WWF

R2R PLAN

SI

RIDGES TO REEF CONSERVATION PLAN

GHIZO AND KOLOMBANGARA

WESTERN PROVINCE, SOLOMON ISLANDS

CRITICAL ECOSYSTEM PARTNERSHIP FUND

ecological Solutions (Solomon Islands)

WWF-Pacific Solomon Islands Vision

The people of Solomon Islands managing their natural resources for food security, livelihoods and a sustainable environment
Olketa pipol lo Solomon Islands lukaotim gud olketa samting lo land an sea fo kaikai, wokim seleni, an gudfala place fo stap

WWF MISSION

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature by:

- Conservation the world's biological diversity;
- Ensuring that the use of renewable natural resources is sustainable;
- Promoting the reduction of pollution and wasteful consumption

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Published by
WWF-Pacific Solomon Islands, World Wide Fund for Nature, Gizo, Solomon Islands.

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Acknowledgement

This conservation document is a product of collective efforts of all stakeholders including the key resource owners of the islands of Ghizo and Kolombangara. WWF SI Sincerely acknowledge the Ecological Solution Solomon Islands (ESSI) for the technical support rendered in building capacity of staff, data collection, and the overall compilation of this report. WWF would like to similarly acknowledge the Critical Ecosystem Protection Fund (CEPF) grant for their critical funding support that has enabled WWF to successfully gather all the information needed for the formulation of this very important conservation plan document.

WWF would like to deeply expressed gratitude towards GELCA on Ghizo Island and KIBCA on Kolombangara Island, the key resource people and other resource owners on both islands for their very important contribution and for recognizing the importance of compiling such a document. Many thanks also to the various stakeholders including representatives from the Western Provincial Government, other NGOs, MECDM, MFMR, MoFR, Ministry of Agriculture and Livestock, and TNC who have displayed support to WWF during the initial phase of this project.

Above all, we would like give back all praise, glory and honor to our heavenly father for his continuous guidance and direction during the compilation of this report.

Without all these efforts, this conservation document for Ghizo and Kolombangara Islands would not have been possible.

Acronyms

AMNH – American Museum of Natural History

CBO - Community Based Organizations

CBD- Convention on Biological Diversity

CBFM – Community Based Fisheries Management

CBRM - Community Based Resources Management

COTS – Crown of Thorns Starfish

ESSI – Ecological Solutions Solomon Islands

GELCA – Gizo Environment and Livelihoods Conservation Association

KIBCA – Kolombangara Island Biodiversity Conservation Association

KFPL – Kolombangara Forest Plantations Limited

LMMA – Locally Marine Managed Areas

MECDM- Ministry of Environment, Climate Change, Disaster Management and Meteorology

MFMR- Ministry of Fisheries and Marine Resources

MoFR- Ministry of Forest and Research

MPA – Marine Protected Area

NBSAP SI – National Biodiversity Strategic Action Plan – Solomon Islands

NECDA – Nusatuva Environment Conservation Development Association

NPoA – National Plan of Action – Solomon Islands

R2R – Ridges to Reefs

SICCP – Solomon Islands Community Conservation Partnership

SILMMA - Solomon Islands Locally Managed Marine Areas

TDA – Tetepare Descendants Association

TNC – The Nature Conservancy

WCS – Wildlife Conservation Society

WWF SI – World Wide Fund for Nature Solomon Islands

Executive Summary

Recognizing the importance of supporting WWF's current initiatives on marine conservation, WWF adopted a Ridge to Reef conservation and planning approach, emphasizing a landscape – seascape connectivity. The interconnectedness and conservation of terrestrial, coastal and marine environments, and therefore has expanded its focus on R2R conservation planning.

Increasing levels of exploitation of coastal resources coupled with the impacts of land based activities like logging are threatening the marine resources of people in the Solomon Islands. People in the Solomon Islands have very high dependency on their natural resources for their wellbeing, and the declining state of these natural resources is also putting their wellbeing and livelihood at stake.

Conservation opportunities are still high for Solomon Islands as there are still some areas that are less threatened when compared to other sites around the globe. However, with the ever growing urge for economic development, natural resources are targeted by resource owners, the government and also external investors. As such there is a need for people to recognize the connectivity between the terrestrial and marine ecosystems and what threats are already in existence.

The R2R project started in 2015 when WWF, in line with CEPF ecosystem profile, facilitated the development of Ridges to Reef conservation planning through a participatory stakeholder process.

The main results of the phase 1 were: i) Increased awareness and education amongst stakeholders and community groups; ii) gaining support and building capacity of partners (key stakeholders, local and provincial government, community and civil society groups) for a Kolombangara and Ghizo Island R2R conservation management strategy; and iii) identification of data sets and information needed to support the analyses of threats and opportunities within the natural environments of Kolombangara and Ghizo Islands required for the anticipated participatory R2R planning process

Based on lessons learnt discussions and results of phase 1, WWF, partners and stakeholders worked together to develop the activities of phase 2, which had an objective to achieve a Conservation Plan Report for both Kolombangara and the Ghizo islands. This report to form frame work on which decisions regarding conservation and development can be guided.

The data used in this conservation document builds on from previous work done by local and international NGOs and CBOs on the islands, traditional knowledge and also other detailed literature review of studies conducted on these two islands in the past. As for Ghizo Islands, verifications were made to the map data found in the Ghizo Blue Print document during the participatory mapping workshops. These workshops were deemed successful as

it was attended by a majority of the key resource people who have contributed to the formulation of the Ghizo Blue Print.

This report is compiled by WWF with the enormous support from ESSI to assist people on Kolombangara and the Ghizo Islands, and the Western Provincial Government to steer the sustainable management and planning of their natural resources so that they can continue to meet food security and livelihood needs and help maintain environmental services essential for human well-being.

1 CONTEXT

The Solomon Islands archipelago occupies part of the Coral Triangle, a region identified as a hot spot for coral species diversity and high alpha diversity of fish and marine vertebrates. The Coral Triangle region is comprised of four marine ecoregions in the central Indo pacific including the Solomon archipelago, Solomon Seas, Vanuatu and the Bismarck Sea (Aalbersberg, et al., 2012). The region covers only 2% of the planet's ocean yet it hosts a rich abundance of marine lives across the Philippines, Indonesia, Malaysia, Timor Leste, Papua New Guinea and the Solomon Islands (Figure 1). In the Solomon Islands, the marine biodiversity are remarkably high as they are still in good condition with low levels of threats compared to the other areas within the Coral Triangle region (Aalbersberg, et al., 2012).

Figure 1: Map displaying the coral triangle region
Source: (WWF, 2008)

The terrestrial environment of the Solomon Islands is also very rich, having recognized as one of the world's major centers for plant species diversity (Solomon Islands State of Environment Report, 2008). This is a reflection on the significant number of biodiversity found in the country which includes approximately 4500 plants species with some groups demonstrating extensive levels of endemism (Solomon Islands State of Environment Report, 2008) .

The Western Province in the Solomon Islands is an area with high levels of species diversity of the marine and terrestrial environment. This region is made up of 35 islands covering 19% of the total land area that make up the Solomon Islands (Pikacha & Sirikolo, 2010) . These

islands are part of the New Georgian chain of islands which angled in a northwest trend, and covering a land area of 5060 km^2 (Bennett et al., 2014) (Figure 2). Three of the main islands; Kolombangara Island, Vangunu and Rendova have predominantly lowland rainforests with summits rising up to 1000 m asl and beyond while the other three islands; Gatokae, Rannonga and New Georgia island reach peaks of about 800 – 900 m asl (Pikacha and Sirikolo, 2010).

A total of 76649 people were recorded in Western Province during the population census in 2009. This places Western Province the second most populous province, seconded to Malaita. About 90% of the total populations are rural dwellers, heavily reliant on gardening and artisanal fishing for their livelihood and dietary needs. However, due to urban pull factors, there has been a significant increase in the number of people moving into the urban centers such as Noro and Gizo (Bennett et al., 2014).

In terms of environmental composition, the province has a wide range of habitat types ranging from high elevation montane forests to low lying atolls and coral reef systems. This ecosystem types supports an extensively wide variety of biodiversity which are found in the marine and terrestrial environments. Being located in the Bismarck sea-ecoregion, these areas have a rich abundance of marine live species hence it is viewed as a hotspot for conservation (Aswani and Lauer, 2006).

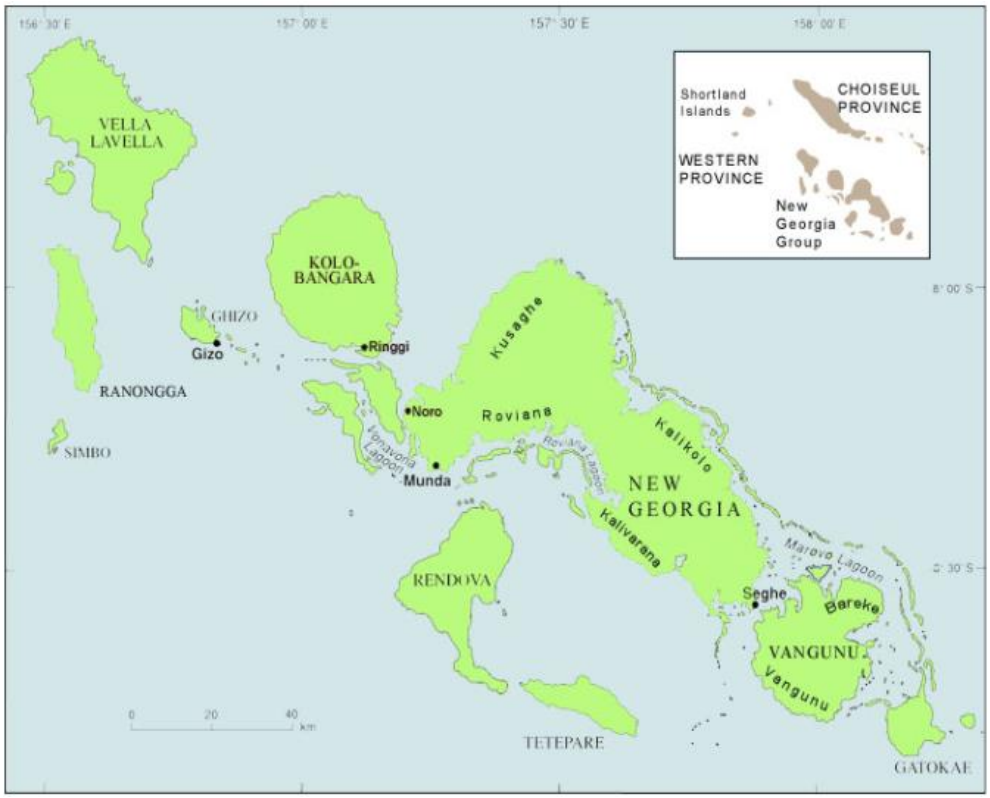

Figure 2: Map of Western Province, New Georgian Islands
Source: (WSRD, 2011)

1.1 Threats & Pressures

Natural resources in Solomon Islands supports the lives and aspirations of most Solomon Islands' local communities as more than 80% of all population are rural dwellers that mostly rely on their natural resources for daily sustenance (Green et. al, 2006). The rapid growth of cash economy and the demand for cash drives people to exert higher pressure on natural resources. This poses a greater challenge and threat to Solomon Islands' conservation efforts (WWF, 2014) and increases the vulnerability of resources.

Most of the countries biodiversity are threatened by excessive logging activities, habitat destruction, overexploitation, pollution, invasive species, and the impacts of climate change on small islands' ecosystems adding to the already vulnerable and threatened environment (MECDM, 2016). According to Pauku and Lapo (2009), commercial logging has changed the vegetation cover of the main islands over the years and it is estimated that forests cover has declined by about 4 % in 1990s alone indicating a significant loss of forest forestry resources and biodiversity in Solomon Islands. A reliable data base recording the degradation status of the remained forests is still under analysis by the government. With reference to the size of most of the islands' ecosystems, the species population tends to be very small. Therefore, with only 1% of natural resources being protected, most resources are vulnerable to the threats mentioned. Impacts of the threats are gradually felt as loss of habitat becomes apparent, as well as the extinction of species and the degradation of some of the key ecosystems.

The biodiversity within the Western Province political boundary are continuously under various threats; enormous pressures from excessive logging activities on the main islands, overharvesting of marine resources, sedimentation, and pollution from improper waste management, habitat destruction, invasive species and other negative impacts of climate change.

1.2 Existing Conservation Efforts

The Solomon Islands being a signatory to the Convention on Biodiversity (CBD) has a commitment to conserve at least 10% of its marine lives and coastal areas (CEPF 2010). This is an obligation towards reducing and managing known endangered species and preventing endemic species from undergoing local extinction (Ministry of Environment, Climate Change, Disaster Management & Meteorology, 2014).

The country has a strong focus on Community Based Resources Management (CBRM) realizing that 90% of all areas in the country are under customary tenure arrangements. The National Plan of Action (NPoA) recognizes CBRM as a core strategy to enhance food security, improve resiliency capacity to withstand natural and population pressures on natural resources, promote conservation, protect threatened species and habitats, and promote

fisheries management. Copious management efforts have been initiated across all the provinces, and these were established through the collaborative efforts of NGOs and local communities under existing local leadership arrangements. At the national level, as an effort to prevent biodiversity loss or conservation of resources, the Solomon Islands government established the Environment and Conservation Division as an administrating instrument to combat biodiversity loss in the country (Ministry of Environment, Conservation, Disaster Management & Meteorology, 2014).

In the Western Province, a lot of communities through local Community Based Organizations (CBOs) have embarked on marine resource management in collaboration with international and local NGOs such as but not limited to WWF, ESSI, World Fish, SICCP, and WCS. Their efforts have in recent years strengthened SILMMA (Solomon Islands Locally Managed Marine Areas), a network hosted under the Ministry of Fisheries to connect and build the capacity of all locally managed marine areas. Although SILMMA is currently inactive, it has been a platform for learning and information sharing regarding resource management. SILLMA manages coordination of the network of Local Marine Managed Areas (LMMAs) through their management committees, and their collaborative partners. It has been successful in assisting Solomon Islands communities to manage and conserve marine resources by empowering partners including individuals, communities, land owning groups, traditional leaders and others who are working towards conservation or sustainable management of marine resources in the country. SILMMA played a very important role in supporting conservation efforts significantly in the country, therefore more funding is needed to re-activate this important network.

Conservation efforts in the Western Province are minimal in the terrestrial environment but is greater for marine resources. Kolombangara has been the only island seconded to Tetepare to have initiated terrestrial resource management, with work currently underway to declare its areas above 400 m contour a national park; protected under the Protected Areas ACT 2010.

A few of the management initiatives established in the province have vainly attempted to have their management plans formalized and designated under the Solomon Islands Protected Areas ACT 2010. Although unsuccessful in meeting all the requirements stipulated in the Protected Areas ACT 2010, these conservation, and natural resource management work are consistent with the National Biodiversity Strategy and Action Plan (NBSAP), and the NPoA (National Plan of Action) (Pauku & Lapo, 2009).

