include analytical thinking and problem solving; ability to present clearly and concisely in English; to gather, interpret, manage and present data; to analyse and critically evaluate options and understand concepts such as integrated approaches, good governance, accountability, economic viability, sustainability and conflict resolution.

Training and education are long-term processes that must be nurtured all the time. Lessons from past training and education activities must be incorporated into contemporary training to meet future demands. Partnerships forged with organisations and institutions within the region and globally can provide welcome opportunities in all areas of capacity building. Such partnerships should continue to expand and publicise useful and innovative methods that should be mainstreamed within the Pacific Islands and beyond.

Conclusion

The future of Pacific SIDS depends heavily on how well the issues examined above are addressed. Living in the world's largest ocean offers inherent challenges as well as opportunities that can only be realised if smart, innovative and painful decisions are taken. This will require that the PICs commit to work together to implement the plans of action they have agreed to and to continue to look for local solutions to their issues. The regional governments must take the lead, while securing the contributions of development agencies, NGOs and the private sector.

The collaborative work now adopted in the Pacific is logical for the national governments that do not have the capacity to have their own people attend to required jobs. While the PICs are helping each other, national governments must commit their own resources to address their issues themselves. Environment departments within some of these countries need the resources to conduct their activities diligently. The countries of the region need to guard their national interests and keep them aligned with international conventions they are party to. As more demands and higher expectations are required of environmental resources, relevant government agencies need to be strengthened with adequate resources and clearer mandates.

The challenge for Pacific SIDS is to appropriately address the needs of their people using the advice and support from its international partners. The countries must develop and strengthen their national capacity to ensure that the regional effort supported by the international community is taken through to local communities who are the owners and guardians of environmental resources. Development projects should be stringently assessed and evaluated, while funding should be provided only for those who have helped themselves. This would require good, transparent, accountable and just governance. Development projects must be related to national priorities and not those for which funds and assistance are available.

Fiji is now focusing on providing A Better Fiji For All and is using sustainable development to achieve its goal. The country aims to use effective resource management practices to unleash the development opportunities that will then benefit the people, the environment and the economy. This vision is now adopted after four decades of pursuing economic development that has delivered worsening poverty, degraded environmental resources and stunted economic growth. It is time to change and time for PICs to articulate the plans of action for sustainable development that have been there since 1994. Customary and community-centred conservation and contemporary, science-based and government-led resource management arrangements should be used to implement the plans. Sustainable development is the best and only available option for PICs.

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