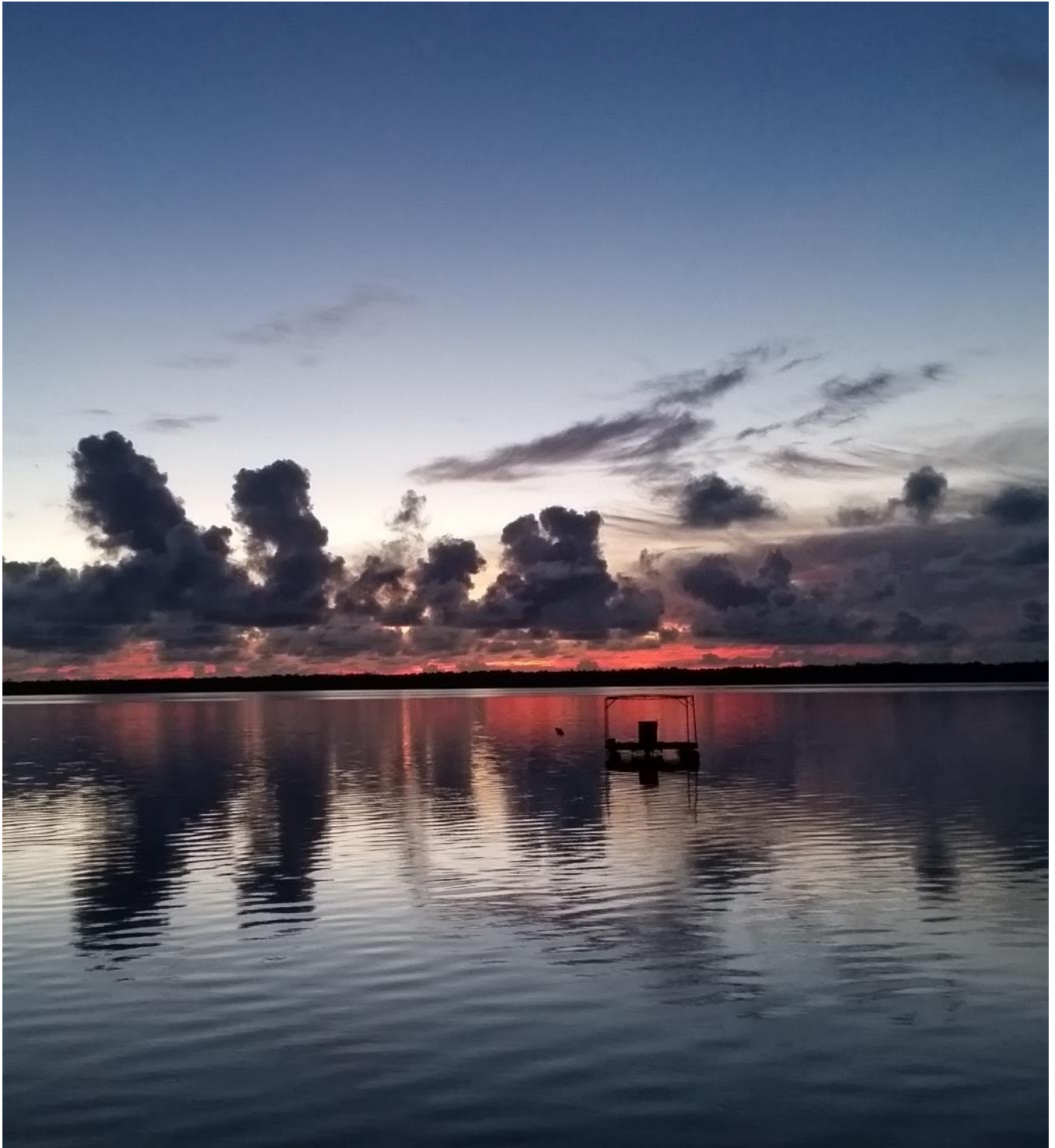


Namdrik Atoll Resources Management Plan



Resources Management Plan for

Namdrik Atoll

Prepared by:

**The People of Namdrik Atoll with
Assistance from MIMRA**

and

Support from CMAC

Acknowledgements

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This work and the ongoing efforts to sustainably and productively manage Namdrik Atoll's natural resources would not have been possible without the generous financial assistance of several organizations. Funding from UNDP/GEF-SGP, MIMRA and Seacology supported initial work towards the development of this plan and the Marine Protected Area at Namdrik. In addition, generous support from USAID through the Pacific-American Climate Fund has been vital to the completion of this plan and to the ongoing adaptation to climate change and development of the Namdrik pearl farming project.



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Glossary

CMAC – Coastal Management Advisory Council

CMI – College of the Marshall Islands

MERIP – Marine and Environmental Research Institute of Pohnpei

MICS – Marshall Islands Conservation Society

MIMRA – Marshall Islands Marine Resources Authority

NALGC – Namdrik Atoll Local Government Council

NALRC – Namdrik Atoll Local Resources Committee

OEPPC – Office of Environmental Planning and Policy Coordination

OFCF – Overseas Fisheries Cooperative of Japan

RAMSAR – The Convention on Wetlands, called the Ramsar Convention

RMI – Republic of the Marshall Islands

RMIEPA – RMI Environmental Protection Agency

SPC – Secretariat of the Pacific Community

SPREP – The Secretariat of the Pacific Regional Environment Programme

UHH-PACRC – University of Hawaii Hilo – Pacific Aquaculture and Coastal Resources Center



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Table of Contents

1. Vision.....	6
2. Background.....	6
3. Status of the terrestrial and marine resources.....	7
4. Preparation of the Resources Management Plan.....	10
5. Objectives & Actions.....	10
5.1 Fisheries	
5.2 Agriculture/Forestry	
5.3 Solid Waste Management	
5.4 Freshwater/Water Lens Management	
5.5 Climate Change Adaptation	
5.6 Sustainable Economic Development	
6. Strategy to achieve the objectives and actions (required by law).....	13
6.1 Responsibilities of the Namdrik community	
6.2 Responsibilities of MIMRA/CMAC	
7. Management area.....	15
8. Establishment of Local Resources Committee.....	15
8.1 Representatives of the committee	
8.2 Responsibilities of the committee	
9. Institutional arrangement and relation to MIMRA and CMAC.....	17
10. Monitoring and Evaluation Plan.....	18
11. Conclusion.....	18
Appendices.....	19

1. Vision

Namdrik Atoll ewamourur im aibojoj. Armij ro ie elap aer limotak kin emman kein rej walok im menin jeramon ko joleti jen Anij, ej komman bwe aelon in Namdrik en kanal tok development (jermal in wonmanlok) ko im opportunity (kotobar) ko nan lelonlok jokkin mour im kokajur lok mejatoto in KUMIT ak jermal in ibben dron eo an ri Namdrik otemjij. Ibben dron eo rainin im jermal ko rainin ikotan, ritel ro ilo Mani local government eo, im armij in Namdrik enaj keboj Namdrik kin melele im plan ko im renaj jiban kekor ro driktak in Namdrik jen joraan ko rellap rej walok jen ukotak in mejatoto iliju im jeklaj. Kotobar kein renaj dim im ben elane wawein letoletak ennan enaj emman lok ikotan ro rej jerbale kotobar kein ilo aer kokmanmanilok ilo wawein ko rejimwe im jejjet nan ro nejid im jibud tokelik, “NAMDRIK ALELE EO DREBBI”.

Rough Translation:

“A lush and beautiful Namdrik Atoll. The people in the “NAMDRIK ALELE” frame of mind to entice development and opportunities to improve the way of life and the spirit of togetherness for the people of Namdrik. Working together today to prepare Namdrik from the effects of climate change tomorrow, for the benefit of the whole community towards the future generation.”

2. Background

Namdrik Atoll is situated in the Ralik Chain in the southwestern Marshall Islands. The atoll consists of only two islands, Namdrik and Madmad with the main community situated on the southwestern part of Namdrik Island where a water lens exists. The community relies on marine resources for sustenance and some income generation but the main source of income is copra production and handicraft sales to the main centers of Kwajalein and Majuro. In 2007, Namdrik was chosen to be part of MIMRA and OFCF’s catch data project to indicate fisheries catch per unit effort with communities in the Marshall Islands. In the same year, Namdrik Atoll was initially identified for marine and socio-economic assessment under the PROCFISH project with the Secretary of the Pacific Community (SPC). However due to logistical difficulty, the survey never took place.

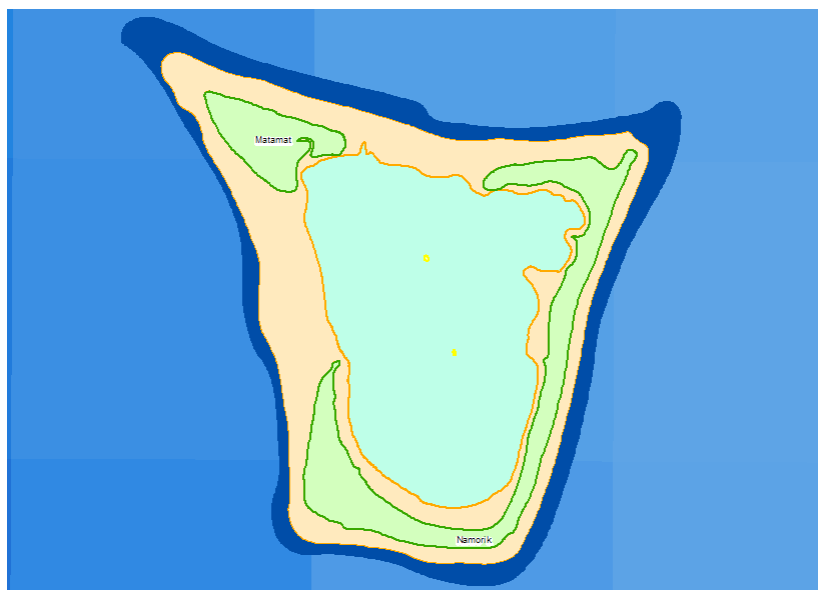


Figure 1. Namdrik atoll

In 2008, the leadership in Namdrik requested a community-based resource management project under the Marshall Islands Marine Resources Authority (MIMRA) and other partners in the Coastal Management Advisory Council (CMAC) such as the College of the Marshall Islands (CMI) and the Marshall Islands Conservation Society (MICS). In response to this request, MIMRA and other partners assisted Namdrik's effort to re-activate the pearl project and helped connect other partners such as the Pacific Aquaculture and Coastal Resources Center (PACRC) at the University of Hawaii Hilo, the Marine & Environmental Research Institute of Pohnpei (MERIP), and MIMRA's Pearl Hatchery project. As alternative income generation through aquaculture and other sustainable utilization of marine resources are identified as important components for any community in establishing conservation areas, this was viewed as a critical step in the overall process. Hence, support to reactivate the community's pearl project (led by the local leadership through a UNDP/GEF-NZ Aid Small Grants Program) was committed from CMAC partners. Additionally, the MICS installed a high frequency two-way radio in the community to assist coordination of conservation efforts, including solid waste management. In addition, RMI-Environmental Protection Agency (EPA) has been working with the Namdrik community in establishing the whole atoll as a RAMSAR Wetlands Area site (in partnership with Secretariat of the Pacific Regional Environmental Programme or SPREP) for sustainable use.

3. Status of the marine and terrestrial resources

Due to a lack of recent studies and information current trends in fishery and terrestrial resources on Namdrik are unknown. Information necessary for fishery management such as status of fisheries catches, landings, consumption and biological and ecological features of the resources are unknown at the present time. Collecting this information is necessary in order to understand the resource conditions to allow for management of natural resources.

Despite this lack of information, it is important to take steps to ensure the sustainability of fisheries and terrestrial resources in Namdrik atoll in order to prevent their decline. As a result all relevant stakeholders including the RMI national government, the Namdrik atoll local government and



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members of the community will cooperate in establishing the Resources Management Plan in order to conserve and manage the atoll's precious resources to ensure that these resources can be harvested at the maximum sustainable yield while ensuring their availability to future generations.

The Namdrik Atoll Local Government has a mandate to manage and protect marine resources within its 5-mile jurisdiction (MIMRA Act, 1997).

The Iroij, Leiroij, Alaps and dri-

jerbal play in important role in advising the Local Council on issues related to economic and social development and the well-being of the community residents. The Mayor of Namdrik also works to improve the standard of living of the Namdrik community. With strong commitments from its Senator and other leaders, Namdrik Atoll has been proactive in seeking to effectively manage its marine and terrestrial resources and implement measures to adapt to the impending effects of climate change.