1.3 Biodiversity Features of Focus Areas

1.3.1 Kolombangara Island

Kolombangara Island, also known as the 'water king' for having more than 80 rivers, supports many different unique ecosystems and habitats, with lowland forests surrounding the entire island (Edoway, 2015). Other forests types that covers the island includes, but not limited to, mangrove and coastal forests, ridge and uphill forests, montane and cloud forests, and plantation and secondary forests. The island is unique also for having a forested crater with deep caverns and gulches. Many plants species as species of ferns, herbaceous plants, fleshy stemmed plants that are rich in water contents, shrubs, trees, mosses, and lichens or crypogamic (Pikacha & Sirikolo, 2010). These plants are found to be restricted to extremely wet conditions and elevated humidity

An inventory study conducted by ESSI, University of Kansas and University of New Mexico at the north eastern tip of the island exhibit high levels of biodiversity at contrasting heights along the island's gradient (see appendix 2) There were findings of various species of bats, frogs, skinks, geckos, birds and mammals (Field note, July 2017). A number of plants species were recorded along the catchment of several rivers in the survey sites with more species of crustaceans found in various rivers surveyed (See appendix 2)

1.3.2 Ghizo Island

The Ghizo Island, like Kolombangara, holds extraordinary beauty with its unique natural heritages that supports a complexity of natural wild life species in both the marine and terrestrial environments. The habitat types ranges from brackish swamp and mangrove forests, lagoons, reef flats, verdant islands, sand banks, sheltered bays and deep ocean basins that provides favorable conditions for micro-algal beds, seagrass meadows and coral reefs.

The marine ecosystem in Ghizo Island is renowned for its rich diversity of reef fish and coral species. It is recognized as one of the most biologically rich ecosystems in the Solomon Islands. While there is high biodiversity around Ghizo Islands, the human pressures is excessive due to various patterns of resource use, cultural and social practices owing to the residing different racial groups living on the island. A socioeconomic study reported a high dependency of marine resources for daily food and cash in both rural and urban populations on Ghizo Island, (WWF, 2011).

1.4 Aims & Objectives

The project aims to facilitate the development of Ridges to Reef conservation planning through a participatory stakeholder's process by involving key resource people of Kolombangara and Ghizo islands to provide input and impart knowledge of threats and the key ecological, biological and cultural features found on their corresponding islands.

It is envisioned that through the development of this conservation plan report and through the implementation of Ridges to Reef conservation planning the key ecological (marine and terrestrial habitats) and cultural features on the islands of Ghizo and Kolombangara will be protected, in turn providing communities within these targeted Islands benefits from increased food security, income and livelihoods.

This conservation plan document would form a framework for future conservation planning for the Western Province. It can be used by the provincial government, NGOs and other stakeholders to plan and make recommendations regarding conservation work and for any development proposals for the islands of Ghizo and Kolombangara.

2 METHODOLOGIES

2.1 Initial Information Collection

Phase 2 of this R2R project for Ghizo and Kolombangara is built on the results and the experiences gained from phase 1 which was focused on awareness raising and capacity building. The awareness activities on ridges to reef were keys in aiding a better understanding of the approach and the resulted planning. Some of the initial information collected or gathered prior to the beginning of phase 2; include a literature review on the important ecosystems, key biodiversity sites of conservation importance and species composition of Ghizo and Kolombangara. Articles about biodiversity, recorded threats affecting various ecosystems of both islands were researched online. All information collected provided a background basis to develop mapping of identified areas that are important to includein this ridge to reef conservation plan for Ghizo and Kolombangara.

2.2 Preliminary Mapping

Maps of Ghizo and Kolombangara available on the internet provided a base to map out key resource areas plans and for communities to provide inputs on areas of conservation interest.

Most information for Ghizo was extracted from the maps produced in the Ghizo conservation blueprint, a conservation document created in 2014. Kolombangara maps were accessed through the KIBCA website. Existing maps of Ghizo and Kolombangara included most of the marine (MPAs) and terrestrial protected sites, terrestrial biodiversity, land use tenure, customary land and alienated land boundaries. Marxan analysis could not be used for this project since there was no GPS data point for areas intended to be mapped. The satellite image maps of Ghizo and Kolombangara were shown to the resource owners and information based on general ideas about the sites and areas on the maps were brought forward and mapped.

For Kolombangara Island, satellite images that contain maps of the Island's biodiversity, conservation features, land cover and important ecotourism sites were obtained and used

in participatory mapping exercise. The participatory mapping exercises depended on the maps produced in the Ghizo conservation blueprint and the satellite maps of both Ghizo and Kolombangara to validate the already existing information and data for Ghizo and Kolombangara biodiversity.

2.3 Stakeholder Engagement Process

WWF SI sent out invite letters to all relevant stakeholders to attend an R2R workshop in phase 2 of the project. Not all requested representatives in the list below who were invited had participated

- Western Provincial Government and National Government,
- Gizo Environment and Livelihoods Conservation Association (GELCA),
- Kolombangara Island Biodiversity Conservation Association (KIBCA),
- Tetepare Descendants Association (TDA),
- Ecological Solutions Solomon Islands (ESSI),
- The Nature Conservancy (TNC),
- Solomon Islands Community Conservation Partnership (SICCP),
- Natural Resource Development Foundation (NRDF),
- World Fish,
- American Museum of Natural History (AMNH)
- Wildlife Conservation Society (WCS).

Stakeholders unable to attend meeting had other commitments at the time.. It is important to note the involvement and different roles each organization plays in the course of the project.

2.4 Ridges to Reef Workshop (TOT Workshop)

WWF SI conducted the first ridge to reef train the trainers' workshop in December 15th of 2016 at the Women's Resource Centre building in Gizo, to prepare for the participatory mapping process and exercise.

Representatives from Kolombangara Island Biodiversity Conservation Association (KIBCA), Gizo Environment and Livelihoods Conservation Association (GELCA), Community conservation representatives, Ecological Solutions Solomon Islands (ESSI) and WWF SI based in Gizo attended the workshop. WWF and ESSI facilitated the workshop which was mainly based on presentations on the R2R concept taking into account the biodiversity of Ghizo and Kolombangara Island and the threats that have affected the various ecosystems overtime.

The workshop began by providing a brief background of the project followed by core presentations and then later discussions were facilitated to enable a sharing of conservation experiences from the various participants. Also during the workshop, facilitators highlighted

the objectives of the workshop; work completed to date and then explained the outcomes and information to be collected from the workshop. The workshop closed with WWF outlining the program activities yet to be done and the date of the first mapping exercise.

2.5 Participatory Mapping Workshop and Exercise

There were two (2) different mapping sessions. The first participatory mapping workshop exercise was held at the United Church building meeting area in Gizo town on 21st February 2017 and the other mapping exercise was conducted at Kena Village on Kolombangara Island on May, 30th, 2017. Again representatives from KIBCA, GELCA, Community conservation reps with WWF and ESSI attended the workshops. The main objective of the mapping workshop was to insert inputs to the base map which was later digitized and analyzed by a GIS specialist.

With the knowledge gained from the R2R workshops, participants were asked to identify and confirm key important resource areas or ecosystems (ecological and social features), the ecosystem services provided by those identified important ecological features and also the threats to these areas. Brown papers were given to each group for written information and large format color base maps of the Islands of Ghizo and Kolombangara were provided to each group of participants to label and delineate features.

The participants were then asked to add and mark on the map using water colors and permanent markers any important ecological feature such as mangroves, coral reefs, sea grass beds, coconut plantation, grasslands, flying-fox roosting sites, Bird sighting areas eg Gizo white eye etc. The same was done for the key ecosystem services (eg. Tambu sites, traditional shell money, food and water, gravel, timber, traditional herbal medicines etc...), and also for the threats (e.g. logging, sedimentation, climate change, population pressure, erosion, coastal inundation, pollution etc.). All these base maps were photographed to make sure all information is captured and kept for digitizing.

2.6 Digitizing and Categorizing Features Identified Through Participatory Mapping

After the participatory mapping workshop, all line and polygon features captured on these base maps were digitized to create GIS files for all features and a dataset built that could be used for MARXAN analysis. During the participatory mapping held in Gizo town on 21st of February 2017, most of the identified features and areas in Ghizo and surrounding islands were mapped however for Kolombangara, mapping was completed during the participatory mapping workshop at Kena Village in Kolombangara.

2.7 Identification of High Value Areas

The high value areas around Ghizo and Kolombangara were identified by the Community representatives during the Participatory mapping exercises by simply indicating important resource areas of great value on blank maps provided using markers.

Coconut plantation and Mangrove forests for example are high value areas hence most resource owners have selected them to be one of their important conservation areas of interest that should be mapped.

2.8 Stratification units

WWF has worked with Gizo Environment Livelihood and Conservation Association (GELCA) in identifying community facilitators who then select community representatives (key resource people), who are instrumental in identifying community zones during the workshop discussions.

Those community zones are mainly villages on ward 11 of Ghizo Island and ward 12 South and ward 26 North of Kolombangara Island as stated in the proposal. Unfortunately, the zones are not specifically mapped but can be seen clearly with their boundaries extended from terrestrial to marine areas (refer to Figure 6 and Figure 9, in chapter 3). Saeraghi and Vorivori villages on Ghizo have larger proportion of marine areas compared to terrestrial habitats. Marine management areas dominated a significant size in the boundaries of those marine areas.

On Kolombangara, the resource people have marked the 400 meter contour as one large conservation area/unit (current status) and more emphasis is on terrestrial areas than marine (refer to Figure 9).

The villages as stratification units are marked light pink in colour (broken line) for both Ghizo and Kolombangara.

Figure 3: Ridges to Reef workshop (Training of trainers' workshop) in Gizo
(Source: ESSI)

The workshop and mapping exercise were both attended by community facilitators and representatives of Ghizo, KIBCA and GELCA representatives, with ESSI and WWF teams.

Figure 4: Participatory mapping exercise at Kena village, Kolombangara.
(Source: ESSI)

Community representatives from selected 30 villages around Kolombangara with KIBCA, ESSI and WWF teams attended the participatory mapping exercise.

3 KEY OUTPUTS AND DISCUSSIONS

The R2R workshop was a successful one together with the participatory mapping exercises. It has been noted in the workshop that the participants, especially the resource owners, were keen and eager to share their knowledge and understanding on the resources they have, as well the issues and threats encountered and experienced.

During the participatory mapping exercises, community representatives from both Ghizo and Kolombangara were very supportive in providing baseline information that were gathered and digitized for the production of resource maps. The information contained in this report (such as the maps and the summaries of conservation features) is essential in developing the R2R conservation plan to assist decision makers in the Western Provincial Government.

Most of the maps and tables that will be displayed and summarized in this section involved the information identified by the participants (resource owners and representatives from WWF, ESSI and other Government officials) during the workshop and the preliminary mapping exercises.

3.1 Ecological features

During the workshop and the participatory mapping exercises, participants identified terrestrial and marine ecological features.

About a total of 49 ecological features were identified for both Ghizo and Kolombangara (see Table 1). Most of the eco features or areas of conservation interest are also high value areas where people depended highly upon for their survival. Specific species sightings were also identified for example sightings of birds, dolphins, dugongs etc in certain localities around Ghizo and Kolombangara Islands. It is important to note that different species of conservation interest as recorded occurred in various habitats from the marine areas up to the ridges and mountains.

Table 1: Eco features identified for Kolombangara and Ghizo and their map codes.

MapCode	EcoFeature
B	Birds
C	Cave
CC	Coconut Crab site
CF	Cattle farm
CoP	Cocoa Plantation
CP	Coconut plantation
CR	Coral reef
Cr	Crocodile
DA	Diving area
Do	Dolphin
Du	Dugong
EF	Eell Fish
F	Forest
FF	Flying-fox
Fi	Fish
FP	Forest plantation
Fsh	Fishing spot
FshP	Fish pond
G	Garden/farming
GB	Grassbird site
GF	Gobi fish
HB	Honey bee
HN	Heron Nesting site
L	Lake
LF	Low land forest
M	Mangrove
MA	MPA
NF	Natural Forest

MapCode	EcoFeature
OF	Open forest
PiF	Piggery
PoF	poultry farm
R	River
RC	Roots Crops
RG	red ground river
S	Stream
S	Swamp
SG	Seagrapes
SG	Seagrass
SG	Seaweed
SPAG	SPAG
SPAG	Spawning site
SpW	Spring Water
Surf	Surfing area
SW	Ship Wreck,warship
SW	Seaweed
Swk	Ship Wreck,warship
T	Trochus
TS	Tambu Site
TS	Tamboo Site
TT	Traditional Taro
WC	Wildcat
WF	Waterfall
WS	Water source
WSB	White sand beach

3.1.1 Ecological features for Kolombangara

Kolombangara Island is one of the most diverse and biologically rich Islands in the Western Solomon Islands. It has some important and unique species of plants and animals such as frogs, bats, snakes and lizards recorded over the years (Pikacha and Sirikolo, 2010). The Oceanic Island features a range of habitat characteristics from beautiful coral reefs, Mangrove forests, coastal forests, swamps and riparian habitats, lowland forests, ridge and hill forests and up to the cloud forests looking down the crater (Pikacha and Sirikolo, 2010).These locales provide significant niche space for many vertebrate species, with some species absent from disturbed and modified habitats (Pikacha and Sirikolo, 2010).

There are about 30 representatives from villages that joined in the participatory mapping exercise for Kolombangara. The participatory mapping exercise is new for Kolombangara Island and the resource areas (eco features) identified by the community representatives

are simply areas of conservation interest ranging from coral reefs, mangroves to secondary forest and plantations.

Recent data from biological surveys/studies conducted on the Island's biodiversity in 2015 and 2017 has provided important information on different species and ecosystems that needed to be conserved by people in the surrounding communities. As different species (s) co-exist in ecosystems, the collective efforts to protect and conserve target species for instance dolphins, birds, wild cats and flying foxes etc.., will also benefit the various ecosystems and the related non-target species. In this way, the holistic approach to conserving the ecosystems from the ridges to reefs perspective will be achieved.

The Figure 6 displays all the ecological features with corresponding codes identified by the key resource owners of Kolombangara Island during the participatory mapping workshops. As shown in Figure 7, Coconut plantation (25) is the most common eco feature identified by the Kolombangara resource owners. The other common ones include Garden (22), Forest plantation (21), Coral reef (18), River (17), Mangrove (12), Tambu site (11), Dolphin (8), Waterfall (6), Flying fox (3), Lake (3) and on to the very least common eco features but still important features of the Island's biodiversity.

The different eco features on Kolombangara Island is presented in the Figure 7, where the numbers on the graph represent the intensity of the most common eco feature to the least common eco-feature. It is important to note that all of the graphed eco features are notable areas of conservation interest brought forward by the community resource owners and that the features provide people of Kolombangara with essential ecosystem services for life. Few of the eco features are directly culturally related like Shipwrecks, Tambu sites and Traditional taro, while most eco features also have cultural connections or links such as Waterfalls (Figure 5), Coconut plantation, Dolphins, Crocodiles etc. People from Kolombangara value these features as they contributed much to their culture and livelihood (Davies and Garrett, 2015).

Figure 5: Miles Waterfall, a tributary to the Vila River deep inside the crater PatuKolo.
(Source: Andrew Cox)

For instance, people have traditional connections with their tambu sites and can produce copra (income) and all sorts of crafts like baskets and carvings from Coconuts. Coconut plantations, Gardens and Forest plantations are not actually natural habitats rather more altered habitats. Forest plantations and Coconut plantations might have some remnants of native plants that are often sparsely distributed within and at plantation edges so by conserving those large plantation areas, native plants including shrubs and herbs might have the chance to thrive as well.

Natural ecosystems like coral reefs, rivers, mangroves, lakes and lowland forests are also important eco features that support humans and wildlife (plants and animals). Many species of flora and fauna like various native plants, Sea grapes, Gobies and other fish species, wild cats, bats, frogs and endemic birds such as the Solomons white-eye *(Zosteropskulambangrae)* and Roviana rail *(Gallirallusrovianae),* well known in the Western Solomons as the 'Grass bird', live in these ecosystems. The interconnectedness that exists between the people of Kolombangara and the surrounding ecosystems and environment is very important as far as peoples' livelihood is concern. The resource owners from the Island understood what it meant to rely on those natural ecosystems or features for survival.

