Project Completion Report

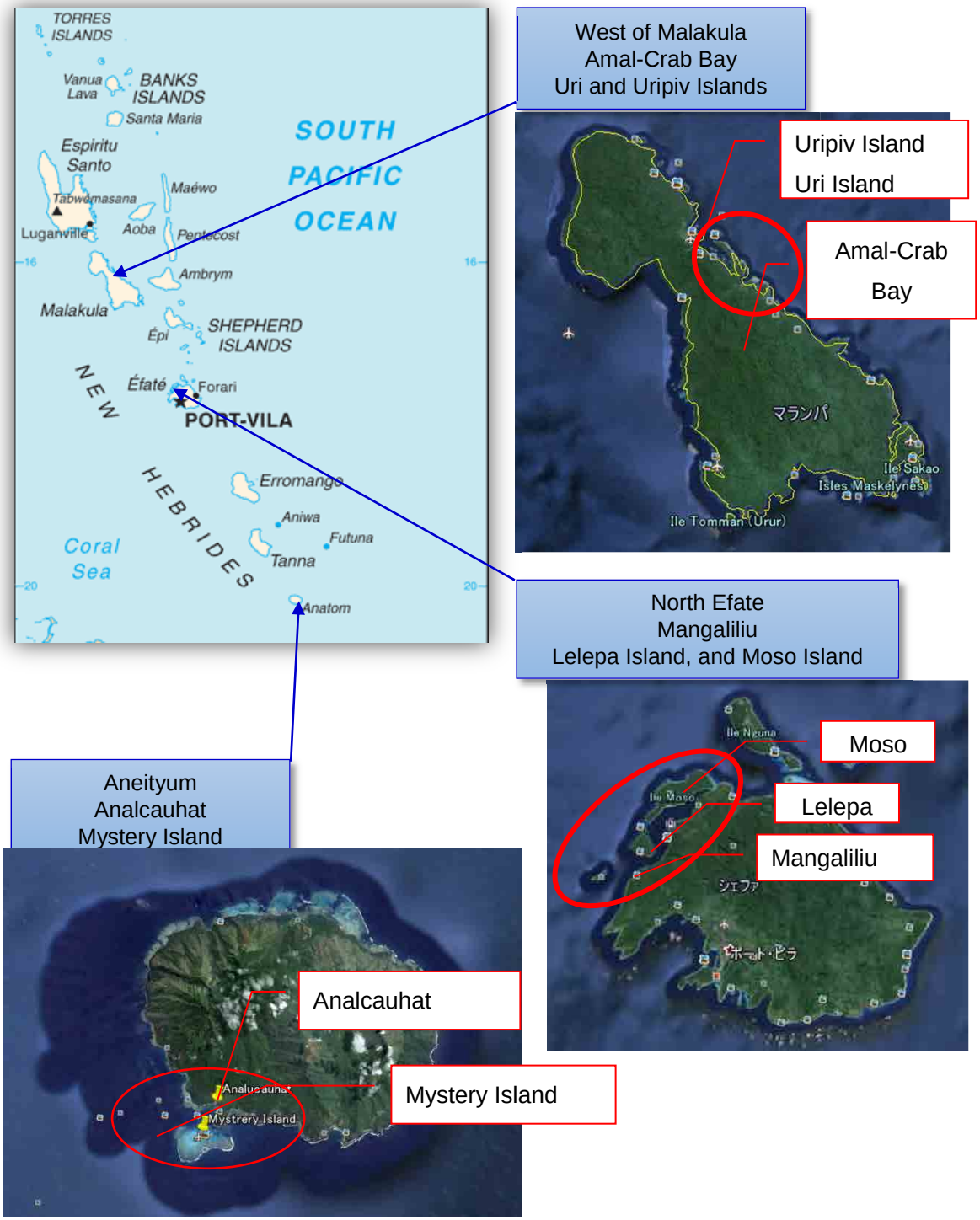
February 2012 - October 2014

Japanese Technical Cooperation Project for Promotion of Grace of the Sea in the Coastal Villages (Phase II)

January 2015

Japan International Cooperation Agency
Vanuatu Fisheries Department
IC Net Limited

The Locations of the Project Areas



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Exchange rate

The following exchange rates are taken from the website of Japan International Cooperation Agency (JICA)
(http://www.jica.go.jp/announce/manual/form/consul_g/ku57pq00000kzv7m-att/rate_201412.pdf)
and the Oanda currency conversion tool
（http://www.oanda.com/lang/ja/currency/converter/）
The exchange rate as of 8 May 2014 (date of the contract).

1Vatu（VUV）= 0. 0107 United States Dollar（US$）
1Vantu = 1.098JPY (Japanese Yen)
1JPY = 0.9107VUV
1JPY = 0.0097USD
1JPY = 0.0105 Australian Dollar（AU$）*
1US$ = 93.887VUV
1US$ = 102.58JPY
1AU$ = 94.94JPY*

（*Exchange rate taken from the Oanda currency conversion tool）

Abbreviations

Abbreviation	Term in Full
CB-CRM	Community-based Coastal Resource Management
C/P	Counterpart
FAD	Fish Aggregating Device
GPS	Global Positioning System
ID/OS	Institutional Development/Organizational Strengthening
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
MPA	Marine Protected Area
PDM	Project Design Matrix
RRA	Rapid Rural Appraisal
SPC	Secretariat of Pacific Communities
VFD	Vanuatu Fisheries Department

Chapter 1. Project Purpose and an Outline of the Outputs

1-1. Background to the Cooperation and Developments before the Project

In the Republic of Vanuatu, many people have self-sufficient lifestyles. However, in recent years, social and economic disparities between urban areas and provincial/outlying island areas have become a major problem.

Many communities in the country are scattered around coastal areas. The community's' lives are largely dependent on coastal resources including marine resources. However, because of the impact of changes in the ecosystems of coastal waters caused by development in coastal areas in recent years as well as climate change, coastal marine resources have declined notably.

In the fishery section of the Vanuatu government's National Development Plan (2006-2015), coastal marine resources are considered extremely important because many people rely on them for their cash income and food for self-subsistence. It recognizes the need for the appropriate management and utilization of coastal marine resources.

Coastal marine resources in the country include shellfish, sea cucumbers, spiny lobsters and crabs. As a conservation measure for these marine organisms, the Ministry of Agriculture, Quarantine, Forestry and Fisheries (MAQFF) manages the resources with fishing restrictions, prohibitions, exportation approvals and authorizations. However, concerning the improvement and dissemination of community-led coastal marine resource management which has traditionally been used in the country, sufficient efforts have not been made because of personnel, technical and budgetary constraints. Although projects for learning aquaculture techniques have been conducted with the support of other countries, activities that require the cooperation of communities (users) have not been conducted such as the direct resource recovery through the release of cultured seeds into the natural environment. In light of this situation, the Vanuatu government asked the Japanese government for technical cooperation on comprehensive coastal marine resource management.

In response to the request, the Japanese government conducted the Technical Cooperation Project for Promotion of Grace of the Sea in the Coastal Villages (Phase I) (2006-2009). In Phase I, the project provided technical support on propagation and culture techniques for shellfish that can easily establish themselves, so that the Vanuatu Fisheries Department (VFD) can launch coastal marine resource management activities with communities. On Efate Island where the headquarters of the VFD is located, the project designated sites for Community-Based Coastal Resource Management (CB-CRM) and supported the establishment of model cases at the sites. As a result, regarding the propagation and culture of shellfish, technology transfers took place for the production of seed and intermediate culture of marine shellfish. At the model sites, activities were launched for the establishment of participatory coastal marine resource management methods.

Based on the results of the technical cooperation project, the Vanuatu government requested the Japanese government to conduct the Japanese Technical Cooperation Project for Promotion of Grace of the Sea in the Coastal Villages (Phase II) (hereinafter referred to as the "Project") for the dissemination of coastal marine resource management methods which were established in Phase I, while also improving community's' livelihoods in order to ensure CB-CRM and its continuation.

1-2. Project Outline

1) The Project Name

Japanese Technical Cooperation Project for Promotion of Grace of the Sea in the Coastal Villages (Phase II)

2) Overall Goals

a. The conservation of the coastal environment and the sustainable use of coastal resources will be strengthened in the project areas.

b. Community-based Coastal Resource Management (CB-CRM) will be disseminated to areas around the project areas.

<Indicators>

a. Positive changes will be observed for at least one of the environmental and resource indicators[1].
b. CB-CRM activities will be conducted in at least one village apart from the pilot project sites[2].

3) Project Purpose

a. CB-CRM will be put into practice effectively in the project areas including outlying islands, through appropriate technical support by the VFD.

<Indicators>

a. At each pilot site, at least one coastal resource management project or its support project will be launched in each community, based on the CB-CRM plan[3].
b. Scores will increase for at least six out of the eight evaluation items listed on the CB-CRM evaluation sheet, at all the pilot sites[4].

4) Outputs and Activities

Output 1. The abilities of the VFD which supports CB-CRM will be strengthened.

<Indicator>

At least 80% of VFD counterparts (C/Ps) will recognize the fact that their techniques and knowledge on CB-CRM have improved through self-evaluation[5].

<Activities>

(a) Improve VFD's abilities concerning the production of the seeds of marine shellfish, the release of shellfish seeds, their management methods, and the creation of business models.
(b) Improve VFD's abilities concerning baseline surveys and analysis.
(c) Improve VFD's abilities concerning the provision of technical support for coastal resource management in communities.

Output 2. Communities in the project areas will obtain techniques and knowledge of coastal resource management approaches.

<Indicator>

At least 80% of C/Ps at the pilot sites will recognize the fact that their techniques and knowledge on CB-CRM have improved through self-evaluation[6].

<Activities>

(a) Conduct participatory coastal resource evaluations and socio-economic surveys in the project areas, jointly with the VFD.
(b) Create organizations for the communities and formulate coastal resource management plans in the project areas, jointly with the VFD.
(c) Implement the coastal resource management plans on a trial basis (as pilot projects) in the project areas, jointly with the VFD.
(d) Conduct monitoring and evaluations concerning the implementation of the coastal resource management plans as well as the revision of the plans, jointly with the VFD.

Output 3. The experiences obtained and lessons learned from coastal resource management

[1] The indicator at the time of the launch of the project was, "There will be positive changes in X (number) environmental and resource indicators."
[2] The indicator at the time of the launch of the project was, "CB-CRM will be conducted in X (number) villages."
[3] The indicator at the time of the launch of the project was, "Coastal resource management will be conducted appropriately in each project area."
[4] The indicator at the time of the launch of the project was, "X% of the community community (households) will participate in coastal resource management."
[5] The indicator at the time of the launch of the project was, "X (number) VFD staff members will have certificates of competence."
[6] The indicators at the time of the launch of the project were, "(a) The coastal resource management approaches selected by the communities will be technically appropriate," and "(b) X (number) coastal resource management methods will be appropriately utilized by each community."

practices will be compiled and integrated.

<Indicator>

(a) At least three effective CB-CRM practices (measures) will be presented at national or regional forums.

<Activities>

(a) Compile the experiences obtained and lessons learned from coastal resource management activities, jointly with the VFD.

(b) Integrate the experiences obtained and the lessons learned from coastal resource management activities and share them with stakeholders, jointly with the VFD.

1-3. Project Implementation Period

The Project was conducted from January 2012 to January 2015 (for 37 months), of which local operations were conducted from February 2012 to October 2014 (for 34 months).

1-4. Project Areas

The Project was conducted in the following three areas.

- The Northern Efate area: Mangaliliu, Lelepa Island and Moso Island
- The eastern Malakula area: Amal Crab Bay, Uripiv Island and Uri Island
- The Aneityum area: Analcauhat and Mystery Island

1-5. Inputs

1-5-1. Inputs from Japan

1) Input of Experts

During the project period, seven Japanese experts were dispatched. They visited Vanuatu 42 times in total during the three years and conducted 54.7 man-months (1,639 man-days) of local operations. The experts were in charge of the following areas: coastal resource management, resource surveys and environmental monitoring (the Chief Advisor); livelihood improvement (the Deputy Chief Advisor); the propagation and culture of marine shellfish; fishing method diversification; participatory development ① and socio-economic surveys ①; participatory development ② and socio-economic surveys ②. Please see Appendix 1 (Assignment of Japanese experts) for details.

2) Provision of Machinery and Equipment

As machinery and equipment for fishing operations, the Project provided bathythermographs, fishfinders, portable GPS units, materials for the fish aggregating device (FAD) including buoys, ropes and metal fittings, fishing gear for the diamondback squid, small outboard engines (five horsepower), etc. As machinery and equipment for the propagation and culture of marine shellfish, the Project provided diving gear (two sets), etc. To improve the distribution of marine products caught and to promote statistical data collection activities, the Project provided small solar freezers and laptop computers. The Project also provided laptop computers and printers as equipment for the project office. The VFD which received the machinery and equipment pledged in writing that it would continue to use the machinery and equipment effectively for the development of project outputs. Please see Appendix 2 (Deed of Donation) for details.

3) Implementation of Workshops and Training

The Project conducted a total of 27 workshops and training sessions during the three-year period. It conducted many workshops and training sessions at the pilot project sites in addition to the VFD headquarters in Port Vila. Workshops for shell polishing and marketing as well as workshops for the "fish café" business were held so that women as well as fishermen can participate. Please see Appendix 3 (Workshops and Training Sessions Held) for details.

4) Local Expenditures

Japan paid for the various items needed for the implementation of the project, including: holding

workshops, training sessions and study tours; construction and deployment of FAD units; the purchase of machinery, equipment and materials for shell polishing; the construction of modified canoes; the implementation of test fishing; and the creation of PR materials. The total amount of local expenditures over the three years is expected to be 46,175,000 yen[7].

1-5-2. Inputs from Vanuatu

1) Assignment of C/Ps

In the Project, the VFD deployed its 12 staff members as C/Ps of the Project (see Appendix 4 for details). The Director of the VFD served as the project manager. Staff members of the Fisheries Development and Capture Division and the Research and Aquaculture Division as well as fisheries extension workers in the target provinces of the Project were engaged in project activities as C/Ps. The Management and Policy Division provided personnel support for the Project where necessary, although it did not officially deploy C/Ps. In addition, Marine Protected Area (MPA) management committee members and young leaders in the target communities cooperated in the implementation of pilot project activities as well as the revision and formulation of coastal resource management plans, as community C/Ps. In particular, in the Aneityum area where no VFD staff members were deployed, the "community fisheries extension workers" who were voluntarily appointed by the VFD worked hard on the liaison and coordination between the Project and local sites. By the end of the Project, community fisheries extension workers were recognized as formal positions at the VFD (volunteer positions).

2) Expenditures by the C/Ps

The C/Ps spent an estimated amount of 400,000 vatus (equivalent to 451,600 yen[8]) as utilities costs for the project office and for running the hatchery.

[7] This is the estimated amount as of the end of October 2014. The expenditure for the third year has not been finalized. It was estimated on the premise that the contract amount will be spent in full.

[8] The amount was converted using an exchange rate of 1.129 vatus to one yen which was JICA's settlement rate in October 2014.

Chapter 2. Outline of the Project Activities

2-1. Baseline Surveys

As the first field activities of the Project, baseline surveys were conducted with the aim of understanding the current situation concerning coastal resource management, socio-economy and fishing activities in the three project areas. To obtain reliable information from various stakeholders from various angles, field surveys were conducted by combining interviews with individuals and workshops. The table below shows the main basic components of the baseline surveys.

Table 2-1: Content of the Baseline Surveys

Surveys	Survey period	Target group and method for the survey	Purpose of the survey
Questionnaire surveys	June-July 2012	Interviews with individual community in the target area using questionnaires	To collect data on the family composition, income, social activities, organizations they participate in, coastal resource management activities and awareness, etc.
Rapid Rural Appraisal (RRA) workshops	June 2012	Participatory workshops with community members using the RRA survey tools (charts on organizational relationships, fishing calendars, mapping of fishing grounds, analysis of problems and objectives, etc.)	To collect information on organizations related to coastal resource management and fishing activities, target species, fishing seasons, fishing methods, sea conditions, the locations of fishing grounds, customers, fish prices, issues and problems concerning coastal resource management, etc.
The Institutional Development / Organizational Strengthening (ID/OS) workshop	July 11-13, 2012	A workshop with VFD staff using the ID/OS method	To conduct external factor analysis (opportunities and threats) and internal factor analysis (strengths and weaknesses) for the promotion of coastal resource management, and the formulation of draft strategies for VFD's activities
Feedback workshops	August 2012	Simplified workshops with community members in charge of coastal resource management	To give feed back of the results of the surveys and workshops, and checking draft pilot project plans

2-1-1. Survey method

The Project designed the baseline survey with four different steps i.e. questionnaire, RRA workshop, ID/OS workshop, and feedback seminar in order to grasp the current situation of coastal resource management from various perspectives.

1) Questionnaire Surveys in the Target communities: June-July 2012

The Project prepared questionnaires for communities, in order to identify the current socio-economic situation and the current coastal resource management situation in the target communities. Project staff gave guidance and explanations about the survey method and content to young leaders and MPA committee members involved in coastal resource management activities, prior to the surveys. The young leaders and MPA committee members then conducted interviews with individual communities.

Table2-2: Content and Dates of Questionnaire Surveys as Part of the Baseline Surveys

Activity	Location	Dates	Description
On-site training for questionnaire surveys	The Northern Efate area	May 7-9	An explanation on the questionnaires was given to MPA committee members and young leaders, who then practiced interviews.
	The Malakula area	May 11-14	
	The Aneityum area	May 21-24	
Questionnaire surveys	Each target site	May-June	Interviews with individual community members using the questionnaires in each project area
Entering collected data	The VFD	June-July	Experts and VFD staff entered onto computers the answers on the collected questionnaire sheets.

Three questionnaires shown in the table below were prepared, in order to obtain detailed information about the current socio-economic situation, the current social capital situation, the awareness about and interests in coastal resource management in the target communities (see the attached baseline survey report for details of the questionnaires).

Table2-3: Outline of the Questionnaires Used in the Baseline Surveys

	Objective	Main items surveyed	Target
Questionnaire 1	Socio-economy of the community	The socio-economic situation (the population composition, the industrial composition, etc.) Social capital (the extent to which public facilities such as schools and clinics and infrastructure such as water and power supply systems have been developed, the compositions and activeness of community organizations, etc.)	Community leaders
Questionnaire 2	Socio-economy of each family	The socio-economic situation in each family (the family composition, income, etc.) Factors supporting social capital (levels of participation and interest in community organization activities)	Heads of families
Questionnaire 3	Awareness about coastal resource management activities	The levels of understanding about MPA management plans, the levels of participation in MPA management activities, interest in MPA activities, etc.	Multiple people by sex and by age

Photographs: Questionnaire Surveys in the Project Areas (May-June 2012)

	
Explanation and guidance on questionnaire surveys by VFD staff (in the Malakula area, May 2012)	Explanation and guidance on questionnaire surveys by VFD staff (Mangaliliu on Efate Island, May 2012)

2) RRA Workshops with Stakeholders in the Target Communities: June 2012

A one or two-day participatory workshop was held at each target community. VFD staff and experts served as facilitators. The current coastal resource management and fishing activities were discussed and summarized with community members, using the RRA-method survey tools.

Table2-4: Content of the Surveys Conducted through RRA Workshops

Survey tool	Description
Fishing ground map	Coastal and offshore sea conditions and main fishing grounds for each fish species were analyzed by looking at the map of each project area.
Fishing calendars	Main target species were listed and the fishing seasons, fishing methods, sales prices, customers, etc. were analyzed for each fish species.
Analysis of problems and objectives	Problems that the communities would face when conducting coastal resource management activities were analyzed. The problems were categorized and the main issues concerning coastal resource management were identified. Solutions to each problem were then discussed.

Photographs: RRA Workshops in the Project Areas (June-July 2012)

	
An RRA workshop with community. In the Efate area, workshops were held in four target communities individually (the photograph was taken in Tasiriki on Moso Island in the Efate area, in June 2012).	The RRA workshop with the Crab Bay MPA committee (in Lakatoro on Malakula Island, in June 2012). Representatives of 16 target communities participated in the workshop.

3) The ID/OS Workshop with VFD Staff: July 2012

To create a strategic map for coastal resource management, the Project held a three-day workshop

for VFD staff. Using the ID/OS method which is a participatory analysis method for organizational strengthening, draft strategies for VFD's activities for the promotion and dissemination of CB-CRM activities were considered and created through discussions with VFD headquarters staff and fisheries extension workers.

The Project set the basic question, "How can the VFD contribute to the promotion of coastal resource management activities?" for the workshop and facilitated participants' discussions based on this question.

Table2-5: Content of the ID/OS Workshop (July 2012)

Survey tool	Description of the discussions
Institution-gramme	Government agencies, NGOs and community organizations related to the promotion and dissemination of coastal resource management were listed and their relationships with the VFD were analyzed in detail.
External factor analysis	External incentives (opportunities) and disincentives (threats) for VFD's coastal resource management activities were listed and the characteristics of each external factor were analyzed.
Internal factor analysis	VFD's internal incentives (strengths) and disincentives (weaknesses) for its coastal resource management activities were listed and the characteristics of each internal factor were analyzed.
The creation of a draft strategy matrix	Based on the results of the analysis of external factors (opportunities and threats) and internal factors (strengths and weaknesses) mentioned above, the participants analyzed VFD's activities that are needed to achieve: (1) the utilization of opportunities using VFD's strengths; (2) the utilization of opportunities by overcoming VFD's weaknesses; (3) overcoming threats using VFD's strengths; and (4) overcoming threats by overcoming VFD's weaknesses.

Photographs: The ID/OS Workshop with VFD Staff (July 2012)

The ID/OS workshop at the VFD headquarters (Port Vila, July 2012). VFD headquarters staff and fisheries extension workers participated in the workshop.

Experts and C/Ps jointly served as facilitators to encourage discussions by VFD staff.

As a result of the workshop, six major strategies for the VFD were identified for the promotion and dissemination of coastal resource management, as shown below. For each strategy, the participants also discussed ideas on specific activities for the organizational strengthening of the VFD, which are needed to use its strengths and overcome its weaknesses.

- Improvement in the distribution of local marine products
- Strengthening the collection of fishing data by fishery organizations
- Respecting and strengthening traditional resource management systems
- Establishing and strengthening the activities of fishery organizations and fishermen's associations
- The establishment of local fish markets

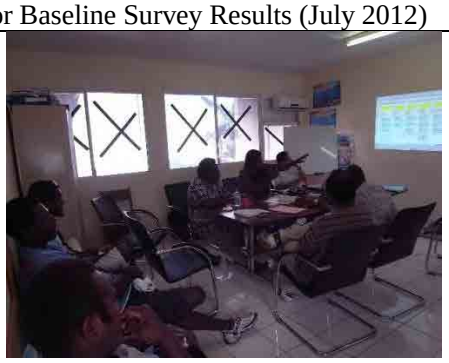
- Strengthening CB-CRM activities

It was decided that draft pilot project plans would be considered and compiled, based on the draft strategies. Please see the attached baseline survey report for the final results of the workshop.

4) Feedback Workshops: August-September 2012

A feedback workshop was held in each project area, in order to report the results of the field surveys and workshops explained above to the target communities as well as to reconfirm the survey results. MPA committee members and community leaders participated in the workshops. Project staff also introduced their ideas about pilot projects and checked the interest of the community members.

Photographs: Feedback Workshops for Baseline Survey Results (July 2012)

	
A feedback workshop was held in each project area in order to feed the results of the field surveys back to the communities and confirm the results (in the Aneityum area, July 2012).	The feedback workshop in the Northern Efate area. Community representatives gathered at the VFD and confirmed the survey results with VFD staff (July 2012).

2-1-2. Outline of the result of the baseline survey

(1) Economic activities at the target communities

The result of the questionnaire survey in summarized in table 2-6. The most important economic activity for male and female for all the target communities is the agriculture. As for fishery, male in Northern Efate and Malakula think it is second most important. In Aneityum, male think fishery is the third most important economic activity after agriculture and tourism). For female, fishery is the third most important for Northern Efate (after agriculture and handicraft), for Malakula (after agriculture and marketing), and Aneityum (after agriculture and tourism).

Table 2-6：Ranking of the economic activities by sites and sex

Sex	Economic activity	Northern Efate	Malakula	Aneityum
Male	Agriculture	A	A	A
	Fishery	**C**	**C**	**C**
	Forestry	D	-	C
	Tourism	D	-	B
	Livestock	D	D	D
	Marketing	E	D	-
Female	Agriculture	A	A	A
	Fishery	**D**	**E**	**E**
	Forestry	E	-	-
	Tourism	-	-	A
	Livestock	-	E	E

	Marketing	D	B	-
	Handicraft	B	E	E
	Church	-	E	-

*：Note: The ranks of economic activities are quantified as scores with the following rules: First-ranked economic activity: 3.0; second-ranked, 2.0; and third-ranked, 1.0. The average score was classified with the following criteria: A: more than 2.0, B: between 1.5 and 1.9, C: between 1.0 and 1.4, D: between 0.5～0.9, E: less than 0.4.

Table 2-7 shows the average income by each economic activity. Income from fishery accounts approximately 20% in Northern Efate, and 10% in Malakula and Aneityum), indicating possibly higher dependence on fishery in Northern Efate. In LELEMA area (Mangaliliu and Lelepa), average income from fishery was higher than the agriculture. In Northern Efate and Aneityum, the income from tourism accounts more than 20%, indicating that the tourism is one of the most important economic activities in the area.

In all the area, the total income from agriculture, fishery, and livestock accounts less than half. The larger share is accounted by tourism, remittance from family, marketing, and salary.

Table 2-7: Average income by different economic activity

Income source	Northern Efate				Malakula				Aneityum	
	Lelema		Moso		Crab Bay		Uri/ Uripiv			
	Amount (Vatu)	share (%)	Amount (Vatu)	share (%)	Amount (Vatu)	share (%)	Amount (Vatu)	share (%)	Amount (Vatu)	share (%)
Fishery	11,190	21.5%	9,100	22.9%	8,914	9.2%	3,412	17.0%	13,179	12.1%
Agriculture	5,100	9.8%	8,318	20.9%	17,235	17.8%	2,938	14.7%	12,080	11.1%
Livestock	7,250	13.9%	-	-	8,583	8.9%	-	-	9,125	8.4%
Tourism	14,125	27.1%	8,750	22.0%	-	-	-	-	27,467	25.3%
Remittance	-	-	-	-	37,333	38.6%	-	-	10,000	9.2%
Others	14,375	27.6%	13,600	34.2%	24,692	25.5%	13,667	68.3%	36,667	33.8%
Total	52,040		39,768		96,757		20,017		108,518	

(2) Current status of fishing activity

The information collected through the questionnaire survey and RRA workshop is summarized into table 2-8. Within the reef, community people targets on small reef fish, shellfish, lobsters. Off the reef, small and large pelagic and bottom fish are exploited. The red snapper fishery (called “Poulet” in Vanuatu) with bottom vertical long line is popular in Vanuatu. In Northern Efate and Malakula, the mangrove crab is popular fishery.

Table 2-8: target species by area

Fishing ground	Species	Area		
		Northern Efate	Malakula	Aneityum
Within reef	Fish	Parrot fish, blue fish etc.	Parrot fish, blue fish etc.	Parrot fish, blue fish etc.
	Shellfish	Giant clam	Giant clam	Trochus, green snail and Giant clam
	Crustacean	Lobster	Lobster	Lobster
	others	Octopus, squid	Octopus	Octopus
Outside reef	Pelagic (coastal)	Horse mackerel, sardine	Horse mackerel, sardine	Horse mackerel, sardine
	Pelagic (Offshore)	Yellow fin tuna, skipjack tuna, Wahoo, Dolphin fish, marine	Yellow fin tuna, skipjack tuna	Yellow fin tuna, wahoo, marine
	demersal	Poulet, snappers	Poulet, snappers, grouper	Poulet, snappers, grouper
others	Crustacean	Mangrove crab	Mangrove crab, land crab	

Figure 2-1 shows the share of catch by fishing ground. In Moso Island in Northern Efate, the share of fish catch in reef area in quite high due to the large reef area between Moso Island and Efate main island. On the other hand, Lelepa area depends more on the fish catch outside the reef or offshore. In Uri and Uripiv Islands in Malakula depends more on the fish catch within the reef. Around the Crab Bay area the most part of the reef is protected as MPA and fishing activity occurs off the reef. In Aneityum the fish is caught more off the reef or offshore, and the coastal reef is well managed by community or clan.
In Lelema in Northern Efate and Aneityum, the exploitation of the offshore fish is developed to some extent, and it may be easier to adopt the introduction of FAD and pelagic fishery.

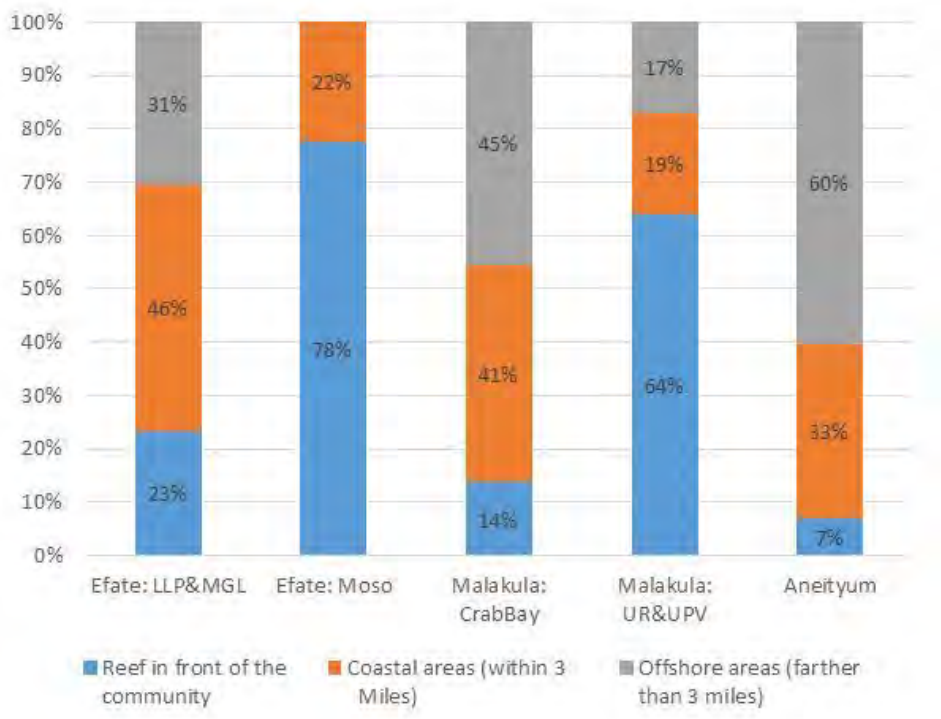


Figure2-1: the share of catch by fishing ground

The marketing of fish is summarized in table 2-9.

Table 2-9: Marketing channel by area

Marketing channel	Area		
	Northern Efate	Malakula	Aneityum
Within community	25 %	31 %	75 %
Nearby market	100 %	56 %	0 %
Middlemen	0 %	0 %	0 %
Local shop	0 %	31 %	50 %
Home consumption	25 %	44 %	50 %

As the table shows, the higher percentage of fish is sold in nearby market, indicating the importance of access to bigger market. In case of Aneityum, marketing activity is limited inside the island, indicating the necessity of creating new market channel.

(3) Current status of coastal fisheries resource

The information on the current status of coastal fisheries resource was collected through the workshop with community members. Table 2-10 shows the status of main fisheries resource in each area. In Northern Efate, community people have concern over the declining trend of fisheries resources within the reef. In Malakula, community people recognize that the fisheries resources either inside and outside reef are stable or increasing as there are not so many fishers or poachers. In Aneityum, people think that fisheries resource inside MPA is well protected but it is declining outside MPA, especially marine shellfish and lobster.

As for fisheries resource off the reef, Northern Efate and Aneityum thinks that small pelagic resource is declining, but offshore pelagic resource and demersal fisheries resource is stable or increasing. This may be due to the under-utilization of offshore fisheries resource. Land crab in Malakula is believed to be declining both inside and outside MPA, indicating that management activity by MPA committee is not working well.

Table 2-10: Status of main fisheries resource in each area

Fishing ground	Species	Northern Efate				Malakula				Aneityum	
		Lelepa		Moso		Crab Bay		Uri/ Uripiv			
		In MPA	Out of MPA	In MPA	Out of MPA	In MPA	Out of MPA	In MPA	Out of MPA	In MPA	Out of MPA
Inside reef	Fish	→	↓	↓	↓	↑	↑	↑	↑	↑	↑
	Shellfish	→	→	-	-	↑	↑	↑	↑	↑	↓
	Crustacean	↓	↓	-	↓	↑	↑	↑	↑	↑	↓
	Others	↑	↓	↓	↓	↑	↑	↑	↑	↑	↓
Outside reef	Coastal pelagic	↑ ↓	↑ ↓	↓	↓	↑	↑	↑	↑	↓	-
	Offshore pelagic	-	↑	-	→	-	↑	-	↑	-	↑
	Demersal	-	↑	-	→	-	↑	-	↓	-	↑
Others	Land crab	-	-	-	-	↓	↓	↓	↓	-	-

The Questionnaire survey collected information on the coastal fisheries resource trend in each area. Figure 2-2 shows that people in Moso Island think that the resource is declining a lot indicating the excessive fishing pressure in the reef area. In Lelema area, the higher percentage of people answered that the resource is declining. In summary, the declining trend of coastal fisheries resources is clearer

in Northern Efate than the other areas, possibly due to be absence of MPA committee in Northern Efate.

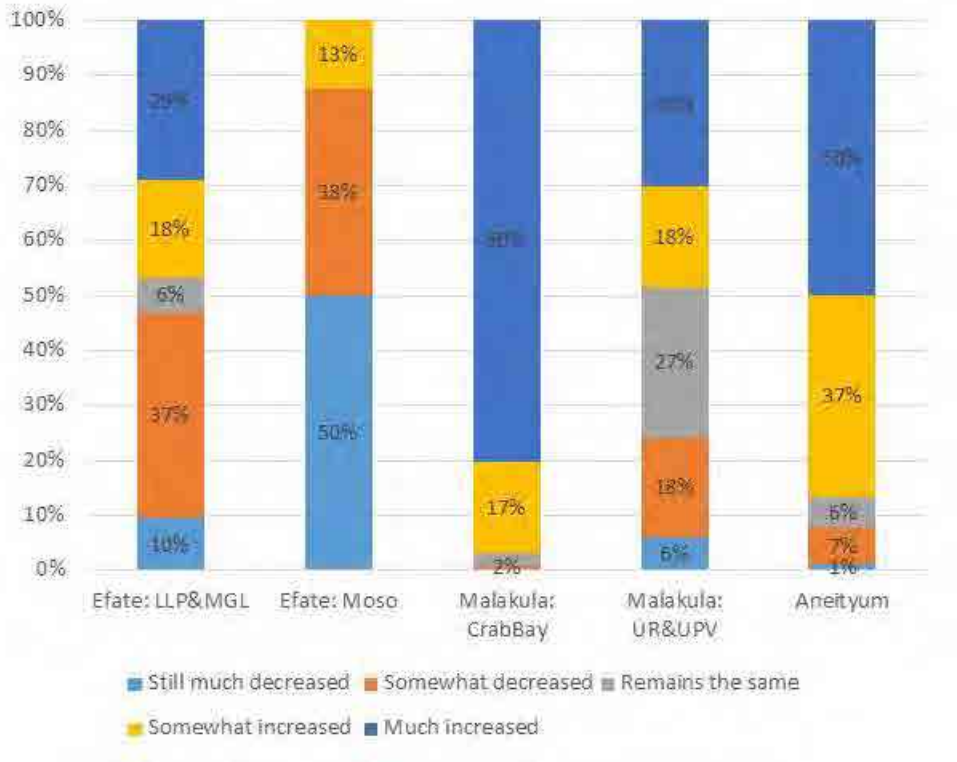


Figure 2-2: Coastal fisheries resource trend in each area

(3) awareness of community people for social activity

Figure 2-3 shows the awareness of community people for social activity. In Malakula and Aneityum, the higher percentage of people showed willingness to participate in social activity compared with Northern Efate. In Northern Efate, it may hold true that the traditional social system and by-laws is weakening.

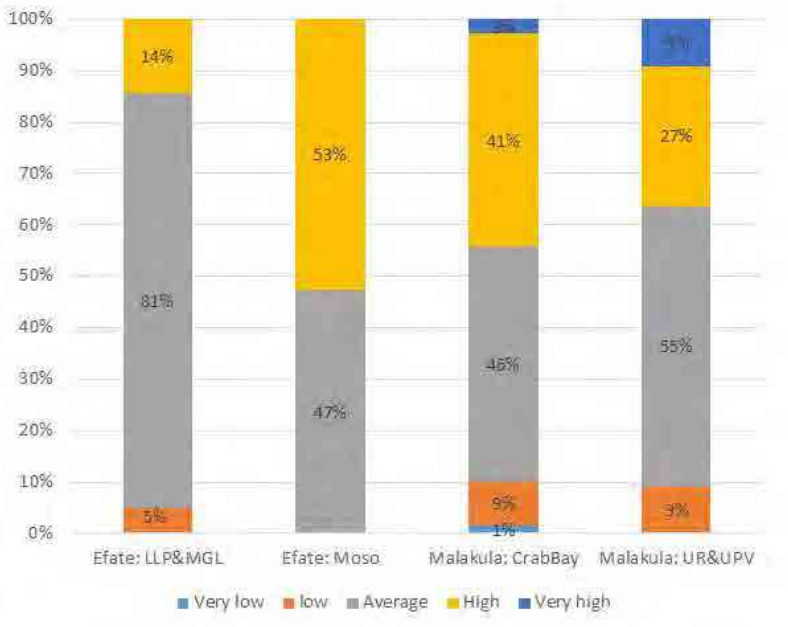


Figure 2-3: Awareness of community people for social activity.

Table 2-11 shows the willingness of community people to provide fund/labor for community. In Northern Efate and Aneityum, higher percentage (60-70%) of people thinks they can provide both fund and labor for the community. In Malakula, more than 60% of people answered that they cannot provide fund for community activity. As for the provision of labor, 80% of people in Crab Bay think they cannot provide the labor, but 90% of people in Uripiv thinks that they can provide the labor.

Table 2-11: willingness of community people to provide fund/labor for community activity

	Answer	Northern Efate	Malakula		Aneityum
		Lelema	Crab Bay	Uri/Uripiv	
Fund	Yes	56 %	31 %	45 %	68 %
	No	44 %	69 %	55 %	32 %
Labor	Yes	74 %	20 %	89 %	62 %
	No	26 %	80 %	11 %	38 %

(5) Understanding on the MPA management plan

For each area, there has been an existing MPA management plan made under the supervision of VFD even before this project started. Figure 2-4 shows the level of the understandings on the existing MPA management plan by the community members. In Aneityum, the level of understandings on MPA management plan by community is lower than that of Northern Efate and Malakula. It may be affected by the limited area for the MPA management plan in Aneityum, and lack of sufficient support from VFD due to its remoteness. The Lelema in Northern Efate and Crab Bay in Malakula showed high level of understandings on the existing MPA management plan.