With a lagoon area of only 3.25 square miles, Namdrik Atoll is quite small compared to other atolls in the Republic. Community members rely on their marine resources for daily subsistence living and limited income generation but the population of 508 (2011 Census) places significant pressure on these resources. In preliminary assessments some of the main issues and threats to marine and terrestrial resources identified by the residents and council include:

1. Solid & human waste;
2. Declining reef fisheries sizes and catches;
3. Coastal erosion & crop diseases;
4. Uncontrolled disposal of hazardous waste materials (used car batteries);
5. New seaweeds and grasses;
6. Other threats to mangroves;
7. Flooding; and
8. Changes/Shift in Seasons

During the initiation visit the CMAC team was able to meet with different stakeholders and community members and raise awareness through PowerPoint presentations and discussions. At a meeting with the Local Council the team was able to present the Reimaanlok Planning Process and discuss marine management and conservation issues in PowerPoint format. During this meeting the Council and Local Government demonstrated a high level of interest in marine resource management and raised several concerns. These included the disposal of human and animal waste into the lagoon and the dumping of hazardous materials such as car batteries on land and in the lagoon. They also highlighted the issue of overfishing due to the use of efficient fishing gear (e.g. night spear fishing and catching flying fish using torches instead of traditional methods). Threats to the mangrove sites on the main island and on Madmad were also raised.

More presentations on MPAs, marine managed areas, the Micronesia Challenge and solid waste were also included during PowerPoint presentations with the general community. The number of community members that turned up during the PowerPoint presentations was very impressive considering the length that some locals had to travel to get to the presentation site. Fish and management posters were issued to the main community center, the school and the health center.

During the trip, two different types of assessment were done with community members. The baseline catch data household survey was conducted with more than 20 households (over 10 % of all households), while the baseline socio-economic assessment was done with more than 30 (over 15% of households). Preliminary analysis was done by the team and then reported back to the Local Council.



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Results indicate that the main source of income in the community is copra production, with fisheries providing a secondary source. Locals utilize their coastal waters for fishing, food preparation, recreational purposes and other activities. Survey results also indicate several fishing methods in both the lagoon and ocean, most of which exist in other parts of the Marshall Islands. Fishing efforts are lower than on other islands because of the time spent on copra making. The locals feel that pollution from human and animal waste and hazardous waste is one of the main

threats to their lagoon and coastal waters. Certain fishermen and community members also identified soil erosion and other changes in the marine environment. Finally, the Council was quite worried that declining water quality would be a major threat to their aspiration of creating an economically viable pearl farming industry. Production of high quality pearls requires clean, clear water. Pearl farming can also help improve water quality since pearl oysters remove algae and sediments by filtering the water.

Site visits were made to Madmad mangrove site, which includes areas of cultural and biological significance. It has been recognized that a "new" mangrove species has populated and is slowly taking over a previously open site on Madmad Island. It is a concern since the mangroves are restricting access to the location of an important *bwebwenato*. However, the community has also recognized that the mangrove species is providing shelter for brackish species and may be increasing life in the area. The locals call this "new" mangrove *eoek*. Furthermore, the locals believe that this species washed ashore and has been constantly overtaking the swamps from the native mangrove species, *jon* and *bulabol*. One of the main issues with this species is that the roots are on the surface of the swamp, which makes it difficult for locals to cross the mangrove swamps. Some unique marine animals that are known by the locals to inhabit the swamps include *kirinbo*, *lobrak* and the *drijin* (mantis shrimp) that are found more on the sandy beaches at the lagoon side.

4. Preparation of the Resources Management Plan

The Resources Management Plan was developed from the results of the series of four weeklong community workshops carried out in Namdrik. Community workshops involved all sectors of the community including men, women, youth, and local and traditional leaders. Workshops conducted separately and independently by each sector provided useful information on problems that exist in the marine environment and the various factors that caused them. Workshops also provided information on the effect of these problems on the Namdrik Atoll community and its marine environment, and possible ways to minimize the causes. It was clear from the results of the community workshops that lack of fish in the lagoon of Namdrik atoll constitutes the key problem to the Namdrik community. The plan was drafted by the selected representatives from each sector and was presented before the Local Council for endorsement. The resource management plan for Namdrik has now placed obligations on the Namdrik community to implement management actions (undertakings) to help in the management of its environment including both marine and terrestrial resources. The plan also offers technical services and advice from MIMRA's Coastal Fisheries Division in order to support the fisheries section of the plan; technical services and advice required from the Ministry of Resources and Development's Agriculture Division to support the agriculture section of the plan; technical services and advice required from the RMI-EPA to support the solid waste management and water lens management sections of the plan; and technical services and advice required from the RMI Office of Environmental Planning and Policy Coordination (OEPPC) to support the climate change section of the plan.

5. Objectives

The objectives of the plan are as follows:

5.1 Fisheries

5.1.1 Development for Fisheries

Manage the fisheries to provide a livelihood for and ensure maximum economic benefit to Namdrik atoll communities and ensure a stable food supply for local and outside consumers.

5.1.2 Fishery resources sustainable use

Realize sustainable use of fisheries resources in Namdrik Atoll.

5.1.3 Conservation of marine environment

Conserve the marine environment in Namdrik Atoll.

5.1.4 Ensure fishermen and local government's accountability to fisheries

Define obligations and rights of Namdrik community residents and duties and powers of the Local Government in order to ensure implementation of fisheries management and to achieve the above objectives.

5.2 Agriculture/Forestry

5.2.1 Development for Agriculture/Forestry

Develop agriculture to stabilize livelihoods of the communities, maximize economic benefits to Namdrik Atoll community and realize stable supply for consumers within and outside of Namdrik Atoll.

5.2.2 Land resources sustainable use

Realize sustainable use of land resources towards agriculture/forestry on Namdrik Atoll.

5.2.3 Conservation of terrestrial environment

Conserve the terrestrial environment of the Namdrik Atoll land area.

5.2.4 Ensure community and local government's accountability to agriculture

Define obligations and rights of Namdrik community residents, and duties and powers of the Local Government in order to ensure implementation of terrestrial management and to achieve the above objectives.

5.3 Solid Waste Management

5.3.1 Development for Solid Waste Management

Develop a solid waste management plan for the Namdrik community to reduce pollution especially in the lagoon area and provide for proper disposal of hazardous waste.

5.3.2 Land resources sustainable use

Develop sustainable use of land resources for solid waste management on Namdrik Atoll.

5.3.3 Conservation of environment

Conserve the marine and terrestrial environment in the Namdrik Atoll area.

5.3.4 Ensure community and local government's accountability to solid waste

Define obligations and rights of Namdrik community residents and duties and powers of the Local Government in order to ensure implementation of solid waste management and to achieve the above objectives.

5.4 Water Lens Management

5.4.1 Development for Water Lens Management

Develop a Water Lens Management Plan for the conservation and sustainable use of the freshwater lens on Namdrik.

5.4.2 Freshwater resources sustainable use

Realize sustainable use of freshwater and water lens resources on Namdrik Atoll.

5.4.3 Conservation of freshwater/water lens

Conserve freshwater and the water lens environment on Namdrik Atoll.

5.4.4 Ensure community and local government's accountability to freshwater and water lens

Define obligations and rights of Namdrik community residents and duties and powers of the Local Government in order to ensure implementation of freshwater/water lens management and to achieve the above objectives.

5.5 Climate Change Adaptation

5.5.1 Conduct awareness campaigns to the Namdrik Community regarding the impact of climate change and sea level rise and potential impact on low lying coastal communities by 2011.

5.5.2. Implement measures/best practices on moving sand and aggregate to slow the rate of coastal erosion on Namdrik by 2013.

5.5.3 Build resilience and ensure that the Namdrik Community is able to better adapt to sea level rise and the effects of Climate Change.

5.6 Sustainable Economic Development

- 5.6.1 Develop bylaws for a community owned and managed pearl farm.
- 5.6.2 Develop Best Management Practices for the pearl farm to protect the environment and make pearl farming economically feasible.
- 5.6.3 Draft rules to make the pearl farming area a no-take zone. (A no-take zone was declared around the pearl farm in 2014).
- 5.6.4 Capacity building to make pearl farming environmentally sustainable, resilient to climate change impacts and economically viable.

6. Strategy to achieve the objectives (required by law)

6.1 Responsibilities of the Namdrik community

In order to achieve the objectives of its plan, the Namdrik community is committed to carry out the following responsibilities:

- i) Establishment of aquaculture for important fishery resources namely 1) Black-lipped Pearl Oyster (*di* or *Pinctada margaritifera*), 2) sea cucumbers (*Jibenben* or *Holothuria* species and like species), 3) Mangrove crabs.
- ii) Make rules to use the pearl farming as a no-take area. (This was completed in 2014).
- iii) Establishment of agriculture for important terrestrial resources namely 1) Taro, 2) Bananas, 3) Sweet potatoes, other species for consideration.
- iv) Ban the use of destructive fishing practices such as 1) Clorox or bleach, 2) chemicals, 3) scuba diving gear, 4) other chemicals that contain poison and 5) breaking off of reef and corals.
- v) Closed seasons will be introduced for the harvest of 1) (insert fish name here), 2.) Mangrove Crabs, 3.) Sea cucumbers, etc.
- vi) Introduce licensing fees to foreigners who wish to fish waters of Namdrik Atoll.
- vii) Introduce closures on certain breeding sites during spawning seasons of important fish to allow them to breed. Notifications on banning of fishing and other activities shall be made before the breeding seasons.
- viii) Ban of lobster fishing within one-year period.

- ix) Conservation Areas designated by the community: to be confirmed after a marine assessment.
- x) Implement quarantine procedures to prevent influx of invasive species and diseases to local crops.
- xi) Provision of data and information as requested by MIMRA through filling of questionnaires.
- xii) Develop Resource Management Ordinances to legally bind the ban on destructive fishing practices, seasonal closures as stated above, licensing conditions and fees, and quarantine measures.
- xiii) Shoreline replanting on lagoon and ocean side, identify best places to take sand and aggregates, and work together to identify best practices/designs/etc. for seawalls.
- xiv) Implement best practices/designs to lessen impacts of floods.
- xv) The Local Resources Committee (LRC) will advise on best practices to mitigate impacts on flood areas and the best ways to address flooding and impacts.
- xvi) The Local Resources Committee (LRC) will review the plan and Resources Management Ordinances every two years or when required by the Namdrik community.

6.2 Responsibilities of CMAC

In order to support the Namdrik community/LRC in its attempt to manage and develop its marine environment and marine resources through its Resources Management Plan, the Marshall Island Marine Resources Authority and interested partners have agreed to provide the following support:

- i) Provide technical and scientific advice and training on the development of aquaculture for black-lipped pearl oysters. Support has been provided by multiple entities to obtain funds for improving pearl farming and linking it to climate change adaptation.
- ii) Provide technical and legal advice on the preparation of Fisheries Management Ordinances on destructive fishing practices and seasonal closures on breeding sites for important marine species of Namdrik.
- iii) Provide technical and scientific advice and training on the development of agriculture for important food crops.
- iv) Provide technical and legal advice on the preparation of Resource Management Ordinances on proper quarantine actions to protect important crop species on Namdrik.
- v) Conduct base-line surveys on marine resources in waters around Namdrik, provide a report on the survey and run community workshops to explain results and the state of marine resources

in waters around Namdrik Atoll.

- vi) Conduct base-line surveys on terrestrial resources of Namdrik, provide a report on the survey and run community workshops to explain results and the state of terrestrial resources of Namdrik Atoll.
- vii) Conduct socioeconomic survey to ascertain the importance of fishery resources to the people of Namdrik, provide a report and run community workshops to explain results and the situation in Namdrik.
- viii) Conduct routine surveys and training of local community members to survey the Marine Reserve/MPA and terrestrial resources to determine their progress and provide information to the Local Resources Committee and the community.
- ix) Develop marine and terrestrial resource awareness materials to advise the Namdrik community on the importance of proper management and conservation of its atoll resources and environment through running community workshops, radio, local newspaper and TV advertisement and provision of information sheets.
- x) Conduct a vulnerability assessment for coastal communities on the impact of sea level rise.
- xi) Conduct awareness programs on the impacts of flood areas and to make a contingency response plan for the community.
- xii) Secure training on the impacts of the sea level rise and rising water lens and impacts on low lying areas

7. Management area

The Resources Management Plan of Namdrik community will cover the whole lagoon of Namdrik Atoll, its landmass, and its reefs, and will extend to 5 miles seaward from the baseline from which the territorial sea is measured. All fishing, agriculture, management and development activities carried out in the above-prescribed area are subject to conditions and matters directed under the plan. The exploitation of fish, shellfish, plants, animals and any atoll resource within the management area are also covered under the plan.

8. Establishment of Local Resources Committee

The community of Namdrik has established a Local Resources Committee (LRC) to manage and oversee the operation of the plan.

8.1 Representatives of the committee

The Namdrik community has established a Local Resources Committee that is comprised of:

- 2 representatives from the women's group
- 1 representative from the Lijabkanira group
- 1 representative from the Wutkajdo group
- 2 representatives from men's groups
- 3 representatives from the Namdrik Council/Alabs group
- Mayor or designee
- 1 representative from the youth group
- 1 representative from the teachers' group
- 1 representative from the pearl farm

8.2 Responsibilities of the committee

The committee will be responsible for the overall administration and operation of the Namdrik Resources Management Plan. Its specific tasks include:

- i) Develop an annual work-plan to guide the yearly implementation of activities under the plan and achieve its objectives.
- ii) Ensure that the responsibilities of the community under the plan are properly carried out and completed in a timely manner.
- iii) Work closely with MIMRA and CMAC partners and follow up with MIMRA's and CMAC's obligations so that they are carried out in a timely manner.
- iv) Report the progress on the development of the Resources Management Plan to the community and Namdrik Government Council from time to time, or as required.
- v) Arrange and organize community workshops and gatherings as required under the responsibilities of both the community and MIMRA/CMAC.
- vi) Represent the interests of the Namdrik community in national and regional gatherings in matters concerning marine environment and fishery resources.
- vii) With assistance from MIMRA, initiate and establish processes that lead to the formulation and approval of Fisheries Management Ordinances as required under the Fisheries Management Plan and Section 50 of the Marine Resource Act 1997.
- viii) With assistance from MIMRA, determine conditions and licensing fees for consideration and approval of the Local Government Council.