During the mapping exercise held at Kena on May 2017, the people placed more emphasis on conservation and resource management and were more vocal against logging as it destroyed much of what they have in nature.

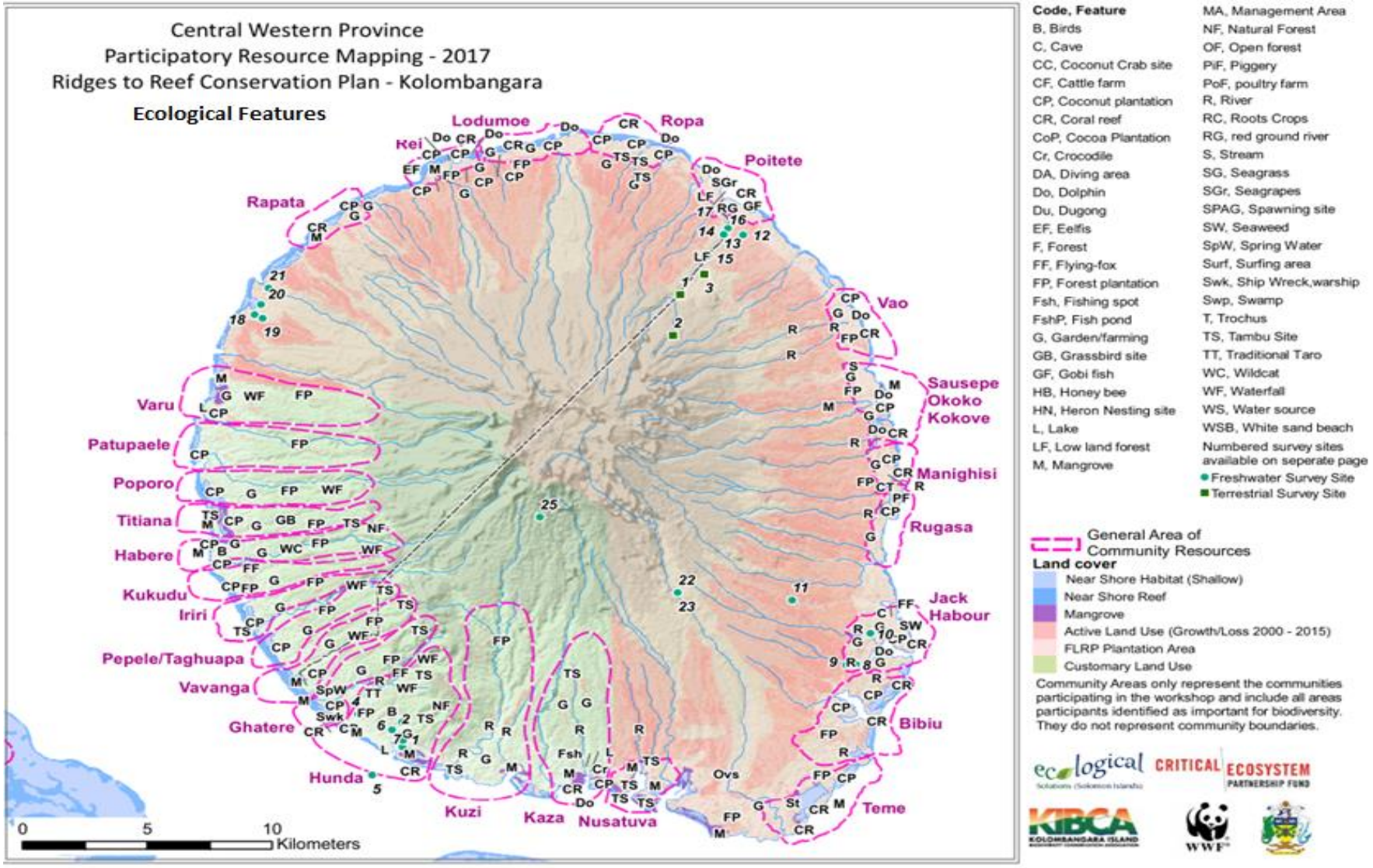

Figure 6: Map of Ecological Features of Kolombangara Island with corresponding codes

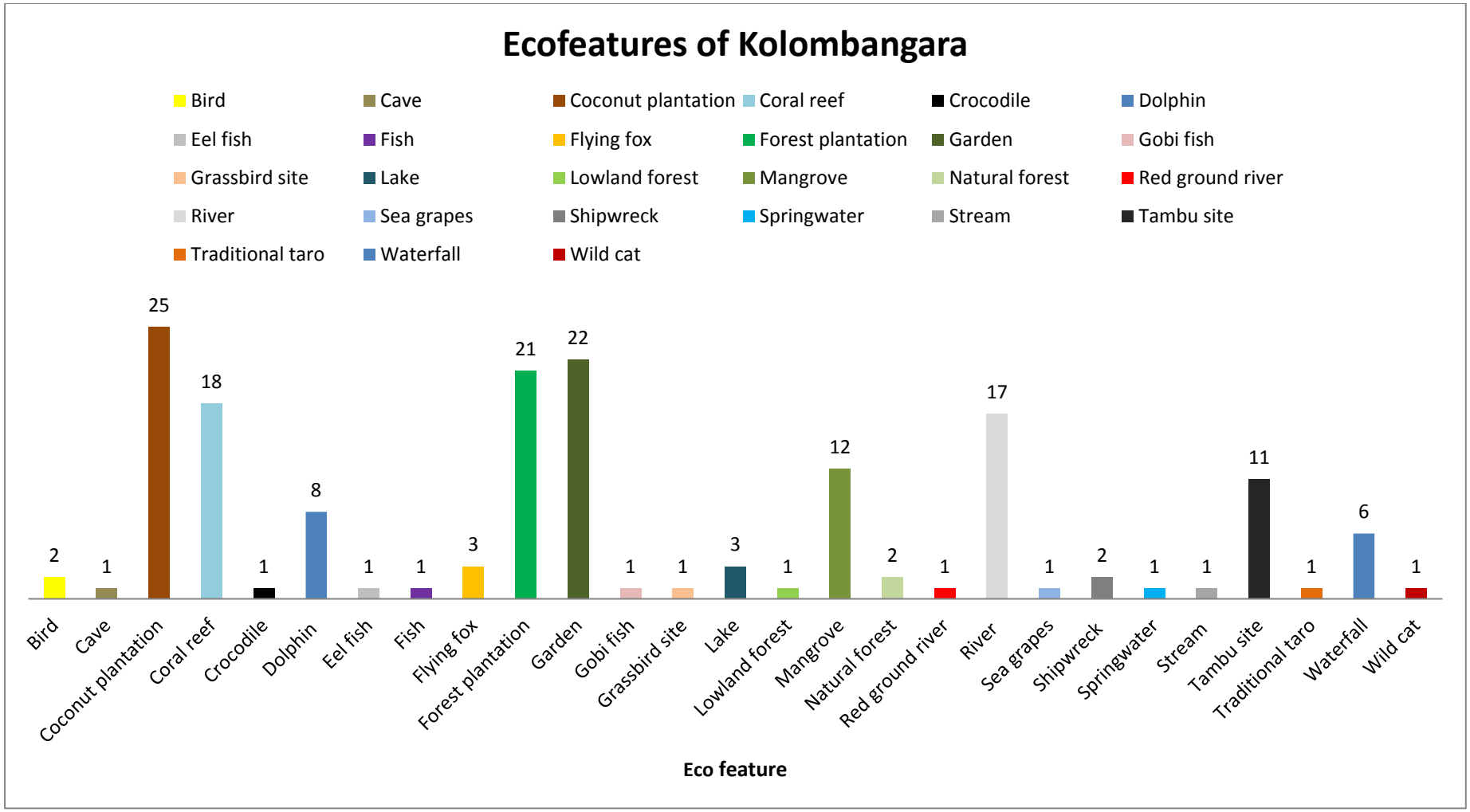

Figure 7: Eco features on Kolombangara Island.

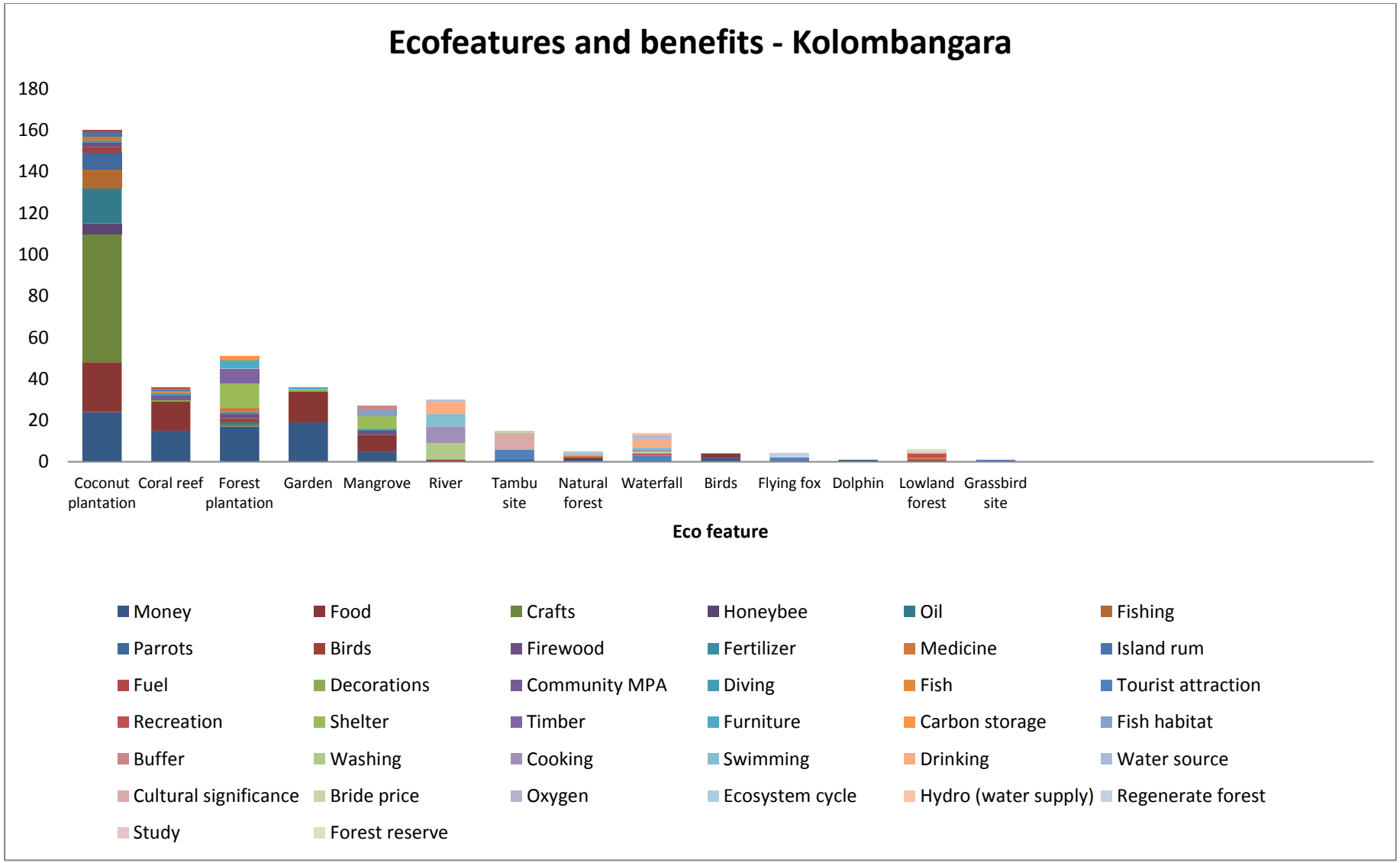

Figure 8: Eco features and benefits on Kolombangara Island

The bar chart of eco features of Kolombangara with their values or benefits are presented in the Figure 8. The values are represented by the stacked columns. The sizes of the stacks represent the level of importance of the ecological values. About 6 eco features were not included in the chart namely: shipwreck, wild cat, red ground river, Eel fish, traditional taro and sea grapes; but it does not mean they are excluded from the discussion.

As depicted on the bar chart, Coconut plantation, Forest plantation, Coral reef, Garden, Mangroves, River, Tambu sites, Waterfall, Lowland forest and Natural forest have more clearly defined values/benefits that the people have seen and experienced. Most people from Kolombangara benefited more from Coconut plantations. It has clearly outweighed most of the ecological features when talking about the services it provides to the people (values/benefits).

People of Kolombangara have benefited from the Coconut plantations through income (blue stack), food (red stack), crafts (baskets, mats etc...) (dark green stack), oil, building materials to name a few. Forest plantations provide people with timber, means of shelter, income, furniture, traditional medicines, firewood etc. The forest plantations were planted by the indigenous people and the advantage is that, people have wide varieties of raw materials to select from and can be used for different types of products. Traditional gardens on the Island are a great deal for the citizens of Kolombangara. The resource owners have stated that people valued and depended on their gardens for food and income.

According to Edoway (2015), the main economic activities that were inclusive of most of the eco features of the Island are agriculture, forestry and fisheries. Marine natural features like Coral reefs and mangroves supported many marine lives that directly and indirectly benefited the people as well through income, food (protein), tourism, ornamentals, fuel and others. Mangroves and Coral reefs acted as buffer zones that protect beaches and coasts from breaking waves and strong winds and further are habitats, breeding and nursery areas for marine organisms like fishes and crustaceans.

The natural forests, Waterfalls and Lowland forests offer services like tourism and recreation, ecosystem functions like water regulation, air (oxygen) regulation and water and soil protection. Fresh water from various waterfalls on the Island supply domestic water benefits like cooking, swimming and drinking and also the source for hydro power. In addition most people are drawn to the Island for study and research purposes. The Island's rich biodiversity has attracted a lot of interest locally and internationally. Species (s) of Plants, Bats, Frogs, Mammals and Birds especially the Solomons White eye *(Zosteropskulambangrae),* Kolombangara White eye *(Zosteropsmurphyi)* and the Roviana rail *(Gallirallusrovianae),* are bird species of interest (refer to appendix 2 for species survey list on Poitete). The Kolombangara Island Biodiversity Conservation Association (KIBCA) has taken the initiative to preserve the Kolombangara crater and the forests above 400 meter altitude to ensure people continue to receive the ecosystem benefits from the forest (Cox and Vaghi, 2014).

Shipwrecks, tambu sites and traditional taro have cultural significances that were related to the Island's rich history and beginnings and the peoples' ancestors traditional way of life. Most tambu sites on the Island are highly valued by the people and have attracted tourists over the years (Cox and Vaghi, 2014).

In general, food and income are two (2) of the most important benefits people of Kolombangara have received from their natural resources. Those eco features with the services provided did add value to Kolombangara's biodiversity and people have experienced the benefits traditionally, socially and economically.

3.1.2 Ecological features for Ghizo

There are about nine (9) villages who participated in the mapping exercise for Ghizo Island.

Ghizo Island unlike Kolombangara had gone through participatory mapping exercises previously which resulted in the production of the Ghizo Conservation Blue-print Report. Most of the people that contributed to the Ghizo conservation blueprint have also contributed to phase2 of this project hence most of the inputs are closely aligned with the Ghizo Conservation Blue-print.

