



Strengthening Ridge-to-Reef Natural Resource Management in the Seram-Buru Corridor

FINAL REPORT FROM TANAH AIR BETA

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i. List of Abbreviations

APL	<i>Areal Penggunaan Lain</i> – other land-use
BAL or UUPA	<i>Undang Pokok Agraria</i> – Basic Agrarian Law (1960)
BAPPEDA	<i>Badan Perencana Pembangunan Daerah</i> – Provincial Development Planning Agencies
BAPPENAS	<i>Badan Perencana Pembangunan Nasional</i> – National Development Planning Agency
BPBL	<i>Balai Perikanan Budidaya Laut</i> Government aquaculture research facility in Ambon
BFL	Basic Forestry Law
BKPH	<i>Badan Kemantapan Kawasan Hutan</i> – Forest Mapping Agency
BKPRD	<i>Badan Koordinasi Penataan Ruang Daerah</i> – Coordinating Board for Regional Spatial Planning
BKPRN	<i>Badan Koordinasi Penataan Ruang Nasional</i> – Coordinating Board for National Spatial Use Management
BKSDA	<i>Balai Konservasi Sumber Daya Alam</i> – Bureau Conservation of Natural Resources of Ministry of Environment & Forestry
BUMN	<i>Badan Usaha Milik Negara</i> – State-owned company
CIFOR	Centre for International Forestry Research
CIRAD	French Agricultural Research Centre for International Development
CoLUPSIA	Collaborative land use planning and sustainable institutional arrangements for strengthening land tenure, forest and community rights in Indonesia
DPRD	Dewan Perwakilan Rakyat Daerah – Provincial House of Representatives
FAO	Food and Agriculture Organization of the United Nations
HGU	<i>Hak Guna Usaha</i> – right of exploitation (concession)
HPH/IUPHHK-HA	<i>Hak Pengusahaan Hutan / Izin Usaha Pemanfaatan Hasil Hutan Kayu</i> – right of forest use (concession)
IUPK	<i>Ijin Usaha Penebangan Kayu</i> – permit for wood exploitation
JCU	James Cook University
KAPET	Strategic investment plan of Seram Island
HL	<i>Hutan Lindung</i> – protected forest
HP	<i>Hutan Produksi</i> – production forest
HPK	<i>Hutan Produksi Konversi</i> – conversion forests
HPT	<i>Hutan Produksi Terbatas</i> – limited production forest
HTI	<i>Hutan Tanaman Industri</i> – industrial forest plantation
IRD	Research and Development Institute - France
KAPET	<i>Kawasan Pengembangan Ekonomi Terpadu</i> – Integrated Economic Development Zone

KBR	<i>Kebun Bibit Rakyat</i> – Community nursery program
KKWT	<i>Karyawan Kontrak antara Waktu</i> – Temporary contract employee
LIPi	<i>Lembaga Ilmu Pengetahuan Indonesia</i> – The Indonesian Institute of Sciences
LC	land cover
LU	land use
LUP	land-use planning
MoEF	Ministry of Environment and Forestry
MoU	Memorandum of Understanding
MPR	<i>Majelis Permusyawaratan Rakyat</i> – People’s Consultative Assembly
NGO	Nongovernmental organization
NP	National Park
NTFPs	Non-timber forest products
PES	Payment for ecosystem services
PPN	<i>Perusahaan Perkebunan Negara</i> – public plantation company
PSKL	<i>Perhutanan Sosial dan Kemitraan Lingkungan</i> – Bureau Social Forestry of Ministry of Environment & Forestry
RePPPProT	Regional Physical Planning Project for Transmigration
RDTR	<i>Rencana Detail Tata Ruang</i> – detailed spatial plan
RIL	Reduced-impact logging
RPJPD	<i>Rencana Pembangunan Jangka Panjang Daerah</i> – Regional Long Term Development Plan
RTRW-B/P	Regency spatial plans/provincial spatial plans
RTRW-K	<i>Rencana Tata Ruang Wilayah Kabupaten</i> – District Spatial Planning
RTRW-P/K	<i>Rencana Tata Ruang Wilayah Provinsi/Kabupaten</i> – Provincial/District Spatial Planning
RTRW-P	<i>Rencana Tata Ruang Wilayah Provinsi</i> – Provincial Spatial Plan
STPDN	<i>Sekolah Tinggi Ilmu Pemerintahan Dalam Negeri</i>
TAB	<i>Tanah Air Beta</i>
TBT	<i>Tenaga Bulanan Tetap</i> – monthly contract employee
TGHK	<i>Tata Guna Hutan Kespakatan</i> – consensus-based forest land-use planning
THT	<i>Tenaga Harian Tetap</i> – daily contract employee
TN	<i>Taman Nasional</i> – National park
TPTI	<i>Tebang Pilih Tanam Indonesia</i> – selective cutting and planting system
UNPATTI	Universitas Pattimura- Pattimura university in Ambon.

ii. Executive Summary

This report outlines Tanah Air Beta (TAB) activities in Seram and Pulau Boano for the period 2016 – 2019. The Seram-Boano landscape is one of a series of “Sentinel Landscapes” where TAB is committed to long-term research and development. The introduction and preface provides a brief overview of the mission statement of TAB and engagement with the Critical Ecosystem Partnership Fund (CEPF). Each chapter provides details of TAB activities and learning, contributing to sustainable natural resource management in Seram and Boano. **Chapter 1** begins with an overview of the North Seram and Boano landscape, which form the focus of TAB activities. **Chapter 2** provides a sharper focus of natural resource management challenges in the landscapes, including terrestrial and marine ecosystems. It builds from previous information documented in Chapter 1 to examine complex relationships between socio-economic, political, and environmental systems. **Chapter 3** focuses on socio-economic components of each landscape, using participatory methods to capture income and expenditure dynamics of villages. **Chapter 4** takes a closer look at the current and potential sources of income; kayu putih oil in Boano and ecotourism in North Seram. **Chapter 5** shifts to examine links between income and environmental management, highlighting existing and potential programs for collaborative natural resource management initiatives. **Chapter 6** is positioned towards future natural resource management on Seram, critically evaluating pathways and leverage points for sustainability. **Chapter 7** reflects on the activities and lessons learned in Chapters 1-6, identifying next steps and opportunities for strengthening conservation initiatives in Wallacea.

iii. Introduction

Tanah Air Beta History and Mission Statement

Tanah Air Beta (TAB) is a platform for people to exchange, share and experiment practical solutions for achieving conservation and development. We are a non-governmental organization based in Indonesia, supporting local partners in achieving sustainable and productive landscapes and seascapes. We established Tanah Air Beta in 2016, to bring together a group of action-researchers and conservation and development practitioners interested in addressing conservation and development challenges at the landscape scale. We understand landscapes are complex social-ecological systems and they require holistic, problem focused, collaborative efforts to address their challenges of delivering sustainable societal benefits. Our members are diverse and have years of experience working in conservation, development, research and private sector organizations. In the past five years, we have focused on local NGOs and Universities in Indonesia, creating platforms for research and engagement in sentinel landscapes. We have intimate knowledge of the development challenges facing Indonesia and the critical environmental risks they confront. We recognize that as Indonesia moves along its development pathway, management for conservation and development will need continuing adaptation. We continue to grow from experiences and believe that our interventions have led to better conservation outcomes on the ground.

TAB's trademark approach is to engage with local actors in the practice of "sustainability science" – this is science driven by the needs and aspirations of the ultimate beneficiaries of the research. We endeavor to "get into the system" (Sayer and Campbell 2004, Boedhihartono, Bongers et al. 2018). Our goal is to "learn together for change". Our science is embedded into resource management practice and we co-generate knowledge with local people (Langston, Riggs et al. 2019). Our thinking on this embedded science or action research has evolved during the conduct of our work in Seram and Boano and the papers cited above were inspired by our experience.

TAB began its collaboration with the Critical Ecosystem Partnership Fund in 2017. We agreed to support their work on the conservation of critical ecosystems in Wallacea. We agreed to work in a number of Key Biodiversity Areas on the island of Seram and on some small nearby islets. Our original intention had been to work at a larger scale and to address the entire Seram-Buru Corridor – one of the highest priorities of the CEPF Ecosystem Profile. We realized quickly that the concept of this very ambitious corridor was flawed. It would be extremely challenging to bring together all the stakeholders in this vast area distributed through several jurisdictions. We agreed early on to focus on a smaller cluster of locations around the KBAs in West Seram and Manusela National Park in North Seram.

The intention was to apply TAB scientific expertise in landscape approaches to the problems of these KBAs. The understanding was that we would support the work of local CEPF partners and help them to work together strategically in support of ecosystem conservation. The focus was on terrestrial KBAs in West Seram and their adjoining marine areas and on the Manusela National Park (KBA 212, in Central Seram and adjacent forest and agroforestry areas) and Boano island (KBA 199).



Map of Key Biodiversity Areas in Southern Maluku

The Strategic Direction 7 and geographic priorities of the initial CEPF for the Wallacea Biodiversity Hotspot study, states: “Provide strategic leadership and effective coordination of conservation investment through a regional implementation team”.

The priorities were:

- SD1 (species): trade in Moluccan cockatoo is a problem.
- SD2 (sites): one national park, large areas of forest remain outside protected areas.
- SD3+4 (community-based approaches): highly relevant, SASI is reported to play a central role in terrestrial and marine resource management for local communities.
- SD5 (private sector): few players; may be opportunities to collaborate with logging companies on concession management.
- SD6 (capacity-building): active NGO community in Ambon, university, LIPI research station, with active research on Seram.
- SD7 (RIT): this area could probably respond quickly to an RFP.

Based on these points, TAB tried to prioritize our strategies and activities in Maluku.

TAB operated from the Faculty of Forestry at Pattimura University in Ambon. The Faculty was the base of our permanent representative in Maluku. A number of faculty members worked in support of the TAB CEPF project. We also developed close links with the LIPI Research Centre for Maluku. The “Ecosystem Profile of “Wallacea Biodiversity Hotspot” provided overall guidance for our work. We pursued six priority objectives:

1. Assembling detailed documentation of social and biophysical conditions in the KBAs and their surroundings.

2. Building links with local stakeholders in communities in and around the KBAs. We invested heavily in understanding the livelihoods of these people and their concerns about their future development and the implications of these for ecosystem conservation.
3. Building links, establishing trust with local governmental institutions and NGOs, and bringing them together to build a shared vision of the challenges and opportunities for the wise use of KBA ecosystems.
4. Exploring options for interventions that would favor conservation in and around the KBAs. We focused on the range of government initiatives to give local people control of resources and motivations for conservation.
5. Connecting stakeholders from Seram with institutions and individuals working on ecosystem conservation elsewhere in Indonesia to enable shared learning and to increase the visibility of Seram conservation needs at the national level.
6. Mobilizing resource people from Universities, research institutes and NGOs to provide specialist support for conservation in Seram. TAB provided approximately 2000 person days of outside expertise to the project.

The agreement with CEPF spelt out a number of activities and deliverables. However, we began with a very superficial understanding of the needs and priorities for conservation on Seram. As work progressed, we learned a great deal from our interactions with local stakeholders. We produced quarterly comprehensive reports on our activities and in these reports, we indicated to the CEPF the ways in which our activities and deliverables would be adapted to address our new understanding of local problems and opportunities. Edited versions of these quarterly reports make up the bulk of this final report. As work progressed, a divergence appeared between the views of TAB and CEPF on priority actions. This divergence of views led to the suspension of all field activities in early 2019 and TAB decided to terminate the project in July 2019. A number of important activities planned for the January – July 2019 field season did not therefor take place.

The CEPF “Ecosystem Profile” had noted the absence of NGOs working on conservation in Maluku. Only one local NGO – LPPM – was able to collaborate with TAB but this collaboration was very fruitful. Unfortunately, LPPM also reduced field operations in the first half of 2019. In the absence of effective conservation NGOs, we relied on specialists in government bodies in Ambon, Masohi and Piru who had a good knowledge of ecosystem conservation issues and who were enthusiastic and competent. These specialists worked for the Ministry of Environment and Forests and for the regional and district planning boards. Senior persons from a number of government offices strongly supported our conservation work. The staff of Manusela National Park were especially helpful and effective. The emphasis of our work therefor moved to facilitating dialogue amongst these government officials and local stakeholders. The Faculty of Forestry at Pattimura University played a leading role in facilitating this dialogue; we held regular meetings at UNPATTI and in the field to discuss conservation challenges on Seram. Many influential people attended these meetings and this led to greatly improved understanding of conservation priorities and opportunities. Local specialists from the MOEF played a valuable role in these discussions.

TAB field activities focused on the communities who had the greatest interest in the KBAs. These were villages on the norther boundary of Manusela National Park and the two villages and several hamlets on Pulau Boano. TAB specialists spent long periods in these communities living with the inhabitants and gaining a deep understanding of the strengths and weaknesses of the communities and the opportunities and risks that they confronted. We focused on finding conservation approaches that would make sense to local people. People in the communities around the KBAs are amongst the poorest in Indonesia and have need for development. We tried to reconcile these development needs with the conservation of ecosystem values.

We have divided this report into seven sections.

1. An overview of conservation and development issues in the Manusela National Park KBA focusing on communities affecting the KBA in North Seram.
2. An overview of issues in West Seram with an emphasis on Pulau Boano.
3. A detailed examination of the household economies of the villages adjacent to the KBAs on Pulau Boano and in North Seram.
4. As assessment of potential livelihood improvement strategies for the communities on Pulau Boano and in North Seram.
5. Institutional arrangements and stakeholder engagement
6. Building capacity for natural resources management

We have also prepared a detailed study of the broad scale conservation and development issues affecting the island of Seram. This study is at present under review by a scholarly journal and will be available to CEPF and stakeholders when published.

A detailed study of the difficult challenges faced on Pulau Boano where the growth in Cajuputi oil harvesting is endangering the habitat of the critically endangered single island endemic, the Black Chinned monarch, is being prepared for publication and will be available shortly.

iv. Preface

Tanah Air Beta (TAB) initiated its CEPF activities in Seram on June 1st, 2017 through background studies, a literature review and study of remotely sensed imagery. Contact was established and intensified with local partners on Seram and in the provincial capital Ambon at this time.

We developed the initiative through a series of visits by Tanah Air Beta teams to Ambon and Seram during the inception phase (defined as the first three months of the initiative).

TAB did not immediately appoint a permanent field manager as initially planned but engaged a senior faculty member from Pattimura University in Ambon to liaise with different actors in the landscape in Seram and in Ambon (as the capital of the Maluku Province). The TAB team visited Ambon and Seram regularly. Delays in funding from CEPF forced us to use funding from other sources to cover the cost of early stages of fieldwork.

We undertook several field visits at the beginning to familiarize with the condition on the villages in northern part of Seram and in West Seram. The TAB main team was composed of Agni Klintuni Boedihartono (AKB), Jeff Sayer (JAS), Rebecca Riggs (RR), James Langston (JL), Chris Margules (CM), Jatna Supriatna (JS) of (University of Indonesia and chair of National Ecosystem Initiative). Several other TAB associates came joined the activities in Seram: Emilio Valeri (EV), Adinda Rizky (AR), Rowan McIntyre (RM), Emma Carson (EM), Gary Wilson (GW), Robyn Wilson (RW), and several volunteers including 8 graduate students from James Cook University – 3 Indonesians, 2 from Australia, one each from Russia and Vietnam and University of British Columbia student from the UK. The TAB team joined LPPM colleagues (Piet Wairissal, Noni Tuharea and others) on several occasions on Boano Island for a scoping visit and workshops with multi-stakeholders interested in land-seascape of Boano. Faculty members from UNPATTI (Agus Kastanya, Hendrik Aponno, Christy Suhendy, Gun Mardiatmoko and several others) joined the TAB team in Seram for some visits and for diverse meetings during the work in Seram. The project focus on 2-3 villages in each of the two focal areas of Boano and Manusela National Park. We engaged with additional villages in the higher area of Manusela NP as the program advanced. The objective of the project was to use these villages as models for biodiversity friendly sustainable development and to secure support for biodiversity conservation from the villagers.

During the initial visits the field team was based with LPPM on the island of Boano and was divided into two groups in North and South Boano. In North Seram, we joined Yastra colleague in the

village of Masihulan, and based our team in the villages of Masihulan, Melinani and Sawai. We also met with the sub-district administration in Wahai and we visited the Manusela NP offices. The team stayed in the houses of local people in all of the villages and introduced the project to local government and key stakeholders in each village. We provide a list of all people contacted on these first two visits and of meetings convened and attended in Appendix 1.

a. **Boano:** The team interviewed local stakeholders and conducted a number of participatory exercises to develop village profiles, historical time lines, studies of local perceptions of strengths, weaknesses, opportunities and threats faced by the villagers etc. Village profiles were developed and selected and we interviewed local people to determine their livelihood profiles. We give summaries of studies conducted in this and the other villages in Appendix 2.

b. **Masihulan:** This village is the location of a rehabilitation centre for confiscated parrots, it has some trails and platforms used by visiting bird watchers and offers homestay accommodation to these bird watchers. The people have agroforests and some marine resource harvesting activities. Another CEPF grantee is working here on conservation of parrots (*Konservasi Kakatua Indonesia*).

c. **Melinani:** We selected this village as it is the location of one of the first two Community Forest Initiatives (HKM) in Seram and is located in the forest area close to Manusela NP. The people were relocated to Melinani from their original village of Manusela from which the NP takes its name. We conducted our usual series of participatory exercises in the village and visited the community forest (HKM). An exhaustive inventory of forest products used by the villagers was conducted and an exercise to determine their relative importance to the village economy was carried out.

d. **Sawai:** This village has easy access to diverse marine environments, offering many fishery and aquaculture resources, as well as significant marine tourism opportunities. A local NGO is attempting to improve waste management practices with a new recycling center, due to begin operations in December 2017.

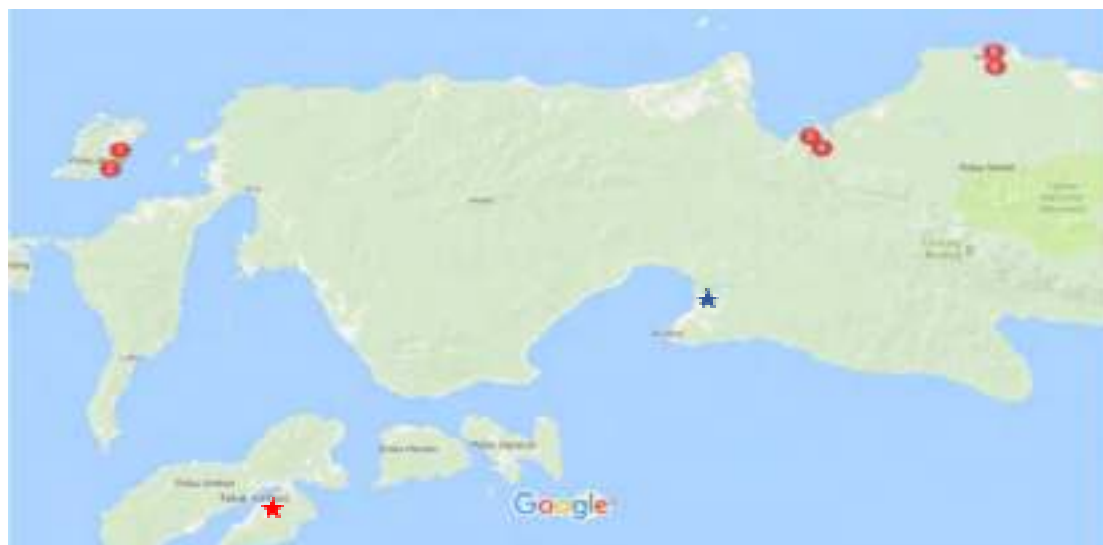


Image 1. Map of Boano and Seram Islands showing locations of villages where TAB worked. 1 = Boano North, 2 = Boano South, 3 = Sawai, 4 = Masihulan, 5 = Wahai, 6 = Melinani. (Image source Google Maps).

CHAPTER 1. OVERVIEW OF THE LANDSCAPE AND SEASCAPE

1. Main Issues

A. Marine resource management

In depth studies of marine resource dependency and management challenges were conducted in Boano and Sawai. A very high diversity of marine resources are used by local people but few measures to ensure sustainability are in place. The problems of industrial fishing by foreign boats seems to have been brought under control by the actions of the Ministry of Fisheries. A number of small-scale aquaculture initiatives are underway and show some potential for expansion. In North Seram there is a large-scale prawn farming initiative that supplies export markets but also provides significant local employment. Traders pick up live fish and lobsters in schooners to transport to Bali for onward export to East Asia.

- Capture fisheries

The villages of Boano and coastal Seram are highly dependent on marine capture fisheries for nutrition and food security. Fish is the most affordable and consumed animal protein. Small tuna (such as *Euthynnus affinis* and *Katsuwonus pelamis*) contribute heavily and were the most abundant fish for sale in Boano and Sawai. Their importance was further confirmed using participatory approaches in Sawai, where they were voted the most consumed fish in everyday life (see Sawai village profile Appendix 2). The Sawai community also placed a high importance on the *bagan* (moored platforms that attract fish) fishery which targets schooling baitfish for human consumption. As these fisheries can be seasonal and sometimes unpredictable, other regularly consumed fish included rabbit fish, trevallies and reef fish.

Fishing is also an important source of income, with fish from the area appearing in local, domestic and international markets. Market access varies across the landscape with poor access in Boano (except to the tuna fisherman of Pulau Kasuari) and some access on Seram. The cost of transport limits access of fishers from Boano to the closest market town of Piru. In the North of Seram, buyers from Masohi regularly travel to collect suitable catches for resale in the markets of Masohi or Ambon. Groupers are by far the most expensive fish, with live specimens achieving prices ten times that of other reef species. Live fish, along with live crayfish are collected by specialized boats bound for the markets of East Asia. Increasing consumer demand and the reproductive biology of groupers, place them at serious risk of overexploitation – if this hasn't occurred already.

Fishers utilize a range of methods including nets, spears/spear guns, diving and line fishing to target a diversity of species across pelagic, coral reef, sea grass, mangrove and inshore habitats. Sea cucumbers, crabs, crayfish, Trochus, and other shellfish are also harvested. Despite the diversity of options, individual fishers tend to specialize, focusing on a particular niche. Whether this is a product of convenience or necessity is unclear. The diversity of the fishers' livelihoods extends beyond the marine environment, with many fishers involved in farming activities as well, which contributes to increased livelihood flexibility, resilience and adaptive capacity.

Perceptions of the state of the local fisheries were mixed. Some fishers suggested catches were declining while others suggested catches were stable or improving. Reasons offered for declining catches included habitat degradation caused by coral harvesting for construction, impacts from destructive fishing practices, and the intrusion of outside fisherman into local areas. Most people believed the use of potassium cyanide and explosives has now ceased, but some suggest it may still be occurring. Some attributed their improved catch to the cessation of such techniques. Awareness of the

impacts of overfishing was quite low, with many fishers happily targeting immature fish. In some places fishers even received better prices for smaller fish of the same species.

- Aquaculture

Aquaculture is in its early stages within the region, especially when compared to aquaculture development in other parts of Indonesia. The region has been identified for the expansion of aquaculture with a focus on mariculture. Seed supply, research and extension support is provided by the government *Balai Perikanan Budidaya Laut* (BPBL) facility in Ambon. Only marine aquaculture activities were observed within the region with no mention of freshwater aquaculture in any of the focus villages. Small-scale culture focused on seaweed and marine finfish with large-scale culture focusing on shrimp. Pearl culture previously existed but proved to be uneconomical.

Seaweed culture is prevalent throughout West and North Seram, in locations with suitable water conditions. Although not currently cultured on Boano Island, culture sites exist in the adjacent Kotania Bay. Seaweed culture is used as a livelihood diversification strategy, with few farmers focusing solely on seaweed. Once harvested, the seaweed makes its way through buyers in Ambon to Surabaya and on to international markets. Despite its potential, seaweed culture faces a number of issues. Poor water quality has resulted in outbreaks of “ice ice” disease, reducing yields. Farmers are facing issues regarding the availability and quality of seed for restocking longlines. They are also at the mercy of the “boom and bust” cycles of global seaweed prices and limited buyers. In times of reduced profitability, farmers often reduce or stop production and focus on other livelihood activities. Value adding opportunities exist within the sector, with a women’s co-operative in Nuruwe demonstrating some success through the local processing of seaweeds into snacks and drinks. Research programs are also underway at BPBL to improve the quality of seaweed stocks.

We observed cage culture of marine finfish in Sawai and the bays adjacent to Boano. Key informants also mentioned the prevalence of sea cage culture in some of the unvisited sub villages on Boano. Cultured species included trevally, grouper, Asian sea bass and rabbit fish. Sea cages are also utilized as holding facilities for the live fish trade. The majority of farmers relied on the questionable practice of growing wild caught juveniles rather than hatchery produced seed. This is despite the efforts of BPBL to entice farmers into sea cage culture with free seed (1st order), free sea cages and extension support from the BPBL in Ambon. A single farmer in Sawai had taken up the offer and was approaching his first harvest of Asian sea bass, which were bound for restaurants in Masohi. Market access and the supply of seed from BPBL demonstrates potential for the future, but BPBL needs to work more with farmers to develop relationships and improve knowledge transfer. The major constraint identified by farmers was the reliance on *bagan* (lift net pontoons) caught trash-fish for feed. Catches from the *bagan* are variable and unpredictable, and are also utilized by the community for food. This reliance may limit expansion, reduce productivity, and cause possible conflict between farmers and local consumers in the future.

A large shrimp farming venture in North Seram was the only large-scale aquaculture observed in the area. Based across a number of sites (including hatchery, grow out and processing sites), the venture is one of the largest employers (over 100 employees from Sawai) in the area and provides other benefits to communities such as generators. Despite the benefits, serious concerns were raised during our participatory activities over the negative environmental impacts of some of the facilities. The longevity of the operation is also in question with some employees suggesting production was decreasing due to disease issues. As the only large-scale employer in the area, the potential fall-out of the venture failing could result in increased pressure on terrestrial and marine resources as redundant employees re-engage with other livelihoods activities.

B. Forest resource management

Detailed studies of the uses of forest resources, management of “*kebun*” – local agroforestry gardens – and commercial forest and tree crop estates were undertaken. Complex agroforests have been a feature of the Seram landscape for hundreds of years and have supplied global markets for cloves and nutmeg. These gardens also supply up to 100 other crops – non-timber forest products, timber, spices, medicines and food crops. Industrial scale tree crop estates are being established on a significant scale on the north coast of Seram. 30,000 ha of oil palm has been partially planted by a Jakarta based company split equally between East and West Seram with an integrated mill in East Seram. Olam is developing a 1500 ha cacao plantation in East Seram. Neither of these schemes involve out-growers and they do not source products from smallholders – even though Indonesian law requires them to do so.

a. Industrial forestry

A single large industrial selective logging concession borders the NE of Manusela NP. This concession appears not to have been operating or to have only been operating at a low level in recent years. However major road construction into the concession East of Wahai is now underway and we were informed that at least part of the concession is now a “conversion concession” which suggests the likelihood of conversion for oil palm – this would bring oil palm and people up to the borders of the National Park. This development and the possible establishment of additional logging concessions should be monitored on future visits.

b. Community forestry

Community forests (*HKM* and *Hutan Desa*) are being developed around the villages of Masihulan and Melinani. We joined a field school at Melinani for two days where the Social Forestry Unit of the Ministry of Forestry and UNPATTI were developing plans for the *HKM*. The *HKM* provides an interesting opportunity for developing support for conservation in this important area close to the NE boundary of Manusela NP and we plan to follow the development of the *HKM* and contribute to promoting sustainability objectives and biodiversity conservation initiatives in the *HKM*. A *Hutan Desa* is planned for Masihulan and we also joined the discussions on this with villagers and representatives of the *Dinas Kehutanan* (Provincial office of the Ministry of Environment and Forestry). The *Hutan Desa* has the potential to contribute directly to conservation objectives on this area which is very important for the endemic birds and which lies of the boundary of the national park.

c. Smallholder gardens

Our studies indicate a wide range of *kebun* farming systems being used in the landscape. There are numerous subsistence level gardens of 1 hectare or less. Smallholder farmers own plots for household use, where excess harvests may be used for barter or sold for income. Questionnaire surveys indicated that the capacity to scale-up yields is limited by a shortage of finance, infrastructure and skills. Smallholders suggested training or extension programs to improve skill levels. The extent that such a transition might provide a ‘real’ change in the level of household income is worth closer attention when compared to other future scenarios.

TAB visits to numerous smallholder agroforestry plots suggest a lack of strategies for managing yield gaps – actual production is much lower than potential. TAB observed pest and disease-limited crop yields in various smallholder plots. People’s ability to manage such challenges without access to capital resources (training, knowledge and learning, pesticides) limits the possible coping strategies. This provides an example of the potential limitations as seen in this type of farming system. Smallholders viewed their personal *kebun* farming system as adequate for their livelihoods but there was little indication of potential for increasing income from these small-scale systems. In general, TAB saw that

larger land areas (>2 ha.) throughout the landscape correlated with greater economic benefits for smallholders. Those observed benefits translated to higher levels of household income including savings in various instances. Farmers reported specialising in between 4-6 different crops, but also harvested a diversity of other crops opportunistically.

Our studies prompted us to explore two questions; what might occur if smallholder farmers specialised through selection of 1-3 crops only (selection relative to land size perhaps), and could such a change improve livelihoods of smallholders by connecting them to value chain suppliers, and providing value adding opportunities? We noted one nutmeg trader who buys from smallholders located in 3 Moluccan locations (Banda Island, Ambon Island, and East Seram). This trader receives the highest price for exports to the Netherlands for processing, however relies on sourcing high quality dried seed and mace to sell for export. The lower quality dried products are sold at a far lower price in the Indonesian domestic market or are exported to Vietnam for processing. There is a potential opportunity for smallholders to specialise in harvesting a high value crop and for which global demand is increasing.

Land tenure and occupation remains an issue in the landscapes surrounding Manusela National Park. Smallholders are concerned that the national park is likely to restrict their land expansion in future. The HKM in Melinani could provide an opportunity to monitor whether the HKM system of land tenure can mitigate this issue over the longer term. It is worth contemplating the real and potential implications of the threats to the villages and areas which surround the fertile boundary of Manusela National Park. Consideration of the main terrestrial impacts on forest benefits directly derived by people for both livelihoods and incomes is required, as well as the spill-over effects to other environmental resources including marine benefits. A landscape level discussion with the stakeholders (smallholders, other land owners, multiple levels of government, and private business) may provide an opportunity to assess the most sustainable and equitable way forward. The intent of our approach is to start a conversation on the potential for broad economic development whilst maintaining environmental values for the people and their lands, the national park and sea in this land-seascape.

C. Ecotourism

The north coast of Seram attracts international tourists for both coastal and terrestrial tourism. The well-known tourist destination of Ora Beach, situated along the coast of Manusela NP facilitated the expansion of smaller ecotourism ventures by local people. Three small traditional resorts exist in the village of Sawai. The neighbouring village Masihulan is expanding capacity for homestay ecotourism and several other initiatives exist along the coastline. Visitors to the area are generally international or local (from Ambon and other parts of Seram) and prefer to stay 3-4 nights, visiting both coastal and forest locations. Approx. 20% of tourists are birdwatchers seeking rare bird species such as the Salmon crested cockatoo. Local interest in ecotourism varies between the three profiled villages; Masihulan is very interested in ecotourism as a way to profit from forest conservation and are aware of the rare birds located in the nearby forest. Their interest stems from regular visits from birdwatchers, the establishment of local NGO *Perkumpulan Konservasi Kakatua* (Indonesian Parrot Project) and investment in a bird-watching platform in 1994, still in use. One man in the village previously captured and sold rare birds and now runs a bird rehabilitation centre. In neighbouring Sawai, people see commodity crops as a more profitable source of growth than tourism. Ecotourism is still a new concept in Melinani despite occasional visits by international tourists for the past 10 years. Lack of interest in tourism in Melinani may be due to the lack of profits trickling down to the village from tourism activities – a consequence of enclave development along the coastline. On the island of Boano tourism is limited to birdwatching with short term stays and organized tours. TAB was unable to visit the area on the island with tourism activities during this period.

Ecotourism services in the area are underdeveloped with potential for expansion, including trekking, bird watching and picnic facilities, cultural experiences and adventure activities. The small airport located in Wahai and improvement of the road through Manusela National Park could increase accessibility to the area, attracting more international tourists. Partnerships and improved management (maintenance and waste) will be required to ensure the facilities function effectively. Current limitations for ecotourism expansion include remoteness (road to the north coast of Seram is in bad condition), lack of organized and trained people and advertising and marketing. TAB caution against promoting ecotourism as the major development pathway for the communities living in Seram but conclude that if managed carefully tourism could contribute to incomes and to improved natural resource management on the island.

Inclusion of local people and products and development of partnerships-networks outside the island is vital to ensuring progress.

D. Manusela National Park

We visited the national park offices in Masohi, Wahai, Huaulu and Masihulan. Staff were motivated and competent and the park appears to be secure. Very few people penetrate into the park except for those who cross the park on the Masihulan to Masohi section of the Trans-Seram highway which passes through interesting forests from sea level to 1300 meters – many of the endemic birds can be seen from this road. Access to the park is also possible from Kenike village on the North-East of the park – Kenike is the point from which the tourists trekking to the summit of Gunung Binaiya enter the park. This trek already attracts quite lot of local and some domestic tourists and has potential for further development. Some of the rarest of the endemic birds can be found on this trek in the forests above Kenike – for instance a bird watcher took the first ever photographs of the Seram Thrush in the wild in this area during our visit. We plan to spend more time in the villages in the highland (Huaulu and Kenike) on the border of the National Park and explore options for biodiversity initiatives on our next visit.

E. Smallholder livelihood systems

Smallholders in Seram and Boano rely on a diverse range of both terrestrial and marine resources for income and livelihoods. The majority of people living in the studied villages identified themselves as farmers managing agroforestry systems “*kebun*”. In the coastal villages, those who identified as fishermen also managed *kebun* and many farmers fished intermittently depending on the season and condition of their *kebun*. Ridge to reef connectivity surfaced in multiple other aspects of livelihoods; coral is a common construction material, mangroves provide fuelwood for cooking, fish is the most common protein for households, valuable smallholder commodities rely on the port for export and tourists engage in both marine and terrestrial activities. Smallholder engagement in marine and terrestrial systems is variable from place to place and over time.

Average landholdings are 2-3 Ha but *kebun* do not have clearly defined boundaries. Households commonly manage gardens for subsistence and *kebun* for cash crops, predominantly cloves, nutmeg, coconut (for copra) and cacao. Other food crops in *kebun* include (but are not limited to) bananas, durian, avocado, jackfruit. Common crops grown in gardens for household use include cassava, chili, *kangkung*, taro, ferns and sweet potatoes. Image 15 contains a complete inventory of forest resources used by households in Melinani. Households frequently mentioned timber as an important source of cash income, specifically Ironwood (*Intsia bijuga*), known locally as *Kayu Besi* or Merbau. Villages along the border of the National Park harvest timber without a permit, although it is unclear what informal agreements exist between the villages and the National Park authority.

During interviews with households we asked if people felt their livelihoods had improved over the past 5 years. Across the 36 interviewees there was a mix of responses, with many farmers stating that their livelihood had not improved due to poor harvests from their *kebun*. Seasonal fluctuations appear to have the largest effect, followed by tree crop disease. This highlights an important element of smallholder livelihoods; household incomes are highly diverse yet still mainly dependent on food crops. Farmers see their natural environment deteriorating but have little management capacity to respond to this challenge. Village infrastructure is improving but the potential positive impacts of electricity and accessibility may be overshadowed by challenges in crop production. Many households were concerned about population rise and land availability but do not see this as an imminent threat; they manage their lands for the present not the future.

Overall trends in Boano and Seram show gradual change in smallholders livelihood systems, land is inherited and managed the same way as by previous generations. Employment and education opportunities are increasing; most villages contained people working for private companies including prawn production, Olam's cacao plantation and oil palm. Those employed privately tended to spend less time managing *kebun*, instead leaving the task to other members of the family. Households with more land appeared to specialize in fewer crops, raising the question of whether this will be a future trend.

Similarly, fishermen with more assets target fewer higher value fish, such as tuna in Sawai village. Our preliminary investigations indicate terrestrial and marine systems are closely bound and future livelihood changes will impact both systems. As development is geographically limited to the coastal regions, further investigation into how terrestrial activities impact the marine environment is needed.

F. Customary law and resource rights

We had little opportunity to conduct in depth studies of laws and resource rights – this will be the object of more intensive work during future visits. There is evidence of some fluidity in this area – new government initiatives are opening up new possibilities for people to acquire certificates for their own land and negotiations are underway to develop community forests and village forests. New industrial concessions are being allocated and these may mean that less land is available for local people.

G. Industrial agricultural development – estate crops

TAB gathered information about two current areas of oil palm estate near Manusela National Park. Analysis of satellite imagery showed an estate to the west of the park, near the village of Loon, which has difficult access. The road has been blocked off for several months due to a bridge collapse. TAB will need to visit this area in future to gain more detailed information about the plantation, mills, export trade and smallholders.

We observed an oil palm estate 23km to the east of the Eastern park boundary. A mill is located very near the village of Kobimukti, within a Transmigrant settlement. The stands of oil palm in the estate ranged in age from less than a year, to approximately 10 years. From our East-West transect and analysis of satellite imagery, we discovered a few smallholder growers near the mill, and we predict that numbers of smallholder growers will increase as the industry develops in the area. This will have significant implications for livelihoods of people in the region.

The East-West transect also revealed a new road being forged into secondary forest 7km East of Waihai, and only 1km west of the Manusela NP border. This road services a HPK (conversion forests) concession, and it appears likely that this concession will be converted to oil palm. This conversion will be a

significant driver of change in the landscape. TAB discovered that many local people are unaware of the details of this concession. We plan to examine developments in this area during future visits.

OLAM international owns a large cocoa estate 13km East of the Manusela NP border, and 31km East of Wahi. The estate operates under the name PT Sumber Daya Wahana, and is 1500 Ha in size. We observed that the company does not currently buy from or interact with smallholder cocoa farmers in the region. Smallholder cocoa farmers are facing significant challenges in the form of disease and access to markets, and would benefit greatly from training in improved silviculture practices and disease control. We plan to attempt to facilitate interactions between estate companies and smallholders in future.

H. Transmigration

There is a large transmigration village near to Huaulu to the East of Sawai. It is located on an area of lowland forest that was cleared to accommodate the settlement. This is the latest transmigrant village set up in Seram in 2010. Other transmigration settlements are located along the coast to the East of Manusela NP and have existed for more than 25 years. There appears to be a likelihood of further establishment of transmigrant settlements triggered by expanding estate crop ventures all along the North coast of Seram. The potential impacts on natural forest values and on the national park will need to be monitored.

I. Infrastructure

We have been unable to obtain the *RTRW* (spatial plan for the next planning period) from the *Kabupaten* (district); that is a priority for the future. The following information is based on observations on the ground surrounding the national park.

From Ambon City there are two differing ferry and speedboat routes to Seram – via Masohi and Waipirit. There is also a regional airport adjacent to Melinani village near to Wahi, the capital of the *Kecamatan* (sub-district). That airport has 1 flight from Ambon per week, with 12 person capacity and mainly services military, police, and civil servants.