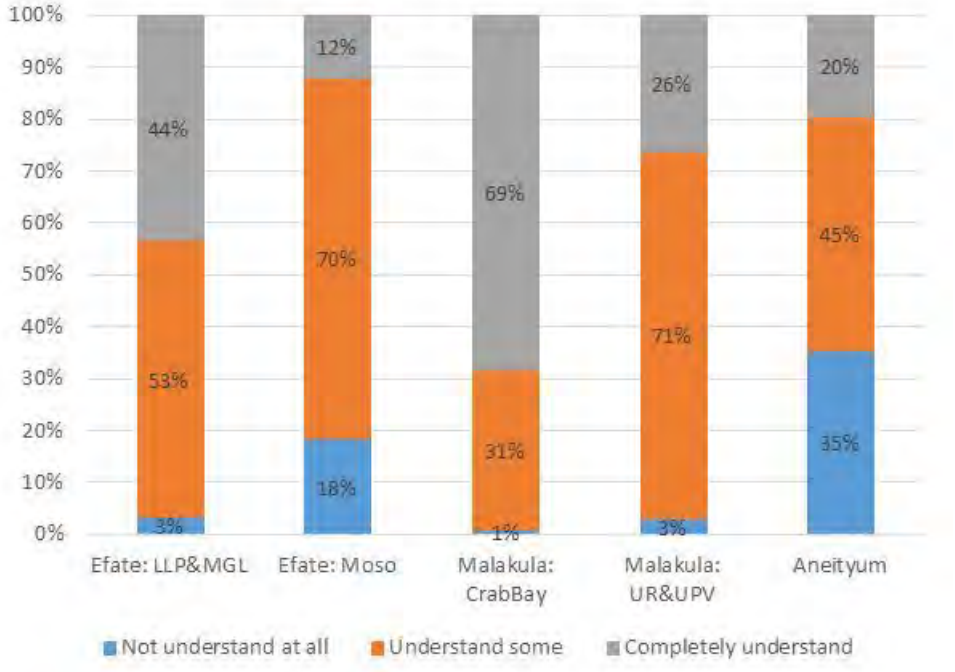


Figure2-4: Understanding on the MPA management plan by area

Figure 2-5 shows the appropriateness of the existing MPA management plan. In all the areas, between 70 and 90 % of respondents think that the contents of the existing MPA management plan is appropriate. Like figure 2-4 (understandings on the existing MPA management plan), lower percentage of the respondents in Aneityum answered that the existing MPA management plan is appropriate.

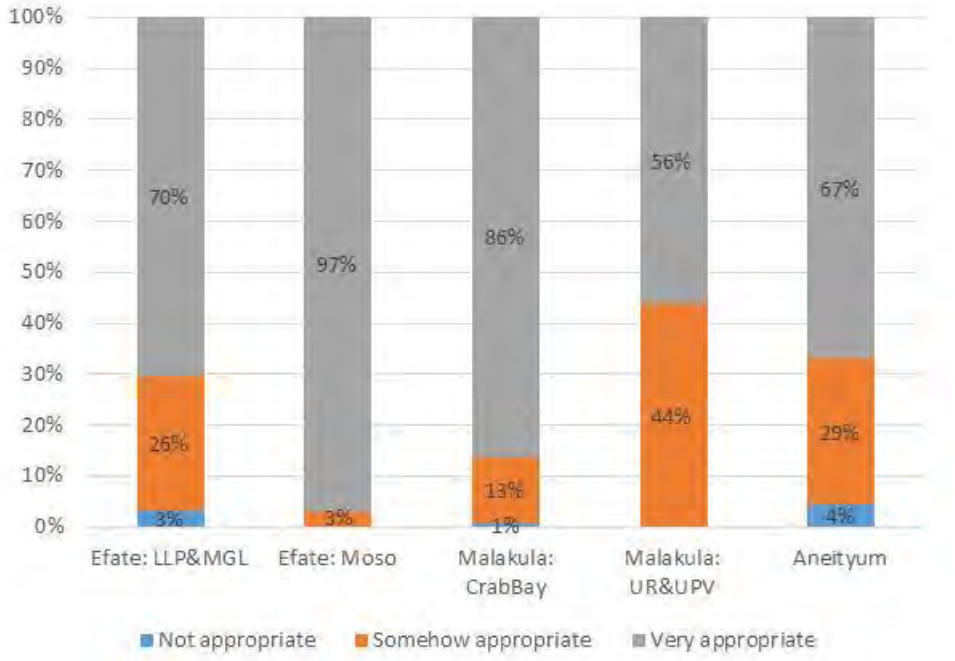


Figure 2-5: Appropriateness of the existing MPA management plan

Figure 2-6 shows the percentage of the community members who answered that he/she participated in any CB-CRM activity after making MPA management plan. Overall, more than 80% of respondents participated in some CB-CRM activity, indicating that making of MPA management plan could promote the participation of community members in CB-CRM. However, in Moso Island in Northern Efate the high percentage of community members answered that they did not participate in any CB-CRM activity after the MPA management plan was made.

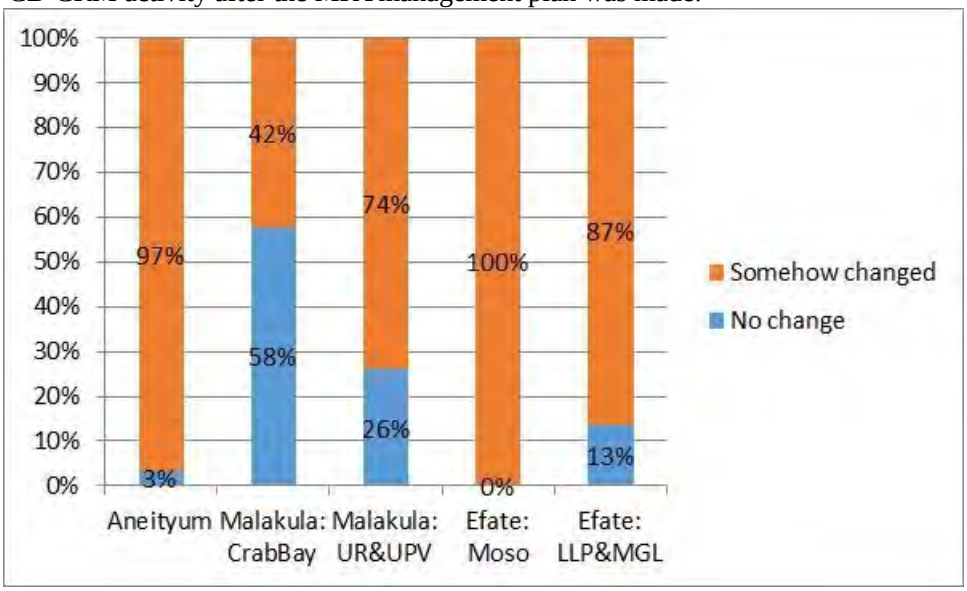


Figure 2-6: Percentage of the community members who answered that he/she participated in any CB-CRM activity after making MPA management plan

(6) Issues on CB-CRM activity

Table 2-12 is the summary of the result of workshop with community members done for problem and objective analyses.

Table2-12: Main Issues of CB-CRM in Each Project Area

Project area		The main issues identified through the baseline surveys
The Northern Efate area	Mangaliliu	• Creation of the alternative income (Freshwater shrimp farming shell polishing, expansion of farm for agriculture) • Tourism development (building of the bungalow, construction of access road) • Establishment of the fishermen's association (procurement of fishing boats and equipment)
	Lelepa	• Marketing of fish (processing facility, marketing of giant clam for aquarium) • Alternative income (equipment for shell polishing, training for tourism development, lodge for tourists) • Diversification of fishery (introduction of FAD fishery and new fishing method)
	Tasiriki	• Education (kindergarten and primary education) • Alternative income (cooking, sewing, and advertisement for tourists)
	Sunae	• Alternative income (tourism development with kayak, tourist attraction by giant clam, guesthouse) • Formulation and implementation of MPA management plan • Improvement of education
The Malakula area		• Prevention of poaching (regular meeting and enforcement of the rule) • Shortage of the fund for MPA committee • Difficulty in the MPA management (boat for monitoring, portable water in Crab Bay)
The Aneityum area		• Alternative income (provision of fish to the tourists, procurement of freezer and ice-making machine, fish processing) • Improvement of education for community (awareness raising at school, distribution of video and poster, data collection on fishing activity) • Establishment of the fishermen's association (procurement of fishing boats and equipment)

（7） Issues on the supporting capacity of VFD for CB-CRM

VFD has been conducting various activities for the promotion of CB-CRM through the phase I of the Project, and other projects financed by other donors. However, the sufficient levels of achievements were not realized. With this in mind, the Project conducted ID/OS workshop. The main external factors affecting the promotion of CB-CRM were analyzed as shown in the table 2-13

Table 2-13: Main external factors affecting the promotion of CB-CRM

Opportunity	Threat
1. Large domestic demand for fish	1. It takes long time to establish fishermen association
2. fishermen association cooperate for the data collection on fish catch	1. Majority of community members engaged in fishery is not registered
3. Traditional social governance system sustain the CB-CRM	1. There is no fish market for local fishers

*the number shows the result of voting by the participants of the workshop (as to which factor is most important)

Based on the above external factors, the VFD discussed on the approaches to utilize the opportunities or mitigate the threat for the promotion of CB-CRM. These approaches were taken into account in the designing of the pilot projects.

Table2-14: Approaches for VFD to promote CB-CRM

	Main external factors	Approaches to be taken to promote CB-CRM
Opportunity	Large domestic demand for fish	Market development for fish

	Fishermen association cooperate for the data collection on fish catch	Collaboration with community organizations in charge of CB-CRM to collect data on fish catch
	Traditional social governance system sustain the CB-CRM	Promotion of collaboration with decision-makers in community such as chief
Threat	It takes long time to establish fishermen association	Capacity development of the community organizations which implement CB-CRM activity
	Majority of community members engaged in fishery is not registered	Organization of fishermen association to promote registration of fishers
	There is no fish market for local fishers	Establishment and management of the fish market at community level

From the internal factor analysis, following strength and weakness were identified. CB-CRM activities could be promoted by utilizing the strength or mitigating the weakness.

Table2-15: Main internal factors affecting the promotion of CB-CRM

Strength	Weakness
1. VFD staff have capacity for the data collection and analysis on fish catch	1. There is no regular meeting
2. VFD have accumulated research information	2. There is no policy for coastal fisheries
3. VFD can exempt tax on fuel for the registered fishers	3. The data collection on fish catch by fisheries extension officer has stopped
4. VFD always collaborate with MP management committee	3. There is reporting of data on fish catch from fisheries extension officer
4. VFD extension officer has good relationship with provincial government	3. There is no enough follow up by VFD officer
4. VFD can provide small scale financial support in collaboration with local NGO	6. Financial management by fisheries extension officer is not sufficient

*the number shows the result of voting by the participants of the workshop (as to which factor is most important)

2-1-3 Issues on CB-CRM identified through the baseline survey

Issues on CB-CRM identified through the baseline survey can be summarized as in the table below. The project designed the pilot projects taking into account these issues

Table2-16: Issues on CB-CRM at each area

	Northern Efate	Malakula	Aneityum
Main economic activity	Agriculture, tourism, fisheries	Agriculture, marketing, fisheries	Agriculture, tourism, fisheries
Percentage of income from fisheries	About 20%	About 10%	About 10%
Status of fisheries resource (coastal area)	Declining both inside and outside MPA	Stable inside MPA Declining outside MPA	Stable inside MPA Declining outside MPA
Status of fisheries resource (offshore)	Good	Good	Good
Interest and participation in the social activities in community	Middle	Crab Bay: High Uri/ Uripiv: Middle	High
Understandings on MPA management plan	Lelepa: high Moso island: middle	Crab Bay: High Uri/ Uripiv: middle	Middle
Participation in CB-CRM	Lelepa: middle	Crab Bay: Middle	High

activity	Moso: low	Uri/ Uripiv: High	
Main issues in CB-CRM	Development of alternative income source Linkage with Tourism development Market development for fish Fishing method diversification Establishment of MPA management organization	Shortage of fund for MPA management committee Prevention of poaching	Development of alternative income source Awareness building on CB-CRM for community Establishment of fishers association

The different characteristics on CB-CRM by each area are summarized into the table below. This also was taken into account in designing the pilot projects.

Table2-17: Different characteristics on CB-CRM by each area

Area	Characteristics on CB-CRM
Northern Efate	• MPA management plan exists (made during the phase I of the Project) but not well respected by community • There are conflicts over the use of fishing ground • There is no collaboration between Lelema and Moso Island. Especially, the community in Moso Island has low interest in working together
Malakula	• 16 communities participate in the management of land crab in Crab Bay and coordination is difficult • In Uri and Uripiv Islands, the coastal resource and economic status are in difficult situation. On the other hand, the remaining 14 communities in the main island of Malakula is relatively well off. There is a socio-economical gap between main island and remote islands. • Due to the shortage of fund, monitoring activities in Crab Bay is very limited
Aneityum	• There is a pressure for the temporal opening of MPA • The only fisheries resource sold to the tourists is lobster. Hence the fishing pressure on lobster is too high. • There is no VFD staff assigned in the island. VFD officer visit several times per year and provide limited governmental service.

2-1-4 Designing of the pilot projects

When considering effective and efficient approaches to coastal resource management activities, the activities can be divided into the following three components.

1. Resource management: Activities directly related to coastal resource management
2. Support for resource management: Activities that support coastal resource management or are indirectly related to coastal resource management
3. Institutional and organizational strengthening: Activities for creating organizations and systems that are needed to conduct the above-mentioned activities 1 and 2

Table 2-18: The components of the coastal resource management

Component	Envisaged activities
Resource management	• The formulation of management rules for coastal resource-related activities: Coordination between fishing grounds, deciding on protected species, size restrictions, legislation for MPAs, etc. • Resource recovery measures: Releasing and raising the seeds of marine shellfish (the trochus and the green snail), relaying bloodstock, etc.
Support for resource management	• Fishing activity diversification: The promotion of fishing activities in offshore areas using the FAD • Livelihoods other than fishing: Shell polishing, ecotourism using MPAs, ocean nursery of Tridacna clams, etc. • Adding value to the caught marine products: Running restaurants which use or sell local fish, keeping the caught fish fresh by developing fish markets, etc.
Institutional and organizational strengthening	• Establishing and strengthening the activities of MPA committees • Strengthening the operation and management of fishermen's organizations such as FAD management committees and fishermen's associations • The collection and analysis of fishing activity data by fishermen's organizations

The contents of the pilot project in each site should be consistent with the socio-economic situation in each site. Based on the result of the survey, the Project discussed with MPA committee on the contents of the pilot project and agreed on them.

North Efate

Due to the influx of immigrants from other islands, the traditional governance system is weakening. There was an effort to establish MPA committee but failed because of the different opinions in the community. The result of the survey indicated the high potential of tourism development, but at the same time declining trend of reef fish and coral reef. The Project adopted the tourism development approach for the promotion of CB-CRM

In order to strengthen the linkage between tourism development and CB-CRM, the Project developed such activities as ocean nursery of giant clams produced by VFD hatchery, utilization of giant clam for the tourist attraction, protection of reef fish through the introduction of FAD fishery and modified canoe. The community proposed to include the marketing activity of fish and shell polishing products to nearby hotels and restaurants and there were included in the pilot project.

Malakula

The Amal-Crab Bay MPA committee was established more than 10 years ago, but their activity was stagnated due to the shortage of fund. Hence the Project adopted approach to activate the MPA committee by generating fund for the promotion of CB-CRM. The Project introduced FAD fishery, release and monitoring of green snail and trochus in Uripiv Island, production and marketing of shell polishing products, marketing of kava, bee culture, and installation of yacht mooring facility.
The communities proposed to establish fish market in Uripiv Island and Lowni. The fish market built in Uripiv made possible the joint fish marketing with Uripiv and Lakatoro fish market.

Aneityum

The Mystery Island MPA management committee developed CB-CRM activities such as the data collection of lobster and protection of reef fish, trochus, and green snail inside MPA area. It was necessary to control the lobster fishery and expand the MPA from Mystery Island to cover wider area. As there was no VFD officer in the island and community extension officer was playing an important role, the Project adopted the approach of strengthening of the community extension officer for the further promotion of CB-CRM.

The Project introduced FAD, fish market, fish café, shell polishing by women, and helped community extension officer to manage the pilot project. As the result, the capacity of community extension officer was improved and more community members became involved in CB-CRM. The pilot project brought alternative income and fund for the promotion of CB-CRM.

The Project created pilot project implementation plans as shown below, by combining the above-mentioned activities, in accordance with each project area's current situation and issues which exist in the area. In particular, it was decided that the following three activities would be conducted in all the project areas, as they would contribute to resolving issues that exist across the project areas: "the promotion of fishing activities in offshore areas through the introduction of FAD fishing," "the introduction of shell polishing as an alternative livelihood" and "the collection and analysis of fishing activity data by fishermen's organizations."

It was decided that pilot projects would be conducted for one and half years from October 2012 to March 2014, based on the implementation plans.

Table 2-19: The Draft Pilot Project Plan for the Northern Efate Area (Mangaliliu, Lelepa Island and Moso Island)

Objectives	The establishment and strengthening of coastal resource management organizations for the relevant communities and the improvement of compliance with the MPA management plan
Activities	1. Securing alternative livelihoods: The promotion of linkage with tourism (joint sales of marine products caught and shell craft by communities, mariculture of ornamental Tridacna clams, and the promotion of the utilization of giant clam (*Tridacna gigas*) raising sites for tourism) 2. The promotion of joint activities by relevant communities through the above-mentioned activities 3. Fishing activity diversification: The promotion of fishing outside reefs through the introduction of the FAD 4. Strengthening coastal resource management: Strengthening compliance with the MPA plan through the revision of the plan by the relevant communities 5. Establishing and strengthening the activities of the MPA committee and fishery organizations

Table 2-20: The Draft Pilot Project Plan for the Malakula Area (Crab Bay, Uripiv Island, Uri Island)

Objectives	The revitalization of the activities of the Crab Bay MPA committee, by mainly securing financial sources for its coastal resource management activities
Activities	1. Strengthening joint activities between communities: The joint introduction of FAD fishing by relevant communities, shell polishing by women in the communities, ecotourism activities using the Crab Bay MPA, etc. 2. Improvement in the distribution of marine products caught: The development of joint fish collection points (fish markets), the sale of marine products caught in cooperation with the Lakatoro fish market 3. Fishing activity diversification: The promotion of fishing outside reefs through the introduction of the FAD 4. Coastal resource recovery: Releasing and raising marine shellfish (the trochus and the green snail) 5. Organizational strengthening of the MPA committee and fishermen's organizations: The community-based collection and analysis of fishing activity data, the diversification of financial sources for MPA activities such as lending fishing gear, beekeeping, selling kava, etc.

Table 2-21: The Draft Pilot Project Plan for the Aneityum Area (Analcauhat)

Objectives	The reduction of fishing pressure on spiny lobsters through fishing activity diversification

	and the introduction of alternative livelihoods
Activities	1. Training of community fisheries extension workers: A trial extension worker system where community representatives recognized by the VFD serve as extension workers 2. Securing alternative livelihoods: Cooperation with cruise ship tourism (the provision of cuisines which use locally produced fish other than spiny lobsters, the production and sale of shell craft), the development and operation of joint collection points for marine products caught (fish markets) 3. Fishing activity diversification: The promotion of fishing outside reefs through the introduction of the FAD 4. Strengthening coastal resource management activities: Strengthening the size restrictions for catching spiny lobsters and the expansion of the size of the MPA 5. Organizational strengthening of the MPA committee and fishermen's organizations: The community-based collection and analysis of fishing activity data, management of fish markets by fishermen's organizations, etc.

2-2. Improvement of VFD's Abilities to Manage the Production and Release of Shellfish Seeds

With the static marine resource like marine shellfish, it is relatively easier for the community people to have visible achievement (resource increase) compared with migratory resource such as reef fish. In fact, the green snail transplanted from Aneityum to North Efate had been well protected and now it is reproducing. This fact motivates community people for more CB-CRM.
For the marine shellfish propagation, the phase I of the Project provided basic technical guidance. During the phase II of the Project, monitoring and supplementary technical guidance was provided. The phase II also gave advice on the management of VFD hatchery.

(1) The Operation and Management of the Hatchery and the Creation of a Management Plan

To improve the facilities of VFD's hatchery and its operation, the Project created a draft "Operation and Management Plan for Aquaculture Facilities" in July 2012. Based on the plan, VFD C/Ps conducted production activities for marine shellfish seedsseeds. The following activities were also conducted: leakage repair on concrete water tanks, maintenance of the water intake filter, cleaning of elevated water tanks, removal of mud sediment from the water intake pit, and the repair of the seawater intake pipe. However, an additional seawater pump has not been installed and only one pump is used to supply seawater to the hatchery.

The Project carried out a mid-term revision of the operation and management plan in February 2013, in accordance with the progress in the implementation of VFD's production activities for seeds. The Project's basic policy was that VFD C/Ps would be encouraged to conducted seed production activities independently and experts would give advice and guidance (identifying problems and taking countermeasures) where necessary, which would then be included in the revised operation and management plan. In December 2013, the Project conducted the final revision of the operation and management plan jointly with the C/Ps, and the final version was compiled as the 2014 fiscal year edition (see the Appendix 5).

(2) Supplementary Guidance on the Techniques for the Production, Release and Raising of Tridacna Clam Seeds

The production of the seeds of Tridacna clams was mostly led by the VFD. Tridacna clams that are currently raised at VFD's hatchery are from seeds produced by the C/Ps. Tridacna clam eggs, fry and juveniles that were produced during the project period were: the maxima clam (*Tridacna maxima*) (which hatched in December 2011 and March 2012), and the fluted giant clam (*Tridacna squamosa*) (which hatched in October 2012).

1) The Production of Juvenile Maxima Clams

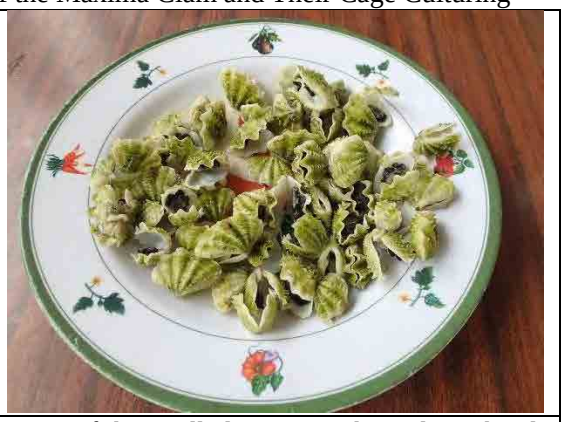
Maxima clams that were raised in the hatchery water tanks in order to produce juvenile clams

were from seeds independently produced by the VFD in December 2011 and March 2012, before the Project started. As of 2013, the maxima clams raised at the hatchery had grown to a size suitable for sale and shipping for ornamental purposes. However, because of the small number of shellfish in colors that are in strong demand in the ornamental shellfish market such as bluish shellfish (shellfish which have blue mantles), the number of inquiries from exporters was low and the shipping of the shellfish was irregular. In the 2013 fiscal year, a total of 450 maxima clams including 150 cultured on Moso Island were sent in four shipments.

The VFD was raising many maxima clams at its hatchery, and therefore it provided very small sized maxima clams (the size of corbicula clams or littleneck clams) which hatched in 2012 to the Melanesian Port Vila Hotel, and asked them to use the clams to create new recipes. The maxima clam is not regularly sold to the hotel. Further development of recipe and trial to check the economic feasibility is necessary. Even so, it is significant that VFD and local hotel collaborated for the development of market channel for maxima clams. The remaining clams which hatched in 2012 were harvested from the water tanks in order to conduct release experiments and tests to improve mariculture cages, so that a new production and raising space can be secured.

Some of the maxima clams which hatched in 2011 and were raised at VFD's hatchery were distributed for the ocean nursery to the Lelema area (the area between Lelepa Island and Mangaliliu) in the Northern Efate area and Eratap in southern Efate, while others were kept at the hatchery for sale as ornamental clams.

Photographs: The Production of the Seeds of the Maxima Clam and Their Cage Culturing

	
Maxima clams being raised to produce juvenile clams. Some were harvested and shipped for Ocean nursery tests, etc., because the water tanks were crammed with many clams kept at the hatchery.	Some of the small clams were shipped to a hotel, where they were used as an ingredient for new recipes. The photograph shows maxima clams boiled in salty water, cooked on a trial basis (February 2013).
	
Some of the maxima clam seeds were shipped for Ocean nursery tests on Moso Island (August 2012).	The installation of aquaculture cages on Moso Island (August 2012)

2) Production of Seed of the Fluted Giant Clam

The Project carried out spawning induction tests for the fluted giant clam in October 2012 and January 2013. Before the tests were conducted, the Project obtained 10 naturally grown bloodstocks from Uri Island (in the Malakula area) which is one of the project sites, in order to replace the bloodstocks kept at VFD's hatchery with new ones. The table below shows the results of the seed production tests for the fluted giant clam.

Table2-22: Results of the Seed Production Tests for the Fluted Giant Clam

The date of spawning induction	Hatched larvae	Three-month old seeds
Produced in October 2012	17 million clams	12,000 clams
Produced in January 2013	22 million clams	All died

As of the latter half of the 2013 fiscal year, fluted giant clams which hatched in October 2012 were still small. Normally, there is low demand for small clams in the ornamental shellfish market, but luckily there were some inquiries from exporters and a total of 250 clams were sent in two shipments. Normally one clam is sold at 300 vatu. Thus the sales amount of 250 clams is estimated to be 75,000 vatu. Some of the batch of clams being raised at the hatchery was distributed to target communities in the Northern Efate area, with the aim of the sale and release of the clams. The clams are being raised in the sea by communities (750 clams on Lelepa Island, 850 clams in Sunae and 970 clams in the Lelema area). This batch of the clams will be ready to be released into natural waters for grow-out from around 2016 onwards.

The batch of fluted giant clam eggs spawned in January 2013 in the presence of experts all died later, while the experts were absent. The technical levels of the VFD personnel is now high enough to produce the seeds of Tridacna clams by themselves, but there are some cases where they end up losing all the fertilized eggs or larvae produced. This is perhaps because they have not understood the importance of maintaining the appropriate population density in the water tanks by taking into account the relationship between the size of the clams and the number of clams in the water tanks. To achieve stable seed production, it is essential for them to gain more experience in crisis prevention. The Project identified low salinity of the inlet water as critical point of control for the management of the hatchery. The countermeasures for this problem is clarified in a manual and given to VFD.

Bloodstock for spawning for the production of the seeds of the fluted giant clam are obtained from VFD's stock kept by target communities in the Northern Efate area and by borrowing clams owned by individual community. The VFD also selects and raises candidate bloodstock from its stock produced from cultured seeds. From the stock of fluted giant clams which hatched in October 2012 and were raised at the hatchery, the VFD selected and secured 100 candidate bloodstocks with superior characters. They are called fluted giant clams with "blue spots" and have very high commodity value in the ornamental fish market, as rare individuals. In this way, through improving its own stock of cultured bloodstocks at the hatchery, the VFD can reduce reliance on naturally grown bloodstocks.

Photographs: The Production of the Seeds of the Fluted Giant Clam

Spawning and the release of sperm were induced by exposing the bloodstocks to the air and then returning them to the water tanks (October 2012).

The eggs and sperm released by the bloodstocks were collected and the eggs were artificially fertilized (October 2012).

Fluted giant clam larvae being reared. Cheesecloth was used to block direct sunlight (January 2013).

Fluted giant clam seeds which have grown to a size suitable for shipping (June 2013)

3) The Release and Raising of the Fluted Giant Clam

VFD hatchery has not enough space for the fluted giant clam. The Project released 67 fluted giant clams which hatched in 2007 and were raised in two water tanks at VFD's hatchery in Gideon's Landing beach (a privately owned tourist beach) in the Northern Efate area in July 2012 to promote clam management by community level. The released clams were five-year old immature males (an average shell length of about 20 cm and an average weight of 1.7 kg), which were already at the grow-out stage (the stage where they do not need to be protected in a net cage). Tourists often visit Gideon's Landing beach to swim because it is easily accessible from Port Vila. The transplanted fluted giant clams are expected to be used as a tourism resource.

Fluted giant clams being raised near Gideon's beach (a tourist beach) in the Lelema area

When the Project checked the growth of the clams in January 2013, 58 clams were alive. It is likely that somebody took some clams for food because only one empty shell was found. Project staff explained to local people involved in tours that VFD's stocks of bloodstocks and giant clams were being kept by the beach and asked them not to allow tourists to collect the clams without

permission. The clams stopped decreasing in number after that.

The release and raising of giant clam done during the phase I and II of the Project promoted awareness on CB-CRM among the community members.

4) Ocean nursery of Tridacna Clams

The techniques for the mariculture of Tridacna clams using net cages were already established in Phase I. In August 2012, the Project distributed maxima clam seeds which had been raised at VFD's hatchery to five families in Tasiriki and five families in Sunae, on Moso Island in the Northern Efate area. The families then conducted Ocean nursery by the seashore in front of their homes. In February 2013 (six months after the seeds had been distributed), the Project conducted an interim evaluation of the mariculture management. Only two families in Sunae were appropriately managing the ocean nursery, by cleaning the cages and clams regularly. The other eight families had not conducted management and the maxima clam seeds had been eaten by carnivorous snails which had invaded the cages. Nonetheless, it was demonstrated that many Tridacna clams can survive and grow to a size suitable for shipping, if the cages are cleaned regularly.

In June 2013, the Project distributed cultured seeds of the fluted giant clam to the two families in Sunae who had completed the maxima clam mariculture and two families in the Lelema area who had culturing experience from Phase I. They then started the Ocean nursery of the fluted giant clam, and the mariculture is currently ongoing.

In the past, Tridacna clam seeds were only supplied to areas within the Efate area. The Project devised a method to transport (by air) Tridacna clam seeds to remote areas. In November 2013, it conducted a demonstration test for the transportation of the seeds to Uri Island and Uripiv Island in the Malakula area using the new method as well as installing aquaculture cages on the islands. This paved the way for transporting Tridacna clam seeds to remote areas. It is expected that Tridacna clam seeds can be distributed to an extended area when there are requests for the supply of the seeds from remote areas.

Photographs: Ocean nursery of the Fluted Giant Clam

	
Ocean nursery for the fluted giant clam installed on Lelepa Island and Moso Island (June 2013)	The Project conducted a test to transport by air the seeds of the fluted giant clam which were wrapped in wet newspaper before being packed.

5) Monitoring the Giant Clam Being Raised

Concerning the release of Tridacna clams, the Project conducted monitoring and data compilation for giant clams that were transplanted from Tonga to the Northern Efate area (Mangaliliu, Lelepa Island, Tasiriki and Sunae) in 2007. The clams released were already at the stable later grow-out stage, and therefore the Project was able to confirm that they were growing steadily, except for ones in Mangaliliu which had some problems regarding the location of the habitat[9].

[9] It is only the reef of the Mangaliliu that faces directly with outer ocean without any protection. Stormy weather made difficult for the green snail to survive and grow. Also, muddy or sandy water coming from the river after heavy rain slowed down the growth.

Table2-23: Growth of Giant Clams That Were Transplanted in Phase I

Community	At the time of relaying in Phase I		At the time of monitoring (June 2013)		
	Transplanted date	The number transplanted	The number which survived	The survival rate	The average shell length
Mangaliliu	Nov. 2008 Feb. 2009	11 clams 22 clams	26 clams	78.8%	50.3 cm
Lelepa Island	Feb. 2009	97 clams	88 clams	90.7%	51.8 cm
Tasiriki	Jun. 2007	97 clams	82 clams	84.5%	54.3 cm
Sunae	Aug. 2007	98 clams	86 clams	87.8%	57.8 cm
Total		325 clams	282 clams	86.8%	

On December 2, 2013, on Lelepa Island, project staff reported to the communities the progress and output of the giant clam raising project that had been ongoing since Phase I. In the meeting, the project staff proposed to the communities that the giant clam raising farm (which has nearly mature clams) should be used as a tourism resource (a clam garden) in the future, as a symbol of community resource management activities.

The Project also installed signboards which explain developments in the raising of giant clams in the four communities in the Northern Efate area (Mangaliliu, Lelepa Island, Tasiriki and Sunae), with the aim of publicity for the giant clam raising farms.

Photographs: Monitoring of the Giant Clam Raising Farms

Monitoring of a giant clam raising site (Tasiriki on Moso Island, October 2012)

The Project installed a signboard which explains developments at the giant clam raising farm in each community (the photograph was taken in Mangaliliu).

(3) Supplementary Guidance on Techniques for the Production of Trochus Seeds

Concerning the trochus, the production of seed was not included in the initial plan. However, after the seed were released on Uripiv Island in the Malakula area in August 2012, there was a shortage of trochus for cleaning the water tanks at VFD's hatchery. Therefore, the Project's activity policy was revised to include the active propagation of the trochus through the production of cultured seeds as well as increasing the number of released seed. Based on the revised policy, the Project conducted spawning induction tests in February 20-22, 2013 and produced 800,000 fertilized eggs, of which 100,000 larvae (trochophores) were moved to the fluted giant clam water tanks. After six months, about 4,000 trochus seeds were harvested from the tanks.

Although the VFD has knowledge accumulated over many years on the production of trochus seeds, many of the current C/Ps are inexperienced. Therefore, experts gave on-site guidance to young staff at the hatchery. With the existing hatchery facilities, it is possible to produce about 10,000 trochus seeds for release purposes a year if they are reared in the same tanks as Tridacna

clams'. Therefore, the experts proposed a method for producing seeds through two spawning events per year, without involving too much extra effort. Based on the proposal, the VFD plans to independently conduct a trochus resource restoration (release) project.

(4) Seed Production Tests for the Green snail, the Release and Raising of the Shells

1) Seed Production Tests for the Green snail

In October 2012, VFD C/Ps conducted spawning induction tests for the green snail. About 40 shells were collected from the stock released and raised by the seashore of Mangaliliu, and they were used as bloodstocks. However, 17 precious bloodstocks died for no obvious reasons during the tests in the absence of Japanese experets. The most likely cause was excessive stress caused by transportation and the spawning induction. With the current technical levels, it is risky for the C/Ps alone to conduct spawning induction tests. A further decrease in the number of the bloodstocks of the green snail would make it difficult to maintain the spawning population at the release point. For this reason, it was decided that tests for the production of cultured green snail seeds should be suspended.

After the suspension of the tests, the project staff tried to arrange seed production tests for the green snail to be conducted with technical experts who were to be dispatched by the SPC. However, the experts could not be dispatched during the project period because of difficulties in administrative procedures and coordination within the SPC. Project staff instructed the VFD not to conduct spawning induction tests on its own for the time being, because spawning uses precious threatened parent shells. Future testing activities will be conducted through coordination between the VFD and the SPC.

In October 2013, the Project released around Uripiv Island the last 28 shells from the seeds stock of the green snail which hatched in 2007 during Phase I that had remained at VFD's hatchery. It then conducted follow-up surveys on the movement, dispersion and predation after release. Through the surveys, it was confirmed that the survival rate of cultured green snail seeds was extremely low after being released into natural waters as well as during farming in the hatchery water tanks. Therefore, the Project recommended that the VFD should withdraw from the production of cultured green snail seeds, at an appropriate time. The best propagation method for the green snail is to facilitate natural propagation through the development of bloodstock populations for spawning.

Photographs: Seed Production Tests for the Green snail (October 2012)

	
Bloodstocks of the green snail collected by the seashore of Mangaliliu. They were exposed to the air for a while in order to stimulate spawning (October 2012).	The parent shells were checked regularly because they release eggs and sperm in the middle of the night (October 2012).

2) Reproduction of the Green snail Released in Phase I

In Phase I, the green snail brought from Aneityum Island were released at Mangaliliu and they then formed a bloodstock population of the green snail by the seashore of the communty. In February 2013, the Project conducted a recapture survey for the green snail by the seashore of

Mangaliliu, and found two young green snail individuals (while free swimming for 30 minutes). This is likely evidence of the reproduction of the released green snail.

On December 2, 2013, a briefing session on the output of the giant clam raising project was held on Lelepa Island. At the session, the project staff reported the current condition of the bloodstock population of the green snail released in Phase I, along with the report on developments in the release and propagation activities. In the report, the project staff explained that the released shells had established themselves at all four release points, and that reproduction was confirmed at three out of the four release points. They also reported that young shells were found on Hat Island which is a long way away from the release points, and that young shells were reported to have been found by the seashore west of Mangaliliu.

Table2-24: Release of Tagged Individuals of the Green snail in the Northern Efate Area (2007 and 2008 in Phase I) and the Results of the Recapture Surveys (2012 and 2013 in Phase II)

Area of release and recapture	The number released (2007 and 2008)	Recapture survey (2012 and 2013)		
		Recapture of tagged adult shells	Capture of non-tagged adult shells	Capture of non-tagged young shells
Katoa (Mangaliliu)	205 shells	✓	✓	✓
Mangaliliu	262 shells	✓	✓	✓
Lakantamas (Lelepa Island)	195 shells	✓	✓	✓
Hat Island	0 shell	×	✓	✓
Sunae (Moso Island)	150 shells	✓	Not surveyed	Not surveyed

Figure 2-7:Green Snail releasing site

Regarding the report that young shells were found by the seashore to the west of Mangaliliu, the problem is that a long uninhabited shoreline area such as this one is not monitored by the nearby community at all. Therefore, the Project proposed that the Mangaliliu community should work together to catch the green snail in the relevant sea area and relay the shells at the release point or the community's taboo area (no-fishing zone). The green snail population released in Phase I have already started to get old. To facilitate a full-fledged resource recovery through reproduction, they must be replaced with a young population.

Photographs: Reproduction of the Green snail Released in the Northern Efate Area

The green snail caught by the seashore of Mangaliliu. There were no numbers (tags) on the opercula of these individuals. This suggests that they were born after the bloodstocks were released (June 2014).

In November 2013, the SPC and the VFD jointly conducted a stock survey for the green snail and the trochus in specific sea areas including the release points. Although reproduction of the green snail was confirmed by the survey, the actual population size at each site could not be identified because the survey was conducted using a standard method. The Project planned to conduct detailed surveys for determining the resource recovery situation quantitatively, as a joint project with the SPC. However, again, the surveys could not be conducted during the project period because of difficulties in coordination with the SPC. A detailed survey should be conducted in the sea area around Moso Island in particular, because there have been no reports of the reproduction of the green snail being observed on Moso Island. Therefore, the Project recommended that the VFD should coordinate with the SPC again in order to obtain detailed surveys.

Through the Project, VFD learned different approaches for different species of marine shellfish. For green snail, releasing of small individuals into Uripiv Island did not give good result. However, transplantation of gigas and green snail in Northern Efate became good example of CB-CRM. Overall, the static resource such as marine shell fish is easy to see the result of CB-CRM activity and can serve as good tool to raise awareness among the community members.

2-3. Pilot Projects common components over the three sites

There are two components of pilot project commonly implemented over the three sites. They are community-based collection and analysis of fishing activity data, and introduction of FAD fishery.

