



Coastal resource management and tourism development in Fiji Islands: a conservation challenge

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Abstract

The tourism sector has been a key driver of socioeconomic progress in Fiji Islands since the 1980s, in comparison with other industries such as agriculture, fisheries, and forestry. Fiji currently plans to further expand its tourism industry into a 2 billion FJD sector, which places great pressure on the coastal environment and resources that attract more than 500,000 tourists per year. Unplanned tourism development has adverse impacts on the environment and dependent communities, which is often attributed to weak governance and poorly enforced regulations. In Fiji, the industry has been recognized as responsible for mangrove clearance and coastal degradation, both of which aggravate problems such as coastline erosion, vulnerability to natural disasters, fish stock declines, poor water quality, pollution, and biodiversity loss. Though the country has national legislations in place, as well as regional and international collaborations to manage its ocean resources, it lacks the capacity and resources to implement environment policy, planning, and regulation. There is a need to strengthen governance and community capacity to address problems of effective enforcement of legislation and ensure the conservation, management, and sustainable utilization of marine and coastal resources.

Keywords Coastal habitats · Resource management · Tourism · Policy · Development · Fiji

1 Introduction

The global tourism and travel industry is one of the world's largest industries, with an estimated economic contribution of over 7.6 trillion USD in 2016 (Statista 2016). According to the World Tourism Organization (UNWTO) report (2016), the industry has sustained

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steady growth over the years and is among the fastest growing sectors in the global economy. The industry has become one of the major drivers of international commerce, equaling or surpassing oil exports, food products, and automobiles in terms of global business volume. This exponential growth is mainly because of increases in international tourist arrivals from 528 million (2005) to 1.2 billion (2015) (UNWTO 2016). Pacific island countries (PICs) showed similar trends in tourist arrivals, increasing from 620,000 in 1996 to 1.4 million in 2014 (Perrottet et al. 2016). At this rate, it is estimated that the PICs will attract an additional one million visitors per year by 2040, which could bring in additional 1.7 billion USD in revenue and an estimated 116,000 jobs to the region (Perrottet et al. 2016).

Since the 1980s, tourism in Fiji has increased gradually in comparison with other industries such as sugar, fisheries, garments, and forestry. The industry provides approximately 17% of the nation's gross domestic product (GDP) and is mainly private sector-driven, employing an estimated 40,000 people (Investment Fiji 2016). As a result, Fiji's earnings from tourism in 2016 were estimated at 1.6 billion FJD (FBoS 2017). The government's plans for tourism expansion aim to raise that number to 2.2 billion FJD by 2021 (Fijian Tourism 2021 Plan 2017). Thus, in Fiji and other developing countries, tourism is considered a key driver of socioeconomic progress (FBoS 2017). It is perceived as a provider of significant opportunity for economic growth and prosperity, which is primarily derived from the pristine natural environment and cultural diversity of the region. However, for the tourism industry to expand as forecasted by UNWTO (2016), the region depends on maintaining clean water, healthy marine and coastal ecosystems, and a protected and pleasant environment.

Coastal environments are one of the most utilized and vulnerable natural systems (Barbier et al. 2011). Within the Asia–Pacific region, coastal systems are essentially associated with human well-being (UNDP/IUCN 2006). In the PICs these ecosystems support food security, decrease vulnerability, strengthen resilience, and mitigate natural disasters; services which are mostly underestimated, poorly understood, and inadequately protected (UNDP/IUCN 2006). Marine resources contribute to food security and livelihood of around nine million people in the Pacific Islands (Polidoro et al. 2010). Across 17 PICs, around 47% of the coastal communities depend on fishing as a source of household income, with subsistence fisheries accounting for 60–90% of all fish caught in many rural communities (Hills et al. 2013) and a fish consumption rate which is 3–4 times above the global average (SPC 2008; Bell et al. 2009). Anthropogenic impacts on marine resources are, however, intensifying; with 50% of tidal marshes, 35% of mangrove forests, 30% of reefs, and 29% of seagrass beds either lost or degraded globally (Barbier et al. 2011).

In many Melanesian countries, assessments of economic dependence on the ocean suggest that overharvesting, overfishing, and coastal development are depleting the marine and coastal resources (Hoegh-Guldberg et al. 2016). Increased fishing, pollution, and development pressures (Chin et al. 2011) have already degraded critical ocean assets in the Melanesian regions valued at US\$548 billion (Hoegh-Guldberg et al. 2016). As a general rule, the coastal zone is fundamentally appealing for human settlement and today takes the form of continued urbanization. Accordingly, about 60% of the mangroves in Asia–Pacific region continue to be removed for urban expansion, while around 80% of coral reefs are under threat (UNEP 2016). In addition, one-fourth of hard warm-water corals in Oceanic countries including Small Island States are experiencing bleaching due to high thermal stress and are threatened by the disposal of plastic and micro-plastic hazardous waste into oceans (UNEP 2016). Similarly, Short et al. (2014) suggested from seagrass surveys in the Western Pacific region that human-induced additional nutrients and sediments are primary

reasons of seagrass decline. Similarly, factors contributing to mangroves degradation are coastal development, firewood harvesting, pollution (through waste disposal, sewage, aquaculture, pesticide runoff), watershed alteration and increased sedimentation, overfishing, sea level rise, and invasive species (Greenhalgh et al. 2018).