Ghizo Island does not have broad habitat characteristics such as cloud forests and montane forests that would cater for a higher number of species diversity and various ecosystems. However, the islands are blessed with scenic coral reefs, sandy white beaches, war wreckages and relics to a myriad of marine lives and mangrove forests, grassland and woodlands and to the secondary forests and plantations. The marine areas around Ghizo are abundant with life and definitely more rich in species compared to the terrestrial habitats not to mention the endemic Gizo white eye bird *(Zosteropsluteirostris)*, that is currently under threat due to clearing of land (loss of habitat).

The Ghizo Islands marine environment is also one of the most biologically rich ecosystems in the Solomon Islands and is of global significance. Its wide range of habitats include brackish swamp and mangrove forests, lagoons, long stretches of shallow sheltered reef flats, verdant islands, sand banks, sheltered bays and deep oceanic basins that provide favorable conditions for macro-algal beds, seagrass meadows and coral reefs (World Wide Fund for Nature, 2011). Generally, the main natural habitat types around Ghizo and surrounding islands are Coral reefs, Sea grass and Mangroves (Ghizo Conservation Blue Print, 2014).

The Figure 9 displays all the ecological features with corresponding codes identified by the key resource owners of Ghizo Island during the participatory mapping workshops. The Figure 10 show the different eco features on Ghizo Island (note that the numbers on the graph represent the intensity of the most common eco feature to the least common eco feature).

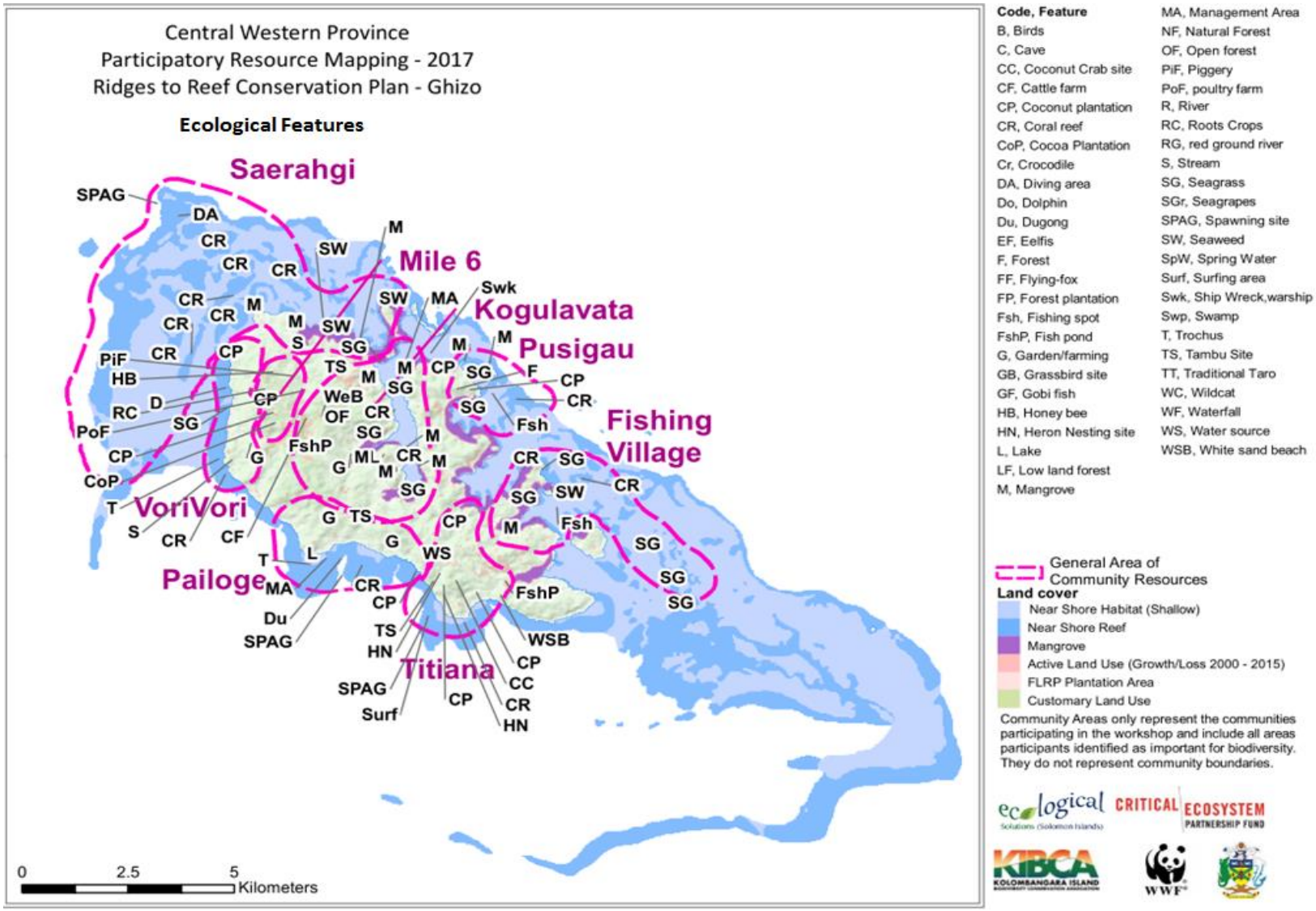

Figure 9: Ecological Map of Ghizo Island.

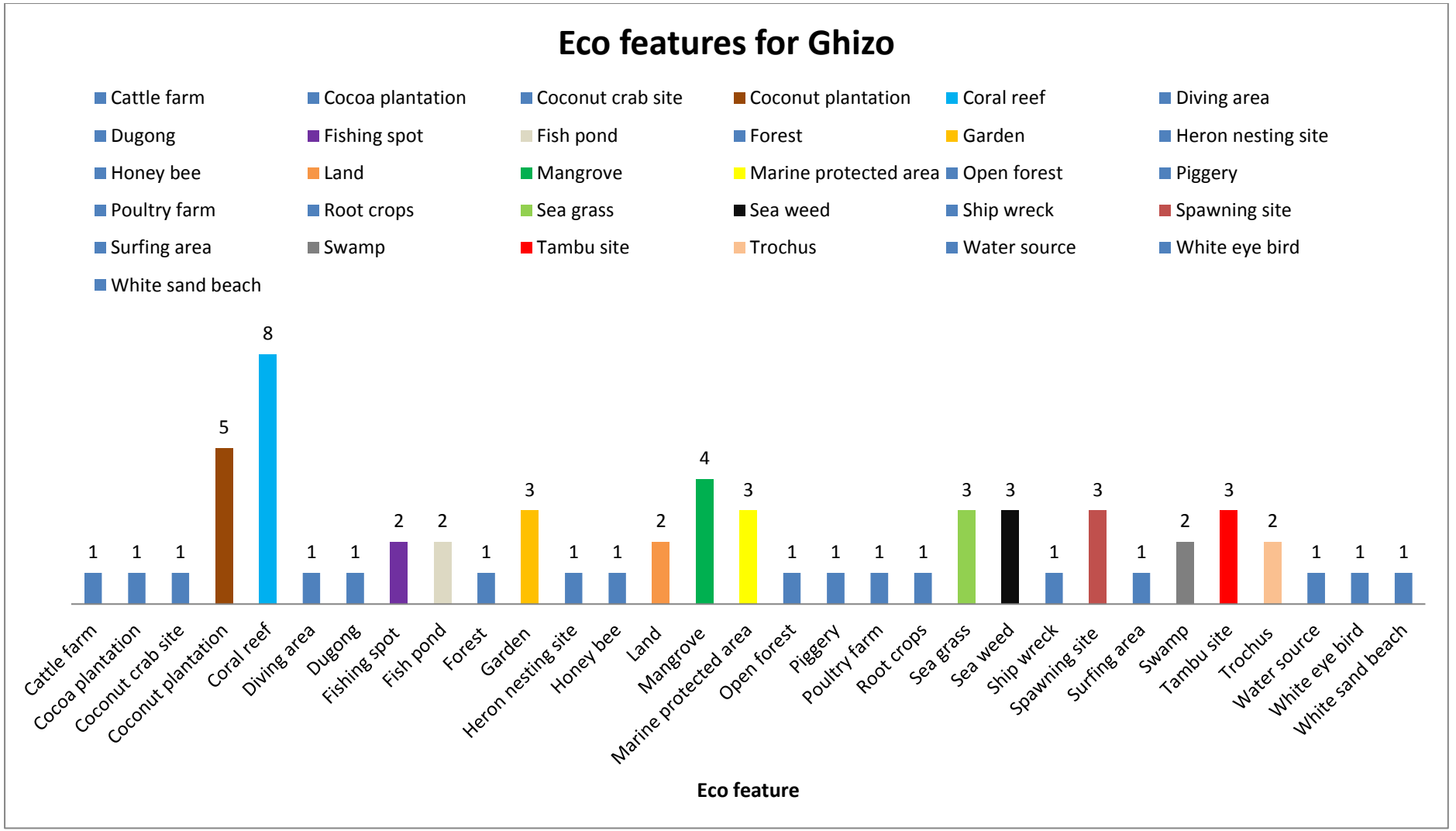

Figure 10: Eco features on Ghizo Island.

Note that the numbers on the graph represent the intensity of the most common eco feature to the least common eco feature.

As shown in the Figure 10, Coral reef (8) is the most common eco feature on Ghizo Island followed by Coconut plantation (5), Mangrove (4), Garden (3), Marine protected area (3), Sea grass (3), Sea weed (3), Spawning site (3), Tambu site (3) and on to the very least common eco features (navy blue bar charts) but important features of the Island's biodiversity..

According to Ghizo Conservation Blue-print 2014, Coral reefs, Mangroves and Sea grass are the main habitat types found around Ghizo. It was obvious from the findings that Coral reefs (sky blue bar), Mangroves (dark green bar) and Sea grass (light green bar) were all common eco features and that coincides with the Ghizo conservation blueprint report. As depicted in Figure 11 on the next page, large portion of marine areas around Ghizo are covered with beautiful coral reefs and mangrove forests dominated the Northern coasts and shorelines. This map technically has shown the habitats from ridges to reef inclusive of all of the eco features identified by the resource owners from Ghizo Island. Sea grass meadows occupied significant parts of the reef where the ocean is shallow adjacent to mangroves and more predominantly on clear sandy areas on the coasts. These marine ecosystems are an important component of Ghizo Islands' natural heritage; as a complex matrix of habitats that support rich biodiversity and for their economic value in supporting the traditional subsistence economy and commercial harvesting (WWF, 2011).

Only one area of natural forest remains the rest of the island is dominated by coconut plantations and secondary forests that have been planted since the island was logged in the 1960s (Ghizo Conservation Blue-print, 2014). Over the years the coconut plantations have benefited the people economically (copra) in rural villages mainly on the west coast of Ghizo. Other eco features like cattle farm, piggery and poultry farm are not very common on the area and are confined to Mile 6, a village in the inland Northern side of the Island. The farms are in the Secondary forest including rural gardens. Though farmlands are altered habitats, they are examples of man-made ecosystems that are directly and indirectly supporting the well-being of people and as essential features in the ecosystem cycle.

Tambu sites and shipwrecks are merely cultural related and have attracted tourists overtime who would come and visit those sites around the Island. Ghizo Island has a rich traditional history which connects the people to their ancestors who were the original inhabitants of the Island. Different terrestrial and marine species (s) are also significant features identified by the resource owners that contributed to the Island's biodiversity.

As seen in Figure 10, Coconut crab, Honey bee and Gizo white eye bird were three (3) terrestrial species considered important by the people. There are very few land mammals and native frog species in Ghizo due to relatively dense human populations and lack of primary forests (WWF, 2011). In the marine areas, species like trochus shell (*Trochus niloticus)*, Dugong, sea weed and various fishes are celebrities of the shallow lagoons, reef flats and sheltered bays. These different marine lives contributed to Ghizo Island being a marine hotspot and having a unique seascape.

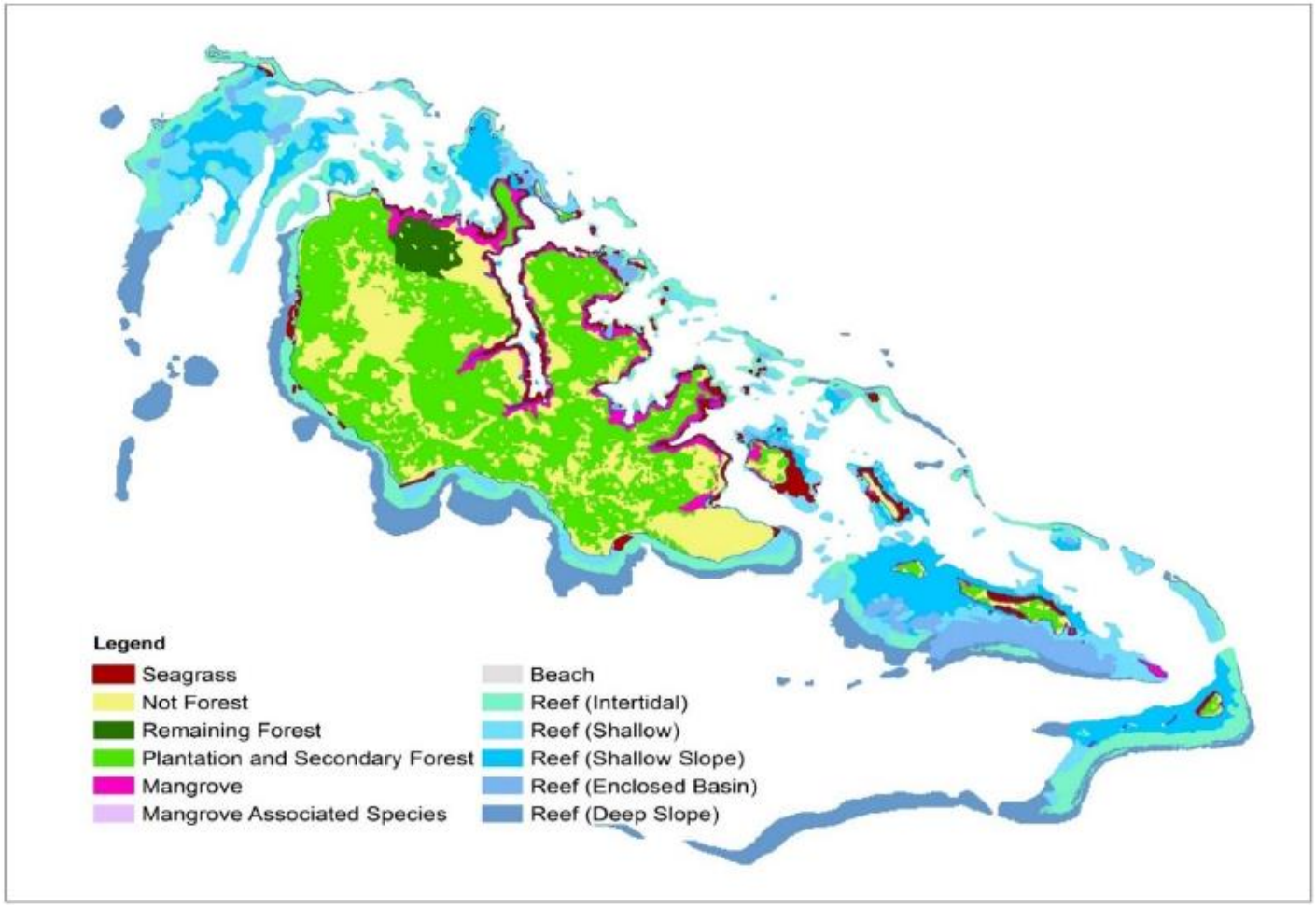

Figure 11: Habitat types on Ghizo Island.
(Source: Ghizo Conservation Blueprint, 2014).