2-3-1. The Community-based Collection and Analysis of Fishing Activity Data

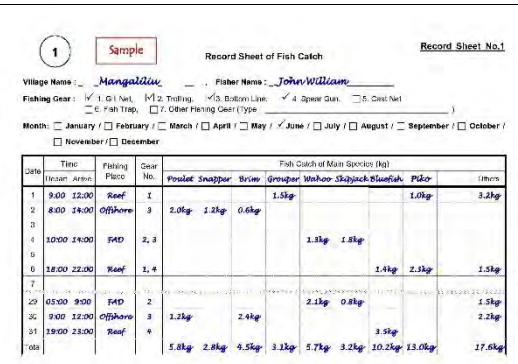
To conduct coastal resource management appropriately, it is important to record and analyze fishing activity data in coastal areas, as well as adjusting and coordinating the catch and fishing activities based on the analysis results. The VFD had been collecting and analyzing fishing data, but the data to be collected was complex because it was for the purpose of conducting scientific statistical analysis. This made it difficult for communities to conduct continuous recording and analysis.

In this program, the Project primarily aimed for the communities themselves to collect and aggregate their fishing activity records and understand the general trends and changes in the fishing activities during the pilot project period, rather than collecting and analyzing data for scientific purposes. In addition, the Project aimed to use the aggregation results to consider future coastal resource management activities by the target communities.

Therefore, the recording sheets were simplified for use by the communities. The Project also created a simple program which automatically aggregates data entered on PCs, and taught the community members how to use the program.

(1) The Creation of Fishing Activity Recording Sheets and a Simple Tabulation Program

In November and December 2012, the first deployment of the FAD took place and the FAD management committees were established (see the chapter on the FAD below for details). At the same time, the Project introduced the fishing activity recording sheets shown below to the project areas. The fishing activity recording sheets contain sections to record the catches of pelagic fish and demersal fish within reefs and offshore areas as well as areas around the FAD units. They also contain sections to record income from fishing activities and fishing activity expenditures. To start with, the Project distributed the set of fishing activity recording sheets to the FAD committee members in the project areas and asked them to record their daily fishing activities on a trial basis.



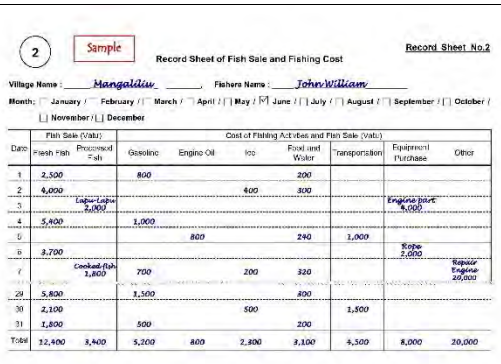
1 Sample — Record Sheet of Fish Catch — Record Sheet No.1

Village Name : Mangaldiu , Fisher Name : John William

Fishing Gear : ☑ 1. G/I Net, ☑ 2. Trolling, ☑ 3. Bottom Line, ☑ 4. Spear Gun, ☐ 5. Cast Net, ☐ 6. Fish Trap, ☐ 7. Other Fishing Gear (Type ____)

Month: ☐ January / ☐ February / ☐ March / ☐ April / ☐ May / ☑ June / ☐ July / ☐ August / ☐ September / ☐ October / ☐ November / ☐ December

Date	Time Depart.	Time Arrive	Fishing Place	Gear No.	Fish Catch of Main Species (kg) Poulet	Snapper	Brim	Grouper	Wahoo	Skipjack	Bluefish	Pilot	Others
1	9:00	12:00	Reef	1				1.5kg				1.0kg	3.2kg
2	8:00	14:00	Offshore	3	2.0kg	1.2kg	0.6kg						
3													
4	10:00	14:00	FAD	2, 3					1.3kg	1.8kg			
5													
6	18:00	22:00	Reef	1, 4							1.4kg	2.3kg	1.5kg
7													
29	05:00	9:00	FAD	2					2.1kg	0.8kg			1.5kg
30	9:00	12:00	Offshore	3	1.2kg		2.4kg						2.2kg
31	19:00	23:00	Reef	4							3.5kg		
Total					5.8kg	2.8kg	4.5kg	3.1kg	5.7kg	3.2kg	10.2kg	13.0kg	17.6kg



2 Sample — Record Sheet of Fish Sale and Fishing Cost — Record Sheet No.2

Village Name : Mangaldiu , Fishers Name : John William

Month: ☐ January / ☐ February / ☐ March / ☐ April / ☐ May / ☑ June / ☐ July / ☐ August / ☐ September / ☐ October / ☐ November / ☐ December

Date	Fish Sale (Vatu) Fresh Fish	Processed Fish	Cost of Fishing Activities and Fish Sale (Vatu) Gasoline	Engine Oil	Ice	Food and Water	Transportation	Equipment Purchase	Other
1	2,500		800			200			
2	4,000				400	300			
3		Lapu-Lapu 2,000						Engine part 6,000	
4	5,800		1,000						
5				800		240	1,000		
6	3,700							Rope 2,000	
7		Cooked fish 1,800	700		200	320			Repair Engine 20,000
29	5,800		1,500			300			
30	2,100				500		1,500		
31	1,800		500			200			
Total	12,400	3,400	5,200	800	2,800	3,100	4,500	8,000	20,000

Recording sheet 1: Fishing activities (sample) The sheet is to record the catches of the main target species, the number of fish, the fishing methods, the fishing grounds and the operating hours	Recording sheet 2: Income and expenditures for fishing activities (sample) The amount of sales and fishing costs (fuel, food, ice, transportation, materials, etc.)

Figure 2-8: Fishing activity recording sheets

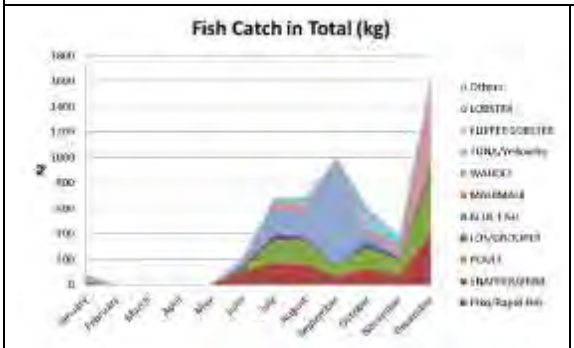
The Project also created a simple tabulation program using Microsoft Excel, which automatically calculates the total catch and the average as well as creating graphs by entering the fishing activity data on the recording sheets onto the program. This program allows each community to manage and

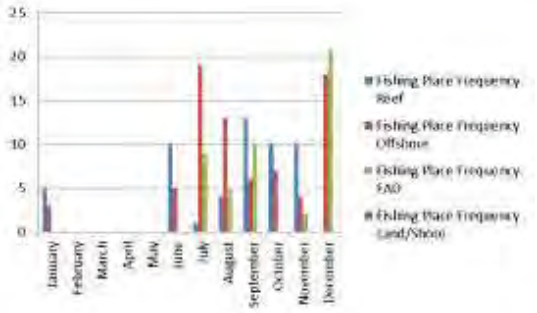
aggregate fishing activity data by themselves as well as analyzing each community's fishing activities.

Record Entry Sheet: September

Village name	Fisherman's name	Date	Departing time	Arriving time	Fishing hours	Fishing place (Choose one item and input "1")						
						Reef	Off shore	FAD	Land/ Shore	Gill net	Trolling	Bo li
Anelcauhat	Jonah.w	2	6 : 0	15 : 30	9.5			1			1	
Anelcauhat	Jonah.w	3	5 : 30	15 : 0	9.5			1			1	
Anelcauhat	Jonah.w	6	6 : 0	14 : 15	8.25			1			1	
Anelcauhat	Jonah.w	7	6 : 0	14 : 30	8.5			1			1	
Anelcauhat	Jonah.w	8	6 : 0	15 : 0	9			1			1	
Anelcauhat	Jonah.w	9	7 : 0	16 : 0	9			1			1	
Aniyat	Titus	11	19 : 0	19 : 45	0.75	1						
Anejo	Japhet	11	18 : 30	19 : 30	1	1						
Anaya	Joshua	11	18 : 30	19 : 30	1	1						
Aniplidei	Tasuea	11	18 : 0	18 : 30		1						
Anawonjei	Naredaniau	11	19 : 0	19 : 30	0.5	1						
Aniplidei	P.F.T	16	:	:	0							
Aniplidei	Tasuea	16	:	:	0							
Anelcauhat	Joel.Rawai	16	5 : 50	14 : 15	8.41667		1					

The recorded data is entered onto the Excel sheet.





The data is automatically aggregated and graphs are created for the monthly catch by fish species.

Various tables and graphs are automatically created including the average fish weight and the frequency of the use of each fishing ground.

Figure 2-9: Simple Tabulation Program

(2) Holding Workshops on the Recording and Analysis of Fishing Activities

In June 2013, the project staff held a workshop in each project area in order to explain how to enter fishing activity data onto a PC and how to analyze the data, so that the relevant communities can enter and analyze their fishing activity data by themselves using the simple tabulation program. Each workshop invited five to ten representatives from organizations involved in coastal resource management, including the MPA committee, the FAD management committee and fishermen's associations in each project area. At the workshops, the project staff explained how to enter data onto the program and how to read the automatically analyzed charts, using actual recorded data.

Table 2-25: Outlines of the Workshops on the Recording and Analysis of Fishing Activities Held in June 2013

Project area	Date	Venue	Participants
The Northern Efate area	Monday, June 17	The project office at the VFD in Port Vila	People in charge of coastal resource management in the four target communities (Mangaliliu, Lelepa, Tasiriki and Sunae) Representatives of the FAD management committee
The Malakula area	Wednesday, June 6	The agricultural training center in Lakatoro	Representatives of the Crab Bay MPA committee Representatives of the FAD management committee Representatives of women's groups

The Aneityum area	Monday, June 10	The youth center in Analcauhat	Representatives of the Mystery Island MPA committee Representatives of the FAD management committee Representatives of fishermen's organizations

Photographs: Workshops on the Recording and Analysis of Fishing Activities (June 2013)

		
The workshop on the recording of fishing activities for the Efate area: Port Vila, June 17	The workshop on the recording of fishing activities for the Malakula area: Lakatoro, June 6	The workshop on the recording of fishing activities for the Aneityum area: Analcauhat, June 10

After the workshops had finished, the Project provided a PC to the MPA committee or the FAD management committee in each project area and the committee entered and aggregated the fishing activity data on the PC. Japanese experts and VFD staff continually visited the sites and checked the progress of the fishing data recording. However, it is not easy for individuals to continue to keep records, and only a small number of highly interested community members in each project area are continuing to keep their fishing records. Nonetheless, the activities provided a valuable opportunity to understand the trends in fishing activities in the project areas because no records on daily fishing activities had been recorded in the past. The MPA committee and the FAD management committee in each project area encouraged more community members to participate in the recording of fishing activities, by for example explaining the importance of analyzing the recorded fishing data to the communities.

In the Aneityum area, the Project installed two solar freezers and developed a joint collection point for caught fish (fish market) in Analcauhat. A joint collection point for caught fish was also developed on Uripiv Island in the Malakula area, with the cooperation of a Japan Overseas Cooperation Volunteer (JOCV), and a small solar freezer was installed. These fish markets are run mainly by local FAD management committees. Through the collection of products at the markets, fishing data is being collected.

(3) Collection and Aggregation of Fishing Records in Each Project Area

The following explains the progress in the fishing records collection and aggregation activities in each project area.

<u>The Aneityum Area</u>

At the joint fish collection point (fish market) which was established at the site where solar freezers provided by the Project were installed, the FAD management committee chairperson (Mr. Joseph Yusof) records fishing data and enters the data onto the tabulation program introduced by the Project. However, community members in the area have customarily purchased fish on the shore and it is not easy to collect data on all the catches when fish are unloaded on the shore. Therefore, at the moment, fish which remain unsold are temporarily kept in the solar freezers at the fish market and their data is collected at the fish market. The Mystery Island MPA committee has been collecting fishing data for spiny lobsters to be sold to tourists on cruise ships for many years. They started to manage the fishing data by entering it onto the tabulation program. This made it possible for community members to browse the fishing data where necessary.

The Malakula Area

On Uripiv Island, the FAD management committee chairperson (Mr. Steward Roy) understood the importance of collecting fishing activity data and the island community built a "fish market" which serves as a joint fish collection point and a fishing gear storehouse. With the cooperation of a JOCV dispatched to the fisheries office in Malampa Province), a solar freezer (166 L) was installed at the fish market in November 2013. In the Crab Bay area on Malakula Island, several community members who conduct fishing in Louni Community started to record their fishing activities. The recorded data is reported to the fisheries office in Malampa Province where it is analyzed and compiled using the tabulation program with the cooperation of the JOCV.

Project staff suggested that the Crab Bay MPA committee should keep records on the weights in addition to the quantities concerning the land crab harvesting data that the committee has been collecting at the Lakatoro market. In addition, their data collection activities were improved so that the land crab harvesting information is recorded and aggregated for each of the five harvesting zones (Louni, Losarsar, Barak, Portindir and Uripiv). Community members started to manage the land crab harvesting data on the PC, by entering it onto the tabulation program introduced by the Project.

Through the efforts of the youth group of the Crab Bay MPA committee, preparations for the establishment of a fish market are ongoing in Louni Community which is located at the center of the Crab Bay area. They are raising funds for purchasing construction materials through charity activities. The plan is to install a small solar freezer with the support of the JICA office, after the main building for the market has been completed. The fish market in Louni Community is planned to be used as a data accumulation point for the fishing data collected from the Crab Bay coast.

The Northern Efate Area

Since the FAD workshop was held, several members of the FAD management committee on Lelepa Island have continued their fishing data recording activities. The fishing data is collected and managed at the project office. However, the recording of fishing data has not taken root in other communities in the area, and the area is lagging behind the other project areas concerning the dissemination of fishing data collection and analysis activities.

The FAD committee in the Northern Efate area had not been conducting their activities regularly, and there had been no progress in the development of a joint fish collection point. However, in the middle of the implementation of the Project, the FAD committee was restructured by two communities in Lelema (Mangaliliu Community and Lelepa Island) and, since then, the FAD committee has been active. Currently, the FAD committee is leading the preparations for the establishment of a fish market on Lelepa Island, by referring to the example of Uripiv Island. They have already secured a community-owned building for the market. They are considering the installation of a solar freezer, and are asking for support from various donors for funds to purchase the freezer.

As seen above, the Project motivated communities to start the voluntary collection of fishing activity data, and the activities are continuing, although they are still small-scale. The results of the collection of fishing activity data during the pilot project period were presented at the "national seminar" and the "regional seminar" held in October 2014.

Current status and prospect of community-led data collection and analysis on fishing activity

The community-led data collection and analysis on fishing activity has just begun. Limited numbers of committed fishers continuously collect the data. The amount of the collected data is not enough to diagnose the resource status. To motivate the community, it is important to give regular feedback of the collected data to the community

On the other hand, it is a big achievement that community started voluntary data collection even it is limited scale, as such initiative was barely taken in the past. In country like Vanuatu, where number of government officers is limited, community-led data collection could pave the way to

collect necessary information for the fisheries resource management.

The fish market and fish café introduced by the Project contribute for the promotion of data collection. Data collection in connection with the small scale business management not just for the fisheries resource management ca motivate for community-led data collection. Hence, provision of a combination of support, including the introduction of solar freezer, training on maintenance, and training on small scale business management should be promoted.

The community-led data collection made possible for fisher in Aneityum to obtain bank loan to purchase solar freezer. The bank accepted the fish catch data as income certificate.

SPC recognizes the significance of community-led data collection and reported the outline of the activity in the newsletter (shown in the figure below).

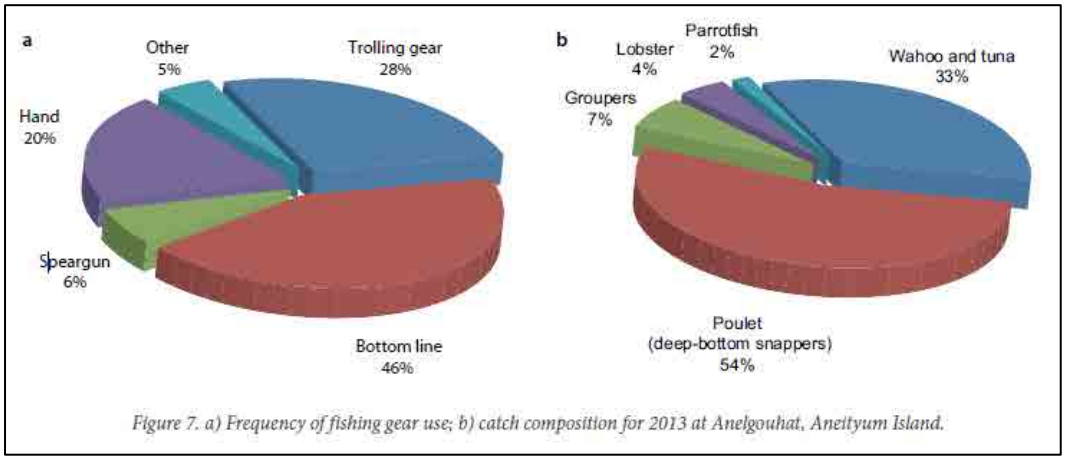
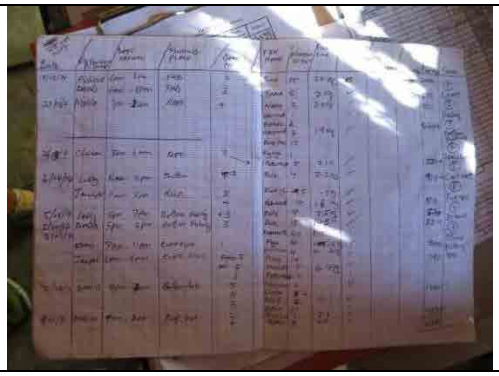


Figure 2-10: result of community-led data collection shown in the SPC news letter

*SPC Fisheries Newsletter #144 - May–August 2014

Photographs: Fishing Data Recording and Analysis Activities by the FAD Management Committees in the Project Areas

	
The interior of the fish market in Analcauhat Community in the Aneityum area. Solar freezers and fishing gear are kept at the building.	The Aneityum FAD committee measures and records the caught fish when they receive the fish to be kept in the solar freezers introduced by the Project.

	
The fish market on Uripiv Island in the Malakula area. A small solar freezer was installed with the cooperation of a JOCV.	The Malakula FAD committee records in a notebook the data on the caught fish that they have received to be kept in the solar freezer at the fish market on Uripiv Island.

2-3-2. Community-based FAD Fishing Management

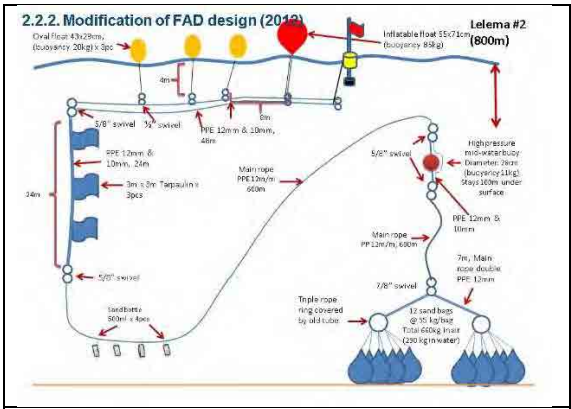
It was discovered that one major issue concerning coastal resource management in the target communities is that fishing pressure within reefs is high and the marine resources within the reefs are decreasing in general. Therefore, the Project aimed to move fishing activities by the relevant communities from areas within the reefs to areas outside the reefs by encouraging fishing activities in offshore areas using the FAD, thereby reducing the fishing pressure within the reefs.

To disseminate FAD fishing widely, a simple and inexpensive FAD unit that can be installed and maintained by communities is needed. Based on this idea, the Project designed an FAD unit to be introduced to communities, who were then told how to use them. The total cost of materials for one FAD unit designed by the Project is roughly in the range between 1,000 and 1,500 US dollars, depending on the deployment depth, because the cost of ropes accounts for a large portion of the total cost. It can be installed using small boats owned by local communities, because sandbags are used to anchor the FAD. The deployment of the conventional concrete anchor introduced by the SPC requires the chartering of a large vessel (such as a cargo vessel), while the deployment cost for the small FAD is very cheap because all it needs is the fuel for two small boats.

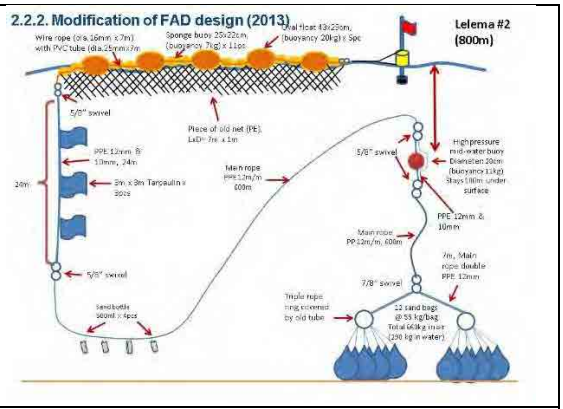
Table 2-26 is the comparison table between the FAD promoted by the Project and recommended by SPC. SPC recommended FAD cost almost triple. Moreover, additional cost occurs for the deployment, as it requires large vessel. If include the deployment cost, the SPC recommended FAD is approximately five times more expensive than the FAD introduced by the Project.

Table2-26: Comparison between the FAD promoted by the Project and recommended by SPC

	FAD promoted by the Project	FAD recommended by SPC
Basic concept	Try to extend the life span by regular maintenance by user (fisher)	Use strong material to prevent FAD loss
Weight of anchor	440kg	1,160kg
Cost of one FAD	US$1,500	US$4,500
Deployment	By using sand bags as anchor, two small boats (20- 30 feet) is enough to deploy	Due to the weight of anchor (concrete block), it required large vessel with crane
Maintenance deployment	Easy to clean and change parts with small boat and canoe	Difficult as it requires large vessel for the maintenance



The FAD unit installed in the workshop. It can be installed using small boats because sandbags are used to anchor the unit. The material costs for this FAD unit were 1,300 US dollars.



The head (buoy) of the original model shown on the left tends to become fouled. Therefore VFD C/Ps improved the head. They are gradually replacing the old type of head with the new type.

Figure 2-11: Structure of the FAD

(1) The First Workshops on FAD Fishing Management

In November and December, 2012, the "First FAD Fishing Workshop" was held in each project area, where project staff taught community members the basic knowledge and techniques for the construction and deployment of the FAD, including the effects of the FAD, its design, how to construct and install the FAD.

Table2-27: Overview of the First Workshops on FAD Fishing Management Held in November and December 2012

Project area	Dates	Venue	Participants	The number of participants
The Northern Efate area	November 19-23	Mangaliliu	People in charge of coastal resource management in Mangaliliu, Lelepa, Tasiriki and Sunae Young leaders in the communities	14 people
The Malakula area	December 3-7	Lakatoro	Members of the Crab Bay MPA committee Young leaders in the communities	18 people
The Aneityum area	December 12-17	Analcauhat	Members of the Mystery Island MPA committee Young leaders in the communities	15 people

At the workshops, two FAD units were installed in each project area, using small community-owned boats. Based on the requests from community members, the FAD units were installed within the coastal waters (waters within 1-3 miles of the coastline) where they can be operated using existing fishing methods and the boats they own. On the last day of the program (after the deployment had been completed), the participants discussed the roles for FAD management in a workshop setting. At a later date, the discussion results were compiled into a set of FAD management guidelines for each project area, and the representative of the VFD, the representative of the Project and the chairperson of the relevant FAD committee signed the guidelines. A FAD committee was founded for each project area mainly by the workshop participants, and officers such as the chairperson, the vice chairperson, the secretary and the accountant were decided upon through discussions.

Photographs: The First Workshops on FAD Fishing Management (November and December, 2012)

	
A lecture on the effects of the FAD and how to install the FAD. A poster was created and used as a training aid because no public power supply is available in the project areas.	The community members who participated in the workshop worked together to construct the FAD unit.
	
Two small boats are used to install the FAD. One boat is used to carry ropes, buoys, etc. and place them in the sea.	The other boat is used to carry the sandbags, which are then dropped all at once to anchor the FAD.
	
The FAD unit installed in the sea	On the last day of the program, guidelines for the management and operation of the installed FAD were created in a workshop setting.

(2) The Second Workshops on FAD Fishing Management

In May and June 2013, the "Second Workshop on FAD Fishing Management" (a five-day workshop) was held in each project area, with the aim of maintaining and inspecting the two FAD units installed in the coastal waters in each project area, as well as improving and teaching the

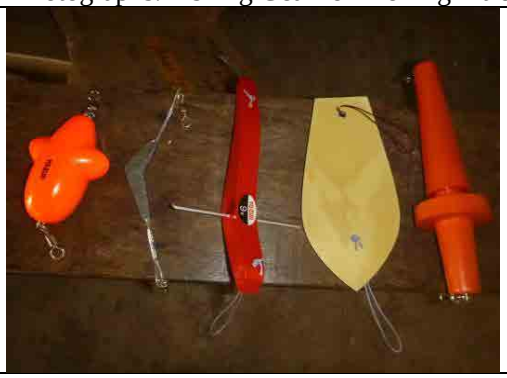
trolling method in the waters around the FAD. The participants in each workshop constructed a new FAD unit using extra FAD materials and placed it further offshore. Each workshop had 13-30 participants involved in local fisheries and coastal resource management.

Table 2-28: An Overview of the Second Workshops on FAD Fishing Management Held in May and June, 2013

Project area	Dates	Venue	Participants	The number of participants
The Northern Efate area	Mon. May 27 - Fri. May 31	Lelepa Island	People in charge of coastal resource management in Mangaliliu, Lelepa, Tasiriki and Sunae FAD management committee members	30 people
The Malakula area	Mon. June 10 - Fri. June 14	Lakatoro	Representatives of the Crab Bay MPA committee FAD management committee members	13 people
The Aneityum area	Wed. June 19 - Mon. June 24	Analcauhat	Representatives of the Mystery Island MPA committee FAD management committee members	22 people

In the guidance on the improved trolling method given in the workshops, the project staff introduced accessory fishing gear which gives more variation in the movement of the artificial bait during trolling and fishing gear which adjusts the depth of the artificial bait, as an alternative to the simple trolling with artificial bait on the surface of the water which is currently used by communities. More specifically, the project staff introduced a type of fishing gear called the "airplane" which enables the effective use of artificial bait just below the surface of the water, and the trolling method further below the surface of the water using the "underwater board." The participants were very interested in the "airplane" in particular, because the hooking rate was high during the practice. One of the participants in the workshop for the Aneityum area even created multiple "airplanes" by himself and started to teach people how to make them in his local area.

Photographs: Fishing Gear for Trolling Introduced at the Second FAD Fishing Workshops



The fishing gear for trolling introduced at the workshops: the "rabbit," the "*hime*," the "airplane," the "underwater board" and the "rocket"

"Airplanes" made by a training participant in the Aneityum area using local materials

At the first FAD workshops held in November and December, 2012, the management plans for the deployed FAD units were formulated and the FAD management committees were organized. At the second workshops, the participants checked how the FAD had been managed since the first workshops, and they revised the FAD management plans based on the management experience in the period between the first and the second workshops. The Project discussed with community member on the issues on the FAD management, such as no regular maintenance of FAD, no reporting of the

FAD position to the stakeholders, no data collection on fishing activity. Further, the participants created more specific activity implementation plans (Action Plans, see Appendix 6) based on the revised FAD management plans, and agreed to work on the management and promotion of FAD fishing in the future.

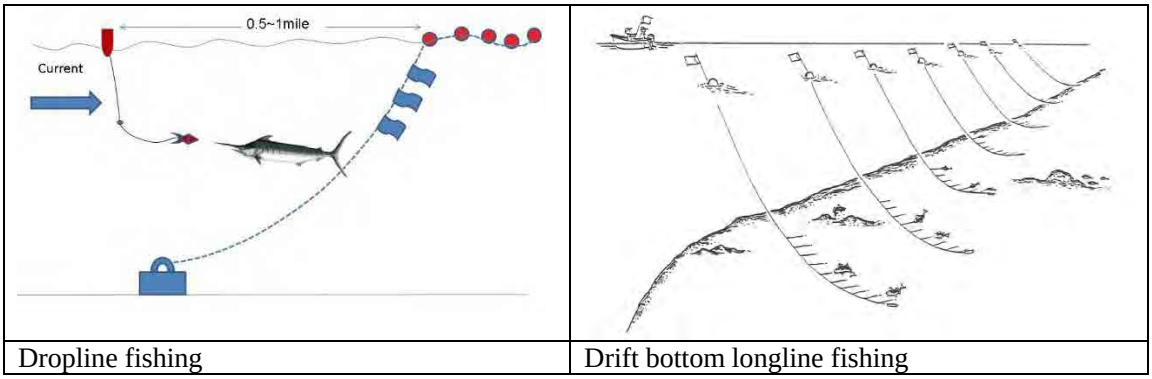
Photographs: The Second Workshops on FAD Fishing Management (May and June, 2013)

	
The installation of bamboo poles for trolling on a small boat (Lelepa Island in the Northern Efate area)	Guidance and practice for the production of trolling fishing gear (in the Malakula area)
	
Practicing trolling using the improved fishing gear at sea (in the Malakula area)	The revision of the FAD management plan and the creation of an action plan (in the Malakula area)
	
Practicing the production of an additional FAD unit (in the Malakula area)	Practicing the deployment of an additional FAD unit (in the Aneityum area)

(3) The Third Workshops on FAD Fishing Management

In October and November 2013, the third workshop on FAD fishing management was held in each project area. The objective of the third workshops was to give guidance on new fishing methods for

offshore pelagic fish and demersal fish using the offshore FAD. Essentially, the following three fishing methods were taught: dropline fishing, drift bottom longline fishing and diamondback squid (deep-sea squid) fishing.



Dropline fishing	Drift bottom longline fishing

Figure 2-12: The fishing methods introduced during the third FAD fishery management workshop

Table 2-29: Overview of the Third Workshops on FAD Fishing Management Held in October and November, 2013

Project area	Dates	Venue	Participants	The number of participants
The Northern Efate area	Mon. October 28 - Fri. November 1	Lelepa Island	People in charge of MPA management in Mangaliliu and Lelepa Island, FAD management committee members	27 people
The Malakula area	Mon. November 11 - Fri. November 15	Uripiv Island	Representatives of the Crab Bay MPA committee FAD management committee members	23 people
The Aneityum area	Mon. November 25 - Fri. November 29	Analcauhat	Representatives of the Mystery Island MPA committee FAD management committee members	20 people

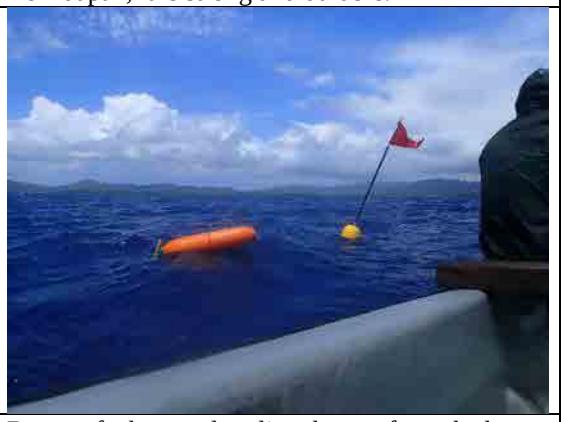
In the Northern Efate area and the Aneityum area, practical training was conducted in the seas around the offshore FAD units deployed in the previous workshops (June 2013), using the FAD units. In the Malakula area, the three deployed FAD units had all drifted and been lost. Therefore, the practical training at sea was conducted at an appropriate fishing ground near Uripiv Island. Similarly to the first workshops, project staff created opportunities to have discussions with participants, where they revised the plans for future FAD management activities in accordance with the current situation. In the discussions, trial operations by the FAD committees of the three new fishing methods being taught were proposed, in order to accumulate field experience and to identify appropriate fishing seasons and fishing grounds for promising fish species such as tuna and the diamondback squid. It was decided that the Project would provide fuel (40-60 liters per month) only during the pilot project period (from December 2013 to February 2014). The trial operations by the FAD committee in each project area were conducted with the guidance of the VFD. The results of the trial operations were recorded on the Project's fishing data recording sheets and the data was aggregated at the communities before it was reported to the VFD.

It is worthy of special mention that a diamondback squid which is a large deep-sea squid species was caught during the practice at sea in the Aneityum area. This is the first case of a diamondback squid being caught in Vanuatu. In the South Pacific, the SPC has conducted trial operations of diamondback squid fishing using tuna longline fishing vessels in New Caledonia and the Cook Islands. However, cases of successful diamondback squid catching using small general use boats are rare. The diamondback squid is a high value food and it is a promising commodity to be sold to tourists.

One advantage of diamondback squid fishing is that it does not require live bait and therefore it

can be carried out in combination with fishing for offshore demersal fish as long as one brings the fishing gear. It became clear that the diamondback squid could be caught in Vanuatu's offshore waters which were reachable in small boats. Therefore, a stable catch of the diamondback squid can be expected in the future, if appropriate fishing grounds and fishing seasons can be identified.

Photographs: The Third Workshops on FAD Fishing Management (October and November, 2013)

	
Guidance on the construction of fishing gear by the expert Mr. Fujii and VFD C/Ps (in the Malakula area)	The fishing hook for diamondback squid fishing (made in Japan). Although it has to be imported from Japan, it is strong and durable.
	
Practicing a new fishing method at sea. It was conducted using small local boats (in the Malakula area).	Buoys of a bottom longline thrown from the boat. The buoys become upright when fish are caught.
	
The diamondback squid caught off the coast of Aneityum Island. This is the first case of the diamondback squid being caught in Vanuatu.	The diamondback squid was used to teach the appropriate cutting method and processing method (in the Aneityum area).

(4) Follow-up Program for FAD Fishing

FAD fishing management in the project areas has just begun and the communities are short of experience in the management. Therefore, it is essential for the Project staff and VFD C/Ps to visit the project areas after the workshops have been completed and conduct monitoring/follow-up activities for FAD management and the utilization of fishing methods that enable the effective use of the FAD. For this reason, the Project staff in charge of fishing method diversification and their C/Ps conducted follow-up activities in each project area in February 2014.

Table 2-30: The Dates of the Follow-up Program for the FAD Fishing Development and Management Held in February 2014

Project area	Dates	Venue	Participants	The number of participants
The Northern Efate area	Fri. February 21, Mon. February 24 and Tue. February 25	Lelepa Island	People in charge of coastal resource management in the four target communities (Mangaliliu, Lelepa, Tasiriki and Sunae) FAD management committee members	30 people
The Malakula area	Mon. February 10 - Wed. February 12	Uripiv Lakatoro	Representatives of the Crab Bay MPA committee FAD management committee members	18 people
The Aneityum area	Wed. February 5 - Fri. February 7	Analcauhat	Representatives of the Mystery Island MPA committee FAD management committee members	17 people

The fishing gear and methods for trolling and bottom longline fishing were the most actively used, out of all the types of fishing gear and fishing methods introduced by the Project, as it is similar to the existing fishing methods. More communities are taking advanced actions and independently improving the fishing gear introduced by the Project. Therefore, further developments are expected in the future. On the other hand, dropline fishing and diamondback squid fishing have not been conducted frequently, and therefore practical training was conducted at sea as part of the follow-up program. Regarding dropline fishing, the participants proposed directly connecting the hooks to wire rope lines as sharks are cutting the trace lines. Based on the proposal, the fishing gear was improved. With regard to diamondback squid fishing, it is expected that the VFD will lead repeated trial operations in order to accumulate fishing data and experience on diamondback squid fishing. On the last day (the third day) of the follow-up program, the Project checked the progress in FAD management activities, and compiled the FAD management activity plans to be used after the pilot projects have been completed.

Photographs: The FAD Fishing Follow-up Program (February 2014)

Communities started to improve, produce and use the fishing gear introduced by the Project (in the

Diamondback fishing practice at sea (off the coast of the Aneityum area)

Aneityum area).	
	
The fishing gear provided by the Project was inspected and repaired where necessary (on Lelepa Island in the Efate area).	Drift bottom longline fishing practice at sea (off the coast of Lelepa Island)

At the first FAD workshops, two FAD units were deployed in each project area. Based on requests from the coastal communities in the project areas, the FAD units were deployed within the coastal waters (waters within 1-3 miles of the coastline) where they can be operated using existing fishing methods and the boats they own. However, the FAD deployed within the coastal waters had some management problems, for example fish did not aggregate around the FAD regularly, or it took a long time before fish started to aggregate around the FAD, and ropes were cut by vessels navigating the coastal waters.

Therefore, in the "Second FAD Fishing Workshops," it was decided that the FAD would be deployed further offshore in deeper waters. Therefore, one additional FAD unit was deployed offshore in waters of 600 meters or more depth (4-8 miles off the coastline) in each project area.

In the Northern Efate area and the Aneityum area, it was discovered that notable numbers of offshore pelagic fish such as the bonito and the rainbow runner aggregated around the FAD deployed offshore. Therefore, the following fishing pattern started to take root in these two project areas: pelagic fish such as the bonito are caught around the FAD by trolling, and the bonito is used as bait to catch offshore demersal fish such as the ruby snapper using the bottom longline fishing method.

In Vanuatu, offshore demersal fish such as the ruby snapper are traded at high prices, and demand is high. In the fishing of demersal fish (bottom longline fishing), the challenge was to secure a stable supply of live bait. Through the deployment of the offshore FAD and guidance on improved fishing methods, it is becoming possible to catch a stable number of offshore pelagic fish such as the bonito.

In the Malakula area, all three FAD units had drifted and been lost during 2013. Therefore, three new FAD units were deployed off the coasts of Uripiv Island and the Crab Bay area (in waters of about 300-meter depth) in December 2013. The FAD committee led the construction of these FAD units using materials (buoys, ropes, etc.) kept at the fisheries office.

The current condition of the FAD units deployed in the project areas are shown in the table below. This experience shows that the small FAD model lasts at least two years, provided that there are no accidents such as ropes being cut by vessels navigating the areas, there are no natural disasters such as hurricanes and the communities conduct regular repair and management. However, offshore FAD fishing has just been introduced to the areas and FAD utilization rates by the communities are not high. Therefore, they do not conduct sufficient daily monitoring activities. In fact, more than half of the FAD units deployed in the project areas have drifted and been lost.

The program paved the way for the deployment and management of FAD units by the communities. The next important step is to consider ways to achieve continuous and regular FAD management and guide the communities to do it. For future development of FAD, current situation, potential, and issues are summarized below.

In Vanuatu, fishing pressure is concentrated on the reef area, as it is easily accessible by canoe and diving. Off the reef, the exploitation of the resource is not well developed. Hence the shifting of

fishing pressure from reef to outer sea through FAD can be effective for better resource management.

On the other hand, the offshore fishery is something new for the coastal community of Vanuatu, and the effectiveness of the FAD is not well understood. For they, it may look risky business to invest on the expensive fuel to go offshore. To improve the situation, VFD should take initiative by demonstrating the economic feasibility (profitability) of FAD, identifying the effective FAD design and location for the deployment, and developing the marketing channel of fish catch.