9. Institutional arrangement and relation to MIMRA and NALRC

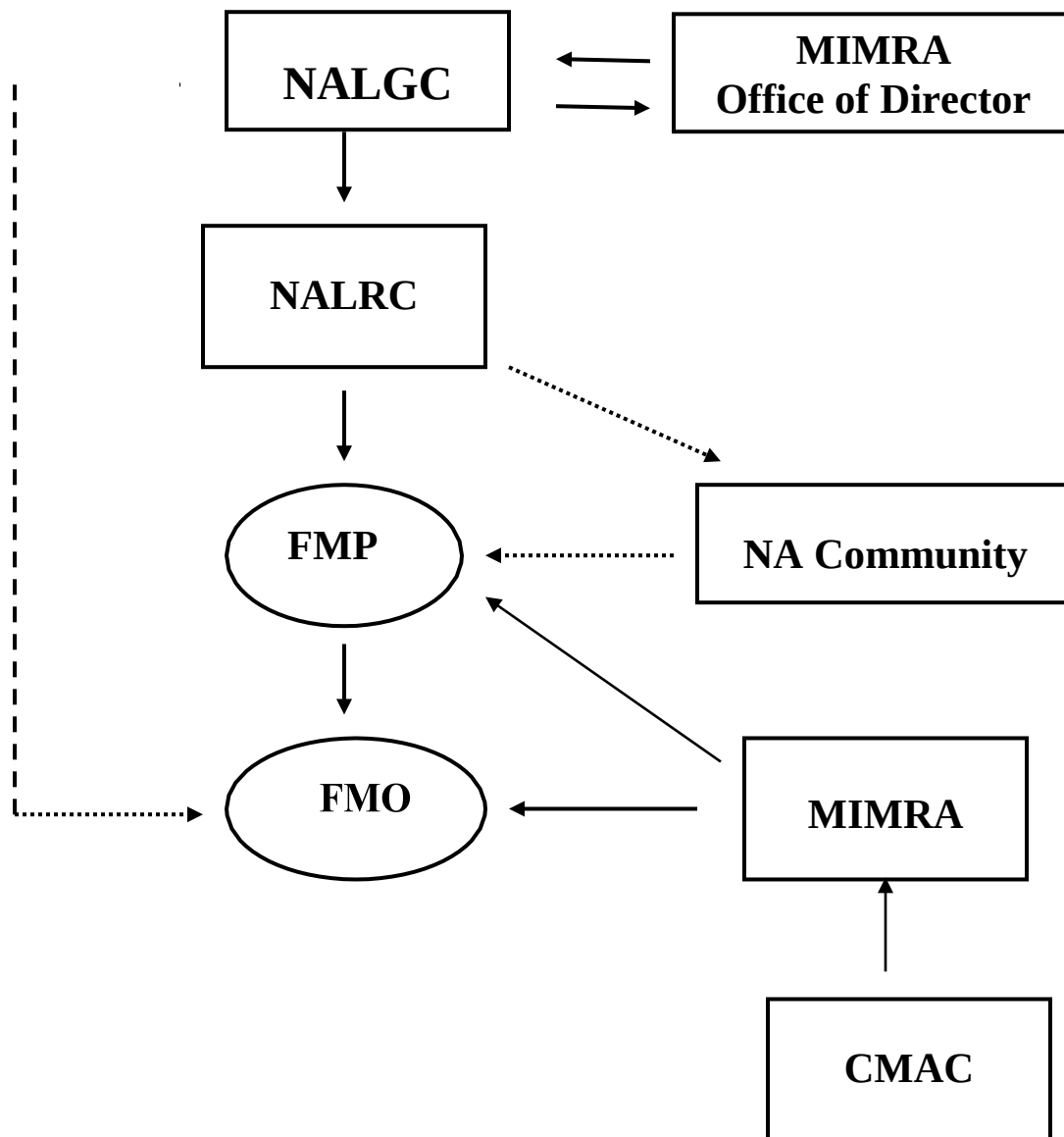


Figure 1- Flow Chart reflecting how the FMP and FMO are to be implemented

The overall administration and operation of the Resources Management Plan and Resources Management Ordinances are carried out by the Namdrik Atoll Local Resources Committee (NALRC). The committee reports to the Namdrik Atoll Local Government Council (NALGC) on the progress of the plan and the management ordinances in terms of achievements of the plan objectives and the difficulties encountered. The Local Government Council can directly oversee the enforcement of the Resources Management Ordinances with assistance of the Committee. The committee will make sure that its responsibilities and those of the community are implemented as required under the plan. In

addition, the committee will make sure that the supporting services and advice by MIMRA under the plan are carried out in a timely manner. Where the needs for implementing certain aspects of the plan and the management ordinance fall outside MIMRA's expertise, the assistance of the Coastal Management Advisory Council (CMAC) will be sought. The assistance of CMAC may include the identification of external resources to implement parts of the plan. Having reported to the Local Government Council the achievement of the plan, the NALGC has the responsibility to consult with the Director of MIMRA on various matters including the endorsement of the Fisheries Management Ordinances (FMO), Fisheries Management Plan (FMP), and the approval of the Resources Management Plan. Figure 1 provides a simple flowchart outline of the institutional arrangement on how both the Resources Management Plan and the Fisheries Management Ordinance are implemented and monitored.

10. Monitoring and Evaluation Plan

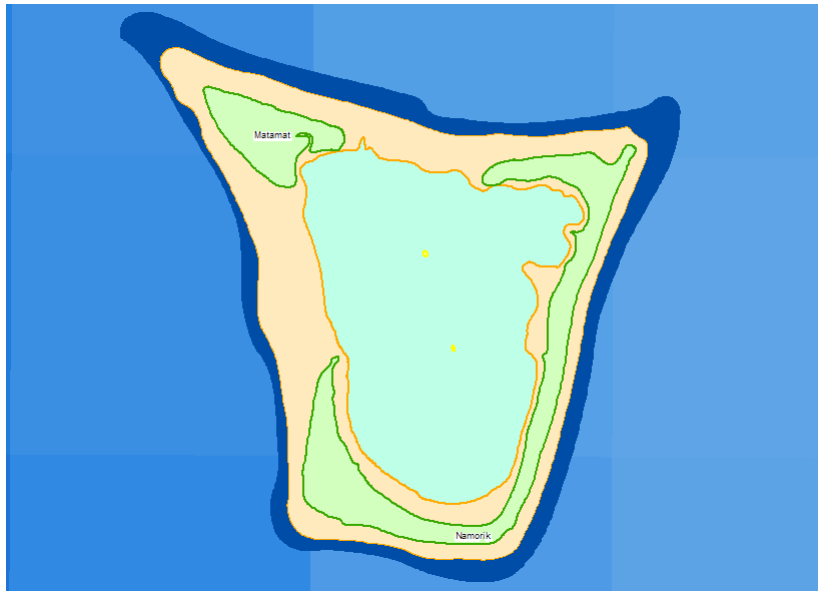
Monitoring the progress in the development of the plan and the degree of success in fulfilling the plan objectives will be carried out jointly by the Local Resources Committee and MIMRA/CMAC. This exercise should be carried out six-monthly or when the need arises. The report on the evaluation should among others consist of:

- i) Information on the activities implemented and level of achievement
- ii) Challenges met during the course of the plan implementation and suggestions how these challenges may be overcome.
- iii) Information on the status of the fishery resources as the results of assessment surveys.
- iv) Suggestions on new developments for consideration of the Namdrik community, Government and MIMRA/CMAC to better serve the interest of the people of Namdrik and,
- v) Recommendations on how the plan may progress in future

11. Conclusion

The Resources Management Plan of Namdrik Atoll marks a step forward for the island community to realize the importance of its terrestrial environment, marine environment and fisheries resources for the future generations of Namdrik community. Community members of Namdrik Atoll are resource users of its terrestrial and marine environment and they must take the prime responsibility of looking after its resources. The plan can only work successfully when the community takes it as its obligation to implement responsibilities listed under the management plan. With the support from the Marshall Island Marine Resources Authority and the Coastal Management Advisory Council, the plan will work towards the betterment of the Namdrik community, its people and future generations while adapting to changes in climate.

Appendix 1: Namdrik Profile



Number of Islets: 2 (8 main villages)

1. Zulu
2. Betol
3. Majol
4. Jinai
5. Rantak
6. Zion
7. Elmon
8. Madmad (island)

Population: 814 (1998), 508 (2011)

Land Area: 1.07 sq. miles Lagoon Area:

3.25 sq. miles Latitude: 5°35" – 5° 38"

North

Longitude: 168° 5" – 168° 9" East

Historical significance:

- Namdrik Alele
- Known for a variety of traditional fishing methods known as an atoll reserve for Paramount Chiefs in the Ralik Chain.
- Stopping point for Ralik's Irojlaplaps voyages to Ebon Atoll for provisioning

Cultural significance:

- Well-known for their ability to compose song and choreograph;
- Lijabkonira and her 24 children;

- Jolikwod and her 2 daughters
- Lajomile and the Kutilti

Biological & Resource significance:

- Because of the Atolls formation, it is believed that this allows the Black-lipped oyster (*Pinctada margaritifera*) to grow naturally in the lagoon making it one of the only atolls in the Republic to have a concentrated number of this oyster species.
- 3 mangrove swamps: Ajelto, Lobat and Madmad
 - Catfish species
 - Lobrak - Mudskipper (amphibious species)
 - Mangrove crabs
 - bulabol, jon, eoeak , kone, wop, kije, kanal, kojbar, binbin are known to exist in the mangrove and surrounding systems
- Water lens on Namdrik Island
- Different variety of bananas
- Fresh water lens on reef flat
- Mantis shrimp (*Lysiosquilla maculata*)

Other Existing projects:

- Tobolar and Namdrik Atoll Development Authority virgin coconut oil project.
- Namdrik Black pearl project operated from 1990-1995 but currently re-activated (BPI, MIMRA, PACRC, MERIP, CMI);
- Solar Home Program (R&D, MEC);
- Septic project (Local Gov't);
- Community island cleanup project

Appendix 2: Namdrik Historical Timeline

			
TimeLine	Infrastructure	Environment	Food Security/Livelihood
2000 1990 1980 1970 1960 1950 1940	2007: New School Building 2005: 1st USDA/Rural Development Housing Constructed 2000: Solar Energy Program (MEC) 1999: New Dispensary Constructed 1996: Solar Energy Program (EU/R&D) 1982: Airport Constructed 1980: Renovation of School 1980s: Build Jetty 1970: Building of Dispensary 1960: Expansion of School (1-8 Grade) 1957: Elementary School Constructed (1-6 Grade) 1957: Repair of Dispensary 1940s: First Dispensary Constructed and First Community Warehouse Constructed	2007: King Tide (flooding up to road) 2005: King Tide (crops damaged - ni, ma, bob, etc.) 2004: Crop Pest (fungus) on major crops - mainly breadfruit early 2000s: new species of mangrove seen on Madmad 1998: Drought (No rain for several months but community survived with well water) 1991: Typhoon - Northern reef pinnacle ocean side breaks off. Loss of giant clam collection area and spear fishing area. 1990s: unknown sponge/seaweed observed growing on corals and smothering corals AND extreme low tides and drying up of tidepools observed affecting corals 1983: El Nino - no effect to community 1979: Typhoon (95% homes lost, crops damaged/fall over, salt water contamination of wells) 1970s: EROSION observed 1957: Typhoon (100% homes lost, major loss of crops, local tapioca numbers not recover)	2009: Restart of Community Black Pearl Program 2008: Taiwan Aid - Rice Distribution 2007: Sea Cucumber Program (PACRMI) 2006: Community Black Pearl Program 1995-2005: KMI purchasing of dried Sea Cucumbers 1985: Introduction of Mountain Apple (FSM) early 1980s: Introduction of Banana species (FSM) 1957: Agriculture Program (R&D) -coconuts (Singapore), breadfruit (FSM), Mckenzie Banana (Samoa), Trochus (other atolls) 1st USDA food shipment to Community 1940s: Introduction of Mango (from?) and Banana species (Kirbati)