Although at the international level, there are increased discussions on fishery and coastal management, but small Pacific nations face difficulties in influencing policy and decision making, and therefore must emphasize more on collaborative regional arrangements. Consequently, the establishment of the Pacific Ocean Alliance prompted increased collaboration around marine issues. While there have been a lot of policies put in place, the governance of marine and coastal resources at national, regional, and international levels still poses a formidable challenge. Additionally, there are always trade-offs in ocean resource use, particularly in fishery management of species such as tuna, and coastal ecosystem management and conservation. These are some issues highlighted at the Pacific Islands Development Forum Leaders' summit held in Honiara, Solomon Islands in 2016, with a focus on "stewardship for healthy oceans and healthy nations." Suggestions included the need to focus on ecosystem services provided by ocean and coastal ecosystems, especially food security and economic growth for islanders. This highlights the awareness that the health of oceans is vital for islanders' livelihood and is too critical an issue to be bypassed.

We believe that there is an urgent need to strengthen governance and community capacity for integrated coastal management to adequately incorporate tourism as a component of coastal development. We sourced data from grey literature, such as government reports and online sources, to provide background on the status of tourism, highlight imminent challenges for coastal zones, and search possible resolutions from the scientific and technical community. Our arguments align with achieving the Sustainable Development Goals (SDGs), specifically goal 14, which emphasizes the conservation and sustainable management of marine and coastal resources. The primary focus of the overview is on tourism development posing a conservation challenge for coastal ecosystems in Fiji and the way forward.

2 Tourism industry in Fiji

Tourism offers crucial contingency for economic growth and prosperity in Pacific island countries (PICs) and is usually derived from pristine natural environments and cultural diversity. Visitor arrivals have increased globally at an average rate of 4% per annum from 2005 to 2014. Similar increases of 4.5% have been observed specifically in PICs (Perrottet et al. 2016). Fiji receives more than 500,000 international visitors by air and cruise ship each year (Gonzalez et al. 2015). Similarly, Investment Fiji (2017) pointed out that tourist arrivals have persisted over the past 20 years.

The major markets for Fiji's tourism are Australia (50%), New Zealand (16%), and the USA (8.5%), with the remainder of business originating from markets ranging from Canada and Europe to China, and India, as well as other PICs (Investment Fiji 2016). In late 2015, the Fijian government increased tax on tourism associated revenue from 20 to 25%, enabling the government to directly benefit from tourism (Perrottet et al. 2016). Fiji showed an estimated direct contribution of travel and tourism to its GDP of 705 million USD for the year 2017, approximately 14.4% of total GDP (WTTC 2018). Additionally, it is forecasted by WTTC (2018) that travel and tourism could grow by 1.4% for the year 2018. Meanwhile, direct contribution of travel and tourism to Fijian GDP is projected to

increase at a rate of approximately 5.3% per annum, and represent 16.1% of GDP by the year 2028, generating 1200 million USD.

3 Fiji's coastal resources

Coastal zone or area is the intermediary boundary where terrestrial meets marine environment (Kay and Alder 2005). Around 60% of cities globally are built in coastal zones, while 40% of global human populations are found living within 100 km of a coastal zone (Nobre 2011). The uneven distribution is far more extreme in the Pacific region, where the ocean contains substantial natural resources that are vital in supporting the economy, and livelihoods of islanders. The following subsections discuss coastal habitats, ecosystems, and blue carbon ecosystems in Fiji.

3.1 Coastal habitats

The coastal habitats of Fiji include estuaries, mangroves, seagrass and macroalgae beds, coral reefs, and sand and mudflats, with exceptional diversity in freshwater and marine flora and fauna. Mangroves in Fiji often occur in conjunction with seagrass beds and coral reefs forming a specialized ecosystem, the seascape (Moberg and Folke 1999), wherein mangroves and seagrass beds filter water discharges and intercept sediments from land, thereby promoting reef growth, and the reefs in turn act as a buffer for waves and strong currents creating a conducive environment for mangroves and seagrasses (Agrawala et al. 2003).

Fiji has the third largest area under mangrove forests in the Pacific region after PNG and Solomon Islands, approximately 517 km², which is primarily, concentrated in the two largest islands Viti Levu and Vanua Levu (WCS 2009). Large tracts of these forests exhibit typical zonation patterns, with red mangroves *Rhizophora stylosa*, *Rhizophora samoensis* (Tiri) and the sterile hybrid *R. × selala* (*Selala*) occurring in the seaward zone, and the black mangrove *Bruguiera gymnorhiza* (*Dogo*) and white mangroves *Xylocarpus granatum* (*Dabi*), *Heritiera littoralis* (*Kena ivi ni*) further inland (Spalding et al. 2010).