Table2-31: Current Condition of the FAD Units Deployed by the Project (as of October 2014)

Project area	Deployment location	Depth	Date of deployment	Current condition (as of October 2014)	Name of FAD
The Northern Efate area	3 miles north off the coast of Moso Island	314 m	Nov. 21, 2012	Lost in Jun. 2013	Moso1
			Nov. 21, 2012	Lost in Sep. 2013	Lelema1
	3 miles north off the coast of Mangaliliu	189 m	May 23, 2013	No abnormalities	Lelema2
			Oct. 10, 2013	No abnormalities	Hat 1
	4.5 mile north-northwest off the coast of Lelepa Island	730 m			
	4.5 miles northwest off the coast of Lelepa Island	600 m			
The Malakula area	Off the coast of Uripiv Island				
	1 mile north-northwest	200 m	Dec. 5, 2012	Lost in Jan. 2013	Uripiv1
	1.2 miles northeast	550 m	Dec. 5, 2012	Lost in May 2013	Uripiv2
	2.2 miles east	660 m	Jul. 14, 2013	Lost in Nov. 2013	Uripiv3
	2 miles north (deployed at the midpoint between the surface and the bottom)	300 m	Dec. 16, 2013	No abnormalities	Uripiv4
	1.5 miles east (deployed at the midpoint between the surface and the bottom)	300 m	Dec. 16, 2013	No abnormalities	Uripiv5
	Off the coast of the Crab Bay				
	3 miles northeast	300 m	Dec. 18, 2013	No abnormalities	Crab Bay1
The Aneityum area	Off the coast of Analcauhat				
	3.7 miles southwest	350 m	Dec. 14, 2012	No abnormalities	Keam1
	4.7 miles northwest	270 m	Dec. 15, 2012	Lost in Jun. 2014	Keam2
	7.5 miles southwest	805 m	Jun. 25, 2013	Lost in Sep. 2014	Keam3

Note: The main reason for the FAD units drifting and being lost is thought to be large and middle-size vessels such as cargo vessels and cruise ships cutting the ropes.

Figure 2-13: Positon of FAD in Northern Efate
(Red means the FAD was confirm to be lost as of October 2014)

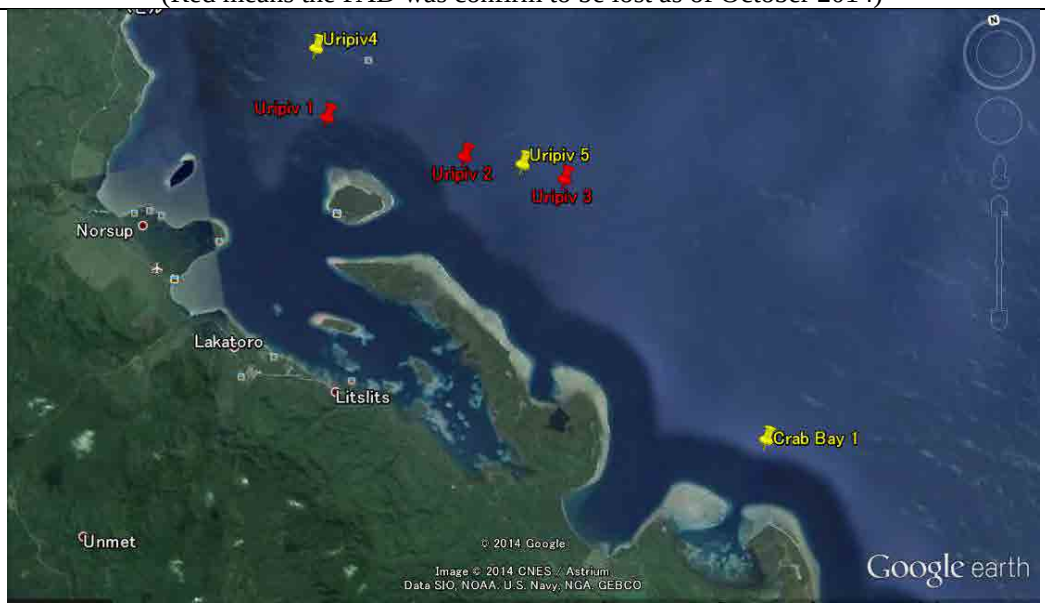


Figure 2-14: Positon of FAD in Malakula
(Red means the FAD was confirm to be lost as of October 2014)

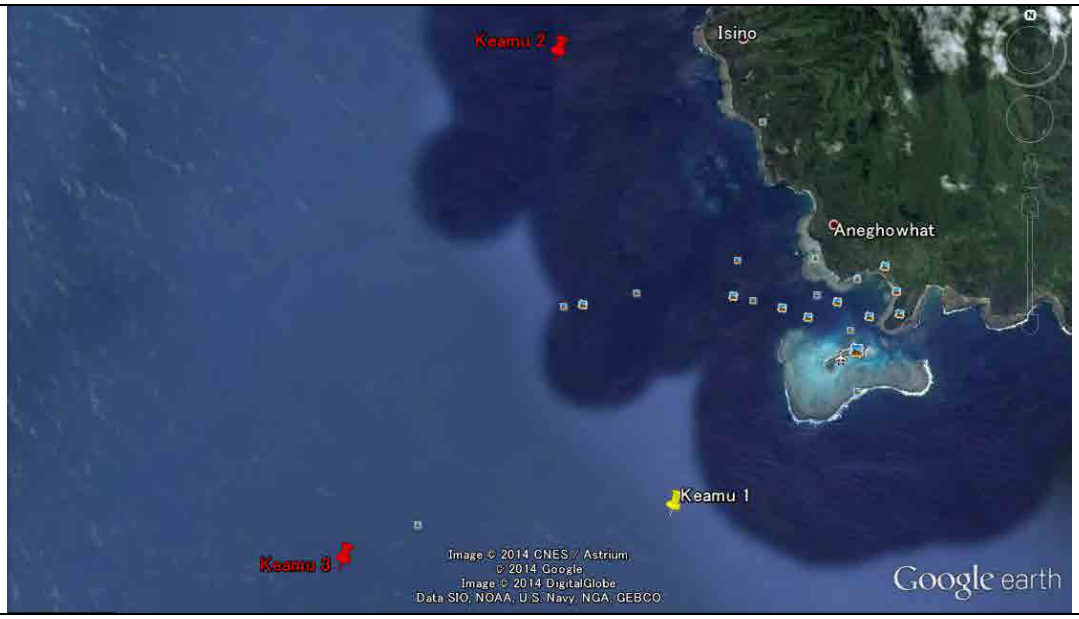


Figure 2-15: Positon of FAD in Aneityum
(Red means the FAD was confirm to be lost as of October 2014)

2-3-3. Shell polishing and Marketing Workshops, and Dissemination of Eco-Tags

For the effective promotion of CB-CRM, working only with male and MPA committee members is not enough. In Vanuatu, where the fishing pressure concentrates on reef, women and children also play significant part in management of resource. To work with them and crease an alternative income source, the Project help MPA management committee to establish women group to promote shell polishing and marketing.

Vanuatu has advantage to sell the products, as many tourists visit the island from Australia and New Zealand. Coastal community can easily find the materials for the products. Moreover, it does not requires cold chain. Even the remote island where no tourists visit, they can produce and send it to market such as Port Vila.

Even before the Project, some community members are engaged in shell polishing. However, the amount was limited. One of the important issues on shell polishing and marketing was that there was no information provided to the products, as to whether the product is imported or locally made. In addition to that, it was also necessary to provide assurance to the environmentally sensitive tourists that their buying of local shell products does not have adverse effect on the resource and environment. With this in mind, the Project introduced tag to be attached to the product and provide necessary information. For the community, the Project made pamphlet to learn how to make the shell polishing products.

(1) Production of Eco-Tags and a Booklet on Shell polishing

One of the objectives in the Project is to help fund CBCRM activities by using some of the margins from selling shell craft made in the communities. The VFD and Department of Tourism teamed up to produce Eco-Tags for use on shell craft merchandise, and distributed them to the MPA Committees in the three target areas.

More than just a promotional tool raising the commercial value of shell crafts made by the communities, one of the aims of Eco-Tags is for tourists and other customers to properly understand the significance of shell polishing and marketing as a CBCRM activity. For this reason, it is written on the Eco-Tags that the crafts have been made by local communities, and that the proceeds from the shell craft are used in CBCRM activities. The MPA Committees sell the Eco-Tags to individuals making and marketing the shell craft, and the proceeds from this are used to fund the activities of the MPA Committee. (see appendix 7 for sample Eco-Tags)

Furthermore, a poster and booklet in Bislama on the making and marketing of shell craft were produced for the purpose of widely disseminating both the proper way of making shell craft and the selling of shell craft using Eco-Tags, guidance on which was provided through the Project. These promotional materials have been distributed not only to the target areas, but also to communities in other areas that are interested in shell polishing and marketing. (see appendix 8 and 9 for sample poster and brochure)

Photographs: Eco-Tags used in Marketing Shell Craft, and a Promotional Poster and Booklet

Eco-Tags used in marketing shell craft (from left: tags used in Aneityum, Efate and Malakula)

Promotional poster and booklet (in Bislama) for shell polishing and marketing

(2) Activities at each site

Northern Efate

In Northern Efate, the introduction of tag promoted the marketing activity. The community member in Mangaliliu with high skills on shell polishing became instructor and gave technical guidance to the community of Malakula and Aneityum.

Malakula

The community members became interested in the production and marketing of shell craft after learning the activity in Aneityum. Upon the request from the leaser of women group, the Project conducted the irst Shell polishing Workshop was held at the Lakatoro Fisheries Office on July 11-12, 2013 for representatives from women's groups, with an expert on shell craft being dispatched from the Mangaliliu on Efate Island. Subsequently, a Shell Craft Committee was formed by the women who participated in the workshop, and they began making shell craft.

Because there is no public electricity service that reaches the communities of Crab Bay, the initial plan was for the machine tools used for making the shell craft (grinders, drills, etc.) to be managed at the Lakatoro Fisheries Office, and for the women's groups to produce the shell craft by utilizing the power supply at the Fisheries Office. However, Crab Bay and Uripiv Island are located some distance from Lakatoro, and because many of the members are housewives, it would have been difficult for them to find the time to go to Lakatoro to do the work. Consequently, some women voiced the view that they wanted to manage the machine tools and metal fittings at the communities. Taking those views into account, machine tools and a generator were provided to two women's groups in Crab Bay and on Uripiv Island, and guidance was provided for them to begin making shell craft samples.

Another opinion raised was that only a limited number of women who could get to Lakatoro were able to participate in the First Shell polishing Workshop. Consequently, a request was made for the same workshop to be conducted out in the community for those women who find it hard to leave their communities. In response to that request, the Second Shell polishing Workshop was held on November 14, 2013 on Uripiv Island and on November 15 at Louni in Crab Bay. Following discussions immediately after the workshop, separate Shell Craft Committees were established in Crab Bay (on the main island) and on Uripiv Island. Each of the committees worked on making samples of shell craft, and the fruits of their efforts were displayed as samples at the ceremony for legislation of the Crab Bay MPA.

The challenge for the future will be selling the shell craft. Compared to other target sites, the environs of Lakatoro are visited by few tourists. Nevertheless, it is hoped that the local shell craft will be sold at the craft center attached to the Lakatoro Market and at the Lakatoro Fish Market. There is also hope that the shell craft will be sold on Wala Island where many cruise ships make port.

Photographs: Shell polishing Activities by Community Women's Groups in Crab Bay

	
Representatives from women's groups in Crab Bay participated in the Shell polishing workshop (Malakula Island). (Lakatoro, July 2013)	The plan was for participants in this workshop to provide guidance in the making of shell craft to other women in their respective communities.

	
Shell craft workshop on Uripiv Island Local instructor provided guidance on the basic techniques for making shell craft (November 14, 2013)	Shell craft workshop at Louni in Crab Bay The workshop ended up being held outside because arrangements were not made for a venue. (November 15, 2013)
	
Shell craft made by the women's group were displayed as samples at the ceremony for legislation of the Crab Bay MPA. (Lakatoro, December 19, 2013)	The Eco-Tags provided by the Project have been used as a promotional tool on shell craft.

Aneityum

In late May 2013, instructor for shell craft selected from Mangaliliu was dispatched to Aneityum Island to conduct a shell polishing workshop for the local women of Analcauhat on May 27. Subsequently, the community in Analcauhat formed a Shell Craft Committee, which has begun actively making shell craft. Moreover, in November 2013, the community members also started selling their craft to cruise ship tourists at a store on Mystery Island.

Furthermore, utilizing an unused solar panel that had been previously installed by the VFD, additional equipment such as batteries and a regulator were introduced to develop a solar power generation system for use in the making of shell craft. As a result, the Shell Craft Committee has set up a shell craft studio, and has set to work making shell craft.

For the purpose of linking resource management activities with shell polishing and marketing, the Mystery Island MPA Committee plans to aid the CBCRM activities by distributing and selling Eco-Tags to attach to shell craft products made on the island. To this end, in the Project, 300 Eco-Tags were printed and provided to the MPA Committee. The MPA Committee appropriately selects shell craft producers and sellers who cooperate in the Eco-Tag activities, and distributes the tags to be used. However, because the idea of Eco-Tags has not yet spread among the relevant people, the MPA Committee has started by distributing tags to shell craft sellers for free on a trial basis and getting them to use the tags for promoting locally made shell craft.

Photographs: Activities by a Women's Group for Making and Marketing Shell Craft (Aneityum)

	
Shell polishing workshop (Analcauhat: May 2013)	Shell polishing by the youth group (August 2013)
	
Sales of shell craft have begun at a store on Mystery Island for when the cruise ships dock (November 2013)	Eco-Tags have been distributed and used on a trial basis as a promotional tool for local shell craft (November 2013)
	
The shell craft studio, equipped with a new solar power generation system (February 2014)	Shell craft products being made at the shell craft studio (February 2014)

The shell craft activities on Aneityum Island have only just begun, and the organizational structure of the Shell Craft Committee is fluid. As a consequence, the results of the activities as of September 30, 2013 were confined to sales of about 50 items from five sales opportunities to tourists. For this reason, in October 2013, changes were made to the committee members to focus on the members who are more enthusiastic about making and marketing shell craft. Furthermore, the MPA Committee and Shell Craft Committee united, and have promoted the following three activities.

- Use the shells of dead shellfish as materials for making shell craft.
- Make sure that community members who collect shellfish report the types and quantities of shellfish collected.
- Conduct campaigns to promote awareness among women and children for resource

management.

(3) Shell Polishing and Marketing Workshops

In the Project, a workshop on shell polishing was held in each target site, with guidance and support being provided for activities for making shell craft, primarily among women's groups. As a consequence, shell polishing activities are gradually becoming more formalized in each site. For a three-day period, February 5-7, 2014, a Shell polishing and Marketing Workshop was held at the VFD in Port Vila, for the purpose of exchanging views with the shell craft groups in each site and providing guidance in aspects relating to the selling of the shell craft they produce. The workshop was attended every day by 15-20 people, including representatives from the shell craft groups in each site, officers from the VFD, government officials (Department of Tourism, Department of Environment and Conservation, Department of Women's Affairs), and representatives from tourist and souvenir shops in Port Vila.

In addition to reviewing and confirming the techniques used in making shell craft, the workshop also focused on the selling of shell craft. Participants were provided with opportunities to visit relevant stores in Port Vila and to listen to talks given by representatives from local tourist and souvenir shops about the conditions for selling handicrafts to tourists in Port Vila (such as price setting for handicrafts, the designs preferred by tourists, and best-selling items). On the final day of the workshop, participants visited Sunae on Moso Island to conduct a local workshop, providing local women and youths with advice on shell polishing, and making shell craft products together with them.

The workshop was very popular, not only among the participants, but among the government officials too, and it is thought that it has given significant momentum to the promotion of shell craft activities. The representatives from the Department of Tourism who participated in the workshop, showed a strong interest in the shell craft products being made at each target site, and they have decided to set up a place within the Department of Tourism immediately after the workshop to showcase shell craft products made in Vanuatu. The workshop was also covered by Radio Vanuatu, and interviews with the participants were broadcast nationally.

Photographs: Shell polishing and Marketing Workshop (February 2014)

	
Reports were made on the shell polishing activities in each site. The issues in making and marketing shell craft were then analyzed and discussed.	Tourist and souvenir shops in Port Vila were visited to see which shell craft products are being sold.

	
Discussion and exchange of opinions on marketing handicrafts, led by the representative of souvenir shop, Pandanus Vanuatu.	Shell craft products made by women's groups from Aneityum and Malakula
	
The workshop on making shell craft, held at Sunae on Moso Island. Participants provided guidance to local women and youths.	Even the participants learned techniques for making shell craft from each other.

Shell polishing and CB-CRM

In Vanuatu, it is common practice for women and children to make handicraft with locally available material to sell and make cash income. Shell polishing made an additional opportunity for them to make income, and contributed to some extent for the promotion of women in the community.

2-4. Individual Projects in Each Project Area

2-3 explained the two components of pilot project commonly implemented over the three target sites. These components were implemented under the strong request from VFD rather than from communities. This chapter explains Individual Projects in Each Project Area.

Table 2-32: Individual Projects in Each Project Area

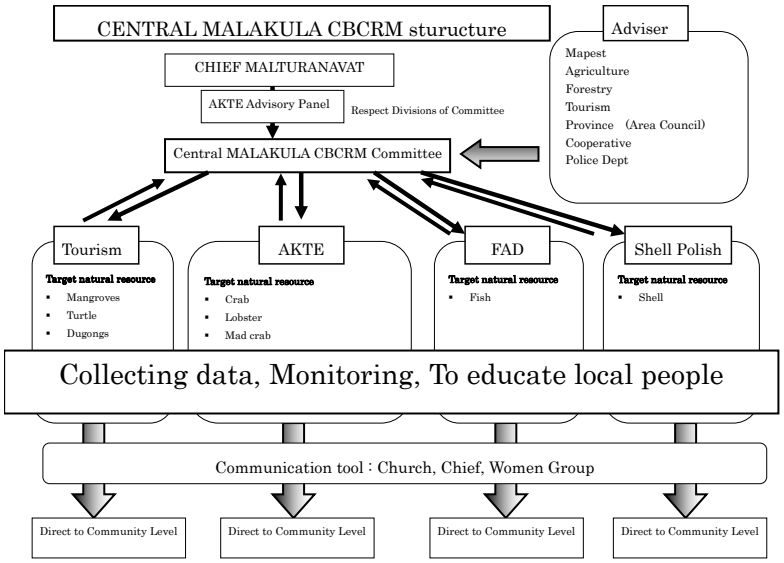
pilot project commonly implemented over the three target sites（2-3）	
Community-based data collection and analysis on fishing activity（2-3-1） Community-based FAD fishery management（2-3-2） Community-based shell polishing and marketing (2-3-3)	
Individual Projects in Each Project Area（2-4）	
Northern Efate (2-4-1)	(1) Collective fish marketing by FAD management committee (2) Ocean nursery of giant clam (3)release and monitoring of giant clam and green snail (4) construction and utilization of modified canoe

Malakula (2-4-2)	(1) Diversification of the fund generation activity for Crab Bay MPA committee (2) Monitoring o released marine shellfish in Uripiv Island (3) Installation of the giant clam ocean nursery in Uri and Uripiv Islands (4) Legislation of Crab Bay MPA (5) Establishment of fish market
Aneityum (2-4-3)	(1) Introduction of fish café (2) Introduction of modified canoe (3) Establishment of fish market

* number in () indicates the chapter in the report

BOX1: MPA committee and CB-CRM committee

MPA[10] management committee is community organization in charge of the management of taboo area. Through the implementation of pilot projects, the community set up various committees, such as committee for FAD management, shell polishing, fish café management. These committee supported MPA committee by creating alternative income. Activate by these committees, the MPA committee started activities not only for the management of MPA but more comprehensive activities for the promotion of CB-CRM. Hence the MPA committee was renamed to CB-CRM committee. Supporting activities such as FAD management, shell polishing, fish café management could have adverse effect for CB-CRM if proper guidance is not provided. Hence the committees for FAD management, shell polishing, fish café management are placed under CB-CRM committee.



※AKTE is in charge of MPA management

2-4-1. Individual Activities in the Northern Efate Area

The following activities were conducted with the aim of strengthening coastal resource management abilities and letting all the people involved know about the management methods, in the Northern Efate area.

(1) Joint Shipping of Marine Products Caught by the FAD Management Committee

When the second FAD fishing workshop was held in June 2013, the executive officers of the FAD management committee established at the first FAD fishing workshop in November of the previous

[10] Here "MPA" is not officially registered but decided by by-law

year changed from members mainly made up from Mangaliliu to members mainly made up from Lelepa Island. This happened because of low interests among Moso community for the introduction of FAD. The FAD management committee led by new executive officers conducted FAD fishing by mainly involving communities from Lelepa Island and Mangaliliu and jointly shipped the marine products caught to the capital city Port Vila, with the aim of raising funds for FAD management activities. They sold about 60,000 vatu worth of products in three months up to September. The proceeds were used as activity funds for the FAD management committee. There is also a plan to establish a "fish market" to be managed by the FAD management committee.

As of the end of the Project, the joint shipping of marine products is not done on regular basis. The main reason is the lack of ice-making and storage facility for the products. If the facilities and training necessary to maintain the facility is provided, the joint shipping will be promoted. A part of the sales could be used for the promotion of CB-CRM.

(2) Ocean nursery of Ornamental Tridacna Clams

From July 2012 to January 2013, the Project conducted ocean nursery tests for the maxima clam in Sunae and Tasiriki on Moso Island. Out of the 10 families which participated in the tests, only two families (in Sunae) conducted appropriate aquaculture management. The maxima clam seeds distributed to the remaining three families in Sunae and five families in Tasiriki were all eaten by carnivorous snails. This is largely because of the different awareness levels of the communities who volunteered to participate in the aquaculture tests. Another problem is that the VFD did not give sufficient technical follow-up support because this was the first time for the communities to conduct aquaculture. Aquaculture requires detailed technical support for a certain period of time. This is a major extension challenge for the VFD which only has a small number of staff.

As can be seen from the successful cases of Tridacna clam aquaculture in Sunae, having core human resources in a village will be the key to success in the future. Tridacna clams cultured in Sunae were harvested in May 2013 and sold to an ornamental fish exporter in Port Vila. The VFD mediated the trade, but this is outside the scope of VFD's work. It should reconstitute the Tridacna clam aquaculture association whose secretariat existed within the VFD in the past.

In June 2013, the Project distributed fluted giant clam seeds to two families in Sunae who performed successfully in the maxima clam aquaculture tests as well as one clan on Lelepa Island and one clan in the Lelema area on Efate Island who have aquaculture experience from Phase I. They then started fully-fledged ocean nursery.

As for the stock of small maxima clams which are difficult to sell in the ornamental fish market, the Project distributed them to those who wish to grow them, for food purposes. There is little need for maxima clam culturing because their natural stocks are not exhausted. If the aquaculture of the fluted giant clam and the giant clam can be launched in the future, Tridacna clam aquaculture can potentially be an alternative income source for coastal communities.

Photographs: The Introduction of Tridacna Clam Ocean nursery on Lelepa Island (June 2013)

	
Transporting Tridacna clam seeds (the fluted giant clam) from the VFD to Lelepa Island	The installation of mariculture cages for Tridacna clams (on Lelepa Island)
	
The maxima clam being raised in an ocean nursery (Sunae, January 2013)	The maxima clam raised in Sunae were sold to an exporter via the VFD (January 2013).

(3) Monitoring and Awareness Raising Activities for the Release and Raising of the Giant Clam and the Green snail

Regarding the giant clam brought from Tonga and released as well as the green snail brought from Aneityum Island and released in Phase I, the Project and the VFD jointly conducted monitoring of their growth, at appropriate times. As for the green snail, in order to check reproduction after the release conducted in Phase I, stock surveys were conducted with the cooperation of the SPC in October 2013, in the sea areas where the green snail had been released in the Northern Efate area. The Project supported the field surveys by providing relevant information, etc. The result of the survey scientifically verified the reproduction of the green snail transplanted from Aneityum.

The Project also installed signboards which explain developments in the release and raising of giant clams in the four communities (Mangaliliu, Lelepa Island, Tasiriki and Sunae) which conduct giant clam raising management. It also created a pamphlet on the raising of the giant clam and distributed it to community members. This is used as a tool for environmental education and tourism, through which children and young people in the communities as well as tourists can learn about the objectives of the release and raising of the giant clam.

In the Phase II implementation period, about six years had passed since giant clams and green snails had been released in the raising and propagation project launched in Phase I. The results of monitoring conducted by the Project were compiled and a briefing session on the output of the giant clam and green snail raising project was held on Lelepa Island on December 2, 2013. Community members from Mangaliliu and Lelepa Island participated in the session (see the Appendix 10 and 11 for the presentation material).

Although the number of giant clams is decreasing slowly, about 80% of the released clams are still alive. They have grown to an average width of about 50 cm, and some have entered the maturation stage. It was explained that they should continue to be managed with care because they are expected to start propagating (releasing sperm and eggs) in a few years' time.

Regarding the green snail, it was explained that bloodstocks released in 2007 and 2008 have

already started propagating and young shells have been found in the release areas. It was also proposed that young shells should be collected and released in the new propagation area (Lelepa Island) at the same time, because the current stock of released green snail are getting old, six years after being released.

CB-CRM with static marine shellfish is relatively easy to obtain the tangible result if community can make committed effort. Hence it could be effective for awareness raising among the community. The grouping of bloodstock for green snail made significant achievement. Gigas could soon become matured and ready for the reproduction. In Vanuatu, there is traditional custom to gather the clams in nearby reef to protect and secure the food for any emergence. The grouping of bloodstock may have succeeded due to this custom.

Photographs: Monitoring and Awareness Raising Activities for the Raising of the Giant Clam

<table>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Monitoring a giant clam raising farm. The number of surviving clams was counted and shell lengths were measured (Lelepa Island, June 2013).</td><td>The PR pamphlet for giant clam raising farms was created and distributed, when signboards were installed.</td></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><td>The briefing session on the output of the giant clam and green snail release and raising project (Lelepa Island, December 2, 2013)</td><td>The expert Mr. Sone and VFD C/Ps summarized the output of the six years of activities since the release and proposed the continuation of the management activities.</td></tr>
</table>

(4) Construction and Utilization of Modified canoes

In an island country such as Vanuatu, fuel prices are high and gasoline for one fishing trip costs at least 2,000-3,000 vatu, if an outboard engine with 30-45 horsepower is used to go offshore. This cost is one of the reasons why communities hesitate to use FAD units deployed offshore. As one of the measures to promote the utilization of the FAD and offshore fishing activities, the Project worked on the construction and utilization of modified canoes which are inexpensive to build and save fuel costs because they use sails.

On January 28 and 29, 2013, the “Canoe Modification Workshop” was held in Mangaliliu. In this workshop, project staff introduced the plans for the modified canoe (a small canoe equipped with a sail and an outboard engine) and then converted the existing canoes with the community members.

As a demonstration, the project staff sailed to the deployed FAD unit in the modified canoe and returned to the village using the small outboard engine (eight horsepower). The fishing operation with modified canoe saved at least the fuel necessary for one from the shore to the FAD (10-15 litters, equivalent to 1,500 to 2,000vatu). The modified canoes are being used for everyday fishing activities and tourism activities in communities in Mangaliliu and on Lelepa Island.

Photographs: The Canoe Modification Workshop (January 2013)

	
Community members from Mangaliliu and Lelepa Island participated in the workshop (January 2013).	Existing canoes were converted by project staff and the community members.
	
After the conversion of canoes was completed, a small outboard engine was deployed on an modified canoe and it was used to make a trip to the FAD unit. The sail was used to travel to the FAD unit.	From the FAD unit back to the village, the sail was folded and the outboard engine was used.

Being inspired by the introduction of the modified canoes, the communities in Mangaliliu and on Lelepa Island constructed a large canoe equipped with a sail and an outboard engine, using the FAD committee's profits from selling the marine products they had caught. Also, in Mangaliliu, a young people's group is considering the implementation of tourism activities and trolling in the waters around the FAD unit using the modified canoes, in cooperation with the community-managed tourist bungalow project being implemented by the UNESCO World Heritage Centre and the Vanuatu Department of Tourism. The future challenge is to clarify how to operate and manage the modified canoes within coastal communities.

Photographs: Construction and Extension Activities for Modified canoes in Mangaliliu

	
A large canoe being constructed in Mangaliliu. It will be used for tourism and fishing (October 2013).	The completed large modified canoe (December 2013)
	
An modified canoe leaving Lelepa Island for the offshore FAD (February 2014)	A large catch using the modified canoe in the waters around the FAD unit (February 2014)

(5) Trial Operation in the Northern Efate area

Drop-line fishing and diamondback squid fishing had been introduced as part of the Project, and together with members from the Lelepa Island community, the methods were put into practice by conducting a final trial operation off the coast of Lelepa Island, North Efate, over a three-day period, October 21-23, 2014. On this occasion, the VFD's small ship, Albacore, was used.

During the operation, six diamondback squid were caught. This was only the second case of diamondback squid being caught in Vanuatu, after the first was caught off of Aneityum Island in November 2013. The operation confirmed that October and November are the good time for catching diamondback squid, and that they can be caught in the coastal waters of Efate Island. Diamondback squid are a large squid that inhabit the deep sea, and with a single squid weighing 20kg, they are highly valued as a food. There are few examples of diamondback squid being caught in the island countries of the Pacific Ocean, and they hold promise as an undeveloped marine resource with future potential benefit.

At the VFD on October 24, a mini-event was held to introduce people involved in tourism and fisheries in Port Vila to the methods for catching and processing diamondback squid. In addition to officers from the VFD, participants included the director of the Department of Tourism, cooking instructors from the HTLTC, and local media. They tasted the diamondback squid for themselves, and exchanged views on the better use of promising local ingredients. Cuts of diamondback squid were also provided to hotels and restaurants in Port Vila to sample.

The HTLTC spoke of its keen interest in the squid as a new local ingredient, and of how it would put effort into developing diamondback squid recipes. The college has planned an event for December 2014 to introduce hotels and restaurants in Port Vila to its diamondback squid recipes.

Photographs: Final Trial Operation Off the Coast of the Northern Efate Area (October 2014)

	
A diamondback squid being raised off the coast of Lelepa Island. They are pulled up from depths of greater than 200 m.	A caught diamondback squid. Only the second case in Vanuatu.
	
Showing the diamondback squid to the Lelepa Island community. Seeing a large squid for the first time, they were surprised.	Mini-event at the VFD to introduce the diamondback squid. Mr. Graham Nimoho, Manager of Coastal Fisheries Development Division, presented on fishing for diamondback squid and its potential as a food.
	
Mr. Motoko Fujii (expert) introduces how to process diamondback squid, including a hands-on explanation of how to peel back its skin.	Participants at the mini-event tasted diamondback squid sashimi and stir-fry, and discussed its potential as a new food.

2-4-2. Individual activities on Malakula Island

The goal in the project target area of Malakula Island is to expand the target species of resource management from land crabs to other fish species by strengthening the financial footing of the Crab Bay MPA Committee. To monitor the Crab Bay area, at least 2,000 vatu will be necessary for fuel.

To visit Crab Bay once in every two weeks, 4,000-5,000 vatu will be necessary.

(1) Diversification of funding for Crab Bay MPA Committee Activities

Support was provided for the following financing activities for the purpose of generating new sources of funds for the activities of the Crab Bay MPA Committee. For effective CB-CRM activity, especially for the monitoring in Crab Bay, transport cost for Crab Bay is necessary. If MPA committee has to visit the Crab Bay once in every two weeks, 4,000 to 5,000 vatu/month would be the target amount for the fund generation.

1) Installation of mooring facilities for foreign yachts visiting Crab Bay (designated MPA)

Crab Bay has great promise as an anchorage for yachts, and so for the purpose of encouraging overseas yachts to moor here, two mooring buoys and a rainwater tank for drinking water were installed in July 2013. The plan is to collect a toll from the moored yachts and then to use this to finance the activities of the MPA Committee. It was confirmed that six yachts used the mooring buoys in Crab Bay between when they were installed and January 2014. Thus it was revealed that sightseeing yachts will visit and drop anchor at Crab Bay. However, progress has not extended as far as the MPA Committee actually levying mooring fees, and so an issue for the future will be to develop a system for the collection of these mooring fees.

Photographs: Pilot Project on Securing Funding for Coastal Resource Management Activities in Crab Bay through the Installation of Mooring Buoys for Yachts

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>In July 2013, members of the MPA Committee set up a place for yachts to moor in Crab Bay. It has potential as a new source of funds for resource management.</td><td>A facility was set up to store rainwater flowing from the roof of the guesthouse. This is sold by the MPA Committee to the moored yachts.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>The Crab Bay MPA Committee constructed mooring buoys in two locations nearby the guesthouse.</td><td>Members of the MPA Committee in Louni regularly check on the mooring buoys when they go fishing.</td></tr>
</table>

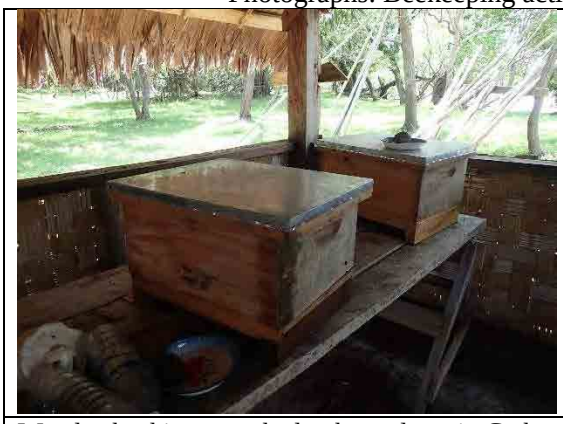
2) Introduction of mincing machine for the production of kava[11]

As a means of creating funds for the activities of the MPA Committee, previously, the committee would borrow a mincing machine to produce kava, which it would then sell at community events and church events. In July 2013, a mincing machine was provided to the MPA Committee. As a result, the MPA Committee was able to lower the costs for producing kava, and they are now able to produce a greater volume, meaning that their revenue from selling kava has increased. In one sale, committee gets 2,000-3,000 vatu of the profit.

3) Introduction of beekeeping equipment

The objective of the Project is for bees to be kept in the mangrove areas of Crab Bay, and to create funds for the activities of the MPA Committee through processing and selling the honey. In addition to carrying out the actual beekeeping, the plan is for the beekeepers to also collect the mooring fees from moored yachts and to regularly be on the lookout for any illegal harvesting of land crabs. Under the Project, two wooden beehives were provided, and under the guidance of an agricultural extension officer, beekeeping activities were started, using the tourist bungalows in Crab Bay. The harvested honey was sold as local produce, such as to the tourist bungalows in Lakatoro.

Photographs: Beekeeping activities in the Crab Bay community

	
Wooden beehives attached to bungalows in Crab Bay.	An agricultural extension officer providing guidance on apiculture to MPA Committee members.

(2) Release and Monitoring of Marine Shellfish on Uripiv Island

In July 2012 on Uripiv Island, underwater research was conducted in the reefs surrounding the island, and meetings with community members were held. Overexploitation during the 1980s had led to a dramatic decline in the trochus and the green snail resources on Uripiv Island, and it had recently become clear that the shellfish were missing from around the island. The underwater research in the reefs also failed to identify either the trochus or the green snail. Given this situation, it was decided to take trochus seed and green snails nurtured at a VFD hatchery and release them into the reefs off Uripiv Island, and to try to get the island community to rear and manage the shellfish. On August 15, 2012, 348 trochus seeds (average shell length: 51.7 mm, average weight: 51.1 g) and 299 green snail seeds (average shell length: 56.3 mm, average weight: 55.5 g) were flown in from a VFD hatchery in Port Vila, and in cooperation with the local community, were released off the east coast of Uripiv Island.

[11] Kava is a traditional drink consumed in South Pacific countries. It is a type of narcotic which, when taken, has a sedative effect. It is a common drink in Vanuatu, known for its excellence as a remedy for muscular pain and general pain relief.

Photographs: Release of Juvenile Trochus and Green snails Off Uripiv Island (August 2012)

	
Meeting with community members on Uripiv Island. Using maps, confirmed the no-fishing zones on the island and also the state of shellfish resources. (July 2012)	Juvenile trochus and green snails were transported from a VFD hatchery, and released into reefs off the east coast of Uripiv Island. (August 2012)
	
Releasing the juvenile shellfish was conducted in cooperation with youths from the local community.	Memorandums on the management and rearing of the released shellfish were exchanged between the Uripiv Island community and the VFD.

Four monitoring (recapture) surveys were conducted after one month, three months, six months and one year to check the effects after the release. Ropes were sunk around the release site to establish permanent transects, and monitoring of the released shellfish was conducted across an area of 1,000 m^2. Between September 24 and 28, 2013, a monitoring (recapture) survey on the released shellfish was undertaken on Uripiv Island to ascertain the effects one year after the release. A visual inspection using scuba equipment was made, but none of the released shellfish were detected living in the release site or its surrounds. However, given that the only find was a small number of dead shellfish, this indicated the strong possibility that the other shellfish had moved and dispersed. In any case, more time is needed for the effects of the release to come to light.

On November 13, 2013, a meeting was held on Uripiv Island to announce the results of the test to release and nurture the trochus and the green snail. The results of the test to recapture the released shellfish were announced to the island community, and discussion was held on the recommended conservation activities for the future. (see appendix 12 for the presentation documents) The community members understood that it is important to continue the ban on the harvest of trochus and green snail and to protect them.

Table2-33: Number of Recaptured Trochus Seeds Which Have Been Tagged Released Off Uripiv Island

Distance from release site	At release Aug 2012	After 1 month Sep 2012	After 3 months Nov 2012	After 6 months Feb 2013	After 1 years Sep 2013
Zone within 5 m	348	162	34	1 (3)	0 (1)
Zone beyond 5 m	0	17	32	No data	0
Total number of recaptured shellfish	348	179	66	1 (3)	0 (1)
Number of dead shellfish discovered	0	24	23	2	6 (1)

Note: Numbers in parentheses ( ) indicate the number of untagged shellfish that were recaptured

Table2-34: Number of Recaptured Green Snail Which Have Been Tagged Released Off Uripiv Island

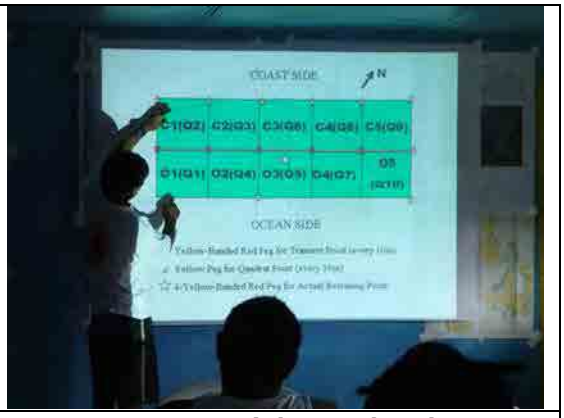
Distance from release site	At release Aug 2012	After 1 month Sep 2012	After 3 months Nov 2012	After 6 months Feb 2013	After 1 years Sep 2013
Zone within 5 m	299	143	17	0 (1)	0 (1)
Zone beyond 5 m	0	12	28	No data (2)	0 (2)
Total	299	155	45	0 (3)	0 (2)
Number of dead shellfish discovered	0	36	15	4	14 (1)

Note: Numbers in parentheses ( ) indicate the number of untagged shellfish that were recaptured

Photographs: Recapture Surveys of Released Shellfish (the Green snail, the Trochus) on Uripiv Island, and Meeting to Announce the Survey Findings

Recapture surveys were conducted on shellfish released off Uripiv Island. Surveys were conducted after establishing permanent transects.