Ferries go to Masohi and Waipirit and there are frequent daily trips (every couple of hours). Both cities are located along the Trans-Seram road. The Trans-Seram road is the only artery for road traffic and runs along the south of the island. It extends from Piru in the west all the way eastward along the coast.

Access to the north is by the *Kabupaten* road. The *Kabupaten* road starts from Masohi and heads to Sawai on the north coast. Sawai has become an ecotourism destination (125 km total). Prior to reaching Sawai, the *Kabupaten* road turns into what is locally known as the 'SS' road, for its slalom configuration – this section of the road cuts through the national park. Once in Sawai, the road extends eastward along the coast. Bridges on the westward road from Sawai are currently damaged. Villages are sparsely settled along the northern coastal road, with some extending inwards up into the highlands. Those villages are located near the national park (from Huaulu to Kanike) and are reachable only on foot. The trails are narrow and muddy, lined by a strip of managed agroforest. Beyond 25 meters from the trails the forest is in very good condition.

The *Kabupaten* road is in mediocre condition – many potholes and slips have made the road 2-3 times slower than under normal paved conditions (it took us 6 hours, normal conditions take 2-3). There has not been spontaneous settlement or *ladang* (small scale swidden farming) expansion along the national park section of the SS Kabupaten road.

A new road is being opened into a conversion forest just east of Wahi. Most locals were unaware of this conversion forest status and did not know the plans for the road or what would become of the vast forest adjacent to their villages on one side, and adjacent to the national park on the other. This requires follow-up. The new road is being constructed in a 'least best practice' way – as is the logging accompanying it. This is worrisome because we fear the resulting land degradation will justify converting the forest to an oil palm plantation without appropriate social and environmental studies.

All electricity comes from diesel generators – with the notable exception in the transmigration village which has a solar farm and extensive battery capacity. Most villages in our landscape only received power during the night hours – from 6 pm to 6 am.

J. Urban green infrastructure

An urban green infrastructure program is one of the most important potential programs in urban areas especially in developing countries such as Indonesia. One example looked at on this field study is Wahi. Wahi is the capital of the sub-district of North Seram (Seram Utara) in Central Maluku Regency (*Kabupaten Maluku Tengah*). The town is situated between forests and sea. Wahi is only 1-2 meters above sea level, 108,40 km² with more than 5,400 people, and population density of 50.32 human/km² (BPS, 2016).

Urban development in Wahi has been influenced by history, religion and culture, the town's location in regard to access to natural resources and remoteness, and actions by local people of working age (21 – 60 years) who are well educated (RPJMNeg, 2016). Since the Dutch time Wahi has been an important harbor for the Molucca spice trade and exports. The extent of these influences need to be controlled by government regulations to promote better urban development. Good governance is also needed to improve urban green infrastructure. The reason is that the urban green infrastructure such as urban forests, private gardens, playing fields, watersheds, open spaces and street trees can influence protect Wahi against floods, sea-level rise and storms and can also provide a healthier and more attractive environment for the people.

We designed a flow chart to model urban green infrastructure development in Wahi based on observation, information and data from key informants. This model describes how urban green infrastructure in Wahi needs government regulation, good governance and identification of trade-offs to achieve sustainable urban development. See diagram 1.

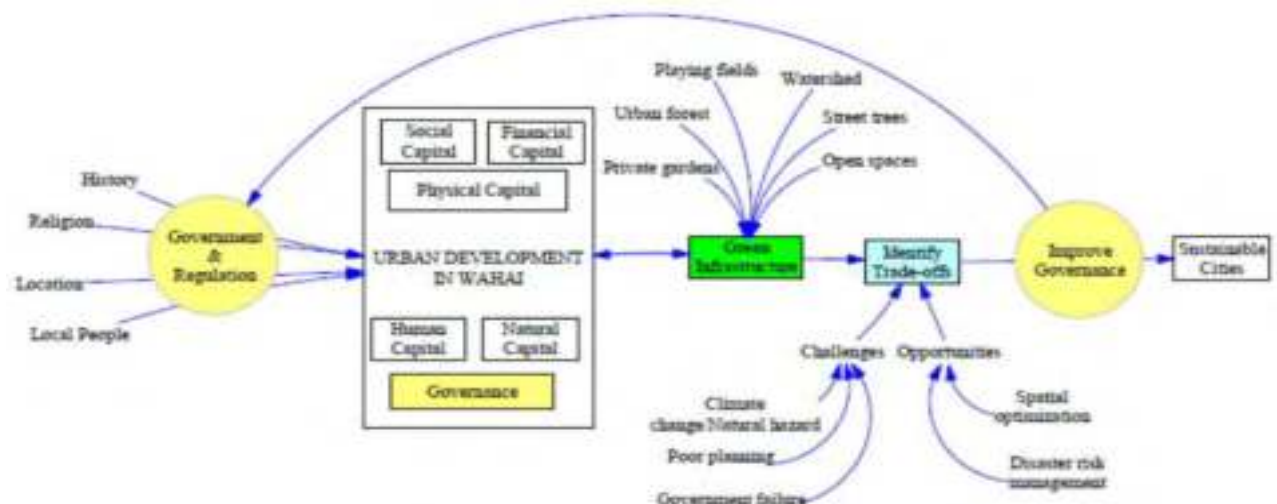


Diagram 1. Urban Green Infrastructure Development

There are always trade-offs in urban green infrastructure that include challenges and opportunities. At

the moment, Wahai has grown organically and does include some urban green infrastructure. Members of the community have planted trees in their front yards that create shade in the streets. Furthermore, many houses have private gardens and plant flowers and fruits. These conditions contribute to keeping temperatures low in Wahai. Some facilities such as playing fields, watersheds forests, cemeteries and other open spaces are also present in Wahai.

However, the future is unclear. Currently, Wahai does not have a master plan. Furthermore, the remote location of Wahai has made it difficult to coordinate with the regency and national government. There is currently no program to further develop forest or urban green infrastructure in Wahai. This means that Wahai is vulnerable to flooding and erosion from both the forest and the ocean. Government should regulate and plan to avoid or minimize risks from climate change/natural disasters through opportunities such as spatial optimization and disaster risk management. Spatial optimization and effective natural disaster management planning are important requirements for cities in close proximity to a disaster zone. Government and other actors of development in Wahai should improve governance in order to cope with these challenges. Strategic decision-making as well as day-to-day maintenance are needed for sustainable urban development in Wahai.

K. Public awareness, Universities, Schools

There is a moderate research capacity in the landscape, with several universities located in Ambon city, as well as research groups such as *Lembaga Ilmu Pengetahuan Indonesia* (LIPI = the Indonesian Institute of Sciences), having a presence. We connected with several people in LIPI, and collaborated and shared knowledge considering both the marine and terrestrial environment.

There is one public and several private Universities located in Ambon that are in position to provide support to Seram Island. In Melinani and Sawai, the TAB team collaborated with a group from Universitas Pattimura, who were in the area assisting local villages establish and maintain community forest land (see 3.2b. above). We plan to continue a relationship with various faculty members from UNPATTI in the future, including both the Forestry and Marine Science departments and faculties. We see the local universities as a valuable resource for providing training and support to local actors in the landscape and also a good way to help in improving local capacity as local actors (NGOs, local government and young generation from the region) will seek education in this university

Local people in Seram regularly aspire to university level education, and TAB came across many graduates and students. In questionnaires, many people also noted that they have children currently away studying. Students must travel and live away from their local village in order to attend university, and this as well as university fees were often identified as a barrier to attendance. People have developed various ways to overcome these barriers. Several people suggested that families could often afford to send the oldest child to university, but not subsequent children. Others said that they would work together as a larger family unit, encompassing aunts, uncles, cousins, nieces, nephews etc. The family would contribute to each child as they came of university age, either by offering money to help with fees, or accommodation if they lived in a city with a university. After graduation, there is a mix of people who return to live in the village they grew up in, and those that move on to other places. We found graduates with expertise in Forestry, Economics, Fisheries, Teaching and Health Care (nurses or doctors). There is opportunity to support potential students in future, perhaps by enhancing networks or providing information about scholarship opportunities.

Senior school completion varies from around 80 % (North and South Boano) to an estimated 100 % (Masihulan, Sawai). In all villages that TAB visited, a senior school was located either within the village, or within 5km. Interruptions to children's' high school attendance occur for several reasons, including

the need to assist parents in a *kebun* or garden, or in other livelihood activities. Overall, attendance at school is valued by local people.

The TAB team gathered some indicative information about public awareness on the topics of health and waste management. TAB observed that waste, primarily in the form of plastic rubbish, is an issue in many of the areas they visited. Plastic waste is often scattered on the ground outside homes and buildings, or dropped into gutters and waterways. Locals identified waste management and littering as problems in several villages, but considered that general concern for waste management in their area is low. Several programs are in place with the aim of reducing littering in the area. In Sawai, a locally formed NGO has been given a government grant to start up a recycling centre just outside of the village. The recycling centre has been built, and should be operating within the next few months. The centre will aim to service three local villages, and in future earn an income from selling compost material and diced plastics back to the government. In Masihulan, there are signs along the main road asking people to dispose of waste responsibly, and we observed that Masihulan has lower levels of litter on the ground than other villages. It is quite probable that this change came about as part of the help that Masihulan has received by the NGO *Perkumpulan Konservasi Kakatua* (Indonesian Parrot Project) to set up facilities to host bird watching tourists to the area.

Members of the team visited schools in Boano, Melinani (primary school) and Sawai (middle school) to discuss with children about waste management and littering. The teachers and parents in Sawai identified that there had previously been programs run within the schools to teach children about waste management, but that these programs had been short-lived. TAB sees teaching young people about environmental values and responsible waste management as an opportunity for the landscape. There is no awareness about the dangers of plastic waste that could be harmful to wildlife, fish, the ocean and human health.

Health care available to people in the villages varied greatly, and people's attitudes and awareness of health practices reflected this. The nurse in Sawai was born in the village and returned after his training. He commented that before he started working in the village, vaccination rates and use of modern health care was low. He has been able to convince people of the importance of these things and believed that this is because people trust returning residents who have grown up in the village. TAB hopes that the number of people going away to university then returning to the villages of Seram will prove positive for health care in future. There are a number of basic health education programs offered in government schools, and there is opportunity for TAB to further study the reach and breadth of these programs.

2. Stakeholder consultations

Stakeholder consultations included working with both local people and key informants. Voluntary participation methods included landscape scenarios, SWOTs analysis (Strength, Weakness, Opportunities and Threats), historical timeline, mind maps and Dotmocracy (prioritization exercises using sticky dots to allow people to state preferences). The landscape scenario activity played an important role in understanding the recent changes in the landscapes of the villages and the desirable landscapes for the future. In Boano and Masihulan local people indicated through landscape scenarios that the problems their village faces are lack of electricity, water shortage, sanitary problems, poor infrastructure and lack of economic opportunities. The SWOT analysis, helped TAB to understand the strengths, weaknesses, opportunities and threats facing the villages. From Masihulan and Sawai, local people revealed that they have opportunities from natural resources, such as abundance of water resources, marine resources, natural forest and good soil for planting a diversity of tree crops like durian, cloves, coconut, nutmeg, cacao, rambutan, cassava, sweet potatoes, banana, papaya and spices. However, the weaknesses identified included lack of human resources, Adat or local customs, which are

not recorded in writing, waste management problems, land erosion and lack of employment opportunities. Villagers indicated that their opportunities encompass trading marine products, farming products and non-timber forest production, more young people studying at university at Masohi and Ambon and good partnerships with local NGOs such as LPPM. Threats that local people have to face include using poison and bombing methods for fishing in Boano, sanitation and contamination effects on health, lack of funding for education and waste having detrimental effects on the environment. Prioritization exercises were conducted in Melinani and Sawai to find out which kind of marine resources and tree crops are the most valuable for each community, which are important for livelihoods, which provide the best cash income, and which resources have the most problems and the most potential for the future. The results from Melinani show that coconut, nutmeg and cloves are the most valuable crops; beans are the most used for selling; sago is the most used in everyday life; cacao has the most problems and coconut have most potential in the future. The historical timeline activity assists TAB to know about the history of the village.

Key informants in the landscape are the people who play a key role in the village like the *Bapak Raja* (elected king of the village) and *Bapak Desa* (appointed Head of the village). Outside the village stakeholders include local NGOs, UNPATTI, LIPI and Forestry Department. The people of Boano see LPPM- a local NGO as facilitators to connect them to the government. KAPATA helps to facilitate environment issues and deal with waste management in Sawai.

UNPATTI is the biggest public university in Maluku, annually training thousands of students in a diversity of subjects including marine sciences, forestry, and economics. The LIPI research centre in Maluku province has conducted several research projects on Seram Island.

Appendix 1 contains a list of all stakeholders that TAB met during the initial two field visits. The list is divided into participants in the voluntary participation activities, interview respondents, participants of the *HKM* field school in Melinani and some key actors from the city of Ambon. We will build this list into an extensive and well- connected network to support future conservation activities.

In September 2017, TAB brought partners from Seram and Ambon to attend a Landscape Approach Workshop in Malinau, North Kalimantan. The objective was to share and learn experiences with other institutions from different parts of Indonesia who are trying to apply Landscape Approaches to gain a better balance between conservation of biodiversity and sustainable development. The meeting involved actors from Burung Indonesia in Flores and Gorontalo, WWF Indonesia in East & North Kalimantan, FFI in West Kalimantan, ZSL in South Sumatra, CIFOR, ICRAF, LIPI, local governments, universities from Jakarta, Norway, Spain, Australia, and private sector operating on logging and pulp & paper companies.

3. Governance, Institutions, social networks: Disconnects in Seram

Local people in northern Seram are not adequately engaged in discussions about their future landscapes - thus providing a role for TAB.

We developed a preliminary Actor Network for Northern Seram. In the actor network diagram below Orange=private; Purple=public; Green=civil society. Lines show links between actors in the landscape. This is preliminary and will evolve with greater stakeholder inputs and further analysis. Links will also describe influence and knowledge sharing within the landscape upon further evaluation.

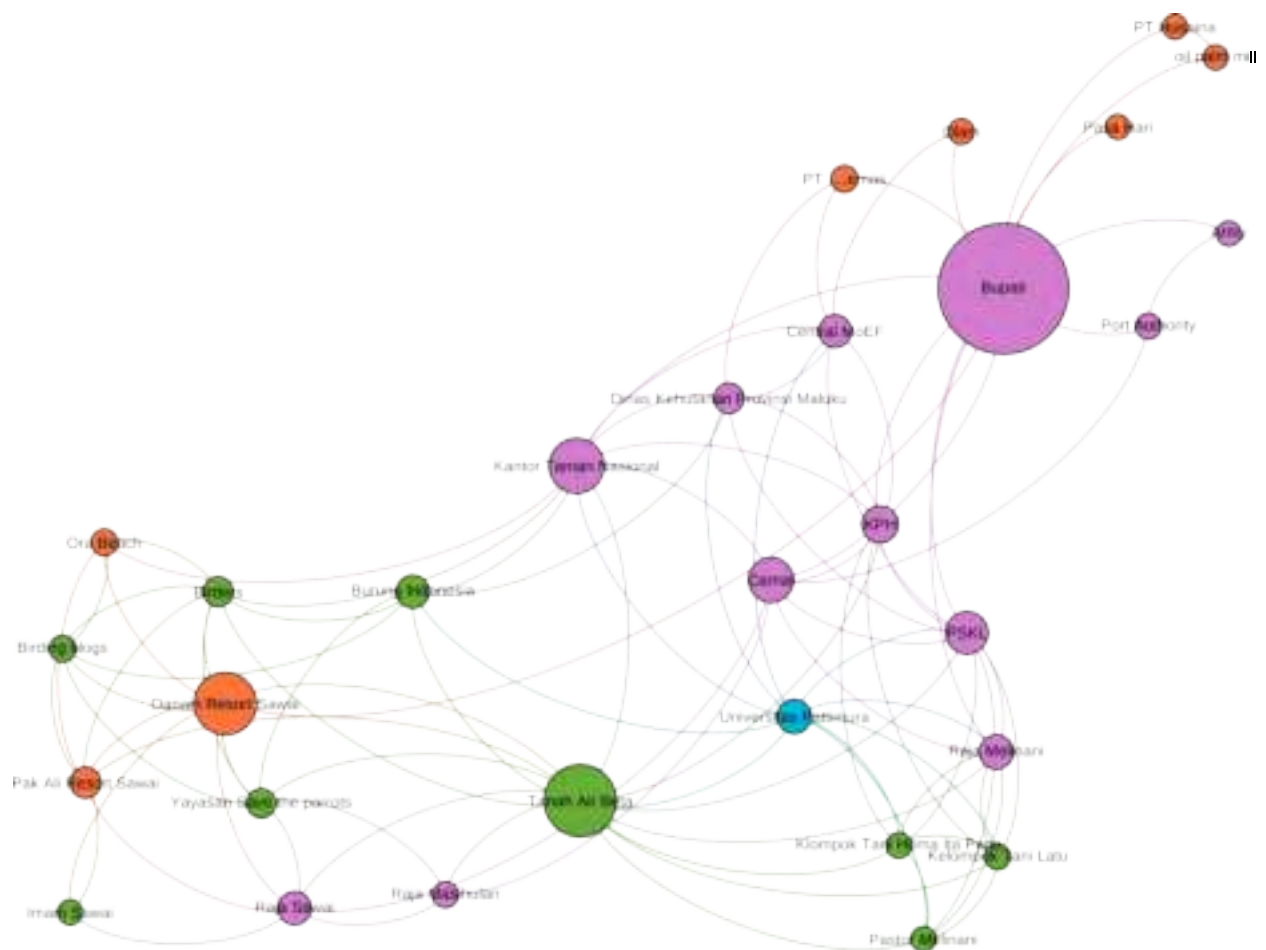


Diagram 2. Preliminary Actor Network of North Seram using Social Network Analysis

CHAPTER 2. CHALLENGES OF CONSERVING THE CRITICAL ECOSYSTEMS OF WEST SERAM AND PULAU BOANO

The TAB team visited Pulau Boano, Piru and Ambon in December 2017 to continue surveys and relationship building that we began in August 2017. This chapter describes these visits.

1. Economy and Demography

Boano Island has two main villages, Boano Utara (North Boano) and Boano Selatan (South Boano). These two villages are located next to each other. There are an additional 6 sub-villages scattered along the coast of the island. Four of the villages are “*dusun*” affiliated with North Boano. Three of these Pulau Kasuari, Anauni, Naiselan are Butonese the fourth Huhua is inhabited by people indigenous to Boano. Two *dusuns* are affiliated with South Boano – Hoarora and Pasir Panjang and these are also Butonese. The two main villages consist of Christians and Muslims indigenous to Boano. North Boano is primarily Muslim and has a population of 6949 (2015 estimates). South Boano is primarily Christian and has a much lower population of 1507 people. These population estimates may not be reliable as different sources quoted very different figures. For example, voting age people at the last election were 1020 for Boano Selatan and its small surrounding villages and 1200 for Boano Utara (voting age is 18 years old). Further surveys are needed to obtain reliable population estimates. Population growth rates are unavailable; migration levels are considered to be low but household size and number of children per family indicate population growth is high. The information below represents both North Boano and South Boano unless noted. The inhabitants of Boano Island have strong historical connections with the kingdom of Buton (South East Sulawesi) and the kingdom of Ternate in Halmahera (North Maluku) which had an important role in the spice trade with the Portuguese and the Dutch from the 16th to 20th century.



Figure 1. Map of Boano Island (Source: Ndaru P /USAID SEA Project and LPPM, 2017)

Village	Total House hold	Men	Women	Total
North Boano	2110	3439	3510	6949
South Boano	331	766	741	1507

Source: Demography Data in the area of Puskesmas South Boano, 2015

Table 1: Population estimates provided by the Puskesmas (dispensary) on number of people they cover in the region in 2015.

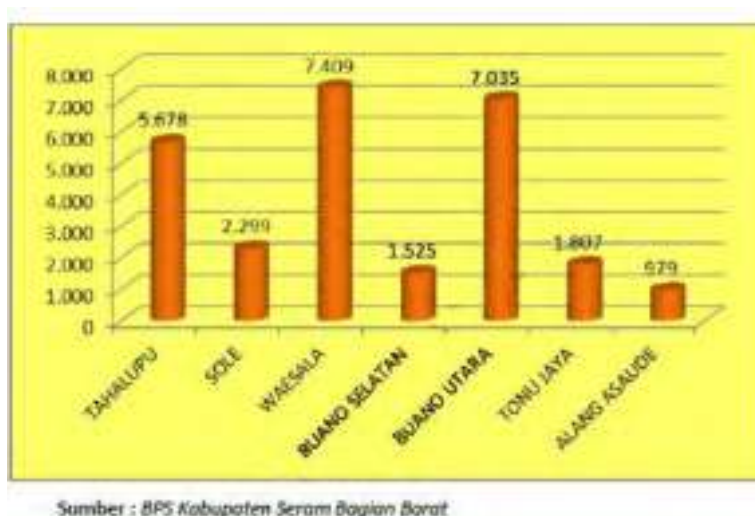


Table 2. Population number from Bureau Statistic in West Seram District, 2014

Small scale agriculture, *kayu putih (Melaleuca)* oil production and fishing are the main economic activities in Boano Utara. The expansion of agricultural and fishing activities is hindered by poor market access. There are currently no financial institutions (banks) on the island. A community initiated financial cooperative failed to gain government support. Without access to financial institutions, borrowing money from friends, family and wealthier residents has become common practice. Preliminary surveys suggested that average household expenditure might be in the order of between 40,000 and 70,000 rupiah per day. Provision of labor for a share of the harvest and bartering are common. Community members are increasingly gaining employment outside of the island, developing important social and knowledge transfer networks, but this is also contributing to the rising levels of inequality. We noted the return of a number of young men to Boano Utara who had been working as artisanal Cinnabar – mercury - miners in Luhu on the adjacent mainland of West Seram.

Village	Farmer	Fisherman	Traders	Civil Servants	Forest users	Total
North Boano	855	570	50	31	380	1886
South Boano	134	89	8	20	60	311

Table 3. Estimates of number of people involved in different economic activities on Boano (Data source from BPS Kecamatan Huamual Belakang, 2015).



Figure 2. Melaleuca stand in dry forest in the Centre of Boano island

Most funding the village receives is from *dana desa* (from government budget). According to some reports from head of village in Boano, income for the village usually come from:

1. Public services
2. Retribution – tax - from Kayu Putih distillation
3. Rate / tax from communities

We were unable to obtain information on whether this retribution actually been paid or enforced by the village officers.

2. Health and Education

There is a *Puskesmas* (dispensary) servicing both villages, with 19 staff, including 4 nurses and 4 midwives, plus 10 volunteers. Each sub-village also has a smaller *Pustu*, with either a nurse or midwife. The only concerns raised were regarding the availability of some medications. The highest reported diseases are:

1. Respiratory problems
2. Malaria (laboratory tested)
3. Gastro-intestinal infections
4. Accident and trauma
5. Dermatology infection
6. Muscle and ligament problems
7. Diarrhea
8. Hypertension
9. Dermatology allergy
10. Otitis ear infection

(Source: SP2TP Puskesmas South Boano, 2015)

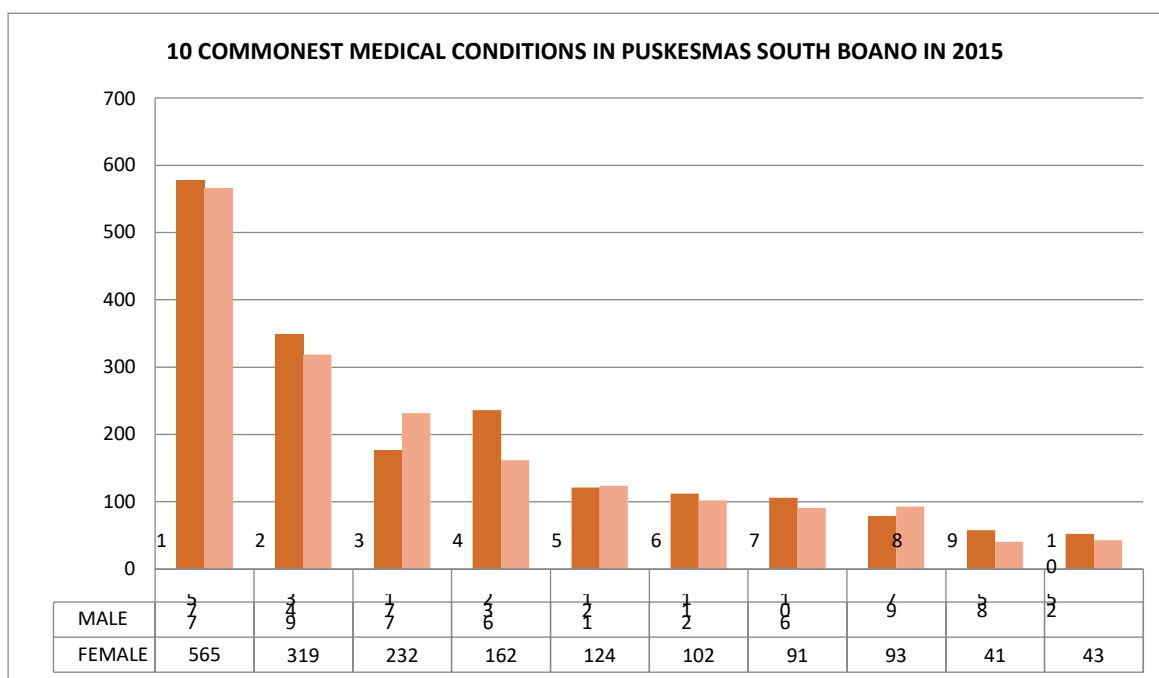


Table 4. Commonest medical conditions in the Puskesmas in South Boano in 2015

Access to basic education is available with a junior, middle and senior high school located on Boano. The teachers appear to be motivated, confirmed by a number of external sources, despite receiving a small wage and in some cases, no wages. The attendance of students is good, except during the *kayu putih* harvesting season in July/August and December/January where attendance can drop to 50%. The school gives the students Saturday off during these times, to allow the students to contribute to agricultural activities. The teachers appear sympathetic to the socioeconomic situations of the students, and help them catch up on the required school work. High school completion rates are around 80%. The school has no employed English teacher, but an administrator from the junior high school acts as a volunteer English teacher. The school has won numerous provincial awards for *Pramuka* (scouting). The school has its own generator to power their computer lab.

DESA/DUSUN (Village/Sub-village)	SCHOOL NAME
North Boano	Paud Puan Mandiri Paud Terpadu Hatu Ina SD Inpres 1 Boano Utara SD Inpres 2 Boano Utara SMP PGRI Pulau Boano SMA Negeri 3 Waesala
Dusun Anauni	SD Inpres Anauni
Dusun Huhua	SD BPD Uhua
Dusun Pulau Kasuari	SD Negeri Pulau Kasuari SMP BPD Pulau Kasuari
Dusun Naeselan	SD Negeri Naeselan
Desa Boano Selatan	SD Neg. 1 Boano SD Neg. 2 Boano SMPN Satu Boano Selatan
Dusun Hoarora	SD Negeri Hoarora
Dusun Pasir Panjang	SD Negeri Pasir Panjang SMP Satu Atap Pasir Panjang

(Paud is kindergarten, SD is elementary school, SMP is middle school and SMA is High School.)

Table 5. Number of schools in Boano island, (Source: Data Program UKS, 2015)

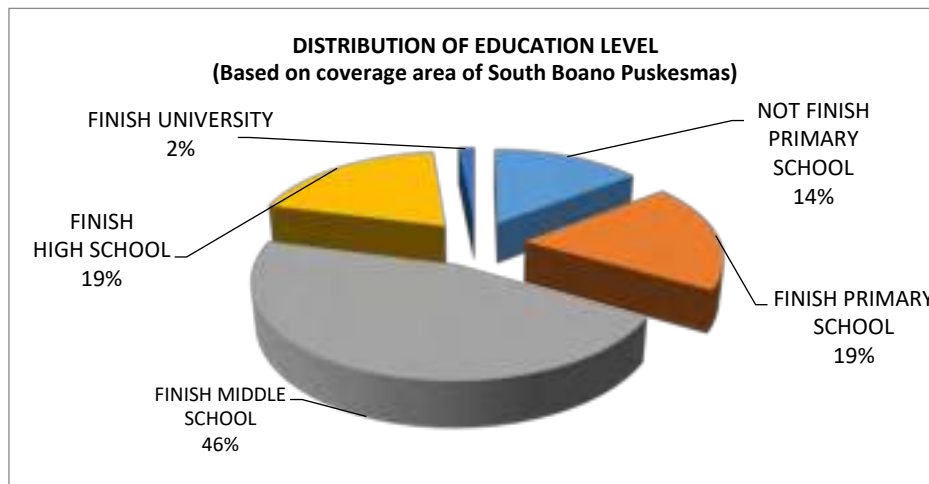


Figure 3. Education level in Boano island (Source: Data Program UKS, 2015)

3. Physical Infrastructure

Electricity in the villages comes from a public generator, operating from 7pm to 7am. Telecommunications coverage in Boano is reasonable but low signal strength only gives poor internet access. Traditional houses are made of wood with palm frond roofs. Modern houses are mostly constructed out of concrete, with coral often forming the foundations. Lack of clean water is a major issue on the island. A government funded system to supply water to community taps failed and a new system is being installed but is not yet operating. Wells are located within the village and natural water sources exist in various locations outside the village boundaries. During the dry season (June/July) the wells in the villages do not have enough water or it suffers from saline intrusion. At these times people walk to the more distant natural water sources to collect water for household use. No crop irrigation systems are currently used. North Boano community suffers badly of lack of water during dry season. The last few years a pond has formed in the middle of the village due to bad drainage system from rainwater and rising sea levels and tides pushing into the village. This artificial pond could create health problems in the future as the water is stagnant and becomes mosquitos infest. A better drainage system is needed in the village.

Official land certificates are not yet accorded to any land on the island. Most is land held under traditional – *adat* ownership. In settled areas household blocks are small and the houses are crowded together. The average size of agricultural plots was difficult to estimate. Most appeared very small but some households had access to larger areas ranging up to 9 ha. The size of blocks of land is determined by the traditional clan group known as the *Soa*.

4. Terrestrial ecosystems

Boano experiences a humid tropical climate with high rainfall - probably about 2000 mm per annum but with a pronounced dry season in June- July. The natural vegetation cover of most of the island would therefore be a closed tropical dry forest. Dryer forest types exist on the high limestone ridges in the center and north of the island, an intermittent fringe of mangroves occurs on most of the coastline and an extensive mangrove area exists in the hinterland of Teluk Valentine. Forests on steeper slopes and some of the forests and deforested areas on level land are classed as *Hutan Lindung* (Protected Forest) but the protection of these forests is not effective. The designation of these areas as *Hutan Lindung* is contested by local people who claim prior rights.



Figure 4. Land cover of Boano Island

Vegetation is degraded over most of the island. Low lying areas with level terrain have been used extensively for gardens for many years. The present population claim that they were originally inhabitants of the forests and cleared ladangs for cultivating rainfed hill rice. Rice is no longer grown and the staple diet is now a mixture of imported rice, manioc, sago, breadfruit, sweet potatoes and yams. Manioc, a small amount of maize and the other food crops are cultivated in *Kebun*. A diversity of fruit trees also occur in these *Kebun*.

History of *Kayu Putih* (Melaleuca Oil) in Boano

Historical cultivation has led to the degradation of much of the island's forest. *Melaleuca* plantations for the production of *Kayu Putih* oil are now extensive in level areas in the center of the island but accounts of their origin are not consistent. Some informants claimed that *Kayu Putih* production only began in the 1980s at the instigation of "Chinese" dealers in Piru – others claim that it has been cultivated for longer. The *Kayu Putih* plantations may have replaced gardens or even the rainfed rice that previously existed in these areas. A comprehensive account of the *Kayu Putih* cultivation was provided by some elders in South Boano and North Boano. This study reports that only 2-3 *Kayu Putih* stills were operating in the 1990s whereas today there are in excess of 300.

A number of pressures are leading to continuing degradation of the forests:

1. Wood harvesting: Boat building was an important economic activity of Boano until the 1960s. Some boats are still being made but boat building is no longer a major activity. A logging company Busana Indah operated on Boano in 1987 apparently seeking *Kayu lassi*. Today most timber that is extracted is used on the island. Considerable quantities of wood are now harvested both from the *kebun* and from the natural forests in the *Hutan Lindung*. The stills or "kettles" that are used to process the leaves of the *Melaleuca* consume a great deal of wood. We were told that a single distillation required three trees and took one or two days. There are

estimated to be about 300 stills on the island. The stills do not all function all of the time so it is difficult to estimate total fuel wood offtake but it is clearly enough to lead to degradation of large areas of forest and scrub. A large amount of wood is also harvested for the construction of barriers to prevent pigs from entering *kebun*. Some *kebun* use bamboo fences and live fences of *Glyricidia* and this is clearly preferable to the use of wood. Additional wood is harvested for house construction, furniture making and wood is the main fuel used for cooking in many households. Recently wood from the island has been used for building walkways on adjacent mainland areas and on Pulau Osi – some of this in support of new aquaculture infrastructure. The wood offtake needs to be monitored as it is likely to exceed the production potential of the remaining forests. Excess wood harvesting is likely to be the main cause of forest degradation on the island.

2. Expansion of *kebun*: We observed several areas where regenerating forest was being cleared for new *kebun*. Most were on areas which were recovering from earlier cycles of clearance and none were observed encroaching on natural forest areas – but the only remaining natural forests are on steep rocky slopes and in gullies along watercourses and are not suitable for *kebun*. As population increases the intensity of cultivation for *kebun* will inevitably rise and will degrade more forest. The *kebun* contained a variety of plant species but were less diverse than those that we have seen in North Seram. Coconuts are widely planted in areas close to the coast. Breadfruit, jackfruit and a variety of other fruits (*Syzigium spp*), pineapples etc. were present. Manioc and yams were widely planted. There are scattered patches of teak. Most of the *kebun* were somewhat neglected and appeared to be producing at below their potential.
3. *Kayu Putih*: *Melaleuca cajuputi* is grown in pure stands and managed on a coppice system. We observed laborers harvesting the leaves by hand for a payment of 500 Rp per kilo. The plants are maintained at a height of about 150 cms. The leaves were carried in 25 - 35 kg sacks to a still or kettle – many stills were scattered along water courses in depressions around the plantations. About 1% by weight of oil is extracted from the leaves – apparently less in some situations. The boundaries of the *Melaleuca* plantations appeared stable. We did not observe any areas where vegetation was being cleared to extend the plantations. Gaps in the plantations were filled by vegetative propagation from stakes (cuttings). We were unable to obtain consistent information on how and when the plantations were first established. Several people told us that *Kayu Putih* production only began in the 1980s and that it was inspired by entrepreneurs from Pulau Buru. The oil crop is now bought by traders in Boano Utara and sold to traders in Buru. It is marketed throughout Indonesia as a product of Buru. The stills have a limited lifespan and many are in poor condition – the *Bapak Raja* in Boano Utara is providing subsidies to producers to purchase the materials for making more stills – mainly to replace existing ones. *Dana Desa* funds are re-fitting 300 kettles over a 3 year period (2016-2018). Several *Kayu Putih* producers believed that they could increase their profits by cutting out the middlemen in Buru and marketing directly in other parts of Indonesia but they are prevented from doing so by government licensing arrangements.



Figure 5. A family working on *kayu putih* distillation



Figure 6. *Kayu Putih* growing in the highlands of Boano island



Figure 7. School girls harvesting *kayu putih* leaves to get extra income

Threats to biodiversity

There do not appear to be any comprehensive studies of the biodiversity of Boano. The island is designated as a Key Biodiversity Area because of the presence of the critically endangered endemic Black-chinned monarch. This bird was originally collected in 1919 and the specimen left in the Bogor Botanical garden. The specimen was not examined until 1939 when it was described as a new species. There were no further recorded observations of the species until 1991 when Dutch ornithologists mounted three expeditions to Boano and “rediscovered” the species. The monarch was found in forested gullies on the lower slopes of the limestone hills on the North side of the island. Recent expeditions have tried to establish the full range of the species but it appears to be very restricted. The rarity of the species makes it a target for visiting birdwatchers almost all of whom observe it in one tiny forest gully above the village of Huhua. The total population of the species has been estimated at 100 – 200 individuals. The endangered Moluccan scrub fowl is widespread on the island and an endemic subspecies of the Paradise Kingfisher *boanensis* occurs. A total of 68 species of birds have been recorded from Boano. Several bird species endemic to Seram occur on Pulau Boano. Two bat species known only from the adjacent island of Marsegu fly to Boano to feed.

There is insufficient knowledge of the ecology of the Monarch to allow an assessment of the degree to which it is immediately threatened. The species does appear to survive in degraded/disturbed forests and garden edges although it has been recorded in cacao and bamboo plantations (communication with bird watchers who had been to Boano) – but if it requires undisturbed areas for any part of its life cycle its situation must be very precarious. If it is able to adapt to disturbed areas and gardens it may have a more secure future. A bird watcher tour operator in Ambon organizes visits to observe the bird and sends a few birdwatchers each year. Recently, in December 2017, the head of the *Soa* where the bird occurs has decided to levy a charge of 2 million rupiah on visiting birdwatchers. There is speculation that this price is too high and may discourage visitors. During our stay in Boano we observed that a lot of families keep birds in their backyard, birds not only from Boano but also from neighboring islands including from Papua and Obi island.



Figure 8. Some birds that were kept by villagers in Boano Island

Water sources

The population depends upon springs and streams for its water supply. During our visit all water sources were yielding water but during past periods of drought the people have suffered from drastically reduced water supplies. Most of the water courses that we observed were protected by riparian strips of scrub or woodland. Further degradation of the forests might reduce water availability to the people and even impact on the habitability of the island. In the past most of the people lived in the forested interior of the island and old village sites can still be detected in remote areas. One of them, Kampung Makassar, in the area behind Huhua is said to have been a significant settlement even before the Dutch were operating their spice trade in the region.

5. Critical marine ecosystems

The marine environment of Boano Island consists of seagrass, mangrove, coral reef and pelagic ecosystems. The waters around the island are home to, or visited by, a number of endangered and vulnerable species including the critically endangered hawksbill sea turtle (*Eremochelys imbricata*); the endangered green sea turtle (*Chelonia mydas*) and the napoleon wrasse (*Cheilinus undulatus*); and the vulnerable Olive Ridley sea turtle (*Lepidochelys olivacea*), dugong (*Dugong dugon*), humpback grouper (*Cromileptes altivelis*) and green humphead parrotfish (*Bulbometopon muricatum*). Beaches on the island have been identified by local community members to be breeding sites for sea turtles. Dugongs have been spotted in the vicinity of sea grass meadows, presumably utilizing the areas for feeding. The seagrass and coral reefs areas are also presumed to be important habitats for endangered and vulnerable sea cucumbers (including *Actinopyga miliaris*, *Holothuria lessoni*, *H. fuscogilva*, *H. scabra*, *H. whitmaei*, *Thelenota ananas*) and giant clams (*Tridacna gigas*), though further examination is needed. The status of threatened coral and reef fish in the area also requires further attention. The wider region is frequented by at least 15 species of cetacean including the endangered blue whale (*Balaenoptera musculus*). Some of these Cetaceans may also visit the waters around Boano Island.