Livelihood dependence on the mangroves is high, with communities extracting food, firewood, charcoal, medicine, construction material and dyes from the forests. It is estimated that around 60% of commercial fish species and 83% of subsistence fish species depend on mangrove ecosystems in Fiji during some phase of their life cycle (Ellison and Fiu 2010). Though the total area of seagrasses in Fiji is currently unknown, the seagrass flora includes 5 species *Halophila decipiens*, *H. ovalis*, *Halodule pinifolia*, *Halodule uninervis*, and *Syringodium isoetifolium*, and a subspecies *H. ovalis* subspecies *bullosa* which is endemic to Fiji, Tonga and Samoa (Skelton and South 2006). Both mangroves and seagrass beds provide nursery grounds for an array of juvenile fish, molluscs, and crustaceans.

Appropriate environmental conditions have promoted the growth of an abundance of coral reef forms, such as fringing, platform, patch, barrier, oceanic ribbon, and atoll structures, which account for nearly 4% of the total reef area globally. The country has the largest area of coral reefs in the Pacific region extending over more than 10,020 km², with a remarkable biodiversity exhibited by the 350 different species of corals (Lovell and McLardy 2008) and another 1198 species of reef fish, including 4 endemic species (Sulu 2007). While coastal development, sedimentation, eutrophication, and pollution are the principal threats to the reefs of Fiji (Chin et al. 2011), near-shore reefs are under the

greatest anthropogenic pressure emanating from coral harvesting, fisheries, and the tourism industry (Sykes and Morris 2009).

3.2 Coastal ecosystem services

Nowhere is the importance of coastal resources more evident and valuable than in Melanesia, seagrasses alone are valued at USD151.4 billion, and similar values are associated with coral reefs (USD145.7 billion), marine fisheries (USD124.1 billion), and mangrove (USD109.6 billion). In association, productive coastlines (focused on tourism) and carbon absorption are valued at USD17.2 billion (Hoegh-Guldberg et al. 2016). A study conducted in 2015 by Marine and Coastal Biodiversity Management in Pacific Island Countries (MACBIO) determined the economic value of coastal environment in Fiji.

The national evaluation specifically focused on seven ecosystem services (subsistence food, commercial food, mining, tourism, coastal protection, carbon sequestration potential, and research and education) that ranged from USD1.14–1.17 million per year (Gonzalez et al. 2015). The authors estimated subsistence fishing to be valued at USD44.09 million per year within a total national gross value of USD29.56 million per year. Bêche-de-mer, chiefly an export commodity and offshore tuna fishery are valued at USD2.9–8.7 and USD10.07 million per year, respectively. In addition, coastal protection services provided by mangroves, coral reefs, and seagrass beds are valued at USD6.36–10.61 million per year in terms of avoided repair costs of coastal properties by erosion and floods (Gonzalez et al. 2015). An estimate of the total economic value of mangrove carbon sequestration in the country is estimated at USD 73.93 million.

3.3 Blue carbon ecosystems

The currently available evidence and prediction (based on IPCC-AR5 scenarios) suggest that small islands will be most vulnerable to sea level rise and increased sea temperature. It is projected by IPCC (2013) that the Melanesian region's coastal areas will experience sea level rise at rates up to four times the global average. Additionally, rising sea temperatures are projected to increase the occurrence and strength of cyclones in the tropical Pacific (ABM and CSIRO 2014). It is also predicted that intense storms could increase wave and wind energy in oceans, including the Pacific, causing coastal flooding (Hoegh-Guldberg et al. 2016). In addition, physical damage to coasts and coastal infrastructure will negatively impact fisheries, food availability, income, and coastal protection (Hoegh-Guldberg et al. 2016).

Recognizing the severity of the problem the United Nations established the “blue carbon” initiative, a global program that aims at climate change mitigation through the conservation and management of marine and coastal ecosystems (Hutomo 2009; Wawo et al. 2014). Mangroves, seagrass meadows, and salt marshes are recognized for ecosystem services such as coastal protection from natural disasters, fish nursery grounds, and sequestration of “blue” carbon (Fig. 1). Although they constitute less than 2% of the total ocean area, they account for 50% of the total organic carbon stored in marine sediments. These blue carbon ecosystems are a net sink of carbon when conserved or restored and a net source when degraded releasing around 1.02 billion tons of carbon dioxide per year, equal to 19% emissions from tropical deforestation in the world (Howard et al. 2014).

They are, therefore, an important part of the solution to climate change. However, the annual rate of loss of these ecosystems is pegged at 1–2% for salt marshes, 0.4–2.6% for

Fig. 1 Coastal area showing mangroves and seagrass beds. (Photo by: Shalini and Jahangeer)



seagrass meadows, and 0.7–3% for mangroves. The biomass and organic-rich sediments of a typical mangrove ecosystem contain around 3–5 times the carbon stored in a tropical rainforest ecosystem (Pendleton et al. 2012). Mangroves of the Rewa Delta in Fiji are estimated to sequester around 1700 tCO₂e/ha (Heider 2013). The absence of data on the extent of seagrass beds and tidal marshes, however, impedes efforts for their economic valuation and carbon stock assessment despite their tremendous importance as carbon sinks (Gonzalez et al. 2015).