The recapture survey 1 year after release (September 2013). Using scuba equipment, researchers dived to the area around the release site and checked for tags on the released shellfish.

	
Meeting to announce the results of the recapture survey on shellfish (the green snail, the trochus) released off Uripiv Island (November 13, 2013)	Presentations were made by Mr. Shigeaki Sone (expert in marine shellfish propagation) and Andrew from the VFD

(3) Set Up of Ocean Nursery for Tridacna Clams Off Uripiv and Uri Islands

In the past, the VFD used to purchase fluted giant clams from the coastal waters of Uripiv and Uri islands to be used as mother clams in hatcheries. Given this, the decision was made to provide the island with fluted giant clam seeds produced by the VFD. On November 12, 2013, 157 fluted giant clam seeds (one year old) were transported by air from a VFD hatchery in Port Vila to Uripiv Island in Malakula, and on the following day (November 13), in cooperation with the local communities, aquaculture cages for giant clams were set up off Uripiv Island and Uri Island (one cage each). This trial demonstrated that setting up of ocean nursery for Tridacna clams is possible by airplane.

Photographs: Introduction and Installation of Aquaculture Cages for Giant Clams on Uripiv and Uri Islands

	
About 100 of the one-year-old fluted giant clams flown into Malakula Island from a VFD hatchery in Port Vila. The juvenile clams were produced as part of the Project. (November 2013)	The cages for the giant clams were set up in the coastal waters of Uripiv and Uri islands with cooperation from the local communities.

(4) Legislation of Crab Bay MPA

At the Coastal Resource Management Planning Workshop, which was hosted by the VFD in Port Vila in late February 2013, the Crab Bay MPA Committee established legislating the Crab Bay MPA as one of the activities of the action plan. This came about because of the difficulty under by the dominant chieftain system for local communities to independently maintain the MPA scheme, which they had been maintaining autonomously, given the recent changes in Vanuatu's social and economic environment. The MPA Committee has actually applied to the Ministry of Lands and Natural Resources for the MPA to be legislated, and the ministry is currently proceeding with an internal

review of this. This kind of activity is linked to support from the International Union for Conservation of Nature and Natural Resources (IUCN), which promotes the conservation of mangrove forests in South Pacific island countries, and led by the Crab Bay MPA Committee and the Malampa Province Fisheries Department, workshops on reworking coastal resource management plans were held in 16 communities related to Crab Bay between late September and early October 2013. Based on these results, Crab Bay was announced as a legislated MPA on December 19. Also, the revised MPA management plan was published as a pamphlet. In the Project, given that full support has been given to the resource management activities of the Crab Bay MPA Committee, legislation of the Crab Bay MPA is regarded as a great success.

Photographs: Ceremony for legislation of the Crab Bay MPA (December 19, 2013)

Ceremony for legislation of the Crab Bay MPA (December 19, 2013)

The revised MPA management plan was signed by representatives from the 16 member communities of the Crab Bay MPA Committee.

(5) Establishment of a fish market

In cooperation with a Japan Overseas Cooperation Volunteer (JOCV) currently dispatched to the Malampa Province Fisheries Department, a fish market was built on Uripiv Island by the island community, and a small solar-powered freezer was installed. By doing so, catches of fish can now be kept frozen on the island before being shipped in bulk to the Lakatoro Fish Market. Also, because the fish caught on the island are almost all stocked and stored for market, catch records are now taken down all together at the fish market. The fish market is administered and managed by members of the FAD Management Committee (which was organized as part of the Project) who live on the island.

Spurred on by the activities on Uripiv Island, the Crab Bay Community on the Malakula main island have begun preparations to set up a similar fish market in the community of Louni, again with guidance provided through the Project. Louni is located near the midpoint of the Crab Bay coastline, and so is suited to being the point of collection for fish caught in the bay. The youth group within the MPA Committee has slowly purchased necessary materials using funds such as those collected from selling kava, and is now building a structure to house the market. As at the completion of the project (October 2014), the building for the fish market had been completed, and there were plans to install a small solar-powered freezer using assistance funding from the JICA Office.

Figure 2-16: Map of Crab Bay MPA, member communities, and fish market

Photographs: The Fish Market on Uripiv Island

Inside the Uripiv Island Fish Market. A small solar-powered freezer was installed with support from the JICA Vanuatu Office.

Fish caught on the island are kept in the freezer. They are then shipped in bulk to the Lakatoro Fish Market for selling.

2-4-3. Individual Activities on Aneityum Island

The following activities were undertaken to reduce the fishing pressure on lobster resources, which is the project goal for this site.

(1) Introduction of the "Fish Café" Business

Mystery Island is located next to Aneityum. Currently, more than 70 cruise ships put in here each year, bringing with them many tourists. However, the only local cuisine targeted at tourists is spiny lobster, and so the fishing pressure on this species is excessive. Accordingly, a major challenge is to diversify the local cuisine offered to tourists, and to maintain lobster resources. Given this background, in the Project, the "fish café" business was introduced and relevant guidance provided, with an aim of encouraging the effective utilization of currently underutilized fish resources, while at the same time, reducing the fishing pressure on spiny lobsters.

1) "Cooking with fish" workshop

Between July 27 and August 3, 2013, a workshop was held to provide guidance on cooking dishes using locally caught fish. On the recommendation of Mr. Goto, a senior volunteer in Japanese cuisine at the HTLTC, two cooking instructors were dispatched from the HTLTC to Aneityum Island to lead the workshop. The workshop was attended by 15 locals who had been selected from among the communities of Analcauhat. The primary focus of the instruction at the workshop was on how to make four different fish dishes and how to make coconut juice cocktails. The fish dishes included fish kebabs made with skipjack tuna, wahoo and other pelagic fish (that live in the upper layers of the open sea) or snappers and other demersal fish (that live close to the sea floor). Instruction was also provided on procurement methods and on calculating costs. Furthermore, on three days during the workshop, participants tested selling their trial dishes to cruise ship tourists. All the costs incurred in the cooking workshop, including the costs of dispatching the instructors, were met by the Analcauhat Tourism Committee.

Table 2-35: Fish Dishes Taught at the Cooking Workshop (August 2013)

Fish dishes	Menu price (AUD)
Barbeque Snapper Kebab	$ 4
Plate of Deep Fried Finger with Tartare Sauce	$ 10
Poached Snapper with Fish Veloute Served with Rice Pilaf	$ 19
Grilled Snapper with Tartare Served with Rice Pilaf	$ 19

Photographs: Cooking Workshop on Aneityum Island (August 2013)

Trainees preparing local fish dishes in the kitchen of the fish café

Preparing the barbeque dishes

Tourists from a cruise ship, waiting for their fish dishes at the fish café

Sample of an à la carte dish taught at the “cooking with fish” workshop

2) Management of the fish café

The three days of trial sales at the “cooking with fish” workshop generated about 270,000 vatu in

sales. After the workshop, based on their culinary skills and their capacity to manage business, nine of the 15 trainees were selected to join a management committee for the fish café. As of the end of September, the Café Management Committee had sold fish dishes to the tourists from cruise ships on five occasions (five days), with average daily sales of approximately 60,000 vatu (gross profit of 20,000 vatu/day). This indicated that, from a business perspective, a fish café for tourists on Mystery Island could be highly feasible. Furthermore, as of October 2013, it was confirmed that two new fish restaurants run by individuals/families had been opened on Mystery Island, modeled on the fish café.

Table 2-36: Fish café income and expenditure (Sep.-Dec. 2013) Unit: vatu

Date	Sep. 2	Sep. 8	Sep. 11	Sep. 16	Sep. 19	Sep. 26	Nov. 28	Dec. 1
Sales	61,625	35,500	40,800	68,000	68,000	43,350	40,000	26,757
Material costs	15,640	15,900	13,320	18,300	21,480	7,500	19,190	8,480
Labor costs	21,500	16,500	27,500	23,500	28,000	19,000	15,000	10,000
Gross profit	24,500	3,100	20,805	26,500	19,000	16,850	5,810	8,295

Note: The Vanuatu vatu is nearly at parity with the Japanese yen.

However, from October 2013, the fish café found itself suspending business operations, partly because the Café Management Committee was unable to secure wahoo and other types of pelagic fish, and partly because they could not decide on the location to open the café. Consequently, discussions were held with the Café Management Committee and guidance was provided about securing the necessary volume of fish for the café, such as starting to purchase fish several days before each cruise ship is scheduled to dock, making arrangements for the right fish by providing money for fuel costs to the local fishermen, and using the ruby snapper and other types of demersal fish instead of just pelagic fish caught far out at sea. Furthermore, after meeting with senior members of the Mystery Island Tourism Committee, a request was made for their understanding and cooperation for the fish café program, such as establishing a permanent place to open for business. As a result of the approaches made in the Project and by the VFD, the fish café was able to resume business in time for the arrival of a cruiser on November 28 2013. However, unable to resolve the problems of procuring the right type of fish and securing a place to open for business, the café again found itself suspending business operations from December 2013.

The operation of fish café is approved by the chief council in Analcauhat. However, it seems that not everybody was happy to promote the fish café.

3) Follow-up on the fish café business operations

For the purpose of reviewing the management of the fish café and finding a breakthrough to the current suspension of business operations, two cooking instructors from the HTLTC visited Aneityum Island again on January 25-28, 2014, and followed up on the “fish café” business. In addition to reviewing and providing guidance on technical aspects, such as recipes and cooking methods, they also conducted a workshop to identify the issues in managing the café and to examine solution strategies for those issues.

The initial perceptions of the members of the Café Management Committee were varied. Some of them had lost interest and grown weary of managing the café. In contrast, three of them had decided to take a one-year cooking course at the HTLTC in Port Vila starting in February 2014. To replace the members who had lost interest in managing the café as well as the members who were going to study at the Hospitality Tourism and Leisure Training Center (HTLTC), a number of new local women joined the committee, including graduates from the HTLTC who lived on the island, and a new Café Management Committee was launched.

As this shows, in order to set the foundations for sales of fish dishes at the fish café it is important to ensure a stable supply of fresh fish from local fishers. Furthermore, in connection with the management of coastal resources, consideration has also been given to displaying decorations and panels in the fish café in order to promote a better understanding of the reef environment and

resources of Aneityum Island. For this reason, developing a building to house the fish café is essential. Despite this though, the maneuvering of leadership between the Tourism Committee and MPA Committee has meant that the question of where to open the fish café has remained unresolved since October 2013. Since opening for business, the location of the café has changed several times, and without a decision on an appropriate building, there have also been times when the cooking and selling of food has been done outside. According to local information received in October 2014, consensus within the community had at last been reached. The location for the fish café on Mystery Island had been settled, and work had begun on constructing the building, such as putting up a galvanized-iron roof and installing a rainwater tank.

Photographs: Business Conditions at the Fish Café and Follow-up Seminar

	
Business conditions of the fish café on Mystery Island (November 28, 2013)	Because the right building could not be provided by the Tourism Committee, the café was run under the skies.
	
Follow-up seminar on the fish café business operations. Guidance provided by two instructors from the HTLTC (January 27, 2014)	Discussions held on issues facing the café business and solution strategies for those issues. Café Management Committee also reshuffled for the purpose of improving and revitalizing management.

	
Fish café resumed business operations under a new Café Management Committee (January 28, 2014)	Café resumed business operations by borrowing the restaurant facilities operated by another family.

(2) Introduction and construction of a modified canoe

Although fresh fish are an important source of protein on Aneityum Island, there are only a limited number of community members who go fishing regularly. One possible reason for this is the high price of gasoline on the island (about 350 vatu (about 400 yen) per liter). Therefore, to keep the costs of fuel for fishing down, the introduction of modified canoes has been promoted. These canoes can use a sail and small outboard engine for propulsion in combination. In October 2013, a local youth group set to work building the modified canoe, which was completed in February 2014. In particular, the modified canoe is being used by a group of youths engaged in diving for spiny lobsters, who in addition to fishing outside the reefs have begun tourism activities giving rides to tourists from cruise ships.

By popularizing the modified canoe, fishing outside the reefs will also flourish, and in turn, this is expected to increase the demand for fresh fish consumed by the island communities and used in the cuisine targeted at tourists. Furthermore, so that it actually leads to a reduction in the fishing pressure on lobster resources, it is also important to identify the issues to follow up on and to consider appropriate countermeasures.

	
The modified canoe being built by a youth group on Aneityum Island (October 2013)	The canoe has been carved out of a log and is being prepared for construction (January 2014)

	
The completed modified canoe (February 2014)	Fitted with a small outboard engine (8 horsepower), the canoe is taken on a test-run (February 2014)

(3) Establishment and operation of fish market

With support from the Project, two small solar-powered freezers (200 liters) were installed at Analcauhat, and a fish market was established. By doing so, fish caught on the island can now be kept frozen, preserving the freshness of the catch for a longer period of time. In addition to enabling a stable supply of caught fish for the community, arrangements were put in place to prepare and sell the caught fish to tourists from the cruise ships too. Also, with records being taken on the type, weight and number of caught fish that are stocked and shipped to this market, it is now possible to collate the catch data.

In conjunction with establishing the fish market, a Market Management Committee has also been founded in the village, with participation by members of the FAD Management Committee which was organized as part of the Project. In effect, the market is operated and managed by the FAD Management Committee. To cover the expenses for running the market, a freezer levy is collected according to the weight of the fish and other products kept in the freezer plus the number of days they are kept frozen. The committee is also contracted to recharge mobile phones, computers and other devices, with the recharging levy being used to fund the costs of fuel used in the FAD monitoring.

	
The fish market established in Analcauhat. Part of a community-owned building has been leased, and small solar-powered freezers installed.	The objective is for caught fish to be kept frozen. Community members make their way to the market to buy fish.

2-5. Review and Formulation of Coastal Resource Management Plans

Regarding the review and formulation of coastal resource management plans (MPA management

plans), rather than the Project or VFD preparing a draft plan for the target communities, efforts were made for the target communities, to independently proceed with their own discussions and reviews, and gradually formulate their own implementation plans based on the experiences and lessons learned from the pilot project.

2-5-1. First Coastal Resource Management Planning Workshop

A Coastal Resource Management Planning Workshop was held at the VFD in Port Vila over a five-day period, February 18-22, 2013. The workshop was attended by 3-5 community representatives involved in CBCRM activities from each target area, including members of the MPA Committees, leaders of the FAD Management Committees and leader fishermen.

The central problem set for this workshop was "existing community-based coastal resource management (CBCRM) plans are not working well." Based on this central problem, the community representatives from the three target areas listed up relevant problems and issues (problem analysis), and examined the solution strategies to undertake for those problems and issues (objective analysis). To facilitate deliberation of the problems and issues in connection with CBCRM activities, the following three perspectives were presented as hints for discussion: organization and governance; content of CBCRM plans; and support activities (for conducting CBCRM activities). At the same time, the content of existing MPA management plans was reconfirmed, and discussion was had on revising the plan details.

Furthermore, based on the above discussion, and while also referring to the details of the pilot project activities being considered by the Project, CBCRM action plans to be undertaken by the community in each target area for the next year (March 2013 to March 2014) were collated.

On the middle third day, participants visited the North Efate target area, and observed the efforts for coastal resource management being undertaken by the local community. The visit included a tour of farms where the giant clam and the green snail have been transplanted and nurtured, fish aggregating devices (FAD) moored off the coast of Lelepa Island, community-run tourist bungalows (Tasiriki), ocean nursery of giant clams (Sunae), and tourism programs on Lelepa Island.

Photographs: First Coastal Resource Management Planning Workshop (February 2013)

	
At the Coastal Resource Management Planning Workshop (February 2013), discussions were held in each target area group on the problems facing CBCRM activities and associated solution strategies.	In light of the proposed pilot projects, an action plan for the next year of CBCRM activities was prepared.

	
All participants observed the CBCRM activities in the Northern Efate area. Visit to FAD off the coast of Lelepa Island.	On Lelepa Island, explanations were given by the chief and others on CBCRM initiatives and tourism programs.
	
On the final day, a representative of each target site presented a draft action plan for their next year of CBCRM activities.	Representatives from the JICA Office, relevant government offices and NGOs and researchers from the IRD also attended the final day's presentation of action plans, and joined in the discussion.

Furthermore, feedback seminars were also held at each of the target areas, for the purpose of deepening discussion in local areas by getting the workshop participants to present and explain their action plans produced at the workshop for the next year of CBCRM activities to the community members in their respective target area. With experts and VFD officers also participating in the seminars, discussions were had on the preparatory procedures and systems for implementing the action plan and on the support structures provided by the Project and the VFD. Through the seminar, main stakeholders understood what kind of activities should be developed for CB-CRM.

Table2-37: Outline of Feedback Seminars in Each Project Area (February and March 2013)

Project area	Date	Venue	Community approach
The Northern Efate area	February 27	Sunae Mangaliliu	Consider the action plan for CBCRM activities on a community-by-community basis (as in the past, make a common plan for both Mangaliliu and Lelepa communities). Regarding the comprehensive CBCRM plans for four communities, set up a consultation later with community representatives.
The Malakula area	March 4	Lakatoro	The target communities take the action plans back to their community for discussion. Fisheries Office to provide support to target

			communities so that efforts for CBCRM activities can be undertaken right away.
The Aneityum area	March 8	Analcauhat	Urgently make changes to the makeup of the MPA Committee, and work on implementing the action plan.

Photographs: Local Feedback Seminars on the Coastal Resource Management Action Plans (March 2013)

	
Feedback seminar on Aneityum Island (March 2013) Workshop participants presented and explained the CBCRM action plan to community members.	Feedback seminar in Malakula (March 2013) Representatives from the Crab Bay Community attended, and discussed the action plan for CBCRM activities.

2-5-2. Study Tour to Malakula Island

Over a three-day period, February 12-14, 2014, five community members from North Efate and three from Aneityum Island were taken to visit activities on location at Crab Bay on Malakula Island and on Uripiv Island. A study tour was undertaken on the coastal resource management and livelihood improvement activities practiced by the local communities.

The participants from North Efate and from Aneityum Island showed a strong interest in the cooperative activities undertaken by 16 communities under the Crab Bay MPA Committee, in Fish market which was established by the community on Uripiv Island, and in the various schemes carried out by the MPA committees for acquiring funds for activities. Given their inability thus far to successfully build a cooperative relationship among four target communities, the officials from North Efate were surprised that resource management activities had continued with cooperation by 16 communities belonging to the Crab Bay MPA Committee. The officials from Aneityum Island seemed to be excited by the fact that the solar-powered freezer, FAD fishing equipment, tools for making shell craft and other related equipment were being collectively managed and stored at Fish market on Uripiv Island. They started talking of wanting to develop facilities on Aneityum Island with a similar concept. It also appears that the developments in coastal resource management activities in the MPAs on Uripiv Island and in Crab Bay also provided impetus. All the community members who participated on the tour spoke of how informative the tour was, and how it was a good opportunity to exchange opinions.

Photographs: Study Tour on Malakula Island (February 2014)

	
Joint meeting to exchange views with the Malakula FAD Management Committee. Representatives from each site explained about their FAD fisheries activity, and exchanged opinions.	Inspection of Fish market on Uripiv Island. A strong interest was shown in the fact that the facility had been established through the voluntary endeavor of the community.
	
The MPA off of Uripiv Island was observed, and opinions exchanged on activities for coastal resource management. In particular, various views were exchanged on the protection and propagation of marine shellfish such as the trochus and the green snail.	Visited the fisheries and livestock market at Lakatoro. After hearing an explanation about the management and operation of the market, discussion was had on such topics as quality control and retail price setting.
	
Observed the beekeeping activities of the Crab Bay MPA Committee. Initiative has been started as an activity for acquiring funds for coastal resource management.	Meeting to exchange views with the Crab Bay MPA Committee. Explained about the developments underlying the many years of ongoing activities involving the cooperation of 16 communities for the management of land crabs.

2-5-3. Second Coastal Resource Management Planning Workshop

In February 2013, the First Coastal Resource Management Planning Workshop was held at the VFD, for the purpose of reviewing the existing coastal resource management plans (MPA management plans) in each project site, and to formulate an action plan for coastal resource management activities during the one-year implementation period of the pilot projects (March 2013 - February 2014). Given that about a year had passed since this first workshop, the Second Coastal Resource Management Planning Workshop was held February 12-19, 2014, for the purpose of checking the progress of the pilot project at each site, and based on the experiences and outcomes of the pilot projects, to formulate coastal resource management action plans (activity schedules) for the next three to five years. Community representatives from each site participated in the workshop, including five from the Northern Efate area, five from the Malakula area, and three from the Aneityum area. Personnel from the VFD (fisheries extension officers from each target province) and members from the Japanese experts facilitated the general and group discussion, and helped to summarize and collate the views of the community representatives.

Details of the coastal resource management action plans (activity implementation plans) prepared by the community representatives of each project site for the next three to five years are as follows.

Table 2-38: Outline of the Coastal Resource Management Action Plans for the Next 3-5 Years, Prepared for Each Project Site

	The Northern Efate area	The Malakula area	The Aneityum area
Organization for coastal resource management	Establishment of the Lelema MPA Committee (Mangaliliu, Lelepa Island)	Organizational enhancement of the Crab Bay MPA Committee	Establishment of the Aneityum Fisheries Cooperative Association
Policy for coastal resource management	Formulation of MPA control regulations	In addition to the existing land crabs, add mud crabs to the managed species.	Expansion of MPA (expand from Mystery Island to the whole of the Analcauhat area) In addition to spiny lobsters, collection of catch data on important fish species
Measures assisting activities	Promotion of the offshore fisheries utilizing FADs, dissemination and utilization of modified canoes, making and marketing of shell craft products, value-adding activities such as filleting fish and operating fish cafés and road shops, establishment and operation of fish market, promotion of tourism activities in association with the fishing industry, etc.		

* For details of each site plan, see Appendix 13.

In the Northern Efate area, after the support activities of Phase I, each target community was managing resources on an individual basis, with a focus on the nurturing of the giant clam and the green snail. The pilot project in the Project had raised awareness for the need to go beyond community boundaries and for several communities to band together and tackle coastal resource management at the regional level. To realize this, in May 2014, Mangaliliu and Lelepa Island held talks and established the Lelema MPA Committee to carry on with the activities of the pilot project, and it was written into an action plan that the two communities would work together in tackling coastal resource management activities. In particular, the chief of Mangaliliu (Kalotiti Mormor), who participated in the workshop, has energetically started the wheels turning for establishment of the MPA Committee.

On Malakula Island, efforts for the management of land crab resources were already underway, and now, in addition to keeping records on the land crabs shipped from the Lakatoro Market, the issue is being resolved by also banning the sale of any females carrying eggs. Furthermore, appropriate measures for the management of mud crab resources were also incorporated into the action plan, after mud crabs were added to the target species for resource management and basic

information on this species was collected.

On Aneityum Island, to strengthen activities for the management of coastal resources, a number of measures were incorporated into the action plan, including: reviewing the traditional systems and measures for community governance; establishing a new Aneityum Fisheries Cooperative Association; expanding the marine protected area (MPA) to include reefs in the Analcauhat area in addition to the reefs surrounding Mystery Island; and conducting coastal resource management activities by continuing on with the activities advised by the Project for collecting fisheries data and getting the communities to use that data themselves.

With regard to measures assisting the management of coastal resources, plans were put in place to further promote a number of initiatives led by community organizations and with support and guidance provided by the VFD, which were introduced and directed in the pilot projects in the Project, including promotion of inshore and offshore fishing industries by utilizing FADs, reduction of fuel costs through the dissemination and utilization of modified canoes, improvement of the livelihoods of women in coastal communities through making and marketing shell craft, and adding value to local fishery products through filleting locally caught fish and operating fish cafés and road shops. In particular, in North Efate, diversifying alternative livelihood by taking advantage of its close proximity to the capital, Port Vila, was also incorporated into the action plan, such as promoting tourism activities utilizing the giant clams transplanted from Tonga in Phase I, and operating road shops along the road making a circuit of the island. In this way, by having each target community put together its own action plan for future coastal resource management activities, the roadmap for coastal resource management activities after the conclusion of the Project has been made clear. Thus, it appears that the workshop enabled a roadmap to be successfully achieved for community members to independently carry on coastal resource management activities even without the direct support of the Project.

In the first workshop in February 2013, the participant community representatives performed a key role in formulating the one-year action plans for managing coastal resources. At this time, given that the pilot project had not yet reached its midway point, the action plans showed signs of lacking specificity and feasibility. On the other hand, at this second workshop, the community representatives were able to formulate more realistic action plans based on the experiences and knowledge gained from implementing the pilot projects and from observing other sites. This point has been highly praised by the counterpart at the VFD. With regard to the coastal resource management skills and knowledge possessed by community members in the target sites, definite improvements can be seen in their capacity to analyze the current situation and devise plans.

Photographs: Second Coastal Resource Management Planning Workshop (February 2014)

	
Community representatives presented on the progress of the pilot projects in their respective project site, and exchanged views.	Community representatives from each site and extension officers from the VFD cooperated and talked with each other, and examined action plans for managing coastal resources for the next 3-5 years.

	
The VFD counterpart played a key role in supporting the discussion of each site group and in putting together the action plans.	Post-it notes were used to visualize discussions before putting the action plans together.
	
On the final day, the draft action plans put together by each site group were announced, and a Q&A session held.	Other personnel from the VFD and researchers from the IRD team also participated in the presentation of action plans, and talked about areas for improvement from various perspectives.

Armed with the draft action plans for managing coastal resources for the next three to five years, which were examined at the Second Coastal Resource Management Planning Workshop, participants took them back to their communities to share and discuss broadly with community members, and feedback seminars were held at each project site for the purpose of making the plans more realistic in content.

Table 2-39: Outline of the Seminars for Providing Feedback on Coastal Resource Management Action Plans (February 2014)

Project site	Date	Location	Number of participants
The Northern Efate area	February 27 (Thu)	Lelepa Island	30
The Malakula area	February 24 (Mon)	Lakatoro	20
The Aneityum area	February 24 (Mon)	Analcauhat	23

Between 20 and 30 community members participated at each site. The participants in the VFD workshop presented the action plans that they had worked on and prepared themselves, and confirmed the details and timing of the activities and who would be in charge and responsible for implementing the activities. Where necessary, the counterpart from the VFD provided guidance on

how to proceed with future community activities. Although there seemed to be no significant changes to the plan details, it does appear that the seminars enabled the details of the action plans to be conveyed extensively to community members, and enabled the community activities needed in the future to be organized in a clear and concise fashion.

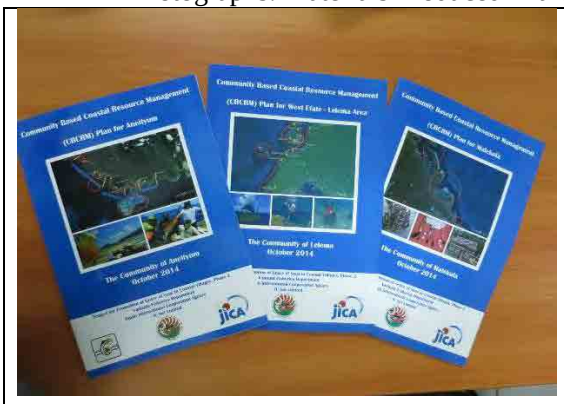
Photographs: Feedback Seminars on the Action Plans for Managing Coastal Resources (February 2014)

	
Feedback seminar on Aneityum Island (February 24). About 20 community members participated.	Draft implementation plans were presented, which had been worked on and prepared by the community counterpart by taking on board the chart for action plans prepared at the VFD workshop.
	
Feedback seminar in North Efate on Lelepa Island (February 27). About 30 community members participated.	Feedback seminar on Malakula Island (February 24).

2-5-4. Booklet of CBCRM Plans

Following the conclusion of the Second Coastal Resource Management Planning Workshop, led by the community counterpart, an action plan for managing coastal resources (activity implementation plan) was put together in each project area by May. Also, based on the results of discussion at the workshop, amendments were made to existing MPA management plans—such as expanding the MPA to other districts, increasing the range of protected species, and adding new communities—and consultation and adjustments were advanced within the respective communities. In the end, these were collated into a CBCRM plan for each project area. These CBCRM plans have been printed as a booklet, which was distributed to relevant people in the target communities.

Photographs: Materials Produced in the Project for Disseminating CBCRM Plans

	
Booklet containing the CBCRM plans (final versions) of the three project areas. These were distributed to community members.	Signboards were also produced indicating no-fishing zones (marine preserves). These were installed in the project areas.

2-6. Participation in a Joint JICA-FLMMA Seminar

In Fiji, a private-sector organization called the Fiji Locally Managed Marine Area (FLMMA) network conducts projects aimed at managing resources in a way that responds flexibly to local social structures and economic conditions. Its focus is on the establishment of marine protected areas (MPAs) through community participation.

In cooperation with JICA, FLAMMA held joint seminars with stakeholders from Fiji, Tonga and Vanuatu on December 10-12, 2013, for the purpose of building an ongoing cooperative relationship, by sharing the outcomes gained and lessons learned from similar activities conducted in various South Pacific nations thereby gaining knowledge for implementing better coastal resource management, and by interacting with NGOs and other groups.

The main participants in the seminar who were involved in the Project comprised the four counterparts from the VFD and project sites, a Japan Overseas Cooperation Volunteer (JOCV) affiliated with the VFD on Malakula Island, and one person from the Project. There was also participation in the seminar by people involved in the Gau Island Project and in the Inshore Resource Development and Management project in Tonga, as well as by officials from FLAMMA including from the University of the South Pacific (USP) and environmental NGOs.

Photographs: Joint JICA-FLMMA Seminar in Fiji (December 2013)

	
Tour of facilities for farming sea cucumbers	Tour of community-run tourism and accommodation facilities

	
Joint seminar	Presentation by Mr. Graham Nimoho, Manager of Coastal Fisheries Development Division, VFD, on overview of the Project

Through this seminar, the participants were able to share a number of useful lessons for implementing coastal resource management in the South Pacific region, by visiting project sites and engaging in discussion at the presentation sessions.

Through visiting project sites, the participants from Vanuatu gained knowledge that they could put into practice in their own communities. Furthermore, other regions paid considerable attention to the activities being implemented in Vanuatu, and it is thought that this led to Vanuatu participants gaining confidence in future activities.

2-7. Regional and National Seminars

Regional and national seminars were held at Port Vila in October 2014 for the purpose of sharing and disseminating the Project's outcomes. Both seminars were jointly sponsored with the Secretariat of Pacific Communities (SPC).

2-7-1. National Seminar

The National Seminar on CBCRM was held in Port Vila over a four-day period, October 7-10, 2014. Participating at the workshop-style seminar were 12 community representatives listed in the table below who conduct coastal resource management and fisheries activities. In addition to sharing the outcomes from the Project, they held discussions on future CBCRM initiatives. With co-sponsorship by the Secretariat of Pacific Communities (SPC), three SPC officials in charge of coastal resource management also attended the seminar.

Table 2-40: Communities Participating in the National Seminar, and Numbers of Participants

Target province	Communities in the target areas	Communities participating in the seminar (outside the target areas)
Shefa Province	• Mangaliliu (2 participants) • Lelepa Island (4 participants)	• Nguna Island (2 participants) • Pele Island (2 participants) • Emau Island (3 participants)
Malampa Province	• Crab Bay Community (4 participants) • Uripiv Island (2 participants)	• Ambrym Island (2 participants) • South West Bay (Malakula Island, 2 participants)
Tafea Province	• Aneityum Island (5 participants)	• Aniwa Island (2 participants) • Futuna Island (2 participants)

Table 2-41: Schedule for National Seminar (October 7-10, 2014)

Date	Details	Location
October 7 (Tue)	Opening ceremony (speeches by the JICA Office, the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity, and SPC) Presentations: • General outline and outcomes of project • Activities and outcomes of pilot projects in project target areas: the Northern Efate area, the Malakula area, the Aneityum area • Coastal resource management activities in other communities: Nguna Island, Pele Island, Emau Island, Ambrym Island, South West Bay, Futuna Island, Aniwa Island • Outline of FAD Fishery Program (pilot project) • Outline of Marine Shellfish Propagation and Aquaculture Program (pilot project)	Large Conference Room Vanuatu Meteorology and Geo-Hazards Department (VMGD)
October 8 (Wed)	Presentations: • Coastal resource management initiatives by SPC • Outline of the recording and analyzing of fisheries activity data (pilot project) Discussion: • Problems and issues in coastal resource management activities (group discussions in 3 target provinces)	Large Conference Room, VMGD
	Tours: • Production of seed and intermediate culture of marine shellfish (hatchery) • Demonstration of shell polishing	VFD
October 9 (Thu)	Tours: • Release and nurturing of the green snail • Introduction to the modified canoe equipped with sail and outboard engine • Visit to FAD off the coast of Lelepa Island • Introduction to float and bottom line fishing and drop-line operations • Community-run ecotourism activities • Visit to giant clam farm	North Efate Mangaliliu Lelepa Island
October 10 (Fri)	Discussion: • Future initiatives for coastal resource management (group discussions in 3 target provinces) Presentations: • Announcement of what each provincial group talked about, and general discussion • Voting and announcement of shell craft contest Summary and closing ceremony: (speeches by the Department of Women's Affairs, the Department of Tourism, and the JICA Office)	Large Conference Room, VMGD

The group discussions were divided according to each target province. Four perspectives were

indicated as hints for discussion—production and the economy, resources and the environment, society and culture, and organizations and government—and participants talked with each other about the problems in managing coastal resources and solution strategies for those problems. On the middle third day, participants visited the project sites in the Northern Efate area. There, they observed first-hand the initiatives for coastal resource management being undertaken by the local community, visualizing a concrete image of CBCRM activities. Using Post-it notes to arrange their discussions in order, on the final day, participants presented their discussions and engaged in general discussion. (see appendix 14 for a detailed description of the outcomes of the discussion)

Consideration is being given to reflecting the outcomes of the discussion at the national seminar in the "Coastal Fisheries Policy" currently being drafted by the VFD.

The Project conducted the contest of shell polishing products to improve the design and skills on the final day of the national seminar. The products were collected from three sites, and participants voted for their favorite products. The locally made shell polishing products has just begun in Vanuatu. VFD, in collaboration with the Department of Tourism and Women's Affair, should promote further the shell polishing and marketing activity.

Photographs: National Seminar on CBCRM (October 2014)

	
National seminar (October 2014): Participation by 12 communities in the 3 target provinces, the VFD and SPC.	Manager of the Coastal Fisheries Programme at the SPC, presented about the initiatives undertaken by SPC for managing coastal resources in Vanuatu.
	
Participants were divided into groups according to their province, and over two days, discussed the problems in managing coastal resources and any associated solution strategies, and summarized their discussions.	Tour of the VFD. Women leaders in the target communities demonstrated how to make shell craft.

	
Visited Mangaliliu. Introduced the modified canoe equipped with sail and outboard engine, which was made by the community. Also heard explanation about activities for nurturing the green snail.	Visited Lelepa Island. Inspected FADs and giant clam farm managed by the community. Also heard explanation about tourism activities on the island.
	
Each provincial group presented a summary of their discussions on the problems and solution strategies for coastal resource management, before engaging in general discussion.	Shell craft contest. Shell craft made by women's groups in each target area were ranked in order after a vote by all participants.
	
Women leaders from each community were presented prizes in order of rank by female guests from the Department of Women's Affairs (Director) and the Department of Tourism (manager of the Cruise and Sightseeing Division).	Commemorative photo taken with all participants at the national seminar.

2-7-2 Regional Seminar

The Regional Seminar on CBCRM was held over a four-day period, October 13-16, 2014. In addition to officials from the VFD, the seminar was also attended by representatives from the four fisheries departments of Fiji, the Solomon Islands, Tonga and Samoa, as well as from the Fisheries, Aquaculture and Marine Ecosystem (FAME) division of the Secretariat of Pacific Communities (SPC), and from the School of Marine Studies at the University of the South Pacific (USP).

The objective of the seminar was to present and share the CBCRM initiatives of each country's fisheries department and of the SPC and USP, and to examine and put in order future regional cooperation programs. Furthermore, by providing an opportunity to visit the actual project sites in the Northern Efate area, participants also observed CBCRM initiatives in the field.

Table 2-42: Schedule for Regional Seminar (October 13-16, 2014)

Date	Details	Location
October 13 (Mon)	Opening ceremony (speeches by the JICA Office, the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity, and SPC) Presentations: • CBCRM initiatives in each country: Fiji, Solomon Islands, Tonga, Samoa, Vanuatu • General outline and outcomes of project • Activities and outcomes of pilot projects in project target areas: North Efate, Malakula, Aneityum	The Melanesian Port Vila Hotel
October 14 (Tue)	Presentations: • CBCRM policies and programs by the SPC • Outline of the CBCRM program at the USP School of Marine Studies • Outline of FAD Fishery Program (pilot project) • Outline of Marine Shellfish Propagation and Aquaculture Program (pilot project)	The Melanesian Port Vila Hotel
	Tours: • Production of seed and intermediate culture of marine shellfish (hatchery) • Demonstration of shell polishing	VFD
October 15 (Wed)	Tours: • Release and nurturing of the green snail • Introduction to the modified canoe equipped with sail and outboard engine • Community-run ecotourism activities • Visit to giant clam farm	North Efate Mangaliliu Lelepa Island
October 16 (Thu)	Discussion: Regional cooperation issues and initiatives in relation to CBCRM (issue-specific group discussion) Presentations: • Announcement of what each issue-specific group talked about, and general discussion • Summary and closing ceremony: (speeches by the JICA Office and SPC)	The Melanesian Port Vila Hotel

During the group discussion on the final day, issue-specific groups were created based on three

themes, being the main content of the pilot projects, namely: fishing using fish aggregating devices (FADs); propagation and aquaculture of marine shellfish; and livelihood improvement activities (shell craft, tourism and distribution). Each group examined the regional cooperation issues relating to CBCRM as well as future regional programs. Finally, the issue-specific groups presented their discussions to each other, and engaged in general discussion on regional cooperation for each theme. The general outcomes of the discussions are as follows (see appendix 15 for detail).

Fishing using fish aggregating devices (FADs)

The conventional FAD model disseminated by the SPC is fairly expensive on the basis of both materials and deployment, and so will not be easily disseminated. The FAD model in the Project is inexpensive as measured by both materials and deployment, and is also durable. A strong interest has been shown by both the SPC and surrounding countries. There have been requests for training in the construction and deployment of this new FAD model to be held at the regional level. As a sub-regional program, the SPC wants consideration to be given to dispatching the VFD officers who received instruction in the Project to neighboring countries as FAD fisheries instructors.

Propagation and aquaculture of marine shellfish

When it comes to the propagation and aquaculture of marine shellfish (such as the green snail, giant clams, the trochus and mangrove oysters), the level of facilities (hatcheries) and aquacultural technology varies from country to country. With respect to the disparity of production technology, in particular the production of seed, intermediate culture and sea-water culture, an effective program could be to send technicians from fisheries departments to each other's countries, and to show each other the skills in which they excel. As for the production of seed and nurturing of giant clams, given that Palau does well in this, there have been requests for regional-level technical training to be carried out here.