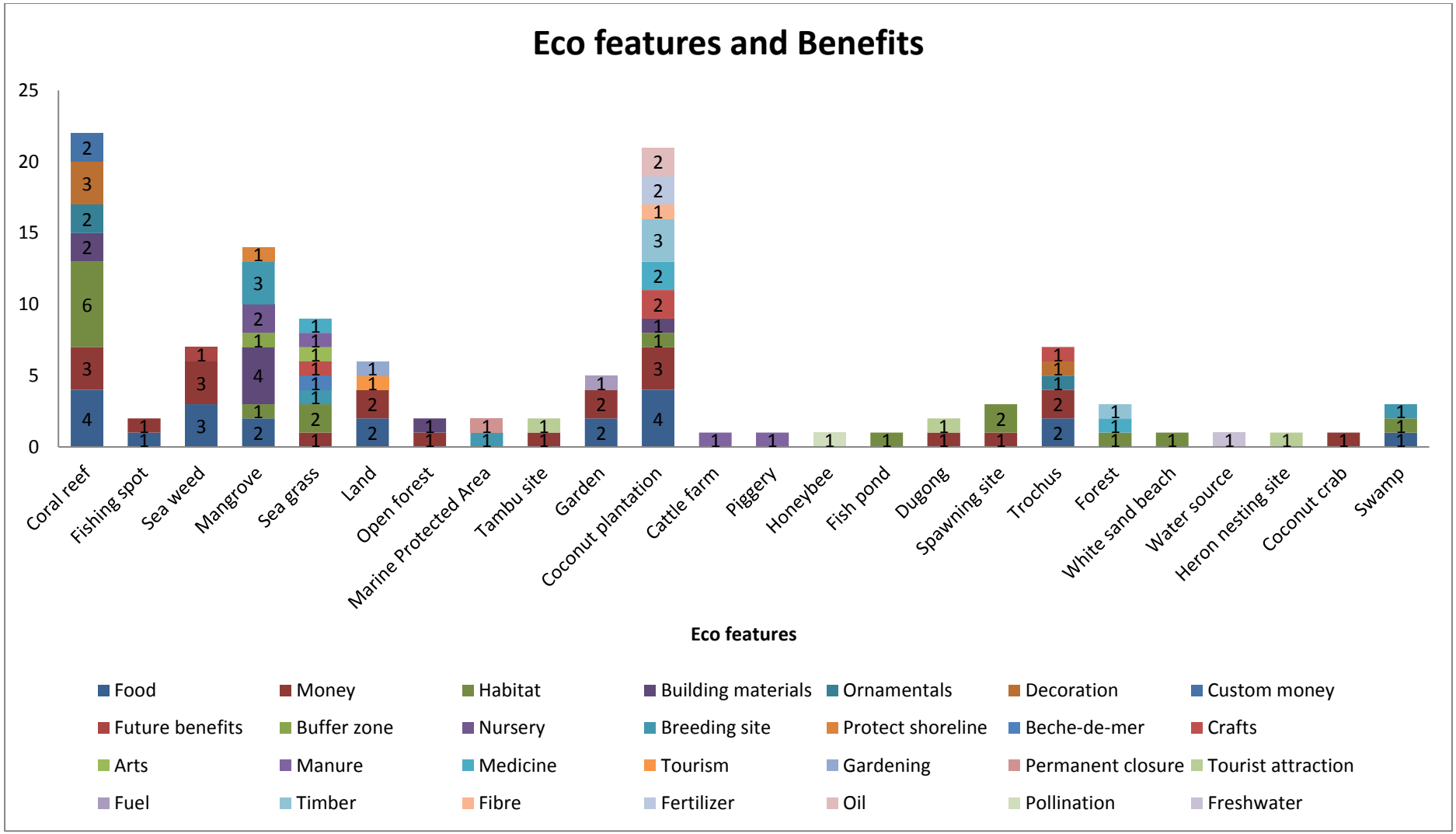

Figure 12 Eco features and benefits on Ghizo Island.

Note: The values (benefits) are represented by the stacked columns.

The larger the stack indicates the greater the importance of the ecological value. The size of the stack indicates ecological values along with the level of importance

As shown in Figure 12, people of Ghizo have benefited a lot from eco features like coral reefs, coconut plantations, mangroves, seagrass, sea weed, trochus, land and gardens. These mentioned eco features have more benefits and those values provided the people services that support livelihood and ecosystems. Other eco features such as piggery, honey bee, fish pond, tambu sites, white sand beach, heron nesting sites and swamps are also important eco features but with limited benefits.

Coral reef is the most common eco feature in Ghizo where people benefited a lot from. The resource owners in Ghizo have valued the services that this ecosystem has provided. Such values include buffer zones to protect shoreline from crashing waves, food, income (money), tourism activities, habitat for most marine lives and raw materials for ornamentals and decorations. Marine protected areas which include permanent and seasonal closure areas are part of the reef system. Njari Island is one example of a permanent closure area under GELCA management (WWF, 2011). This significant globally outstanding biologically rich marine area has some of the highest fish and coral biodiversity in the world and has supplied other areas in the vicinity stocks of fish (WWF, 2011). Saeraghi village at the western coast of Ghizo has a marine management area that is of seasonal closure. Sea weed and various reef fish species found in the area are well managed by the community and has become a source of food (protein) and income for the people. In addition, Njari Island as well as other notable sites around Ghizo has attracted tourists who would come to do snorkeling, diving and other recreational activities which then provide income for the resource owners.

Mangroves and sea grass communities are two important marine habitats identified around Ghizo. Those two (2) eco-features are highly valued because they provide ecological services like buffer zones against strong winds and waves, nursery and breeding sites for many fishes and crustaceans, natural habitats, building materials, filtering sediments etc. The dugong depends on sea grass meadows for food and habitat. Terrestrially, Ghizo Island is dominated by secondary forest and plantation mainly coconut. Two of the most important benefits people have received from Coconut plantations are food and income (money). Crafts like baskets and mats, oil, timber, building materials, medicine etc are other values identified for coconut plantations. Furthermore, open forest, piggery, cattle farm and gardens are part of the secondary forest. Gardens especially are considered to be traditional banks and most people in the villages depend entirely on their traditional gardens for their livelihood. An important eco feature identified which is not very common but occur in some areas on Ghizo is the freshwater swamp. The swamps are habitats and breeding sites for most freshwater swamp species like some birds, skinks and freshwater invertebrates. Usually on lowland, freshwater swamps contain swamp taro (source of food) and various shrubs and trees are hosts to epiphytes (WWF, 2011).

3.2. Threats and pressures

There were about 51 total threats acknowledged for the eco features of Kolombangara and Ghizo. About 28 threats and pressures were identified for Kolombangara whilst Ghizo registered 34 threats and pressures. Majority of the threats that have been identified during the workshop and mapping exercises are similar for Ghizo and Kolombangara and have negatively impacted the biodiversity of both islands. Out of the 51 threats identified, 20 threats were natural while the remaining 31 threats were caused by human interference on the environment (Figure 13).

Some threats occur naturally and can be quite difficult to control such as climate change, sea level rise, coral bleaching, intense heavy rains and cyclones, droughts, sedimentation, crown of thorns starfish out breaks etc. Threats like diseases are epidemics and most pests are vectors of various diseases like worms while other pests like insects directly affect the ecosystems.

Human induced threats such as logging, clearing of land for gardening and settlement, deforestation, overharvesting of marine resources, and careless boat anchoring to name a few. All these can be minimized if people understand the importance of biodiversity and what the different eco features have to offer for their livelihood.

Inhabitants of Ghizo and Kolombangara need to value the ecosystem services received from the various eco features identified from their Islands and engage in sustainable management practices.

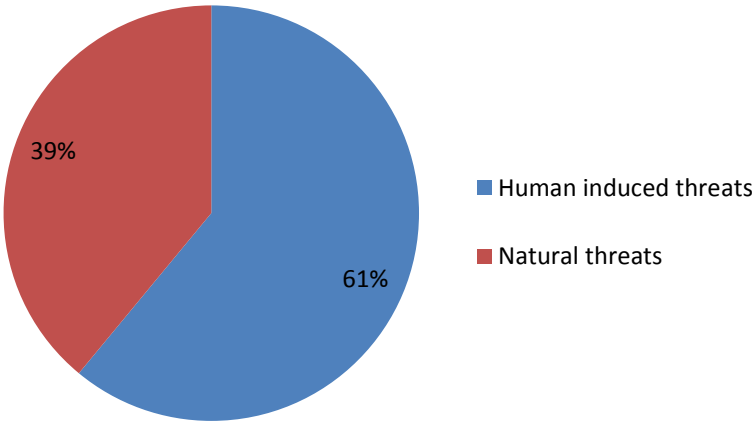

Figure 13: Percentage of human induced threats and natural threats on Ghizo and Kolombangara eco features.

Few natural threats are related to human interference in the environment such as the introduction of cane toad and dogs. Cane toads are invasive species that have negatively affected the biodiversity of Kolombangara and the Ghizo Islands posing risks to native frog species and other insects as well as disrupting the natural processes (food chain). Dogs have eaten off poultry farms; destroyed gardens, and also polluting water sources and rivers.

The overall threats to the ecological features on Ghizo and Kolombangara islands are presented in **Error! Not a valid bookmark self-reference.** below. The threats were categorized into human induced and natural threats. Human induced threats outweigh natural threats.

Table 2: Overall threats to the ecological features on Ghizo and Kolombangara islands.

Human induced threats	Natural threats
Logging	Climate change
Human beings	Worm
Over- harvesting	Beetles
Stealing	Sedimentation
Unnecessary clearing	Pig invasion
Poison leaf (bubuna)	Lightning
Improper waste disposal	Diseases
Clearing for garden	Natural disaster
KFPL forest activity	Birds
Oil spillage	Insects
Hunting	flooding
Lack of management	Pests
Population increase	Coral bleaching
Developments	Crown of thorns starfish
Pollution	Dry season
Careless drivers	Soil erosion
Careless anchoring	Strong winds and heavy rain
Dynamite fishing	Dogs
Night diving in management areas	Cane toad
Fishing intruders (MPA)	Sea level rise
Community arguments	-
Net fishing	-
Coral mining	-
Spear fishing	-
Sand mining	-
Deforestation	-
Under-size fish catch	-
Fish poison leaf	-
Timber milling (export)	-
Clearing for settlement	-

3.2.1 Threats to Kolombangara eco features

There are 28 threats and pressures identified for Kolombangara Island. During the participatory mapping exercise, community conservation representatives and resource owners of the Island stated that humans are the greatest threat to the environment and that most people on Kolombangara are yet to become faithful managers of their own resources on land and sea Figure 14.

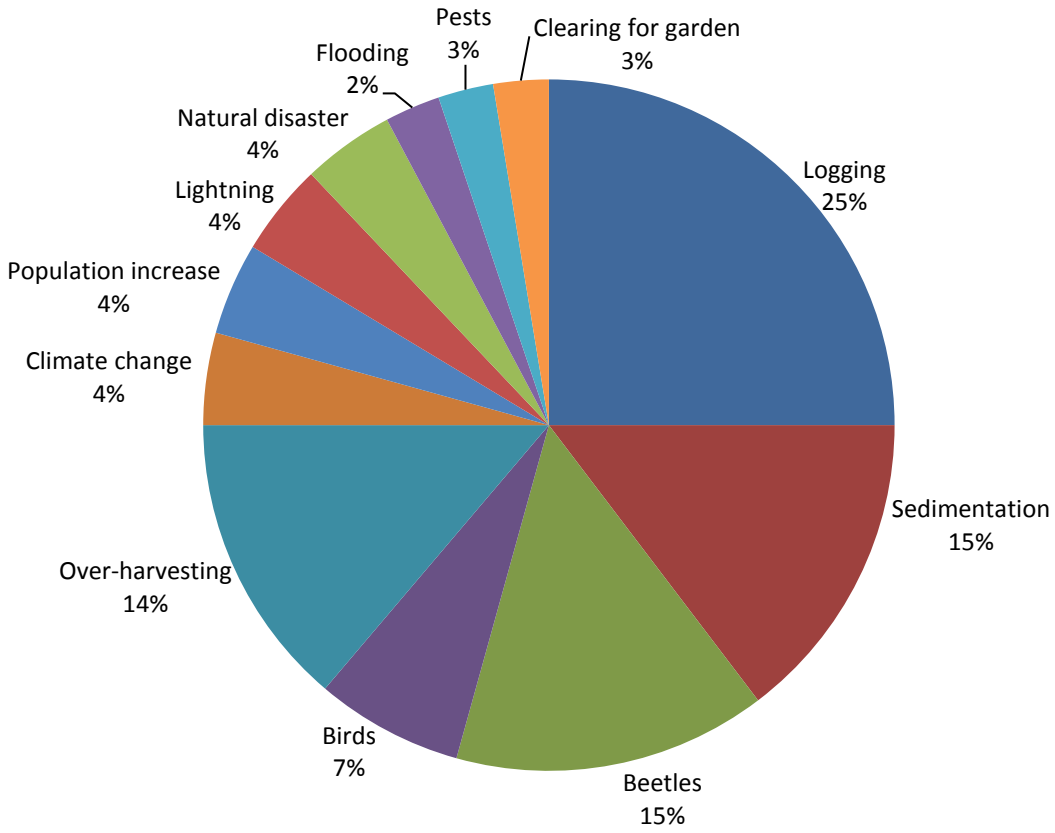

Figure 14: Threats to the eco features of Kolombangara.

Note, that only top 10 threats are represented on the graph. However that does not mean the other 18 threats are totally excluded from the discussion. (Refer to appendix 1 for the list of threats).

Commercial logging has the highest threat percentage (25%) followed by Sedimentation (15%) and Beetles (15%), Over-harvesting (14%), Birds (7%), Climate change (4%), Population increase (4%), Lightening (4%), Natural disaster (4%), clearing for garden (3%), Pests (3%) and flooding (2%).

Kolombangara Island has a unique biodiversity and traditional culture that connected the people together over the past years up till now. However the degree of threats on the Island's ecosystems is alarming.

Threats like logging, sedimentation and the current and possible invasion of pests on coconut plantations and other fruit trees and crops have been detrimental. Logging poses the greatest threat to biodiversity on Kolombangara and has been identified by the resource owners of Kolombangara as the number one cause of environmental degradation which led to loss of habitat and destruction of land and forests (refer to Figure 14). Large tracts of

lowland forests have been removed by logging companies, destroying major habitats for vertebrates, fruiting and seeding trees, nesting and roosting sites, and polluting important water sheds such as streams, rivers and lakes (Pikacha and Sirikolo, 2010). The 400 m asl conservation contour with all the species of plants and animals are highly at risk of encroachment (Pikacha and Sirikolo, 2010). Studies have also shown that re-entry logging into previously logged areas on Kolombangara has further intensified the threats and has changed the forest dynamics (Katovai, 2018).

Sedimentation and potential invasion of rhino beetles are rated as the second greatest threat to eco features of Kolombangara. Sedimentation has posed threats to rivers, streams and coral reefs. Loaded particles of suspended solids, soil, silt and debris downstream can contaminate fresh water for drinking, washing and other domestic uses and further more affect coral reefs. This is often a disaster for many organisms and ground dwelling species of animals, particularly frogs and ground dwelling birds (Pikacha and Sirikolo, 2010).Flooding is mostly associated with sedimentation and together with their impacts, are detrimental to river and coral ecosystems. In this process, corals were actually buried under thick layers of soil particles and debris, resulting in death of coral polyps. When the rivers and streams are flooded, source of freshwater for drinking and cooking is contaminated and people often found it difficult to stand such circumstances (K. Victor, personal communication, May 2017).