4 Impacts of tourism development in Fiji

Fiji's economy is dependent on the natural environment that is small and includes minimal export oriented industry; therefore, the economy is vulnerable to fluctuations (Lane 2006), and substantial amount of pressures are exerted on the coastal environment (Levett et al. 2004; Lane 2006). Tourism and fisheries earnings are explicitly controlled by coastal ecosystems and shoreline features in Fiji. As a tourist destination, the country has largely been characterized as a secure and tranquilizing destination that offers a cluster of distinctive experiences in natural environments.

Sustaining the quality of the natural environment is a crucial industry requirement. On the contrary, interactions between tourism and environment are rather complex and require careful planning and monitoring to avert adverse environmental impacts. The vulnerability of Fiji's environment is augmented by factors such as population growth and coastal development (UNEP/SOPAC 2005). The State of the Environment Report by Watling and Chape (1992) stressed that growing population and urban expansion are key drivers of environmental devastation. Majority of the 884,887 Fijian population (BoS 2017) have a livelihood dependency on littoral zones; therefore, environmental destruction is extreme in the coastlines and estuaries (Lane 2006).

The development of tourism infrastructure is resulting in reef degradation, poor water quality due to untreated sewage disposal, clearing of mangrove forests, overexploitation of reef resources and reclamation of reef flats to enhance coastal land availability (Sykes and Morris 2009; Caldwell et al. 2009). Coastal degradation due to unplanned hotel infrastructure development and uncontrolled tourist activities along coastlines are key drivers for habitat destruction and marine life losses (Hall 2001). Inadequate coastal

development threatens one-fifth of Fiji's reef ecosystems. Tourism sector is the largest non-extractive user of reef ecosystems in Fiji with 75% of tourists engaging in reef-based recreational activities (Sykes and Morris 2009). Increased human traffic in coastal areas places immense pressure on the already overrun and exploited marine resources, especially in the absence of any control on the number of tourist visitation. In Mamanuca and Yasawa Islands, reef tourism activities have caused an increase in dead coral cover and fish population (Dutra et al. 2018).

Nutrient load is causing increased reef mortality along the Coral Coast in Fiji which has a number of prominent resorts (Mosley and Aalbersberg 2003). Watershed pollution and resultant nutrient load facilitates transition from coral-dominated to algal-dominated reefs, promoting seasonal algal blooms (Dutra et al. 2018), and possibly out-competing or killing coastal fauna and flora sensitive to increased nutrient levels. Lovell et al. (2004), and equivalent reports since, indicate that declining coastal water quality is already affecting coastal habitats in the region.

Ellison (2009) pointed out that mangrove forests are often cleared for urban development and expansion. This and other forms of land reclamation could have uncompromising local effects (Chin et al. 2011). A study carried out in PICs on the developing fondness for coastal protection by Mimura and Nunn (1998) pointed out that since 1960s, mangrove removal generated pleas for hard coastal engineering structures such as seawalls, displacing customary practices of planting and protecting vegetation beside coastlines (Hills et al. 2013). Again, mangrove clearance is principally connected with coastal urban development.

Multiple threats to Fijian coastal environment primarily habitat losses are a result of such deforestation activities along the coastline consequent to urban expansion (Watling and Chape (1992), and tourism infrastructure development (Hall 2001) (Fig. 2). In the case of Fiji's Denarau Island resort development, 130 ha of mangrove forest was cleared to create golf course and artificial marina (Minerbi 1992; Hall 2001). Near-shore vegetation clearing (Fig. 3) is necessary to construct beachside resorts and consequently exposes the coastlines to coastal erosion. Furthermore, establishing of commercial marinas involves both clearing and dredging of mangroves and estuaries, which are important, fish nursery grounds, while other coastal habitats (e.g., coral reefs and sea-grass beds) are affected as sedimentation increase in these areas (Clarke 1991).



Fig. 2 Coastal reclaiming of mangrove areas for hotel development in Rakiraki, Fiji Islands. (Photo by: Shalini and Jahangeer)

Fig. 3 Mangrove clearing and reclamation underway in Rakiraki, Fiji Islands. (Photo by: Shalini and Jahangeer)



Wetland alteration, loss of coral reefs, seagrass and shellfish beds, low dissolved oxygen, and resuspension of nutrients and toxins are other major impacts of “dredge and fill” activities (Chin et al. 2011). Reclamation that utilizes heavy machinery disturbs soil and loosens sediment deposits thereby accelerating soil erosion as observed in the construction of Treasure Island Resort in Fiji Islands (Hall 2001). In addition, sedimentation increases the water turbidity and reduces sunlight available for photosynthesis by plants such as seagrasses and macroalgae beds, and the symbiotic algae of reef building corals (Minerbi 1992). The subsequent loss of ecological diversity may also substantially impact the whole estuarine food web, compounded by the fact that the islands of Fiji exhibit minimal ecological resilience (Levett et al. 2004).