Livelihood improvement activities (shell craft, tourism and distribution)

Various initiatives for improving the livelihoods of coastal communities are carried out in each country. Examples of the main activities common to each country included: the making and selling of handicrafts, including shell craft; tourism activities that use the coastal environment, such as eco tours, snorkeling and canoe fishing; and the aquaculture of tilapia and freshwater prawns. As for livelihood improvement activities, what is needed is a comprehensive approach from various aspects. More than just providing technical advice about shell polishing, tour guiding and aquaculture, at the same time, it is also important to provide target communities with guidance in management, sales and organization.

Furthermore, Mr. Moses Amos, director of FAME at SPC, put forward to the positive view that, in light of the outcomes of the Project and the results of discussions at this seminar, he wanted to examine and review future regional cooperation programs. He also spoke of how, as part of their cooperation with JICA, he wanted to continue endeavoring to realize the ideas and recommendations discussed at this seminar. As for regional programs, he had hope for Phase III of the Project.

Photographs: Regional Seminar on CBCRM (October 2014)

	
The CBCRM initiatives of each participating country were presented and shared.	Manager of Coastal Fisheries Development Division, VFD, presented a general report on the Project.
	
Director of the Division of Fisheries, Aquaculture and Marine Ecosystems (FAME) at SPC, delivered a presentation about SPC's regional cooperation for CBCRM.	Visited the VFD's hatchery facilities. Observed the production of seed and intermediate culture of marine shellfish (giant clams, the trochus).
	
Observed the activities in Mangaliliu for nurturing the green snail and the giant clam.	Heard explanation about ecotourism activities in Mangaliliu and on Lelepa Island.

	
Visited a giant clam farm on Lelepa Island. Chief Mormor explained about the past developments and current status of his community's preservation activities.	Divided into 3 issue-specific groups (FAD fishing, propagation and aquaculture of marine shellfish, livelihood improvement activities), and discussed about future regional cooperation for CBCRM.
	
Announced the results of the group discussion. Engaged in general discussion on each topic.	Photo of all the participants at the regional seminar

2-8. Cooperation with Relevant Organizations

In the Project, a variety of collaborative activities were conducted as part of the pilot projects in cooperation with the following relevant organizations and government offices.

(1) Survey of Marine Shellfish Resources with Expert from the SPC

In accordance with a memorandum exchanged between the Secretariat of Pacific Communities (SPC) and the JICA Fiji Office, a request was made through the VFD in December 2012, and an expert from SPC in surveying marine shellfish resources was indeed dispatched. From the end of September until the end of October 2013, the SPC expert and staff from the VFD conducted a resources survey on the green snail and the trochus off of North Efate and Aneityum Island.

It is hoped that the survey will provide scientific evidence for the spawning of green snails, which were transplanted from Aneityum Island to North Efate as part of Phase I of the Project, has resulted in the green snails reproducing in the North Efate region. Because of their high economic value, the overexploitation of green snails has resulted in their depletion on a global scale, so much so, that it would not be surprising if they were registered as an endangered species. In Vanuatu, only Aneityum Island has succeeded in restoring green snail resources through more than a decade of steady resource management activities by the community. There is a strong possibility that the spawned green snails transplanted from Aneityum Island are now successfully reproducing in North Efate, where the natural stock was virtually depleted, again thanks to the steady resource management activities of the coastal community. Proof of this reproduction would lend substance to the

effectiveness of the Project. It is hoped that it would also serve as an extremely valuable model case for JICA in promoting the management of valuable fisheries resources in the South Pacific region in cooperation with international organizations such as the SPC.

SPC also cosponsored the regional and national seminars on CBCRM held in October 2014. Both seminars were attended by representatives from SPC's Division of Fisheries, Aquaculture and Marine Ecosystems (FAME), including the director and the manager of the Coastal Fisheries Programme.

(2) Cooperation with the Department of Women's Affairs

The director of the Department of Women's Affairs accompanied the mid-term evaluation team and the terminal evaluation team on their field surveys, and primarily observed the making and marketing of shell craft by women's groups in the project areas. In particular, in Lakatoro on Malakula Island, the Handicraft Center, which is operated by the Department of Women's Affairs, has been opened for business and deals in the shell craft products made by the community.

(3) Cooperation with the Department of Tourism

In Phase I of the Project, giant clams (*Tridacna gigas*) were transplanted from Tonga for the purpose of raising awareness for resource management among coastal communities. These giant clams have almost matured enough to reproduce themselves and to endure tourism. As mentioned earlier, it was also decided to affix Eco-Tags to shell craft products in order to develop the shell craft activities designed to improve the livelihoods of women and to raise awareness for resource management. The Eco-Tag introduced by the Project has two purpose:

i) to show that it is made by people engaged in CB-CRM

ii) to show that the product is locally made

Eco-tag is normally made for i). Department of Tourism provided their logo on the Eco-Tag, which facilitated to convince tourists.

In cooperation with the Department of Tourism, signboards were constructed to explain about the relay and recovery of giant clam resources, and Eco-Tags for attaching to shell craft were also made. The signboards have been erected in the four communities of Mangaliliu, Lelepa Island, Tasiriki and Sunae, where giant clams have been nurtured since Phase I. The Eco-Tags have been distributed to women's groups making shell craft on Aneityum Island and in Crab Bay, Malakula and in the North Efate region, to be attached to the shell craft they make.

Photographs: Collaborative Activities with the Department of Tourism

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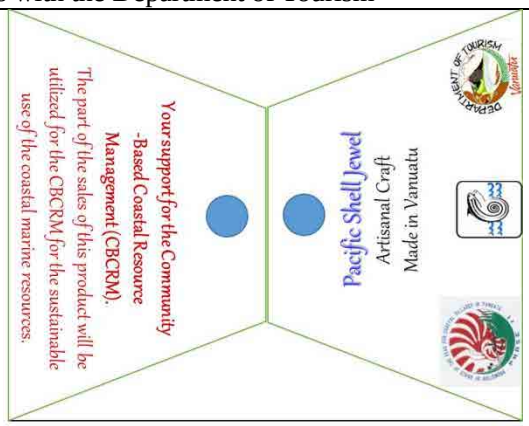
<td> 
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<tr>
<td>In cooperation with the Department of Tourism, signboards explaining about the relay and recovery of giant clam resources have been erected in four communities in Efate.</td>
<td>Eco-Tags displaying the logos of the Department of Tourism and the VFD have been produced. They explain that purchasing locally produced shell craft will contribute to the management of coastal resources.</td>
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(4) Cooperation with Local NGOs

The manager of environmental programs at the Wan Smolbag Theatre—a local NGO engaged in environmental programs—accompanied the mid-term evaluation team (July 2013) and inspected Aneityum Island. There, as part of a mini-seminar with local community, he explained about the NGO's Sea Turtle Protection Program and about the importance of "Fishing Activity Record Sheets" being recommended by the Project.

(5) Cooperation with the Department of Co-operatives and Ni-Vanuatu Business Development Services

The Department of Co-operatives and Ni-Vanuatu Business Development Services conferred certificates of completion to four of the 15 community community who attended the "cooking with fish" workshop on Aneityum Island (August 2013), which had been conducted in cooperation with the HTLTC.

2-9. Publicizing the Project

(1) Report of Outcomes through the SPC

In cooperation with the Secretariat of Pacific Communities (SPC), the outcomes of the Project—namely, the findings of a baseline survey, community-based FAD fisheries, and diamondback squid fishing—were publicized to the interested parties in the Pacific island nations via the following periodicals and newsletters published by the SPC.

- A Baseline Survey of Coastal Communities in Vanuatu
  Traditional- Marine Resource Management and Knowledge
  Issue 32, December 2013, 84pp.
  http://www.spc.int/DigitalLibrary/Doc/FAME/InfoBull/TRAD/32/Trad32.pdf

- New FAD Development Approach Strengthens Community-based Fisheries Management in Vanuatu
  SPC Fisheries Newsletter, Issue 144, May – August 2014, 41 – 47 p.
  http://www.spc.int/DigitalLibrary/Doc/FAME/InfoBull/FishNews/144/FishNews144.pdf

- Diamondback Squid and Egg Mass Record in Vanuatu
  SPC Fisheries Newsletter, Issue 144, May – August 2014, 48 – 51 p.
  http://www.spc.int/DigitalLibrary/Doc/FAME/InfoBull/FishNews/144/FishNews144.pdf

(2) Introduction of Project Activities through the Local Media

In the Project, the state and progress of pilot projects in the project sites have been widely communicated through the local Vanuatuan media. The following lists the main instances of publicity.

Table 2-43: Introduction of Project Activities Publicized through the Local Media

Media	News details
Television Blong Vanuatu (state operated)	• Second JCC meeting (Port Vila, July 2012) • Modified canoe workshop (Mangaliliu, January 2013) • FAD fishery workshop (Malakula Island, June 2013) • Third JCC meeting (Port Vila, August 2013) • Fishing for diamondback squid on Aneityum Island (December 2013) • Signing ceremony for the CBCRM plan by the Lelema community (September 2014) • National seminar on CBCRM (Port Vila, October 2014)

	• Fishing for diamondback squid off coast of North Efate (October 2014)
Radio Vanuatu (state operated)	• Study tour in Crab Bay, Malakula Island (February 2014) • Workshop on making and marketing shell craft (February 2014) • Report on pilot project on Aneityum Island (February 2014)
Vanuatu Daily Post	• Workshop on making modified canoes (Mangaliliu, January 2013) • FAD Fishery Workshop (Lelepa Island, May 2013) • Shell polishing on Aneityum Island (July 2013) • Shell polishing and Marketing Workshop (February 2014) • Signing ceremony for the CBCRM plan by the Lelema community (September 2014) • National seminar on CBCRM (Port Vila, October 2014)

(3) Materials Used for Publicizing the Project

With regard to materials used for publicizing the Project, a calendar and folded pamphlet have been produced which introduce the project activities. These have been used when describing and introducing the project activities to officials and visitors.

A calendar and pamphlets used for publicizing the project activities.

Project activities have been introduced in several articles published in the local newspaper.

(4) Publication of the website for the Project

Vanuatu government provided the space for the Project website. The Project prepared the contents of the website, and it is already publicized with many downloadable report and other outputs.
<http://fisheries-gos.gov.vu/>

Chapter 3 Achievements of the Project

3-0. Background Information

It is important to understand the background information regarding to the socio-economy in Vanuatu to fully understand the contents of chapter 3 and 4.

The owner and users of the coastal marine resource in reef area in Vanuatu

Vanuatu consists of 83 islands, and more 100 different tribes. Each tribe consists of many clans, and each clan consists of families. Normally the land is owned collectively by clan. The reef extending from the land does not belong to the land owner. However, the stationary resource on the reef such as marine shellfish belongs to the land owner. Migrating species such as fish does not belong to anybody (common goods), but it needs permission from the clan who owns the land if other clan wish to exploit the resource in the reef area. Under the traditional governance system, the owner of the resource has power to decide the rules such as fishing season, method, and amount. Moreover, the clan discusses the contents of punishment and chief of the clan takes final decision when they find somebody not respecting the rules. Because of this socio-economic background in Vanuatu, the involvement of clan and chief of the clan is indispensable for the promotion of CBCRM in Vanuatu.

In Efate and Malakula where many immigrants live and exploit the coastal marine resource, clan and community have difficulty in the monitoring and enforcement of the rules set by the traditional governance system. To improve the situation, some communities are requesting to the government to convert traditional taboo area into officially legislated MPA and take charge of the monitoring and enforcement of the area.

When we discuss on the CBCRM in Vanuatu, it is pre-requisite to understand the existence of the traditional governance system, the reality that this traditional governance system is weakening in some area, and some clans are not necessarily willing to keep the power but to delegate the power to the government.

The economic incentive of the community

In Vanuatu the economic incentive, i.e. demand for cash, is increasing little by little. In remote island, the demand for cash is still very low, but in urban areas especially Efate, the capital island, people is increasingly feeling the necessity of cash. While the subsistent economy and abundant natural resource keeps the cost of food and water very low, parents need to pay for the education for their children. Parents work and earn the cash just before the beginning of the school to buy clothes, stationary and other goods necessary for the school. Typical cash earning job in Efate is the mowing along the road, or selling of charcoal and vegetables. People in Aneityum have relatively high cash income thanks to the tourism business, but it seems that they feel not much demand for cash apart from the cash necessary for the education of their children. This fact indicates that the while economic incentive and livelihood improvement not always motivate the community people in Vanuatu, it may change in the future as the demand for cash increases.

The coastal fisheries resource management in Vanuatu

The fisheries resource management requires the management of community. Normally the management limits the fishing activity in some way, such as fishing ground, target species, or the season, and these measures are implemented together with the economic incentives such as compensation, introduction of alternative fisheries, or other livelihood improvement. It isimportanat to keep in mind that providing economic incentive to the community is not always the effective way to manage the resource users in Vanuatu and other counties in the Pacific region. The traditional social institution in Vanuatu is very conservative and need time for change. For the promotion of CBCRM in Vanuatu, due attention should be paid for this socio-cultural aspect.

Users of coastal marine resources in Vanuatu

As explained above, community members belong to the clans who own the land and extending

reef can exploit the marine resource in the area. However, people from other clans need to get permission from the clan who own the reef. The table below summarizes the different users for different resources

Table 3-1: Summary of the different users for different resources in Vanuatu

Area	Type of resource	Main users	Fishing method	Number of users
Beach (without diving)	Small shell fish and reef fish for own consumption	Women and children	By hand or simple gear, and accessible without boat	high
In reef	Reef fish, trochus, sea cucumber, lobster, octopus, squid etc.	Owners and workers of the small canoe without engine. Typically young male	Gillnet, diving, hand line, spear	Relatively high
Off the reef	Spanish mackerel, skipjack, Tuna, snapper, poulet fish	Owners and workers of the boat with engine	Trolling and bottom fishing	Very few

The number of resource users off the reef is few in Vanuatu. The majority of the resource is exploited within the reef. While the population in Vanuatu is increasing 1% each year in last decade and fishing pressures on the resource is expected to grow, resources off the reef is not yet developed. The boats with engine are used for transport but not very often for fishing off the reef. Hence it is important to shift the fishing pressures from within the reef to off the reef. Considering the high price of fuel in Vanuatu, economizing the fishing operation such as through the introduction of Fish Aggregating Device (FAD) will be the key.

3-1. Achievement of the Outputs

3-1-1. Output 1　Capacity of the VFD to Support CBCRM is Strengthened

The indicator for output 1 is “More than eighty (80) % of counterpart personnel of VFD recognize improved skills and knowledge on CBCRM at the self-evaluation”.

Self-evaluation by Counterparts

After the completion of the pilot project (May 2014), the Project asked VFD counterparts to evaluate themselves. The result showed that approximately 70% responded that they understand CBCRM measures and its supporting measures and capable of introduction CBCRM measures to the community by themselves. It also showed that approximately 90% responded that they can introduce supporting measures for CBCRM such as FAD fishery, shell polishing, fish café, and support community to plan CBCRM by themselves (refer to appendix 15). From this, the Output 1 is considered to be achieved.

Below is the detail of how the counterparts felt that their skills and knowledge on CBCRM are improved.

Baseline survey

The Project trained VFD counterpart on how to conduct and analyze the result of the baseline survey on current situation and issues on the socio-economy and CBCRM activities in the target communities. The survey was done with questionnaires and participatory workshop in the community. Through the planning, implementation, and analysis and synthesis of the result, the counterpart acquired the necessary skills and knowledge for the base line survey.

Planning, implementation and monitoring of the pilot projects

The VFD counterparts learned how to plan the pilot project based on the result of the baseline survey. Once the pilot projects started, the VFD counterpart made regular visits to the communities to monitor the progress and provide necessary technical guidance. Through these activities, the VFD counterparts had opportunities to discuss in detail with stakeholders in the communities on how the MPA management plan should be reviewed and updated, and which kind of supporting measures are effective for the promotion of CBCRM.

Impact of the achievements of the Project

The VFD counterparts felt confident to apply improved skills and knowledge into other communities.

They conducted lecture and workshop on FAD at Vanuatu maritime College, constructed and deployed small scale FAD off coastal community in Santo as part of the project run by international NGO "World Vision". In addition, they supported the community in Emae Island in Shefa Province to make CBCRM plan and FAD management and establish CBCRM committee. These activities were conducted by the own initiative of the VFD counterpart without intervention from the Project.

Synthesis of the achievement of the Project, and its dissemination

The result of the baseline survey was synthesized into an article in the bulletin "Traditional Marine Resource Management and Knowledge" of SPC. Upon the request from SPC, they also synthesized the development of FAD fisheries and diamond back squid fisheries in Vanuatu into technical papers. The articles were published in "SPC Fisheries Newsletter". The VFD counterparts improved their skills and knowledge through the publication of their articles in the bulletin and newsletters of regional international organization.

The VFD counterparts presented and discussed with the participants on the result of the Project in the national and regional seminar of CBCRM held in October 2014 by the Project. Through the discussion, they learned that high potential applicability of the CBCRM approaches developed through the Project has high potential to be applied in the other target areas both nationally and regionally.

3-1-2. Output 2 Communities in the Target Areas Acquire Necessary Skills and Knowledge of CBCRM Approaches and Tools

The indicator for output 2 is "More than eighty (80) % of counterpart personnel at the pilot sites recognise improved skills and knowledge on CBCRM at the self-evaluation".

Self-evaluation by communities

After the completion of the pilot project, the project requested to the member of MPA committee and young leaders to conduct self-evaluation for the community people to check whether they felt their skills and knowledge were improved or not. The Project prepared questionnaire and got 146 responses (of which 58 from North Efate, 55 from Malakula, and 33 from Aneityum, 94 from male and 52 from female)

The result showed that approximately 90% of the respondents can explain to the other community stakeholders. Approximately 80% responded that they have better understands on the importance of CBCRM and its supporting measures. According to the evaluation, the community people improved skills and knowledge related to the following CBCRM supporting measures.

- Off the reef fisheries development with FAD: 79%
- Date collection on the fishing activities: 82%
- Production and marketing of shell polishing products: 77%

* % indicates the percentage of answer who said their skills and knowledge are improved.

More than 90% answered that community would be able to continue the supporting measures for the promotion of CBCRM. According to the evaluation, approximately 70% of the community people improved skills and knowledge related to the following CBCRM measures.

- Selection of target species for the management: 84%
- Limitation of fishing ground: 78%
- Limitation of size for catch: 77%
- Limitation of fishing methods: 69%
- Knowledge on the fishing regulation: 66%

* % indicates the percentage of answer who said their skills and knowledge are improved.

From this, the Output 2 is considered to be achieved. Below is the detail of how the communities felt that their skills and knowledge on CBCRM are improved.

Implementation system for the CBCRM activities

For the promotion of CBCRM, it was indispensable to strengthen the existing MPA committee. The community people participated in the pilot projects and recognized the importance of CBCRM and necessity of strengthening the implementation system for the CBCRM. With the guidance from the Project and the VFD counterparts, the community established various groups such as for FAD management, shell polishing, fish café. These groups supported the promotion of CBCRM, and MPA committee supervised and coordinated the whole activities. In North Efate, the phase I of the Project could not help establish the MPA committee. In the phase II of the Project, Lelema community voluntarily established MPA committee.

Apart from the organizational strengthening in each site, the Project tried to motivate community people for the CBCRM through the inter-exchange of skills, knowledge, and experience among the target sites. The Project organized CBCRM planning workshop (first in February 014, and second in February 2014), study tour (North Efate in February 2013, and Malakula in February 2014), shell polishing workshop (February 2014). In these opportunities, main stakeholders from all the three target sites come together to exchange their skills, knowledge, and experience.

- The community people from North Efate learned that 16 communities are collectively managing the land crab. Since then, there was no cooperation among different tribes for the resource management in North Efate. The story in Malakula realized the people from North Efate the importance of cooperation among different tribes and communities for the effective CBCRM
- The community people from North Efate and Aneityum visited “fish market” in Uripiv Island in Malakula. The activities in the fish market such as data collection and collective marketing of fish inspired them to have their own fish market.
- The people from North Efate advised the people from Crab Bay in Malakula that marine shellfish should be aggregated closely to have better chance for the reproduction.
- The shell polishing workshop provided the opportunity for the shell polishing women groups from three different sites to exchange skills, knowledge, and experience each other. After the workshop, the design and quality of the products were improved dramatically.

Other activities are summarized in the box blow.

BOX 2: Activity of CB-CRM committee

Expansion of MPA in Aneityum and JICA training

One of the local counterparts in Aneityum is ex-participants of JICA training in Japan. During the training, he learned about fisheries management by cooperatives, and he made action plan to introduce similar system in Vanuatu. The fisheries management system in Japan is based on the customary law started centuries ago. He was pleased to learn that, because it is something that Aneityum have but it s governing power diminishing due to the increasing population and modernization of the life (even in Aneityum). The implementation of the phase II of the Project was timely for his action plan. The Project and he could work together to realize the

harmonization of fisheries management system between Japan and Vanuatu.

Shell polishing activity and CBCRM
The chairlady of the shell polishing group under the CBCRM committee in Aneityum understands very well the importance of CBCRM and its supporting measures. The expectation was high for shell polishing to provide livelihood improvement measures and promote "made in Vanuatu" products for the tourists. However, the production of shell polishing products could have adverse effect on the resource management of marine shellfish. The Project proposed the introduction of marine eco-tag to make sure that only the dead shells washed ashore can be used for the shell polishing. She understands why it is important to use only the dead shell, and how the eco-tag works. She works with school kids to raise awareness on the importance of CBCRM and ask their help to collect the dead shells.

National seminar

Most of the local counterparts involved in the pilot project participated into the national seminar held in October 2014. They presented the skills, knowledge, and experience in each site to the participants from other communities. The involvement of local counterparts in the seminar promoted the ownership of the pilot project by the representatives of MPA committee.

3-1-3. Output 3 Experiences Gained and Lessons Learnt from CBCRM Related Activities are Compiled and Synthesized

The indicator for output 3 is "At least 3 cases of effective CBCRM approaches / tools are presented at national / regional forums".

As explained in the chapter 2, the Project held regional and national seminar in October 2014 in Port Vila. The following people participated in the seminar. In the regional seminar, fisheries department officers in charge of coastal fisheries from Fiji, Solomon Islands, Tonga and Samoa, representatives from SPC and USP participated. In national seminar, the VFD staff in charge of extension, representatives from communities outside the target sites of the Project (Nguna Island, Pele Island, and Emae in Shefa Province, Ambrym Island and South West bay from Malampa Province, Aniwa Island and futuna Island from Tafea Province) participated in the seminar.

Following is the detail of the activities for output 3.

Implementation of regional and national seminars

The skills, knowledge, and experience of the target sites of the Project were presented during the seminars and it was highly appreciated as good practice for CBCRM in the Pacific region.

The CBCRM approach proposed by the Project, which consists of the four perspectives namely resource/ environment, Economy/ Production, Institution/ Governance, and social/ culture, was named by the VFD as "VALEMA approach" acronyms taken from VAnuatu, LElema, Malakula, and Aneityum. The VALEMA approach was presented to the participants of the seminars as new approach developed in Vanuatu.

Moreover, the FAD model which is easy to deploy and economic to replace was named by the VFD as "Vatu-Ika[12]" model. The VFD has intention to disseminate this FAD model both nationally and regionally. The unique naming by counterparts has following importance.

- It clarifies the model is developed by Japan and Vanuatu to the stakeholders including international donors and NGOs.
- It promotes the ownership among the local government and communities for the newly developed CBCRM approach.

[12] Vatu means Vanuatu and also money and good luck in Bislama (local language in Vanuatu". Ika means aquatic animals.

BOX 3: dissemination of the achievement of the Project through the national and regional seminar

On the last day of the national seminar, participants conducted problem and objective analyses based on VALEMA approach in order to formulate strategies to develop coastal fisheries. Currently the VFD is formulating the coastal fisheries development policy due to be presented in March 2015 with the assistance of SPC. The VFD will reflect the result of the analyses on the policy. The Project made significant contribution of the formulation of the coastal fisheries policy in Vanuatu.

Mr. Moses the director of the Division of Fisheries, Aquaculture and Marine Ecosystems of SPC gave the closing speech for the regional seminar, pointing out that the FAD model developed by the Project has the potential for the first time to be fully utilized by the coastal community people in the region, and that SPC will promote the dissemination in the region.

The VFD counterpart Mr. Nimoho presented the approach developed by the Project during the international conference held in Australia by International Union for Conservation of Nature and Natural Resources (IUCN) in November 2014. This was realized upon the request from GIZ to Mr. Nimoho to attend the conference and present the result. This may show the high appreciation by GIZ for the achievement of the Project.

3-2. Achievement of the Project Purpose

Project purpose：
Community-based coastal resource management is effectively practiced at target areas through adequate technical assistance from the VFD
Indicators：

1. More than one management as well as supporting measure(s) are implemented by communities in accordance with the CBCRM plan at each target area
2. The results of CBCRM evaluation at each target area show increased scores gained in at least six out of eight assessment areas

Regarding the indicator 1, the communities have already started various CBCRM activities. The table below summarizes according with the four perspectives the CBCRM measures and its supporting measures implemented in the communities.

Regarding the indicator 2, the self-evaluation of CBCRM conducted after the completion of the pilot project showed clear change in the result of self-evaluation (refer to Appendix 16 for full detail)

- Community awareness (understanding and acceptance of CBCRM among the community)

After the workshop for the draft plan on CBCRM held in February 2013, communities held several times the voluntary meeting to discuss and update the CBCRM plan including the representatives in the traditional governance system. In Northern Efate and Aneityum, the local community consultation continued among different clans (owners of land) to promote further CB-CRM with their own initiatives. From this fact, the Project considers that the community awareness on CB-CRM was enhanced.

- Compliance and enforcement of CB-CRM regulation

The CBCRM regulation is announced when community held meeting to discuss and update the CBCRM plan. The updated plan is now approved by the minster, and now being processed for the official legislation

- Monitoring and evaluation of CBCRM activities

The representatives of the community have been participating into the monitoring and evaluation of the Project together with the Japanese experts and the VFD counterparts.in addition, they took part in the stock assessment survey by SPC and IRD. Through these, they improved the capacity for

monitoring and evaluation.

- Status of coastal resource

Evaluation of the resource (increase or decrease) requires time-series data to see the trend. While the Project period is too short to have such data, the community in Malakula and Aneityum started the data collection. As they accumulate the data and give feedback to the community, they will be able to see the status of coastal resources

In Efate and Aneityum, the community recognize the potential of the off the reef fishery and introduction of FAD. The reproduction of green snail transplanted from Aneityum to Efate during the phase I of the Project is now being proved scientifically. The number of fishermen specialized in lobster decreased from 11 to five, and number of canoe engaged in off the reef fishery increased from one to five. The reduced fishing effort in the reef area will likely to bring the resource increase in the future.

- Impact of fishing activities on the resource

The impact of fishing activities on the coastal resource is expected to be reduced due to the same reasons explained above, and also the fact that CBCRM committee and community people increased area and target species for the management in the reef area.

- Economic stability of the households

As explained in detail in chapter 2 the community in Aneityum realized increased income by the off the reef fishery. The other two sites (Malakula and North Efate) are not trying to introduce fish café to add value on the fisheries products. In Malakula the fish market established in Uripiv Island is sending fisheries products to the fish market in Lakatoro. Another fish market is expected to be introduced in Lowni, community near the Crab Bay, and they will start sending the fisheries products to Lakatoro fish market. In Efate, fishermen in Lelema is establishing the marketing channels in Port Vila and surrounding resort hotels. Community people are feeling more economic stability than before.

3-3. Progress Toward the Overall Goal

Overall goal:
1. Conservation of coastal environment and sustainable utilization of coastal resources are enhanced in target areas.
2. CBCRM are promoted in other rural coastal areas

Indicators:
1. More than one environmental and / or resource indicators showed positive changes
2. CBCRM activities are extended to more than one province(s) outside of target areas

According to the VFD, the Aneityum Island succeeded in the voluntary establishment and management of taboo area in 1980's to invite cruise ship and increased coastal resource especially green snails. In Efate, green snails transplanted from Aneityum and gigas transplanted from Tonga are well protected. The green snail in North Efate has already started the reproduction. These facts indicate that the overall goal 1 is partially being achieved. Regarding the overall goal 2, it is expected to be achieved because of the following fact.

<u>Expansion of CB-CRM to areas outside the Project</u>

The VFD made CBCRM plan for Emae Island in Shefa Province in October 2014 applying the skills, knowledge, and experience gained through the Project, and also during the JICA training in Japan he participated before. In Aneityum Island where there is no VFD officer, community counterpart extended his promotion activity to the two communities not included in the target communities of the Project (Port Patrick in North, and Umeji in south of Aneityum) to formulate their CBCRM plan. This was done by own initiative of the local community side.

Possibility of adoption of CB-CRM approaches by other organizations

In the regional and national seminar, the CBCRM approach developed by the Project attracted high interest among the participants from fisheries department from other countries and regional organizations such as USP and SPC. It is expected that CBCRM will be promoted further both nationally and internationally. The GIZ requested support from the VFD to deploy FAD in the Island of Nguna and Pele as part of the project to mitigate the damage of climate change. The VFD will also support the introduction of the shell polishing activities.

The international NGO "World Fish" funded a regional project to promote community-based fisheries management project for Vanuatu, Solomon Islands, and Kiribati with the project period of four years. This regional project adopted the questionnaire survey made by the Project for its baseline survey in Aniwa, Masculine, north-east Santo, and other community. According to the VFD this regional project will utilize the output of the Project even after the baseline survey.

3-4. Actions to the Recommendations Made during JCC

Apart from the achievement explained above, the forth JCC held in July 2014 made recommendations to the Project to respond to the following two recommendations to improve the sustainability of activities after the completion of the Project.

3-4-1. Completion of the CBCRM Plan and its Endorsement

The Project supported the three target sites, North Efate, Malakula, and Aneityum to formulate the CBCRM plan at each site. The plans were completed in October 2014 (plans are attached as Appendix 17). The community chief, director of the VFD, and minster put their signatures on the plans, and the CBCRM plans were officially endorsed.

For the endorsed CBCRM plan to be gazetted and for the by-laws defined in the plan to be officially legislated, it was found that penal rules should be clarified in full detail. Mr. Nimoho, manager of the costal fisheries development division of the VFD is now coordinating with the VFD legal officer to convert the penal rules stipulated in the CBCRM plans as by-law into the official penal rules incorporated into the official legal system.

3-4-2. Completion and Endorsement of the Guideline for the Community Extension Officer

The guideline for the community extension officer (see Appendix 18 for full detail) made by the Project was approved by the director of the VFD and now is being processed in the ministry. Mr. Nimoho already explained to the minister about the guideline, and minister agreed for the endorsement. Hence it will be officially endorsed as soon as the paperwork finishes within the ministry.

Chapter 4 Effectiveness of the CBCRM Approach Developed by the Project

4-1. Conceptual structure of CBCRM

For the appropriate coastal resource management, it is necessary to plan both the resource management rules and its supporting measures. The supporting measures can be classified according with the four perspectives, namely the resource/ environment, economy/ production, socio-culture, and institution/ governance. The Project established the objective from the each of the four perspectives to develop activities.

Resource/ environment: to realize the objectives i) to motivate community people for CBCRM, and ii) to establish the coastal resource management rules, the Project conducted such activities as awareness raising for CBCRM, implementation of coastal resource survey, collection and analysis of data on fishing activities.

Economy/ production: to realize the objectives i) to reduce the fishing effort on coastal resource, and ii) to compensate the economic loss due to CBCRM activities and make fund for CBCRM activities, the Project introduced the alternative livelihood measures, FAD fishery, and promoted the linkage with tourism.

Socio-culture: To motivate for CBCRM and increase the management capacity in the community, the Project organized participatory workshop and meeting to exchange opinion.

Institution/ governance: in order for the community to acquire necessary support from government and NGOs, project supported communities to coordinate with relevant external organizations.

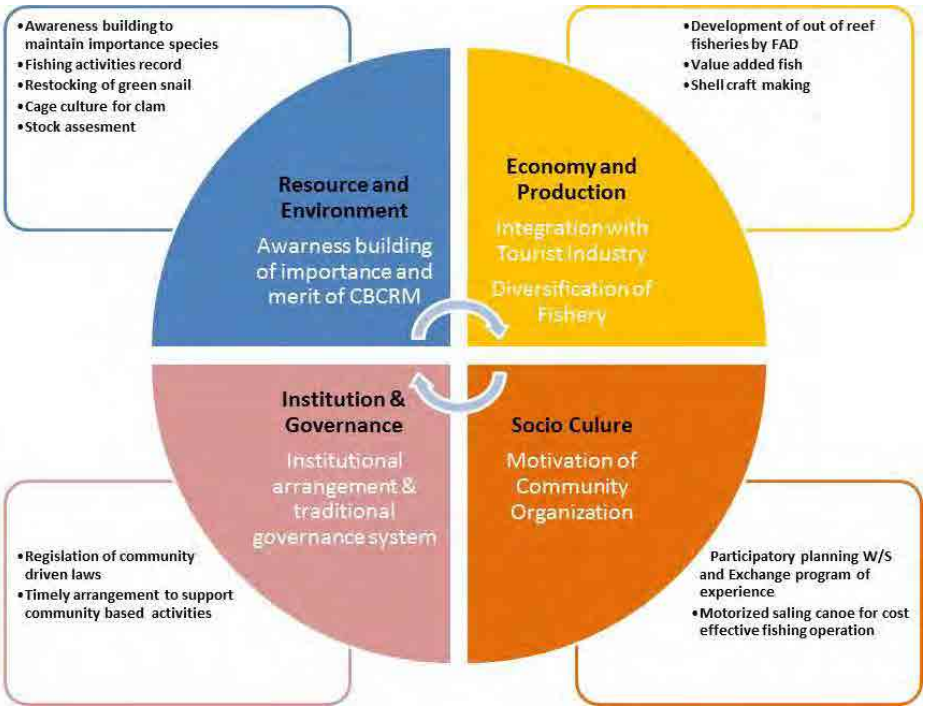


Figure 4-1: The four perspectives of CB-CRM and activities under each perspective

.These four perspectives are all important, and complement each other. The resource management is realized only when we succeed in managing the people who exploit the resources. That is why the socio-cultural perspective sustains the resource/ environment and production/ economy perspectives. The pilot project in each site was designed for the VFD counterparts and local counterparts in the community can have good understandings on CBCRM. Taking the result of baseline survey into

consideration, the project adopted "linkage to tourism development" approach for North Efate, "Strengthening the existing organizations/ collaboration among the different communities" approach for Malakula, and "Community extensionists approach" for Aneityum.

The measures to promote CB-CRM, and supporting measures for them at each site can be summarized as in the table below.

North Efate

CBCRM measures	Supporting measures for CB-CRM
1. Large scale expansion of taboo area 2. Introduction of fishing regulation and its documentation 3. Assignment of five monitors for the expanded taboo area	Economy and production 1. The diversification of fisheries and increase of fish catch through the promotion of FAD and off the reef fishery. Marketing and distribution of the fisheries products to local hotels and restaurants 2. Introduction of the modified canoe with traditional sail with small scale out board engine 3. Promotion of marketing of the shell polishing products in Port Vila (improvement of quality and sales amount) Resource and environment 1. Data collection on fishing activities Socio-culture 1. Motivation of the CBCRM committee members and awareness raising for better understanding among community people Institution and governance 1. Establishment of CBCRM committee (supervise the sub-group activities) 2. Establishment of LELEMA fishermen's association 3. Procurement of the building for the fishermen's association in Lelepa Island

Malakula

CBCRM measures	Supporting measures for CB-CRM
1. First legislation of MPA in Vanuatu with the support from the Department of Environment and IUCN 2. Addition of the target species of resource management (mud crab) 3. Expansion of the management area for land crab (to include the outside of Crab Bay)	Economy and production 1. Tourism development initiative by CB-CRM committee 2. Establishment of the fish market in Lowni community 3. Marketing of the shell polishing products in Lakatoro hand-crafting centre with the support from the Department od Women's Affairs Resource and environment 1. Establishment of fish market in Uripiv and data collection on fishing activities 2. Segmentation of catch area of land crab into five sub-area to get more detail information on the catch. Socio-culture 1. Motivation of the CBCRM committee members and awareness raising for better understanding among community people Institution and governance 1. Increase of communities that belong to CB-CRM committee(from 16 to 17) 2. Holding of MPA committee monthly meeting (each time different communities that belong to the committee) 3. Discussion and implementation for the fund raising activities 4. Acquisition of the support from provincial government, department of tourism, and private company for the tourism development in Crab Bay.

Aneityum

CBCRM measures	Supporting measures for CB-CRM
1. Compliance to the fishing regulations (ban on green snail and sea cucumber, size limit on trochus and lobsters 2. Introduction of the stricter size limit on the lobsters for tourists (25 cm minimum, where the national regulation defines 22 cm) 3. Establishment six taboo areas by traditional governance committee	Economy and production 1. The diversification of fisheries and increase of fish catch through the promotion of FAD and off the reef fishery. Marketing through the fish market. The number of boats with engine increased from one to eight in Analcauhat. 2. Introduction of the modified canoe with traditional sail with small scale out board engine (the number of canoe increased from one to four) 3. Increase of the sales of local fish to tourists (number of fish case increased from zero to 3) 4. Number of fishers specialized into lobster decreased from 11 to five 5. Production and marketing shell polishing products with eco-tag Resource and environment 6. Promotion of the data collection on the lobster catch 7. Awareness raising on the importance of CBCRM in all the three communities in Aneityum Island by the community extension officer Socio-culture 8. Motivation of the CBCRM committee members and awareness raising for better understanding among community people Institution and governance 9. Increase of CBCRM committee members (five clan chief newly joined into the committee) 10. Preparation of the establishment of Aneityum fishermen's association (by own initiative of the community extension officer)

4-2. Effectiveness of CBCRM Approach

This section reviews the background and discuss on the effectiveness of the approach taken in each site.

4−2-1. Northern Efate (linkage to tourism development)

The result of the baseline survey indicated that the traditional governance system in the Efate Island is weakening due to the economic development. The phase I of the project tried to set up the MPA management committee to promote the collaboration among different communities. However, it failed because different communities could not reach to an agreement regarding on the use of coastal resource.

(1) Implementation of the pilot project

Transplanted green snail and gigas were have been well maintained by the community. The community people were used to take care of the coastal marine resource. The Project tried to set up again the MPA committee, and develop the linkage between CBCRM and tourism development.

The site has good tourism attraction such as Roy Mata Domain (the only one world heritage in Vanuatu), tourist resort hotels and restaurants, seems to be providing the chance for local community to generate income for the promotion of CBCRM. The Project promoted the linkage with tourism in order to motivate community for CBCRM and help community to implement coastal resource management plan made by the phase I of the Project).

During the CBCRM planning workshop held in February 2014, the representatives from community agreed to review the existing MPA management plan. After that, they held regular meeting for the clans in Lelema community to discuss and update the plan. The plan was finalized as Lelema CBCRM plan.