The invasion of the coconut rhinoceros beetle into the Solomon Islands in January 2015 was seen as another major threat to food security in the Solomon Islands (News and Resources, 2016). The adult beetles tend to chew big holes through the growing tops of Coconut palm trees to feed on their sap making zig-zag shaped cuts in their leaves and disrupt fruit growth (News and Resources, 2016). People on Kolombangara have expressed their fear for their coconut plantations in the immediate future. This potential invasion can lower coconut production, negatively affecting people's livelihood.

Other natural threats like climate change, natural disasters and lightning are also notable threats to the terrestrial and marine eco features of Kolombangara. The changing climate has intensified heavy rains and droughts to longer periods. Heavy rains associated with flooding have destroyed most gardens and forest plantations of Kolombangara people and longer drought periods have made most streams to dry up further killing freshwater eels, fishes and prawns (source of food). Fallen trees in the forest due to intense heavy rains can also be harmful to species of ground birds and mammals, frogs and insects and even human beings. A change in sea surface temperature has intensified coral bleaching and sea level rise in coral reef areas around Kolombangara over the years. Sea level rise for instance has affected coastal crops such as Taro and Coconut plantations around the Island and has further inundated salt (saltwater intrusion) into coastal streams reducing water quality. Crown of thorns Starfish (COTS) outbreaks annually can also pose threats to the marine ecosystem especially corals.

Few marine management areas around Kolombangara such as Sausama and Tirobangara LMMA have reportedly mentioned the effects of Crown of thorn starfish - COTS on their coral reefs. One COTS can eat up to six (6) square meters of coral per year (Albert et.al, 2013), so in that sense, increasing COTS numbers can be highly lethal to corals.

More identified human threats are over-harvesting, population increase, stealing, clearing for garden, hunting and lack of management. Population increase is a major factor when it comes to resource management with the increase in demand for natural resources. Kolombangara supports a resident human population of more than ten thousand, approximately half of whom live in rural areas with customary land tenure (Solomon Islands Community Conservation Partnership, 2015).

An issue (threat) often associated with population increase is over-harvesting. Harvesting of natural resources at a faster rate and/or harvesting of terrestrial and marine resources (native timber trees, coconut crabs, fish and marine crustaceans, trochus shells, sea cucumbers etc) before maturity and during breeding seasons can lead to depletion of resources. Even the marine management areas have been encroached and were regarded by the resource owners of Kolombangara as 'stealing'. Marine species like fish, crustaceans and highly valued trochus shell are normally harvested at a faster rate, thus resulting smaller sized fish catches for evening meals (R. Loka, personal communication, May 2017).

Clearing of land for gardening is also an identified threat. According to Katovai 2018, land clearance for gardening is one of the major drivers of deforestation and degradation in tropical forests which may also result in loss of habitat for various terrestrial species. Forests that should have been used for timber, furniture and other building materials have been cut down to clear land for subsistence and commercial gardening. The cash economy has turned things around where natural resources from land and sea have been depleted in exchange for money. Logging activities coupled with clearing of land for gardening and other practices like stealing resources in management areas are activities that are economically oriented.

Some community representatives during the mapping exercise have blamed the Kolombangara Forest Products Limited (KFPL) contractors for the damages made to the low land forests such as unnecessary clearing on areas especially closer to the Vila River (South Kolombangara) which included the Vila forest reserve. The reserve is a site that is important for tourism, study and research purposes. Oil spillage from KFPL power house has further contaminated the Vila river reserve and adjacent streams making it unsafe for human use. Kolombangara Island Biodiversity Conservation Association (KIBCA) has taken a step forward with support from KFPL, providing a realistic way for Kolombangara indigenous people in managing their resources and possibly minimizes the threats affecting their rich biodiversity (Cox and Vaghi, 2014).

3.2.2 Threats to Ghizo eco features

There were about 34 identified threats and pressures for Ghizo Island. Most threats are similar to those from Kolombangara. People from Ghizo have stated, the threats that were identified during the workshops and participatory mapping exercises were challenges to the eco features that were valued so much by the resource owners or custodians of the land and sea.

Threats like sedimentation and soil erosion negatively impacted both the terrestrial and marine eco features because of the interconnectedness (connectivity) that existed between the land and sea (ridges to reefs).

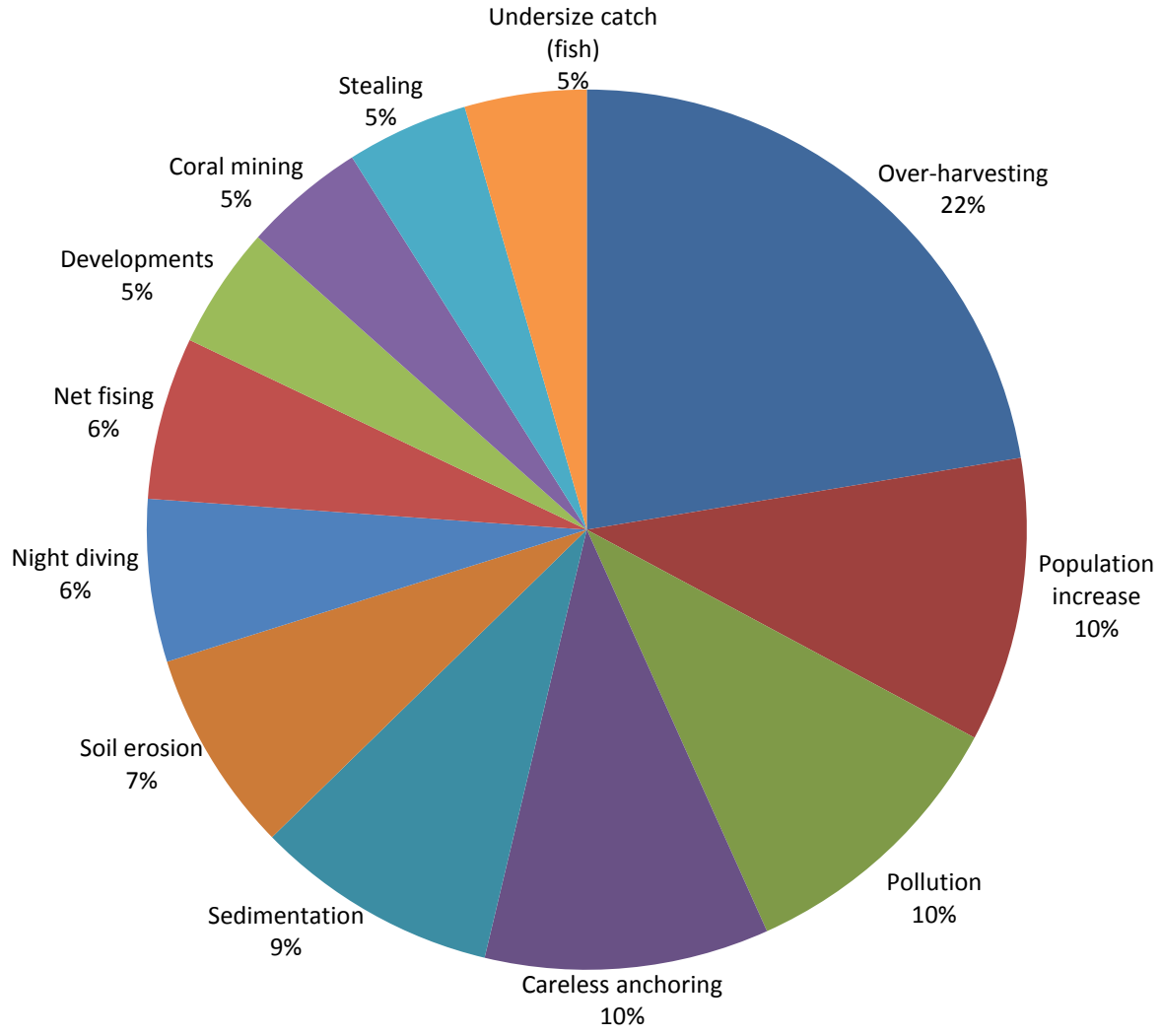

Figure 15: Threats to the eco features of Ghizo Island.

Note, only top 10 threats are represented on the graph. However that does not mean the other 24 threats are totally excluded from the discussion. (Refer to appendix 1) for the list of threats.

Over-harvesting of natural resources (22%) has the highest threat percentage followed by population increase (10%), pollution (10%) and careless anchoring (10%), sedimentation

(9%), soil erosion (7%), night diving (6%) and net fishing (6%), developments (5%), coral mining (5%), stealing (5%) and undersize fish catch (5%).

During the ridges to reef workshops and participatory mapping exercise, the resource owners and community representatives from Ghizo Island assured that they are highly dependable on resources from the sea and land and that the careful management of those resources is required from all the people from the communities. However, it is unfortunate that threats always exist either naturally or because of some activities done by people that are beyond the acceptable limits.

The resource owners from Ghizo have identified over-harvesting as the main threat to most eco features around Ghizo Island. Over-harvesting of mainly marine and terrestrial resources was done in almost every zone and village around Ghizo. People sought marine species like mangroves, sea weed, fish and trochus whereas on land, trees from the open forested areas, coconut palm and coconut crabs were depleted.

According to WWF 2011, there is increasing concern that marine resources within Ghizo and its surrounding Islands are under heavy fishing pressure and from the harvest of other marine invertebrates for commercial resources such as trochus and beche-de-mer.

Population increase as depicted on the pie chart is another important threat. According to the 2009 census, Ghizo Island has the population of about 7,177 inhabitants (Taylor et.al, 2016). The current population should be more than the previous record and an increase in population would mean more demand for natural resources and space. Threats like over harvesting of natural resources on land and sea, pollution (wastes generated from households, shops and construction sites) clearing for gardening and settlements and other developments are usually associated with population increase, resulting in pressures on fish populations, sea weed, sea grass, coconut plantations and mangrove forests on Ghizo Island.

One example of fishing pressure on Ghizo is in the marine management areas and spawning sites on Njari Island, Naru Island, and Kennedy Island. Fishers target those areas to meet family demands and also for the growing municipal population of Gizo town (WWF, 2011). Sea grass communities which are important habitats for dugong are under threat to excavation and reclamation of coastal areas, soil erosion, over fishing and careless boating. The endemic Ghizo white-eye bird *(Zosterops luteirostris)* is becoming threatened as well due to clearing of forests for new settlements.

Collateral damage during artisanal fishing such as damage caused by anchors (careless anchoring), nets, dynamite fishing and *muro ami* (driving fish into nets by striking coral with rocks and or sticks) are also key threats. Plant poisons used to stun fish is not in much use around Ghizo reefs but is still considered a threat to fish and other marine invertebrates (WWF, 2011).

Other threats on marine eco features include coral mining, crown of thorns star fish, stealing (poaching) in marine management areas and sand mining. Coral mining especially, has been accounted for vast communities of corals extracted for lime and as raw materials for construction.

Stealing or poaching in marine management areas for reef fish, dugongs, turtles, and sharks also is on the rise. Sometimes because of poor management systems, and lack of enforcement of management rules, people continue to encroach into marine management areas around Ghizo Island.

Crown of thorns starfish effects on coral reefs can be very lethal. Over the years, Ghizo Island has experienced out breaks of COTS and just recently, coral reefs in Ghizo were being reduced to white calcified structures, leaving many juvenile reef fishes vulnerable to predators (Pagepitu, 2018).

Pollutants like plastics, oil, sewage and run offs are poisoning the reefs and mangroves. These wastes can cause an overgrowth of algae blocking sunlight from reaching the reefs hence, killing the corals. Sedimentation, soil erosion and land reclamation along coastal areas for developments have been seen as threatening to both the land and marine environments.

Gardens along streams are vulnerable to flooding and sedimentation and drinking water from streams is being contaminated. People who live on the west coast of Ghizo are more vulnerable to their streams being contaminated during intense heavy rains. The debris, soil and other suspended particles when introduced into the marine areas can be harmful to corals and other important eco features such as sea weed and trochus (Martin, 2013).

Climate change and sea level rise impacts on Ghizo is a major concern. The increasing saltwater intrusion into water wells and bore holes reduced water quality in Ghizo town and surrounding villages over the years (Taylor et.al, 2016). Longer drought periods resulted in landslides which further destroyed rural gardens and also blocked streams important for drinking and washing. Even drought periods reduced surface water quantity.

Timber milling was also identified as one of the threats to the open forest. Though the activity brought income for the people of Titiana and Vorivori on west coast of Ghizo, forests that were regenerating including other native plant communities were destroyed in the process (F. Nuapitu, Personal communication, December 2016). Most people in Ghizo depend entirely on marine areas for daily sustenance, hence are more vocal on marine threats than terrestrial threats.

4 MANAGEMENT AREAS

Management areas are seen as initiatives resource owners have created to manage, conserve and protect marine and terrestrial natural resources. Kolombangara and Ghizo resource owners have established management areas over the years with the help and support from WWF SI and key stakeholders.

The establishment of GELCA and KIBCA as governing bodies for resource management and conservation for Ghizo and Kolombangara respectively, were seen as a step to achieving the management and sustainable harvest of resources. Community based resource management approaches were also employed by GELCA and KIBCA in which communities have rules and regulations concerning management of resources within their boundaries of land and sea. Fifteen (15) management areas has been recorded for Kolombangara and nineteen (19) has been recorded for Ghizo (Table 3).

Table 3: Management areas of Kolombangara Island

Name	Designation	Domain	Status
Nusa Tuva	LMMA	Marine	Proposed
Kolombangara Conservation Area	Natural Reserve	Terrestrial	Designated
Voko	Resource management area	Terrestrial	Voluntary
Vavanga	Resource management area	Marine-Terrestrial	Voluntary
Sausama	LMMA	Marine	Voluntary
Tirobangara	LMMA	Marine	Area of interest
Tombulu reserve	Forest reserve	Terrestrial	Designated
Tuki reserve	Nature reserve	Terrestrial	Designated
Muhiro	Resource management area	Marine-Terrestrial	Area of interest
Poitete reserve	Nature reserve	Terrestrial	Designated
Bohu	LMMA	Marine	Voluntary
Huda/Kena	Marine resource management area	Marine	Area of interest
Vila reserve	Nature reserve	Terrestrial	Designated
Santupaele	Marine conservation area	Marine	Voluntary
Boboe	LMMA	Marine	No longer active

The management areas in Kolombangara are designated under Locally Marine Management Areas (LMMA), Conservation area, Resource management areas, Forest and Nature Reserves, Marine resource management areas and Marine conservation area.

Kolombangara Island has five designated areas namely Kolombangara Conservation Area (400 meter above), Tombulu Reserve, Tuki Reserve, Poitete Reserve and Vila Reserve. Those designated areas are terrestrial areas of great significance and value.

Nusatuva is a proposed LMMA managed by the Nusatuva Environment Conservation Development Association (NECDA), comprising of coastal villages who are custodians to the coastal marine area. The LMMA is currently proposed to be included in the fisheries act

under the Solomon Islands Government with support from WWF SI team based in Gizo through its current Community Based Fisheries Management (CBFM) program approaches.

Marine resource management areas and LMMAs from Huda/Kena, Muhiro and Tirobangara for example are ideal areas of conservation (areas of interest) of high value but currently lacking data or there has never been marine surveys done to investigate reef structures and species compositions. Voluntary management areas are areas that are yet to be assessed for its value and to be involved with Non-Government Organizations like WWF SI to promote and provide legal support to these community-based conservation and resource management zones, and set out management regulations and prohibited activities through the management area (Martin, 2013).