Brown et al. (2017) indicated that, in several island catchments of Fiji, land-based activities result in high erosion rates and have a large influence on the turbidity of coastal waters, particularly where native riparian habitat has been removed for construction. Moreover, the rapid increase in and unsustainable manner of commercial extraction of rock, gravel, and sand from rivers is causing major ecological and hydraulic changes (NFMV 2010). For example, mining of gigantic rocks from upper river beds by some resorts, such as Outrigger Reef Resort, Momi Resort, Denarau Resort, Sonaisali Resorts, Wailoaloa Fantasy, and Naisoso Resort, for purely decorative purpose has been associated with more frequent and extreme flooding and increased dredging needs in Nadi’s Sabeto River (NFMV 2010). Furthermore, it has been reported that changes in ground water patterns, altering stream paths, and overexploitation of ground water by resorts have interfered with the hydrological cycle (Minerbi 1992; Hall 2001).

It has also been observed that the tourism industry is reducing self-sufficiency in the country. Movono (2012) revealed that villagers employed in the tourism industry were diverting their efforts from traditional activities such as agriculture and fisheries, as observed in two coastal communities along the Coral Coast in Fiji, where villagers faced difficulties in fishing and seafood collection due to less time available from resort employment, lack of skills and equipment. This in turn left villagers highly dependent on the tourism industry and less self-sustained, as about 65% did not own or work on their farms, nor fished for subsistence purpose. When laid off from the industry during low tourism season, cyclones, or political instability, villagers faced challenges providing for their families because they have no farm-based income or food.

Consequently, the importance of alternative livelihood and adapting to changes well that would help to sustain coastal users when they are faced with environmental or other adverse challenges depends on their adaptive capacity. This adaptive capacity could relate to education, age, financial status, natural resources, markets, skills, and access to alternative livelihoods for future changes (Satumanatpan and Pollnac 2019). Furthermore, Torell et al. (2010) pointed out the importance of livelihood development not related to profitability that may also benefit coastal management programs. In order for livelihood diversification, often promoted in fisheries policy we need to look at roles of women and men in livelihood activities. Likewise, ideas to build on the strength of people sometimes are found within a community or needs to be learnt by coastal communities as state of marine resources becomes increasingly uncertain.

5 Governance system in Fiji's marine resource

Fiji's law and governance are complex topics, since they are based on a balance of customary rights and centralized control adapted from the British system since it was ceded from 1874 to 1970. Here, we briefly explain the history of Fiji's law making system particularly for fisheries management which comprises coastal management. Prior to the colonial era, there was no systemization for recording rights to land and sea, and the traditional understanding was based on collective or communal ownership of natural resources. During this time, iTaukei communities had a traditional hierarchy system still in existence today, where chiefs were leaders and custodians of authority.

However, ownership over land and the sea did not extend to an individual but everyone in the community. This communal basis held in favor of the traditional iTaukei groups known as Yavusa (meaning tribes) has been recognized in Fiji's Fisheries Act, 1942. This gives local coastal communities the right to practice traditional management and governance structures, e.g., "taboo areas." It also gives coastal communities the right to utilize their traditional fishing grounds known as qoliqoli to harvest fish for subsistence purposes. This unique traditional and modern governance system makes the interpretation of Fijian laws concerning resource rights questionable and challenging to iTaukei communities.

The qoliqoli areas extend from the coast to the outer edges of fringing reefs, varying in size and covering almost all of Fiji's territorial waters. These qoliqoli areas are governed by Inshore Fisheries law, while territorial sea and Exclusive Economic Zone are governed by Offshore Management Decree, both regulated by national and provincial government agencies. Furthermore, council of chiefs traditionally regulated decisions related to all aspects of resource management within the qoliqoli areas that have shown positive impact in sustaining resources. Specifically, taboo areas and seasonal closures which persist to this day usually result from social custom or significant events such as the death of a chief or more recently observed decline in fisheries resources.

Similarly, Fiji has a unique marine tenure system which is a combination of traditional rights and modern law. A key part of the Fisheries Act was the recognition of traditional fishing grounds under Colonial administration ensuring all coastal waters are owned by the State. Although the legislation does not grant ownership of the areas, a combination of law and practice has conferred certain rights in registered communal communities. In addition, the qoliqoli boundaries are not complemented under the United Nations Convention on the Law of the Sea (UNCLOS) of which Fiji is a signatory. This implies that the approximately 410 (385 marine and 25 freshwater qoliqoli sites) registered qoliqoli areas (each registered

to a different group or Yavusa) are not formally recognized under Fijian or international legislations.

The taboo areas also known as Locally Managed Marine Areas (LMMA) are a community design and implemented version of Marine Protected Areas (MPAs). Here, the fishing activities are subject to varying levels of restriction determined by the communities themselves which makes them reasonably effective. Veitayaki (1998) pointed out that Fiji's use of traditional and community-based marine resource management systems produces effective coastal management programs. On the other hand, Chang et al. (2006) revealed that performance of local conservation efforts varied across villages. Communities that utilized conservation designs promoted by external aid programs tended to be less successful in their management than groups that designed their own guidelines from a bottom-up perspective. The qoliqoli sites of Fiji support the livelihood of around 300,000 people belonging to coastal communities; however, recently these livelihoods are increasingly threatened due to depleting marine resources (UNDP 2012). As a result, the government has committed to conserve 30% of the benthic marine environment through the implementation of Locally Managed Marine Areas (LMMAs), with over 450 communities as part of the LMMA network (Hoegh-Guldberg and Ridgway 2016).