Table 4-1: Implementation process of the pilot project in Northern Efate

Perspectives	Resource/ Environment	Economy/ Production	Socio-culture	Institution/ governance
Situation before the project	Status of the resource there was a concern over decreasing resource due to the illegal fishing Coastal resource management plan Phase I of the Project made the plan but yet to be fully implemented resource management -community maintain well the transplanted green snail and gigas -no MPA committee functioning	Main fishing is spear fishing in the reef. Catch goes mainly for home consumption Only few limited fishers catch high value bottom fish such as poulet to sell to hotels and restaurants Not many tourism visiting to the Roy Mata Domain, the only world heritage in Vanuatu	Immigrants sometimes cause conflict The compliance to the existing MPA plan is low There is a conflict among communities over the fishing ground low level of collaboration among the different communities	It has good access to the VFD service because of physical proximity
Issues	Coastal resource seems decreasing	Low level of tourism development by the community	Traditional governance system is weakening	Low level of governmental service is provide because of the weak organization in the community
Approach	Linkage with tourism			
Pilot project and other inputs	-monitoring on the transplanted green snail and gigas -support for the review and update of CBCRM plan -stock assessment survey for sea cucumber by IRD -survey on the reproduction of green snail by SPC	-introduction of off the reef fishery through FAD -production and utilization of modified canoe for fishery and tourism development -production and marketing of shell polishing products -development of marketing for fisheries products -promotion of the ocean nursery for the giant clam	-implementation of the participatory workshop -exchange and sharing of the experience on CBCRM among different communities	-support for the regular guidance by the VFD extension officer -participation of young leader to the FLMMA-JICA workshop in Fiji -Participation of the women leader to the training on shell polishing and fish processing in Indonesia
Outputs of pilot project	-improved awareness on CBCRM among community people -expansion of management measures (MPA area, target species, and restriction on fishing methods)	-established off the reef fishing by FAD -established fish marketing channels to hotels and restaurants -promoted shell polishing production and marketing by women's group -successful trial of diamond back squid fishery	--formulation of CBCRM plan through the own initiative from the community	-establishment of Lelema CBCRM committee -procurement of the building for the office of CBCRM committee in Lelepa Island

*the underlined inputs are provided by external organizations, not by the Project

(2) Discussion on the Effectiveness of the Approach "Linkage with Tourism"

The Project promoted the promotion of giant clams as a tourism attraction, production and marketing of shell polishing products, marketing of newly developed offshore pelagic and bottom fish to the resort hotels. Through the activities, community people gained proper understandings on

the importance of CBCRM, tourism, and linkage between them and finally made CBCRM plan. In that sense, the effectiveness of the approach was proved.

The most important factor for the success seems that the involvement of clan chiefs into the pilot project motivated them for the promotion of CBCRM. That is the difference between phase I and phase II of the Project

In the phase I of the Project, community chief and young leaders were involved in the project. MPA committee was not established due to the lack of common understandings on the importance of CBCRM. The phase II of the Project made sure that clan chiefs are involved in the Project as much as possible. In interacting with the representatives from other sites, the clan chief started to realize the high potential of North Efate for tourism development. In particular, the story of tourism development in Aneityum and Malakula inspired the clans chiefs in North Efate. Through these processes the clan chiefs understood the importance of CBCRM, tourism development, and linkage between them. Motivated clan chiefs played important role in establishing the CBCRM committee.

To establish MPA area, not only the chief's agreement but also clan chiefs' agreement are necessary, as they own the land and decide the usage of static resource in the reef extending from their land. The approach to promote the linkage between CBCRM and tourism development catalyzed for clan chiefs and young leaders to work together for CBCRM.

4−2−2. Malakula

With the support from the VFD extension officer in Malampa Province, 16 communities around Crab Bay formed Crab Bay MPA committee, and established Crab Bay MPA area. The MPA committee was formed for the protection and management of land crab, binding as many as 16 communities all together. However, the activities of MPA committee was stagnated as time passes, and MPA committee was not capable of monitoring even though there was an increasing number of reporting on illegal catch of land crab.

(1) Implementation of the Pilot Project

Under the circumstance explained above, the Project design the pilot project to strengthen MPA committee and tourism development of Crab Bay to generate fund for the committee. Its implementation process is summarized in the table below.

Before pilot project, the members of MPA committee were restructured. At the beginning the participants of meeting and workshops were old people in the community. The age structure of the MPA committee seemed to have some relationship with the stagnation of the activity. The Project proposed to invite younger generation in the committee explaining that the education and training of young leaders is very important. Finally the MPA committee was reorganized to accommodate younger generation.

During the first CBCRM planning workshop held in February 2013, the young leaders made action plan for the promotion of CBCRM. They brought the plan back to their community, and explained to village chiefs about their ideas on CBCRM. Based on their own idea, young leaders developed various activities. They organized training on the maintenance of outboard engine with the support from TVET, AusAID, installed fish market with freezer and solar power generator in Uripiv Island (another fish market is prepared for the installation in Lowni). They also realized the official legislation of Crab Bay MPA area with the support from the Department of Environment. The young leaders are also trying to promote the tourism development in Crab Bayt area.

The initiatives from young leaders also activated the management activity of land crab. They decided to expand the MPA area to include the mangrove area in front of Lowni village, and Unau newly joined into the Crab bay MPA committee as 17th community. After the recent development, the Crab Bay MPA committee was renamed to be "Central Malakula CBCRM committee".

Table 4-2: Implementation process of the pilot project in Malakula

Perspectives	Resource/ Environment	Economy/ Production	Socio-culture	Institution/ governance
Situation before the project	Status of resource land crab resource is recovered Coastal resource management plan MPA was established with management plan was made in 2002 with 16 communities resource management -data collection in Lakatoro publish market on land crab -fund raising by MPA committee -four regular meeting per year	Plantation of copra and cacao is the main economic activity. There is a limited activity of fishery it has relatively good access to the capital city (regular ship and airplane)	There was a conflict over the land ownership of the Crab Bay area. In 2002, MPA and its committee were established for the management of land crab, alleviating the land issue. The CBCRM activity is stagnated due to the lack of fund. there is increasing case of no-compliance to the management measures for land crab, due to the weakening respect for the traditional rule.	There is a VFD extension officer in the capital of Malampa Province. Other governmental officers are also stationed at Lakatoro. The governmental service is in limited scale. The extension officer played an important role in the establishment of Crab Bat MPA committee
Issues	There is a concern over the decreasing resource of land crab	There are few alternative livelihood	The activity of the MPA committee is stagnated	MPA management plan became old
Approach	Strengthening the existing organizations/ collaboration among the different communities			
Pilot project and other inputs	-collection and analysis of the fishing data by the communities. -release and monitoring of the marine shellfish (trochus and green snail) -review and update of the MPA management plan -stock assessment of the marine shellfish and sea cucumber by IRD	-introduction of off the reef fishery through FAD -production and marketing of shell polishing products -installation of facilities for tourism development in Crab Bay (yacht mooring and water tank) -fund raising through kava and bee culture -establishment of fish market with freezer and solar power generator in Uripiv Island and Lowni village with the support from JOCV -field survey for the tourism development done by private company	--implementation of the participatory workshop -exchange and sharing of the experience on CBCRM among different communities	-support for the regular guidance by the VFD extension officer and JOCV -participation of young leader to the FLMMA-JICA workshop in Fiji -participation of young leader to the JICA training in Japan for the eco-tourism development -legislation of Crab Bat MPA with the support of IUCN and Department of Environment
Outputs of pilot project	-collection and analysis of the fishing data through the fish market --improved awareness on CBCRM among community people -expansion of the MPA area for land crab (to include Lowni village) -inclusion of new target species for the management (mud crab)	-training on shell polishing organized by community -market development for shell polishing products in Port Vila -storage and distribution of the fish catch with the solar freezer in collaboration with Lakatoro fish market	-formulation of CBCRM plan through the own initiative from the community -different communities collaborating for the tourism development in Crab bay	--legislation of Crab Bay MPA area -acquisition of the support from provincial government, Department of Tourism, NOG, and tour companies for the promotion of CBCRM

*the underlined inputs are provided by external organizations, not by the Project

(1) Discussion of the Effectiveness of the Approach “Strengthening the Existing Organizations/ Collaboration among the Different Communities”

The Project implemented the pilot project in fully participatory way to make sure that MPA management committee can build more capacity. Along with the implementation of the pilot project, the young leaders became more proactive and capable of planning, monitoring, and implementing the activities. At the beginning of the pilot project, the young leaders were not official member of the MPA committee. However, the elder member of MPA committee admitted their significant contribution, and accepted them to be formal members of MPA committee. The MPA committee became CBCRM committee to supervise other groups, and young leaders were promoted to be board members of the CBCRM committee. Nowadays the representatives of the committee continue the tourism development in collaboration with member communities on regular basis.

The young leaders promoted the implementation of tentative CBCRM plan made in February 2013 with the VFD extension officer and JOCV. Their hard effort acquired the support from the Department of Environment and IUCN to legislate Crab Bay MPA. For the legislation, the VFD extension officer and young leaders visited repeatedly to the 16 communities concerned to explain the importance and necessity of the legislation of Crab Bay MPA. The first legislation of coastal MPA in Vanuatu was a product of their dedicated work. Through the success, they understood well the importance of working together, and finally led to the voluntary work for the tourism development in Crab Bay. their active work attracted the support from Malampa provincial government, Department of Tourism, and private companies. The strong motivation of the young leaders are maintained through their participation to the FLMMA-JICA workshop in Fiji (Mr. Steward) and JICA training in Japan for the eco-tourism development (Mr. Malili)

It was the capacity development of young leaders who played pivotal role in the promotion of CBCRM and tourism development in Crab Bat area. Hence the project considers the approach “strengthening the existing organizations/ collaboration among the different communities” to be effective.

4−2−3. Aneityum

The CBCRM in Mystery Island is one of the best examples in Vanuatu. The community of Analcauhat declared the reef around Mystery Island as MPA, started the data collection on the lobster sold to the tourists, protection of trochus, green snail, and sea cucumbers. However, due to the sharp increase of the tourists, the lobster catch increased and there was a concern over the decreasing resource of lobster. There was also an increasing pressure from the community to temporally open MPA for the community people to catch trochus.

(1) Implementation of the Pilot Project

The pilot project focused on the sustainable management of lobster resource. Since there is no VFD officer, the Project adopted “Community extensionists approach”.

Mr. Reuben was appointed as community extensionists by the VFD and liaised with the VFD even before the Project started. In the Project, he worked as local coordinator to prepare and conduct workshop, technical training, liaise with community, and monitor the progress of the Project.

Among others, the most important outputs achieved by the pilot project was the stable utilization of the off the reef fisheries resource with FAD, and local fish sales through the fish café. Before the fishing effort tended to concentrate on lobster, as it was the only fisheries resource sold to the tourists. However, as the fish care demonstrated that the local fish can be also sold to the tourists, the part of the fishing effort was shifted from within the reef to off the reef. Production and marketing of shell polishing activity realized the livelihood improvement and promotion of environmental awareness in the community.

Through the pilot project the community people started to understand the importance of linkage between the CBCRM measures and its supporting measures. This led to the declaration of new MPA

in Analcauhat. The MPA committee started to manage the MPA in Mystery Island, Analcauhat, and also the supporting measures to manage MPA. Hence the committee was renamed to be Analcaihat CBCRM committee.

Table 4-3: Implementation process of the pilot project in Aneityum

Perspectives	Resource/ Environment	Economy/ Production	Socio-culture	Institution/ governance
Situation before the project	Status of the resource Green snail was depleted in 1980's, but it recovered through the voluntary management by the community Coastal resource management plan the reed around Mystery Island was declared to be MPA in 2001 for tourists. MPA management plan was made in 2007 with the support of the VFD. resource management lobster was the only fishery resource sold to tourists. There is a voluntary management measure in place (minimum catch size)	Tourism is highly developed due to the increasing cruise ship visit from Australia started from 1980's. fishery resource is consumed within the Island, by tourist (mainly lobster) and local people	The traditional governance system is relatively well maintained and strong The tourism committee exists and functions well. Mystery Island MPA committee was established in 2007 and there are some activities.	The VFD officer provide service when they visit the Island. There is a community extensionists appointed by the VFD
Issues	-there is a pressure for temporal open of MPA -there is a concern over the decreasing resource of lobster.	There is no alternative livelihood apart from tourism	The traditional governance system is weakening due to the penetration of the capital economy	The activity of the community extensionist is limited.
Approach	Community extensionists approach			
Pilot project and other inputs	-collection and analysis of the fishing data by the communities. -review and update of the MPA management plan -stock assessment of marine shellfish and sea cucumber by the IRD and the SPC	-introduction of off the reef fishery through FAD -production and utilization of modified canoe for fishery and tourism development -establishment of fish market with freezer and solar power generator -production and marketing of shell polishing products -management of fish café	--implementation of the participatory workshop -exchange and sharing of the experience on CBCRM among different communities	-capacity building for the community extensionist -participation of community extensionist to the FLMMA-JICA workshop in Fiji -Participation of the women leader to the training on shell polishing and fish processing in Indonesia -The VFD support for fishery data collection and its utilization for the bank loan
Outputs of pilot project	-start and expansion of the fishing data collection. -improved awareness on CBCRM among community people and better participation in CBCRM -expansion of MPA in	-introduction of fish sales through FAD fishery and fi cafe -active commitment of community (investment) in the livelihood improvement (fish café and shell polishing) -successful trial of	-CBCRM plan with due consideration in to the traditional governance system -expansion of MPA (to include whole area of Analcauhat) -establishment of group to manage various	-formulation of guideline of the community extensionist and its legislation -selection of new community extensionist based on the guideline

	Analcauhat	diamond back squid fishery	activities of pilot project -supporting system for the community extensionist	

*the underlined inputs are provided by external organizations, not by the Project

(2) Discussion on the Effectiveness of the "Community Extensionists Approach"

The provision of the community fisheries extensionist has been in place even before the Project. The ministry has appointed five extensionists so far. There was no guideline as to how the extensionists should be selected, community chief and member of parliaments appointing without any clear criteria. The duty of the community extensionist is wide, covering almost all of what the VFD extension officer is in charge of (such as monitoring of fishing activity, data collection and reporting, awareness raising). It requires not only the technical knowledge on fishing and aquaculture, but also the communication and coordination for the community development. It was important for the promotion of CBCRM to set clear criteria on the selection of extensionist.

The Project monitored the performance of the community extensionist in the pilot project, and discussed with the VFD on the required skills and knowledge for the community extensionist. The VFD prepared guideline for the selection of community extensionist. The community extensionist in Aneityum is the first case to be officially approved by ministry.

For the smooth implementation of the pilot project, the community extensionist paid due attention to ensure the fair and even participation of six different clans in Analcauhat. Participation of wider clans and families fostered better understandings on CBCRM among the community.

The community extensionist selected young leaders an assigned them in charge of FAD fisheries management, shell polishing, management of fish café etc. Among the young leaders, Ms. Luise in charge of shell polishing had opportunity to participate in the training in Indonesia on shell polishing. Her skill on shell polishing was improved dramatically. Three members of fish café group are now studying cooking in the HTLTC in Port Vila from February 2014. They are expected to come back to the fish café group after their study. The young leader in charge of FAD management (Mr. Joseph) is to be recommended as new community extensionist. In this way the guidance from the community extensionist contributed for the capacity development of the young leaders. Based on the achievement explained above, the Project considers "Community extensionists approach" functioned effectively.

BOX 4: Strengthening of CB-CRM in Aneityum with the community extension officer

The contributing factors for the achievement in Aneityum are considered as follows.

Mr. Reuben formed his concrete idea to expand CBCRM to cover whole Aneityum through his participation into JICA training. However, he did not have concrete idea as to how he can motivate the community. The Project developed various activities with the community extensionist. He felt difficulty in managing everything by himself, and necessity to have supporters for better management. This idea was approved by the chief council, the traditional governance system and young leaders were developed. In many islands in Vanuatu, there is no VFD officer like Aneityum. Just appointing one community extensionist will not work, but it is also necessary to find his (or her) supporters from within the community.

Considering that fact that most of remote island has no VFD officers, the role of community extension officer is quite important in Vanuatu.

4−3. Wider applicability of the Developed Approaches

(1) Linkage to Tourism Development Approach

Linkage with tourism is quite effective for CBCRM if tourism resource is available. While, the tourism is already developed in Aneityum and North Efate, it is just a potential in Crab Bay in

Malakula. The tourism linkage approach can be effective in the place like Malakula. Aneityum and North Efate is based on the mass tourism. However, there is small scale tourism business too. In case of Malakula, there is flight every day from Port Vila. Crab Bay is one hour drive from the airport, and road access is good. In Crab Bay there are tourism resources such as sea turtles, wide variety of mangrove, nesting place of fruit bad. In fact, the cruise ship company (P&O) conducted the survey for the abundance of turtle, and other private company (Trek Vanuatu) conducted survey for the eco-tour. Community identified natural, environmental, and social values for tourism development, and they are trying to utilize them for the promotion of CBCRM.

Therefore the linkage with tourism development can be effective for the remote island where CBCRM is not yet well developed. Supports from government, local NGO, and private companies are important as the community cannot develop everything by their own effort.

(2) Strengthening the Existing Organizations/ Collaboration among the Different Communities Approach

This approach focuses on the development of young leaders for the strengthening of MPA management committee. This approach is effective in such community where the organization for resource management exist but its activity is stagnated. To identify and develop the young leader, implementing pilot project such as tourism development, installation of fish market, and other livelihood improvement measures. For the promotion of effective BCRM, it is important to obtain the participation of the whole community, not just limited segment of the community, such as fishermen.

(3) Community Extensionists Approach

This approach aims at the promotion of CBCRM through the strengthening of community extensionist. It is effective in such community where there is not regular visit by government officer, and community need to play bigger role in the absence of government service. He or she should not only give technical guidance for fishing and aquaculture but also help community to make management plan. It is important to select the community extensionist based on the guideline developed by the VFD, and provide training.

These approaches need to be combined to fit the socio-economic situation of the target community. As an initial step the baseline survey should be conducted based on the four perspectives for CBCRM, select the best combination of approaches and make appropriate action plan for the promotion of CBCRM.

4-4. Lessons Learned from the Project

(1) Due Consideration into the Relationship among Four Perspectives of CB-CRM

In Aneityum, community extensionist approach (institution/ governance) linked with FAD fishery management, shell polishing, and fish café (economy/ production). That strengthened community organization (socio-culture). In Malakula, strengthening the existing organizations/ collaboration among the different communities approach (socio-culture) realized serious commitment of the community, and that led to the external assistance from government and NGO (institution/ governance). It is important to consider the best combination of the approaches, as different approaches generate different synergy effect.

(2) Inclusion of Wider Social Segments of the Community (Cluster Approach)

The FAD fishery management workshop motivated the fishers. However, the number of community people who has access to FAD fishing was limited. Hence the interest of the community in CBCRM was not high at the beginning. Later they started to develop various activities such as modified canoe, shell polishing, fish market, fish café etc. The participation of wider social segments of the community led to the successful promotion of CBCRM.

(3) Involvement of Clan Chief

During the phase I of the Project, Community chief and youth leaders worked for the project, but could not establish MPA management committee due to the lack of understandings by community members. This may be because the Project did not involve well the clan chief who has power to manage the reef area. Phase II of the Project asked participation of clan chief. Their participation eventually formed CB-CRM committee.

BOX 5: The creation of the LELEMA CB-CRM committee

In Northern Efate, target site for the phase I of the Project, MPA committee was not established due to the low awareness on CB-CRM among community members.

The Project considers that it is due to the weakening traditional governance system, and low dependence on coastal marine resources. However, after the second FAD fishery management workshop, leader of a clan in Lelepa island showed interest in FAD fishery, and became leader of FAD management committee. The awareness on CB-CRM among the community started to rise after this.

He took strong leadership not only in FAD fishery but also in CB-CRM planning and other activities. Through the activity, he seems to have realized the high potential of tourism development in the area, and started to convince the other chiefs of clans. My Billy says that he was motivated from other communities, Malakula and Aneityum.

Without the understanding of him on the linkage between CB-CRM and tourism development as supporting measures for CB-CRM, the creation of LELEMA CB-CRM committee would not have been possible.

(4) Thorough Participatory CBCRM Planning and Implementation

The Project always ensured the participation of the community. Through workshop, community made their own CBCRM plan with the support from the VFD and Project. Through the planning, implementation, review and update of CBCRM plan, the community people became self-dependent and capable of sustainable promotion of CBCRM.

(5) Feedback of the Achievement of the Project

The Project always ensured the feedback to the communities. The result of the baseline survey was presented to the community. The CBCRM plans made in Port Vila with the representatives of each site were brought back to the community for further consultation within the community. The fishing data collected and analyzed was presented to the community. This kind of feedback to the community was the key for the community to understand the importance of CBCRM.

(6) Study Tour

In Vanuatu, there is not much opportunity for exchange program. Through the study program organized during the implementation, the Project proved that even if it is just for a few days, community people can learn many things from each other by discussing and observing the project site.

(7) Collaboration with Various Local Resources

The Project collaborated with various local resources apart from the VFD. A young leader in Mangaliliu worked as trainer for shell polishing and taught basic skills to women's group. The owner of hand craft shop in Port Vila gave advices to the community people during the shell polishing workshop. The trainers from the HTLTC came to Aneityum to teach basic skills to manage fish café. Department of Tourism cooperated for the promotion of giant clam farming (gigas) and production and marketing of local shell polishing products.

These collaborations made possible to promote CBCRM higher level than the Project working alone.

(8) Collaboration with Relevant Organizations

One of the key for the success of the Project was the timely collaboration with national and international organizations. While the phase I of the Project focused mainly on the resource and environment out of the four perspectives, phase II of the Project focused on the other three perspectives important for CBCRM (economy/ production, socio-culture, and institution/ governance). Development of activities based on the various perspectives brought timely collaboration with relevant organizations, such as Department of Environment, Department of Tourism, Department of Cooperatives and Ni-Vanuatu Business Service, and NGO. The timely collaboration contributed significantly for the motivation of community for CBCRM. The resource/ environment perspective was not the main focus during the phase II of the Project. Thus the collaboration with IRD and SPC for stock assessment was indispensable. Their survey and feedback to the community enhance the awareness for CBCRM and motivate community for CBCRM. In particular, the scientific demonstration by IRD and SPC for the reproduction of green snail in Efate, and survey by IRD for the potential utilization of coastal resource for tourism development were important for the motivation of community.

(9) Collaboration with Other Schemes Such as Training and volunteer

One of the contributing factors for the success of the Project is the collaboration of ex-participants of JICA training. Out of eight VFD C/Ps, six are the ex-participants of JICA training. Through the JICA training, they understood the fisheries management in Japan, PCM, and RRA. Thanks to this, they were capable of facilitating the community participatory workshops for CB-CRM planning from the beginning of the Project. They also trained community members on how to facilitate an coordinate the community.

JOCV and Senior Volunteer also played an important role in the Project. JOCV assigned to VFD office in Malampa Province worked together with the youth leaders in the community. The Senior Volunteer assigned to the HTLTC made possible to organize the training on cooking in Aneityum to introduce fish café.

With the cooperation from the expert assigned to USP in Fiji, C/Ps from VFD and local communities participated in the FLMMA-JICA joint seminar in Fiji. A youth leader in Malakula participated in JICA training in Okinawa on Eco-tourism. He is working hard to promote Crab Bay as tourism destination.

From these experience, the Project recommend well designed framework for the implementation of the project which enable the smooth collaboration with other schemes such as training and JOCV.

4-5. Recommendation

Based on the experience gained through the Project, the Project put forward the following recommendations.

<u>Timely and continuous support</u>

The most important achievement of CBCRM is to realize the resource recovery or increase. However, the accurate stock assessment is difficult, costly, and affected by natural uncertainty. Hence just checking whether the resource recovered or increased could mislead the evaluation of projects. The Project not only contributed for the self-dependence of community and capacity building of the VFD staff, but also influenced on the VFD policy and SPC cooperation in the Pacific region. However, the effectiveness of the approaches remains still hypothesis proved only in the target sites of the Project. For this hypothesis to have real usefulness and replicable in the wider region, it is important to start another project to demonstrate the hypothesis in a timely manner, and in the long term. Currently, the fisheries section of PSC has three staff who used to work at the VFD (Mr. Amos, Mr. Robert, and Mr. Pakoa). They are willing to work to demonstrate the hypothesis and disseminate the model to the region-wide. It seems very opportune to start it while they are working in SPC.

In Pacific region, the self-sustaining development is very difficult due to the disadvantage of small

island states such as high dependency on foreign aid, remittance, limited governmental capacity. The past experience indicates that in many cases outputs and achievements of projects eventually shrinks after the completion. If started too late, the next project would require additional inputs to recover the lost outputs and achievement.

Dissemination of CB-CRM as effective tool for the comprehensive regional development

For the regional development in South Pacific including Vanuatu, the sustainable development and utilization of marine, especially fisheries resource is indispensable. In most case, the exploitation of the off the reef fisheries resource is at low level, and domestic fishery depend heavily on the resources inside the reef.

The Project promoted CBCRM and its supporting measures to ensure the sustainability after the completion of the Project. Diversification of fisheries, distribution and marketing, value adding by fish café were introduced through the Project. Moreover the linkage with tourism and production of shell polishing brought wider social segment of community to face with CBCRM such as women and children. Naturally, a project for CBCRM realized community development.

The experience of the Project indicates that the comprehensive community development can promote CBCRM, and community development through CCBRM can be quite effective tool approach for small island states.

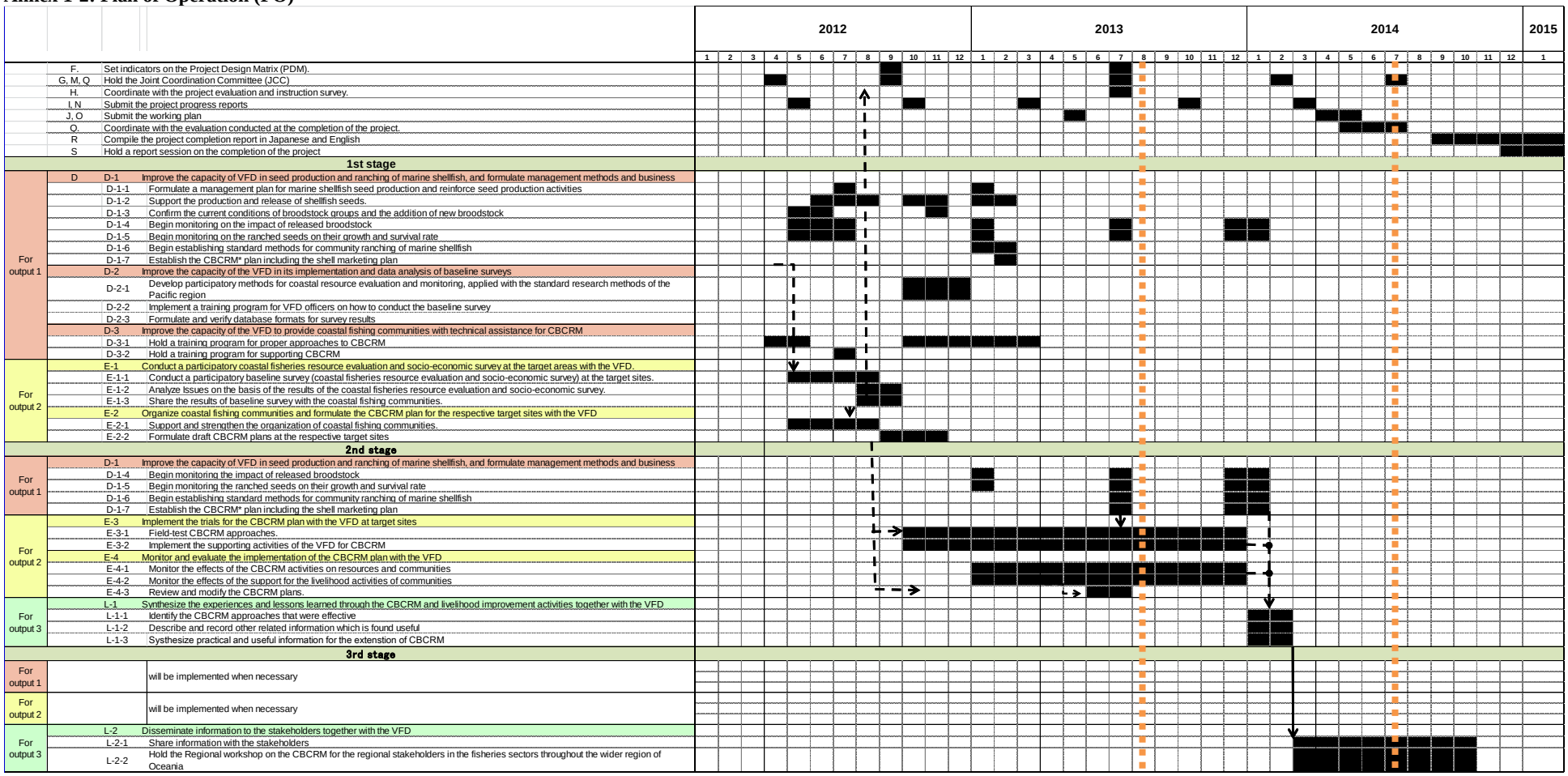
List of appendices

Annex 1-1: PDM　添付資料 1-1 PDM

(Revised at JCC on 6 August 2013 held after the Mid-term Review)

Narrative Summary	Objectively Variable Indicator	Mean of Verification	Important Assumption
< Overall Goals > 1 Conservation of coastal environment and sustainable utilization of coastal resources are enhanced in target areas 2 Community-based coastal resource management are promoted in other rural coastal areas	1 More than one environmental and/or resource indicators showed positive 2 CBCRM activities are extended to more than one province(s) outside of target areas.	1 report of any associated survey/study. 2 Annual report of VFD	
< Project Purpose > Community-based coastal resource management is effectively practiced at target areas through adequate technical assistance from the Vanuatu Fisheries Department (VFD) (*1)	1 More than one management and supporting measure each are impremented by communities in accordance with the CBCRM plan at each pilot site 2 The results of CBCRM evaluation at each pilot project site show increased scores gained in at least six out of eight assessment areas.	1 Endline survey 2 CBCRM evaluation form	
< Outputs > 1 Capacity of the VFD to support community-based coastal resource management (CBCRM) is strengthened 2 Communities in the target areas acquire necessary skills and knowledge of CBCRM approaches and tools 3 Experiences gained and lessons learnt from CBCRM related activities are compiled and synthesized	1 More than eighty (80) % of counterpart personnel of VFD recognise improved skills and knowledge on CBCRM at the self-evaluation. 2 More than eighty (80) % of counterpart personnel at the pilot sites recognise improved skills and knowledge on CBCRM at the self-evaluation. 3 At least 3 cases of effective CBCRM approaches/tools are presented at national/regional forum	1 Endline survey 2 Endline survey 3 Presentation of CBCRM approaches/tools	
< Activities > **1-1 Capacity area: Marine shellfish seed production and release as a management tool** 1-1-1 Strengthen production-planning and operational management of shell hatchery 1-1-2 Monitor the effect of translocation of spawners 1-1-3 Monitor the status of released seeds (growth and survival rate etc.) 1-1-4 Review and improve the standard method of community farming of marine shellfish 1-1-5 Formulate a CBCRM plan including sales plan of marine shellfish **1-2 Capacity area: Baseline survey and analysis** 1-2-1 Develop participatory coastal resource assessment/monitoring methods that are harmonized with regional standard methods 1-2-2 Conduct training on participatory coastal resource assessment/monitoring methods 1-2-3 Conduct training on socio-economic survey and analysis 1-2-4 Develop a database format of survey results **1-3 Capacity area: Provision of technical advice to rural communities** 1-3-1 Conduct training on CBCRM approaches/tools 1-3-2 Conduct training on supporting activities for CBCRM **2-1 Baseline surveys** 2-1-1 Implement participatory coastal resource assessment 2-1-2 Conduct socio-economic surveys 2-1-3 Analyze survey results 2-1-4 Share the survey results with the communities **2-2 Community organization and CBCRM planning** 2-2-1 Facilitate/enhance organization of fishing communities 2-2-2 Identify management issues based on baseline survey results 2-2-3 Formulate a CBCRM plan for each target area **2-3 Trial implementation of the CBCRM plans** 2-3-1 Field-test CBCRM approaches/tools 2-3-2 Implement supporting activities for CBCRM on trial basis **2-4 Monitoring/evaluation and modification of the CBCRM plans** 2-4-1 Monitor the effect of CBCRM approaches/tools on resources and communities 2-4-2 Monitor the effect of supporting activities on the livelihood of communities 2-4-3 Review and modify the CBCRM plans **3-1 Compilation of experiences & lessons from CBCRM related activities** 3-1-1 Identify CBCRM approaches/tools that were effective 3-1-2 Describe and record other related information, which are found to be useful **3-2 Synthesis of experiences & lessons from CBCRM related activities** 3-2-1 Analyze the compiled information for their effectiveness & usefulness in CBCRM extension 3-2-2 Disseminate the information to project stakeholders & wider audience	**< Input >** **Japan side** 1. Personnel 1-1. Long-term expert Chief Advisor/Costal resource management 1-2. Short-term experts a. Marine shellfish propagation b. Participatory approaches/Socio-economic survey c. Resource assessment/Ecological monitoring d. Fishing effort diversification e. Income generation activity (including fish distribution)/Project coordinator 2. Equipment Provision Seed production and intermediate culture Coastal resources management Field research Data analysis livelihood diversification Trainings and workshops 3. Supplementary cost allocation	**Vanuatu side** 1. Personnel 1-1. Personnel from the Research and Aquaculture Division 1-2. Personnel from the Coastal Fisheries Development 1-3. Personnel from Management and Policy Division 1-4. Other supporting staff 2. Facilities Office space in the Fisheries Department Hatchery and Laboratory 3. Equipment Official vehicles and vessels Hatchery equipment Training and extension materials and equipment Survey materials and equipment 4. Cost for project management (counterpart budget) Maintenance cost of the facilities and utilities Counterparts operation cost Maintenance cost of vehicles and vessels	**< Pre-condition >** a Dispute over land and marine tenure will not occur b Commitment of provincial government is secured

Annex 1-2: Plan of Operation (PO)



1-3]Diepatch of Japanese Expert s　　添付資料 1-3 要員計画　（日本人専門家）

Name		Duration of Dispatch			Total Days
		1st FY (2012)	2nd FY (2013)	3rd FY (2014)*	
Dr. Akiya Seko	Chief advisor/ Coastal resource management/ Resource assessment/ Ecological monitoring	2012/4/1 – 2012/6/10 (71 days) 2012/8/4 – 2012/9/27 (55 days) 2012/11/24 – 2012/12/24 (31 days) 2013/1/12 – 2013/1/19 (8 days)	2013/5/8 – 2013/8/9 (94 days) 2013/9/11 – 2013/10/20 (40 days) 2014/1/11 – 2014/2/10 (31 days)	2014/5/10 – 2014/6/19 (41 days) 2014/7/13 – 2014/8/2 (31 days) 2014/9/18 – 2014/9/20 (3 days)	405
Mr. Mitsuo Iimura	Deputy chief advisor / Income generation activities	2012/2/8 – 2012/2/19 (12 days) 2012/4/7 – 2012/5/6 (30 days) 2012/6/6 – 2012/7/15 (40 days) 2012/10/13 – 2012/12/9 (58 days) 2013/1/5 – 2013/2/13 (40 days)	2013/5/18 – 2013/6/19 (33 days) 2013/10/16 – 2013/12/5 (51 days) 2014/1/22 – 2014/2/26 (36 days)	2014/5/29 – 2014/6/29 (32 days) 2014/10/1 –2014/10/28 (28 days)	360
Mr. Shigeaki Sone	Marine shellfish propagation/ Resource assessment/ Ecological monitoring	2012/2/12 – 2012/3/11 (28 days) 2012/6/3 – 2012/8/19 (78 days) 2013/1/5 – 2013/3/3 (58 days)	2013/5/11 – 2013/6/23 (44 days) 2013/9/15 – 2013/10/6 (22 days) 2013/11/3 – 2013/12/11 (39 days)	2014/10/4 –2014/10/18 (15 days)	285
Mr Satoshi Nagashima	Resource assessment/ Ecological monitoring	2013/2/2 – 2013/3/3 (30 days)			30
Mr. Motoki Fujii	Fishing effort diversification	2012/11/10 – 2012/12/24 (45 days)	2013/5/18 – 2013/7/1 (45 days) 2013/10/19 – 2013/12/5 (48 days) 2014/2/1 – 2014/2/12 (12 days)	2014/10/4 –2014/10/18 (15 days)	165
Mr. Kazuo Nishiyama	Participatory approaches I /Socio-economic survey/Logistics I	2012/3/28 – 2012/6/24 (89 days) 2012/8/27 – 2012/11/10 (76 days) 2013/2/10 – 2013/3/6 (25 days)	2013/6/15 – 2013/8/9 (56 days) 2014/1/22 – 2014/2/24 (34 days)	2014/8/21 –2014/8/2 (43 days) 2014/10/10-2014/10/26 (17 days)	340
Mr. Takuma Takayama	Participatory approaches II /Socio-economic survey/Logistics II		2013/10/19 – 2013/11/17 (30 days)	2014/8/1 – 2014/9/30 (30 days)	60
				Total	1645

GOVERNMENT OF THE REPUBLIC OF VANUATU

GOUVERNEMENT DE LA REPUBLIQUE DE VANUATU

FISHERIES DEPARTMENT
SÉRVICE DES PECHES
Private Mail Bag 9045/Sac
Postale Privé No. 9045,
Port Vila, VANUATU
Tel: 678 5333340

Date : *Tuesday, October 21, 2014* **Ref :**

Deed of Donation

To: The chief advisor of the Project for Promotion of Grace of the Seas for Coastal Villages in Vanuatu, Phase II

Attention: Dr. Akiya Seko

Dear Sir,

We are pleased to confirm that the Fisheries Department of Vanuatu had received the equipment from the Project for Promotion of Grace of the Seas for Coastal Villages in Vanuatu, Phase II and therefore would like to take this opportunity to express our uttermost gratitude for the donation.

We would like to assure you that the equipment and other valuable project assets here with us in Port Vila and those that are located at the project sites will be utilized appropriately and in accordance to purposes in which they are purchased for. We are optimistic that the equipment and tools will contribute significantly in promoting the lessons learnt from the Grace of the Sea project's CBCRM approach to other islands and provinces.

I thank you for your cooperation.