The communities of Boano Island are heavily dependent on the exploitation of marine resources for livelihoods (food security, nutrition security and income). Fishers utilise a range of methods to target fish, molluscs, crustaceans and sea cucumbers across all habitats. Fish is the most affordable and consumed animal protein in all of the communities. The most populous villages of Boano Utara and Boano Selatan capture fish predominantly for subsistence purposes relying on abundant species such as small tunas (*Katsuwonus pelamis*), needlefish (Belontiidae), fusiliers (Caesionidae) and other small pelagics (*Rastrelliger* sp.). Whether this is due to their natural abundance or the over exploitation of other fish such a demersal reef species is unclear. These communities have limited market access with excess fish sold within the community. The Butonese communities of Pulau Kelapa and Pulau Kasuari in the North-west of the island rely heavily on fishing for their incomes.

These communities have the experience and the means to target high value pelagic species such as yellow fin (*Thunnus albacares*) and big-eye tuna (*Thunnus obesus*) and deep-water snappers, far offshore. The catch is transported direct to suppliers in Ambon with the highest-grade tuna loins destined for export markets.



Figure 9. Yellow fin tuna for export



Figure 10. Loins of tuna ready to be exported from Boano island

Threats contributing to the degradation of the marine environment

1. **Unsustainable fishing practices:** Unsustainable fishing practices threaten the long-term sustainability of Boano Island's marine resources. No marine resource management currently exists (although LPPM is working to re-establish traditional management strategies) and awareness of the impacts of overfishing is low. Pressure on marine resources may yet increase, with a focus group from Boano Utara identifying commercial fishing as the livelihood with the most future potential. Declines in the availability of land for gardens and the productivity of gardens and Kayu Putih forests may speed up this transition. Increasing internal and external demand for marine products and improved market access will only exacerbate the situation. High demand species such as groupers will be hit the hardest. Community members have also identified the increasing intrusion of fishers from mainland Seram. The use of bombs and potassium cyanide for fishing appears to have ceased, with only a few people possibly continuing the practice.
2. **Coral Reef Harvesting:** The harvesting of coral for use in construction is a widespread issue across the island. This is despite assurances that the practice had been prohibited. Live and dead coral is harvested, dried and utilised in the foundations of houses or for the construction of sea walls. This practice has destroyed vital coral reef habitats within the vicinity of each community.



Figure 11. Coral being used for construction (for housing and pathways in the village) and timber are used for fencing to protect against wild pigs and other feral animals.

3. **Mangrove Harvesting:** The mangrove ecosystem is under threat from the harvesting of mangrove timber for use as firewood and building materials. This is particularly evident in the mangrove areas of Valentine Strait and may also occur in other areas of the island. Mangroves are the most accessible source of firewood for the Butonese communities of Pulau Kelapa and Pulau Kasuari. Poor management of terrestrial timber resources may result in increased degradation of mangrove areas as communities seek firewood to fuel their “*kayu putih*” stills.
4. **Waste Management:** Like many other areas of Indonesia, Boano Island lacks a waste management system. Discarded plastic waste is prevalent in the nearshore and offshore environments around Boano Island. Plastic waste can be a major problem for cetaceans, sea turtles and sea birds. Visible plastic waste also reduces the eco-tourism potential of an area.
5. **Irresponsible Land Use Practices:** Irresponsible land use practices can result in increased sediment and nutrient run-off, causing eutrophication and siltation of sensitive marine ecosystems such as coral reefs and seagrass beds. The impacts on Boano are presumed to be limited but require more attention. Agriculture on Boano is small-scale, with minimal, if any, fertilizer used. Logging activities are also small-scale, although a commercial company operated a lease in the past. Areas for gardens were observed on steep slopes and in the vicinity of waterways. Riparian areas on the island also appeared to be logged.



Figure 12. Sea wall in front of village to avoid big waves and floods into the village

Marine Protected Areas

Marine protected areas (MPAs) are perceived by many to be an essential tool for halting and, in time, reversing the degradation of marine ecosystems. LPPM has been working with the communities on Boano to re-establish traditional management systems to achieve beneficial ecological and social outcomes. The acknowledgement and incorporation of traditional management strategies into MPAs is a successful method of legitimizing an MPA in the eyes of the community.

Recently, plans for a large scale MPA covering the waters around Boano Island have come to the attention of TAB through our CEPF partner LPPM. An initiative of the USAID SEA Project, the MPA is being implemented by a consortium of actors including WWF and the Coral Triangle Centre (CTC). To understand the roles and goals of the actors, TAB facilitated a focus group discussion (FGD) with relevant actors including those working in other land-seascapes around Maluku (Appendix 1). The MPA is still in the early stages of development, with the government currently working on a marine zoning plan for the area. CTC has been conducting rapid ecological assessments to identify areas of ecological importance and will be responsible for developing the zoning within the MPA with communities, once governmental approval is achieved. It is believed that CTC will work with LPPM to incorporate aspects of traditional management within the MPA regulations. WWF is responsible for improving the sustainability of fisheries and has been conducting catch surveys on the island. With a large number of NGO's now working in the landscape, the possibility of "donor fatigue" within the communities needs to be managed.

The MPA may prove ecologically beneficial to the marine ecosystem of Boano Island but may also adversely impact on the livelihoods of the local population. Displacement of fishing pressure will occur in the marine environment but may also increase pressure on terrestrial resources. The livelihoods of the people on Boano are linked between the land and sea, with many reliant on resources from both environments. Without suitable livelihood diversification strategies, affected fishers may look to expand their agricultural or *kayu putih* production to sustain their livelihoods, increasing the pressure on the habitat of the critically endangered endemic Black-chinned monarch. Although TAB's input into the MPA may be limited, TAB can continue to facilitate discussions with the actors involved to develop and encourage land-seascape level thinking.

6. Land-seascape governance & actor networks

The government institutions on Boano Island appear to be poorly connected to the sub-district, district and provincial bureaucracies. The only government institutions on the island are at the *Desa* level and the *Puskesmas*.

Local leaders perceive that the only local outcomes influenced by higher and external levels of government have come from the '*Dana Desa*' program. *Dana Desa* is the federal Billion Villages program where funds (~Billion Rupiah) are allocated to villages for local infrastructure. Currently the North Boano Head of Village is under investigation for misuse of these funds. *Dana Desa* money is contributing to renovating 300 kettles used for *kayu putih* oil distillation.

The village level bureaucracy – the *Desa*, has differentiation of powers unique to Boano. *Desa* officers are not the ultimate decision-makers, they administer some bureaucratic functions but compete with the *Soas* in making many land use decisions. Our preliminary findings are that there is a degree of competition between the *Soas* and the *Kepala Desas* and the limits of responsibilities are not clear.

Boano inhabitants are a mix of local indigenous people and migrants from Buton. For several generations there have been links with the Sultanate of Ternate in Halmahera. The indigenous people govern the island with their 'community-clan' system. Clan groups or kin groups are known

as Soa. There are 9 Soas governing people and their resource-use. The traditional people settled into two adjacent and densely populated villages on the east coast. The village has now split along religious lines – North Boano is Muslim and South Boano is Christian. 5 Soas in North Boano govern about 7035 people and their land and sea. 4 Soas in the south govern 1,791 people and their land and sea. Butonese are Muslim and maintain agreements with *Soas* that have authority over their lands.

A spiritual leader/figurehead called a *Guru Mahu* advises the *Soas* on the cultural values for determining appropriate behaviors, regulations, ceremonies, and religious activities. He is considered to be the spiritual leader in North Boano – however we were not able to determine their level of authority. This *Guru Mahu* in North Boano is probably what was called the *mauweng* in the past in other islands of Moluccas. *Mauweng* was responsible for all matters connected with the “other world” including religion and *Adat* before the coming of monotheistic religions in the Moluccas.

In order to understand the complexities in the island of Boano, an understanding of the governance system is essential to be able to engage the communities in our goal of conserving these key biodiversity areas and its richness. There have been several conflicts in the island that have turned into deadly clashes between clans and groups. The debate still continues from time to time.

The *Pemerintah Negeri* (equivalent to Village Council and rulers in other parts of Indonesia) is composed of the *Raja* (ruler who had been chosen from an election by the people) and staff who works with him on development programs, local welfare and livelihoods, and the village secretariat. At the moment, there is a *Raja* in the North and an election will be held shortly in the South. The government has chosen a *Pejabat* in charge of South Boano while no *Raja* is yet elected.

Each village or *negeri* consists of several *Soas*. *Soas* are kin-group similar to clan groups made up of *Marga* (or in the Maluku often we hear *Mata Rumah* which is a unilineal descent group) which are lower level kinship units. The *Kepala Soa* (head of the *Soa*) is responsible for the clan and helped by an *Adat* leader and *Datis* who are responsible for land tenure issues for each *Marga*. There is one *Dati* for each *Marga* in charge of family lands. This unilineal descent group is in charge of control and administration of land.

Saniri is the village council which constitutes the main institution of local governance in a village. *Saniri* provide a community check and balance over the *desa* administrative institution. The *Saniri* consists of *Raja* (ruler) or head of village, *Kepala Soa* (chief of a collection of kin-groups), *Adat* chief, *Dati*, *Kewang*, and other elected members of the council.

Each *Soa* has authority over a terrestrial and marine areas. Boundaries are demarcated by a mix of natural and man-made landmarks. The borders between demarcations are not visibly delineated or fixed due to cultural taboos prohibiting border identification. This is creating some conflict between *Margas*. Each *Soa* has a chief and at least 2 *Kewang* – village police or security forces or rangers implementing *Sasi* (traditional natural resource management systems) and other regulations on management of the land and sea. *Kewang* works closely with the *Dati* as this group is most intimate with details on land-boundaries.

Recently the acting *Kepala Desa* for South Boano dismissed some *Soa* representatives from *Desa* level administrative positions, creating conflict between *Soas* and the *Desa*. The *Soas* are currently strategizing on nominations for an upcoming vote to elect new head of the village positions. Competition among the *Soas* seem to hinder the coordination and collaboration required to effectively manage island-wide resources.

7. Development Challenges

Development on Boano is limited by a number of factors. Human resources, isolation and lack of infrastructure place severe constraints on economic activities. Enrolment in education appears high but learning outcomes may be limited. Education is not providing the skills and competencies needed to drive the economy of this small and poverty afflicted island. Farming, fishing and forest resources remain the dominant contributors to livelihoods and all are of low productivity and the resource base is degrading. Some households receive remittances from family members employed in mining and logging in different parts of the Moluccas. Most households rely on subsistence agriculture for food. The Butonese communities on the north coast of the island and on Pulau Kasuari appear to receive higher incomes from fishing and may enjoy somewhat higher living standards than the indigenous Boanese.

Discussions with community leaders showed that they did not expect economic circumstances to change in the future. They identified fishing and farming as likely to remain the main income sources in twenty years' time (focus group discussion). In Boano Selatan 120 households are considered to be "*Miskin*" or poor. A similar or even higher proportion of the population of Boano Utara are *miskin*. Free rice allocations – "*Raskin*" - for poor families are said to be available for the entire population. There appears to be little other outside support, with the exception of LPPM and the allocations from the '*dana desa*' there are no external development programs active on Boano. Local leaders identified government funded physical infrastructure such as piped water, 24hr electricity and improved telecommunications as having the greatest potential to improve livelihoods.

The level of dependence on natural resources for livelihoods raises concerns over the future carrying capacity of the island. The population growth rate is not known but appears to be high - if population continues to grow and development aspirations rise, pressures for land conversion for agriculture and intensified marine resource exploitation will increase. An increase in remittances from off-shore income from mining and logging could reduce pressure on resources on Boano.

Development that leads to greater local value added from natural resources with more opportunities for high-skilled labor could offset this trend. Alternative development pathways could include intensified agriculture/aquaculture but more information on potential market opportunities is required. The formation of cooperatives (some already exist) could strengthen farmer's access to markets and to external support.

Development is also inhibited by social and political factors. Past conflicts between North Boano and South Boano have weakened partnerships that provided both villages with economic opportunities (see Soselisa, 2007). Lack of trust amongst leaders on the island inhibits development processes and makes it difficult for external agencies to deliver effective and useful support. This is likely to impact conservation activities due to lack of information flow and disorganized leadership. Given the complex resource management regimes on the island, at this stage it is unclear how to move towards effective leadership. We are using Actor Network Analysis to find leverage points for strengthening leadership and building connectivity between local leaders and outside groups.

The Kabupaten of West Seram recognizes that the community has to understand the need to conserve their island in order to have sustainable development. As long as pressure on forests is high because of rising need from fire wood, for Kayu Putih oil distilment, and fencing their forest gardens, and no restoration or restriction is planned, the future of the island looks problematic.

In October TAB organized a Learning Landscape workshop in North Kalimantan and invited organizations who are trying to implement Landscape Approaches in different provinces of Indonesia. From the CEPF partners in Maluku, we had LPPM and University of Pattimura coming to this event and sharing their vision of landscape and seascape dynamics.



Figure 15. Prioritizing resources with North Boano representatives

sumber alam (darat)		Sumber alam Laut	
Lassi	- kayu putih	- saku	- air
Bofasa	- cengkeh	- lalosi	
Lingga	- cokat	- komu	
Besi	- kopi	- mava	
Daun kelor	- jagung	- tuna	
Tiga daun	- karbih	- monar	
Jati	- sagu	- bia pacul	
Bambu	- kacang tanah	- bia kodok	
Palaka	- kacang merah	- kepiting	
Sisir	- labu	- udang	- sarinya
Marsequ	- pisang	- lobster	- julung
rusa	- pepaya	- samandar	- kalua
maleo	- mangga	- bafila	- make
bebek	- keladi	- teteruga	- ikan puri
Kambing	- ubi/potatos	- cuni	- ikan gaga
sapi	- kumbili (kub)	- hiu	- batu kabi (merah)
durian	- sayur paku	- akar bahar	- ikan pari
nenas	- tomat	- lolan	- teragiti
rebung	- chili	- terumbu karang	- kobara
jeruk	- jambu	- pasir	- garara
jeruk Badi	- kelapa	- mangrove	- ikan terbang (tungtung)
Kampong	- pinang/sirin	- garara	
Ayam	- beras merah	- ikan kakatua	
	- lemon cina	- tatu	
	- sukun		
	- hangka		

Figure 16. List of terrestrial and marine natural resources used in North Boano



Figure 17. Communities still hunt for subsistence needs



Figure 18. TAB and LPPM together visiting a Protected Area on Boano island with local communities



Figure 19. Discussion on key biodiversity species in Boano with partners LPPM



Figure 20. Looking for the Boano Monarch around Valentine Bay



Figure 21. Meeting with *Bupati* (Head of District), Sekda and Head of BAPPEDA (Local Planning Board) in Piru, West Seram District



Figure 22. Landscape Approach Workshop (TAB brought partners from CEPF to the workshop in Kalimantan)



Figure 23. Sharing and learning from other landscapes in other provinces of Indonesia



Figure 24. Participants of Learning Landscapes workshop where TAB brought different organizations to work together on sustainable landscape issues

8. Conclusion and next steps

Boano and the adjacent islands and mainland peninsulas of West Seram are of major significance for the CEPF. Both the marine and terrestrial environments have rare and endangered species and the threats to both are significant and growing. Population pressure is growing and the forests are being rapidly degraded. The critically endangered Black-chinned monarch is heading rapidly for extinction as a result of the destruction of its forest habitat. The livelihoods of the people are threatened as they also depend upon the forests for fuel and construction materials. The marine environment appears to be over-exploited and there is little control over fishing levels. The proposal for a Marine National Park is good but it will be difficult to apply regulations in practice.

To address these issues, we conclude that the following actions are needed:

1. Arrangements for local management of the forests of Boano must be discussed. Several recent government policy changes open opportunities for community and collective management of the forests. TAB will engage the Dinas Kehutanan, the Kabupaten authorities in Piru and the local people in discussion of options.
2. A meeting will be convened with the BAPPEDA and stakeholders in Piru to attempt to find solutions to conserve the Boano forests.
3. TAB will remain engaged with the Marine Protected Area process to investigate ways of bringing some level of protection to the most sensitive marine areas.
4. Further fieldwork in Boano will focus on engaging local people in discussions about sustainable resource management.
5. Particular attention will be given to the local economic value of the forests and marine resources on Boano.
6. Field surveys will be conducted on forests and marine resources on adjacent islands and on the nearby mainland peninsulas to determine their conservation value.

Future visits to Seram will also aim to:

1. Further engage with the development of the ecotourism potential of N. Manusela – including Masihulan and the villages from Hualulu to Kenike. We will attempt to get the Kakatua Foundation to join us for this visit.
2. Follow up studies of the economic value of the “Kebuns” in N. Manusela, especially around Melinani and Sawai.
3. Continuation of the studies of marine resource management around Sawai.
4. A stakeholder meeting in Masohi to engage the local BAPPEDA, BKSDA and others in discussions on the future of the park and its surroundings.
5. A workshop at UNPATTI to assess progress of the project and strengthen support of provincial authorities in conservation activities.
6. Present the document repository that we have developed for Seram on Mendeley – this is the web site where all the documents on Seram and surrounding seas will be stored and made available to all stakeholders.
7. Further develop the Theory of Change for conservation and development for Seram.

CHAPTER 3. INCOME AND EXPENDITURE OF RURAL COMMUNITIES IN WEST SERAM AND MANUSELA LAND-SEASCAPES

Overview

Previous work has demonstrated that the people of Seram Bagian Barat and Manusela Land- seascapes are heavily reliant on natural resources for their livelihoods. Understanding which resources are important to people and how the people benefit from these resources is vital for the design and implementation of effective conservation measures. It is also important to understand what the people perceive to be current or future challenges to their livelihoods, and what they perceive to be opportunities for alternative livelihoods or livelihood diversification. Understanding these aspects is essential to understand the complexity of the land/seascapes, to identify drivers of change within the landscape and to develop positive future scenarios.

In February and March 2018 Tanah Air Beta had several members joining the team in Sawai, Masihulan, North Boano and South Boano. In February and March Adinda Rizky, Emilio Valeri, and Rowan McIntyre conducted some participatory methods and discussions in 4 villages and Intu Boedhihartono and Jeff Sayer joined the TAB team in March with 2 colleagues from Australia and New Zealand who are specialists in botany, biology and ecotourism. These colleagues stayed in the villages with our TAB team for 3 weeks until mid-April. The present report relates to the activities in February and March carried out by Adinda, Emilio and Rowan. The work of the biodiversity and ecotourism team is reported in chapter 4.

Methods

To understand the importance and benefits gained from natural resources, participatory activities were carried out in Boano Selatan, Boano Utara, Sawai and Masihulan to determine where people gained their income and what they spent their income on. The field work was carried out during February and March 2018. Respondents were opportunistically approached, and their sources of income recorded through casual discussion. Respondents used 20 stones to then demonstrate the proportion of their incomes gained from each source. This activity was also repeated for their expenses. This activity was also used stimulate discussions regarding value chains, opportunities and challenges.

By using this interactive activity, it was hoped to overcome some of the difficulties associated with respondents attempting to quantify their sources of income using monetary or percentage values. The percentages reported throughout this report are therefore representative of the perceptions of the respondents rather than monetary values. The demographics of respondents differed between communities due to the availability of participants. In Sawai, male respondents were difficult to interview due to work and religious commitments. This was the opposite in Boano Utara, where difficulties were experienced with female respondents due to shyness, religious beliefs and a lack of ability to speak Indonesian. TAB field workers were able to learn basics of the local languages in both locations.



Figure 1: Locals fishing around fish cages in Sawai

Sources of Income

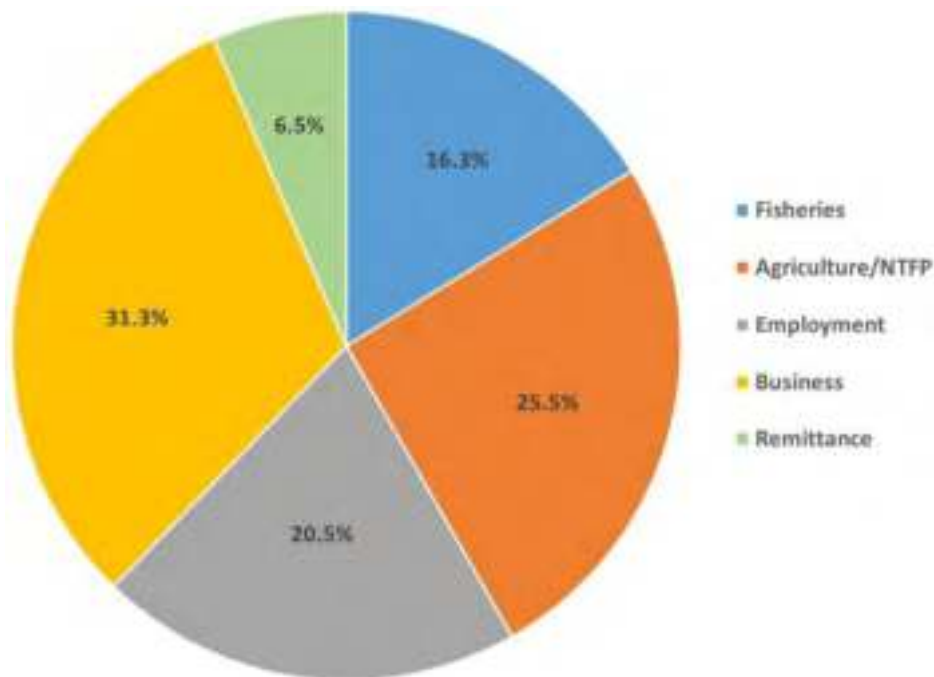


Figure 2: The sources of income for the people of Sawai

Sawai is considered by neighboring villages to be a fishing village, but our interviews suggest otherwise. Respondents relied on a variety of sources for their incomes, with micro- businesses providing the largest proportion (31%), followed by agriculture (25%), employment (20.5%) and fisheries (16.3%) (Figure 2). Remittances provided the smallest proportion of income with 6.5%. When this data is further broken down, the true diversity of their livelihoods is revealed (Figure 3).

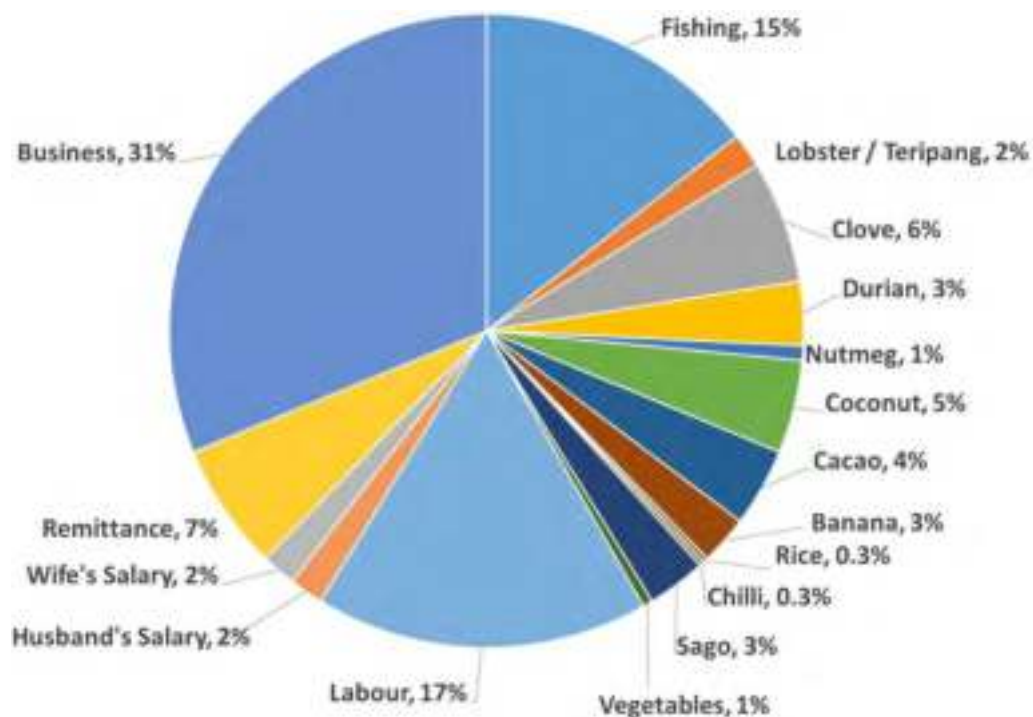


Figure 3: The diversity of income sources in Sawai

Agriculture

The importance of agriculture to Sawai should not to be underestimated, especially as the origins of the village are closely linked with the clove trade. The people of Sawai produce a variety of commodities, with the most economically important being clove, coconut, cacao, durian, and banana (Figure 4).

Income is also gained from the harvesting of sago from wild sago palms. Attitudes towards agriculture vary, but most farmers in Sawai focus on crops that require minimal inputs and people invest minimal effort into improving agricultural yields.

Continual tending of agriculture sites is perceived by many as a fruitless use of their time. Only a few people frequently visit their harvesting site for management purposes, with most choosing to invest their “spare” time in activities that are perceived to offer better financial yields such as microbusiness or fishing. The lack of focus on agriculture might be caused by a number of factors including the seasonality of agricultural yields, the lack of immediate financial rewards for crop management and the absence of a tradition of agriculture in the area.

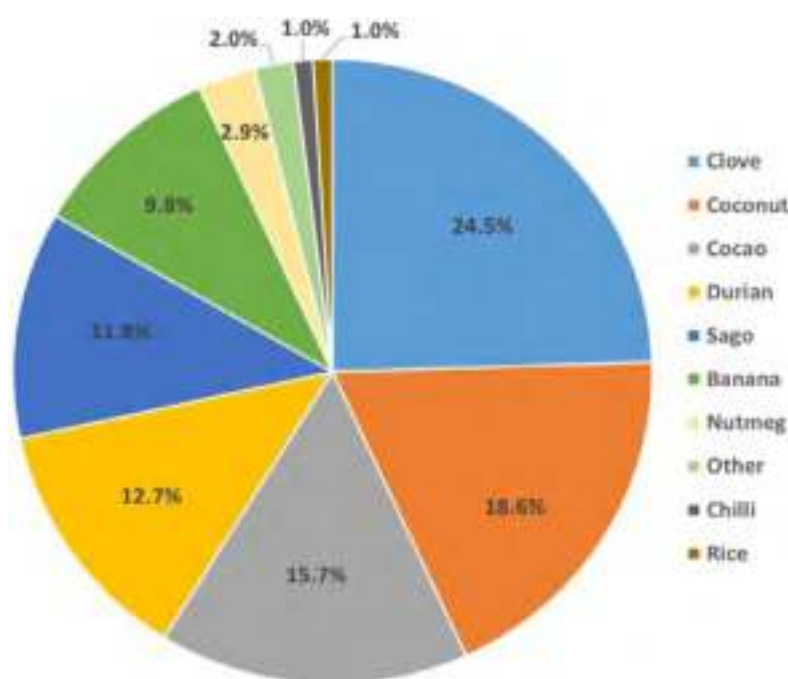


Figure 4: Sources of income from agriculture and non-timber forest products (NTFP)

Cloves

Cloves are perceived to be the most important agricultural commodity produced in Sawai (Figure 4).

Factors contributing to the importance of cloves include the historical connections between Sawai and the clove trade and the significance of cloves as a source of income. The significant income is despite the unreliability of clove bud formation, with harvests reportedly occurring around July/August every two to three years depending on environmental factors.

At the time of the last harvest in 2016, a single tree could produce around 7 kilograms of dried cloves worth 100,000 Rp/Kg. Estimates suggest that clove farmers own around 40 trees, although some suggested the number to be much higher than this. One household whose husband describes himself as a fisherman, owned around 80 clove trees in 2016 (excluding trees he inherited from his father) and he was planning to buy around 20 more trees. An average household with 40 trees could earn 28 million Rp per harvest.

People generally earn income from clove harvests as either a clove tree owner, a clove harvester, or a clove buyer. Clove tree owners earn income by selling dried cloves obtained from their own trees to Masohi and Ambon. Clove tree owners are usually mature households with a number of children and have inherited considerable number of trees from their parents. Clove harvesters, or *alisewa*, are mostly

males above the age of 19 who do not yet own sufficient clove trees and/or males who are recently married and have inherited a few trees from their parents. Clove buyers are households in Sawai who buy undried clove from other households. They earn profit from the value adding activities of drying and transporting the cloves to buyers in Masohi or Ambon. Clover buyers in Sawai, generally own clove trees as well. The wealth generated during the clove harvesting period also benefits those not directly involved, through increased patronage for businesses such as shops and *warungs*.

Clove harvesting sites in Sawai are located in two areas. One area (A) is on a steep slope directly above the shoreline and is adjacent to Manusela National Park, the other area (B) is on flat ground across the bay from Sawai (Figure 3). These two areas are not restricted to clove production with coconut, banana, and cacao also planted. Bananas and/or coconuts are planted to serve as a boundary of harvesting sites.



Figure 5: Clove harvesting locations in Sawai

Coconut

Coconuts are another important crop for the people of Sawai. Coconuts are predominantly grown for the production of copra which is valued at 7,000 Rp/Kg. Those dependent on copra as a source of income need to have a large number of trees to be able to gain a significant amount of income. A single tree could produce around 7 - 10 kilograms of *kopra*, hence, owning only a small number of tree would not make the efforts of harvesting profitable.

Copra is generally gathered twice a year, to ensure a substantial amount of coconuts are available for processing. Usually the owner of a large number of coconut trees would hire a gatherer and divide the amount gathered in half. A coconut farmer in Sawai, was able to harvest 3 tons of copra from his 300 trees in 2017. Coconuts are also used in Sawai for direct consumption and for the production of coconut oil.

Cacao

Despite being a fairly recent addition to the area, cacao provides income for a number of the households interviewed. It is thought that cacao was first introduced to the area in the 1990's through a government program involving the nearby village of Masihulan (previously a sub-village of Sawai). Cacao has become a popular crop, but harvests have been heavily impacted by black pod disease (*Phytophthora sp.*) and the cocoa pod borer (*Conopomorpha crameralla*). The minimal effort approach employed by most cacao farmers in Sawai, contributes to the negative impacts of pests and diseases. Constant pruning and treating the trees with smoke was successfully used by a farmer to improve his yields. These methods must be effective as he has planted an additional 300 trees in recent years, adding to his 500 mature trees. He believes his diligence is uncommon though as "Sawaians are fishermen, they don't care much about their trees".

Dried cacao can be sold for 18,000 Rp/kg to a local buyer in Sawai, although the price can fluctuate. Cacao produces four main harvests throughout the year, with the largest around June and December. From the last two harvests, one small and one large, the farmer was able to produce 300kg of dried cacao from his 500 trees. On average, his trees produce around 0.5 kilograms of dried cacao, with around 11 to 14 pods required to obtain a kilogram of dried cacao.

Durian

Durian trees can provide substantial income with each tree capable of producing around 300 fruit but yields can be unreliable. The harvesting season is dependent on environmental conditions and generally occurs every two years around March/April. Durian trees are large and old, with ownership and harvest rights a source of conflict within family groups. The ownership of trees is respected by the community, but once the fruit falls from the tree it can be collected by others, to prevent wastage. This has resulted in family members waiting in temporary shelters near their trees, waiting for fruit to fall. Durian is sold in bulk to trucks from Masohi, Wahai, or Ambon for 50,000 Rp for 15 durian, sold locally or to people driving by for 50,000 for 3 durian or sold without the shell and seeds for 100,000 Rupiah per container. Durian is also processed into durian cake (*dodol durian*) for sale. The brief harvest season and high yield of the trees, results in farmers selling in bulk to passing trucks at a very low price.

Banana

Bananas are only cultivated as a source of income by a few people in Sawai. The constant tending that banana trees require to minimize predation and monitor ripening, reduces the time available for more economically productive activities such as fishing. Bananas are grown by some respondents for subsistence purposes.

Nutmeg

Nutmeg is also a highly desirable spice crop but was found to be far less prevalent than cloves. Despite this, nutmeg was observed within agroforestry plots and drying within the streets. Nutmeg can be harvested more frequently than cloves and can be harvested throughout the year. Nutmeg and mace are sold to local buyers within Sawai.

Fisheries

Fisheries play an important role in the livelihoods of the people of Sawai, providing 16.3% of income for respondents (Figure 2). Enumerators involved in a WWF project estimated that the number of fishers had fluctuated between 35-55 over the last few months. Fishing provides a source of income for fishers, fish buyers and fish processors. The fisheries of Sawai have defined gender roles with the men typically responsible for catching the fish and the women responsible for processing and selling the catch. Numerous fishing techniques were reported during interviews including hand lines, gill nets, lift nets (*bagan*), trolling and spearfishing, although each household tended to specialize. Catches are sold to community members for consumption, to local fish buyers for transport to other centers or to local processors who “value add” before on selling the product. Value-added products include dried fish, salted fish and fish floss. Smaller specimens of more valuable species such as grouper are kept alive by the fishermen and grown out in sea cages.

Business

Apart from generating income from forest and marine resources, the people of Sawai also undertake a variety of micro business¹ to support their livelihoods. Economic activities in the village are concentrated on producing daily food supplies or snacks made from local agroforestry products such as dried sago biscuit (*lempeng sagu*) and banana cake (*nagasari*). Some of these foods such as sticky durian cake (*dodol durian*) are seasonal and are dependent on a surplus of produce. The pricing of these products is usually below 5,000 Rp each, except for sticky durian cake which can be sold in different package sizes. In spite of the low and relatively stagnant pricing over time, these micro entrepreneurs gain sufficient profits to finance their expenditures. The main ingredients used by the businesses usually comes from their own agroforestry plots, thus from the people’s perspectives, a significant amount of the cost of

¹ Based on Statistics Indonesia, micro business is defined as a business entity operated by 1-4 persons

acquiring raw materials is *seemingly* exempted from the overall production cost. In households lacking access to agricultural products, the cost of purchasing resources for microbusiness, e.g. rice, is often overlooked as the products are initially purchased for daily consumption. For instance, a woman selling rice dumplings (*ketupat*) for 1,000 Rp each claimed to take home all 1,000 Rupiah without calculating the cost of buying rice.

Some households also operate micro-businesses utilizing marine resources captured by fishers within the bay. Value adding activities such as the processing of small fish into fish floss or salted fish are common, especially when the catches are plentiful. One woman reported selling fish floss for 50,000 Rp/Kg but the overall profitability of her operation was unclear as she was unaware of the initial weight of the fish. Approximately four to five households, buy fish from local fishermen and sell them to Masohi or Ambon with an approximate margin 10,000 Rp/Kg. The price per kg differs depending on the size of the fish, with the fisherman being paid 20 000 Rp/Kg for fish below 2oz, 30 000 Rp/Kg for fish between 2oz and 1.2kg, 20 000 Rp/Kg for fish between 1.2kg and 2kg and 15 000 Rp/Kg for fish over 2kg.

The majority of the micro-businesses encountered were operated by women and were especially prevalent in households with high education costs. In cases where men participated, they carried out the physically demanding activities such as supplying the agriculture products, or skilled activities such as tailoring or furniture making. Despite the apparent success of the businesses encountered, some important business skills were lacking. Financial education may prove beneficial to improve the understanding of expenses and the overall profitability of these businesses.

Other

The construction industry also employs a number of people, either locally in Sawai and neighboring villages, or outside of Seram. The construction projects include private sector projects such as tourist facilities around the village and government-funded programs such as road construction and maintenance. Construction work is not limited to specialized “construction workers” with fishers and farmers often participating in construction work when available. Working temporarily in a construction project enables people to earn a fair, guaranteed income (around 150,000 Rp/day) without having to commit to the job long term or equip themselves with any specialized equipment or skills other than physical capability to undertake arduous work.

Others utilise their means of transport as a source of income, for instance transporting passengers to the sub-district capital of Wahai more than 45km away. One respondent’s husband converted from fishing to a motorbike taxi (*ojek*) and earns a more stable income while working better hours. Men with decent boats also work in the tourist industry transporting tourists to lodges in Sawai. One respondent mentioned he could earn 10 million Rp during the holiday season from renting his boat for tours and transport. Besides rented motorbikes and boats, car taxis are also available in the village. These cars generally travel between Sawai and Masohi charging 200,000 Rp per person or 600,000 Rp for the whole car.

Breakdown of Expenditure

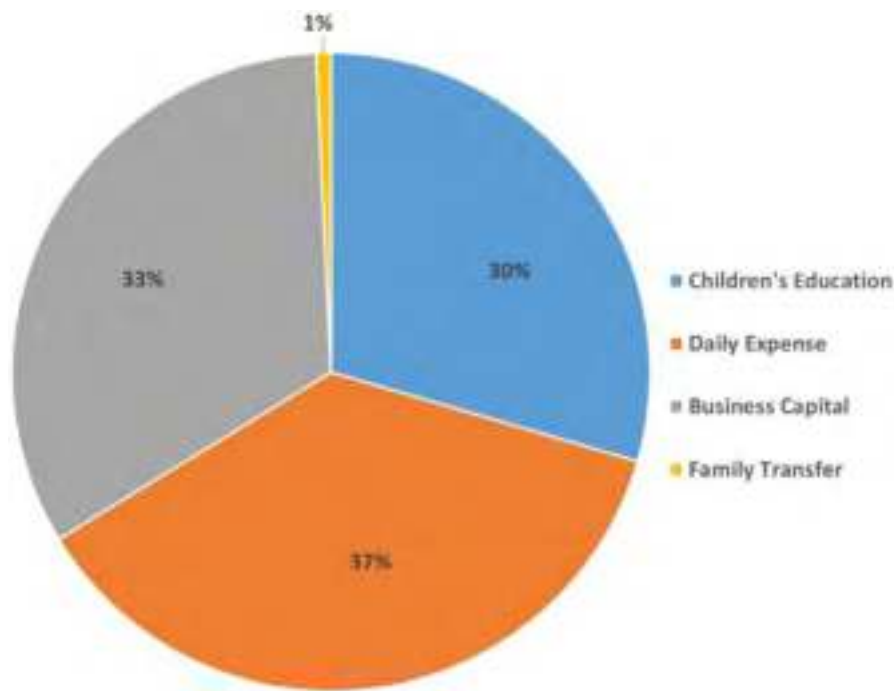


Figure 6: Breakdown of household expenditure in Sawai

Daily Household

Daily household expenses account for the largest proportion of total household expenditures in Sawai. Daily expenses are categorized in this report as spending associated with food, including kerosene for cooking. Most of the money is spent on rice, which is the main staple food in Sawai, rather than the locally occurring traditional staple of sago. As a part of government social assistance, each household is *supposedly* entitled to a 15kg sack of subsidized rice (*beras sejahtera - rastra* or *beras miskin - raskin*) every month. The rice is obtained from Indonesian Bureau of Logistics' storage (*Badan Urusan Logistik – Bulog*) at a subsidized cost of 1,600 Rp/kg, or 24,000 Rp per sack of rice. Despite its availability, some households in the village do not buy subsidized rice because of its poor quality. The village government, hence, sells the excess without the ration restrictions set by the Ministry of Social Affair. The retail price of this subsidized rice is 13,000 Rp/kg, the cheapest among the three types of rice sold in Sawai. The best quality rice is sold for 15,000 Rp/kg, whereas the price of the medium type, which is the combination of subsidized rice and the best quality one is 14,000 Rupiah/kg. Other important commodities to complement rice for the people in Sawai are fish and chili. While the both commodities are mainly sourced from Sawai, the supply of these and other fruit and vegetables is supplemented from neighboring villages including the nearby transmigration village. Recently the village-level women's organization started gardening activities to improve vegetable supplies within the village.