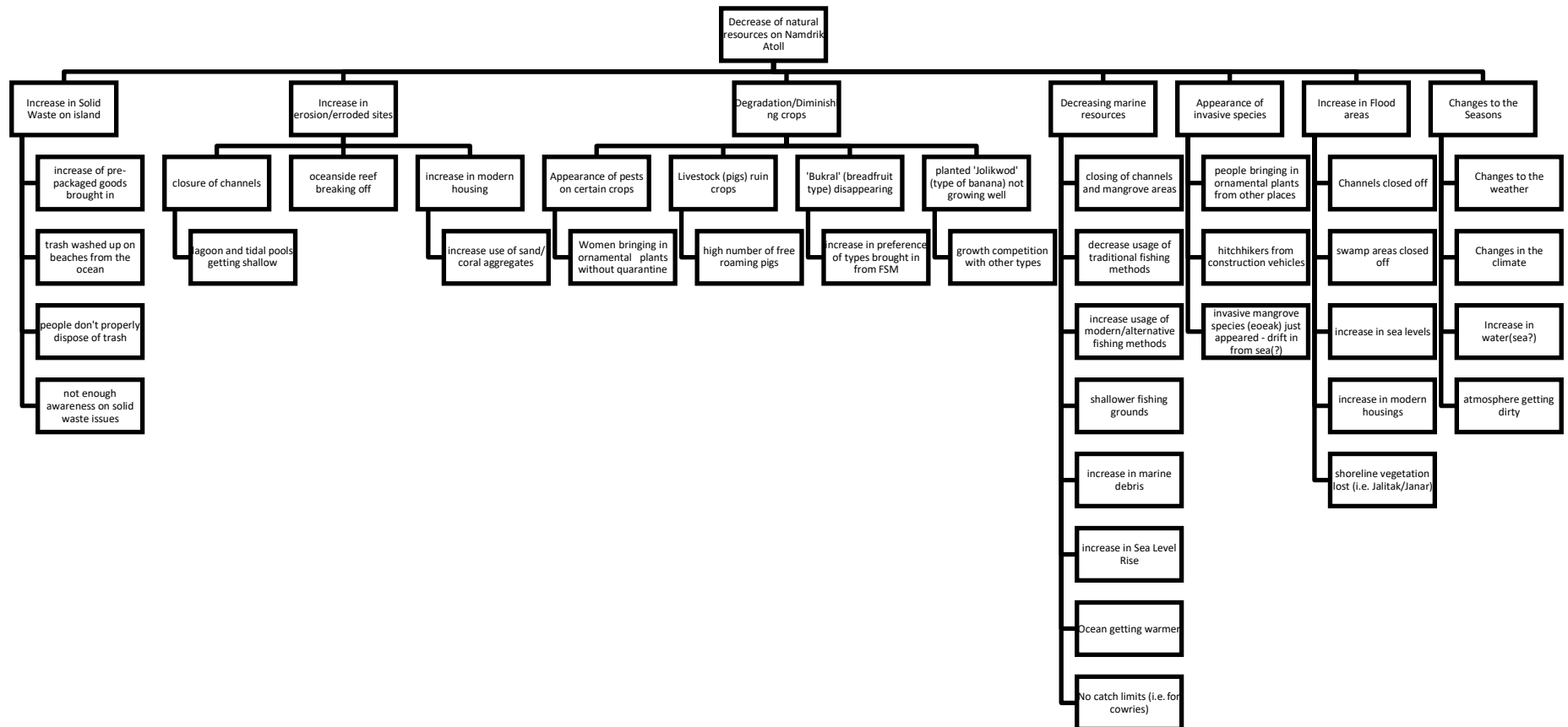
Appendix 3: Seasonal Calendar



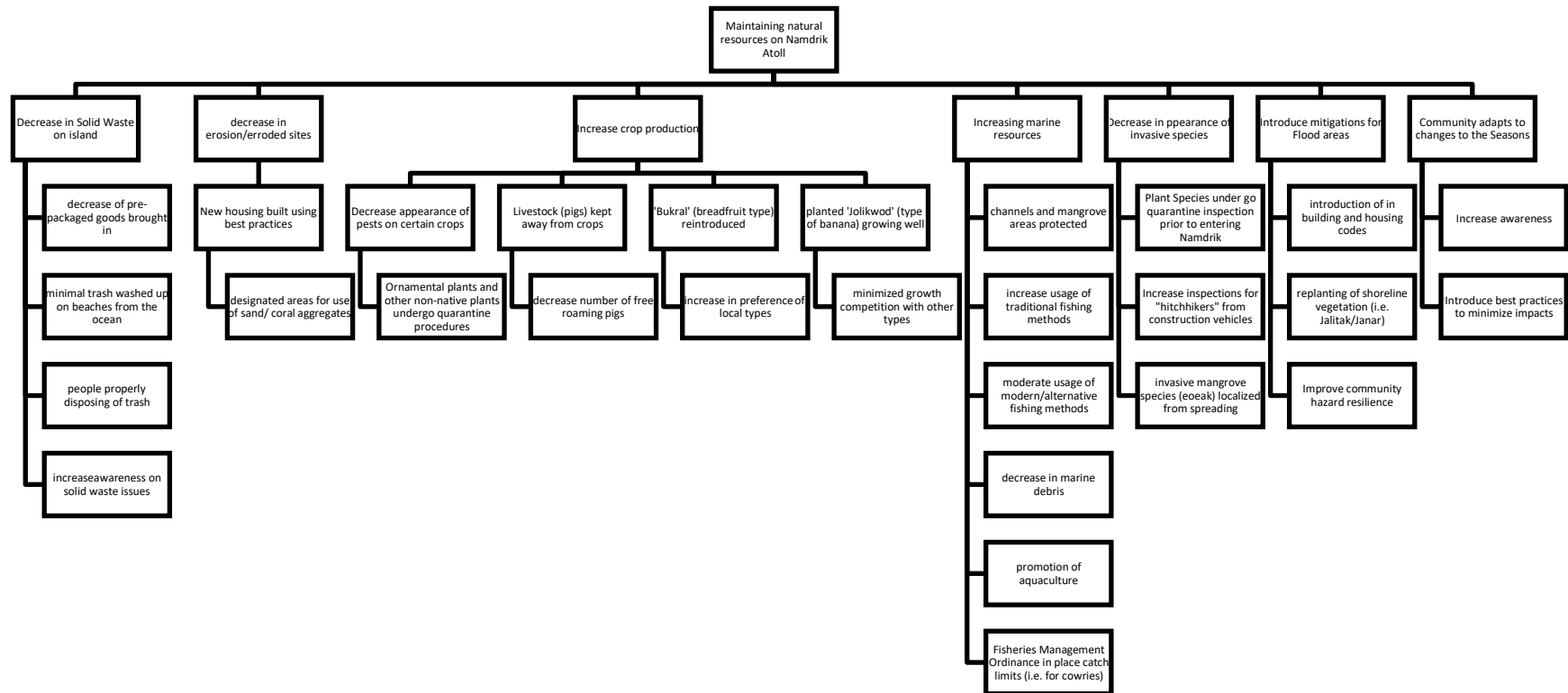
Appendix 4: List of Resources Management Ordinances that need to be developed during the implementation of Namdrik Atoll Resources Management Plan

1. Conditions on development of Aquaculture,
2. Ban on the use of destructive fishing practices-1) Clorox, 2) chemicals, 3) other chemicals that contains poison
3. Ban on fishing using scuba diving gear.
4. Imposition of closed seasons for the harvest of kiro,
5. Imposition of closed seasons for the harvest of dilin,
6. Imposition of closed seasons for the harvest lojebjeb
7. Imposition of licensing conditions and fee levels for foreigners
8. Imposition of closed seasons on certain breeding sites during spawning of important fish species
9. Ban of lobster fishing within one year period
10. Ban on minimum size limit of various fish and shell fish
11. Restriction of fishing gear and methods.
12. Registration of fishery, fishermen and fishing boats.
13. Restriction of harvest of target species
14. Provision for penalties and violations
15. Establishment of community's exclusive fishing grounds
16. License to sell fishery products from Namdrik Atoll to outside outlets.
17. Special exemption of permits for scientific activities in waters of Namdrik.
18. Imposition of maximum and minimum size limit for marine species – fish, turtles, clams, etc.
19. Ban on free-range livestock
20. Conditions on development of agriculture
21. General goals to adapt to climate change and improve community resilience (See Appendix 13)

Appendix 5: Namdrik Atoll Problem Tree



Appendix 6: Namdrik Atoll Solution Tree



Appendix 7: Issues, solutions and roles and responsibilities

Effect	Issue	Cause	ISSUE/SOLUTION	ACTION	IMPLEMENTORS
- i.e. Plastic, Wij, Plastic Rubbers rej kakure pelaak ko einwot ke etto ad kot lak - E-kakure wod ko im menin mour in lojet	1. Elon lok Kwopej	- Kwopej jen ilikin e-kakure menin ekkat ko - Jab tiljok in jolok kwopej ko - Elap import tok jen likin aelon eo - Edrik/jabwe melele ikijien kwopej ko rej tok jen ilikin	1. En wor jikin ain kwopej ko	- Kajitok ibben LG nan komman kakien - Aini kwopej ko - Kajitok ibben LG bwe en wor ordinance bwe aolep bukon en wor jikin kwopej - Ereok lak melaaj ko - Erreo lak lojet im barijet	1. Namdrik Atoll Local Government 2. Namdrik Atoll Local Resource Committee 3. Namdrik Community 4. CMAC partner ro: EPA, MICS, OEPPC, IA (Local Government Division), MIVA
- Menin jeramon ko lojet/ene rejako lok - Ejako jikin ko bwebwenato ko raurok rej bed ie - Ejako jikin kakwon ro ri-mij - Ewor mwoko emoj aer bed torerein lojet	2. Elap an ene jako lak	- Ekilok ijoko jikin driwoj drelon dren - Rubrub bedbed lik - Elap kojerbal mwon belle ko - Kojerbal bok im la - Bijbij lak iloan ailin in elaptata nam ko ilo aer mora lok	2. Bukot wawein bobrae an barijet ko jako lak -Training ko ikijien ekkat jon im konat ibarijet ko	- Public awareness - Ekkat janar/jalitik - Kakien nan jab bar wor rubrub bedbed kin TNT - Jerbal ibben EPA kin lale ia emman ebok bok im la - Ka-droltok jikin bwebwenato ko - Request nan council nan ordinance nan kejbarok/bobrae bwebwenato ko bwe renjab jako - Emaron bojrak in bijbij nam ko - Kadriklok an lub ko wotlak ilo lojet	1. Namdrik Atoll Local Government 2. Namdrik Atoll Local Resource Committee 3. Namdrik Teachers 4. Namdrik Community 5. CMAC partner ro: EPA, OEPPC, MICS, IA, V7AB, MIVA, RAMSAR
- Edrik lak ka-bwiro - Ma season: ejelok kotoan ien kale; ejako anonean/koto ellap - Ejako lak manit in ibben dron nan ka- bwiro	3. Ejoraan lak jikin ekkat ko	- Kora ro rej boktok wut jen ilikin im ejelok quarantine nan etale - Ewor kij ilo kein ekkat ko - Pig ko jen likin rej ukok kein ekkat ko - Bukdral rej jako lak jen wot an itok ma in kabilon - Jolikwod: enana an edrok	3. Bobrae jen an lonlak Invasive Species	- LG im community ren control e an edrok lak eoeak eo ilo Madmad im bar komman ekkatok kake - Public awareness - Quarantine im inspect jabrewot kein jeral kab wut rej tin drelon tok iloan	1. Namdrik Atoll Local Government 2. Namdrik Atoll Local Resource Committee 3. Namdrik Community 4. CMAC partner ro: EPA, MICS, OEPPC, IA (Local Government

- Iliju im jeklaj enaj iet lak armij - Enaj ietlak mona		kin wot banana ko jet		aelon eo	Division and V7AB), R&D, MIIST
- Eiet lok kein mona - Enaj eiet lok armij - Jako koba ibben dron nan enod - E-jelet ion ene	4. Eiet lok menin jeramon jen lojet	- Jen an kilok jikin toor/wea en - Lead/Eo nan enod e-kakure wod ko - Kojerbal kein enod jen likin - Ejako kojerbal mweio, asep, bwilkin - Epaat lak lojet - Ujoj ne ej kalapupu wod ko - Sea level rise - Elap lak an bwil lojet - Ejelok limit ilo ebbok libukwe/likajur/di ko	4. En lap lok menin jeramon in lojet	- Control kojerbal kein enod ko jen likin im komman kakien kin menin - Komman ekatok kin season in libukwe im loor kakien ko - Jar nan Anij - Kadriklak kojerbali bwe en lablok jeramon tok elik - Kodrool tok traditional homes / em aaj ko	1. Namdrik Atoll Local Government 2. Namdrik Atoll Local Resource Committee 3. Namdrik Fishers 4. Namdrik Aquaculturists 5. Namdrik Community 6. CMAC partner ro: MIMRA, EPA, MICS, OEPPC, IA (Local Government Division and V7AB), MIVA, CMI
- Mad keel emoj aier mani wut im uno in Majol ko - Ejako lak bwebwenato in Madmad kin eoeak en - Aban lok mour an jukjukinbed eo ilo an kein ekkan ko/uno ko elap lok im elap wot jerbal nan jolok mar ko re-keel nan ailin eo	5. Invasive Species	- Armij ilo aer eboktok wut nan kainoknok - Bwirej ko ilo waan jerbal ko rekar buktok (Public Works, PII) - Wut leklek ekar edrok jen ijoko kein jerbal ko an PW im PII rar bed ie - Eoeak en Madmad ekar make walok	5. Emman lak an kein ekkan ko edrok	- Oror/lukoj i pig ko - Control aer jumbo - Kakajur ordinance ikijien pig - Public awareness, replanting - Quarantine - LG resolution to R&D Exec nan lolorjake quarantine - LG bukot jiban jen R&D nan komman e-katok kin ma - pig in New Zealand im ilikin Majol in en jab bar itok nan aelon eo - Bukot kilen an lon lok Jolikwod im Bukdal	1. Namdrik Atoll Local Government 2. Namdrik Atoll Local Resource Committee 3. Namdrik Community 4. CMAC partner ro: EPA, MICS, OEPPC, IA (HPO, Local Government Division and V7AB), R&D (Agriculture, Livestock and Quarantine)