Furthermore, Mills et al. (2011) carried out a gap analysis study, rating the ability of Fiji's marine managed areas to meet the goal to effectively managing 30% of its coastal habitats and 10% of other coastal benthic ecosystems. The study revealed that Fiji does not meet its objectives to protect 30% of coastal ecosystems, which is currently averaged at 17%, nationally. Instead, LMMAs on an average protect about 15% of these areas, and that value already reflects a substantial increase over 3 years ago (Chin et al. 2011). In order to achieve the above objective, Fiji needs to execute foundations sanctioning legislation, and support of institutional resources for effective environmental policy, planning, regulation, and implementation. Additionally, it must utilize local research and policy suggestions that have already been developed; however, few of these initiatives are already in motion.

Nevertheless, Fiji has put in some efforts to address coastal issues, although it lacks a consolidated local environmental legal and administrative framework (Hughes et al. 2003). The Ministry of Fisheries manages the nation's marine resources under the primary legislation of the Fisheries Act and Fisheries Regulations, which is focused on commercial fisheries and inshore or coastal fisheries. It has developed other management tools, including the Inshore Fisheries Management decree, Offshore Fisheries Management decree, Aquaculture decree and Marine Space Act (Fiji's State of Environment, 2013). Additionally, the Fijian government has endorsed legislation such as the Fiji Agriculture Sector Policy Agenda and the National Climate Change Policy that serve to guide the tourism industry toward sustainable development. The government has introduced an Environmental Levy Act 2015 and Environmental Levy for the tourism industry reinforcing government commitment to protect the environment. In order to protect Fiji's vulnerable coastal environment from heavy development, specifically from tourism and public amenity infrastructure (CBD 2014), Fiji has implemented the National Tourism Development Plan, the Land Use Policy, and Code of Logging as methods for assisting Integrated Coastal Management (ICM) under the Environment Management Act (EMA) 2005 implemented by Department of Environment.

A key driver of ICM process is the application of common tools such as measurable indicators and standardized assessment measures for progress reporting (Breton 2006). Surprisingly, Fiji lacks recognition and policy instruments to address and monitor all sources of pollution and contaminants of the ocean and coasts, even though it implements ICM as part of their strategic priorities. Integrated coastal management is clearly

recognized within the Sustainable Development Bill, the National Biodiversity Strategy and Action Plan, and the Climate Change Vulnerability and Adaptation Assessment that collectively determine relevant national policies. Additionally, the country is a member of the International Convention on Biological Diversity (CBD) and has committed itself to implementing an integrated approach to coastal management (Hughes et al. 2003). Despite Fiji's agreement to various worldwide conventions and complementary local regulations, an inclusive resolution to the increasing waste management, pollution, and sewerage disposal issues continues to baffle.

Furthermore, Chandra (2011) pointed out that the Fisheries policies only weakly define the conservation, management, and sustainable use of coastal and marine resources. He raised concern on the Fisheries Act being outdated, inadequate, and failing to provide a policy framework to protect fisheries and coastal resources nationally. This is mainly because the Fisheries Act follows a centralized policy-making process mirrored across the government and also because of the customary command-and control approach, with little room for innovative legislations (Chandra 2011).

6 Issues of tourism expansion and environment management

Tourism contributes considerably to the global gross domestic product (GDP) and is forecast to outpace the growth of several other economic sectors (Lenzen et al. 2018). The growth experience in global tourism demand has already devastated ecosystems and environments in developed countries and is starting to impact Pacific Island countries (PICs). Therefore, majority of the PICs recognize tourism as a major driver for economic growth and accept the importance of the National Tourism Organizations (NTOs) and South Pacific Tourist Organization (SPTO) (Perrottet et al. 2016). As Fiji's popularity increases, the capacity to sustain and manage tourism growth needs to be established. Likewise, Fiji has endeavored to attract investors into its tourism sector by providing incentives such as significant tax concessions for up to 10 years and for capital investments not less than FJ\$7 million, under their new Short Life Investment package for new hotel investments. This financial assistance for tourism infrastructure such as resorts is key driver for the sector. The 2018/2019 government budget allocation of FJ\$ 99.3 million to boost the tourism sector is a good indicator of governments commitment to this industries expansion (Fiji Budget 2017/2018).

Tourism expansion in Fiji should, however, be subjected to the caveat that it is in harmony with the environmental resources which are the indirect impetus to the industry. This is important since unplanned and poorly managed tourism development degrades the natural environment. Although tourism development is not the only contributor to the deteriorating condition of Fiji's marine environment, the impact of tourism cannot be refuted. The synergies and interactions between tourism development and the coastal environment remain poorly understood (Hall 2001). This is true of most coastal regions worldwide (Orams 1999; Hall 2001). For example, in the South Pacific, coastal and marine resource information is inadequate (Milne 1990), and baseline information of the coastal environment prior to tourism development is usually absent (Carpenter and Maragos 1989). There is inadequate information on the environmental impacts of tourism in many areas which stems from numerous factors. Perhaps the most significant is business and political involvement over environmental conditions.