Education

Education is also a major household expense, especially for those with children in higher education. During our stay, few recent school leavers were observed in Sawai, as a high proportion leave to pursue higher education outside of Seram. Some youths also leave the village to undertake their high school studies in Ambon and Masohi. High school graduates in the village are eager to obtain a university degree or join the police/military academy – opportunities perceived to provide a steady income and a source of family pride.

Parents claim to not interfere with their children's decision about where or what to study. They believe that interference would only discourage their children from finishing school. Based on the interviews,

the cost of a 4-year university education typically ranges from 16 million to 40 million Rupiah, not including additional costs such as living expenses and examination fees. On average, parents transfer 100,000 Rp per week for daily needs and 300,000 to 500,000 Rp per month for accommodation. On the top of that, households are often supporting more than one university student at a time. As a consequence, parents in Sawai that send their children to university are economically active and hard-working compared to those that have younger children. The community acknowledges the extra burden these expenses can have on households and provides help by supporting income generating ventures such as sale of ice blocks or fried bananas. There is the expectation though, that once the need to support their child decreases, the household reduces their income generating activities to allow other households to benefit. Households that continue to earn “more than necessary” risk being labelled greedy by other community members.

Livelihood Opportunities and Challenges

Any alternative livelihood activities would need to focus on bringing extra income into Sawai due to the saturation of micro-businesses and the complex social wealth redistribution strategies. One possibility would be to improve the consistency and yields of clove production. Although these issues appear to be associated with environmental conditions, further research is required to determine whether changes in clove management may help.

Another possible alternative was proposed by a local entrepreneur. He has cleared some sago swamp and planted rice under the guidance of farmers from the nearby transmigration village. The transmigrants believe the conditions in the area are ideal for rice and have helped through the provision of seed and the design of his irrigation system. He hopes to be able to produce 5 tonnes of rice and sell it in the local market at 10 000 Rp/kg. The land he has used is 20 minutes away from Sawai and is traditionally claimed by Sawai. Increased agriculture in this area may become a source of conflict with other nearby communities. The environmental impact on the sago swamp and neighboring water ways also needs consideration.

The weakness of governance in Sawai has been suggested as a problem to sustainable development in the area. There has not been an elected king in Sawai for more than ten years. The acting king lacks the power to make decisions when opposing opinions are present and action is only taken when a unanimous decision is reached.



Figure 7: The site of rice cultivation by a local entrepreneur



Figure 8: A collection of fruit trees in Masihulan

Masihulan

Sources of Income

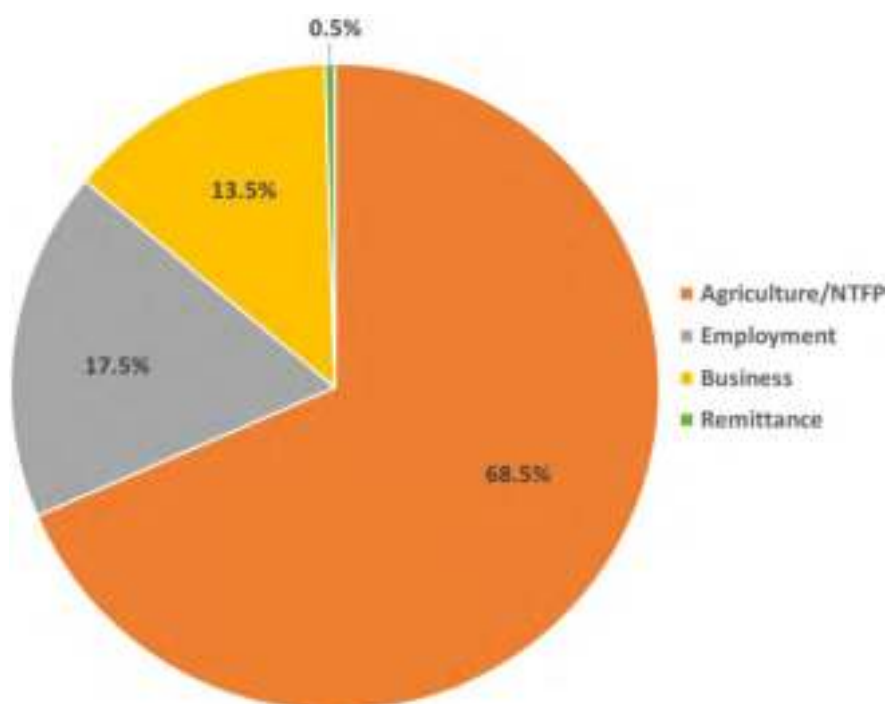


Figure 9: The sources of income and their proportions for the people of Masihulan

Agriculture is the dominant source of income in Masihulan, providing almost 70% (Figure 9). Employment is the next most important with 17.5%, followed by business with 13.5%. When the income sources are broken down further the diversity of the livelihoods in Masihulan becomes clear (Figure 10).

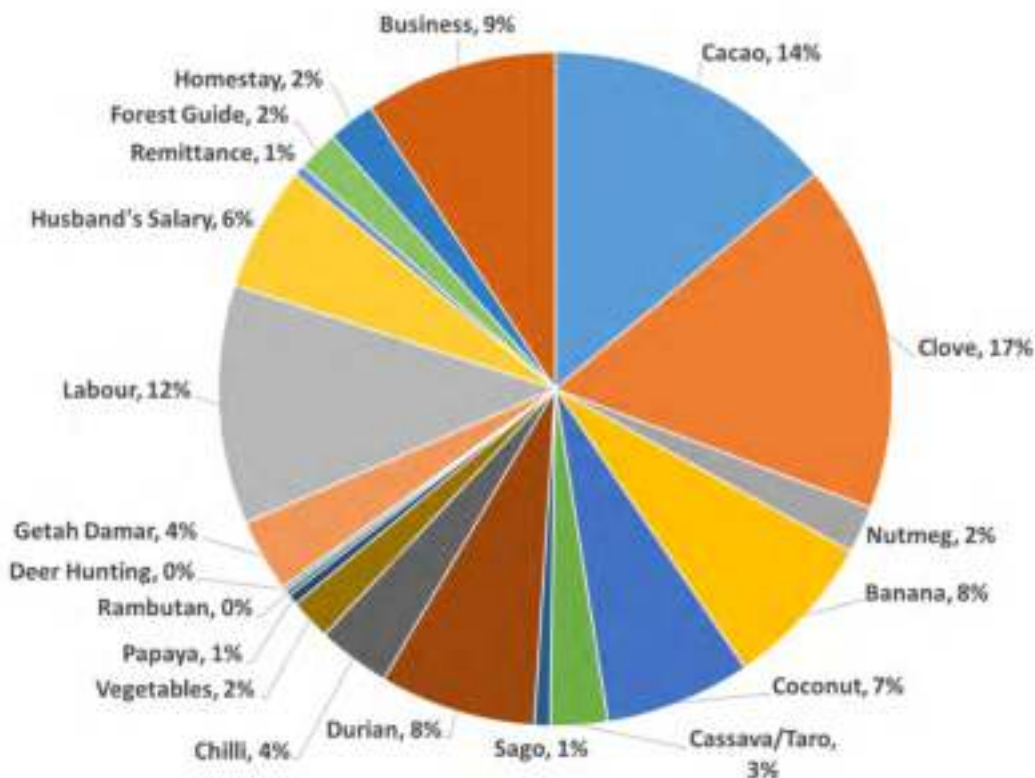


Figure 10: The diversity of income in Masihulan

Agriculture

The people of Masihulan are heavily reliant on agricultural commodities such as cloves, cacao, banana, coconut and durian for their incomes (Figure 11). Of the income gained from agricultural commodities, cloves are responsible for 25%, cacao for 20%, banana and durian for 11% and coconut for 10%. The people of Masihulan are historically forest people, who relocated to the village of Sawai to take advantage of beneficial relationships. They have since moved a few kilometers away from the Sawai and the coast, limiting their fishing capabilities. Traditional harvesting areas of the Masihulan people are located inside the national park.

Cloves

Cloves are deemed the most important source of income by the people when compared with other cash crops such as cacao and nutmeg. The clove gathering and management system in Masihulan is similar to Sawai, as is the price and time of harvest. Masihulan's clove industry differs slightly from that of Sawai, as they harvest naturally growing "wild cloves" as well as introduced varieties. Only a few people still harvest wild cloves though as the price is substantially lower than introduced varieties at 40,000 Rp/kg.

Cocoa

Cacao is also popular in Masihulan. Like Sawai, the introduction of disease and pests has reduced yield, although the people still obtain a substantial amount of income due to the large quantity of trees. Cacao seeds were introduced in the early to mid-1990 by the government as a form of aid. Some cacao growers still receive governmental support in the form of seeds, training, and drying houses (Figure 11).

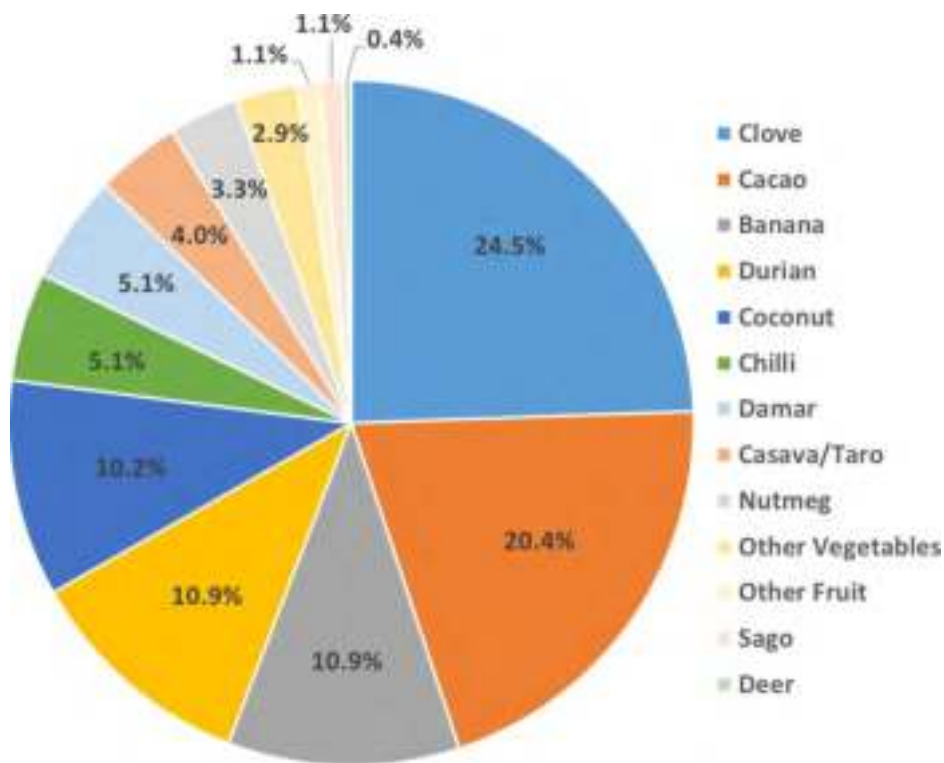


Figure 11: Agricultural income sources of Masihulan



Figure 12: A cacao drying house in Masihulan provided by as part of a government program

Food crops

Popular food crops cultivated include banana, chili, and vegetables. They are grown as a source of income and source of food, contributing to the food security of Masihulan. Vegetable crops are more prominent in Masihulan than Sawai. Most are sold only within the community, except for durian, which is sold to buyers from Wahai, Masohi and Ambon. Bananas are sold for around 40,000 Rp per bundle, chili is sold for around 10,000 Rp per small container, vegetables are sold for 2,000 Rp per small bundle, and rambutan is sold for 10,000 Rp per plastic bag. These food crops help to redistribute wealth within the community with only durian bringing in wealth from outside of the community.

Fisheries

The people of Masihulan lack the affinity with the sea that was observed in Sawai, seeing themselves as forest people rather than sea people. They still however rely heavily on fish for consumption. The dominant method utilised by the men of Masihulan involves spearfishing with hand spears in the shallow seagrass and reef systems. This technique is appealing due to its similarities with game hunting - techniques familiar to the people of Masihulan. It also helps to overcome the specialization in techniques, knowledge and equipment required to target fish in deeper waters. People in Masihulan generally do not own boats and rely on borrowing boats from friends and relatives in Sawai to undertake fishing activities. Spearfishing is usually done for special occasions such as taking guests or tourists or to provide food for festive events such as church celebrations, ceremonies, and weddings. The fish obtained from this type of fishing is mainly for consumption, with any excess sold within the village. Fish for daily consumption is often bought from neighboring villages.

Business

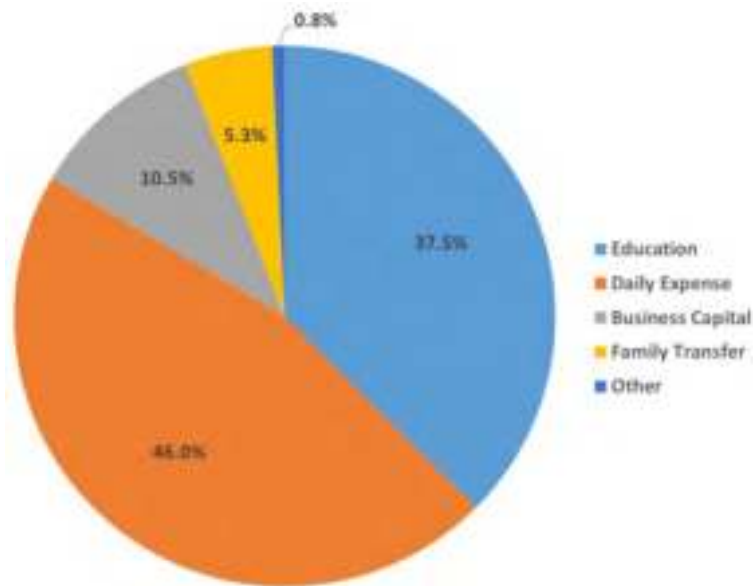
Business ventures were uncommon in Masihulan, possibly limited by size of the community (80 households). A few women in Masihulan operate kiosks, sell bread in the mornings, and fried banana and other kinds of cakes in the afternoon. In contrast to Sawai, the people in Masihulan cultivate vegetables and other food crops in their own garden, hence, it is still possible to produce foods without buying the materials from other places. Food sellers in Masihulan distribute their products within the village rather than nearby villages. Selling to nearby villages would be difficult due to competition with established businesses. The profits would not be worth the effort and the possible conflicts.

Other

The village of Masihulan is quite well-known among researchers and naturalists as a gateway to Manusela National Park. Aware of this potential, the village-level government established a village-owned enterprise (*Badan Usaha Milik Desa – BUMDes*), or a community-based business entity financed by the village fund (*Dana Desa*). This enterprise currently focuses on tourism and to date, has helped establish 20 local houses as homestays for guests. The choice of houses was based on their physical appearance and suitability, while the neighboring houses, usually those which have not been equipped with bathrooms and extra bedrooms, were given the role as the cook. The community agrees to set the price to 250,000 Rupiah per night for each guest, which is distributed between the house owner and the cook. The income generated from the homestays has so far been minimal. The village enterprise also provides trekking tour guidance service that covers 4 tracks inside Manusela National Park and for birdwatching tours to dedicated viewing platforms. Less than 15 people are listed as tour guide in the village-owned enterprise and are paid a daily rate of 300,000 Rp.

A group of people also rely on collecting dammar resin (*getah damar*) as a source of income. The people collect dammar resin once every two months, each time spending around 3 weeks travelling back and forth from the village to the forest to transport the collected resin. One collector stated that he and his friend could obtain around 400 to 600 kilograms of resin during the 3-week harvest period, with each tree producing up to 50 kilograms of resin. Another mentioned that he recently collected 300 kilograms of resin, and together with three friends they collected around 850 kilograms to 1 tonne. The resin sells for around 7000 Rp/kg to a buyer in Sawai. This may be below market price as the buyer is currently helping the community with the construction of their new church. The collection of resin occurs inside the national park, but the harvesters suggested this was allowed as it does not involve deforestation.

Breakdown of Expenditure



Daily Household

Daily household needs provide the largest expenditure for the people of Masihulan, particularly for households with young children. Since gardening is commonplace within the villages, vegetables are easily obtainable. Major food items purchased for consumption are rice, sago and fish. Rice is purchased as subsidized rice or from the nearby transmigration village and sago flour from within the village or from the produces in Sawai. Despite rice being more expensive than sago, it is consumed at least as frequently. It was suggested that 200 000 Rp worth of rice would last 2 weeks or less, whereas 60 000 Rp worth of Sago would last around 2-3 months. Fish comes from nearby villages and is sold for 10,000 to 30,000 Rp per plastic bag depending on the type of fish.

Education

Similar to Sawai, education is regarded as important for improving the children's livelihood in the future. Most of the children of our respondents were in secondary (high school and junior high school) and primary education but the parents stated they are willing to support their children to undertake university in the future. Education based expenses increase when the children enter high school as many go to schools in Wahai, Masohi, or Ambon. Nursing degrees are popular amongst female students but are more expensive than other study areas.

Livelihood Opportunities and Challenges

When compared with other villages visited, Masihulan seemed to be the most willing to learn new ideas. Suggestions from key figures in the community such as the village head, the priest or the head of tourism, are carefully listened to and considered by the people. Unlike Sawai and Boano Utara, the people in Masihulan have no negative presumptions about visiting foreign people. This might be due to past relationship with a foreign conservationist, which was deemed as mutually beneficial by the people offering through the provision of alternative livelihood that promoting the conservation of parrots. The openness of the community is ideal for tourism, providing the right market can be found.

At this stage tourism in Masihulan is still in its infancy. The people of Masihulan are convinced that by investing more on homestays and tourism, they can increase the number of tourists and the community's income significantly. They are planning to spend a significant amount of their village fund to build toilets and additional room for tourists. Consideration is required before they spend the money to ensure that they can get enough return on the investment. Rather than improving tourism recklessly, we suggest that they improve it slowly. But it seems like it is hard to convince them to do that.



Figure 13: A fish buyer in a settlement close to Boano Utara

Boano Utara

Sources of Income

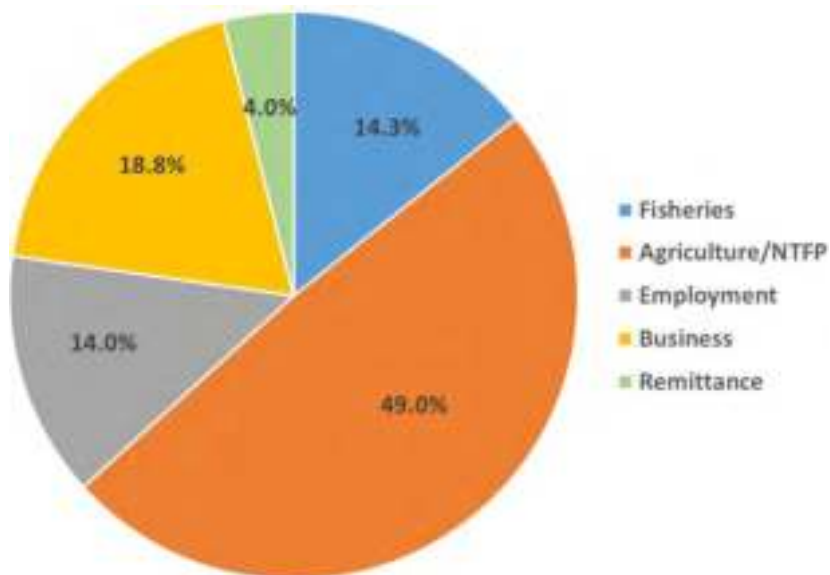


Figure 14: The sources of income for the people of Boano Utara

Agriculture and NTFPs provide almost 50% of the respondent's income in Boano Utara (Figure 14).

Micro-businesses are the next most important, providing close to 20%.

Employment and fisheries provide around 14% each while remittance provides 4%. When the income sources are further broken down it becomes clear how important kayu putih is to the people of Boano Utara (Figure 15).

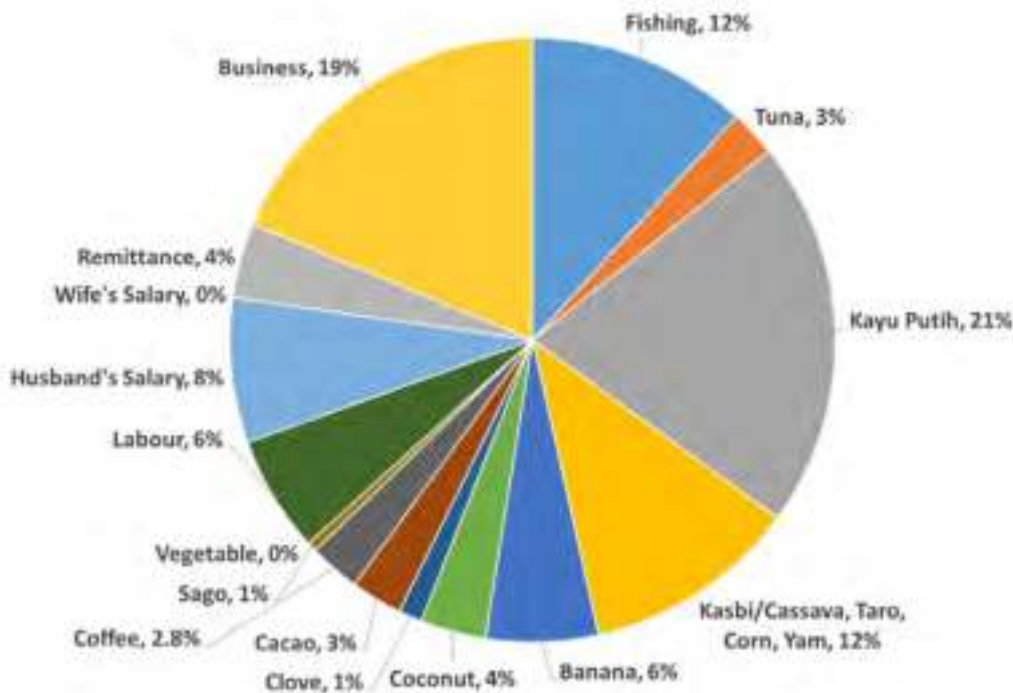


Figure 15: The diversity of income sources in Boano Utara

Agriculture

Agriculture in Boano Utara is dominated by the production of melaleuca oil from wild/semi- wild forests and the cultivation cassava (Figure 16). Cassava is mainly sold within the village and is has replaced sago as an integral part of daily diet of the people. Melaleuca oil is sold to buyers outside of the village, bringing significant income back into the community.

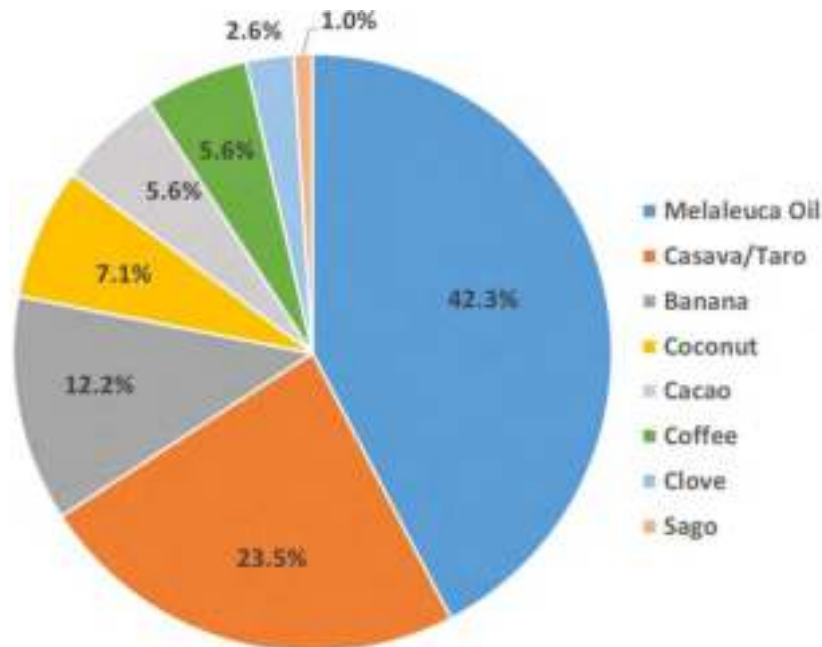


Figure 16: Agriculture income sources of Boano Utara

Melaleuca

The production of melaleuca oil from *Melaleuca cajuputi* is the main source of income for the people of Boano Utara. The melaleuca oil industry in Boano began in the 80's and has increased in size to over 280 distilling sites producing over 10 tonnes of oil a year. The Hitimala soa are the largest producers, with 178 stills operating on their land. The majority of people in Boano Utara earn money from melaleuca either through picking leaves, distilling oil or leasing their site to other operators. Pickers earn 500 Rp per

kilogram and can pick from 25-200kg per day. Still operators generally operate their stills once per day (sometimes twice, depending on the availability of harvested leaves), producing 2-3kg of oil from 300-350kgs of leaves over the 8-9 hour distillation period. Depending on the size of their land, still operators can operate from 2 weeks to over a month, one to two times per year. The oil production from the operators interviewed varied from 20-100kg per harvest period. Estimates from the still operators suggest that 1 ha of trees can produce between 8000 – 10000 kg of leaves, equating to oil yields of 40-90L/ha.

The oil is sold to a number of buyers on the island or in nearby Piru (and sometimes Ambon) for 150 000 to 200 000 Rp/kg depending on the quality. The quality of the oil is believed to be dependent on environmental factors, with the best quality oil coming from the dryer areas of land owned by the Hitimala soa. The local buyers then transport the oil to buyers in Buru for a margin of 30 000/kg. The two main buyers on Boano can deliver 4-5 tonnes of oil each to their buyers in Buru. The buyers provide loans to the still operators if needed, in a patron- client relationship. Some of the larger producers stockpile their oil and deliver it to Ambon or Buru themselves to maximize their profits.



Figure 17: Freshly harvested melaleuca trees in Boano Utara



Figure 18: A still for the production of melaleuca oil



Figure 19: An example of the size of trees being used for firewood as the larger trees have already been used

The melaleuca forests are believed to be native but have been manipulated by the harvesters over time. Melaleuca trees grow readily from cuttings, contributing to the expansion of the forests into new areas. In some areas, forests that have been stripped of timber trees for fire wood are being replaced with melaleuca trees. The removal of timber trees for firewood to fuel the stills is increasing, with some still operators suggesting they will run out of accessible firewood in less than 10 years. Despite this, no one is planting trees for firewood or has put consideration into alternative fuel sources. Estimations based on visual observation and discussion at an operational still site suggests that around 1m³ of firewood is required per 8-9 hour cycle. In recent years, harvests have been impacted on by fires believed to have been started by deer hunters.

Food Crops

Cassava has replaced sago as the main staple for the people of Boano Utara. Cassava is more drought tolerant than sago and can be cultivated in a wider range of areas. Once processed the cassava can be dried and stored for long periods of time. Those who produce cassava only sell their stocks within the community. Wild pigs are a major pest for food production, with gardens away from the settlement requiring solid fencing for protection. This and the large population of Boano Utara has led to the purchasing of garden produce from Boano Selatan and neighboring villages on the mainland. Bananas are also favored crop as they are more resilient to wild pigs than other crops.

Fisheries

Fish is by far the most consumed animal protein in Boano Utara. Other animal protein sources such as goats and ducks are received for special occasions. The most prevalent fish within the community are small pelagic species obtained using nets. The net fisherman work in teams of a few men and travel large distances to find schools of *ikan saku* (needle fish).

The fish are purchased for direct consumption and for processing into smoked and salted fish. Some of the men in settlements to the north of Boano Utara, target more valuable species and transport them to nearby communities for sale. Butanese fisherman intermarried into the community still target large tunas for the buyers in Pulau Kasawari. Most fisherman admit that they are having to increase their effort to maintain their catches.

Business

Despite the large population of Boano Utara, micro-businesses are not showing any development in terms of scale and product diversification. The range of products produced by processing local food crops into snacks and staple foods is limited to the small range of bread, fried banana, *ketupat*, and dried cassava biscuit (*lempeng kasbi*). The products are sold for only 1,000 Rupiah per piece, indicating the minimal costs of the value-adding processes used. The limited range and low cost of products may also be reflective of the limited income available to spend on such products. The unfavorable geographical condition and minimal trade connections with other villages on the mainland of Seram may also contribute to the phenomenon. Drought and unfavorable weather conditions also restricts the people of Boano Utara from growing excess produce to use in processed products, while obtaining food supplies for business from the mainland can be expensive. Some women do undertake value adding activities with fish, selling salted or smoked fish within the community. Some households also operate kiosks attached to their houses, selling almost identical everyday goods.

Other employment

Undeveloped local economic activity and heavy dependence on *cajuputi* oil production hinders the job market in Boano Utara from flourishing. It is common for men in Boano Utara to look for a source of income in other islands or provinces outside of the melaleuca harvesting period. The low level of education on the island, means these men are often employed in low skilled labor-based positions such as chainsaw operators in areas such as Sarong and Dobo. The contracts associated with the jobs are often only short term and precarious. Despite being exposed to a high-risk working environment, these workers do not have written record of their employment nor insurance to compensate for the associated risks.

Breakdown of Expenditure

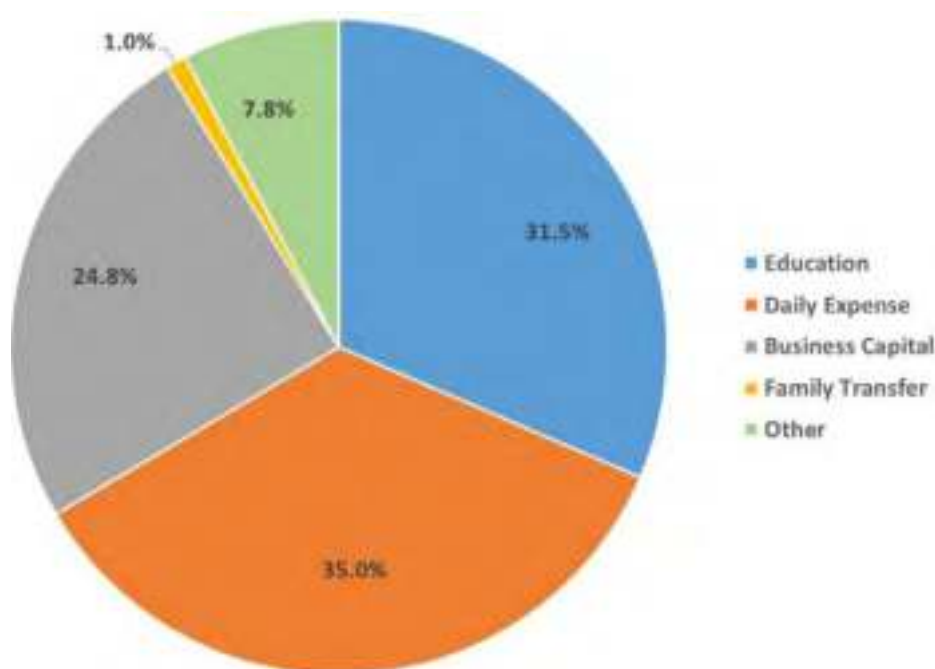


Figure 20: Breakdown of expenditure in Boano Utara

Daily Household

The costs associated with daily needs is the largest expense for people in Boano Utara, marginally higher than that of education (Figure 20). People in Boano Utara faces a range of challenges to meet their daily needs, particularly an appropriate nutritional intake.

Vegetables are not easily accessible for much of the population, with fish and rice a common meal. A small plastic bag containing three fish costs 10,000 Rp and the price of rice is 14,000 Rp/Kg. Many households still rely on firewood for cooking, minimizing the requirement to purchase kerosene. Everyday goods are more expensive than the mainland due to transport costs.

Educational

With the availability of public elementary schools, junior high schools, and senior high schools in the village, students generally wait until they have finished high school before leaving the island for higher education. Undertaking further studies in Piru and Ambon is commonplace for students from Boano Utara. Public school in Boano Utara is practically free as students are subsidized by government assistance (*Bantuan Operasional Sekolah - BOS*) with parents needing to provide basic supplies such as stationery and uniforms. Despite this, households are still spending close to a third of their income on education. Based on the people's account, they depend on income from the melaleuca trade to pay tuition fees and other costs.

Livelihood Opportunities and Challenges

Boano Utara faces a number of challenges originating from its high population and reliance on natural resources. The production of melaleuca oil is leading to deforestation in some areas, with some suggesting timber will run out in 10 years. Still operators are having to travel further for timber but haven't yet considered alternatives. The replanting of trees for firewood is essential if the industry is to continue. Reducing the number of harvests per year, may be required to manage the use of firewood.

Whether the waste melaleuca leaves could be utilised as a fuel source also deserves further attention. The still owners may be able to supplement their income with honey produced from the melaleuca flowers. Bees are apparently prevalent through the melaleuca stands, and they appear despite the harvesting cycles. Marketing the oil as a premium product featuring for example the Boano Monarch or producing other products such as soaps may be possible, but any changes to the value chain will need to overcome the loyalty of the existing patron-client relationships.



Figure 21: A house located in a garden in Boano Selatan

Boano Selatan

Sources of Income

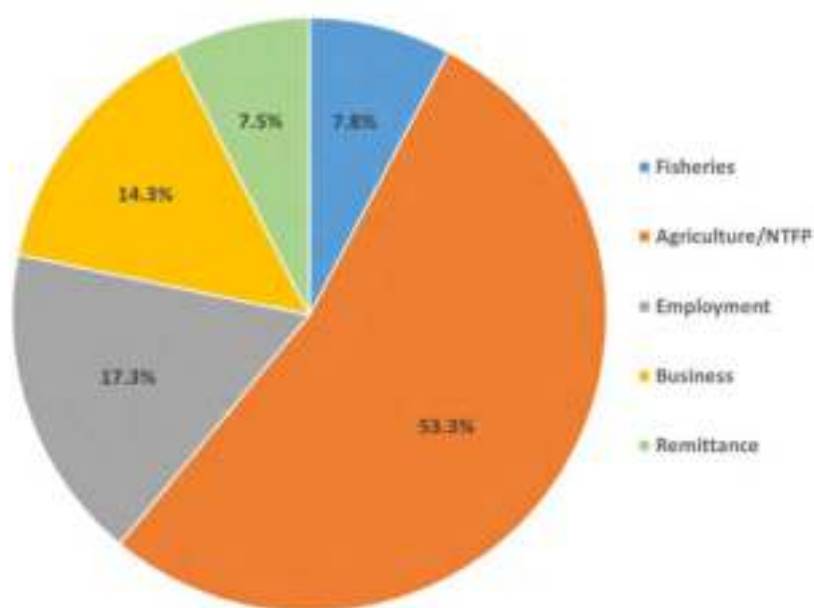


Figure 22: The sources of income for the people of Boano Selatan

Boano Selatan is the second most reliant on agriculture of the four villages visited (Figure 22). Agriculture provides more than 50% of the income of the households interviewed. Employment is the next most important with 17%, however the majority of this employment is located outside of Boano Island. Business provides 14% of income while fisheries and remittances provide 8% and 7.5% respectively. When the sources of income are further broken down the agricultural products of cassava and taro are the most important (Figure 23).

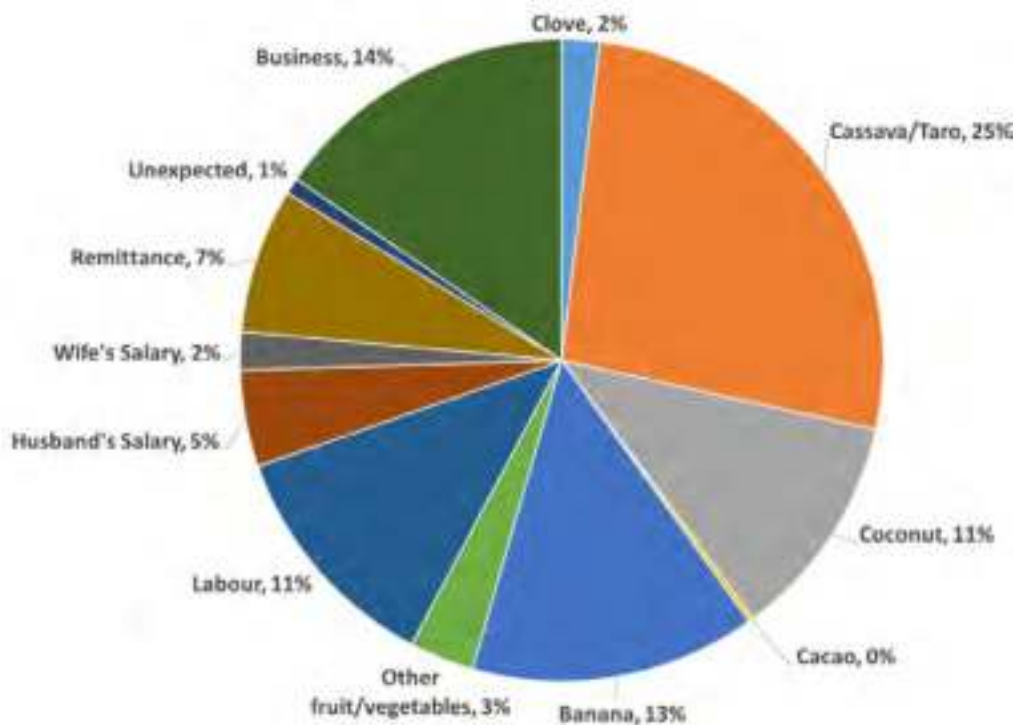


Figure 23: The diversity of income sources in Boano Selatan

Agriculture

Agriculture is vital to the livelihoods of Boano Selatan, providing more than half of the income for respondents. The people of Boano Selatan produce a variety of commodities, with the most prominent being cassava and banana. A number of favorable factors contribute to the emphasis on agriculture. The population of Boano Selatan is dramatically lower than Boano Utara yet they have traditional rights of the same amount of land. This gives the community better access to land for agriculture. The land is closer to their houses and seems to be more productive with better access to water. The community actively hunts pigs for consumption, helping to minimize the damage they cause to their gardens. The community also cultivate their gardens knowing that any excess produce can be sold to the produce-poor Boano Utara.