- Ejako kalub turin barijet - Ejako bedbed im jeramon eo (i.e. kein jakaro) - Ejako jekjek in aelon eo - Ejako jikin kallib (ma, paanke, pinana) - Jako ial eo - Aiboj lal ko - Ajeded naninmej ilo jukjuk in bed eo	6. Elon jikin ko rej ibwiji (Flooding)	- Erub jikin toor - Ekilok wea en - Utiej lok lojet - Ekkal em (ebbok la im bok) - Ejako wojke ko rej drepij bok ko (i.e. Jalitak/Janar)	6. Bobrae an ibwij tok ene	- LG im Community en bukot buntan ne ko - Katok Janar/Jalitak ko - Public Awareness, replanting, etc.	1. Namdrik Atoll Local Government 2. Namdrik Atoll Local Resource Committee 3. Namdrik Community 4. CMAC partner ro: R&D, EPA, MICS, OEPPC, IA (HPO & V7AB),
- Elap naninmej ej walok - Eoktak ien enod - Elon lok ma, ejelok jalele - Tomak an armij edriklok - Jelet income an armij	7. Eoktak Season ko	- Ukoktak in mejatoto - Lablak dren/lojet - Oktak lak weather - Etoon lak mejatoto - Aiboj lal ko emora lok	7. Oktak in Season	- Public Awareness, replanting, etc.	1. Namdrik Atoll Local Government 2. Namdrik Atoll Local Resource Committee 3. Namdrik Community 4. CMAC partner ro: R&D, EPA, MICS, OEPPC, IA (HPO & V7AB)

Appendix 8: SMART Objectives

Threats (Joraan ko)	Solution (bobrae)	Outcome (Tobrak)	Where (ia)	When (Naat)
E lon lak Kwopej	Aini im kajenoloki ekkar nan wawier	- Enaj ieet lok im erreok lok belak ko - Enaj jiban kadrik lak Global Warming	- Namdrik Atoll (ene mora im lojet) - Aolepen lal in	5 yio jen kio 5 yio jen kio
- Ain im kejonolok kwopej ko ekkar nan waweir bwe en ieet lok im erreok lok belak in Namdrik 5 iio elikin dedelok in management plan in. - Collect and sort trash to decrease trash and have Namdrik cleaner in 5 years				
Increase in trash (solid waste)	Collect and sort trash	Decrease in trash and cleaner environment	- Namdrik Atoll - All the World	5 years 5 years
Elap lok an Ene jakolak	Bok jet buntan ko ikijen ebbok bok im dreka	Erumij lok an jako Ene emora	Ijoko elap an den jeleti ilo Namdrik	3 yio jen kio
- Bok jet buntan ko ikijen kamakit bok im dreka non kajjeon karumij lak/bobrae an lojet tore barijet ko belaak in Namdrik iloan 3 iio elikin dedelok in MP in - Implement measures/best practices on moving sand and aggregate to slow the rate of erosion on the coast of Namdrik in 3 years				
Increase in erosion (increase in land disappearing)	Take some measures in regards to sand and rock harvest	Slow the rate of erosion (land disappearing)	Areas that are affected by tides on Namdrik	3 years
Oktak in Season ko	Aelon eo en bojak wot nan oktak in season ko.	Bwe en bidodo ad mour kaki	Ilo ailing in Namdrik	Ilo yio kein rej beddo tok (long term)
- Leen bwijrok wot im bojak im ekatok kake oktak in season ko bwe en bidodo ad mour kaki ilo aelon in Namdrik ilo 5 -10 yio - Prepare and be knowledgeable on the changes in the season to live easier with the changes 5 to 10 years				
The changes of the seasons	Be prepared for the changes of the season	To live easier with the changes (be more resilient)	Namdrik Atoll	As long as the seasons change (long term)
Ewalok Invasive species	Bobrae kij ko im mar ko renana jen aer drelon tok im lon lok	bwe emman lak menin edrek ko mour	Ilo jikin kalip ko ion Namdrik	5 yio jen kio
Bobrae kij ko im mar ko renana jen aer drelon tok im lonlok bwe en emman lak an menin edrek komour ilo jikin kalup ko ion Namdrik 5 yio jen dedelok in MP in				

☐ <i>Preventative measures to decrease the number of invasives entering Namdrik and multiplying to keep crops healthy on Namdrik in 5 years</i>				
The appearance of invasive species	Prevent invasive flora and fauna from entering Namdrik and increasing	To promote healthier crops	Crop areas and gardens of Namdrik	5 years
Elon jikin ko rej ibwiji	Lor jet bunten ko nan kalet lok im kaddriklok	Eiet lok im drik lok jikin ko rej ibwiji	Jikin ko ekka aer ibwij ilo namdrik	5 yio jen kio
Lor jet bunten ko (einwot ejaak zoning plan im building code) nan kadriklok joraan ko ilo jikin ko ekka aer ibwij ion Elmon, Zion im Sinai 5 yio elikin dedelok in MP in				
☐ <i>Implement best practices/designs to lessen impacts of floods especially on Elmon, Zion and Sinai in 5 years</i>				
Increase in areas affected by floods	Follow some measures to lessen areas affected and their impacts	Less areas and less impacts to areas affected by floods	Places on Namdrik affected by flooding	5 years
Eiet lok menin lojet	Koman mo	Enaj lon lok eek im menin mour ko jet ilo lojet	Madmad, Zulu, Marshall	3 yio jen kio
Komman jikin kejbarok ko non kalonlok eek im menin jeramon ko jet iloan malo eo an Namdrik 3 iio elikin dedelok in MP in				
☐ <i>Establish a Marine Managed Area to increase fish stocks and other marine species in Namdrik 3 years</i>				
Decrease of marine resources	Create reserves	Increase in fish and other marine resources	Madmad, Zulu and Marshall	3 year
Ejoraan kein ekkan ko	Kolap lak an armij kalup kein ekkan	Enaj emman lok ak wemourur kein ekkan	Ilo Namdrik	5 yio jen kio
Kolaplak an armij kalup kein ekkan ko bwe en lonlok im emmanlok ak wemourur kein ekkan ko ilo Namdrik 5 iio elikin dedelok in MP in				
☐ <i>Increase the number of people planting crops to improve crops and the overall greenest of Namdrik in 5 years</i>				
Degradation of crops/gardens	Increase people planting of crops	The crops will be healthier	Namdrik Atoll	5 years

Appendix 9: Action Plan

Köttōbar eo	Action ko	Wōn	Due Date	Cost	Status as of 2016
1. Kwopej	Awareness Program Dump site/storage for recycles/hazardous	Partners (MWAC, EPA, MICS) LRC, LG National Gov't, local & Partners ** LRC & MICS	1 ½ yio 1 yio	Experts Warehouse plot of land, drieka	Ereo, ejmour im laplak melele in kwopej im jorran ko rej walok jen i Clean & healthy environment/Armij remelele kin jorren ko walok jen kwopej
1) Komman awareness program/campaign ko ikijen kwopej einwot non jikuul ko im aolepen community (nana in an wor kwopej ilo melaaj ko, lojet, bar ijoko jet rejokar aer bed, 'R' kan 4, e lon bar poster, dvd, im men ko jet) <i>Conduct an awareness program/campaign for schools and community (topics to include impacts of trash on land and sea, the 4 'R's, and media for distribution)</i> 2) Kojenolok juon jikin im kalek juon mon kakwon kwopej ko rekkar non recycle, im kwopej ko rekawotata bwe ren bojak in transport non Majuro <i>Identify place and build a storage place for trash (recyclables and hazards) prior to transport to Majuro</i>					
2. Ene ejako lok	Kalip Jannor/Jelitak Kallikar joko im rekkar nan ebbok bok im dreka Etale wawein ko rejjet ilo ekkal seawalls	Community Partners (MICS, EPA, CMI) LG, LRC MICS, EPA, CMI, LRC/Local Council **LRC	2 yio jen kio 1 yio jen kio 1 yio jen kio	Gardening tools/Seedlings Barge/excavator Expert/equipment	Ne ejab tobrak bar bukwot jet wewein ko rekkar. Ne emman, komane nan aolepen Namdrik. Kabbok ro retelok bwe en bukwot mejlan aban Drik lok an jako barijet Elap lok melele kin issue in
1. Kallip Jannor/Jelitak ilo ijoko elap aer jeleti, iar im lik. <i>Shoreline replanting, lagoon and oceanside</i>					

2. Kallikar joko im rekkar nan ebbok bok im dreka ak la.

Identify places best to take sand and aggregates

3. Jerbal iben dron im etali aolepen buntan ko rekkar im jejjat non ekkal seawall.

Work together to find best practices/designs/etc for seawalls

3. Oktak in season	Kōmman katak ko kōn season ko.	Partners; -MICS, MIMRA, WUTMI, NGOs, LRC & Community of Namdrik Atoll **LG & LRC leaders	1 year “Jen ieen eo approve plan in”	Grant Writer	Elaplok melele im bojak (<i>ñan menin jorrán ko</i>)
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1) Kajitok ibben partner ro non kamman katak ko kon oktak in season ko

Assistance from partners to learn more about the changing seasons and impacts affecting Namdrik

4. Invasive species	Kokajur lok quarantine nan namdrik Request nan R&D nan control mar/kij ko renana ion NDK in	Partners (Kenear, LRC, MIIST, community) Local Gov’t **R&D, LG, LRC	6 months 3 months	Tools – chainsaw, diesel, gas, AMI ticket, wood chipper,	Lonlok menin edrek im jeramon jukjuk in bed in, im laplok mona (local food)
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1. Kokajur lok quarantine nan Namdrik einwot kin awareness im kalaplok kapeel

Strengthen quarantine measures and awareness

2. Kajitok non Ministry an R&D non control mar/kij ko renana ion Namdrik in

Assistance from R&D to control invasives on namdrik

5. Ibwij (<i>wallōñ lak in dren eo ilojet- SLR</i>).	1) Bikot im katak kōn ijoko rej ibwiji. 2). Training ñan monitoring. 3) Ippán doon im monitori ijoko rej ibwiji 4) Kapilōk jen LRC ikijen ekkal ko rejimwe	1) Ro rōtimjelak kōn apōñ in. 2) Experts & LRC + Community & LG **LRC & LG	1) 2 iio jen an dedelak Management Plan (MP).	1) Monitoring Equipment ko. (<i>Kein jermal ko ñan monitor</i>)	1) Melele im jelá ia ko rōkkar ñan ekkal im emakūt ñan. 2) Moko renaj utiej lak jen ñal. Ekkal ion joor.
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	im jejjet ilo ijoko im rej ibwiji.				
1. Katak kin ijoko rej ibwij non komman awareness program ko nan jikuul ko im community eo bwe ren melele im jela nan aer bojak im jelmae ne enaj wor ibwij ko renaj walok nan jikin kein ba kaki <i>Awareness program on impacts of flood areas to make a contingency response plan</i> 2. Kalap lak kapeel im jela nan etale an wallon lok dren einwot an walok ke ewor jet jikin ko ralikkar aer ettã <i>Training on the impacts of the SLR and rising water lens and impacts on low areas</i> 3. Jerbal ippan dron im etali aolepen bunten ko rekkar nan ad maron kadriklok joraan ko renaj walok jen ibwij <i>Work together towards best practices to mitigate impacts on flood areas</i> 4. Kapilok ko jen LRC ikijen ekkal ko rejimwe im jejjet ilo ijoko rej ibwiji <i>Advice from LRC on best ways to address flooding and impacts</i>					
6. Eiet lok menin jeraaman ko jen lojet	Awareness kin size limit nan menin jeramon ko lojet Koman limit nan jonan ebbook ek im men ko jet einwot libuke im likjaur Restocking the lagoon with Namdrik species Monitoring program of catch of marine species on Namdrik	MIMRA im partner LRC Local Gov't LRC, LG, MIMRA, MIMF, Taiwan-ICDF, CMI, MICS LRC, LG, Shear, ri-enod, MIMRA **MIMRA & LRC	3 months 6 months 2 year 2 year 3 years (+)	AMI tickets, refreshment, materials, poster, info sheets,	Elap lak an naj jeramon im ejmour lak jukjuk in bed in
1. Katak im melele ikijen enod einwot size limit non menin jeramon ko lojet <i>Awareness programs on size limit for marine resources</i> 2. Komman limit non control jonan ebbook ek im men ko jet einwot libuke, likajur, mejen wod, wolalo, likabejrat im men ko jet <i>Establish fisheries management measures such as catch and size limits (esp. for cowries, giant clams, rock clams, trochus and other threatened local marine resources)</i> 3. Bar kanne im kejbaroke alele/ Ejaak program im taap menin jeramon in lojet ko an Namdrik einwot emoj aer jino eietlok					

Restock the lagoon with aquaculture activities involving threatened marine species.