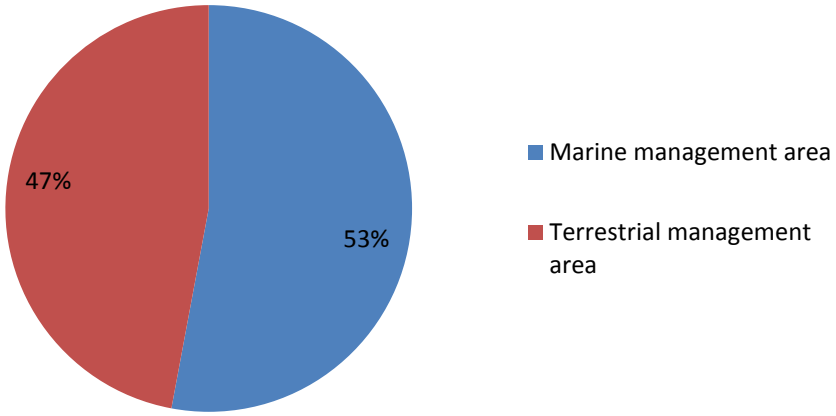

Figure 16: Percentage of Marine management areas and Terrestrial management areas of Kolombangara.

There are about 9 Marine management areas and 8 Terrestrial management areas (refer to Table 3) identified for Kolombangara. Marine management areas have outnumbered terrestrial areas however the Government through its appropriate ministries of environment and fisheries have encouraged resource owners to register their resource management areas under the protected areas act 2010 and the fisheries act so that marine and terrestrial resources can be legally governed for sustainable use.

Table 4: Management areas of Ghizo Island

Name	Designation	Domain	Status
Kennedy Island		Marine	Area of interest
Pusinau reef	LMMA	Marine	Area of interest
Suvania reef	LMMA	Marine	Area of interest
Naru	LMMA	Marine	No longer active
Babanga reef	LMMA	Marine	No longer active
Babanga	LMMA	Marine	No longer active
Nusatupe	LMMA	Marine	Voluntary
Kongulavata	LMMA	Marine	Proposed
West coast MPA (Seaweed mngt zone 2)	LM MA	Marine	Proposed
West coast MPA (Seaweed mngt zone 1)	LMMA	Marine	Proposed
West coast MPA (Reef mngt zone 2)	LMMA	Marine	Proposed
West coast MPA (Reef mngt zone 1)	LMMA	Marine	Proposed

Name	Designation	Domain	Status
Sepo Island (Resource mngt area)	LMMA	Marine	Proposed
Sepo Island (permanent closure)	LMMA	Marine	Proposed
Hot spot reef	LMMA	Marine	Voluntary
Hakaroa	LMMA	Marine	No longer active
Paeloge/Suvania	LMMA	Marine	No longer active
Kongulavata MPA (Permanent closure)	LMMA	Marine	Proposed
Njari		Marine-Terrestrial	Area of interest

All the MPAs within the GELCA Conservation Protected Area are managed by an umbrella body (formed in 2000, the former GMCA Management Committee), now change to GELCA Management Committee (WWF, 2011). Most of the marine management areas in Ghizo were initiated through GELCA with support from WWF-SI.

WWF SI and partners in western province have worked together with Gizo communities to ensure they value their traditional marine environment and resource management practices within the Ghizo marine area and combines this traditional knowledge and practices with current conservation methodologies such as the establishment of community-based Marine Protected Areas to promote the conservation of marine biodiversity and the maintenance of the subsistence resource base on which local communities of the region depend.

Most of the marine management sites in west coast of Ghizo Island come under one management plan developed in 2014, hoping to be designated under the protected areas act 2010. Unfortunately, all management plans remained stagnant and still considered as proposed management areas since requirements to be registered legally as protected areas under the protected areas act 2010 have not been met. All the current management plans are now geared towards designation under the Fisheries Management Act 2010.

The socioeconomic status of both urban and rural populations in Gizo is such that the majority of people living within the GELCA are dependent on its marine natural resources for daily subsistence (WWF, 2011).

Hence this R2R conservation plan aims to help to protect these globally outstanding marine ecosystems and the marine resources that sustain the livelihood of the people of Ghizo Islands. It was determined that a better, more lasting outcome could be achieved with significant engagement from local communities which were interested in also establishing community-based marine protected areas.

With the assistance of WWF SI and the KIBCA and GELCA committees, all management areas in Ghizo and Kolombangara should be well considered as important as far as livelihood of the resource owners and people in the communities are concerned and that a legal framework is created such as the R2R conservation plan, to safe guard the natural resources.

There were more marine management areas than terrestrial areas. This can be for two reasons. First, people from Ghizo depend entirely on marine resources for daily sustenance and secondly, there were resources of high value in the ocean than on land. After the workshops and participatory mapping exercises, people have come to understand the real value of those ecosystems and have placed more efforts to manage and conserve their traditional marine and terrestrial areas.

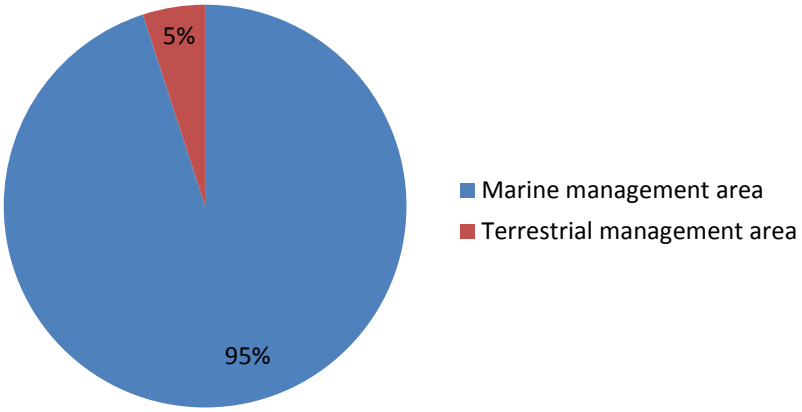

Figure 17: Percentage of Marine management areas and Terrestrial management areas of Ghizo.

5. SUMMARY & RECOMMENDATION

This document is formulated with the anticipation that it would form a framework on which decisions regarding conservation and development could be made at all levels including the resource owners at the community level. It incorporates results from preliminary resource mapping exercises which highlighted key ecological features that could attract conservation interests. These include areas that are highly valued by resource owners such as cultural sites, specific marine ecosystems (coral reefs, seagrass meadows, mangroves sites, and estuaries), and also important terrestrial sites like riparian zones and waterways, gardening areas, and natural forests (including habitat sites of endemic species). Resource owners from these two islands, Kolombangara and Ghizo islands have expressed how they value these sites because of the ecosystems services that these natural features have been providing to support their livelihood.

Although they value the various ecosystems mentioned, their constant interactions coupled with the rapid increase in population growth, and their attempts for economic advancement inevitably causes threats to these natural resources. The establishments of a number of community resource management and conservation areas are initiatives that resource owners are undertaking in recognition of the existence of the threats mentioned. However, currently there is very limited number of terrestrial management sites in contrast with marine areas.

Below are some key recommendations that this report wishes to put forward for important decision makers at all levels to consider, prior to making informed decisions regarding conservation goals and development needs on these two islands:

- According to findings, terrestrial areas around Ghizo were given minimal attention although it hosts the endemic Ghizo white-eye bird *(Zosterops luteirostris)*. Only 5% of the total terrestrial land in the Ghizo Islands is currently under some form of management which is on Njari and Jingono islets. Management of terrestrial areas would limit the number of threats such as sedimentation on both land and sea.
- Njari Island is a marine biodiversity hotspot, thus would be ideal for a marine research station for study and research purposes. Ghizo and Kolombangara Islands are in close proximity hence the establishment of a marine research station on Njari would complement the current terrestrial research station on Kolombangara (Imbu Rano Research center).
- There is only a little patch of natural forest remaining on Ghizo Island therefore the Western Provincial Government should consider conserving that area to ensure restoration of native terrestrial species.
- To this date, there is limited scientific knowledge on Ghizo terrestrial species. An inventory check in the immediate future should be considered as this would provide sufficient information to support further conservation efforts.
- Restrictions on disposal of wastes in the marine environment should be taken up by the Western Provincial Government to support existing management areas in limiting species and ecosystems vulnerability to certain threats.
    - A push for the Plastic Ban in the Western Province as previously voiced by the Western Provincial Government in 2017 should be encouraged with a legitimate law or ordinance enacted to cater for this issue as most of the plastics end up polluting our land and marine environments and their inhabitants
    - Proper and thorough awareness is important for proper solid waste management. Perhaps within the Ghizo Township, proper solid waste management program should be in place and is spearheaded by the Ghizo Town Council and the Ghizo Solid Waste Management Group.
- Kolombangara Island hosts a number of important species of conservation interests. Therefore any development aspirations must take into consideration the existence of these important species such as the Kolombangara white-eye bird *(Zozterops murphyi),* and many other species of frogs, reptiles and insects.
- There are a lot of rivers and streams on Kolombangara thus the protection of riparian areas is crucial for the sustainability of those water sheds supporting livelihood of those who directly depend on them.

- No further data manipulation was done through marxan analysis however, a thorough field data collection in future would really specify defined locality of high value areas in the marine and terrestrial environments on both Islands.
- The National Government could achieve its conservation targets if they can provide support to ensure a legal protection of the proposed terrestrial park on Kolombangara Island under the Protected Areas Act 2010 and the proposed marine management areas around Kolombangara and the Ghizo islands under the Fisheries Management Act 2010.

Using the R2R participatory approach, WWF aims to build on the results achieved over the past twenty years of work with the people of the Western Province, various stakeholders and partners to direct sustainable management of and planning of natural resources holistically. This would ensure that the effective management of high value marine and terrestrial ecological features is maintained, and that food security and livelihood needs are met and environmental services for human wellbeing is maintained. Furthermore, if this project is deemed successful for Kolombangara and the Ghizo Islands, then such project can be replicated on other islands within the Western Province and throughout the Solomon Islands. A combined effort from all stakeholders such as local NGOs, International NGOs, Provincial Government and the line Ministries within the Solomon Islands Government is highly recommended for such initiatives.

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Appendix

Appendix 1 List of Communities & Ecological Features

Ghizo Communities with Corresponding Ecological Features

Check	Community	MapCode	EcoFeature	Benefit	Threat
y	Lire, Fishing Village	CR	Coral reef	Food, custom money	Increase population, Increase crown of thrones, future development, sedimentation
		Fsh	Fishing spot	Food and income	Increase population
		SW	Seaweed	Food and income	Future development, increase population, sedimentation
		M	Mangroves	Material,buffer zone,nursery,breeding	Increase population, waste pollution
		SG	Seagrass	Habitat(rabbit fish),bechdemar ,income	Sedimentation,increase population, development
y	Kongulavata Bay	L	Land	Gardening,food,marzket providing 40%-60% income each family	Land slide(too much fallen tress0
		M	Mangrove	habitat for all marine animals,food,material for house, protect shore line	Overharvesting, sold to commercial company ,hotel and Noro
		SG	Seaweed	Contribute to 10%-30% income for women, food security	Overharvesting, lack of community compliance to community rules, food security, disagreement over harvesting schedule
		OF	Open forest	Income(receive orders from buyers around Gizo),for building house, school and churches	Argument between community members(part of the area belong to the Govenerment,open Government forestry plantation, Overharvest
		MA	MPA	Breeding site for fish,naturing for weeds,pemanent MPA area, turtle and sea	lack of rule compliance ,intruders fishing in the area
		CR	Coral reef	Food,income,dish habitat,ornamental,decoration,building materials	Overfishing, Climate change and weather, coral havesting,overhavesting of marine resources, Boat achorage,crown of thorns
		Swk	Ship Wreck		
		WeB	White Eye Bird		
		TS	Tambu Site		
		G	Garden/farming		
		CP	Coconut Plantation	Bettles,Soil suitable for coconut growth,Food,source	Damage coconut
		CoP	Cocoa Plantation	Soil suitable for cocoa growth, close to communities	

y	Mile 6	CoP	Cocoa Plantation	Soil suitable for cocoa growth, close to communities	
		CF	Cattle farm	Grass lands for feeding cattle, soil contain nutrients from cow manure	
		PiF	Piggery	Grass lands for feeding cattle, soil contain nutrients from cow manure	
		PoF	poultry farm		Dogs
		HB	Honey bee	Shaded area-house, flower(pollination)	
		RC	Roots Crops	Income, food	people steal,
		FshP	Fish pond	Freshwater, suitable environment for tilapia and other small fish to	Soil erosion
y	Pailoge	CP	Coconut Plantation	income,food,	overharvesting
		Du	Dugong	Tourism attraction,income	unsustainable harvesting.
		G	Garden/farming	income,food	frogs,diseases,
		Lnd	Land	Provide food,income,tourism	Unfertile land,soil erosion,land shortage
		SPAG	SPAG	hospital for fish,habitat of fish,	Net fishing,poisen leaf,overharvesting,night spear diving
		TS	Tambu Site	income,tourist attraction,	lack of respect,no community compliance ,lack of
		T	Trochus	income,food,decoration,	unstainable harvesting
		CR	Coral Reef		
		MA	Management Area		
y	Pusigau	CR	Coral Reef	1.Food,custome money,coral,habitats	Coral minning,waste,spear diving, Anchorage
		Fsh	Fishing Spot	2.Income,income	Over fishing
		M	Mangrove	3.material,later zones,breeding,nursery	Over population(stealing of resource)
		SG	Seagrass	4.Arts,crafts,matwork	Sedimentation,climate change, dugong
		CP	Coconut Plantation	5.Material,timber,medicnes,terrestrial habitat	Sealevel rise, insect
		F	Forest	6.Material,timber,medicnes,terrestrial habitat	Deforestation(Stealing)
		SPAG	Spawning site	Habitat of big fish, Planktons	soil erosion, catch small fish, using nets, night
		Surf	Surfing area	Big waves, attracting survers,income	Dispute ,sharks-come out when surviving
		CR	Coral reef	Habitat of marine animals, income,	Soil erosion, careless tourism, careless
		WSB	White sand beach	Habitat of cranes and shell fish	Sand mining, pollution(littering)
		WS	Water source	water spring(provide freshwater)	Susceptible to erosion,dogs,pig drink from the water source.

y	Titiana	CP	Coconut Plantation	Income,food,Craft(Basket, Mat,Fan,toys(Ball, fans),Fiber(used for nursery)Husk(fuel energy nursery used for fertilizer,oil,carving,timber ,broom,medicine	Rhino bettles,over population, Milling timber(export)
		HN	Heron Nesting site	Entertainment	Human activity-people shooting them,
		CC	Coconut Crab site	Income,	Overharvesting
		TS	Tambu Site		
		FshP	Fish pond		
y	VoriVori	CP	Coconut plantation	Income,food,Craft(Basket, Mat,Fan,toys(Ball,fans),Fiber(used for nusery)Husk(fuel energy nursery used for fertilizer,oil,carving,timber	Rhino bettles,over population, Milling timber(export)
		SG	Seagrass	Breeding site(Fish,crayfish,seahorse ,shell),Manure,Medicine,Habitat for different species, trapping	Marine pollution, over harvesting for manure and medicine, careless anchoring
		T	Trochus	Income,food,crafts,necklace,button	Overharvesting,poor management(M.P.A)
		Swp	Swamp	Food, breeding site,fertilizer,Habitat, for compost	Clearing for settlement, heavy rain& Flood,Drought
		G	Garden/farming	Food,income,fuel	Land slide,pest,heavy rain
		CR	Coral Reef	Protect shore line,habitat,materials for building house,	Careless anchoring, harvest for material,sedimentation
		Swp	Swamp	plating kakake,	Insect,
				Swap taro, sago palm	cutting it's leaf
		M	Mangrove	Material for house,food,Spwanning area for fish &Crabs,	Chopping big trees to destroy small ones, area dispute, cyclone/wind
				b)Food	Clamming area
				Spooning area for fish	cyclone/wind
				Income	
		Management Area			
		SW	Seaweed	Food	Overharvesting
				Income	Pull out when harvest
				Future benefits	Dry season
				Coral	Fish or turtle eating them
					Disobey
					Sediments

y	Saerahgi	**Seasonal Closure**			
		CR	Coral reef	Clam sheel-Food,shell,decoration	Net
				Fish-breeding, habitat	Night Diving
				Trochus-Food, shell-	Catch undersize
				turtle-Habitat	Booming ,chemical
				coral-Necklace,decoration,protection against waves	polution,oil,plastic
					Anger
					Harvest for lime
		Jari Island(reef system)Permanent closure Area			
		CR	Coral Reef	Breeding place for fish, Habitat for trochus,turtle,income,decorations,protection from weavings	Net, night diving, cater undersize fish,dynamite,littering of rubbish,pollution(oil, plastic)Anchor,harvest for lime
		DA	Diving area	Income	Carless achoring,draning oil, Careless divers,
		SPAG	Spawning site	Attracting tourism, income	Carless achoring,draning oil, Careless divers,