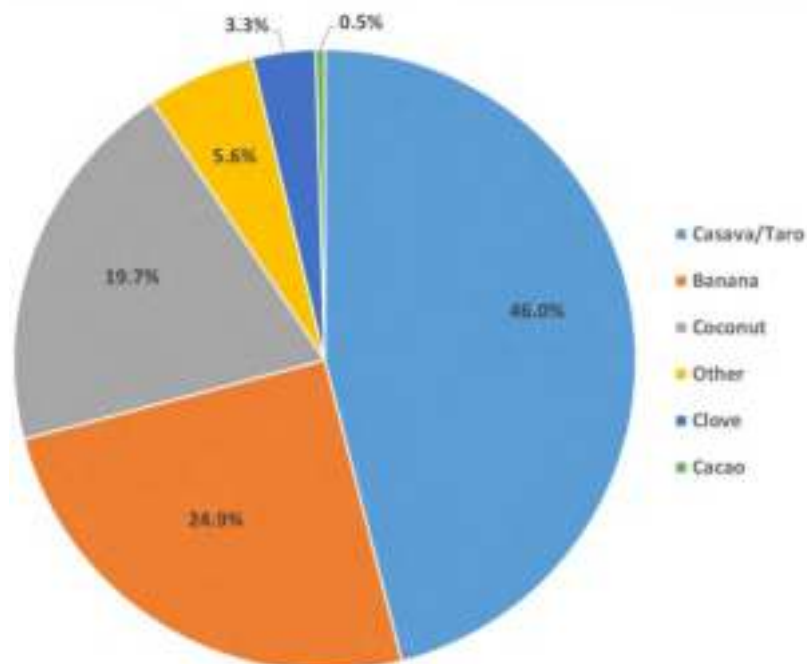


Figure 24: Agricultural income sources of Boano Selatan

Cash crops

Coconut is the most prominent cash crop cultivated by the community providing around 11% of total income (Figure 24). Coconut is predominantly cultivated for copra, which is sold for 5,000-7,000 Rp/ Kg. One respondent harvests his trees up to three times a year, with each harvest resulting in 500 000 – 1 000 000 Rp. The close proximity of the coconut plantations to the villages allows for frequent visitation and harvesting. Coconuts are harvested and stored on site until enough are available to justify processing them into copra. Clove and cacao were prevalent in small quantities but provided little income, possibly due to the absence of traditional production in the past. Both cacao pod borer and black pod disease were observed in local gardens. Production of cloves and cacao is expected to increase in the future as disease resistant seedlings provided through government programs begin to mature. Government programs have also previously provided teak seedlings to the community.

Food Crops

Cassava, taro and bananas are the most economically important crops, responsible for 75% of the income generated from agriculture (Figure 24). The crops are grown for personal consumption with the excess sold within the village or to Boano Utara. These crops are relatively productive, although some issues exist with wild pigs and a disease that affects bananas. Banana is priced in three ways: a big bundle costs 40,000 – 80 000 Rp (consisting around 50 bananas), a small bundle costs 10,000 Rp (consisting around 8 bananas) and three bananas costs 2,000 Rp. Cassava sells for 5000 Rp/bundle consisting of 4-5 pieces or for 30 000 Rp/container, while taro sells for 5000/piece.

Non-Timber Forest Products

Melaleuca forests occur on the customary lands of Boano Selatan but they have chosen not to harvest them, instead they lease the land to still operators from Boano Utara. Some of the men also hunt pigs and deer, either actively or opportunistically, and sell the excess meat within the village. There is also a market for game meat in nearby Piru and Gembe, with the parts of a whole pig selling for around 1 000 000 Rp and deer meat selling for 50 000 Rp/kg. Boano Selatan is also apparently famous for wild harvested *kencur* (*Kaempferia galanga*), a form of wild galangal that is sold in Ambon for 100 000 Rp/18L container.

Fisheries

The fisheries of Boano Selatan are small-scale and underdeveloped compared with those of Boano Utara. Fishers utilise hand lines and nets to capture a range of demersal reef fish and small pelagic species. Fish are sold within the village or to the nearby Butonese village of Huaroa, who on-sell them further afield. One respondent commonly catches *ikan samandar* and *ikan butila* and sells them in the village for 35 000/kg. Boano Selatan also relies on fish traders from outside of the village selling *ikan momar* for 10 000 Rp for 3 fish and *ikan saku* for 5000 Rp/fish. The fishers believed fish stocks were declining, providing a range of explanations including overexploitation.

Micro-business

There are few micro-businesses operating in Boano Selatan as the main economic activity is dominated by the trading of unprocessed food crops with Boano Utara - the biggest and most accessible market to the village. The production of cakes and fried bananas provide valuable income, with 5 households reporting that these snacks provided between 10-40% of their incomes. Home-made snacks are generally sold for 1000 Rp/piece. There are also a few small kiosks selling snacks and other household supplies around the village. One household earned substantial income (75%) from the husband operating a driving business on the mainland of Seram.

Other

The lack of skills, coupled with fairly isolated economic activity, forces many people from Boano Selatan to seek low-paying jobs outside the island in places such as Piru, Masohi, Bula, and West Papua. While the younger

generation has basic skills to work in service sector, others rely on physically demanding job in the logging and construction industries to support their families. As mentioned earlier working in these industries can be risky and often involves informal contracts. A couple of respondents reported that their husbands had not be paid, despite working for several months.

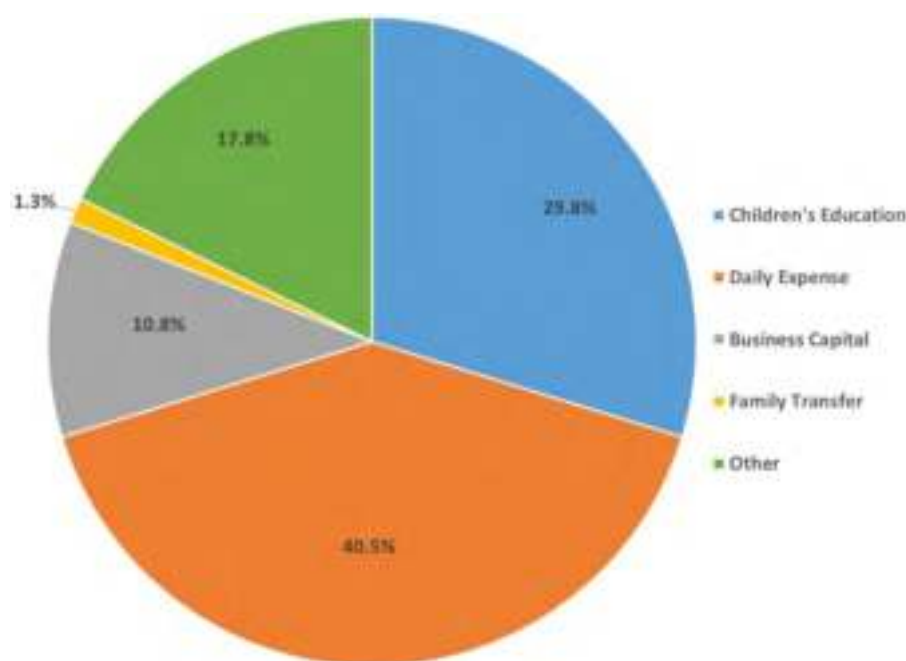


Figure 25: Household Expenditure in Boano Selatan

Breakdown of expenditure

Daily Household

As with the other communities, daily expenses are the largest expenditures for households. The percentage of daily expenditure is also the second largest among other villages, accounting for 41% of the total household expenditure. Some of the higher levels of daily expenditure can be explained by the purchasing of formula and baby food for infants.

Externally produced food supplies are expensive, with the people relying heavily on staples produced within their gardens. The price of fish and rice in the village are the same as those in Boano Utara. As Christians, the people of Boano Selatan rely on wild pig meat, which sell it for 10,000 Rupiah per cut of pork.

Education

Boano Selatan has similar expenditure for education as the other villages. This is expected to increase in the futur as there is a relatively large population of children who are not yet of university age. Parents in Boano Selatan are also becoming more aware of the benefits that a university education can provide for their children. One respondent commented that in the past people in Boano Selatan spent their money on improving their houses while the people in Boano Utara spend their money on their child's education, but this is now changing. Some parents are even sending their children to high schools in Piru and Sapurua to improve their education. A number of students were also enrolled in vocational schools on mainland Seram.

Other

Almost 20% of income was spent on church donations. This proved to be a substantial amount for a number of households, especially those with multiple children. The donations were paid as a monthly fee, but it is unclear whether this included in service donations as well. A new church is currently under construction, with the fees contributing to its construction.

Livelihood Opportunities and Challenges

Increasing the community's well-being while simultaneously conserving the environment is possible for Boano Selatan. Due to the low population size, land for agriculture is abundant and accessible. Livelihood opportunities may exist with the cultivation of kencur for consumption and for its medicinal properties. Depending on the demand in Ambon, production of kencur could shift from wild harvesting to cultivation. There may also be the possibility of value adding activities for the kencur.

CHAPTER 4. ALTERNATIVE INCOME AND CHALLENGES IN NORTH AND WEST SERAM LANDSCAPES

Overview

The last trimester of April, May and June 2018, Tanah Air Beta team consisting of Intu Boedhihartono, Jeff Sayer, Emilio Valeri, Adinda Rizky were joined by partners from different institutions interested in Seram landscape changes. Several studies were carried out during March, April and June 2018. This report has been compiled by TAB team with 2 parts – the first part reported by Emilio Valeri and Adinda Rizky and the second part reported by Gary and Robyn Wilson.

Five initiatives were taken during this period to address high priority issues in the Seram Landscape:

1. The challenges of making the ***Minyak Kayu Putih*** (melaleuca oil for traditional medicinal use) exploitation on the island of Boano were addressed by Emilio Valeri and Adinda Rizky (environmental economist and gender specialist) during March, April and May visit to Boano island. The situation on Boano is critical, the remaining natural forests on the island are being exploited at an unsustainable level. This is destroying the value of the **Boano “critical ecosystem”** and is also likely to lead to declines in the livelihoods of the people of Boano who are heavily dependent on the *Minyak Kayu Putih* industry. The TAB team spent several periods (one to three weeks each time) in the field staying in the huts of the *Minyak Kayu Putih* producers and discussing with them their views of the issues. How do they expect to sustain their livelihoods in the face of declines in the supply of fuelwood to run their stills? Do they appreciate the potential value of conserving the forests for their ecological values and as a resource for ecotourism and can TAB help them to find solutions that will preserve the forests and enable the production of *Minyak Kayu Putih* to be sustained? A report on the situation of the *Minyak Kayu Putih* industry on Boano is appended to this report.
2. The issues around developing **eco-tourism** in Sawai, Masihulan and Boano were addressed by a mission of Gary Wilson (botanist) and Robyn Wilson (wildlife specialist and ecotourism observer) and Emilio Valeri (environmental economist) in March and April 2018. CEPF is supporting different initiatives to attempt to improve the sustainability and the local benefits from ecotourism. The potential for ecotourism in all three locations is high but the study showed that there are several factors that are preventing the full development of the eco-tourism potential and preventing local people obtaining the potential benefits of eco-tourism. The TAB team has written a report on measures that can be taken to advance eco-tourism development and also provided mentoring to local eco-tourism operators to help them acquire the skills needed to allow eco-tourism to expand. A detailed report on the situation of eco-tourism is appended to this report.
3. Progress was made throughout this period in building the **knowledge compendium** for the Seram Landscape by James Langston and Rebecca Riggs. A framework on Mendeley was developed and the collection of documents assembled by TAB was made available on this framework.
4. Progress was made on making **spatial – satellite data** on forest cover throughout the landscape and draft maps are being produced covering the landscape area where TAB is working. A map on land use and potential of Boano island is attached (made by Hendrik Aponno – a partner of TAB based at University of Pattimura in Ambon).

5. TAB took the initiative to assess the progress of attaining the **Sustainable Development Goals** in the **Seram Landscape**. A preliminary report has been produced.



Figure 1. TAB collaborating with other CEPF grantee and other partners in the island of Boano, West Seram, and in North Seram.



Figure 2. *Kayu putih* distillation needs a lot of firewood (left). The oil extracted ready to be sold (right).



Figure 4. Several cuscous species found in Seram island



Figure 5. Wallace's bird wing butterfly (an endemic of Seram island)

1. Socio-economic Circumstances Driving Forest Degradation on North Boano

Introduction

Environmental degradation in Boano Utara is harming the livelihoods of the people and destroying the habitat of critically endangered biodiversity. Trees are over-harvested for fuel for distillation of Melaleuca oil to produce the aromatic *kayu putih* oil. Trees are also harvested for materials for building the stilling sites and as fences surrounding the sites. Understanding how and why Boano Utara's specific set of circumstances drives this degradation is vital for the effectiveness of any conservation strategy. Behavior that drives environmental degradation may be encouraged by market failures, hence, understanding how the market fails to support sustainable use of timber is important. We interviewed local people engaged in the *kayu putih* oil production and joined them in the field to observe their practices.

This report presents the results of these field studies where we focused on identifying the relationship between market failures in *kayu putih* oil production and local challenges, and how this leads to environmental degradation. We focus on two questions: (1) what are the underlying drivers of degradation; (2) where the market fails and how this failure supports further degradation of the environment. The context of the *kayu putih* production is very complex and the drivers of degradation are highly interconnected.

Geographical context

Traditional societies perceive natural resources to have direct linkages to their livelihoods. In many cases agricultural and agroforestry products do not serve solely as the sources of food and other subsistence products; they are often traded with other societies. Trade helps a society to achieve prosperity as it distributes money from other regions to that particular village. The process might sound simple and straightforward, yet, it really depends on many things, particularly on the village's characteristics. In the case of Boano Utara, geographical situation plays an important role.

The village of Boano Utara is continuously confronted by problems arising from environmental limits to food production to support its dense population (Soselisa, 2007). Lack of water and infertile land near the village limits the ability of the people of Boano Utara to cultivate vegetables and other food crops that could sustain their livelihoods. Limited access to areas to grow food requires the people to travel great distances to farm. Putia, a region which is predominantly administered under Soa Hitimala, is 20- to 30- minutes journey in a small traditional boat towards the northern end of the island and access to the area costs around 50,000 Rupiah for a boat or alternatively requires a 6-hour walk from the village. Another region called Huhua, a sub-village within Soa Tuhuteru, is located far on the northern tip of the island. Due to local soil conditions, only a few plants can be grown by the people in those areas. Cassava, banana, and *kangkung* (*Ipomoea aquatica*) are typically the only food products.

Tending a garden frequently is not practical for many people as it takes a lot of effort and much time while only generating relatively low yields¹. We observed that households process food products only to satisfy subsistence need and rarely for sale. The lack of diversity in locally available foods forces the people in

¹See 2nd Quarterly Report from Tanah Air Beta (October to December 2017)

Boano Utara to buy vegetables and other food products, such as rice and eggs that are imported from mainland Seram. The people spend a large share of their money on food even though they have limited sources of income and the limits to the ability to obtain income from food production leaves the people with little money for wealth accumulation or other consumption activities. This situation has led to the stagnation of local economic activities in Boano Utara.

Technology

The people in Boano Utara are similar to other villages that live in a subsistence condition. They have no alternative to working with their bare hands or with simple traditional tools. Acquiring more advanced technology to save labor and assist production activities is beyond their reach. The most noticeable consequence of this is that a large amount of time is required for basic household and market production activities.

Women in Boano Utara, as *de facto* heads of their respective households, spend most of their time in unpaid household work, particularly gathering water from wells for bathing, cooking, and washing. The women often do household works around the well to minimize transportation of water. Women also carry the burden of collecting firewood which is still widely used for cooking. As tree cover continues to decline, women have to walk farther to find firewood. The life of women in Boano Utara is entirely dedicated to managing their households because of poor access to the water source, coupled with unaffordability of efficient household utensils such as washing machines and fuel stoves.

Participating in the labor market is an unreachable ambition for most women in the village as their time is entirely allocated to household production and maintenance activities. Some younger women are reportedly willing to seek jobs in other places that offer better incomes. However, as another consequence of having limited time for non-household activity, they have never fully developed the necessary skill to compete with other job seekers. The problem is rarely solved, possibly because the assigned binary gender norm regards woman as a natural caregivers for their families. Earning income in the presence of male family member is only possible as an occasional supplementary activity. Women's low participation in market activities contributes to the poor economic performance of Boano Utara. If circumstances were different there might be untapped labor potential in the village.

The impacts of the lack of technology in Boano Utara has a major impact on market production. All of the *kayu putih* oil stilling sites in Boano Utara are still utilizing traditional technology that was first introduced to them in the 1980s. Despite the long hours of harvesting *Melaleuca* tree and the lengthy distillation process, the income from selling *kayu putih* oil barely covers production costs due to the inefficient production method.

Unequal access to land and resources

Land is a major resource for a society that depends on subsistence agriculture and agroforestry to live. In Boano Utara, the customary land distribution system is regulated by an *adat* institution called *soa*. Each *soa* comprises several clans (Ind: *marga*) which is responsible for managing communal affair in their traditional territory. Despite the intention to manage resources sustainably, the *soa*-based land administration tends to create unequal access to land. The *soas* are based upon a patriarchal kinship system, and are controlled by men, while their female counterparts are subordinate members of the clan.

Only male family members are allowed to have full access to land and acquire their land from the previous generation. Female members of the *soa* have less control and weaker land claims.

During the past three decades, the *soa* has exercised authority over forest land management associated with *kayu putih* oil production. Patches of forest land have been claimed by families, through their male family head, for *kayu putih* oil production and/or gardening with approval from the head of the *soa* and other village decision making processes. This creates a division of labor between genders that extends to not only household production, but also market oriented activities.

Men are responsible for running the stilling site, the woman, usually the wife and daughter, are expected to *assist* production by picking leaves and performing domestic tasks that include providing food and water for the workers. We observed a family of five with no hired worker through the whole process of *kayu putih* oil production during a period of five days. The family spent more than 6 hours picking 350 kg of leaves and the head of the family went through 14 hours without sleep to keep the fire burning and regularly check the water level. The wife and daughter spent more than 6 hours a day doing domestic tasks such as cooking, harvesting *kasbi* from family garden, collecting water and branches for firewood, and disposing of waste generated from *kayu putih* production and household activities.

The women in Boano Utara are dependent on the men in their households for access to land and resources. In the specific case above, the women made use of agroforestry products for household necessities but receive no income from these. The lack of control over productive assets that results from patriarchal resource distribution causes the woman to be more susceptible to external shocks such as the death of a male family member or financial crises.

Undefined property rights and unregulated use of common pool resources

How a producer utilizes environmental resources depends on the property rights governing those resources. Property rights define the privileges and limitations governing the use of resources. In order for property rights to support efficiency, they have to be exclusive, which means that all benefits and costs for using a specific resource must be borne exclusively by the owner and not by anyone else. This condition motivates the owner to be as efficient as possible because the degradation of the resource is treated as a personal loss. In Boano Utara however, this is not the case. Free access and unrestricted demand for a finite resource promote environmental degradation through over-exploitation. Conversion to *kayu putih* stilling sites can be done by anyone as long as they are willing and able to manage that stilling site. Trees are free for anyone to cut down, whether it is for building a home, building a fence, or for fuel for *kayu putih* oil stilling sites. The people have no incentive to maintain the number of trees because when trees in a certain area are depleted people will look elsewhere for firewood. This is so because ownership is not exclusive, and, benefits from using a resource accrue to individuals, each of whom is motivated to maximize their own use of the resource. The cost of exploitation is borne by the whole community who lose the opportunity to use the same resource.

The regulation of property rights in Boano Utara in the absence of measures to ensure equity amongst legitimate stakeholders may threaten peoples' well-being. This is because they are currently living in a state of subsistence using common property resources. Formal property rights can only be developed when a society has a high enough economic margin to allow for a restriction on resource exploitation. The village's economy must first be leveraged to a point where the establishment of any restriction on resource usage does not threaten communal well-being.

High reliance on *Kayu Putih* oil production

The environment is a composite asset, and, other than providing raw materials, it can provide people with economic benefits if people invest their time, energy, and knowledge in a production process. In the case of Boano, in recent years the production of *kayu putih* oil has been the main source of income for the people. The production process of *kayu putih* oil was introduced in the late 1980s, and since then, the people have been investing much of their energy, time, and knowledge in this activity.

Around 300 stills are currently operating in Boano Utara. They are clustered into areas controlled by the different *soa*. In spite of the low income it yields, *Kayu putih* oil production has become a fundamental economic activity of the people. Their reliance on Kayu Putih is due to the unavailability of other alternatives. *Kayu putih* oil is extracted from the leaves through a process of distillation using a traditional distillery.

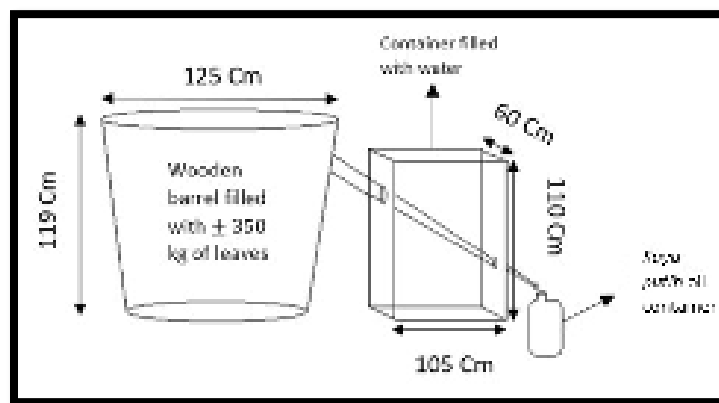


Figure 1. Illustration of distillery

During one observation, 342 kg of leaves, gathered from 67 *melaleuca* trees, were put inside a wooden barrel to be distilled for 14 hours, using 2 trees as firewood (see Figure 2). This process created only 3 kg of oil, which was worth 185,000 Rupiah per kg. One family, who owns a large number of trees, harvests from 1,371 *Melaleuca* trees, earning only 11.4 million rupiahs per year by distilling 7 tons of leaves. Although earning only a relatively small income, the family still depends on *Melaleuca* oil as the main source of income because of the unavailability of alternatives. This situation applied to many other families living in Boano Utara.

The high number of young adults working as wood gatherers does not significantly help the village's economy due to the low wage that they earn. Most of the men working as wood gatherers are men who do not have a *kayu putih* oil distillery, because to own a distillery the men in Boano Utara have to be within a certain age group at which time they are already considered as matured and respected men. Because of the lack of skill as a consequent of low school participation, working as a wood gatherer is a common choice for men who do not yet have a distillery.



Figure 2. The tree used for firewood

Poor governance and unfavorable political condition

Boano Utara's poor governance plays a huge role in its stagnant economic growth. We observed that local leaders dwell on things irrelevant to public life and social upliftment. As an example, local leaders take 1 kg of *kayu putih* oil from every distillery at each harvest as a form of taxation. Harvests occur every three or four months. Taxation is a means to distribute wealth from the relatively opulent families to the poor families through means of social security. On the other hand, in the case of Boano Utara, where all the families are relatively poor, taxation serves only as an economic burden to the family. The tax revenue itself is used for unclear purposes. Assistance from the local leaders, which usually comes in the form of materials for distillery maintenance, is funded by the village fund, which is money given by the central government. It is suspected that the taxation in Boano Utara is used for additional income for the local elites.

Prior to any efforts to increase the well-being of the community in Boano Utara, the political context must be made favorable to progress. Political tension between *soa* is apparent. Allegations of corruption and unruly conduct have been made against the present king by all the main *soa* in Boano Utara. The high rate of violence committed by teenagers shows signs of lack of authority, order, and good influence. A low-level of organizational effectiveness relating to policy formulation to pursue welfare and economic growth is apparent. Efforts to increase the community's capacity will be wasted if the political context is not favorable. Hence, the capacity of the local government needs to be improved in order to create an enabling environment. This could be achieved by setting a good example, strengthening accountability, encouraging

interactions between the villagers and the local government, nurturing local ideas and innovations, and creating new opportunities for people to increase their skills and capacities.

Externalities that cause Market Failures

Exclusivity is vital for the creation of efficient property rights, and the failure to establish exclusivity will result in a condition called an **externality**. An externality exists when the welfare of some agent depends not only on his or her action but also on the actions of others. In the case of Boano Utara for example, the excessive cutting of trees by *kayu putih* still owners will affect the welfare of everyone on the island, even to those who do not have anything to do with *kayu putih*. The people cut down trees without any regard for future supply or for the cost endured by others. This external consequence or cost is called an external cost, and in order to achieve economic efficiency, all externalities need to be internalized.

External Costs in the Production Process and the curse of the sticky *kayu putih* oil price

Direct observation of the production process of *kayu putih* oil shows the materials needed and the types of labor needed to produce the oil. These will make up the total cost of production. In Boano Utara, the production of *kayu putih* oil inevitable involves timber extraction from the forest. However, the decrease of tree stock caused by timber extraction is excluded from the cost of production. As long as producers do not replant or pay compensation to the community for decreasing their tree stock, this will result in an externality. This externality is the result of a condition where the oil producer benefits from the declining tree stock while other people do not. To internalize this externality the producer must replant or compensate, which means an additional cost of production that will drive them further into poverty.

The total cost of a year of production for the family we observed which produces only around 60 kg of *kayu putih* oil is seen in table 1 and table 2. Assuming that the price of a kg of *kayu putih* is Rp185,000, 60 kg of *kayu putih* oil can generate Rp11,100,000. If we include only monetary cost (Rp2,106,666 of the depreciation cost, and Rp60,000 for buying oil container) the net profit is Rp8,933,999 per year. This means that the family of 4 earns only Rp744.499 a month for their labor and capital. If the family was forced to replant or compensate for the decline in tree stocks, they would earn even less per month, and this could drive them further into poverty.

Producers of *kayu putih* oil in Boano Utara earn income below subsistence levels. The enforcement of an additional cost, such as for replanting, to internalize the externality will only make sense if their earning is above subsistence. If the payment for replanting were taken out of their current earning, their livelihoods would be threatened. To increase their margins, they must earn more than they are presently earning, and this can be probably only be achieved through mass production, where they produce higher quantity and economies of scale drive their costs lower. For this to happen, the introduction of new technologies that increase efficiency, better mobility and access to the supply chain, and access to more capital is necessary. A less challenging approach would be to try to increase the price of *Kayu putih* oil, but this can only be achieved if the producers are price makers instead of price takers.

Table 1 Cost of a year of kayu putih oil production

Cost of a year of <i>kayu putih</i> oil production yielding only 60 kg of oil	Amount used	Cost to acquire or build
<i>Kayu putih</i> oil container	12 containers	Rp60,000
Firewood	2.33 m ³	2 persons working for 20 hours
Fresh water that serves as a coolant	13.86 m ³	3 persons working for 60 hours
<i>Melaleuca</i> leaves	6840 kg	4 persons working for 120 hours

Table 2 Cost of a distillery construction

Component for distillery construction	Material	Amount used	Cost to acquire or build	Lifetime	Depreciation cost for a year
Distillery housing	Construction worker	4 people working for 10 days	Rp1,200,000	20 years	Rp60,000
	Timber	unknown	Free		
Cooking barrel	Timber	Unknown number of trees	Rp500,000	2 years	Rp250,000
Cooking barrel base	Timber	2 sacks of cement	Rp180,000	2 years	Rp90,000
Roofing	Aluminum sheet	50 sheets	Rp2,500,000	1.5 years	Rp1,666,666.67
Pillars	Timber	10 trees	Free	unknown	
Second floor flooring	Timber	5 trees	Free	unknown	
Water container	Tarpaulin	12 m ²	Rp80,000	2 years	Rp40,000
	Timber	4 trees	free		
Fences	Timber	Unknown number of trees	free	unknown	
				Total	Rp2,106,666.67

Market Power

In a perfectly competitive market where a large number of producers sell identical products and information is widely available, producers are considered as price-takers due to their low market share.² The absence of free information and free entry to market causes market imperfection, in which one party could exploit another party with less market power. Market imperfection can also reduce market participation and the profitability of agroforestry products (See Gyau et al., 2014). In the context of agriculture and agroforestry products trade is the main source of income and low profitability can be a threat to the sustainability of local livelihoods.

Market imperfection is a challenge to the profits of *kayu putih* oil producers in Boano Utara. There are only four *kayu putih* oil buyers in Boano Utara. These buyers exert power over producers and control local *kayu putih* oil prices. Each of the buyers has a secure trade network with bigger buyers in Buru and Ambon and a patron-client relation with *kayu putih* oil producers in the village. The buyers, as patrons, often lend money to the producers to finance their education expenses, household consumption, or as a working capital. The producers' revenue from selling *kayu putih* oil is deducted from the loan. With prices ranging from Rp175,000 to Rp200,000, most producers have to harvest *Melaleuca* tree and produce oil twice every year to fulfil their subsistence needs. Although producers have the option of selling *kayu putih* oil directly to other buyers outside Boano Utara that offer a higher price, many producers lacking the resources to access this bigger market. The producers also choose to stick with the local buyer who has provided them with assistance at the initial stage of production.

Asymmetric information about the market price of *kayu putih* oil is also responsible for creating an imperfect market. Several producers reported that the actual price of *kayu putih* oil in Buru and Ambon are unknown to them, while the local buyers admitted that they sell the oil to Buru or Ambon for Rp30.000 per kg higher than the local price. Nonetheless, the buyers have no information about the price of *kayu putih* oil distributed by buyers in Buru or Ambon to the market.

Without information and wider access to other markets, *kayu putih* oil producers, and to some extent the buyers, in Boano Utara do not have any bargaining power to control price. As mentioned earlier, local prices cannot cover production costs, especially the environmental costs that include tree replanting. Having no market power induces *kayu putih* oil producers to exploit timber and *Melaleuca* trees even more heavily. Increasing the number of *Melaleuca* trees in the island to gain higher production is a rather a short-sighted view, given that tree-cutting for firewood is becoming more rampant and is putting the sustainability of the business at risk.

Conclusion

A glance of Boano Utara's specific circumstances reveals the complex problem Kayu Putih oil producers are facing. Unfavorable geographic conditions for meeting subsistence needs, lack of the technology necessary for efficient household and market production, unequal access to land and resource management all combine to create challenges for the sustainability of the Kayu Putih producers. The communities lack capacity to intensify their production and unregulated use of common pool resources promotes overexploitation. The problems in Boano Utara might not necessarily be the product of a linear interaction between circumstances mentioned earlier.

Agroforestry-related activities are a means to earn income. The high reliance of the people in Boano Utara on the *kayu putih* oil trade should not be seen in an excessively negative manner. Self-preservation is an act natural to all human beings. To achieve adequate livelihoods human beings, depend on the environment surrounding them. The people of Boano Utara use *kayu putih* oil production as a mean of self-preservation because it can generate income.

² The most common and closest example of "identical product" is agricultural and agroforestry products that bear a high resemblance of quality.

Completely restricting the use of resources necessary for *kayu putih* oil production, without offering an alternative, will disrupt their livelihoods as kayu putih production is the only way that they know to survive.

Future research should seek to understand: (1) the supply chain of *kayu putih* oil in Buru and Ambon to assess whether the price in Boano Utara is fair or not and where improvements can be made to achieve higher production efficiency; and (2) explore alternative livelihoods that could increase the well-being of the people and decrease environmental degradation.

2. Ecotourism Activities and Other Potentials in North and West Seram

The forests and seascapes of Indonesia have high levels of biodiversity and endemism but are under pressure from numerous threats including deforestation, degradation and fire (Edwards et al. 2012; Sayer et al. 2017; Stas et al. 2017). Different approaches are required to address the decline. In this report we focus on ecotourism and homestays as one approach that may be managed by the local communities in Seram and Boano, in Maluku Province, Indonesia. This may bring conservation benefits to the surrounding ecosystems and enhance the livelihood of local people. Ecotourism is one option that managed well with the appropriate checks and balances may offer the best opportunity to conserve the resource values of an area. However, it is noted that ecotourism if not managed appropriately for the local conditions can add to the problems within communities and even lead to ecosystem degradation.

This chapter provides a preliminary assessment of the ecotourism activities and potential in North Seram (the village of Sawai and Masihulan) and the island of Boano (West coast of Seram) and considers options for local people to develop small eco-tourism enterprises. These two locations are already visited by small numbers of tourists, particularly by natural-history orientated tour groups. Further development of small enterprises, some already operational might support the local communities and the natural environment on which they depend.

Overview of Seram and Boano and ecotourism potential

Seram Island and the adjacent Boano Island have for centuries been known as 'The Spice Islands'. Both are in the biogeographic region Wallacea (separated from the Asian continental plate by Wallace's Line in the West and the Australian continental plate by Lydekker's Line in the East) and the Coral Triangle (*sensu* Hoeksema 2007) recognized for its high marine biodiversity with >500 species of coral.

The lowlands of Seram have several species that are of economic importance, e.g. Clove *Syzygium aromaticum*, Nutmeg & Mace *Myristica fragrans*, and Durian *Durio* species. These species are of interest for ecotourism.

Surrounding Sawai is a tropical marine environment that supports a fishing industry and patches of coral that are readily accessible. (Fig. 2), making it an attractive location for ecotourists. Boano also has an interesting coast line with a tuna processing village, good coral and snorkeling opportunities, and a diversity of sea birds and dolphins that could be offered in an ecotourism package.



Fig. 1. Snorkelling over coral near Sawai

Seram's location affords warm conditions (average 26.4° C) along the coast throughout the year. It is also in the doldrums, meaning it escapes the cyclones and severe weather conditions experienced at higher tropical latitudes. This makes it an ideal location for ecotourism. In west Seram rainfall is highest in July (508 mm) and lowest in February (48 mm) and rainy days are highest in October (24 days) and lowest in February (3 days). These climatic values suggest that ecotourism is better suited to the early part of the year when conditions are drier but this also coincides with a period of water stress for the local people (see below).

Villages of interest in the study area on Seram

Sawai is primarily a muslim fishing village and consists of land-based wooden houses and wooden houses built on stilts over the sea in 0.5-1 m of water. It has several small enterprises already in place, including fishing and drying fish for the external market, and boat tours of Sawai and adjacent famous Ora Beach resort and several small islands. In addition, there are terrestrial based activities such as a cane furniture industry, harvest and drying of nutmeg, collection and sale of local honey, harvesting of durian (Fig. 2), cacao, bananas, coconuts and sago, production of *dodol* (a sweet made from durian) (Fig. 3), bird guiding tours and a reverse osmosis plant and several stores selling local honey, groceries and pharmaceutical products.



Fig.2 Sawai children carrying durian



Fig.3 dodol sweets

Masihulan is a Christian village bordering the road to Sawai. Its inhabitants are local indigenous people who have been relocated from the upland forests. It is reached via the Trans Seram Highway from Masohi, the ferry port on the southern coast of the island. The primary occupation of the villagers is small-scale farming (0.5-1 ha plot) on land adjacent to and within the forest. During our visit there were also a couple of families drying cloves for market (Fig. 4), an elder weaving baskets out of grass, and most of the community was involved in harvesting durians for both local consumption and on-selling.



Fig. 4 Clove drying in the sun prior to packing and export

In contrast to Sawai, no one in this community was preparing *dodol*. In terms of ecotourism four members of the community were offering bird-guiding tours and the village has embarked on a program to provide homestays; these are currently used by budget-travelers, visiting university groups, and visiting local officials (see below).

Boano

Boano Island (139.8 km² and highest point 624 m) (Fig. 5) is approximately 10 km off the north west of Seram. There are two main villages on Boano Island and they are adjacent to one another; the larger, more densely populated

muslim Boano Utara (Fig. 6) and the smaller and slightly more affluent Christian Boano Selatan. To the north of Boano is Pulau Kasuari a village involved in the supply of sashimi tuna for the Japanese market. The prime focus for ecotourism on Boano Island is the Black-chinned (Boano) Monarch *Symposiachus boanensis*, a Critically Endangered species (IUCN Red List 2017-3), endemic to the island (Moeliker & Heij 1995; BirdLife International 2001, 2011; Eaton 2011). The habitat of the monarch is under threat from deforestation due to the harvesting of timber to fuel the 300+ stills used to extract *kayu putih* oil from *Melaleuca cajuputi*, domestic fires for cooking and heating, and from encroaching gardens (Anon 2018).



Fig. 6. The village of Boano Utara



Fig. 5 The Island of Boano

Accommodation

In the north of Seram, around Sawai, there are a range of facilities that support ecotourism. This includes the upper mid-range Ora Beach Eco Resort (20 minutes by boat from Sawai), two low-mid-range resorts, Lisar Bahari and Oanain in Sawai, and a developing homestay industry in Masihulan village (three kilometers inland from Sawai).

In contrast, there is no organized homestay accommodation on Boano, although several houses offer accommodation in Boano Selatan and Boano Utara. There are no resorts on Boano island, with the closest homestay and mid-range accommodation in Osi on mainland, western Seram. At present, a ferry to Boano leaves late afternoon and returns to Seram at 8 am on the following morning. Thus, visitors who use the ferry need to stay two nights on Boano if they are to visit the sites of the Black-chinned Monarch. Alternatively, they may hire a private boat, to first visit northern Seram and obtain a visitor's permit then travel to the north-west of the island to Huhua Village or south to Huarua Village, both known locations of the Monarch, and return to Seram the same day. Listings on eBird (<https://ebird.org/home>) indicate that some independent bird watchers and birdwatching tour groups have adopted this approach.

Preliminary assessment of options for local people to develop small enterprises for ecotourism and improve services

Masihulan

A homestay committee, led by Mr. Sonny Sapulette, an English-speaking bird tour guide, has been established in Masihulan. Twenty-three homes are participating, with each identified by a species of bird displayed by an A4 image of it over the front door. An unmanned Information Centre is located on the eastern approach to the village but the location of the homestays is not currently listed or mapped there or elsewhere in the village. The village is without regular power supply (despite the presence of power-line infrastructure), with two residences, those of the Pastor and of the Village Head and both functioning as homestays, having power during evening hours supplied from a generator on the church property. These homes and others with portable generators have access to television services during evening hours. The village has mobile phone but no internet service, but Sonny Sapulette is currently investigating this and is putting in an application to government for it to be made available to the village. Most adults in the village speak the local language and some *Bahasa Indonesia*, several speak some English, and youngster of junior and senior high school are learning English at the local school but need more practice with native speakers.

Houses in Masihulan that we visited were wooden, with wooden floors in the living and sleeping quarters but dirt floors in the eating and cooking area. Not all had internal toilets and those that did had squat toilets with a bucket

and scoop to flush them. Accommodation was in a private room with either a bed or a mattress on the floor; several had mosquito nets. The women were responsible for collecting the water for household use. Houses had containers to catch rainwater off the roof but on days it did not rain the women had to carry buckets of water from a tap on the road side to the house. We stayed in clean houses but dogs running through the houses frequently. The visitors coming to stay are usually school or university groups and individuals seeking a grass-roots cultural experience with low-cost accommodation and experiencing not having running water and restricted access to power. Specialized bird watching individuals and groups are most likely to stay in accommodation that offers greater comfort such as neighboring village like Sawai.

The primary activity of the village community is tending their gardens, which are either individual, family or community run. Activities around the gardens vary with the season and are well suited for ecotourism experiences. During our visit the gardens were producing vegetables including cassava, egg plants, leafy-greens, limes, coconuts, cacao and chili, which were being harvested for family consumption. Cacao *Theobroma cacao* planting was a government initiative, the last few years the yield has failed as the plants have been affected by fungi; most probably Vascular Streak Dieback (VSD) disease a basidiomycete (Ceratobasidiales) fungus *Oncobasidium theobromae* (syn. *Thanatephorus theobromae*). (Samuels et al.2012). Members of the community also visit the forest to harvest cloves for selling and durians for consumption and sale.