4. Kakajur lok program in etale jonan ek ko rej kojok (catch data program) ilo Namdrik

Strengthen the catch data program.

7. Ejoraan kein ekkan	*Komman group non ekkat ma, banana, ni, etc. Lolorjake im jibwe tok program in kalup rej itok jen R&D *Train group/droulul ko non kalup *Wia local fertilizer im seedling mokta jen ro jet ilo namdrik	Community im LG im LRC LG, LRC R&D & Laura Farm **R&D, Executive member, LRC	1 year 6 months 1 year	Transportation, tools, refreshment, seedling, Air Marshall ticket, fertilizer (copra cake/fish meal)	Emanlok an itok melele nan armij Lonlok kein ekkan Enej lonlak jaan Ejmour lok armij Elaplok melele ko kin kilin ekkat
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1. Komman group non ekkat/kalup ma, ni, banana, apple, sweet potato, iaraj, im ekkan ko jet

2. Lolorjake tok program in kalup ko jen R&D (im Taiwan)

3. Kalaplok kapeel im jela ko ikijen kalup nan droulul in ekkat/kalup ko ilo jukjuk in bed eo

4. Wia ine ko im men ko jet rebed iben armij ro ilo jukjuk in bed eo mokta.

Natural Resource Targets:

1. Ni (Coconut Trees)
2. Baru (Bajlo, barulep, likorkor, etc)
3. Wod (Corals & Reefs)
4. Unman (Pandanus leaves)
5. Jon, Eo-eak, bulabol (Mangroves)
6. Aiboj lal (Water lense)
7. Barijet (Coastal area)

Figure 1: Prioritizing the threats

Threats	Target	Area	Intensity	Urgency	Total Score
1. Kwopej	7	3	1	3	14
2. Ene jakolok	5	2	3	3	13
3. Ejoraan kein ekkan	1.5	1	2	3	7.5
4. Eiet lok menin lojet	2	3	3	3	11
5. Invasive Species	5	1	3	3	12
6. Elon jikin ko rej ibwiji	4	2	3	3	12
8. Oktak season ko	5	3	2	3	13

Prioritizing the Threats

Highest priority	Total Score	Climate Sensitivity	Direct/Indirect
Kwopej	14	H	I/D
Enne ejakolak jen an ibwii tok	13	H	D
Oktak mejatoto im season ko	13	H	D
Invasive species	12	-	I/D
Elon jikin ko rej ibwiji	12	H	D
Eiet lok menin mour ilo malo im loiet	11	H	D
Ejoraan kein ekkan	7.5	H	D

Appendix 10: Records of Community workshops

15 September 2009

Debriefing with Mayor and Council

1. Amos Samuel
2. Jakob Jetnil
3. Anjo Jikit
4. Wijlang Hermon
5. Railey Joel
6. Clarence Luther

Attendance

1. Clarence Luther
2. Jakob Jetnil *
3. Railey Joel
4. Anjo Jikit
5. Mario Aron *
6. Elson Naisher
7. Amos Samuel
8. Lobi Lolin
9. Epson Jeik
10. Tamwe Gideon
11. Noah Luther
12. Aisa Peter
13. Lane Lolin
14. Shear Samson
15. Jiti Samuel
16. Isaiah Bokna
17. Biraj Hisaiah
18. Romy Hisaiah
19. Wijlang Hermon
20. Samson Samson
21. Robfort Bwein
22. Shera Hosiah
23. Jita Luther
24. Liton Bejaja
25. Erakdik Joel
26. Ted Elkena
27. Henry Enos

28. Danny Osma

29. Ringo Gideon

30. Anderson Jien

31. Jeffson Bwein *

17 September 2009

Men's Group

- Resource Mapping
- Seasonal Calendar

16 September 2009

Council and Landowners

Agenda

1. Opening Prayer (11:20)
2. ReCap on 2nd Visit and Summary on Activities/Tools
3. Breakout to 3 Groups
 - Resource Mapping
 - Historical Timeline
 - Seasonal Calendar
4. Group ppt for each tool
5. Voting for LRC Reps *
6. Closing (15:35)

Attendance

1. Benjamin Samson
2. Samson Samson
3. Ketel Laeo
4. Jeffson Juna
5. Amos Samuel
6. Ebe Mon
7. Romius K
8. Samson Samuel
9. Hemos Ketton
10. Abija Ned
11. Michael Kabin
12. Tony Kabin
13. David Samson
14. Aisa Peter
15. Robfort Jin
16. Ringo Gideon
17. Tamwe Gideon

18. Damer Beasha
19. Humry
20. Nashion Jin
21. David Gideon
22. Kasbali Jinna
23. Aimon Aron
24. Tom Juna
25. Bed Luther
26. Anthony Peter

17 September 2009
Ri-Kaki in Mwon Jikul Group

- Resource Mapping

Attendance

1. Betwel Samuel *
2. Ninear Ralpho
3. Camillus Jikit
4. Cari Nash
5. Carol Yotama

18 September 2009
Women's Group

- Resource Mapping

Attendance

1. Karen Nathan
2. Rosehana Samuel
3. Lilly Batlok
4. Alice Peter
5. Shiko Luther
6. Clora Amam
7. Wilbina Beaja
8. Christy Ned
9. Jino Lolin
10. Lewa Clement
11. Bina Jokko
12. Rosendy Clement
13. Macy Gideon
14. Maryann Luther
15. Jeritha Luther
16. Hemmylou Samuel
17. Amitha Samuel
18. Macklonia Emil
19. Jacklynn Milne
20. Margaret Hisaiah
21. Ashlynn Beasha
22. Evelyn Henos
23. Wayrose Jikit
24. Lorie Rilang

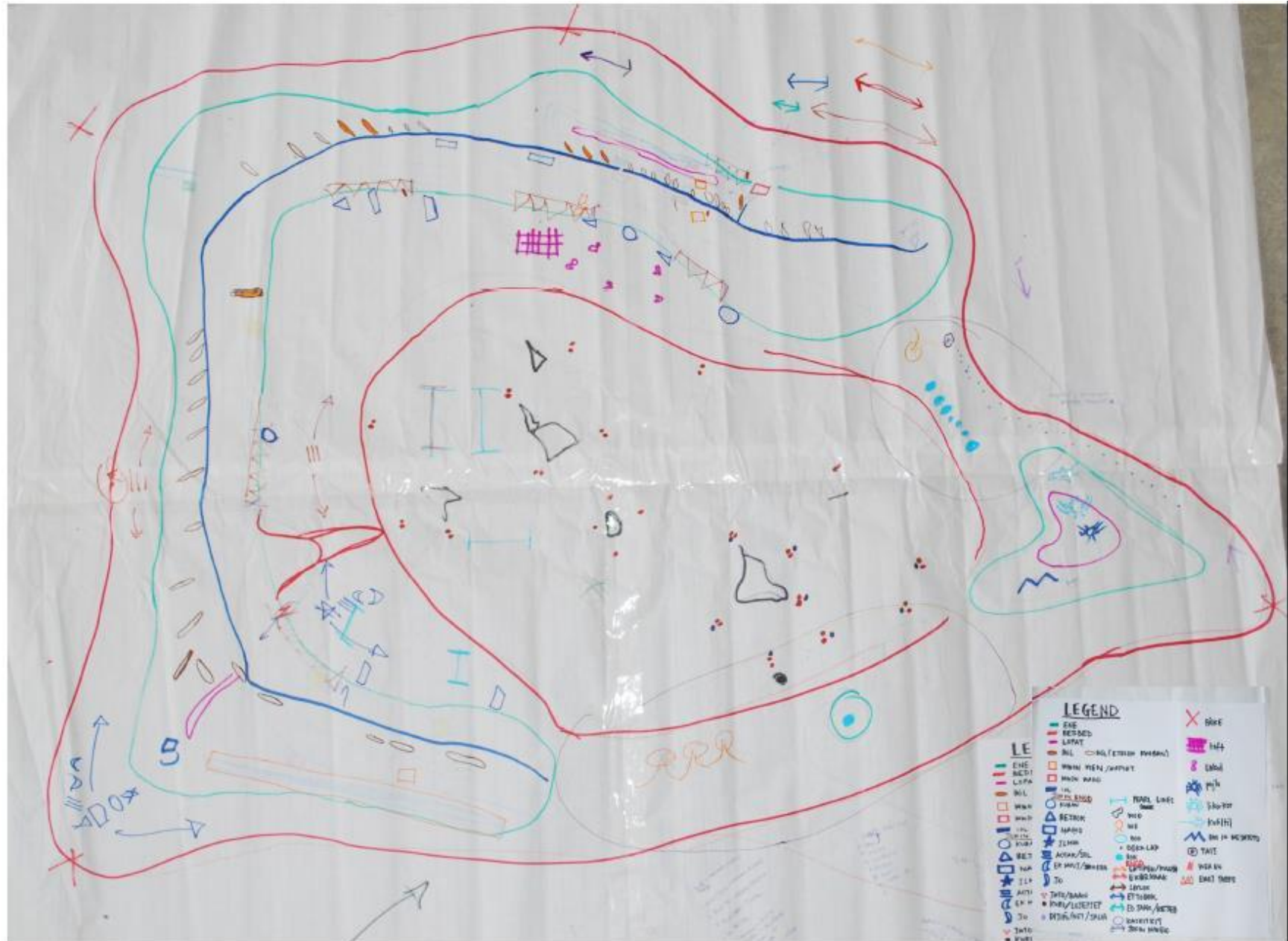
25. Ruby Rubon
26. Maryann Kanono
27. Matline Ralpho
28. Sue Juna
29. Dellyanna Luther
30. Rosita Lolin

21 September 2009
Local Resource Committee
Problem/Solution Tree Analysis

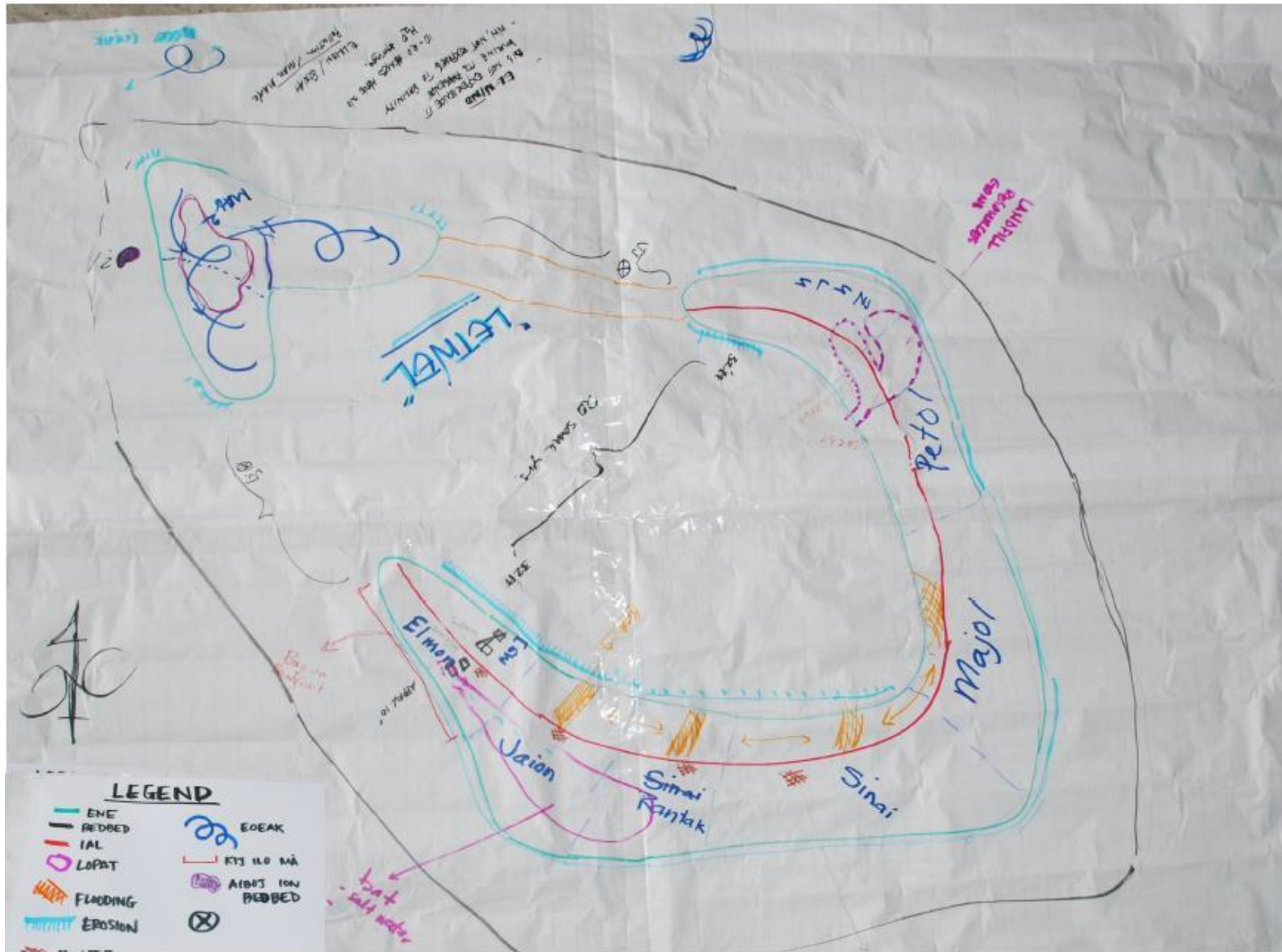
1. Hemmylou Samuel
2. Matline Ralpho
3. Christy Ned
4. Jakob Jetnil
5. Leton Beasha
6. Darrel Samson
7. Betwel Samuel
8. Lewa Clement
9. Hemos Ketton