Additionally, accelerating human population and infrastructural development often abuse and damage the surrounding environment as well as challenge its management (Lane 2006). Consequently, increasing human-induced pressures, such as unplanned coastal development and population rise, among others, are rapidly degrading and depleting many critical assets within Melanesian waters (Nobre 2011; Hoegh-Guldberg et al. 2016) and thus decreasing the services that these ecosystems provide (Costanza and Farley 2007; Lester et al. 2010; Nobre 2011). Reliable water supply and sewerage services are essential for tourism development and expansion. Many outer island resorts face difficulties sourcing water and need alternative sources to ensure consistency. Inadequate sewerage systems degrade the environment and constrain tourism growth by limiting developments. There is a need for proper disposal to avoid groundwater and surface water contamination in these areas. Furthermore, the introduction and expansion of renewable energy usage and energy efficiency measures in the tourism industry would also play important roles in enhancing responsible growth within the sector.

In order to ensure the sustainable use of natural resources, there is a need to shift from bureaucratic arrangement and administration to good governance (Gibbs et al. 2002). Baztan et al. (2015) suggested that though in the past 25 years our understanding of coastal ecosystems has improved, the equilibrium regarding development and conservation frequently inclines toward development, challenging conservation of coastal habitats. Furthermore, developments are implemented by people of power, often with inadequate regard for the common people's environmental interests. Additionally, the governments of less developed countries suffer from investment biases with greater allocation of finance and resources to economic development, healthcare, social welfare, and education, rather than environmental monitoring and conservation. Compounding this issue is the unavailability of necessary resources and scientific expertise required for adequate research (Hall 1996, 2001). It is nevertheless pertinent to observe that co-ordinating and synchronizing with local communities, private and non-government organizations are functional techniques of integrating indigenous information into both planning and implementation. Consequently, new technologies have also emerged for environment management, containing cooperative environment planning (Wondolleck and Yaffee 2000); community-based natural resource management (Agrawal and Gibson 1999); institutionalized involvement (Ribot 2002); and integration plans (Morrison et al. 2004).

Further research on the economic valuation of coastal ecosystem services benefiting communities, and coastal mapping of habitats such as coral reefs, seagrass, and macroalgae beds, and mangrove forests, would be indispensable for policy makers in decision making on coastal ecosystems and resource management in the face of rapid economic development. Such information could also complement the Environmental Impact Assessments (EIAs) on tourism infrastructure development in coastal habitats. A matter of concern is the fact that although such development-specific reports are requirements in developing South Pacific countries, they remain of little use because environmental legislation that might curb environmentally harmful plans based on the assessments' outcomes is either still in the developmental stages or is ineffectively implemented (Hall 2001). The government implements policies and regulations to control the negative impact of tourism on the natural environment for industry development and environmental performance, however, environmental compliance needs enforcement, monitoring on conditions approved for development and formalizing FLMMA since the venture is based on voluntary agreements.

7 The way forward

Coastal zones require an all-inclusive universal managing and planning attitude that has effectively been adopted in many coastal nations (Kay and Alder 2005). In order to neutralize socioeconomic drivers causing environmental destruction, a commercial revolution established on enhanced energy and transportation systems for urban areas is urgently needed. The Fijian government's SDG commitments may possibly encourage a further integrated and holistic method to resource management and ecosystem preservation. There is optimism that the country can manifest resourceful resolutions for robust development and continued prosperity by learning from other developed and developing countries failure and success stories in coastal management. This will further improve and protect coastal resources for the many communities already living within ecologically sustainable limits as development takes place.

7.1 Community participation

An effective tool that could be utilized is Ecosystem Based Approach (EBA) which addresses the critical connection among terrestrial, marine, and coastal resources, hence providing a favorable approach to increasing the resilience of ecosystems and supporting sustainable livelihoods. Recently, a cost–benefit study of engineering and EBA adaptation options for climate change under the UNEP EBA Flagship Program and UN-HABITAT Cities and Climate Change Initiative was carried out for Lami Town in Viti Levu, Fiji (Rao et al. 2013). Engaging the support of local communities in EBA measures would go a long way in securing resources, people and livelihoods. Regulating overfishing, restoring mangroves and catchments areas are EBA measures that entail implementation at the community level.

The revival of traditional resource management measures in Fiji such as retaining surplus catch in enclosures for future use and limiting fishing of easily accessible species to poor fishing seasons, together with protecting *qoliqoli* from overexploitation, are practices that entail active community participation and would make an indispensable contribution to sustainable resource management (Veitayaki 1997). There is therefore a strong need to scale up and replicate such community-based natural resource initiatives in other parts of Fiji.