Based on the activities within the village the following ecotourism ventures could be developed:

- a) Garden visits and cooking lessons: A visit to the gardens with members of a family, involves a walk through forest trails, and either assisting or observing them gather vegetables for their household. This is an activity that could be incorporated into the ecotourism experience. Depending on the season other crops such as cocoa, durian, and cloves are harvested. An extension to visiting the gardens may be learning how the food is prepared and cooked. To assist this a cook book of the local meals could be prepared.

Village tour – a day with women in the village e.g. at the stream washing, visiting the gardens (*kebun*), collecting water, cooking etc.

b) Seasonal activities

Cloves: Picking and processing cloves is labor-intensive and is a social event involving family and community members. The green cloves are de-stalked by everyone including the very young and elderly of both genders. The cloves are then dried outside on sheets and prepared for the external market; most of these as export commodity.

In contrast to cloves, durians were being consumed by most members of communities throughout Seram. In Masihulan, where durians were abundant, they were sold within and outside the community and were an important source of income for it. There are two components to the durian industry,

- The first is the harvesting involving slashing under the trees for ease of finding fallen fruit, building temporary shelters near family durian trees and transporting the fruit out of the forest strapped to bamboo poles. A pole holding 40 durian may weigh over 40 kg.
- The second is the processing, value adding, to create *dodol*, a durian sweet that has a much longer shelf life than the fresh fruit. However, *dodol* was not being made in Masihulan although it was in nearby Sawai. In the houses we visited in Sawai the preparation of *dodol* was a social affair and the end product was exported for sale in Ambon and further afield in Indonesia and Malaysia. The production of *dodol* is seasonal but an enterprise that Masihulan folks could benefit from.

c. Language and interpretation

Successful ecotourism requires good communication. Small number of villagers could speak some English at a level that would be required for visitors to interact and have a rewarding experience. English discussion were conducted for eight consecutive nights in Masihulan; they were attended by a group of enthusiastic school children from middle to senior high school. Their pronunciation improved within a couple of days and a couple of them were starting to

respond to questions. Practice with native speakers would benefit them.

Some further activities that could help improve English speakers in the village would be a plus. As more people get to communicate in English, the family could host visitors and be part of other ecotourism activities or as interpreters. Each homestay would benefit from adopting a high school student to assist in interpretation.

d. Birds - For its size Seram Island has an outstanding number of endemic species of birds. Many, including the emblematic Salmon-crested Cockatoo *Cacatua moluccensis* (IUCN Vulnerable) can be seen from the edge of the three kilometers road between Sawai and Masihulan. However, there are also species that only occur at higher altitude. On the hill-slopes in the forest behind Masihulan are two bird observation platforms and a small ecotourism venture is operating around them. There are at least three members of the Masihulan community that know the local birds well but only one, Sonny Sapulete, has a good command of the English language. None know the scientific names of the birds. Another component of the birding experience is the rehabilitation center for birds on the outskirts of Masihulan.

All ecotourism guides should have a knowledge of the scientific names of at least the endemic and local birds in the area or be able to use an app on their phone or a book to refer to them. Most of the bird watchers will have a good knowledge of the birds prior to arriving. Potential bird guides would need better English to accompany the visitors.

e. Currently bird watching tours are being conducted, on request, out of Sawai or Masihulan, to higher altitudes, particularly in Manusela National Park. The potential for members of the Masihulan community to develop guided tours in the park needs further exploration (i.e. permits, costs and degree of access). Botanical tours - An opportunity exists to develop botanical tours out of Masihulan. Features of particular interest include the Nypa *Nypa fruticans* and Sago Palm *Metroxylon sagu* swamps lining rivers and the associated sago processing facilities, the spectacular large (to 45 m) Striped (Rainbow/Mindanao) Gum *Eucalyptus deglupta* (*Kayu loreng*) on riverine flats, ancient *Cycas rumphii* on foredunes and beaches, and *Amorphophallus* (arrow root) plants on the forest margins. A film group visiting Manusela National Park is coming soon to document the *E. deglupta* - one of only five *Eucalyptus* species that occurs outside of Australasia, and this is an indication of the interest in topics such as these.

Alternatives on development activities to improve economic benefits for the local people engaged in different ecotourism options.

Homestays - offer the potential for economic, environmental and social sustainability for the rural poor. However, this industry needs to be managed if it is to work. Masihulan, through the development of a homestay committee is moving in the right direction. Involving a large sector of the community may address social and economic inequalities that can otherwise develop in a community. Environmental sustainability may be gained by distributing the tourism in the town, negating the need for larger disruptive hotel and infrastructure construction to service tourism. It may also result in diversification away from agriculture, protecting the forest from deforestation as the homestay have funds to purchase goods. However, the rural populations still need to feed their families and additional guests may put additional pressure on the forest products and potable water supplies; these demands need to be assessed. Economically homestays are generally managed by females, thus providing a separate income for the woman and children. This may support sustainable livelihoods through funding better health and education.

The expectations of both the hosts and clients need to be clearly established at the onset of the visit. If a homestay is being presented as a cultural experience then there will need to be a process where the client is made welcome and treated as a family member and not as an outsider or guest. An important part of the experience is sharing meals and the activities around preparing them and cleaning up afterwards.

Communication needs to be improved - this could be managed by either a) an English-speaking community-member being assigned the responsibility of introducing the client to the homestay host, or b) allocating a student to work with a homestay property during the time the client stays. A set of guidelines on use of water, *mandi* (personal washing), use of different areas of the home, laundry, meal times, and use of foot wear in the house should be developed. A sheet with common phrases could be developed so both the host and visitor can communicate on a basic level if neither speaks the same language and no interpreter is available.

A survey of the type of visitor that is likely to use a homestay in Seram and on Boano needs to be conducted. It is envisaged that budget bird-watchers and university study groups are likely to be the main clients. Further a cost-

benefit analysis of different households to host homestays needs to be conducted; it needs to consider the impact on the family especially if they are displacing family members from their rooms to host visitors.

If Boano Utara and Boano Selatan are to develop an effective homestay enterprise it is suggested they form a community homestay committee with representatives from both sectors. They will need external help and mentoring especially with the establishment of this enterprise. This may be achieved through networking with different departments within the University of Pattimura in Ambon and working with the Tourism Board. Both Masihulan and Boano need assistance in marketing as internet connection are non-existent or very poor. The government or NGO could assist these communities in different ways.

Waste management

A major problem in Seram and Boano is disposal of waste. In the last decades people on these islands have moved from using natural biodegradable products to plastics. This is having a major impact on the environment effecting both the land and seascapes and will affect tourism; Baroncini-Turricchia and Benassi (2012) make specific comment on Sawai in a report of a caving expedition to Seram. Bali and Myanmar have recently been identified in the media (*Australian Newspaper* Dec. 29, 2017) as destinations to avoid in 2018 due to pollution and rubbish. Tourist share information and are looking for pristine environments. They would prefer clean and comfortable environments.

A recycling plant has been built between Masihulan and Sawai but it is not operational. The reason for its lack of use needs to be addressed and funding needs to be sought. Schools could give awareness program on the importance of environment and waste management to the children. School monitors were emptying rubbish bins of plastic, food scraps and paper into the sea on a daily basis. In Sawai, the toilet and household wastes are flushed directly into the sea. This may have been sustainable in the past but with disposable nappies, other non-degradable items, and a growing population it is in urgent need of a change.

Alternatives

Small scale biodigesters shared between several households could be installed to assist in reducing waste and providing fuel for cooking. However, a review of 120 households in 2013 found that they were not economically feasible for individual rural households but potentially had broader societal benefits. Improvements in technology and funding sources may have changed in the last five years and this would be worth further investigation. The World Bank Group have a Carbon Initiative Development (Ci-Dev) program that may fund such a project. (World Bank Group accessed 26 June 2018).

Guided tours of Sawai - suggested activities are a visit to the reverse osmosis water purification plant, fish holding pens with large wrasse, drying racks of fish, holothurians (sea cucumbers/ beche de mer) and cloves, swimming and washing center, honey shop, and meeting the fishing boats as they come home from sea. Depending on the season a visit to the furniture making center or to an area where members of the community are processing and making *dodol*.

Boat trip in Sawai Bay – visit mangrove, *Rhizophora* sp. Rehabilitation Site (30 ha have been revegetated; school children assisted at 100 Rp/day each), snorkel off Sawai Island then a stop at the islands nearby, visit fish-holding platform, then continue past Ora Resort to Air Belanda (café for drinks and snacks) also visit the nutmeg tree *Myristica* sp. behind resort, return via the limestone cliffs to Sawai.

Caving Tours, Seram - Caves in the limestone cliffs between Sawai and Ora Beach Resort, Batu Saka Cave (at -388 m, currently the deepest cave in Indonesia) in the mountains near Sawai, and along the River Sapalewa in the Taniwell district (Baroncini-Turricchia and Benassi, 2012) require exploring to determine the feasibility of offering caving tours in the area similar to those offered at Mulu National Park, Sarawak, Malaysia. The latter is one of the largest underground rivers on the planet ("*Seram Speleologia 76 - 2016*"). One or all of these features may provide the foundation of an ecotourism activity. The benefit of more than one related activity will mean people will stay longer in an area. Funding would need to be sought to provide board walks, lighting and interpretation if the cave was to be open to ecotourism visits.

Boano - boating trip around the island. Circumnavigate the island with three/four stops. i) tuna fishing village; ii) village where the Black Monarch tours begin (Huhua Village in the north and Huarua Village in the south) and iii) bay to snorkel and exploring the general coastline. Along the way an opportunity to see sea birds and dolphins.

Boano and the Black-chinned Monarch

The Black-chinned Monarch is recorded foraging in *Ficus* spp. and *Coffea* (Coffee) in mix-feeding flocks (BirdLife International 2018). This suggests that this monarch and other species of birds would benefit from planting these species. It is suggested that *Ficus* with an understory of coffee are planted on degraded lands in close proximity to the known locations of the monarch. The coffee may also serve as a cash crop for the community and could be processed and sold to visitors to the island.

Coconut soap

Coconuts are being harvested for copra in both Seram and Boano. A small enterprise producing coconut soap could be established. This could be expanded to provide small bars of soap for sale and distribution in Ambon and Jakarta at hotels (use a mold for different hotels so individualize them). Note this is being done in Solomon Islands on a large scale with the soap being sold to major hotel chains in Australia.

Manusela National Park

- Information boards could be installed in the National Parks lookout over Sawai Bay and the northern gate lower down. A list of recent sightings of birds and mammals in the park would be of good use.
- The viewing platform overlooking Sawai Bay at 890 m on the Trans Seram Highway in Manusela NP (Fig. 7) need more attention and renovation to attract more tourists to stop and enjoy more of the site. Rubbish and graffiti need to be handled. Signage and interpretive board would be necessary if tourism would grow more. Maintenance plan and implementation are needed.



Fig 7. Lookout in Manusela NP

- National Parks staff would need to make a routine stop here en route to the National Park northern entrance to show a presence and to ensure the site is maintained.
- The National Park could get support from University of Pattimura staff and students to develop interpretive material for the information boards and other materials.

Other issues that would be important for the growing Ecotourism

Water

A major consideration for ecotourism is an adequate and reliable supply of water. This is a major problem, particularly in the island of Boano, as the supply of fresh water is limited even during the rainy season; ecotourists add pressure on an already poor water supply. Water requirements of tourists or visitors tend to be higher than local usage due to their use of showers and laundering linen. This will put added pressure on the environment and

sectors of the community who may have their water rations restricted to service ecotourism. An adequate year-round supply of water for the community needs addressing before ecotourism ventures develop.

In Boano, the government had installed a network of pipes and watering points with taps. However, this wasn't working so the community of Boano Selatan have installed a parallel system and are pumping water from a well to taps throughout the village. The pump is switched on for about an hour a day depending on the water level in the well. During our visit there was a line of people with buckets and bottles waiting to fill up; the flow was switched off before some households managed to get any water. Each tap services several households. Opposite the Secretary's home in Boano Selatan there was an open poly tub that was being filled to store water.

ATMs

Rural villages do not have Automated Teller Machines (ATMs) for the dispensing of cash. The closest ATMs are in Wahai and Masohi (several hours drive).

Payment for access or services

An open system of payment to visit the site of the monarch needs to be established. The people of Huhua commented that they were not receiving money from operators in Boano Utara who were charging for access to the site.

Travel Insurance

Visitors should note travel on motor bikes negates most travel insurances, as does not wearing helmets on them or using life jackets in boats. Life jackets should be compulsory on all boating trips.

References

- Acharya, B. P. and Halpenny, E. A. (2013) Homestays as an Alternative Tourism Product for Sustainable Community Development: A Case Study of Women-Managed Tourism Product in Rural Nepal, *Tourism Planning & Development*, 10:4, 367-387, DOI: 10.1080/21568316.2013.779313
- Anon, 2018. Strengthening Ridge-to-Reef Natural Resource Management in the Seram-Buru Corridor. 2nd Quarterly Report from Tanah Air Beta, October to December 2017
- Baroncini-Turricchia, G., and Benassi, A. 2012. Cave and Karst Prospecting within Seram Island (Maluku Province), Indonesia - 23 May-22 June 2012 . Available from: https://www.researchgate.net/publication/282696062_Cave_and_karst_prospecting_within_Seram_Island_Maluku_province_Indonesia [accessed Jun 28 2018].
- BirdLife International. 2001. Threatened birds of Asia: the BirdLife International Red Data Book. BirdLife International, Cambridge, U.K.
- BirdLife International. 2018. Species factsheet: *Symposiachrus boanensis*. Downloaded from <http://www.birdlife.org> on 28/06/2018. BirdLife International (2018) IUCN Red List for birds. Downloaded from <http://www.birdlife.org> on 28/06/2018.
- Eaton, J. 2011. Black-chinned Monarch *Monarcha boanensis* still survives on its tiny island home.
- BirdingASIA 15: 36.
- Edwards, I.D., Payton, R. W., Proctor, J. and Reswan, S. 2012. Ch. 15. Altitudinal zonation of the rain forests in the Manusela National Park, Seram, Maluku, Indonesia. *In* The plant diversity of Malesia: Proceedings of the flora Malesiana symposium commemorating Professor Dr. C. G. G. J. van Steenis Leiden, August 1989. Eds. P. Baas, K. Kalkman, R. Geesink Springer Science & Business Media, Science 420 pages.
- "Hasil Sensus Penduduk 2010 : Agregat Data per Kecamatan" (PDF). Sp2010.bps.go.id. Retrieved 15 April 2018
- Hoeksema BW. 2007. Delineation of the Indo-Malayan Centre of Maximum Marine Biodiversity: The Coral Triangle. *In* W. Renema (ed.) Biogeography, Time and Place: Distributions, Barriers and Islands, pp 117-178. Springer, Dordrecht.
- Kato, M. and Ueda, K. 1988. Taxonomic studies of the plants of Seram Island. Botanical Gardens, University of Tokyo.
- Moeliker, C.W. and Heij, C.J. 1995. The rediscovery of *Monarcha boanensis* (Aves: Monarchidae) from Boano Island, Indonesia. *Deinsea* 2: 123-143.
- Samuels GJ, Ismaiel A, Rosmana A, Junaid M, Guest D, McMahon P, Keane P, Purwantara A, Lambert S, Rodriguez-Carres M, and Cubeta MA. 2012. Vascular Streak Dieback of Cacao in Southeast Asia and Melanesia: in planta detection of the pathogen and a new taxonomy. *Fungal Biol.* 116(1):11-23.
- "Seram Speleologia 76 2016". *Scribd*. Retrieved 2017-09-20.
- Smith, M. T., Goebel, J. S. Adn Bilgnaut, J. N. 2013. The financial and economic feasibility of rural household biogas digesters for poor communities in South Africa. *Waste Management* 34(2):352-62. doi: 10.1016/j.wasman.2013.10.042. Epub 2013 Nov 25.
- Stas, S.M., Rutishauser, E., Chave, J., Anten, N. P. R., and Laumonier, Y. 2017. Estimating the aboveground biomass in an old secondary forest on limestone in the Moluccas, Indonesia: Comparing locally developed versus existing allometric models. *Forest Ecology and Management* 389: 27-34

Web sites

<https://www.theaustralian.com.au/news/...to.../a15f7289932fe24991fea5d4bf28d585> Dec 29, 2017 - Travel guide Fodor publishes destinations to avoid in 2018

<http://www.mapsguidesandmore.com/Indonesia-Maluku>

Statistics Indonesia – AsiaPortal

www.asiaportal.info/database/statistics-indonesia/

Oct 13, 2017 - Badan Pusat Statistik (BPS-Statistics Indonesia), previously Central Bureau of Statistics, collects and provides statistical data for Indonesia with a responsibility to provide data to the Indonesian government and public.

<http://blogs.worldbank.org/climatechange/bringing-better-biodigesters-and-clean-energy-africa>.
World Bank Group accessed 26 June 2018

The Carbon Initiative for Development (Ci-Dev) was launched in December 2011 to build capacity and develop tools and methodologies to help the world's poorest countries access carbon finance, mainly in the area of energy access. It is set up to use performance payments based on reduced emissions to support projects that use clean and efficient technologies in low-income countries.

Table 1: Issues, problems and possible solutions associated with ecotourism in Seram and Boano

Issue	Problem	Possible Solution
Motor cycle helmets	Negates travel insurance policies	Provide and compulsory use of cycle helmets
Life jackets	Negates travel insurance policies	Provide life jackets and compulsory use of them
Toilets	Carry water to wash them; cleanliness	Install a water tank with an attached pipe to house area
Water	Carrying buckets of water to the houses	Catchment tank to collect water off the roof
Hot water	No hot water for washing	Use a bush shower or black plastic bag hung in the sun with a shower hose (less water wastage and easier to wash)
Flip-flops for toilet area	Shared by everyone potential to pass on tinea and plantar warts	Bring and use your own and not to leave them in a communal area; other people will use whatever is available
Malaria and dengue	Mosquitoes – particularly bad at dusk and during the night	Use mosquito nets; spray bedroom; purchase insect repellent (available in sachets in shops in Sawai) and apply before going into field and in late afternoon. Take anti-malarial drugs (short term visits)
Electricity supply	Limited to night time only 7 pm-midnight; Masihulan only supplied by generator to a few house holds	Install solar panels or biogas digesters and run generators, consider micro-hydro
Hot rooms	Hot rooms in afternoon and evening	Install ceiling fans
Waste plastic and nappies	Large quantity of rubbish particularly plastic in the water. School monitors emptying rubbish bins into the sea (Sawai)	Sawai/Masihulan recycle plant needs to be operating. No plastic should be going into the sea. Ban plastic and babies nappies. Consider using plastic as a composite in buildings. Educate teachers and stop rubbish monitors emptying rubbish bins in the sea.
Sewage	Raw sewage and other wastes going into sea; collecting water from sewage outlet to wash dishes	Holding tanks for sewage; water pipeline to all houses
Termites	Rapid deterioration of buildings e.g. buildings in Sawai and Masihulan being destroyed by termites	Use composite materials: plastic, cement and wood – see Dr Ronny, Universitas Pattimura, Ambon. He has developed a product that could be used in building – benefit is insulation, waterproof and termite proof and use plastic from recycle plant.
Rats	Rats in houses; rats carry <i>Leptospirosis</i>	Use rat bait. Keep all food in sealed containers
Eutrophication of wetlands	Utara Boano has a large area of highly polluted water in the village adjacent to where woman wash clothes; habitat for mosquitoes carrying malaria and dengue	Clean up water (plant reeds) and use it for agriculture?

CHAPTER 5. STAKEHOLDER ENGAGEMENT AND ECOSYSTEM ESSENTIAL FOR CONSERVATION AND SUSTAINABLE LIVELIHOODS

This chapter covers several fieldtrips to Seram and Boano Island during July to September 2018. The Tanah Air Beta team consisted of Emilio Valeri, Adinda Rizky, James Langston, Rebecca Riggs, Agus Kastanya, Jeff Sayer and Intu Boedhihartono. Volunteers joined us from University of British Columbia: Gavyn Mewett and James Cook University: Shannon Burke.

1. Boano Natural Resource Management Workshop

On July 26th and 27th 2018 Tanah Air Beta (TAB) participate in the organization of a workshop with LPPM (*Lembaga Partisipasi Pembangunan Masyarakat*), Burung Indonesia and Coral Triangle Center (CTC) in Boano island entitled “Developing a Natural Resource Management Plan for Boano”. Attendees included relevant government bodies, University of Pattimura staff (UNPATTI), local government, *Soa* (clan groups) representatives, civil society groups, non-government organizations, and several CEPF grantees in Maluku. The focus of the meeting was to bring together different groups interested in natural resource management on Boano, discuss key threats, challenges and opportunities. The high number of government staff and diversity of representatives showed great progress in bringing government attention to Boano – an issue that local people have raised several times with TAB. The discussions were mostly positive, although with limited time there was little progress on tangible outcomes. CTC, LPPM and TAB shared updates on progress and findings and invited participants to share views on Boano’s future. Significant attention was given to developing a marine protected area around Boano. Majority of government representatives supported the initiative but *Soa* groups were unwilling to make commitment without further discussion with the local community. It will be important not to rush this process, without support from local communities the Marine Protected Areas will be futile. Organization like WWF (World Wildlife Fund) and CTC are focusing on Marine Protected Areas in Maluku as part of their SEA project funded by USAid (USAid Sustainable Ecosystems Advanced Project). Their focus is to support the Government of Indonesia to improve the governance of fisheries and marine resources and to conserve biological diversity in West Papua, Maluku and North Maluku Provinces. The interest of SEA project in Maluku has given possibilities for CEPF grantees to collaborate with other conservation organizations (such as WWF and CTC) to reach the same goal of biodiversity conservation on and around Seram and Boano islands.

TAB learned from the workshop the importance of building trust and relationships with local communities on Boano prior to attempting to enforce natural resource management agreements. We also learned that participants shared very different views on natural resource issues and ways to resolve them, for example the pressure on forest from *kayu putih* (melaleuca oil). More discussions need to take place between smaller groups, prioritizing focus on a subset of issues. Small positive changes can instil trust and build partnerships between local community, government and NGOS, allowing further actions to take place. The positive outlook and openness of *Soa* groups represents a great step forward, largely due to LPPM presence on the island. TAB will continue to foster these relationships and identify leverage points for addressing conservation and development challenges.



Figure 1. The workshop in Boano gathered different stakeholders to discuss the future of Boano landscape and seascape

2. Future landscapes: vision, priorities and threats

During the July-September 2018 period we reviewed TABs understanding of local visions for the future. Below is a summary of what we have learnt in each village that we have worked in and visited in Seram.

Sawai

Semi-formal discussions and interviews with community members during July 2018 highlighted improved governance, resolving borders with Manusela National Park and strengthening social cohesion as key priorities for the future of Sawai. Participatory activities during July-Sep 2017 illustrated that the community saw opportunity in university education, commodity crops, tourism, improved waste management practices, strengthened access to markets and in improving cultural systems.

Masihulan

Economic development, improved infrastructure and public services (health centres, schooling) and secure land tenure have been identified as key visions for the future of Masihulan village (TAB Report, July-Sep 2017). Participatory activities during July 2017 revealed that the community perceived a guide training program and inclusive community management as key opportunities for achieving future visions. Future economic development in Masihulan was envisaged by the community to occur across three divisions:

1. Ecotourism (including homestays, guided walks, conservation programs, and non- timber forest products). Money from the village fund is currently being used to build facilities for homestays.
2. Localising production for value-added food crops
3. Sustainable natural resource management around food crop supply and demand (MDP Report, 2017)

Strengthening village *kebun* (home garden and agroforest system) and establishing clear borders with Manusela National Park have also been identified as important for the future of Masihulan.

Melinani

TAB visited the sub-village of Melinani during 2018 and early 2019. Semi-formal discussions illustrated that technical support for agriculture development was important for the future of Melinani. One participant noted that improved technical skills would strengthen the community's capacity to develop their own cocoa industry. Currently a number of community members are employed within the cocoa estate outside of Melinani.

Olong

TAB also briefly visited Olong village to understand the current landscape and visions for the future. Semi-formal discussions revealed that Olong was currently prioritising infrastructure development including roads and irrigation. Growing village capital was seen as a key priority for the future in order to shift away from a reliance on the village fund.

Boano Island

During participatory activities in Boano Seletan and Boano Utara, youth group members discussed advanced *kayu putih* production, road development, clean water access, and employment as important for future visions. Community members expressed keen interest in ecotourism development and encouraged government support for local management on Boano Island. Semi-formal discussions with community members also illustrated that social cohesion, nurturing local entrepreneurship and higher levels of education and training were important priorities for the future of Boano villages. Local leaders identified government funded physical infrastructure including piped water, strengthened telecommunications and 24-hour electricity as having considerable potential to improve community livelihoods (TAB 2nd Quarterly report, 2017). Previous reports by TAB have also illustrated the importance of strengthening mobility, market power and access to supply chains on Boano Island. During a brief visit to Huhua village, interest was expressed in tourism development (guesthouse and bird watching tourism) and in the development of roads to connect the island.

Landscape Scenarios on Boano

TAB facilitated landscape scenario activities with two separate youth groups on Boano Island during July 2018. One group consisted of members from Boano Utara = North Boano and the other from Boano Selatan = South Boano. The activities helped to strengthen TABs knowledge about livelihoods on Boano Island and on youth visions for the future. The aim of the activities was to encourage discussion on future development visions, including the trade-offs and possible synergies. During the activities, both South Boano and North Boano drew advanced *kayu putih* production, road access and employment as important for future visions. Both youth groups expressed interest in tourism and encouraged government support for traditional management.

Summary of Boano Utara Landscape Scenario Activities

Twelve youth group members attended the landscape activities in Boano Utara. In the first activity the group were asked to consider and draw what was important to their livelihoods. They initially drew the natural landscape including animals and crops. Infrastructure then followed including *kayu putih* stills, the traditional house, the mosque, health centre, the sport court, school and roads. The group then drew what they envisaged for Boano in the future. Clean drinking water, tourism development (Huahua, Putia, Valentine Strait, Aauni), road access and the expansion of modern housing were drawn as key priorities. Increased *kayu putih* production with more advanced technologies and investment in vocational training and aquaculture were also drawn. The group drew a new ferry port and an administration building expressing a wish to form a sub-district in the future. The participants also discussed potential for increasing teak production, ensuring 24-hour electricity is available and in *Kewang* staff obtaining high levels of education. The youth group were concerned about destructive fishing practices by fishermen not from Boano. They emphasised the importance of the government supporting their visions. Discussions on potential tensions and trade-offs included population growth exceeding the carrying capacity of the island, and increased deforestation as a result of further *kayu putih* development. Possible synergies identified were youth employment in tourism and traditional management practices that have potential to strengthen conservation outcomes. Although participants stated that this was a shared vision there were only a small number of participants involved in the landscape scenario.

Summary of Boano Selatan Landscape Scenario Activities

The landscape scenario in Boano Selatan took place with ten participants, including the head of the youth group. The church, traditional house and the natural environment (tree crops, animals) were the first aspects drawn as important to livelihoods. Road access, eco-tourism development and the joining of the church and traditional house were some of the aspects drawn as priorities for the future. One participant noted potential for *kebuns* in the Anuena Mountains for growing turmeric. Many aspects were noted and discussed by the group but not drawn. The group noted potential in advanced technologies for *kayu putih* and for other garden yields. Participants also discussed aims for a city including roads and cars and for higher education. They anticipated that *kebuns* would decrease as people join the formal economy. During discussions one participant mentioned that they believed ineffective governance on BS is due to a reluctance in empowering the pre-existing institutions. One participant voiced the need to conserve natural and cultural sites and to prioritise marine and endemic species conservation. There was concern raised about new conservation plans on Boano (such as MPA and Hutan Lindung). One participant perceived them to ignore traditional institutions and thus were ineffective and disruptive. The group encouraged greater government support including in the construction of the church due to it being a symbol of the community. Only a small number of the youth group actively participated in the drawing of the current/future landscape.

The results of the landscape scenarios were communicated to UNPATTI and government bodies at a seminar in UNPATTI and workshop on Boano Island in July 2018. Key points identified during the activity and subsequent discussions are outlined in the table below.

During the next stage, TAB will incorporate biophysical attributes of the landscapes into the scenarios to identify geographic constraints and opportunities for development and conservation. We are discussing government spatial plans with relevant bodies to continue to build a shared future vision. Our goals in these discussions is to ensure communities have a voice in future plans for the landscape and environmental impacts of change are considered.



Figure 2. Landscape visualization in Boano island

Exploring landscape scenarios in North Seram and Boano island

NORTH SERAM	Best case	Worst Case
	Effective social forestry Clear National Park borders Improved agricultural markets Tourism providing economic benefits University education Migration to cities and off-farm employment Good waste management Good management of village fund Strong leadership and social cohesion	Unclear boundaries between national park leading to conflict Continued disease and unprofitable agriculture leading to expansion into forest Poor management of village fund Degradation of resources reducing tourism attractiveness High population pressure on resources leading to conflict
	Synergies Interest in tourism and conserving natural resources Social forestry and needed agricultural extension services Increased prosperity and tertiary education Strong leadership and effective use of village fund and village enterprise	
	Trade-offs Better agricultural markets could lead to increased agricultural expansion Defining national park boundaries could cause conflict Tourism may lead to degradation of resources	

BOANO	Best case	Worst Case
	Advanced technology and good access to markets for profitable and sustainable melaleuca oil price Reforestation Aluminium fences for agriculture replacing timber Migration to cities and off-farm employment available through training facilities and public services Well managed marine and terrestrial conservation areas Enforced regulations on natural resources Good waste management Good management of village fund Strong leadership and social cohesion Tourism providing economic benefit Increased accessibility across island to increase agricultural production Sufficient clean water supply	Continued harvesting of firewood for melaleuca oil Continued expansion of melaleuca oil Population exceeds island carrying capacity (not enough clean water, resource degradation) Poor waste management Poor governance leading to conflict and misuse of government funding Lack of youth employment opportunities leading to conflict
	Synergies Youth seeking employment and tourism opportunities Respect for traditional management and conservation outcomes Increased accessibility, commodity markets and tourism Prosperity and education Profitable and sustainable melaleuca oil and reduced deforestation	
	Trade-offs Profitable melaleuca oil and increased deforestation Increased accessibility and development leading to deforestation Conservation restricting development Healthy and prosperous population exceeding island carrying capacity Tourism putting pressure on resources	



Figure 3. Discussing future landscape scenarios in Boano with the youth group

Boano Utara Youth Group Landscape Scenarios

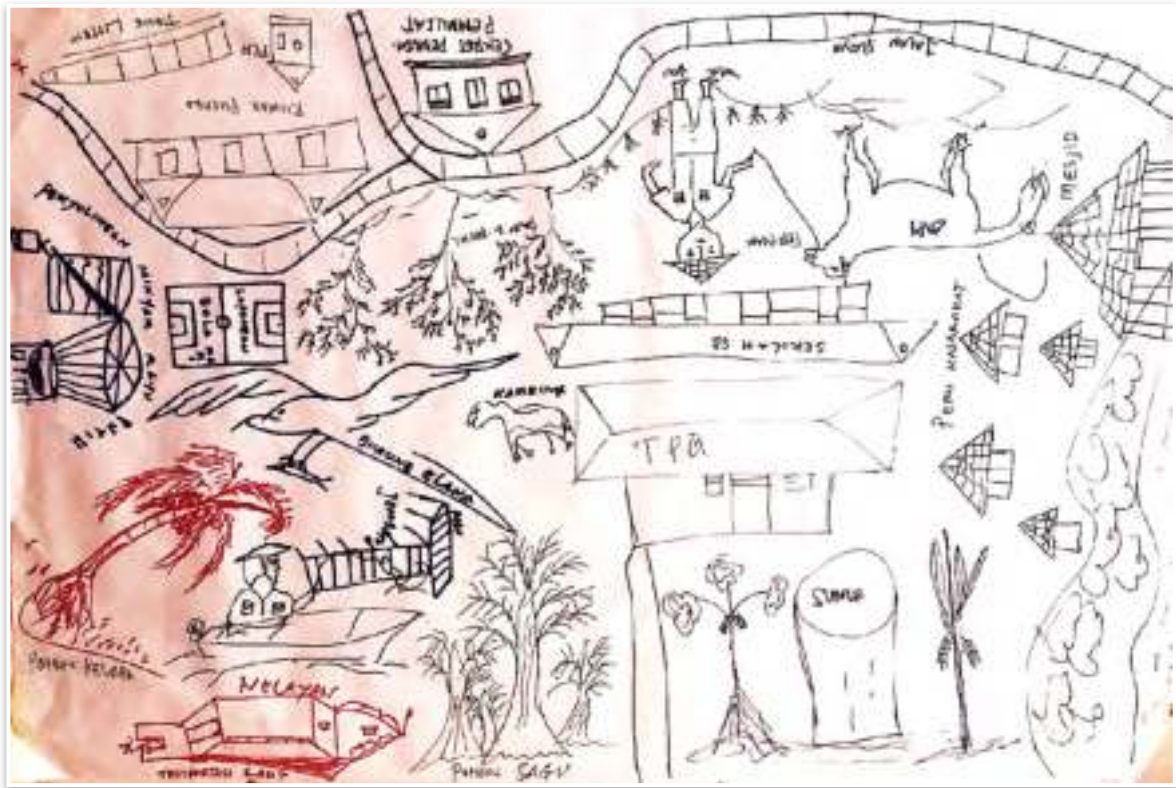


Figure 4. Boano Utara current landscape

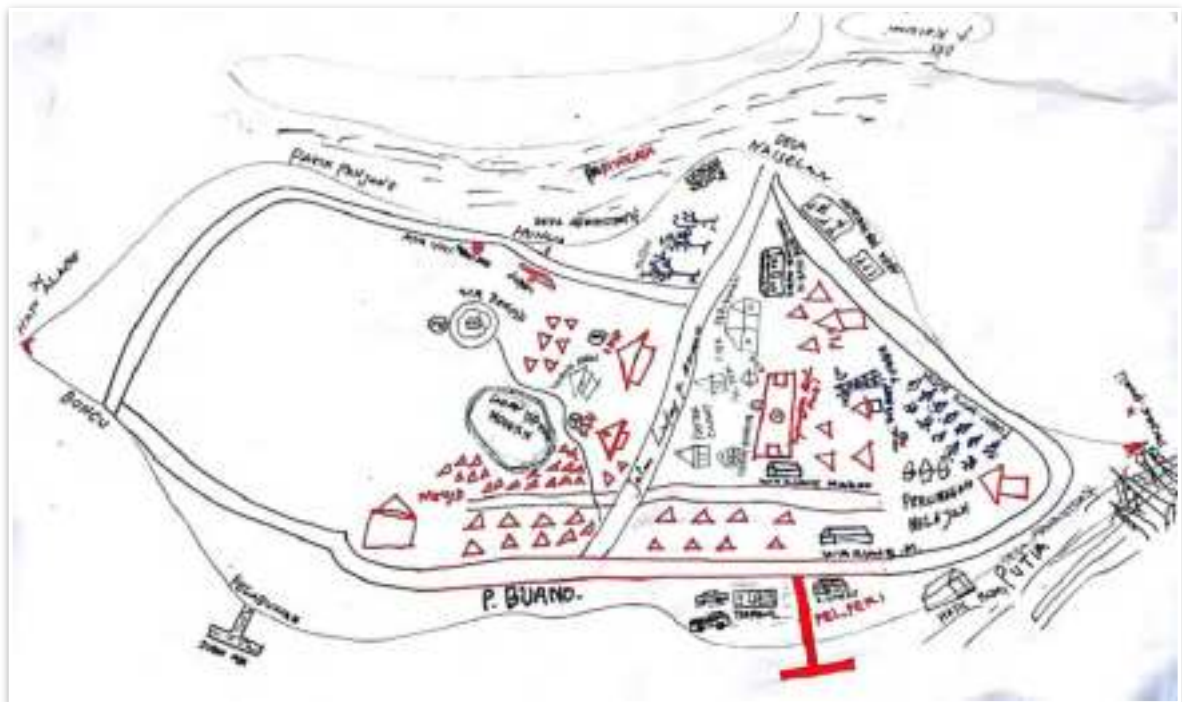


Figure 5. Boano Utara future landscape

Boano Selatan Youth Group Landscape Scenarios

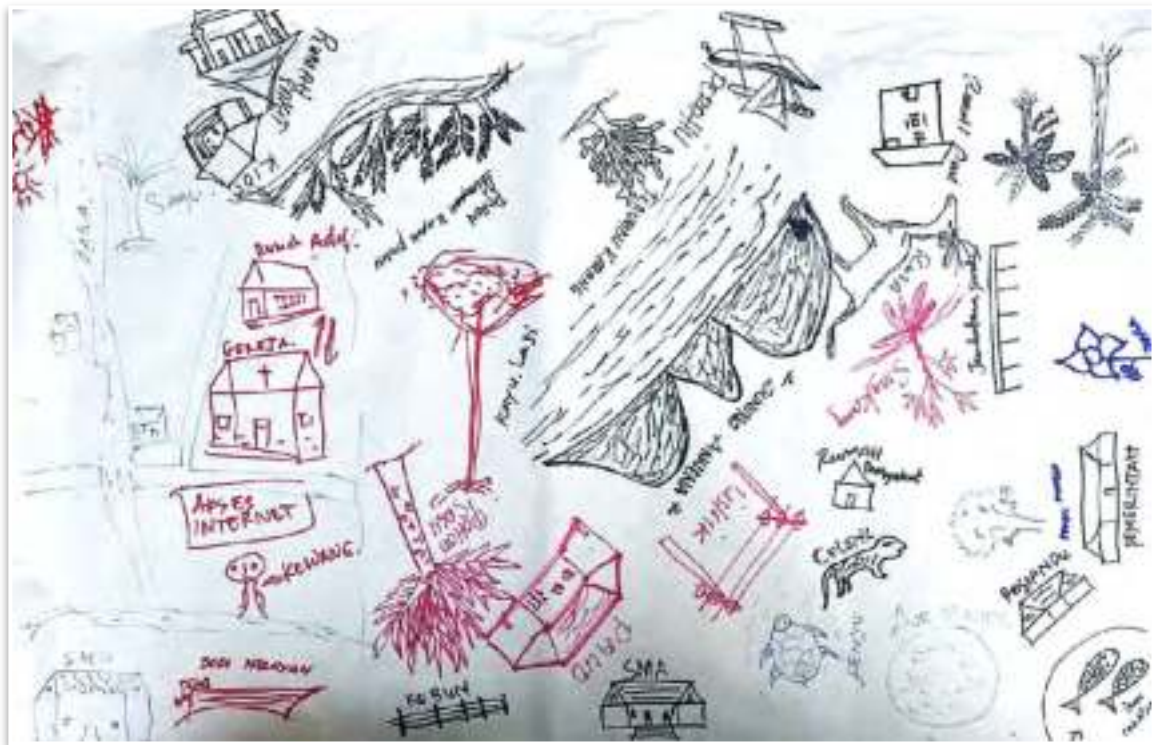


Figure 6. Boano Selatan current landscape



Figure 7. Boano Selatan future landscape

Updated SWOT Analysis

Discussing strengths, weakness, opportunities and threats with communities is a simple way of learning future aspirations, concerns and existing strengths in landscapes. TAB has conducted participatory SWOT analysis in Boano and North Seram and discussed these findings with local NGOs, UNPATTI and government bodies. As we build our understanding of the system, we update the SWOT analysis to reflect our findings. SWOT analysis can then be used as a tool to prioritize actions and close information gaps among stakeholders. The table below summarizes the recently updated SWOT analysis. From the SWOT, we identified key focus areas that can be addressed through partnerships with government or NGOs.