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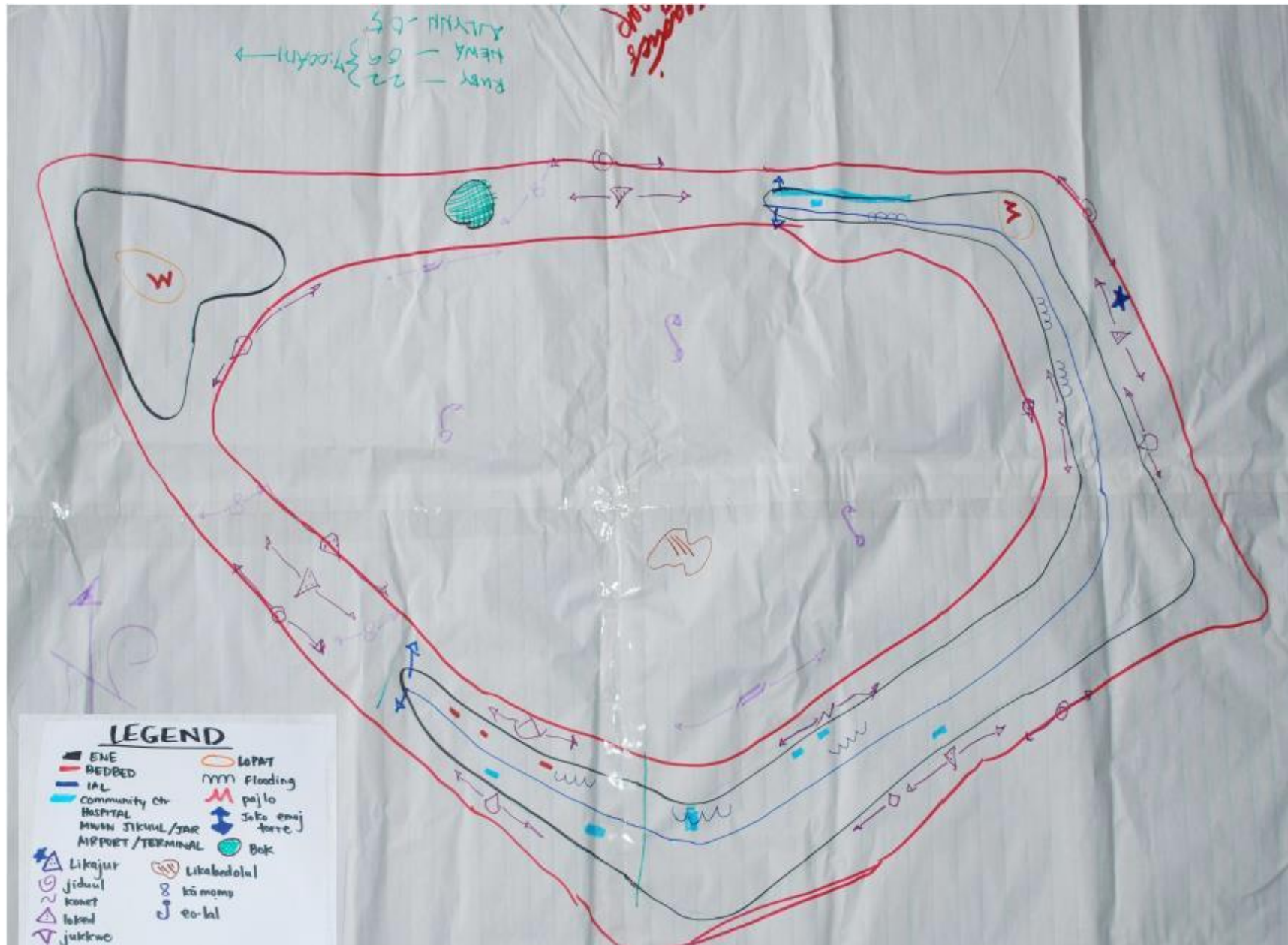
MEN'S RESOURCE MAP:



TEACHER'S RESOURCE MAP:



WOMENS RESOURCE MAP:



Appendix 11: A Brief History and Description of Pearl Farming in Namdrik and the RMI

Namdrik Atoll is one of the few islands in the Marshall Islands to possess relatively high numbers of the Black-Lipped Pearl Oyster (*Pinctada margaritifera*), known as *di* in Marshallese. The Black-lip Pearl Oyster is the basis for pearl farming industries in areas such as the Cook Islands and French Polynesia that have become economic mainstays for these nations. The Japanese trialed pearl farming in the Marshall Islands, Palau and the Federated States of Micronesia prior to World War II. There was a Japanese-operated pearl farm at Ebon in the 1930's. This activity disappeared after the war.

Small-scale pearl farming has also been established on a limited basis in other areas such as Nukuoro (FSM) and at Majuro, Rongelap, Jaluit, Arno and Likiep in the RMI. Most small-scale pearl farming efforts fail early in their development. The primary factors in these failures include: lack of community organization; corrupt or incompetent leadership; high start-up costs; scarcity of spat (small pearl oysters) to stock farms; high costs; difficulty in obtaining grafting services; and difficulty in scaling-up to profitable levels. Pearl farming also requires at least three to five years to realize the first harvest of pearls and several production cycles to achieve profitability. It is difficult to maintain community commitment and cover the operational costs over such a long period.

Despite these challenges, the Namdrik community has been able to maintain some form of pearl farming over many years. The following is a brief history of pearl farming efforts in the RMI with an emphasis on events related to the Namdrik pearl farm.

1984: Japanese survey of pearl oysters on six atolls including Namdrik. The Namdrik Local Government enacted the Namdrik Alele Local Government Pearl Culture Ordinance in 1985, which controls the harvesting and marketing of pearl oysters without government approval.

1989 Inshore Fisheries Programme by SPC- assistance in training of pearl oyster surveys

MIMRA conducted a survey in 1989 in Namdrik. According to the FAO, pearl farming began in Namdrik in 1990 and the effort lasted until 1995. The SPC conducted a pearl oyster survey in 1990 (Preston). Spat collectors and long lines were put out in the lagoon.

1991: SPC's Julian Dashwood drafted a pearl farming development plan and wild pearl oyster management plan for Namdrik.

1993-1995: Black Pearls Inc. conducted a stock survey and trained people in pearl farming methods. Funds were provided by NMFS. Three thousand spat collectors were deployed and two thousand spat were obtained. During this time, BPI took pearl oysters from Namdrik to the hatchery in Kona. Some of the spat produced were returned to Namdrik. Spat was also used for the BPI farm in Majuro. This later lead to issues between the community and BPI and the latter withdrew from pearl farming on Namdrik. The BPOM farm was started on Ejit Island in Majuro in 1997. In 1998, that farm suffered from large-scale mortality due to a red tide.

1995: Pearl oyster farm on Arno started by RRE.

1998: Black Pearls Inc. created Black Pearls of Micronesia (BPOM) a joint venture of BPI, local businessmen and MIMRA. BPOM relocated the BPI farm from Ejit to Birikin, Majuro. Mortalities were later encountered at Birikin.

In 1999, Simon Ellis (at that time employed by COM Land Grant) and Maria Haws (University of Hawaii Hilo) began spat collection experiments in Jaluit supported by the University of Hawaii Sea Grant Program with funding from a regional DOI grant. The work was concluded in 1999, with results indicating that although spat fall was not abundant, this in combination with collection straight from the reef could support small farms.

1998: BPOM started a pearl oyster hatchery at Woja in 1998 in partnership with MIMRA. The parent company, Black Pearls Inc. established a pearl oyster hatchery in Kailua-Kona at the Natural Energy Laboratory of Hawaii Administration (NELHA) in 1992.

RRE had started their farm in Arno (Nam Lagoon) with 7000 spat taken from Jaluit. RRE had 5 harvests from the Arno Lagoon. Lack of spat continued to affect the farm throughout its history until it was closed in 2005 and the pearl oysters relocated to Jaluit. The Jaluit farm had been started in 2001.

Black Pearls, Inc. pulled out of the Marshall Islands in 2002.

At that time BPOM had a farm in Majuro and Bobby Muller was operating a farm in Arno. The Arno farm had about 4000 pearl oysters grafted in 2003.

MIMRA took over operation of the Woja hatchery after BPOM withdrew in 2003. In late 2002 CTSA provided funding for a hatchery specialist to work at the Woja hatchery. His attempt to produce spat largely failed, although some production was achieved shortly before his contract expired.

2003: Hatchery production manual written by Simon Ellis, Maria Haws and Provan Crump.

Pearl grafting training was done in three sessions by Berni Aquilina. These occurred in February 2002 at Birikin, at Arno in February 2003 and February 2004. The training was begun with four trainees but none continue practicing in the RMI today.

Jaluit High School had a small demonstration pearl farm in 2005 and teachers and students were trained in pearl oyster grafting by UHH and MERIP. Support was provided by MOE with a grant from ADB.

The largest RRE harvest was in 2003 (two in Arno and one in Jaluit). Spat collection was also occurring in Jaluit at that time.

By that time, the College of Marshall Islands also had started a pearl oyster hatchery at the Arak Land Grant site (2001), later starting a small demonstration pearl farm (2003).

2003, CTSA award, \$63,546, collaborators: Maria Haws, Simon Ellis, Eileen Ellis, Teresa Lewis, Matang Ueanimatang, Greg Muckenhaupt, Quentin Fong, Manoj Nair. Covered hatchery methods and determination of spawning season in Pohnpei. Genetic study included Namdrik samples.

2003: The first pearl auction in the RMI was held at the Outrigger hotel in November. One hundred of the best pearls of a 3,000 pearl harvest from the RRE farms at Jaluit and Arno were sold. Sea Grant, Outrigger Hotel and CMI provided support for the auction. Ellis and Haws provided technical support for grading and setting the pearls. The highest priced lot from the auction brought in \$1,500.

The CMI Arak hatchery provided spat to Namdrik in 2004

In 2004, Dr. Maria Haws traveled to Namdrik while conducting a fellowship at the U.S. Embassy. It was found that very large and old pearl oysters were still present at the farm site in Namdrik as well as some remnant lines. Matang Ueanimatang, the CMI Aquaculture Extension Agent, accompanied her. Some of the lines had broken and the oysters had fallen down the slope of the coral reef underneath the farm. Haws and Ueanimatang were able to recover approximately 90 pearl oysters but were unable to recover more due to limitations on the number of tanks they had available. At the same time, observations were made that indicated that the Namdrik lagoon might be impacted by pollution, as the lagoon was clearly experiencing eutrophication and visibility was limited to a few feet in some areas. Bivalves of several species were more abundant than is common in most Marshallese lagoons, possibly due to the high level of phytoplankton in the lagoon.

2005: Rongelap began plans to begin a pearl farm. Training was held at Arak for personnel from Rongelap, Bikini, Arno, Ujae and Utrok.

2006: Rongelap began pearl oyster stock assessments with Simon Ellis. Results were: The first assessment was done on October 26-30, 2006, 7,700 oysters were the estimated stocks thru representative sampling. The second assessment was on April 11-May 2, 2007, 6,402 oysters were the estimate. The third assessment was on June 5-July 24, 2008, 5,384 oysters were actual stocks. Prior to grafting, the screening was conducted on Nov. 27-Dec. 16, 2008, 4,584 oysters were counted. Spat collector lines were also established.

MIMRA and CMI began collaborating on producing spat from both hatcheries.

2007 July (yokwe online)-RRE Jaluit farm closed. The lack of hatchery-produced spat was the primary reason for closing both RRE farms.

2009: Grafting occurred on Rongelap and Namdrik. On January 29, 2009 to February 10, 2009 grafting activities were conducted. Out of 4,584 oysters, only 3,306 were seeded, 581 in the next grafting

schedule and 431 pieces were used as mantles.