Establishing water quality standards to decrease pollution by both monitoring and commercial approaches would be beneficial. Additionally, terrestrial-aquatic-waste management strategies are crucial to decrease pollution of terrestrial and aquatic resources (UNEP 2016). Problems of nutrient load and resultant reef degradation along coastal habitats can be prevented by promoting tertiary and biological treatment plants in resorts and coastal settlements (Levett and McNally 2003). This is again possible through the enhancement of peoples' participation in efforts to improve environmental quality.

In Fiji, the engagement of local communities in preserving and managing of coastal environments and protected areas, e.g., FLMMA, is among the most effective in the region. This is reflected by the Great Sea Reef (GSR), the third longest continuous reef structure in the southern hemisphere which gives protection to Fiji's northern coastal areas, and hosts marine biodiversity that has sustained communities in the area for hundreds of years, supplying 80% of fish for domestic markets, as well as valuable tourist attractions for diving, snorkeling, and beachside aesthetics. Moreover, based solely on coastal communities'

management of the reef system, the GSR is directly responsible for the subsistence and income generation of the area.

A high local priority is necessary to establish or strengthen mechanisms for regular reporting on the environment to local government and development bodies. Together with improved monitoring and information management systems, constant building of analytical capability is crucial to support the assessment and research that reinforces policy making. Community sensitization is a viable strategy for effective resource conservation and management. Science-policy dialogues through local programs and events, education and awareness of corporate bodies, national administration, and the local communities by means of media are key to enhancing people's participation. Lane et al. (2004) suggested that government and the general public need to cooperate in both official and unofficial ways to encourage natural resource management. Unification and delegation are equally vital for improving governance.

7.2 Policy measures

The value of coastal resources requires recognition in national policies, as the major threats to coastal ecosystems are a lack of research and education about the resources, gaps in policy frameworks, a prevalence of unsound catchment management practices, and climate change. It is vital that we elevate environment in national governance structures and approach threats by recognizing what we do and do not have the power to change, and not use issues that we have little influence over as an excuse to ignore a lack of progress on fundamental issues such as unsustainable resource use and catchment management. Therefore, the government needs to strengthen environmental institutions to provide adequate policy responses, strong enforcement of rules and guidelines, and capacity building to effectively discharge current responsibilities, as well as future demands of environmental actions.

In addition, the SDGs demand that the government take strong and decisive environmental action, established on an integrated approach, to be embraced through ministries and institutions. Furthermore, application of the SDGs needs judicious science-policy discussions, adequate environmental evaluation and monitoring, and financial and technological provision backed by robust governance mechanisms. While the government should formulate incentive-based policies for protecting coastal resources, it is also upon the tourism industry to invest in the preservation and restoration of degraded mangroves and coastal habitats as part of their Corporate Social Responsibility (CSR). Synergies between tourism development and marine and coastal resource management can be created through integrated policy development to prevent fragmented decision making and to pursue mutually beneficial relationships between the two sectors.

A zero-loss policy should be put in place, ensuring that any damages produced by direct human involvement must be recompensed through the establishment of a new coastal ecosystem area of similar type, which commonly occurs through transplanting. This is particularly applicable for coastal tourism projects which involve the clearing of mangroves. In 2017, the Minister of Fisheries asserted that mangrove preservation should be a key practice in any coastal development project. The establishment of an Environmental Tribunal for the appeal of decisions pertaining to EIA approvals, and a more integrated approach that involves participatory decision making including resource owners and users particularly coastal fishing communities and customary right holders are some valuable recommendations by Sloan (2017), to streamline EIA processes in the country.

8 Conclusion

The ocean and its natural resources are important to the livelihoods and well-being of Fiji's people and communities through their provision of ecosystem services. There is strong indication that more or less concern of ecosystems is traditionally entrenched inside PICs management, but is only indirectly demonstrated through the use of various strategies of managing coastal resources, rather than through explicit statements and actions. Indeed, the civil society is gradually becoming aware of the different types of coastal ecosystems and their significant ecosystem services and functions, which can merely improve the outlook of applying protection management strategies effectively and with full social support. It is important that coastal communities', other stakeholders', and government officials' perceptions of coastal environment degradation through reclamation, infrastructure development impacts on local biodiversity, livelihood outcomes, and assets, as well as governance and management, are examined so that coastal resource management processes that promote sustainability can be adapted and outcomes improved. In time enhanced community capacity backed by strong policy and governance measures has the potential to bridge the gap between development and resource conservation in Fiji. Until then conservation challenges in the face of development remain a threat to ecosystems, people, and livelihoods.

Already there are some effective tools showing promising results in coastal resource management implemented with local communities such as Fiji Locally Managed Marine Area (FLMMA) Network. This model network should be incorporated into government management of coastal systems because it encourages collaboration among local coastal communities, governments, private sector, non-government organizations, and scientific communities. The reason why this network is positively implemented is that it encourages the use of adaptive management achieving best practice in cooperating local coastal community knowledge for management. LMMMA network should be integrated with EBA, ICM, and general good governance practices highlighted in scientific papers and reports for further improvement of management. There is also a need for documenting traditional management system and more scientific research directed at improving our knowledge of factors challenging coastal resource management highlighted in Fijian Tourism 2021 plan for sustainable Tourism development and marine resources.

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