1. Agricultural extension – TAB is seeking support from UNPATTI to investigate issues
2. Tourism – TAB is sharing information with district tourism office and providing support to local tourism enterprises in Masihulan
3. Divergent interests on stakeholder groups – TAB will organize a stakeholder meeting in the landscape to build consensus in North Seram and continue to facilitate collaboration and coordination between stakeholders
4. Rich marine resources in Boano – TAB is supporting CTC and LPPM in designating a marine protected area
5. Waste management – TAB is visiting schools to encourage waste management

Recognizing that many of the challenges can only be met through government intervention, we are focusing on communication the issues to different levels of government to shed light on challenges and identify ways forward. This process is gradual and will require regular engagement with stakeholders. We seek to engage in existing and planned programs (essential ecosystem, social forestry, marine protected area) to ensure that landscape-wide issues are acknowledged and addressed in the development of management plans.



Figure 8. Discussions with local communities and NGO partners

SWOT Analysis

North Seram Landscape	
Threats and Weakness	Strengths and Opportunities
Financial aspects	
Funding for essential ecosystem management authority	Profitable tree crops
Government budget constraints	Investments in large industries
Public revenue sources	Entrepreneurial
	Agroforestry gains (removing disease)
	Entrepreneurial
Environmental aspects	
Awareness of unique, rich natural assets	Fertile soils
FPIC and bargaining power of locals	Spring water
Fish stocks declining	Proximity to valued natural capital
Topological constraints	Recycling awareness in Masihulan
	Arable land under cultivation
Governance aspects	
Egosektoralism	Social forestry program in Maihulan and Melinani
Cumbersome bureaucracy	
Political disarray	
Corruption	
Government top down approach	
Fragmentation	
Enforcement and monitoring capacity	
Human and social capital	
Lack of skills and capacity in village	Welcome community
Religious fatalism	Adat – heritage attraction
Traditional management practices no longer important	Unique local foods and customs
	Inspiration to educate
	Tertiary education relatively high
	Inclusive management strategies
	Inspiration to get jobs elsewhere
Infrastructure	
Waste management (industrial, community)	Improving transport infrastructure
Electricity reliability and reach	Internet/phone increasing access to markets and information
Resource competition	
Tragedy of commons	
Lack of land for villagers	
Unclear spatial zone, rights and responsibilities	
Lowland forests allocated to conservation, threat to farmers	
Large investments looming may not deliver benefits to locals	
Connectivity aspects	
Accessibility, markets, logistics	International spotlight for conservation
Local employment opportunity	National spotlight for ecotourism and conservation
Competing claims on land	
Health accessibility	
Disconnected from networks (trade, information)	
Poor cellphone coverage	
Lack of prosperity	
Divergence in vision	
Community support for conservation	
Divergent interests of stakeholder groups	
Social cohesion	
Leadership	

Boano Landscape	
Threats and Weakness	Strengths and Opportunities
Finance and resources	
	Dana desa Market options for melaleuca oil Availability of fish equipment
Environmental aspects	
Coral for building house foundation	Fish stocks
Fresh water availability	Sea cucumber
Forest fire	Topography
Coastal erosion	Rich marine resources - low pressure from population
	Aquaculture
	Boano Monarch
Governance aspects	
No MPA	Customary Law
Local custom not recorded/in legislation	Government law
No regulation from government	Published local regulation (PERDA)
No family planning program	Sacred protected land
Dana desa poorly managed	Village autonomy
Draft regulation is not applied	Regulation for local customs
	Small island regulation
	Adat management recognition
	Marine zonation process
Human and social capital	
Lack of capacity to manage or plan	Young Boano student association at UNPATTI
Population growth	Partnership between community and LPPM
Conflict between management institutions	Social/adat institutions
Knowledge about sanitation	Village has increasing decision making power
	Cultural tourism
Unsustainable practices	
Mooring boat	
Agricultural expansion	
Firewood harvesting	
Logging timber for sale	
Logging leading to clearing for gardens	
Destructive fishing methods	
Connectivity aspects	
"spooky" island discourages outsiders	Increasing marine related external attention
Expensive and difficult to access	
No continuity between district and village	
No spokespeople at high levels of government	
Little external attention	

Essential Ecosystem Proposal (*Kawasan Ekosistem Esensial*)

In July 2018 TAB met with the provincial forest conservation department (BKSDA) to discuss the designation of an essential ecosystem area (*Kawasan Ekosistem Esensial* = KEE) in North Seram and Boano. Currently, KEE designation is still at an early stage in Maluku. BKSDA is in the process of creating a proposal for the two landscapes and interested in collaborating with partners to move forward. TAB met with KEE team in Sawai to discuss the process of creating a proposal and key elements required in establishing and maintaining a KEE. We also invited the KEE team to attend the stakeholder workshop in Boano with LPPM and CTC. TAB intends to support the KEE proposal, ensuring that the proposal includes key biodiversity areas, is favorable to local people and takes a holistic approach to landscape

management – including multiple stakeholders and sectors. We are currently working with UNPATTI and KEE to identify and collect information needed for the KEE proposal. Important points to consider about KEE are summarized below.



Figure 9. KEE team from Ministry of Environment & Forestry joining us in Sawai & Masihulan for first discussion with communities

KEE is a relatively new concept in Indonesia. It was first created in 1990 (UU 5/1990) that re-emerged following the merge of the Ministry of Environment and Ministry of Forestry. It allows the Government of Indonesia to designate areas outside of formally protected areas as important for conservation. There are only a few fully functioning KEEs in Indonesia at this stage. KEEs can include wetland ecosystem, wildlife corridor, high conservation value area, high biodiversity area, community conservation area. KEE proposals must address planning, management, institutional arrangements, partnership, incentive, funding, reporting, monitoring, evaluation and guidance. The proposal must include an inventory of information about the landscape, outlined in the table below.

Data required for KEE inventory	
Socio-economic	population
	occupation
	education level
Vegetation	Land cover
	Flora
Land use	Topography
	Forest designation
Wildlife	species
	population
	Habitat types

The process of creating a KEE includes (1) area identification, (2) inventory, (3) collaborative forum, and (4) formalization. There must be a public forum and approval from the Ministry of Environment and Forestry and the provincial governor before the KEE is finalized.

Currently in Maluku, KEE are at the inventory stage. To obtain the information required for the inventory, we have discussed potential partnerships between KEE and other institutions. The actors that may be able to contribute to the proposal or are important for managing are listed in the table below.

Actors	
Regional office of forestry	Pak Anwar (Mangrove restoration)
National park	Animal Rehabilitation Center
Church	Mosque
Village-owned enterprise	Ministry of Environment and Forestry
Development Planning Agency	Universitas Pattimura
Village head	Village working group
Sub-district (head of sub-district)	Villagers
Natural Resource Conservation Agency	Governor
KPH Wae Sapalewa	Youth organisation
Talisan Emas (HPH) (logging company)	Regional office of village empowerment
Arara (prawn farm)	Inspectorate
Tanah Air Beta	Head of District-level government
Konservasi Kakatua Indonesia	Regional office of fisheries
Ora Beach Resort (Tourism)	Regional office of estate crops
Ornela (Tourism)	Transmigrant village
Lisar Bahari (Tourism)	Sector police
Oanain (Tourism)	LIPI
LPPM	WWF + CTC (US Aid SEA project)

The establishment of a KEE in North Seram and Boano will be a gradual process. However, the process of establishment could also build coordination and communication between institutions that are currently operating in silos. Throughout 2018/2019 TAB intends to facilitate interactions with stakeholders and the KEE team in each landscape to build consensus on how a KEE can be managed for sustainable natural resource use. In our discussions with KEE team the following concerns/challenges were identified:

- Funding
- Community support
- Ego-sektoral agendas
- Bureaucracy
- Difference in interests between government and people
- Lack of social cohesion in landscape
- Lack of human capital
- Religious fatalism
- Traditional practices
- Political conditions
- Logistics

- Market opportunities and accessibility
- Corruption

From this list we identified four areas of prioritization; funding, community support, agreement between government and local people and human capital. TAB will work with the KEE to strengthen these attributes.

Potential of village enterprise towards sustainable resource use

One avenue for change available to Indonesian villages is the *Badan Usaha Milik Desa* (BUMDes) scheme. These are private village-owned enterprises that should receive a yearly budget from the government, as well as additional assistance in the form of loans. In Masohi district, the budgets and assistance are not in place, instead BUMDes are funded via the village fund (*Dana Desa*). There are different BUMDes categories, such as banking, agriculture, tourism and fisheries. BUMDes are intended to benefit the community as a whole and deliver products from a local to international scale. Villages are keen on this but not many have been established. A representative from the Department of Village Empowerment (DoVE) in Masohi, considers the lack of uptake is due to local capacity and insufficient government assistance. The assistance provided is training in administration and basic management skills.

The village fund is also the conduit through which the Sustainable Development Goals (SDGs) are to be implemented, in lieu of specific funding. This places the BUMDes in a strong position to facilitate locally driven development needs. DoVE has funding to approach each village to explain the SDGs but interviews with the acting village heads in Sawai and Masihulan suggests sustainable development is not a driver for village fund allocation. Heads of BUMDes schemes in each village are not those with whom DoVE communicate either so the SDG agenda is not reaching the people on the ground. In addition to capacity and government assistance problems, local awareness of sustainable development concepts is limited.

The two BUMDes in operation in North Seram are both linked to ecotourism development. In Sawai, 70 million rupiah was invested in 2018. The BUMDes has 18 members, all construction workers. Their first project was to build a birdwatching platform on Raja Island, a short boat trip from Sawai. This was a suggestion by a local entrepreneur who owns a hotel in the village, although the capital cost has been fully met by the BUMDes. Workers were paid 150,000 rupiah per day for their work. The leader has undertaken the majority of the work himself, suggesting that the other members were either not engaged, or the pay was insufficient. There are currently informal arrangements in place with the village hotel to pay 20,000 rupiah per visitor to the platform. The leader is hopeful of arranging a contract with Ora Beach Resort for the same deal. Ora Beach Resort is the only resort in North Seram (owned by an investor) that is well known outside of Maluku and people book directly online to come for holiday. In terms of potential benefit flow to the BUMDes, this birdwatching platform project is a small return. Guest capacity across the two hotels combined (Lisar Bahari and Oanain) is approximately ninety. Maximum income of 1.8 million rupiah is unlikely to be achieved on more than a few days in the year. Even with 75% occupancy and a 50% guest uptake rate, the income falls to 675,000 rupiah per day, a poor return for a village of approximately 1500 people. Perhaps a successful platform can lead to greater income being negotiated in the future. An influx of visitors to the island, with associated noise and litter disturbance could disturb the birds that visitors come to see.

In Masihulan, the BUMDes has been set up to improve visitor facilities in homestays. The homestays are used by tourist groups and individuals, often in Seram for birdwatching. Currently the BUMDes are building western-style toilets in houses with no toilets. These houses belong to the poorest people in the village, adding value to their homes from a tourists' perspective. Prices for the homestays in Masihulan are quoted at 250,000 rupiah per night, prohibitive prices when hotels in Sawai sell rooms far cheaper with better quality accommodation. Whether these investments

encourage increased homestay usage depends on continued preferential patronage from *Konservasi Kakatua Indonesia* (KKI = Indonesian Parrot Project) ecotourism groups. Income from homestay customers who book via KKI or with a local contact is shared with the community. Recently, impromptu bookings have been undermining this flow of benefits to the whole community. These payments remain with the homestay owners. In the future, Masihulan's acting village head envisages each homestay having a separate room for guests.

The two schemes are in their infancy so it remains to be seen how far they can contribute to sustainable development. Ecotourism has been successfully implemented in a number of places worldwide. In North Seram villages, there is limited ecotourism infrastructure and visitor numbers are low. Access to these villages is approximately 12 hours from Jakarta, taking in a flight, 2 car journeys and a ferry; they are off the beaten track. Both BUMDes seek to utilize natural capital for financial capital but financial return is limited. The illegal trade in birds continues, despite bird catchers turning to ecotourism guides in Masihulan. Tourism itself is a source of carbon equivalent emissions contributing to global climate issues. Actors in the BUMDes are not experienced business people and are operating in a low risk, low gain environment, supported by the village fund. Despite the lack of business knowledge, they are willing to invest time and money. If ecotourism takes off in North Seram, a large investor can offer more sophisticated packages that appeal to a mass market. Successful development of these BUMDes to provide provincially or nationally renowned products seems unlikely without preferential government backing. The village fund itself cannot continue to support failing BUMDes so profitability, vision and business nous is needed, even for small-scale success over the medium term. BUMDes need to be viewed within the context of ongoing infrastructure development in the area.

3. Terrestrial Ecosystems

TAB has been working with government, NGOs and local communities to strengthen the knowledge of terrestrial ecosystems. This has included identification of key species and habitat as well as activities that may be harmful to biodiversity and options to reduce their impact. Currently, very few terrestrial biodiversity surveys have taken place in Seram and Boano landscapes. Yet this information is vital for ensuring management plans and behavioral adjustments are effective in their purpose. TAB is working with UNPATTI and the KEE (*Kawasan Ekosistem Esensial*) team to determine what information is needed to draw government funding and resources for long term conservation in both landscapes. Current activities that may be harmful to marine and terrestrial biodiversity are listed in the table below. The options to reduce their impact were determined from discussions with stakeholders and analysis of participatory rural appraisal activities conducted by TAB. Agricultural activities are likely to pose a threat in the future as *kebuns* - home gardens and agroforest land expand, however restricting activities at this stage are likely to reduce income and lead to further environmental degradation. Alternatively, adding value to these commodities could raise incomes and support current trends of sending children to University and off-farm employment. Large-scale forest-based income generating activities include the production of kayu putih, community forestry and logging. These activities may have negative impacts on terrestrial ecosystems if they are not carried out responsibly. Further insights into each of these activities are detailed below, building on previous knowledge.

Landscape	Activities that may be harmful to biodiversity values	Options to reduce impacts
North Seram	Expansion of agroforestry into natural forest	Increasing income from commodities (value-adding), some households seek employment in industry, youth seek employment in Ambon
	Firewood harvesting	TBD
	Bird trade	Rehabilitation centre and ecotourism in Masihulan to provide alternative income and incentive for conservation (led by KKI)
	Logging	Government program to plant timber (Sengon, <i>Paraserianthes falcataria</i>) inside community forest.
	Waste management	Raise local awareness, waste education in schools, some local initiatives that could be supported by external organizations
	Coral mining for construction	TBD
	Unsustainable fishing practices	TBD
	Destructive fishing practices (potassium cyanide)	Decreasing, decision by local community
Boano	Melaleuca oil expansion	TBD
	Firewood harvesting	Advanced technology for melaleuca oil (see pilot on seram), aluminum fences for gardens, incentives for tree planting
	Logging for construction	TBD
	Irresponsible land use practices (planting on steep slopes, harvesting timber in riparian zones)	LPPM project “revitalization of local wisdom for sustainable management of resources in Boano”
	Mangrove harvesting	Government initiative for mangrove rehabilitation in Osi island (West Seram)
	Coral mining for construction	TBD
	Waste management	Raise local awareness, waste education in schools
	Destructive fishing	Decreasing, decision by local community
	Unsustainable fishing practices	LPPM project “revitalization of local wisdom for sustainable management of resources in Boano” USAid SEA project to develop MPA around Boano

Forestry activities on Boano

Spatial analysis of forest area on Boano shows a large portion of the government designated protection forest (*hutan lindung*) currently used for gardens and *kayu putih* production. There is disagreement and mixed information over the extent of *hutan lindung* that is no longer under natural forest. According to the local government, the entire island is divided into *Soa* groups (Clan groups), meaning *Soa* claim rights to land inside the *Hutan Lindung* (State Protection Forest). This issue has not been discussed with Government or *Soa* groups and would require handling carefully. Currently, no large scale forestry activities exist on Boano with the exception of smallholder *kayu putih*. Various stakeholders have raised concerns that the forest may be designated to a concession in the future but this is unlikely for forest designated as protection. The provincial social forestry department (PSKL) is planning on establishing community forestry in the protection forest, working with *Soa* groups to harvest NTFPs (Non-Timber Forest Products). Further exploration of the suitability of community forestry to the Boanese people and for the forest ecosystem is required before moving forward.

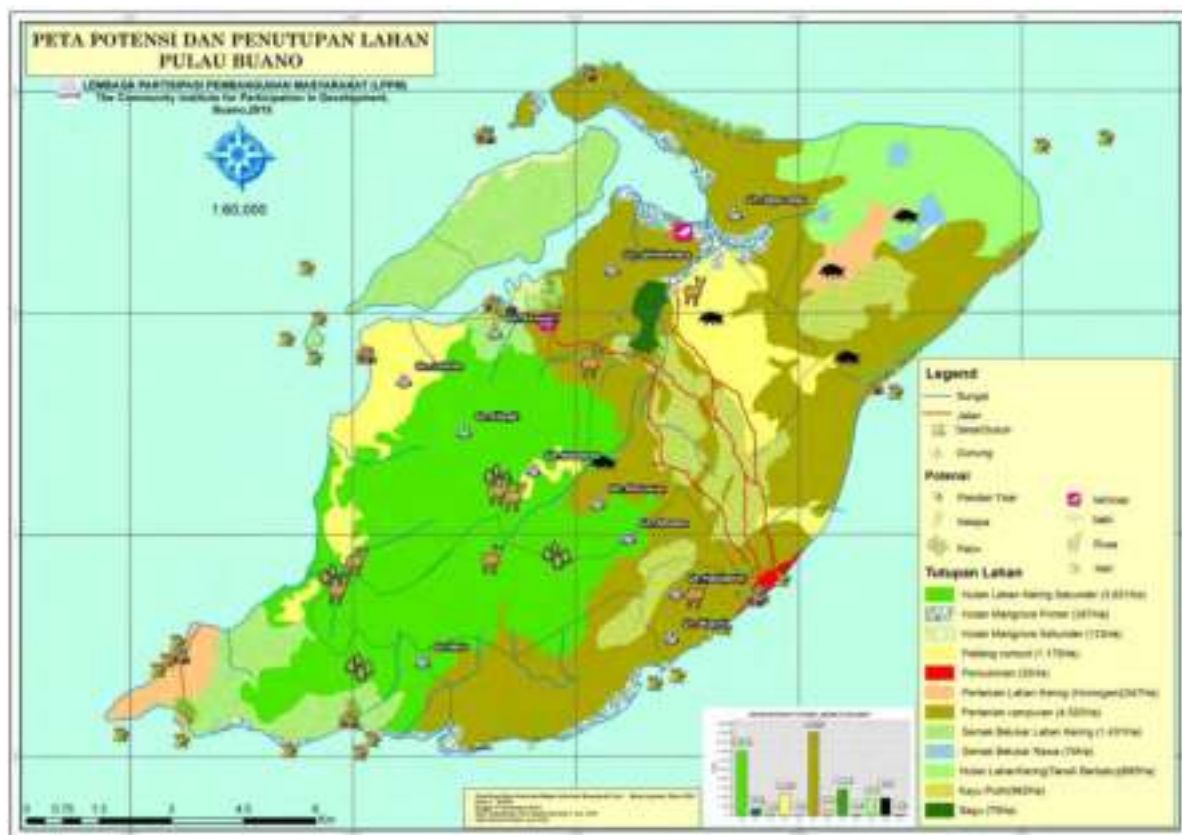


Figure 10. Map of Boano island and its potentials

Boano Monarch Habitat

A local member of the community in Boano island, Pak Ade, an English teacher in the local school, reports that the birds nest in the holes of limestone karst ridges. Pak Ade initially took James Eaton to see the *Kehicap*. James Eaton is one of the author of “Birds of Indonesian Archipelago” and has a special interests in the Wallacea and Greater Sunda islands. We observed the *Kehicap* flying from lowland gullies (altitude ~70 metres) which lie between karst formations, up the formations to higher rugged karst terrain. The *Kehicap* is seen in a small part of *hutan lindung* (designated protection forest) behind *Dusun* (sub-village) Huhua. According to traditional management leaders and the *Soa* youth group, that particular bit of *hutan lindung* is historical ‘sacred forest’. The sacred forest contains a fresh water spring and is where people stop for breaks when traveling by foot, to and from their *kebun* (small farms deeper in the forest). This

breaking point is at the western end of the path that goes from Huhua to the main village: *Desa Boano Utara* and *Boano Selatan*, a 12 to 15km walk through the center of the island. Although the sacred forest is claimed to have been protected since time immemorial, we observed old fences marking what would have been *kebun* – in this case some agroforestry areas (confirmed by locals). Those old *kebun* have naturally returned to forest and people claim it has been a very long time since they farmed the land.

However, in the sacred land we observed some minimal agroforestry management practices. People have planted coconut trees in the gullies where the soil has accumulated and guarded them from erosion by building limestone barriers around the saplings. *Coklat* (cacao) trees are also cultivated along the forest edges – including along the trail and along other edges of open forest canopy. The forest here is structurally complex due to the rugged karst terrain and pockets of good topsoil from years of leaf litter accumulation. On either side of the sacred lands are much more heavily managed *kebun*. Beyond the habitat we saw monocrop coconut *kebun*, and mixed-use *kebun*. This sacred forest was expectedly wetter than the semi-arid inland Cajuput farms, but we could not assess the fauna on the karst outcroppings at higher altitudes.

People report the walking path between Huhua and Boano Selatan/Utara will soon be paved to accommodate motorcycles and small cars. The road is meant to ease the transport of goods and services between the *Dusun*. There are several routes the road may take, but the majority of people expect it to cut through the middle of the island which would likely cut through the *Kehicap* sighting area/sacred ground. One saving grace may be that the *Kehicap* has survived because it occupies a niche in the rugged karst terrain that is unsuitable for planting Cajuput and for collecting firewood. There is also raised awareness and revival of traditional management practices that is meant to alleviate previous indiscriminate harvesting of some dipterocarp species and slow growing, dense hardwoods for fencing and firewood. The birds may have a symbiotic relationship with the minimal agroforestry management practices in the ‘sacred ground’ where they may occupy mixed agroforestry systems. This hypothesis comes from the evidence that they are routinely seen in the area but are normally expected to inhabit the rougher karst ridges at higher altitudes. However, no observations have been made on their foraging behavior, and accessing or observing the higher altitude karst ridges and rock faces is difficult. This requires more survey data and greater investments into observing their behavior.

An opportunity lies in the revival of traditional management. Capacity building and legitimizing the *Kewang* (local natural resource management police/security guard) could open up possibilities for local people to provide data on the *Kehicap*. This could be explicitly linked to the forecast ‘ecotourism project’ in Huhua if the government allocates resources and civil society organizations coordinate their efforts to include *Kehicap* conservation as part of the initiative.

We identified the following trees surrounding area where the bird is usually seen: pohon Kenari-*Canarium (indicum or vulgare)*; pohon besi / Moluccan ironwood – *Intsia bijuga* ; pohon gopasa – *Fitex gopasus* ; pohon cengkeh (clove) - *Syzygium aromaticum*; *Coklat* (Cacao) and *Kelapa* (Coconut).



Figure 11. Looking for the Boano Monarch habitat in Boano island



Figure 12. We observed the kehicap on top of this limestone outcropping. It flew up the ridge to higher ground. Underneath this limestone outcropping is a fresh water spring and where people stop for breaks on their way to and from their *kebun*.

Further insights into *kayu putih* oil production on Boano

Kayu putih oil as the main commodity in Boano Utara is a product of the changing environmental condition that pushed the surrounding people to adapt and shift their production activities. Some elders in Boano Utara recalled that various kinds of vegetables could be grown on the island, even many gardens were reachable in a short walking- distance in the past. The unsustainable farming method, human settlement encroachment, and decreasing forest cover allegedly accelerated soil degradation. As the land became less fertile, producing *kayu putih* oil was seen as an opportunity to gain income used for the satisfaction of needs, such as payment for children's tuition fee, daily expenses, and food, which was mostly imported from the mainland Seram.

The discussion of resource management in the island of Boano should not overlook its customary *adat* law by which production area of *kayu putih* oil is managed. *Soas* (Clan groups or kin groups) have allocated all of their land to families under the respective *soa* for gardening and/or harvesting *Melaleuca* trees. The already fixed *adat* land ownership is inherited to children, and the area given is really dependent on the number of children in a household. It is unlikely for the younger generations that have established their own household to expand their land due to the unavailability of idle land. The shrinking area of production for future generations could also be translated to potentially lesser profit from *kayu putih* oil production. *Kayu putih's* ability in providing for people's needs in the future is threatened. Combined with the impending firewood scarcity and slow-adapting *adat* institution, the *kayu putih* oil production is heading towards uncertain future.

The future landscape scenario done by the youth group in Boano Utara also shows some uncertainty in their vision of *kayu putih's* future. They envisioned an industrialized *kayu putih* production, depicted with a production factory (written as "*pabrik penyulingan hutan kayu putih*" in the drawing in Figure 5), but mentioned that most of the *kayu putih* harvesting area will be removed to make way for roads, district offices, and modern settlements. What they choose when faced with alternative livelihoods will determine the future reality of *kayu putih* production. Some might maintain the lifestyle of a *kayu putih* producer, and/or some might want to shift away from that lifestyle.

Forestry activities in the North Seram

A ± 67.057 ha area to the North of Manusela National Park has been designated as the Wae Sapalewa KPH (Forest management Unit). A detailed management plan for the KPH was seen in the KPH office in Masohi and high quality maps were made available to TAB by the KPH office. The KPH occupies most of the land between the two northern arms of the national park and the sea. A narrow strip along the coast is excluded. The KPH has mostly been allocated for sustainable logging as a HPH (*Hak Pengusahaan Hutan* = Logging/Forestry Concession) – this covers 62,512 ha of the KPH (with *Hutan Produksi Terbatas* consist of ± 27.903 ha and *Hutan Produksi Tetap* with ± 34.609 ha). Around ± 56,258 ha has been given as a 30 year concession to the logging company Talisman Emas. Areas of the KPH adjacent to the logging concession near to the park boundaries have been identified as being of environmental importance and will not be logged. A small area (1200 ha) has been allocated as a community forest around the village of Melinani close to the town of Wahai. Small areas around the villages of Roho and Huaulu are marked on maps as enclaves within the KPH – presumably already identified as APL (*Areal Penggunaan Lain* or other land use) lands. Areas along the coast road between Sawai and Wahai are shown on the maps as HPK – Conversion forest.

The logging company has opened a road into the HPH at the Eastern extremity of its concession area – close to the national park boundary. This road penetrates at least as far as the village of Sorea in the heart of the HPH. Logging is active in the area. The road enables timber to be taken to a beach landing East of Wahai and also near to the national park boundary where we

observed logs being stored prior to shipment. A barge with several hundred logs was moored close inshore. There are no facilities for processing timber and we were informed that the logs were being taken to a plywood mill on Pulau Buru (the island west of Seram). The logs were of a diversity of hardwood species and mostly of intermediate diameter – 50 – 80 cms. The company is said to observe the requirement for leaving a 500 metre buffer zone along the national park boundary.

We learned that there are 3-4 KPH in East Seram and one in West Seram but as far as we could ascertain they are only in the early stages of operation. Inhutani has a HPH in West Seram. We were told of the award of a 192,000 ha forestry concession, apparently for a HTI (*Hutan Tanaman Industri* = industrial plantation), to Bob Hassan in the 1990s. The concession was cleared of forest but not planted and was later reclaimed by the government and some of the land was resettled by trans-migrants. We were not able to learn the present status of this land.

Industrial level activities in Seram

Seram is Indonesia's fourth biggest island and is sparsely populated. The ambitious infrastructure projects being pursued by the government with support from foreign investors are likely to make the island an attractive destination for investments. We are aware of four current investments:

- CITIC – Seram Energy Limited is a project supported by the China International Trust and Investment Corporation. CITIC is quoted on the Hong Kong stock exchange and is a large oil and gas development in *Kabupaten* Baru in East Seram. CITIC is a joint venture with Indonesia and is said to have Japanese and European partners.
- OLAM has acquired a 5000 ha cacao plantation in East Seram – close to the Manusela NP boundary. In spite of OLAM publicity of its work with smallholders and claims of CSR (Corporate Social Responsibility) activities we saw little evidence of this. Villagers in Melinani told us that they obtain daily paid jobs on the estate – which pay more than they can earn on their own farms – but have not received any help with cacao cultivation and are unable to sell their cacao to OLAM – they have to sell to dealers in Masohi.
- A prawn farm near Sawai has been operating for several years but has now closed because of disease problems. It has been acquired by a Chinese investor and is scheduled to re-open. It provides jobs for people from Sawai and supports CSR activities.
- Two blocks, totaling 30,000 ha of oil palm are being developed split between East and West Sawai. The processing mill is in the East.

Our attempts to engage these companies in dialogue have been unsuccessful.

Community Forestry in North Seram

We revisited the village of Melinani, 8 kms to the South of Wahai where, last year, we attended a field school to prepare the village for the establishment of a community forests HKm (*Hutan Ke-Masyarakatan*). Several senior people from the village were absent but we were able to interview the *SekDes* (village secretary) and several farmers who were participating in the HKm. It is important to note that Melinani is a dusun of Manusela village which is located on the southern side of Manusela NP. Melinani is much bigger than its parent village and appears to be quite progressive in its agricultural practices. Interviews with the *SekDes* and the farmers revealed that:

- The PSKL staff helping with the HKm have visited the village approximately once a month over the past year to offer advice.

- The main tangible contribution has been the provision of seedlings of nutmeg and cloves and we observed that these had been planted and were being well cared for in some *kebun* (gardens and agroforest gardens) within the HKM.
- The advisor on beekeeping who had been enthusiastically welcomed at the time of our last visit has not returned and honey production has been poor – the villages lack the skills to manage the hives. Many of the bees have left the hives.
- The villagers believe claims by the PSKL that tree planting will contribute to solving the water shortage problems of the village – springs are expected to flow more abundantly – however it appears unlikely that such a direct link between water yields and tree cover would exist and villager’s expectations may not be met. Similarly claims that tree cover might significantly lower temperatures seem to be optimistic.
- The villagers remained cautiously optimistic about their HKM but admitted that it has not yet delivered any tangible benefits. Most of the farmers also have *kebun* in areas outside the HKM. We walked through parts of the HKM and they appeared little changed from a year earlier.

4. Strategy for moving forward

In the period of July 2018 – September 2018 TAB has made progress on building commitment and cooperation among local, district and provincial level actors in the two landscapes of focus. The next step was intended to build coordination between these actors – ensuring that future interventions share a vision of sustainability in Boano and North Seram. In 2019 TAB planned to prioritize the following:

- Building an inventory for essential ecosystem proposals in Boano and North Seram. TAB will facilitate interactions between KEE (*Kawasan Ekosistem Essential*) and actors that may be able to provide necessary data. TAB intended to work with UNPATTI and other partners to identify knowledge gaps and explore opportunities for data collection.
- Convening a multi-stakeholder meeting in North Seram and West Seram. Relevant government and non government organizations would have been invited to the landscape to discuss sustainable development with communities.
- Developing communication material to share with communities and stakeholders on environmental values and sustainable practices in *Bahasa Indonesia*.
- Strengthening tourism potential. Sharing information with district tourism office and facilitating government programs to develop eco-tourism.
- Expanding the landscape: activities that take place in neighboring villages affect and are affected by activities in the focus landscapes. We intended to engage with neighboring villages, to determine synergies, opportunities and potential challenges of future interventions.
- Further engagement at local and provincial level to maintain commitment. Increased engagement in Masohi and Piru district to strengthen relationships with government bodies.

This work did not take place as TAB suspended and subsequently terminated all activities following a dispute with CEPF management.

Recognizing the limitations of an external agent in driving change in the landscapes, TAB operates as a ‘peripheral agent’. A peripheral agent orchestrates connections among the relevant organizations, to more effectively mobilize their engagement. This involves (1)

convening, by creating interorganizational arrangements that bring together different people and resources that affect local forest initiatives, (2) connecting, by creating indirect ties between actors to facilitate broad interaction among those people, and (3) facilitating interaction between organizations that continue beyond TAB's involvement. Our Theory of Change, below, describes how TAB intended to reach CEPF goals, including our strategy how we will operate in Maluku. **TAB will now proceed with this work independently of CEPF.**

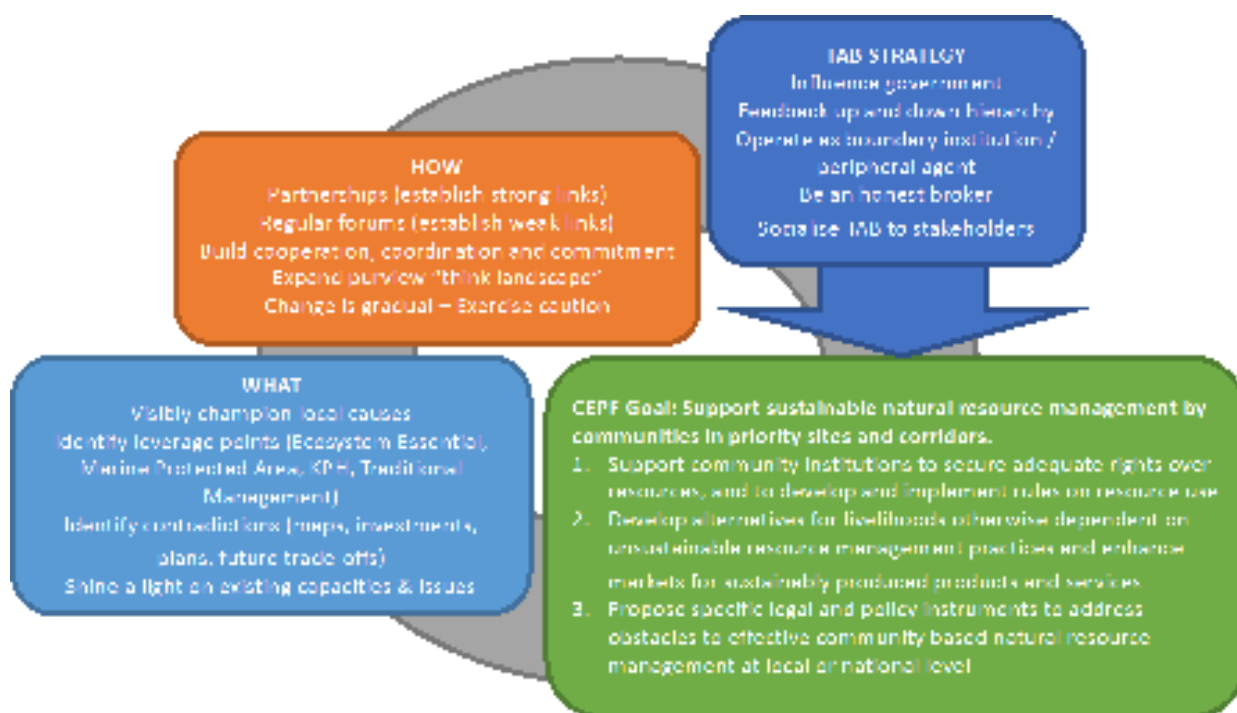


Figure 13. Theory of Change to reach CEPF goals

TAB has been participating in different events to raise awareness amongst many people from academia, government, NGOs and civil society on the issue of the importance of biodiversity and complex landscape condition and development pressure in Maluku. We have participated in a Science seminar organized by Indonesian Academy of Science and University of Indonesia in Jakarta about the importance of Seram and Boano island's biodiversity and the condition of local livelihoods. The goal of this participation is to have more interests from Jakarta on the Maluku situation which is similar to other parts of Indonesian small islands endemic species that are under threat by development pressure and the needs of sustainable livelihoods in small islands.

Another event that we participated in August 2018 is the World Ornithological Conference in Vancouver where several grantees of CEPF also attend the event and TAB organized a round table discussion on how sustainable landscapes and seascapes are critical for the survival of endemic birds in small islands in the tropics. Partnership with private sector (companies that operate in the region) and philanthropists (who would give funding for small targeted areas) are essential to influence the trajectories and development programs in these landscapes.



Figure 14. University of Indonesia and Indonesian Academy of Science Conference in Jakarta where TAB has presented the case of Seram Island's biodiversity and development pressure



Figure 15. TAB and CEPF co-organized a discussion on small island biodiversity at the World Ornithological Conference in Vancouver

CHAPTER 6. BUILDING RESOURCES AND CAPACITY FOR COLLABORATIVE NATURAL RESOURCES MANAGEMENT

1. Introduction

This report covers TAB activities during October to December 2018. During this period, TAB focused on building the knowledge and resources needed to implement future natural resource management strategies in Boano and North Seram.

Key activities include:

- (1) multi-stakeholder meeting on a strategy for a sustainable Boano,
- (2) analysing historical and land-cover trends to determine patterns of change,
- (3) continuing to build the knowledge inventory for the Essential Ecosystem (KEE=*Kawasan Ekosistem Essential*) proposal in Boano and North Seram,
- (4) developing an ecotourism guide for North Seram in collaboration with local communities and the National Park,
- (5) engagement with the wider landscape. This report provides an update on these activities and progress towards strengthening ridge to reef management in the Seram-Buru corridor.

2. Multi-stakeholder Meeting on the Strategy for Sustainable Boano

On 22 November 2018, TAB co-organised a meeting with LPPM (*Lembaga Partisipasi Pembangunan Masyarakat*) and Universitas Pattimura to discuss strategies for achieving sustainable development and conservation on Boano. In this meeting, the participants consisted of academics from Universitas Pattimura, representatives of NGOs working in Boano, and related government officials. Tanah Air Beta staff member Professor Agus Kastanya, facilitated the meeting and discussion. This meeting was the follow-up to prior meetings with local communities held in Boano Utara in July 2018, in which local aspirations and challenges were gathered and discussed. The participants divided into 4 focus groups to discuss priority areas for a sustainable Boano, which were water management and food security, forest management, marine management, and basic principles for a strategic planning and monitoring.

Based on the discussion it was decided that future strategic planning and monitoring will be based on the SDG framework and indicators, and will be consistent with the existing regional and national spatial plans. Traditional institutions and communities will be involved at the planning and monitoring stages as well as in promoting community participation and sustainability. It was recognized that there will be challenges from competing traditional and informal institutions. Another main concern was the increasing population pressure on terrestrial and marine ecosystems in Boano. All discussion groups considered ecotourism as a promising opportunity as it will increase employment opportunities and give the community an understanding of ecosystem services. LPPM and other related parties are also planning to design a more efficient and environmental-friendly Melaleuca oil still to reduce demand for fuel wood and prevent further deforestation.

LPPM, TAB and Pattimura University are working together on preparing a document that could be used as a strategic plan (RENSTRA) for the island of Boano and hopefully could influence decision makers in taking better decisions and to influence investors who might come and do business on Boano. There is an urgent need to get all stakeholders to think more of a sustainable development

pathway for the island. The draft of the strategic plan is being developed and will be subject to continuing discussion and adaptation by all stakeholders and especially with local government.