Meanwhile, the Namdrik community continued spat collection efforts. By early 2009, Namdrik had 1500 pearl oysters ready for seeding and Rongelap, which embarked on pearl farming in 2007, had 3,500, all of which were hatchery generated. Tyrone Tapu visited both atolls in early 2009 to do the first pearl oyster grafting in many years (MIJ 1/23/09). In September 2010, grafting technician Tyrone Tapu traveled to Rongelap and Namdrik.

December 2010 joint pearl sale in Majuro of Rongelap and Namdrik pearls realized a \$31,000 generated in revenue. The Rongelap pearls final harvested numbered 1,368 while Namdrik harvested 517. 561 pearl oysters were re-seeded in Rongelap. Ellis and Haws provided jewelry and marketing training with a grant from SPC.

June 2012 Seacology grant to Namdrik supports designation of 86 acres as MPA. Support was provided to pearl farming so that Apii McLeod could make her first trip to Namdrik in 2012 for grafting and training. Infrastructure was also supported for farm supplies and a grafting house was constructed. The project ended in 2014.

2012, Namdrik wins UNDP “Equator” award.

In 2015, Namdrik received a USAID PACAM grant to support pearl farming development as a means of climate change adaptation. In that same year, Namdrik had enough adult pearl oysters to bring in a grafting technician, Ms. Apii McLeod. She is a skilled grafting technician and comes from a long-standing pearl farming family from Manihiki, Cook Islands. In 2016, the Namdrik community was able to harvest 1061 pearls.

Appendix 12: Code of Practice for Namdrik Pearl farming

The Namdrik Pearl Farm was established with the purpose of providing economic benefits to the community in an environmentally and socially sustainable way. The goal is to meet the “bottom triple line” of providing economic, social and environmental benefits. In order to achieve this, good management practices must be used for farming in order to protect the pearl oysters, the environment, the farmers and the community at large. In general, following the recommendations in the Resource Management Plan will help avoid many possible problems.

Protecting the health of the pearl oysters.

Pearl oysters, like all animals, can become sick and die. Even slightly stressed pearl oysters will produce poor quality pearls which cannot be sold for high prices. The following are some steps to take to keep pearl oysters healthy and producing good pearls.

- Keep densities (number of pearl oysters per a given area) low. Do this by keeping no more than 10 oysters on each chaplet. Chaplets should be kept two arms lengths apart (about 2 yards). Keep the pearl oysters lines at least 40 feet apart. By doing this, pearl oysters will have enough food, clean water and oxygen to keep them healthy.
- Always handle pearl oysters carefully. Do not leave them exposed to the sun and air for more than a few minutes. When transporting pearl oysters, keep them covered and moist by using a covering such as banana leaves, bags or cloth.
- Work rapidly, but gently, whenever it is necessary to take pearl oysters off the line.
- Keep the pearl oysters clean of fouling organisms which compete for food and oxygen. The weight of these can also sink the lines, further harming the oysters.
- Handle pearl oysters particularly carefully after grafting. This procedure is surgery and leaves pearl oysters in a weakened state. Rough handling can kill the oysters and damage the future pearl.
- Pearl oysters should not be killed unless absolutely necessary. Pearl oysters that can't be used for grafting should be returned to the lagoon to breed and thereby increase the number of pearl oysters.
- Do not bring pearl oysters from other lagoons. Spat coming from hatcheries should be inspected for adhering organisms and should be in healthy condition. If possible, spat produced for Namdrik should be from Namdrik broodstock as studies have shown that genetic differences may exist between lagoons.

Protecting the health of the lagoon

Pearl oysters need clean water and a healthy lagoon ecosystem to stay healthy and produce high quality pearls. At the same time, pearl farming can damage the ecosystem. Follow these steps to keep the lagoon in good condition.

- To keep the water quality good, do not allow human or animal waste to enter the lagoon directly or indirectly. Follow the recommendations in the lagoon management plan to reduce contamination of the lagoon.
- Do not dump any rubbish into the lagoon. Chemical waste is particularly harmful, including items such as batteries and electronics.
- Be careful with oil and gas waste. Do not allow outboard motors to leak fuel or oil into the lagoon.
- The waste produced by cleaning pearl oysters will decompose and cause water pollution. Instead of allowing this waste to fall into the lagoon, collect it and dispose of by burying on land on the ocean side.
- Healthy reefs are important to keeping the oysters healthy. Do not damage corals and do not fish around the farm. Fish help keep predators at bay and some fish will help keep the oysters clean.
- Follow the other recommendations in the lagoon management plan to keep the lagoon in good condition.

Protecting People's health and safety

Pearl farming is a strenuous activity that requires hard work and some potentially dangerous activities such as diving. Usually common sense will help keep people safe, but a few extra precautions should be taken.

- Use of SCUBA should only be allowed by people who have received training and have received a certificate.
- SCUBA should be used only for pearl farming activities or related work needs. It should not be used for spear fishing or gathering lagoon resources since it is too easy to over-exploit resources in this way.
- Anyone using SCUBA should always have at least one other person diving with them.
- All SCUBA guidelines such as dive depths and times must be closely followed to avoid injury.
- No one using SCUBA should dive deeper than 60 feet on a routine basis. The exception is for

establishing anchor lines or retrieving broken or sunken lines. Even for this exception, dive depths and times must be carefully calculated and adhered to.

- The compressor and all SCUBA gear should be inspected and maintained regularly by a qualified person. If there is any doubt about the safety of any equipment, it should not be used.
- For persons working by free diving, people should work in pairs and not exceed two hours of work before taking a break. Under no circumstances should workers free dive deeper than 60 feet on a regular basis.
- Children under the age of 16 should not free dive or SCUBA dive for farm work. Children can help with activities on land as long as participation does not interfere with attending school. Children must be supervised by an adult at all times.
- All pearl farm workers should receive basic first aid training.

Achieving Maximum Community Benefits from Pearl Farming

The Namdrik pearl farm was intended to benefit the community by providing employment and economic benefits. In order to achieve this, some basic principles must be accepted and guidelines followed.

- It must be understood that pearl farming is not immediately profitable since costs are high and waiting periods are long. Namdrik pearl harvests have also been small. Therefore, revenues are not likely to be sufficient to make payments to all Namdrik citizens. Much of the pearl farm costs are now covered by grants, not pearl sales. When revenues or grant funds are available, the priorities are in this order: keep the pearl farm operational, pay people who work on the farm, keep a financial reserve for emergencies and necessities.
- In order to benefit from farming, an individual must contribute to the pearl farm by working, providing food or other resources, or contributing some other form of labor related to pearl farming.
- All citizens of Namdrik have a right to be considered for participation in pearl farming activities regardless of gender, age, family relationships or race. An effort will be made to include a wide representation for pearl farming jobs.
- Pearl farming, as well as other forms of aquaculture, are primarily intended to benefit Namdrik citizens. In the case of pearl farming jobs, other aquaculture opportunities or lagoon area for farming, Namdrik citizens will be given preference.
- For any form of aquaculture, all laws and customs of Namdrik and the RMI should be followed, including the need for obtaining permits where legally required.
- Financial records shall be kept and reports made to the community on a regular basis. Any

citizen of Namdrik has the right to review or obtain this information when necessary.

- The Namdrik Atoll Local government shall develop procedures for making decisions about conflicts or disputes related to the pearl farm.
- Until more information is available about the carrying capacity of the lagoon and the relationship between environmental quality, the community pearl farm shall not be expanded beyond 15,000 adult pearl oysters (not including juveniles or spat collectors). Private pearl farms shall not be established.
- The community will hold at least one public meeting each year to review pearl farm activities and provide an accounting to the community.
- For any form of aquaculture or in the case of new pearl farming activities or substantial expansion, a written plan must be developed and reviewed by the relevant experts, including but not limited to the Namdrik Atoll Local Council, CMAC, MIMRA or consultants for a determination of the environmental, economic and social benefits and impacts.

Appendix 13: Recommendations for Climate Change Adaptation

The Namdrik Resource Management Plan contains many recommendations which increase community resilience and help adapt to climate change. Many forms of climate change adaptation are “no regrets option” meaning that if one adopts the recommendation, it will be helpful even if climate change does not occur or if impacts are not severe as predicted. For example, avoiding contamination of sources of potable water is always a good idea, regardless of whether climate change is occurring or not. The following recommendations will help the Namdrik community prepare for changes related to climate change and at the same time, help improve quality of life.

Water resources

Follow the recommendation in the Plan to help ensure water quality and abundance:

- Increase the capacity for water catchment by installing water tanks on all public and private buildings.
- Keep catchment water quality pure by disinfecting or boiling the water before drinking.
- Eradicate rats where possible to avoid contaminating catchment water.

Protect the freshwater lens by:

- Using other sources of water first
- Do not over pump the lens during droughts
- Limit the number of wells
- Keep wells covered to avoid contamination
- Avoid placing wells or taro pits near latrines or pig pens
- Do not engage in earth moving or aggregate collection if these will cause erosion that might effect the lens
- Develop ways to monitor the lens
- Do not clear large areas of trees
- Plant trees in vacant areas

Food security

- Maintain traditional crops and increase the amount of local food being produced
- Increase the number of food producing trees such as breadfruit, bananas and coconuts
- Be sure to cut non-productive coconut trees and plant new coconuts to ensure a constant source for food and copra
- Maintain the practice of preparing local foods such as bwiro, jekaka, jāānkun.
- Teach young people how to prepare and store traditional foods.
- Encourage home or school gardens.
- Consider planting new crops that are healthy such as *bele* (edible hibiscus) or leafy greens.
- Encourage composting since this can help eliminate solid waste, reduces flies (which carry

disease) and produces high quality soil for gardening.

- To prepare for disasters such as storms or droughts associated with El Niño, the community should keep a stock pile of canned food and bottled water in a safe place. Try to choose canned foods which are the healthiest and high in protein such as beans and fish, rather than high fat foods.
- Communicate with the weather service to learn when an El Niño can be expected since this will bring drought. Plant crops that can survive droughts to prepare or have short production times such as sweet potato.
- Begin testing growing taro and other crops in raised beds rather than pits in preparation for times when the pits may be affected by salt water intrusion.
- Encourage sustainable economic development for income in order to assure food security.
- Follow the recommendations in this Plan to manage fisheries resources.

Community health and well-being

In order to survive regular disasters or prolonged climate change impacts, the community must be as physically and mentally healthy and strong as possible. The following is recommended:

- Cooperate with national and local initiatives that promote avoiding health problems such as diabetes, cancer, STD's and teen pregnancy. Encourage health activities such as exercising and smoking cessation.
- Strengthen community organizations that help people organize and cooperate such as WUTMI, Red Cross, church groups, and youth groups.
- Encourage efforts that positively affect mental and social health such as suicide and domestic abuse prevention.
- Plan how each group can contribute to the overall community well being.
- Maintain traditions and practices that bring the community together.
- Strengthen and improve the schools since education helps a community to adapt and be more resilient

Disaster preparedness and recovery

Natural disasters can happen at any time and it is predicted that climate change may cause increased storms and worsen their intensity. Weather patterns may become more predictable. These factors make it important that island communities become more able to prepare for and survival natural disasters.

- Develop a community preparedness plan.
- Team up with the Red Cross to learn first aid, emergency response and evacuation procedures.
- Involve the Namdrik community on Majuro and those living overseas as they can be helpful during emergencies.
- Identify buildings which can be used as shelters. Strengthen these structures and prepare them to handle large number of people in case of emergency.
- Keep in touch with the weather service to be advised about immediate problems with the weather (e.g. storms, high waves) and to learn when an El Niño can be expected since this will bring drought.
- To prepare for disasters such as storms or droughts associated with El Niño, the community

should keep a stock pile of canned food and bottled water in a safe place. Try to choose canned foods which are the healthiest.

- Keep an emergency stock pile of fuel, medicine, batteries and other non-food items that may be needed in case of an emergency.
- Be sure all children are taught to swim
- Make plans to help senior citizens, small children and disabled people in case of an emergency
- Teach emergency drills and first aid in schools.
- Increase the capacity for solar power.
- Keep radios in good shape to ensure communication during emergencies.
- Increase the number of boats and keep them in good shape for use in case of floods or storms.

Coastal Issues

Atolls naturally erode in some areas and enlarge in others. Climate change and sea level rise may change this pattern or speed up erosion and accretion.

- Develop monitoring protocols so that erosion can be tracked.
- Discuss how to handle land ownership in areas which are accreting (growing).
- Make plans to relocate houses or buildings in areas which seem to be eroding the quickest.
- Consider elevating new houses and public buildings where possible.
- Encourage set-backs for new buildings to avoid building in areas that may be affected by flooding or erosion.
- Identify areas where storm surges may impact dwellings or important areas (e.g. grave sites) and make plans for evacuations or relocation during storm surges.
- Do not harden coastal areas or build seawalls as this is expensive and can lead to down-current areas eroding more quickly.
- Identify areas where sand and coral rubble can be safely mined without increasing erosion.
- Do not remove mangroves or other coastal vegetation.
- Plant eroding areas with the appropriate type of vegetation to slow erosion.