Kolombangara Communities with Corresponding Ecological Features

Community	MapCode	EcoFeature	Benefit	Threat
Bere	CP	Coconut plantation	Money, Food, Baskets,Honey Bee,	Logging
	CR	Coral reef	Food, Money	
	FP	Forest plantation	Money, Shelter, Birds	Climate Change
				Humans
				Over-Harvesting
				River
				Worm
	G	Garden/farming	Money, Food	Bettles
	M	Mangrove	Shelter	
Bibiu	CP	Coconut plantation	Money, Food, Mat, Baskets, Broom, Oil, Fan, Fishing, Parrot Birds	Bettle
	CR	Coral reef	Food, Money	Sedi Mentation
	FP	Forest plantation	Shelter, Money	
	R	River	Wash, Cooking, Swimming	Logging
Buki	CP	Coconut plantation	Food, Money, Oil	Bettle
	CR	Coral reef	Food, Money	Pigs
	R	River	Cooking, Swimming, Washing, Drinking	Sedimentation
Ghatere	CP	Coconut plantation	Money, Food, Mat, Baskets, Broom, Oil, Fan, Fishing, Parrot Birds	Population
	FP	Forest plantation	Money, Shelter, Birds	Logging
	G	Garden/farming	Money, Shelter, Furniture	Pig Invasion
	TS	Tambu Site	Cultural Significance,	Logging
	SpW	Spring Water		
	Swk	Ship Wreck,warship		
Habere	CP	Coconut plantation	Money,Food, Crafts,	Bettle
				Natural Threat (Lighting)
	CR	Coral reef		
	FP	Forest plantation	Timber, Money	Logging
	G	Garden/farming	Money, Food	Stealing
	M	Mangrove	Food, Fish Habitats, Shelter	Unnecessary Clearing
	NF	Natural Forest		
	TS	Tambu Site	Cultural Significance,	Logging
	WF	Waterfall	Water Source,(Drinking, Bathing)	
	WC	Wildcat	Sight Seeing, Tourist Attraction	Population Expansion
	B	Birds	Food, Money, Regenerate Forest	Human Being
	B	Birds	Food, Money, Regenerate Forest	Human Being
				Logging
	CP	Coconut plantation	Food, Money, Crafts, House	Bettle
				Disease
				Natural Disater
				Price
	CR	Coral reef	Food, Money, Decoration	Bubuna/Poision Leaf
				Natural Disater
				Over-Harvesting
				Sedimentation
				Waste Disposal
	FF	Flying-fox	Tourist(Money), Studies	Human Activities
				Logging

Hunda	FP	Forest plantation	Money, Furniture, Building, Firewood	Luck Of Management
				Natural Disater
	G	Garden/farming	Food, Money	Birds/ Animals
				Insects
				Logging
				Weather Pattern
	M	Mangrove	Food, Money, House, Firewood, Fish Habitat	Fire Wood
				House Materials
				Natural Disater
				Rubbish Diposal
	NF	Natural Forest	Money, House Materials, Medicine,Food, Fresh Oxygen, Ecosystem Cycle	Human Being
				Logging
				Population
	R	River	Drinking, Wash, Cooking, Food(Fish,Shells)	Gardening
				Population
				Sedimentation
	TS	Tambu Site	Identity, Bride Price, Money	Human Being
				Money
	TT	Traditional Taro	Cultural Knowledge, Food	Flooding
				Ground Bettle
	L	Lake		
	WF	Waterfall	Tourism Activity(Money), Drinking	Logging
Iriri	CP	Coconut plantation	Money, Food, Mats, Broom, Fan	Beetles
	FP	Forest plantation	Timber	Logging
	G	Garden/farming	Food, Money	Rednose Birds
	TS	Tambu Site	Tourist Attraction, Cultural Significance	Population
Jack Habour	CP	Coconut plantation	Money, Food, Mats, Baskets, Broom, Oil, Fishing, Parrot Birds,	Logging
	CR	Coral reef	Money, Food	Plantation
	G	Garden/farming		Bettle
	R	River		
	SW	Ship Wreck,warship	Money	Climate Change
				Over Harvest
				Sedi Mentation
	FF	Flying-Fox		
	Do	Dolphin		
	C	Cave		
Kaza	CP	Coconut plantation	Baskets, Oil, Broom	Pigs
	CR	Coral reef	Food, Money	Logging,Over-Harvest
	Do	Dolphin		Sedi Mentation
	G	Garden/farming		
	L	Lake		
	M	Mangrove	Food	Birds
	Cr	Crocodile		
	Fi	Fish		
	R	River		
	TS	Tambu Site		
Kukudu	CP	Coconut plantation	Money, Food, Mat, Broom, Fan,	Cutting Down
				Natural Disaster (Lighting)
	FF	Flying-fox	Tourist Attraction	

Kukuau	FF	Flying-fox	Tourist Attraction	
	FP	Forest plantation		
	G	Garden/farming	Food For Students	Pests
Kuzi	CR	Coral reef	Food, Money	Climate Change
	FP	Forest plantation	Money, Shelter	Over-Harvesting
	G	Garden/farming	Money, Food	Birds
	M	Mangrove	Shelter, Money	People
	R	River	Water For Drink	Logging
	TS	Tambu Site	Tourist Attraction (Money)	Sedimentation
Lodumoe	FP	Forest plantation	Food, Income, Medicines, Oil/Fuel, Art-Crafts, Firewood, Building	
			Timber, Income, Firewood, Medicine, Carbon Storage Oxygen	
	G	Garden/farming	Food	
			Income	
	R	River		Dry River
				Sedimentation
	Do	Dolphin		
Lolu	CP	Coconut plantation	Food, Money, Oil, Mat	
	CR	Coral reef	Food, Money	
	FP	Forest plantation	Shelter	Logging
	R	River	Cooking, Swimming, Washing	Bettle
Manighisi	CP	Coconut plantation	Money, Food, Mats, Baskets, Broom, Oil, Fan, Fishing, Parrot Birds	Logging
	CR	Coral reef	Money, Food	
	FP	Forest plantation	Money, Shelter, Furnitue	Pigs
	G	Garden/farming	Money, Food	Birds
	R	River	Drinking, Wash, Cooking	Sedimentation
Nusatuva	M	Mangrove	Food, Shelter	
	R	River	Water	
	TS	Tambu Site	Identity	Sedimentation
				Pigs
Patupaele	CP	Coconut plantation	Money, Food, Mats, Baskets, Broom, Oil, Fan, Fishing, Parrot Birds	Natural Lighting
	FP	Forest plantation	Money, Shelter, Furnitue	Logging
Pepele/Taghuapa	CP	Coconut plantation	Money, Food, Mats, Broom, Fan	Bettle
	FP	Forest plantation	Timber, Money	Logging
	G	Garden/farming	Food, Money	Flooding
	TS	Tambu Site	Tourist Attraction, Cultural Importance	Logging
	WF	Waterfall	Source Of Water, Tourist Attraction	Flooding
Poitete	CR	Coral reef	Community Mpa, Diving, Fish, Toads, Income, Tourism	
	Do	Dolphin		
	GF	Gobi fish	Endemic To Poitete River	
	LF	Low land forest	Forest Reserve Area ; Birds, Hicking, Tourism, Medicine, Biodiversity, Study	K.F.P.L Forestry Activity
	RG	Red Ground River	Unique Site (Still Under Study)	Oil Spoilage From K.F.P.L Power House
				Sedimentation
	SGr	Seagrapes	Food, Income	

Appendix 2 List of ESSI Survey Points

Label	SITE	GPS COORDINATES	TAXA
T1	Poitete reserve (Kolombangara) 365m	7.90977S, 157.11389E	**Frogs** *Cornufer guentheri* *C. solomonis* *C.guppyi* *C. weberi* *C.vertebralis* *Litoria thesaurensis* **Snakes** *Ramphotyphlops depressus* *Boiga irregularis* **Geckos** *Cyrtodactylus salomonensis* *Gehyra oceanica* *Nactus multicarinatus* **Skinks** *Prasinohaema virens* *Emoia nigra* *Emoia schmidti* *Corucia zebrata* *Sphenomorphus concinnatus* *Sphenomorphus solomonis* **Bats** *Melonycteris fardoulisi* *Dobsonia inermis* *Pteropus woodfordi* *Pteropus solomonis* *Nyctimene vizcaccia* *Macroglossus minimus* *Nyctimen major* *Rousettus amplexicaudatus* **Birds** *Ceyx collectoris* *Symposiachrus browni* *Zosterops kulambangrae* *Myzomela eichhorni* *Chalcophaps stephani* *Rhipidura cockerelli* *Rhipidura rufifrons* *Monarcha richardsii*
T2	Poitete reserve 675m	7.92677S, 157.11130E	**Frogs** *Cornufer malukuna* *C.hedigeri* *C.elegans* **Skinks** *Sphenomorphus cranei* **Mammals** *Phalanger orientalis* **Birds** *Pachycephala orioloides*
T3	Poitete station 3m	7.52296S, 157.81999E	**Frogs** *Cornufer.sp* **Snakes** *Dendrelaphis calligaster* **Skinks** *Sphenomorphus bignelli* *Lamprolepis smaragdina* *Emoia caeruleocauda* *Emoia pseudocyanura*

ESSI FW- Survey Sites - Kolombangara

	Site Name	GPS coordinates	Taxas
1 and 2	Zamba river (Kena)	08°05.934'S; 157°00.830' 08°05.773'S; 157°00.839'E	Ambassis interruptus Anguilla marmorata Apogon hyalosoma Eleotris fusc Eleotris sp2 Giuris magaritaceus, Giuris sp Hypseleotris guentheri Ophiocara porocephala Stiphodon rutilaureus Stiphodon pelewensis Kuhlia marginata Kuhlia rupestris
	Crustaceans		**Atyidae** Caridina appendiculata Caridina brevidactyla Caridina brevicarpalis **Palaemonidae** Palaemon concinnus, Macrobrachium austral Macrobrachium grandimanus Macrobrachium lar Macrobrachium placidulum **Sesarmidae** Labuanium trapezoïdeum Parasesarma cf plicatum **Varunidae** Varuna litterata
3	Magerai river	08°06.080'S; 157°01.432'E	Eleotris fusca Giuris magaritaceu Giuris sp
	Crustaceans		**Varunidae** Varuna litterata
5	Vagé river	08°05.112'S; 156°59.8674'E; 08°06.64'S; 157°00.167'E	Glossogobius illimis Redigobius bikolanus Stiphodon rutilaureus Toxotes Ambassis interruptus Anguilla marmorata Microphis brachyurus Microphis retzii Eleotris fusca Eleotris melanosoma Glossogobius illimis Redigobius bikolanus Schismatogobius bruynisi Schismatogobius nsp1 Sicyopterus lagocephalus Stiphodon rutilaureus Kuhlia marginata Kuhlia rupestris Gymnothorax polyuranodon
	Crustaceans		**Atyidae** Atyopsis spinipes Caridina appendiculata Caridina brevidactyla Caridina brevicarpalis Caridina buehleri Caridina neglecta Caridina papuana Caridina celebensis **Palaemonidae** Palaemon concinnus Macrobrachium australe Macrobrachium equidens Macrobrachium gracilirostre Macrobrachium grandimanus Macrobrachium horstii Macrobrachium lar Macrobrachium placidulum **Sesarmidae** Parasesarma cf plicatum **Varunidae** Ptychognathus affinis Ptychognathus barbatus Ptychognathus Ptychognathus riedelii Pyxidognathus granulosus Varuna litterat

Appendix 3: Workshop Participant Lists

Ghizo Island – Participatory Mapping

Name	Organisation	Position	Location
Ataban Zama	Dept Of Agriculture		**Gizo**
Yuko	Dept of Environment	Volunteer	Gizo
Ikou Tigulu	ESSI	Field Officer	Gizo
Figs	ESSI	Field Officer	Gizo
Minnie R Ifuto'o	WWF	CBFM Coordinator	Gizo
Tastre Ataria	GELCA	GELCA Chairman	Gizo
Nuatali Veni	GELCA	GELCA Vice-Chair Lady	Gizo
Julie Kalamana	Dept of Environment	Senior Environment Officer	Gizo
Dafisha Aleziru	WWF	Awareness/Livelihood Officer	Gizo
Holland Piokera	ESSI	Field Assistant	Gizo
Bolton Hebala	Epanga Island	Community Rep	Gizo
Frazer Nuapitu	GELCA/ Vori Vori	Executive Member/Community Rep	Vorivori
Albert Kuper	Hakaroa	Community Rep	Hakaroa
Rocalynta Ghoni	Paelonge	Community Facilitator	Paelonge
Stephen Kiolo	GELCA/ Kongulavata	GELCA Executive Member/ Community Rep	Kongulavata
Patson Baea	Sepo Island	Community Rep	Sepo Island
Alpha Gheli	GELCA/ Saeraghi	GELCA Executive Member/ Community Rep	Saeraghi
Teangasi Toma	GELCA / Niu Mandra	GELCA Executive Member/ Community Rep	Niu Mandra
Kenneth	Youth @ Work	WWF – Volunteer	Gizo
Jessie Wong	Youth @ Work	WWF- - Volunteer	Gizo
Newton Pule	Saeraghi	Community Rep	Saeraghi
Aradee Boso	Kongulavata	Community Facilitator	Kongulavata
Junior Joe	Sepo Island	Community Facilitator	Sepo Island

Why we make a difference

Reaching new audiences

We will create new ways to inspire and motivate a new generation of Solomon Islanders and truly realise our collective power to make a difference to the world in which we live.

High impact Initiatives

Over the next 5 years we will accelerate our on ground conservation and advocacy work, focusing on priority areas where we have the greatest impact and influence.

Building a strong network

We will draw strength from WWF's 50 years of rich history, knowledge and experience, harnessing our network of people around the world.

Walking the talk

We, WWF-Pacific Solomon Islands staff will continue to commit to reducing our overall environmental footprint, with an ambitious vision to reduce energy consumption by 30% and emissions from travel by 50% by 2016.

Loyal supporters

WWF-Pacific Solomon Islands partners make an invaluable contribution to our conservation work. We will expand the ways in which partners can connect with WWF-Pacific, giving them a greater choice of programmes from which they can choose to protect our planet's future.

Transforming business

Through building influential relationships with business and industry, we will continue to create solutions to address the major threats to our natural environment.

WWF

Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

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