3. Exploring Ecotourism Opportunities

North Seram

Since August 2017 we have been supporting the villages of Masihulan and Sawai to expand their knowledge and capacity to develop ecotourism. Prior to TAB's presence in the landscape both villages have been exposed to tourism but perceive a lack of benefit to the village. Some members of Masihulan and Sawai have received support from NGOs including KKI – *Konservasi Kakatua Indonesia* (a CEPF grantee) to increase their capacity for ecotourism, and while there is growing interest among the community, there are still many barriers to overcome. There is also a need to be very realistic in expectations for short-term benefits to local people from ecotourism. Some well-meaning outsiders have raised unrealistic expectations for the potential of ecotourism. We have highlighted ecotourism opportunities and constraints in previous reports (1st and 5th Quarterly report). We are working with local communities to support their progress in developing ecotourism, but cautious not to raise high expectations that may not be realistic.

Currently, obstacles include;

- Local people do not see the benefit of protecting the natural environment for tourists
- Inequality – some people gain more than others from visitors
- Lack of visitors – North Seram is still relatively unknown, difficult to reach and expensive
- No data is kept on visitors – so we are unable to target interventions appropriately
- Expectations – local people may see ecotourism as a panacea for meeting natural resource management goals. It may not deliver on these expectations and further degradation of the environment may result.

TAB aims to gradually strengthen ecotourism in Sawai and Masihulan through collaboration with the Manusela National Park office, the ecotourism groups in Masihulan and a youth group in West Sawai. The National Park has recently responded to advice from TAB, built two bird watching towers inside the park, and organised a study tour for members of three villages (Masihulan, Sawai, and Saleman) to travel to Tangkoko Nature Reserve in North Sulawesi. The group learnt from community led activities in Tangkoko where ecotourism is well developed and where conditions are similar to North Seram. The Manusela National Park hopes to start charging visitors an entrance fee to the park to use the facilities. The Masihulan group have created homestays and the Sawai group have created a short track to a hut on the edge of the forest, overlooking the village and coastal area. TAB and WWF were invited to speak at a meeting in West Sawai to provide information on the value of maintaining biodiversity in the area. Approximately 25 villagers attended. The villagers requested continuing help in building their capacity. A discussion on biodiversity and conservation on land and marine areas were the center of interests for all participants. Understanding why Seram is an important region for migratory birds, numerous large marine mammals around the island and the uniqueness of the birds on the island were mentioned.



Figure 1: Walking track to hut built by youths in Sawai

TAB is currently finalizing two publications to support tourism in the North Seram. The first is a guide, written in English and targeted at international visitors that arrive in Sawai and Masihulan. The guide will be produced in partnership with the Manusela National Park and the local communities and will be available for homestays and resorts to provide to guests. The second publication is a laminated document containing images, latin names and local names of birds found in North Seram. Local guides will be able to use the document to support bird watching in the area. Both publications are at present under-review by villagers and the National Park office and will be finalized and distributed in 2019.



had significant positive effects on the peoples' incomes. The work by other environmental NGOs, identified the area in Valentine's strait near to Dusun (sub-village) Huhua as potential site for guesthouses, due to the calm (easy boat access) and picturesque seascape. USAid SEA project (Sustainable Ecosystems Advanced) surveys indicate that the underwater aesthetics – corals – are not likely to be a significant attraction for divers or snorkelers. But there remains potential to establish a guest-house base there for exploring reefs elsewhere around the island. This would allow people to also access the forests where the critically endangered Boano Monarch (local name *Kehicap* or *Symposiachrus boanensis*) can be easily seen. This set of attractions could be marketed as a ridge to reef package to intrepid environmental travelers or bird watchers that may be interested in diving, and vice versa. We are currently exploring the option of a learning exchange between potential tour-guides in Boano with Masihulan, to compare notes on tourism management systems.

We are wary of high expectations the people of Boano place on the contribution tourism might bring. The expectations have already led to the emergence of a new *adat* (customary) law requiring visitors that are looking for the *Kehicap*, the rare endemic bird on Boano, to pay a fee of 2 million Rupiah (~200 USD) to enter the area where the *Kehicap* can be seen, the forest area right behind Dusun (sub-village) Huhua. Additionally, one *Soa* (clan group) has planned on investing in the construction of houses where birdwatchers can stay overnight. We have begun discussions with the *Soa* elder and other relevant community stakeholders on the appropriateness of such a fee, and the kind of accommodation, and location that might be appropriate for incoming nature-based tourism. Currently, tourism in Boano still faces a number of obstacles, such as: (1) the lack of visitors and established tourism enabling networks; (2) the lack of appropriate accommodation for visitors, especially international visitors; (3) the lack of knowledge of the environmental values of interest to tourists; (4) inequitable benefit flows and potential conflicts that may arise between clan groups; and (5) unfounded expectations on the potential revenues from tourism.

To ease transport within Boano, the district-level government has planned to build roads. Contractors have begun clearing the vegetation to open unnecessarily wide roads across the island. The road currently cuts through protection forest (*Hutan Lindung*). No environmental impact studies were conducted. Currently there are no automobiles on the islands. There is also a larger ferry dock on the verge of opening for larger and increased ferry boat traffic. There are therefore variety of significant environmental changes on the near horizon for Boano. We think a holistic planning exercise that includes discussions with the range of stakeholders about the possible trade-offs is necessary for enabling sustainable development on the island. TAB has been working with various groups including the *Soas*, youth groups, and government departments to maintain discussions on the infrastructure-environment nexus. Additionally, TAB has been sharing lessons-learned from elsewhere to supplement the decision-making processes in Boano regarding tourism potential and processes. We have begun helping the local *Soa* strategize a way to adjust the pricing of the *Kehicap* habitat entrance fees so that they are not set so high that they are a deterrent to visitors. Currently the prices are so high that budget birders are no longer coming to visit the area. We have now persuaded the local people to reduce the price to 500,000 rupiah per group. The local people agreed that rent-seeking might be to blame, and that the original pricing was not justified. This illustrates how information-sharing among local institutions can lead to behavioural change.

We placed a survey team on Boano for 7 days and included a bird expert and a staff member of the BKSDA from Ambon in the team. The team camped behind Huhua and ground-truthed the different land-use types visible on sentinel imagery – the highest quality remote sensing imagery available. Two young men from Huhua accompanied and guided us through the island during our surveys. The conditions were very challenging as it was the height of the rainy season, and parts of the island are basins where sago swamps thrive, along with the thirsty cajuputih trees. We cultivated strong relationships with the guides, and they remained enthusiastic to learn about the surveying process and the value of the forests where we were interested in mapping the extent of the *Kehicap* habitat. The attitudes shown by these local guides were impressive and lead us to believe there is adequate human capacity for leadership in nature-based tourism. We aim to maintain relationships with the

young guides and work with them to build their tourism-relevant, nature-based knowledge.



Figure 3. TAB team and partners doing survey on Boano island

4. Spatial Analysis of priority areas

TAB took a major initiative in the fourth quarter of 2018 to exploit the remote sensing capacity at UBC. Four master's students volunteered to work with TAB staff to prepare improved maps of land cover in areas of focus for TAB on Boano and in north Seram. The objective is to determine drivers of change and explore scenarios for future landscapes for Boano and North Seram. The students have been able to access the newly available Sentinel images from the European satellite system, which are of much higher resolution and are more frequently available than the Landsat images that have been used for earlier maps. The spatial analysis will help identify past and current land use trends, identifying priority areas for intervention. The current focus of our spatial analysis includes;

- Mapping the habitat of the endemic Black Chinned Monarch (*Symposiachrus boanensis*) on Boano
- Mapping the historical change and extent of Melaleuca oil on Boano
- Mapping the historical change and extent of Oil Palm in North Seram
- Mapping the historical change and extent of arable agriculture (particularly rice) in North Seram

The spatial analysis for each of the four focus areas will be completed in early 2019 and maps will be made available to stakeholders as appropriate. We expect to share the results with UNPATTI, local NGOs and relevant government bodies, including the Department of Forestry office responsible for the Essential Ecosystem Area (*Kawasan Ekosistem Esensial*). TAB has now completed ground-truthing, verifying large portions of the coastal area of North Seram designated or in use for estate crops. Agroforestry gardens continue to be the dominant land use in TAB focus areas and these do provide habitat for numerous bird species along the border of the Manusela National Park. Using Landsat data we had previously been unable to distinguish between agroforestry gardens and natural forest, but ground-truthing indicates the national park is mostly intact forest and agroforestry is restricted to the coastal areas in North Seram. The transect along the coast suggested the most significant land use type is smallholder coconut plantations. Further analysis is required to determine the past and projected impact on the forest and biodiversity. Landsat images are still being used for North Seram

as they allow for a longtime-series. Land cover classification for Boano is now using Sentinel imagery. We anticipate using Sentinel imagery for North Seram in the near future.

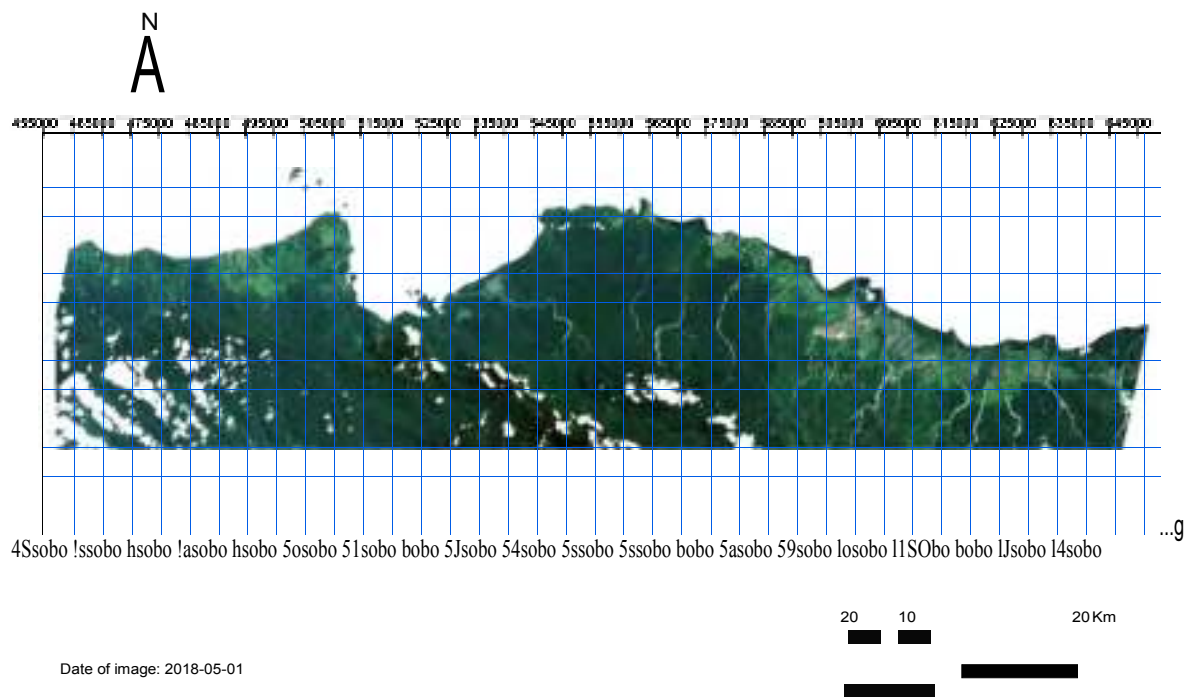


Figure 4. North Seram High resolution (Landsat) true color map May 2018



Figure 5. Boano medium resolution (Landsat) true color map August 2016

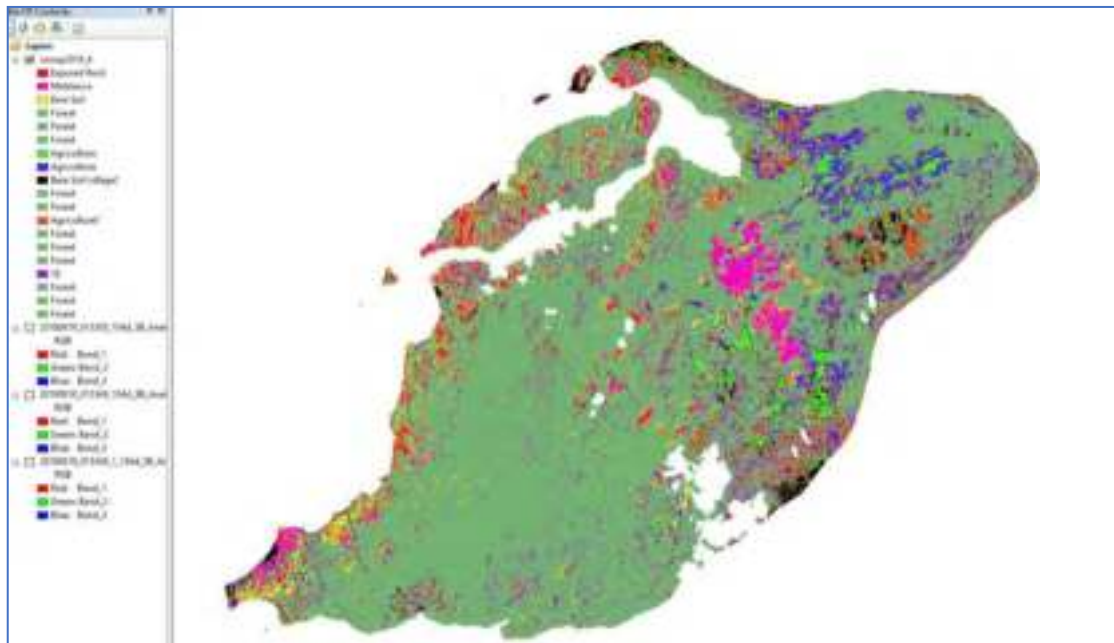


Figure 6. Boano unsupervised land cover classification 2018

5. Engagement with the wider landscape

Part of strengthening ridge to reef management includes understanding how the landscape affects and is affected by the wider region. TAB has delineated landscapes of focus as Boano and the central North coast of Seram, but both of these areas interact in multiple ways with the villages and environment surrounding them. During July 2018 – January 2019, TAB spent time along the west coast of Seram and strengthened connections in the wider region of North Seram. A summary of each region and implications for sustainable natural resource management is below.

Extended land and sea-scape surrounding Boano

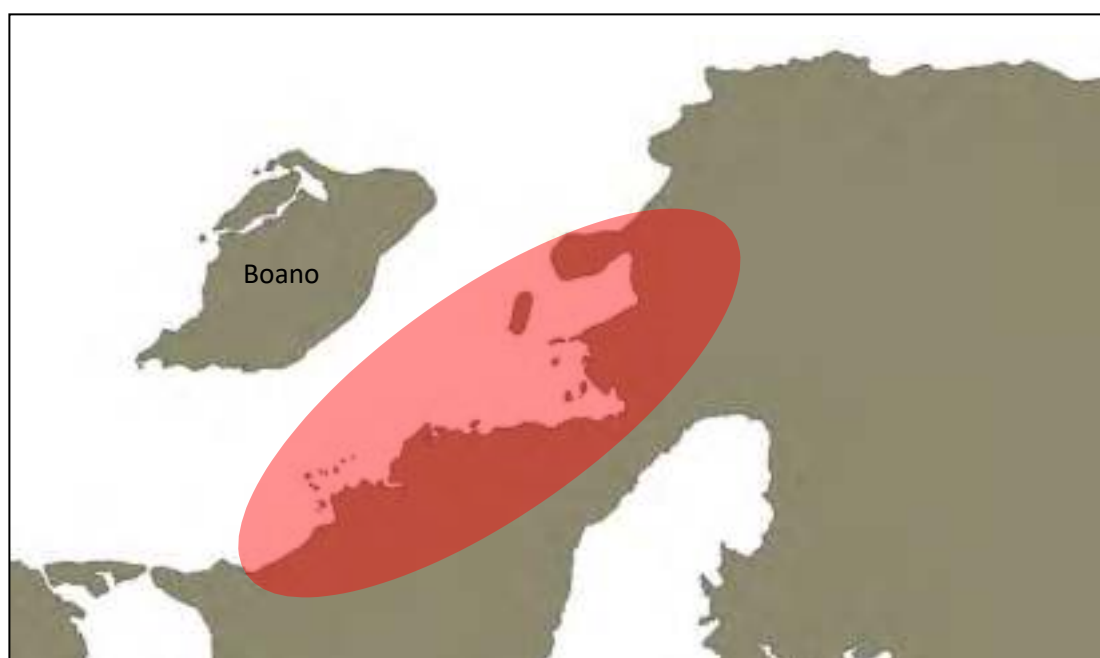


Figure 7. Extended landscape-seascape of West Seram

The ferry to Boano leaves from Pelita Jaya, a jetty in the village of Etty. South of Pelita Jaya is Osi, a small island connected to the mainland with a boardwalk made from timber harvested on Boano in 2006-2007. Osi is a sub-village of Etty, and consists of small community of mostly Butonese fishermen. As the population exceeds the space available on the island the government has made several attempts to relocate people from Osi, first in 1982. The first relocation failed, and families returned to the island. In 1987, households on Osi began to expand the island in 1987 using dead coral and concrete for construction. Some families have moved to nearby villages on mainland Seram. The tourism sector on Osi began to grow when the first guest house was built in 2010, followed by several other guesthouses in 2012.

Osi is a popular tourist destination for local Indonesians, with some restaurants (*warungs*) and accommodation existing in the village. Visitors are mostly local and come for the scenic views of the coastal area and mangroves, but Osi is also a popular bird watching location. Fishermen reported to be taking tourists to nearby islands for bird watching trips, including Boano, Kelang and Manipa island. The Butonese are traditionally skilled at fishing, which is the dominant livelihood on the island. In the past the fishermen hunted sharks, but due to government regulations they now catch pelagic fish to sell to buyers on the mainland. The most common fish caught is the *ikan teri* (anchovy). Fishermen commented that the next generation in Osi are better educated and unlikely to continue to fish. Instead they will get jobs in the nearby cities. The proximity of Osi to the mainland has allowed them to benefit from government infrastructure, including piped water and 24hr electricity. The road to Piru is in good condition, bringing fish buyers to the village and providing access to market and services for most households via motorbike. Villagers complained that Government support frequently did not match the needs of the people. The entrepreneurial nature of the local people appeared to compensate for any lack of government help.



Figure 8. Osi island

The coastal area of West Seram neighbouring Boano includes small organized settlements belonging to Etty village and Waesala village. The road connecting the settlements has been recently rehabilitation and is still under construction. The villages are surrounded by large fields of Melaleuca trees interspersed with agroforestry gardens. Melaleuca oil is produced from household stills similar to those on Boano. The price of Melaleuca oil in the villages in the western tip of Seram mainland is almost 40% higher than that of Boano. Better connectivity and a more efficient transportation

system with buyers in Buru could be plausible reasons of such difference in pricing. There is also a company owned large-scale producer, located in Kotania sub-village. Local growers sell leaves to the company for processing.

The extent of Melaleuca on the West coast of Seram raises important implications for Boano. Melaleuca trees appear to be planted in either production or conversion forest or on privately owned lands. Protection forest does not exist in the area and production is not in competition with other land uses. The proximity to markets and land accessibility means the production of Melaleuca is more advantageous on the mainland compared to Boano. The area is unlikely to attract tourists, although locals on Osi mentioned Kelang and Manipa island as possible bird watching destinations, accessible via boat and day trip only. It is possible the bird species that exist on Boano, including the endemic monarch could inhabit the small islands, further investigation is required. If this is the case, it may have implications for conservation activities and tourism.

Extended landscape in North Seram

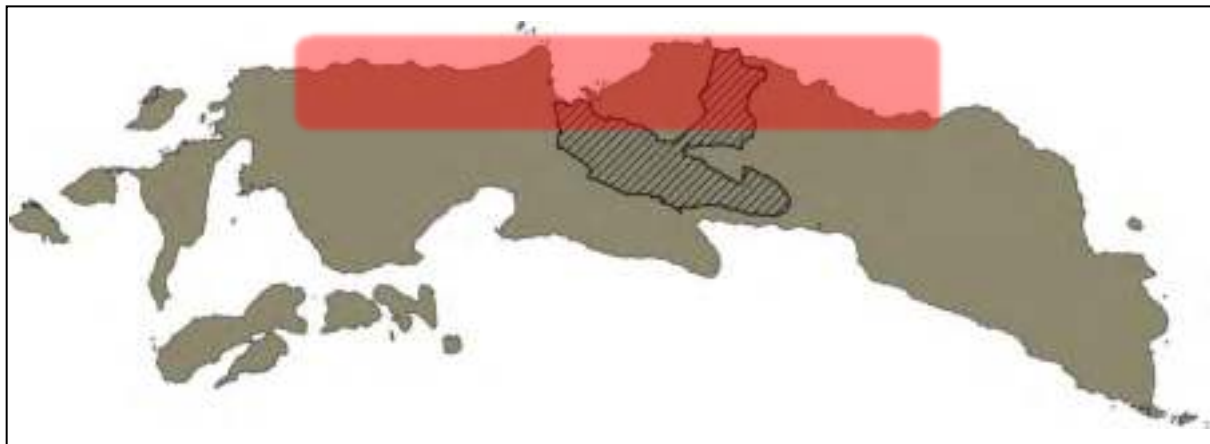


Figure 9. Extended landscape-seascape of North Seram

The coast of North Seram contains a variety of different land uses, including smallholder coconut plantations, estate crops including oil palm and cacao, and natural forest protected by Manusela National Park. The road connecting West Seram to Central Seram along the Northern Coast is in good condition between Osi and Taniwel and has been recently rehabilitated. The road continues until the SS road in the national park, but is of varying condition, mostly very poor. Some bridges have been recently built, there are two major rivers without bridges that cannot be crossed under heavy rain conditions. Between the SS road and Kobi (East of Wahai), the road is in good condition.

Almost the entire coastline has been cleared by smallholders for agro-forestry gardens, with the exception of the land inside Manusela National Park. Approaching Manusela from the west, oil palm plantations can be seen along the road and into the interior. The palms are young (3-4 years). There is no mill in the area so trucks must carry the fresh fruit bunches through the National Park to the mill owned by PT. Nusa Ina in Kobi. It seems likely that as the palms mature the company will build a mill closer to the plantation in SBB and if this happens it is inevitable that oil palm plantations will expand in the West. To the East of the National Park, the land use changes from dominantly agro-forestry to a combination of cacao, oil palm and agriculture. The cacao is owned by PT. Sumber Daya Wahana and OLAM. The cacao plantation appeared to be expanding, historical analysis of land cover change is needed to confirm if the land was previously forest or smallholder agriculture or simply degraded land. The oil palm mill is owned by PT. Nusa Ina. The mill was built in 2008 and the plantation is reportedly 6000ha, consisting of young and mature palms. The land is owned by locals but operated by the company, forming a plasma type scheme. Recent conflict between the company and the local community has been reported in the Maluku Post in 2017. Surrounding the oil palm and cacao are fields cleared for agriculture, some in use and others abandoned or left to regrow.

Most of the locals are transmigrants from Java, arriving in the area up to 35 years ago. The transmigrants grow rice and other agricultural crops and some are employed by the plantations.

The growing connectivity between North Seram and other parts of the island has important implications for sustainable development. The communities on the North coast are currently very remote and would benefit greatly from improved infrastructure such as electricity, water and health and education services that often follow road development. A by-product of this growth could be increased potential for tourism. Broad trends indicate that international and Indonesian tourists have increasing desire to visit new and remote parts of Indonesia. Seram is likely to benefit from this trend as accessibility increases if the natural landscape remains in good condition. It's possible that as estate crops become more lucrative, smallholders will convert coconut plantations to oil palm. This raises important issues regarding the social and environmental sustainability of the area, including whether local communities are culturally amenable to oil palm and whether this conversion would encroach on the forest estate. While these events are unlikely to unfold short term, it is important that decision makers involved in governing these changes are aware of potential future scenarios and carefully consider the desirable social, economic and environmental outcomes.

Focus villages in the mountains: Huaulu, Roho and Kenike

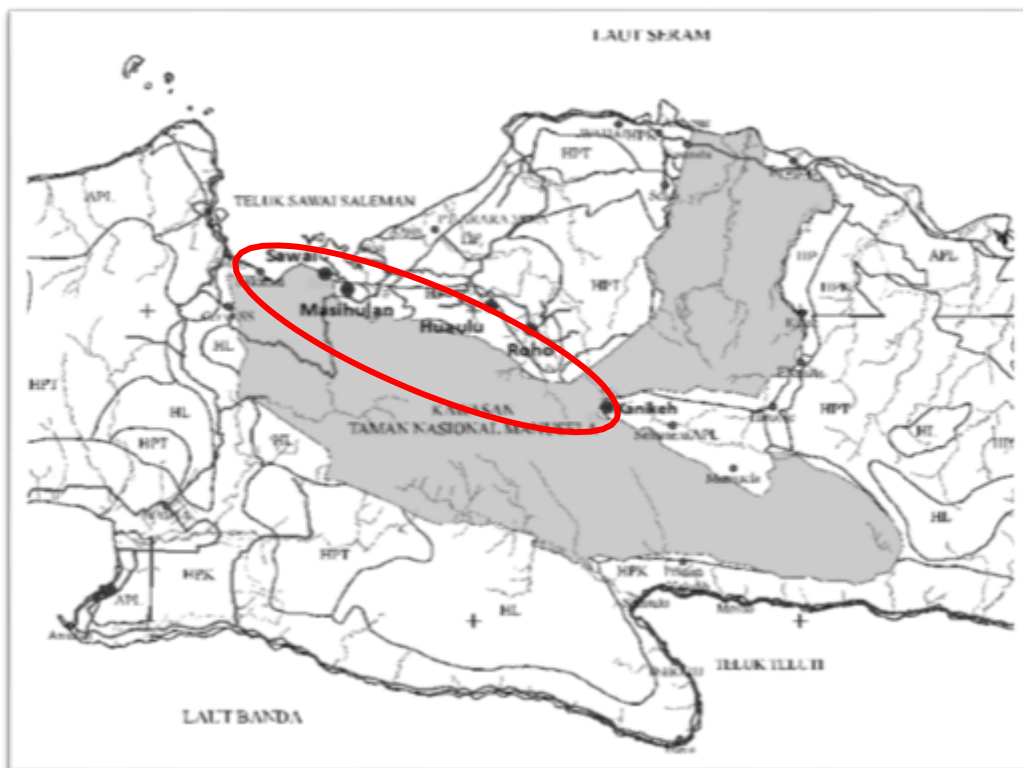


Figure 10. Villages in high mountains around Manusela National Park

Seram island has several villages in the highland within an enclave in the Manusela National Park. TAB visited the traditional *adat* village of Huaulu several times to better understand the condition and pressure of development into these remote villages where indigenous Seram communities live. TAB hopes that the proposed KEE (Ecosystem Essential Area) will include these villages that are very important part of the high biodiversity area around the National Park. Recent discussions with ministry of environment and forestry officials now suggest an alternative designation for these areas as *Kemitraan Konservasi* – and new category for conservation partnerships that may be more suitable for conditions on Seram than the KEE.

Access to these villages is not easy. Huaulu already has road access but the road is in bad condition and not really suitable for cars. Roho and Kenike are 1-2 days walk along the ridge and on the river

banks from Huaulu. The Raja of Huaulu (the head of the village and recognised as the king of the Huaulu community) is now living in the transmigrant village in Kilo 5, along the main Trans Seram road and there are some divisions between the communities on whether to embrace modernisation and development program or stay in the mountains and keep traditional ways of life with *adat* / customary law.

The Huaulu community still catch parrots to sell for income. They also sell fruits and during durian season, we can see all the durians for sale along the main Trans Seram highway. A preparation to receive tourist as part of ecotourism project by the government has shown some new building to receive them in the village and lamps using solar panels were installed along the center of the village. The elders are a bit concerned as government plans to promote traditional *adat* management of these mountain villages are not being discussed with the people who actually live there. We will hike to Roho and Kenike in our next visit as we couldn't do this during our last visit because of the rainy season and strong wind. More information will be gathered on our next fieldtrip.



Figure 11. Huaulu village



Figure 12. Purple naped parrot often seen in Huaulu – selling these protected parrots is a major source of income for the villagers

6. Bird Species List

Lists of birds that visitors can expect to see on Boano and in North Seram have been provided to local people who can use them in guiding visitors – Endemic birds are highlighted in green.

Boano (not including pelagic species):

Brahminy Kite	Wandering Whistling Duck
Glossy Swiftlet	Collared Kingfisher
Metalic Starling	Feral Dove
Pied Imperial Pigeon	Spotted Dove
Island Monarch	Eastern Yellow Wagtail
Mollucan Monarch	Lesser Frigatebird
Boano Paradise Kingfisher	Black Sunbird
Olive-backed Sunbird	Seram Flowerpecker
Claret-breasted Fruit Dove	Moustached Treeswift
Moluccan Brush Cuckoo	Seram Swiftlet
Superb Fruit Dove	Spotted Whistling Duck
Forsten's Scrubfowl	Pacific Swallow
Seram Fantail	Eurasian Tree Sparrow
Striated Heron	Grey-streaked Flycatcher
Boano Monarch	Bridled Tern
Osprey	Red-necked Phalarope
Pacific Reef Egret	

Roadside gardens and forests around Masihulan:

Amboina cuckoo dove	Seram spangled drongo
Superb fruit dove	Seram golden bulbul
Seram imperial pigeon	Long-crested mynah
Seram swiftlet	Moluccan starling
Pacific koel	Seram flowerpecker
Salmon-crested cockatoo	Black sunbird
Red lorry	Sahul sunbird
Coconut lorikeet	Seram boobook
Red-cheeked parrot	Moluccan scops-owl
Great-billed parrot	Cattle egret
Eclectus parrot	Lazuli kingfisher
Seram friarbird	Moluccan king parrot
Seram crow	

The mangroves and coastal areas around Sawai:

Eurasian whimbrel	Osprey
Bridled tern	Brahminy kite
Chinese crested tern – in Northern winter	White-bellied sea eagle
Lesser-crested tern	Sacred kingfisher
Black-naped tern	Seram friarbird
Pacific reef egret	Koel
Striated heron	

The lowerparts of the SS road in North Seram and the observation post at Km 8:

Blythe's hornbill	Seram leaf warbler
Amboina cuckoo dove	Seram friarbird
Salmon-crested cockatoo	Seram mountain pigeon
Streak-breasted fantail	Seram imperial pigeon
Moluccan monarch	Red Lori

Pulau Osi:

Asian Dowitcher	Tree swallow
Osprey	Great-billed heron
Pacific swallow	Little black cormorant
Common sandpiper	Eurasian whimbrel
Grey-tailed tattler	Reef heron
Barn swallow	Striated heron

CHAPTER 7. CONCLUSION AND RECOMMENDATIONS

There is a long history of attempts to achieve conservation goals through small grants to local NGOs and individuals in Indonesia and elsewhere in developing countries. The senior specialists of TAB have decades of experience in managing such grants. We are well aware of the difficulties of small grant programs and their high rate of failure. We therefore entered into our collaboration with the CEPF in the full realization of the difficult path ahead. Our caution aligned with the assessments of the “CEPF Ecosystem Profile” which concluded that local NGO capacity was weak in Wallacea and that in Molucca it was non-existent. Nonetheless, the extreme conservation value of the area and the potential to use some new approaches that our team had developed together with our prior association with some outstanding Moluccan conservation practitioners encouraged us to take on the challenge.

TAB has learned a lot from the work we have conducted with CEPF in Wallacea. Our specialists have published extensively for over three decades on the ways of nurturing local conservation action. We were heavily engaged in the production of the “Ecosystem Profile” which we still consider an outstanding piece of work. The “Ecosystem Profile” can provide guidance for all conservation practitioners in the region for many years to come. The “Ecosystem profile” gives an excellent diagnosis of the biophysical and social conditions and correctly defines the threats. It does not attempt to give any more than very general guidance on the way forward. We believe that there was a failure by CEPF to link the operational phase of the work in Wallacea with the diagnostic phase. There was no shared understanding of a “Theory of Change” amongst CEPF grantees and partners – it was very unclear how the small grants would build capacity or empower leadership to achieve conservation outcomes. The CEPF emphasis during the startup of the operational phase and throughout the Wallacea program has been on process with little attention to measuring progress. We have general observations on the overall performance of the CEPF in Wallacea:

1. An explicit theory of change (ToC) would have greatly strengthened the program. Many of the grantees had little understanding of the concept of critical ecosystems and no experience of dealing with conservation projects. The CEPF failed to provide leadership at this stage. ToC's do not need to be complex and elaborate. It is essential to give thought to the ultimate goals of conservation and to addressing the obstacles to reaching those goals.
2. Small grants alone to local organizations that do not have subject area competence have little chance of succeeding. It is important to link the grants to technical guidance and to ensure that there is a process of learning and adapting based on that learning.
3. CEPF did not believe in the value of the scientific work of TAB. However, it is clear that better science is essential to underpin the conservation work that CEPF is undertaking in Maluku.
4. Periodic meetings of grantees to review progress and learn from each other's experiences could have fostered a movement – a community of practice – that could have provided leadership across Wallacea.
5. We cannot ignore Government. We encountered many competent and willing people in the MOEF and local planning boards who had the potential to provide leadership and the authority to impose changes and CEPF should have engaged directly with relevant government departments. The senior staff of Manusela National Park are doing an excellent job and need to be recognized. The BAPEDA and Bupati's office in Piru have a good understanding of the dilemma on Pulau Boano and are probably the only people with the capacity to address the problems of the island.
6. We found a lot of sympathy for CEPF goals amongst the higher-level staff of the provincial government in Ambon – up to the level of the Governor – there was a need to exploit this opportunity.
7. Pattimura University provides a resource of competent professionals and is trusted by the authorities and by people on the ground – it was key to whatever success TAB achieved in

Maluku. Universities elsewhere in Wallacea are important stakeholders.

8. It will not be possible to solve many of the natural resource governance challenges in Wallacea through short-term projects – there is a need for continuous low-level support over long periods. CEPF needs to nurture local champions.

TAB consider that the most valuable contribution that we made during the period of our partnership with CEPF was in convening and facilitating several high-level stakeholder meetings.

We were disappointed that CEPF did not attend these meetings at a senior level. CEPF presence would have sent a strong signal to the authorities and to local stakeholders that these meetings important. We consider that there was an opportunity to create a movement to support ecosystem conservation in Wallacea and in our case in Maluku. There is a need for a social movement in support of conservation in the region.

The main determinants of the future of rural people in Wallacea will be investments in infrastructure, agro-industries, mining and forestry. These larger scale sources of economic growth and jobs will be more significant than marginal improvements to subsistence livelihoods. Decisions on these investments happen at a political level with minimal participation of communities. CEPF needs to encourage and mentor individuals and local NGOs who can engage with decision makers. The upgrading of the road through Manusela National Park and the installation of fiber optic communications will make the surroundings of Manusela attractive to settlers. The new road through the habitat of the Kehicap on Pulau Boano will greatly increase the threat to this unique bird.

The “Ecosystem profile” correctly identifies many threats to critical ecosystems in Wallacea. It underestimate the single greatest threat in North Seram and Pulau Boano. This threat is forest destruction by uncontrolled fire. Forest on steeply sloping land in areas with strongly seasonal climates are vulnerable to fires after even moderate disturbance. The frequency and level of disturbance through expansion of gardens and local logging activities is creating conditions where fires may begin to do major damage. During our fieldwork in 2018-2019, we encountered very few fires. Fire frequency throughout Indonesia was low in those years. We are now entering a drier period and the danger of significant ecosystem damage by fires will increase.

We caution CEPF against excessive reliance on “ecotourism”. Ecotourism yields only modest revenues to local people and elites tend to capture the revenues. Ecotourism will not be a significant contributor to local livelihoods. Ecotourism does raise awareness at local and provincial levels of the importance of critical ecosystems and this is its main value. Care is needed in attempts to promote ecotourism. Interventions by CEPF grantees to encourage ecotourism in the village of Masihulan on the border of Manusela NP may have done more harm than good. Attempts to get the entire village to engage with ecotourism have negatively influenced the two local entrepreneurs who had existing and successful ecotourism activities. People on the island of Boano are resentful of the fact that outside tour operators receive generous payments from visiting bird watchers but little money flows to the local economy.

TAB work over the past few years emphasizes the importance of ecosystem conservation in Seram. Pressures of development are mounting. Major changes will occur. There is a need for all parties to unite around a shared conservation roadmap for the island and to deploy their resources in a coherent and strategic fashion. CEPF funding of many small interventions may still be useful but only to the extent to which these small projects add up to a whole that is greater than the sum of the parts. A strategic overview and theory of change is essential and at present, the CEPF partnership lacks this.

Next steps

TAB will convene a meeting to address the conservation and development challenges facing Seram

and Boano in December 2019. We will collaborate in this with the Indonesian Academy of Sciences and we will invite a number of leading conservationists from Indonesia and overseas. The meeting will focus on landscape approaches and on the concept of “embedding science in working, biodiverse landscapes”. We will examine the opportunities and obstacles to the emergence of “small and medium forest enterprises” (SMFEs). With the right policies and incentives, SMFEs have the potential to provide an alternative to large industrial investments. The clove and nutmeg production in North Seram and the Cajuputi production on Pulau Boano both have potential to make more contributions to local livelihoods. Government programs to enable community forests (HKM), village forests (*Hutan Desa and Hutan Adat*) and potentially the use of the concept of critical ecosystems (*Kawasan Ekosistem Esensial -KEE*) all need to be debated as potential elements in working, biodiverse landscapes.

We intend to work with local researchers to publish scientific papers on our work in Seram and Boano. We are examining the possibility of a special issue of a journal to bring together the work that we have done over the past three years. We are also considering preparing a book on Seram and Boano to follow on the 1993 book – “The Natural History of Seram” (Edwards, Macdonald et al. 1993) which brought together the results of Operation Raleigh expeditions to Seram in 1986-87.

As an organization consisting of professionals with commitments outside of Seram, we recognize our limitations in facilitating actions at the village level. While we valued our engagement and time spent in the village, our strength came from our ability to convene high-level meeting and attract national and international attention. Our close partnership with CEPF grant recipient LPPM on Boano Island demonstrated the benefits of this model. Without a strong partner in North Seram, we were unable to have the same impact. There is potential to develop this model further, especially with international researchers interested in contributing to long-term efforts for improved natural resource management. TAB intends to stay engaged in Wallacea to facilitate a network of research practitioners seeking to support sustainable landscapes.

REFERENCE:

Edwards, I. D., A. A. Macdonald and J. Proctor (1993). Natural history of Seram, Intercept Ltd.

SOME PHOTOS FROM THE LANDSCAPES



Figure 13. Some birds endemic to the Moluccas that can be found in Masihulan



Figure 14. TAB presenting in the HKM field school organized by MoEF and UNPATTI



Figure 15. TAB participating in HKM field school activities (with communities and local government)



Figure 16. TAB participating in HKM field school activities (using drone to understand boundaries)



Figure 17. Learning about apiculture as alternative income for villagers with community forests



Figure 18. Sawai village depends upon capture fisheries



Figure 19. Manusela National Park Office in Masohi



Figure 20. Meeting with head of UNPATTI Forestry Graduate Program, head of BAPPEDA Maluku, head of Social Forestry of MoEF and Deputy Director of Climate Change Adaptation of MoEF

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**Tingtingyeh, Rumah Tanah Air Beta, Banjar Bendul,
Wongaya Gede, Batu Karu, Tabanan, BALI**
e-mail: intu@tanahairbeta.org