Yours sincerely,

VANUATU GOVERNMENT FISHERIES DEPARTMENT SERVICE DES PECHES

Mr. Graham Nimoho
Acting Director
Vanuatu Fisheries Department

List of equipment donated to Fisheries Department of Vanuatu

No	Equipment	Specification and Manufacturer	quantity	USD	JPY	VUV	Location	Delivery Date
1	GPS sonar	HDS-5Gen2	1		110,000		VFD	2012/4/6
2	Equipment for diving	regulator (TF), octopus, compass, BCD	2		251,790		VFD	2012/4/18
3	Data Logger (Depth, temperature)	(RBRduo T.D.)	1	2,720			VFD	2012/5/3
4	Laptop Computer	Toshiba 16 Inch, PK-NB16E	1			62,222	VFD	2012/6/21
5	FAD materials and fishing gear for the diamond back squid		3		1,268,302		VFD and community	2012/10/1
6	Laptop Computer	COMPAQ Q57 15.6 Inch	1			51,556	VFD	2012/10/31
6	FAD materials (rope, float)			11,836			VFD and community	2012/12/7
7	FAD materials (rope, float) and fish finder	Lowrance HSD-7		38,933			VFD	2013/3/22
8	Solar power generation system	solar panels, inverter, cable etc	1			234,000	Community	2013/6/8
9	Outboard engine	Mercury 5ML 2ST	1			120,000	Community	2013/10/7
10	Laser printer	laserjet Pro 200 M251NW Colour	2			70,000	VFD	2012/10/21
11	Solar power generation system and freezer	solar panels, inverter, cable, and freezer	2			1,754,000	Community	2013/6/26

22/10/2014

添付資料 3 ワークショップ・研修実施実績

No	Date	Title	Place	Number of participants	Target
1	2012/04	Preliminary Survey Workshop	Efate, Malekura and Aneityum	73	CBCRM or MPA committee members
2	2012/05	Training for the baseline survey	Efate, Malekura and Aneityum	19	CBCRM or MPA committee members
3		ID/OS training Workshop	VFD	about 20	VFD staffs
4	2012/08	Workshop for explanation of the result of Baseline survey	Efate, Malekura and Aneityum		CBCRM or MPA committee members
5	2012/11	the first FAD fishery management workshop (Construction and deployment)	Efate, Malekura and Aneityum	47	Fishfolk and MPA members
6	2013/1	Workshop for construction of sail assisted motorized canoe	Mangaliliu/Efate		Fishfolk and MPA members
7	2013/2	Workshop on the CBCRM planning	VFD		Local C/P
8	2013/3	Workshop for explanation of the result of CBCRM planning	Efate, Malekura and Aneityum	65	pupils corresponding to 6th grade
9	2013/5	the second FAD fishery management workshop (Trolling fishing)	Efate, Malekura and Aneityum		Fishfolk and MPA members
10	2013/5	Shell craft workshop	Aneityum		Community general
11	2013/7	Shell craft workshop	Malekura		Women's group
12	2013/06	training workshops on the data collection sheet for fishing activity	Efate, Malekura and Aneityum	about 30	pupils corresponding to 5th grade
13	2013/8	Training for fish café (cooking fish dish)	Aneichum	15	Community people selected by tourist committee
14	2013/10	the third FAD fishery management workshop (Drop line, bottom vertical line and diamond back squid line)	Efate, Malekura and Aneityum	70	Fishfolk and MPA members
15	2013/11	Presentation of the release and grow-out trial of trochus and green snails in Uripiv Island	URIPIV/Malekura		Community people
16	2013/12	Participation in the Fiji Locally Managed Marine Protected Area Network (FLAMMA) seminar	Suva, FIJI	Local CP x 3 CP x 1	Local counterparts and counterpart

17	2013/12	Presentation for the current situation of the green snails released by Phase 1 of the Project.	Mangaliliu		Community people
18	2014/02	the follow-up program for FAD fishery management	Efate, Malekura and Aneityum	65	Fishfolk and MPA members
19	2014/02	Workshop for shell polishing and marketing	Efate, Malekura and Aneityum	10	Women's group representatives
20	2014/02	the study tour to Malakula	Funafuti Library	5 from Aneityum and Efate+Cpx1	Local C/P
21	2014/02	Workshop on the CBCRM planning	VFD		Community
22	2014/03	Workshop for explanation of the result of CBCRM planning	Efate, Malekura and Aneityum		
23	2014/05	Workshop of the result of fishing activity data (catch)	Malekura and Aneityum	45	MPA members and community people
24	2014/07	Workshop for project evaluation	Efate, Malekura and Aneityum	32	Community people
25	2014/09	Workshop for CBCRM plan	VFD	7	MPA members and community people
26	2014/10	National Seminar on Community-based Coastal Resource Management	Port Vila	56	Community people and counterparts
27	2014/10	Regional Seminar on Community-based Coastal Resource Management	Port Vila	43	Participants from Tonga, Samoa, Solomon, Fiji, USP, SPC, community people and counterparts
28	2014/10	FAD experimental sea going practice workshop	Efate	8	Community people and counterparts

添付資料 4：カウンターパート配置実績（プロジェクト終了時）

	Name	Organization	Position (at the time of project completion)	Area in the Project
1	Mr. William Nabiti	VFD	Acting Director	Project Manager
2	Mr. Graham Nimoho	VFD	Manager, Fisheries Development and Capture Division	Project Coordinator / Fisheries Development and Extension
3	Mr. Sompert Gereva	VFD	Manager, Resource Assessment and Aquaculture Division	Project Coordinator / Marine Shellfish Propagation and Resource Assessment
5	Mr. George Amos	VFD	Fisheries Development Officer (Shefa Province)	Fisheries Development and Extension
6	Mr. Kevin Moris	VFD	Fisheries Development Officer (Malampa Province)	Fisheries Development and Extension
7	Mr. William Morris	VFD	Acting Fisheries Development Officer (Tafea Province)	Fisheries Development and Extension
8	Mr. Lency Dick	VFD	Senior Aquaculture Officer, Resource Assessment and Aquaculture Division	Marine Shellfish Propagation and Resource Assessment
9	Mr. Andrew William	VFD	Aquaculture Officer, Resource Assessment and Aquaculture Division	Marine Shellfish Propagation and Resource Assessment
10	Mr. Rotrick Tatuna	VFD	Hatchery Technician, Resource Assessment and Aquaculture Division	Marine Shellfish Propagation and Resource Assessment
11	Mr. Alsen Obed	VFD	Principal Fisheries Development Officer (North)	Fisheries Development and Extension
12	Mr. Bruce Robertson	VFD	Principal Fisheries Development Officer (South)	Fisheries Development and Extension

Note: VFD is “Vanuatu Fisheries Department”

The Promotion of the Grace of the Sea in Coastal Villages (Phase II)

HATCHERY OPERATION AND MANAGEMENT PLAN FOR 2014

---- Revised in December 2013 ----

Research Section, Vanuatu Fisheries Department

Introduction

This plan is prepared under the Vanuatu-JICA jointed “Project for the Promotion of the Grace of the Sea in Coastal Villages (Phase II)”. Although this plan is particularly designed based on the current hatchery condition at Vanuatu Fisheries Department (VFD), Port Vila as of December, 2013, it aims to provide a general idea in planning of shellfish hatchery operation and management. This plan does not make reference to staffing and finance in detail (including the number of staff as well as the availability of them, and the budget required for the hatchery work), as the primary focus of this plan is to provide technical and practical analysis. Those excluded factors could be also important aspects in planning. In addition, the hatchery must be strictly operated in accordance with the government strategy for fisheries development.

Summary

1.Spawning trial in gastropods will be conducted on green snail *Turbo marmoratus* in January 2014 together with the invited specialist (under negotiation).
2.Spawning trials in bivalve species will be conducted on *Tridacna maxima* in February 2014 and *Tridacna squamosa* in November 2014, both will be followed by *Trochus niloticus* spawning for developing polyculture technique.
3.The first spawning induction on *Tridacna gigas* will be tried in the summer months of 2014 together with well experienced specialists. Cancel seed production of *T.squamosa* if that of *T.gigas* is successful.
4.The present volume will be revised in December 2014 as the *“Hatchery Operation and Management Plan for 2015”*.

Hatchery management planning

Procedure regarding the hatchery management planning is shown in Fig.1. This flowchart indicates a general idea for planning. The detail of each article is discussed in the following sections.

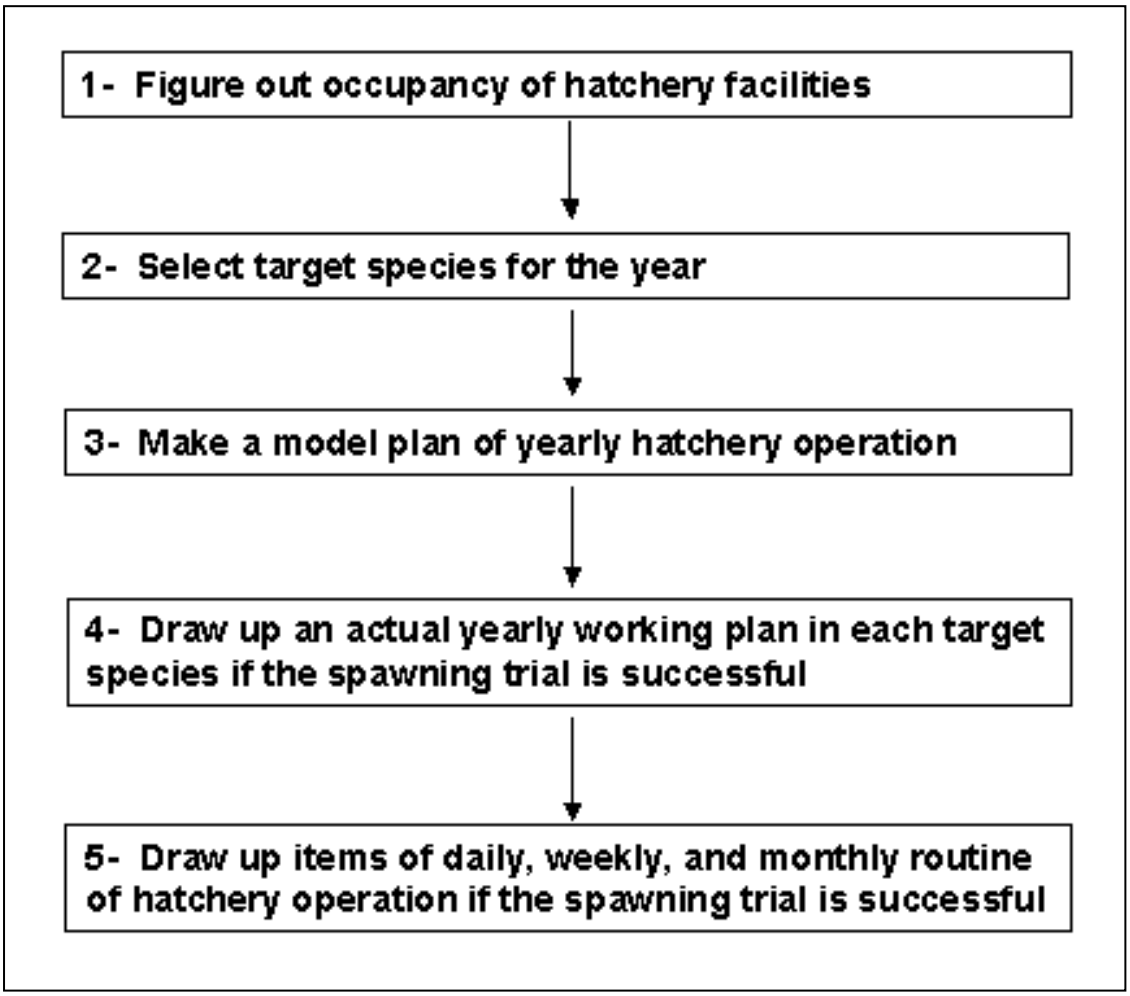


Fig.1. Procedure regarding the hatchery management planning

1. Figure out occupancy (current usage) of hatchery facilities

At the beginning, access an inventory of shellfish stock by tank to keep the record of exact number held at the hatchery. An example from November 2013 assessment is shown in Fig.2. In this assessment, all the stocked animals (shellfish species only) were counted. It is recommended that the inventory assessment should be done on a monthly basis. This is the most essential part in the management of hatchery. For reference, the arrangement and measurements of each tank is shown in Appendix 1.

Hatchery Inventory Form by Rearing Tank

Date: 27-Nov-13 Counted by Boys, Sone

TANK #	DOMINANT		SUB		Remarks
	Species	Number	Species	Number	
FRW-1	TM11	619	TM10	45	TS12:128(BS)+49, TR13:106, TRM:69, BTC:2, BTM:4
FRW-2	TR13	1,225	TS13	25	Polyculture experiment
FRW-3	TM11	492	TRM	29	TR13:90
FRW-4					Diatom culture for trochus
FRW-5	BMR				
FRW-6					TAP WATER DEPOSIT
CRW-1	TS12	492	TRM	32	TR13:11
CRW-2	TS12	607	TRM	38	TR13:52
CRW-3	TS12	714	TRM	26	TR13:60
CRW-4	TS12	1,230	TRM	22	TR13:1, Direct
CRW-5	TS12	459	TRM	48	TR13:25
CRW-6	TM11	633	TRM	24	Direct
CRW-7	TM12	913	TRM	22	TR13:215, Direct
CRW-8	TP				
CRW-9	MR				
CRW-10	MR				
CRW-11	MR				
CRW-12	MR				
CRW-13	TP				
CRW-14					Dried up
R-1					Dried up
R-2	TM11	649	TRM	37	TR13:41
R-3	TM11	242	TRM	20	TR13:7
VRW-0					Dried up
VRW-1	TM11	104	TRM	22	TR13:68, BTM:2, NIMO
VRW-2	MR				
VRW-3	MR				
FC1	BTP				
FC2	BTP				
FC3	TP				

Fig.2. Assessment of hatchery inventory as of November 2013

The inventory kept at each tank should be separately segregated by species. This information is also extremely fundamental to the hatchery management. Refer to Fig. 3 for further detail. Rules of batch identification are given in Appendix 2.

Hatchery Inventory Form by Species

Date: 27-Nov-13

Species	Batch ID	Year	Month	Age	E/A	Number	Size	Remarks
Greensnail	Out of stock							
Trochus	TRM	Mixed			A	320	5-10cm SD	All born in hatchery
	TR13	2013	Feb	9mos	A	1,901	1-3cm SD	Grow-out phase
Maxima	TM10	2010	Feb	3.8	A	45	4-7inch SL	Grow-out phase
	TM11	2011	Dec	2	A	2,739	3-8cm SL	Land nursery phase
	TM12	2012	Mar	1.7	A	913	2-5cm SL	Stock in CRW-7 only
Squamosa	TS12	2012	Oct	1.1	A	3,679	3-7cmSL	Land nursery phase
	TS13	2013	Jan	10mos	A	25	1-3cmSL	Land nursery phase
Crocea	BTC	Wild			A	2		Broodstock
Squamosa	BTS	Wild			A	0		Broodstock
Teardrop	BTdM	Wild			A	0		Broodstock
Maxima	BTM	Wild			A	6		Broodstock

E/A: Estimate / Actual

Fig.3. Species-segregated inventory of hatchery as of November 2013

Above Fig.3 simply shows how many individuals of each species are currently reared in the hatchery.

According to the Fig.3, the batches of *T. maxima* (TM11) and *T. squamosa* (TS12) became dominant in the hatchery as of 27 November 2013. Although the TM11 batch is difficult to sell out to aquarium markets because of its dull mantle colors, it can be harvested for food stuff. Further research should be needed in domestic marketing of cultured giant clams in Vanuatu. The TS12 batch must be thinned out because it occupies many tanks (5 CRW tanks) at the moment. It can be sold to the aquarium markets or transferred to the ocean nurseries for growout. More than 100 pieces of blue-spotted specimens have already selected from the TS12 batch then being kept as a reserve broodstock in the FRW-1 tank. Adult trochus (TRM) should be removed out from rearing tanks for the reason that they may compete with young trochus to secure their food. Some lots of them (TRM) can be released to the reefs for reseeding purposes. The young trochus (TR13) must be spread out to or relocated among giant clam rearing tanks as grazers but careful observation should be needed on them to prevent starvation from shortage of food.

2. Select target species for the year

2.1. Target species

Possible target shellfish species for seed production are listed in Table 1. Production of giant clams *Tridacna* spp. is mainly aimed to sell as aquarium pets (except *Hippopus hippopus*), while commercial gastropods, such as green snail, *Turbo marmoratus* and trochus, *Trochus niloticus*, are cultured for the purpose of restocking of the depleted resources. Pearl oysters and edible oysters have not been examined. Other locally edible bivalves and gastropods seem to have no necessity for artificial breeding in Vanuatu at this moment.

Table1. Possible target shellfish species for seed production in Vanuatu

Species	Stock status	Purposes of production
Tridacna maxima	Abundant	Aquarium trade
T. noea	Abundant	Aquarium trade (Teardrop Maxima)
T. crocea	Abundant	Aquarium trade
T. squamosa	Over-fished	Aquarium trade (Blue-spotted Squamosa) Tourist attraction, Restocking, Food
T. gigas	Reintroduced	Tourist attraction, Aquarium trade, Shell, Food
Hippopus hippopus	Over-fished	Restocking, Food
Turbo marmoratus	Heavily depleted	Restocking
Trochus niloticus	Depleted	Restocking, Hatchery tank cleaner

Note: Compiled results of several surveys carried out during the period of the project phase 1.

Considering the inventories' situation (see Fig.3), green snail will be the main concern for the 2014 seed production. Trochus might be added to the target species list to raise the stock in the hatchery aiming not only tank cleaners but also seeds for release. Despite high demands in the aquarium market, the VFD could not produce blue maximas in the last two trials. It is strongly recommended that only quality broodstock must be used for spawning inducement. Practically they can be selected from the present hatchery stock such as artificially bred F1 (TM10-blue) and wild individuals (purple-blue). If the VFD has enough time to deal with other species, the first spawning induction of *T.gigas* is recommended to be tried in the summer months (October - December) of 2014. Well-experienced giant clam specialists should be called from the region, i.e., Solomon Islands, Fiji, Tonga and Australia. If spawning occurs successfully in *T.gigas* at first, the following *T.squamosa*'s spawning program would be cancelled. Target species selection for the year should be compatible with the VFD's yearly business plan.

2.2. Set a target number of the production in each species

Proper stocking densities are given in Fig.4. As the seawater supply is limited at the hatchery, tanks are not able to use in full. Refer the tank capacities carefully then decide the target production number for each species. The current seawater supply system is shown in Appendix 3 for further information.

Name #	Gross Vol. (t)	Net Vol. (t)	Btm Area (m2)	Proper Stock Density per Tank
FRW-1	5.2	4.5	7.5	50,000 giant clam spats @ first harvest 20,000 giant clam juveniles of 1 cm SL 5,000 giant clam juveniles of 2cm SL 5,000 trochus juveniles @ 1 year old
FRW-2				
FRW-3				
FRW-4				
FRW-5				
FRW-6				
CRW-1	2.2	1.8	3.6	20,000 giant clam spats @ first harvest 10,000 giant clam juveniles of 1 cm SL 2,000 giant clam spats of 2 cm SL
CRW-2				
CRW-3				
CRW-4				
CRW-5				
CRW-6				
CRW-7				
CRW-8				
R-1	6.2	5.8	9.0	10,000 green snail spats @ first harvest
R-2				5,000 green snail juveniles @ 1/2 year old
R-3				
CRW-13	5.6	4.5	7.5	2,000 green snail juveniles @ 2 years old
CRW-14				
VRW-1	2.1	1.8	3.0	3,000 green snail juveniles @ 1 year old
VRW-2				
VRW-3				

Note: Red tanks were occupied for other purposes in November 2013.

Fig.4. Production capacity by rearing tank at the hatchery.

Target species and those numbers for 2014 are proposed in Table 2. Target numbers for *T.maxima* and *T.squamosa* are 5,000 each at harvest as aquarium pets. No target number is set on *T.gigas* because it will be done as an experiment. Trochus spawning trials are proposed twice a year. 5,000 trochus yearlings will be polycultured with giant clams. Though the current hatchery has a holding capacity of 3,000 green snail yearlings, 2,000 individuals will be affordable for the staff.

Table 2. Proposed target species for the 2014 seed production

ID	Proposed target species	Starting time	Target number
TM14	Elongate giant clam: *T.maxima*	February	5,000
TS14	Fluted giant clam: *Tridacna squamosa*	November	5,000
TG14	True giant clam: *Tridacna gigas*	October - December	Experiment only
TR14-1	Trochus: *Trochus niloticus*	February	5,000
TR14-2	Trochus: *Trochus niloticus*	November	5,000
TM14	Green snail: *Turbo marmoratus*	January	2,000

3. Make a model plan of yearly hatchery operation

3.1. Standard schedule for shellfish seed production in Vanuatu

Seed production of marine shellfish species must be set as a seasonal activity with a yearly cycle. This cycle consists of three phases, namely preparation phase, spawning trial phase and intermediate culture (land nursery) phase. Spawning trials should be conducted in a spawning season from September to March in the following year, when marine animals are naturally active in reproduction in the Southern Hemisphere. Further gonadal studies must be required for the target species in Vanuatu.

3.1.1. Preparation phase

Prior to seed production, prepare spawning tanks, larval settlement/culture tanks and other hatchery equipment for the season. If these tanks still hold animals, remove all animals out to other tanks, then dry up those empty tanks for a while. At the same time, enough number of broodstock are accumulated and conditioned for spawning induction.

3.1.2. Spawning trial phase

Start with spawning induction, followed by larval and post-larval culture. The post-larval culture will end when spats become visible and can be counted (= first count).

3.1.3. Intermediate culture (land nursery) phase

Juvenile intermediate culture will usually start after the first count. This phase finishes at harvest as seeds for releasing or farming are taken place. In case of giant clams, this phase is a transition phase to the ocean culture. Since the VFD has no ocean culture facilities, it must be careful about the overcrowding due to prolonged intermediate culture in the hatchery. Harvest from the booked larval settlement tanks should be given priority and completed before the next spawning season, otherwise the following seed production cannot be started. Giant clams will be harvested (= thinned out) by selling to aquarium fish exporters during this period.

3.1.4. Grow-out culture

Over-aged specimens and broodstock specimens (artificially bred or wild) may be held for demonstration. Such long-term land based grow-out cultures sometimes become very hazardous to animals. Number of them must be kept at the minimum.

3.2. Proposed yearly hatchery operation plan for 2014

Yearly schedule of the hatchery work for 2014 is proposed in Fig.5. This schedule is prepared by species/batches. Red bars indicate the timing of spawning trial. Yellow bars show the post-larval culture period. Blue bars indicate the intermediate (land-nursery) culture period. Green bars show the grow-out culture period.

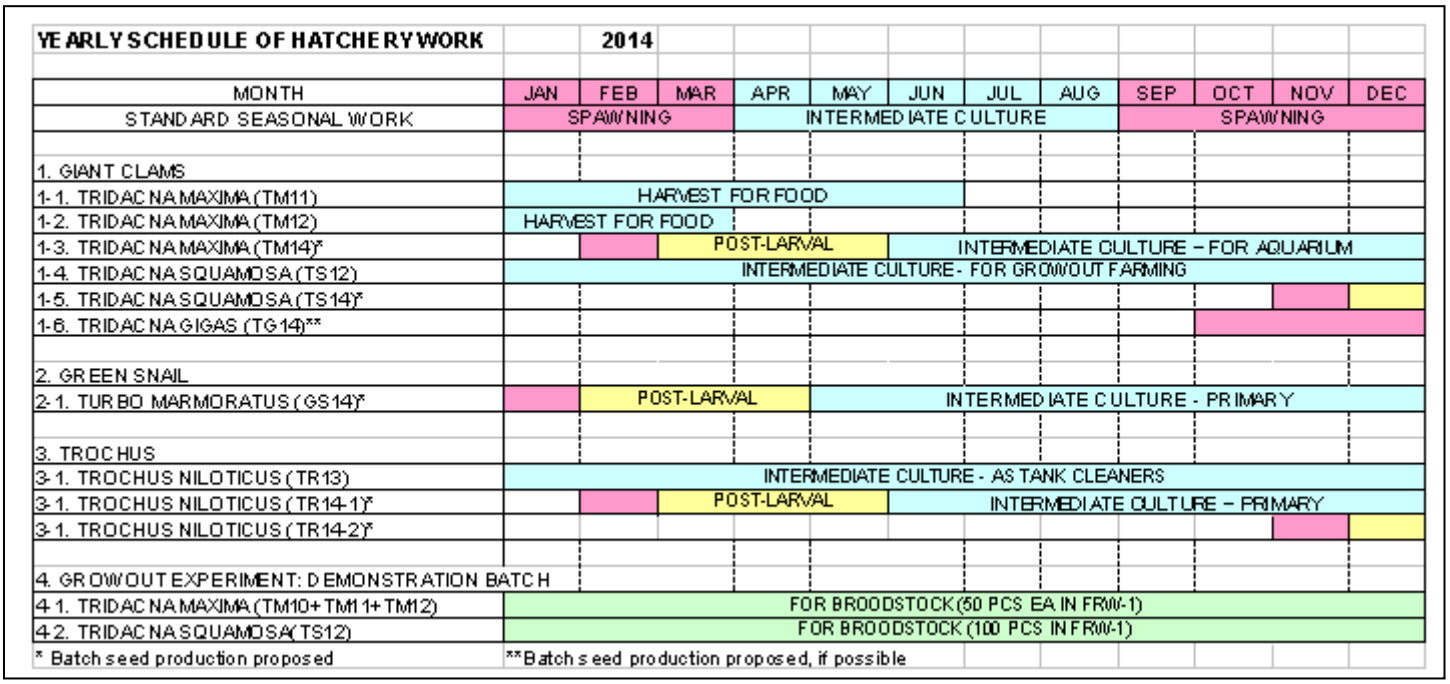


Fig.5. Proposed yearly schedule of the hatchery work for 2014.

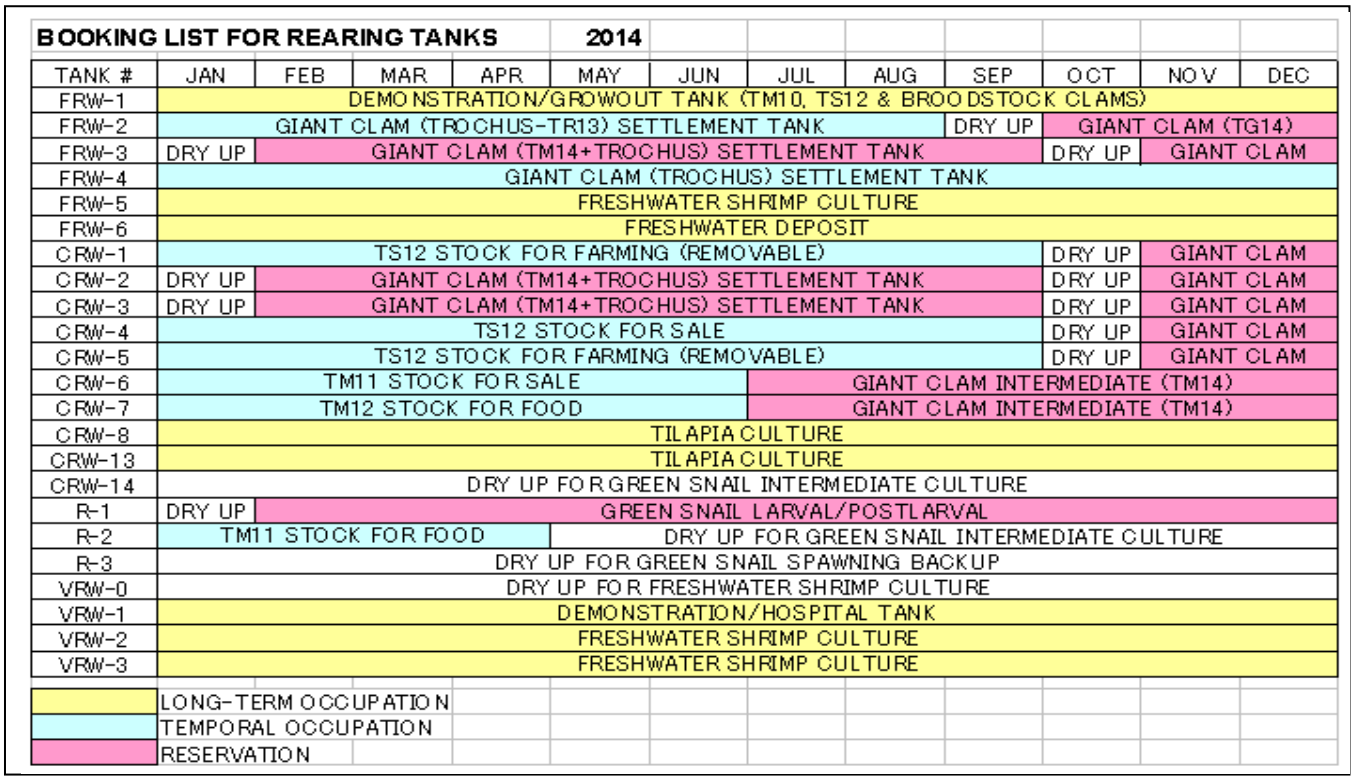
Spawning trials are planned in five species for 2014 (see Table 3). It will be a full scale production for the current hatchery. To avoid overwork among the staff, abide by the production target number given in Table 2. Giant clam A, *T.maxima* will be produced for the aquarium pet trade. Giant clam B, *T.squamosa* will be seeds for farming and restocking. Giant clam C, *T.gigas* will be produced as an experiment. Green snail production is planned as staff training for developing seed production technology on the species. Trochus will be produced as future restocking seeds.

Table 3. Production purposes of the target species for 2014 seed production

Proposed target species	Production purposes
Giant clam A: *Tridacna maxima*	Aquarium trades (VFD's own program)
Giant clam B: *Tridacna squamosa*	Seeds for farming (extension)
Giant clam C: *Tridacna gigas*	Experiment only
Trochus: *Trochus niloticus*	Seeds for restocking
Green snail: *Turbo marmoratus*	Seeds for restocking after VFD's staff training

3.3. Rearing tank reservation

According to the latest inventories, a rearing tank booking list is prepared as shown in Fig.6. For the spawning trial 2014, the tanks with red marked bars must be reserved for the corresponding periods. Since the VFD is constructing a new hatchery for freshwater species such as freshwater prawns and tilapias, this booking list is tentative. When the construction is completed, some functions will be transferred to the new facility, together with live animals. In that case, the present hatchery will have more room for seed production on marine shellfish species.



BOOKING LIST FOR REARING TANKS	2014											
TANK #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FRW-1	DEMONSTRATION/GROWOUT TANK (TM10, TS12 & BROODSTOCK CLAMS)											
FRW-2	GIANT CLAM (TROCHUS-TR13) SETTLEMENT TANK								DRY UP	GIANT CLAM (TG14)		
FRW-3	DRY UP	GIANT CLAM (TM14+TROCHUS) SETTLEMENT TANK								DRY UP	GIANT CLAM	
FRW-4	GIANT CLAM (TROCHUS) SETTLEMENT TANK											
FRW-5	FRESHWATER SHRIMP CULTURE											
FRW-6	FRESHWATER DEPOSIT											
CRW-1	TS12 STOCK FOR FARMING (REMOVABLE)									DRY UP	GIANT CLAM	
CRW-2	DRY UP	GIANT CLAM (TM14+TROCHUS) SETTLEMENT TANK								DRY UP	GIANT CLAM	
CRW-3	DRY UP	GIANT CLAM (TM14+TROCHUS) SETTLEMENT TANK								DRY UP	GIANT CLAM	
CRW-4	TS12 STOCK FOR SALE									DRY UP	GIANT CLAM	
CRW-5	TS12 STOCK FOR FARMING (REMOVABLE)									DRY UP	GIANT CLAM	
CRW-6	TM11 STOCK FOR SALE						GIANT CLAM INTERMEDIATE (TM14)					
CRW-7	TM12 STOCK FOR FOOD						GIANT CLAM INTERMEDIATE (TM14)					
CRW-8	TILAPIA CULTURE											
CRW-13	TILAPIA CULTURE											
CRW-14	DRY UP FOR GREEN SNAIL INTERMEDIATE CULTURE											
R-1	DRY UP	GREEN SNAIL LARVAL/POSTLARVAL										
R-2	TM11 STOCK FOR FOOD				DRY UP FOR GREEN SNAIL INTERMEDIATE CULTURE							
R-3	DRY UP FOR GREEN SNAIL SPAWNING BACKUP											
VRW-0	DRY UP FOR FRESHWATER SHRIMP CULTURE											
VRW-1	DEMONSTRATION/HOSPITAL TANK											
VRW-2	FRESHWATER SHRIMP CULTURE											
VRW-3	FRESHWATER SHRIMP CULTURE											

	LONG-TERM OCCUPATION
	TEMPORAL OCCUPATION
	RESERVATION

Fig.6. Proposed usage of rearing tanks in 2014

3.4. Revision of the plan

The present volume should be revised in December 2014 as the *"Hatchery Operation and Management Plan for 2015"*. Thus the new version will be prepared by the Research Section of the VFD every December, according to protocol described in this volume.

4. Draw up an actual yearly working plan in each target species

If a spawning trial is successfully completed, it is time to draw up an actual yearly working plan for seed production of each species. The plans must be summarized on the same time table to balance each workload. These can be worked by referring to a series of seed production manuals prepared during the JICA Project Phase 1 (see Table 4).

Table 4. List of seed production manuals prepared for the VFD hatchery

Species	Title of Manual
Giant clams	Giant Clam Seed Production Manual; Targeting for the Aquarium Pets Market, Second Edition, October 2008
Green snail	Seed Production Manual of Green Snail, *Turbo marmoratus,* February 2009
Trochus	Some useful outside manuals are available, *i.e*. Trochus Hatchery Seeding Techniques, - A Practical Manual, ACIAR 2002

5. Draw up items of daily, weekly, and monthly routine for hatchery operation

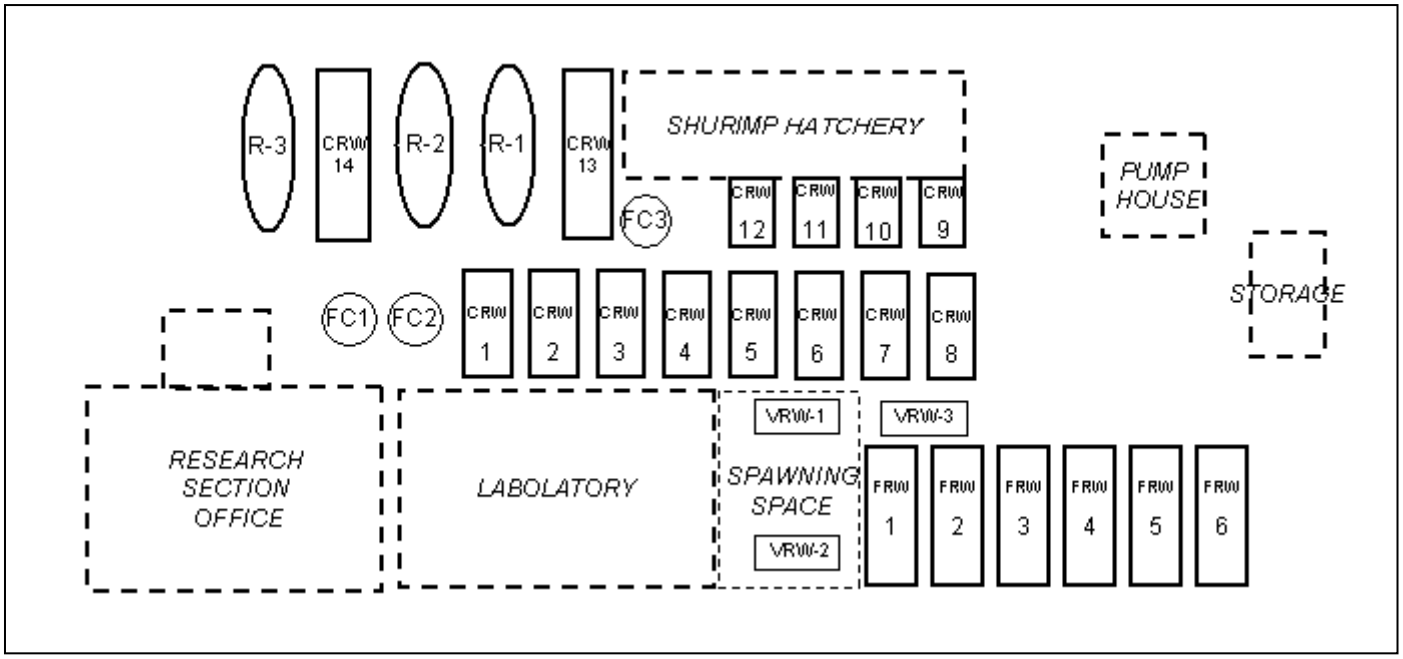
This procedure is almost same as above. If spawning trials are successful, it is time to draw up contents of daily, weekly and monthly routine for the whole hatchery operation. Most important thing here is not to draw up routine activities itself, but to practice working operational procedures. It is required to decide who is taking responsibility for routine activities. Major activities are presented as follows:

--- *Monthly* ---
*Inventory
*Measurement and count of each batch (monitoring on growth and survival)
*Maintenance of the water supply system

--- *Weekly* ---
*Replacement of filter bags during larval/post-larval culture periods

--- *Daily* ---
*Record of water temperature
*Observation of animal health (remove dead bodies and inspect the cause of death)
*Check of level, flow rate and quality of rearing water as well as aeration
*Feeding (just in case)

Appendix 1. Rearing tank arrangement and measurements



1-1. Layout of rearing tanks and facilities at the VFD's hatchery

Hatchery Tank Measurements

Name #	Made	Type	Gross Vol. (t)	Net Vol. (t)	Length (m)	Width (m)	Depth (m)	Installer
FRW-1	FRP	EKT-5.2/Earth-Japan Raceway	5.2	4.5	5.0	1.5	0.7	JICA 2006
FRW-2								
FRW-3								
FRW-4								
FRW-5								
FRW-6								
CRW-1	Concrete	Raceway	2.2	1.8	3.0	1.2	0.6	ACIAR 2000's
CRW-2								
CRW-3								
CRW-4								
CRW-5								
CRW-6								
CRW-7								
CRW-8								
CRW-9	Concrete	Raceway	1.2	1.0	2.0	1.0	0.6	VFD 2002
CRW-10								
CRW-11								
CRW-12								
CRW-13	Concrete	Raceway	5.6	4.5	5.0	1.5	0.7	1980's
CRW-14								
R-1	FRP	ERT-6.2/Earth-Japan Circular	6.2	5.8	5.0	2.0	0.7	JICA 2006
R-2								FAO 1989
R-3								
VRW-0	FRP	FGV-Local Raceway	2.1	1.8	3.0	1.0	0.7	JICA 2007
VRW-1								
VRW-2								
VRW-3								
Total			91.8	79.0				

1-2. Measurements of the present hatchery tanks

Appendix 2. Animal Identification Rules

2-1. Acronyms and Abbreviations

Species ID	Species
TM	*Tridacna maxima*
TdM	Teardrop Maxima= *Tridacna noae*
TS	*Tridacna squamosa*
TC	*Tridacna crocea*
TG	*Tridacna gigas*
HH	*Hippopus hippopus*
GS	Green Snail= *Turbo marmoratus*
TR	Trochus (shell)= *Trochus niloticus*
TP	Tilapia= *Oreochromis niloticus*
MR	Freshwater Prawn= *Macrobrachium rosenbergii*
B**	Broodstock: B + Species ID
**M	Mixed batch: Species ID + M

2-2. Batch ID

Batch ID is a combination of the species ID and the spawning year (indicated by the last two figures, see Example 1). If the batches were obtained from other spawning trials, add the batch number after the spawning year (see Example 2).

Example 1

TM09 means the batch of *Tridacna maxima* spawned in 2009.

Example 2

TS07－2 means the 2nd batch of *Tridacna squamosa* spawned in 2007.

2-3. Other IDs

The B mark in front of the ID means adult animals that usually come from wild. If the batches of the same species are mixed up with other age groups, put the M mark after the ID instead of the year.

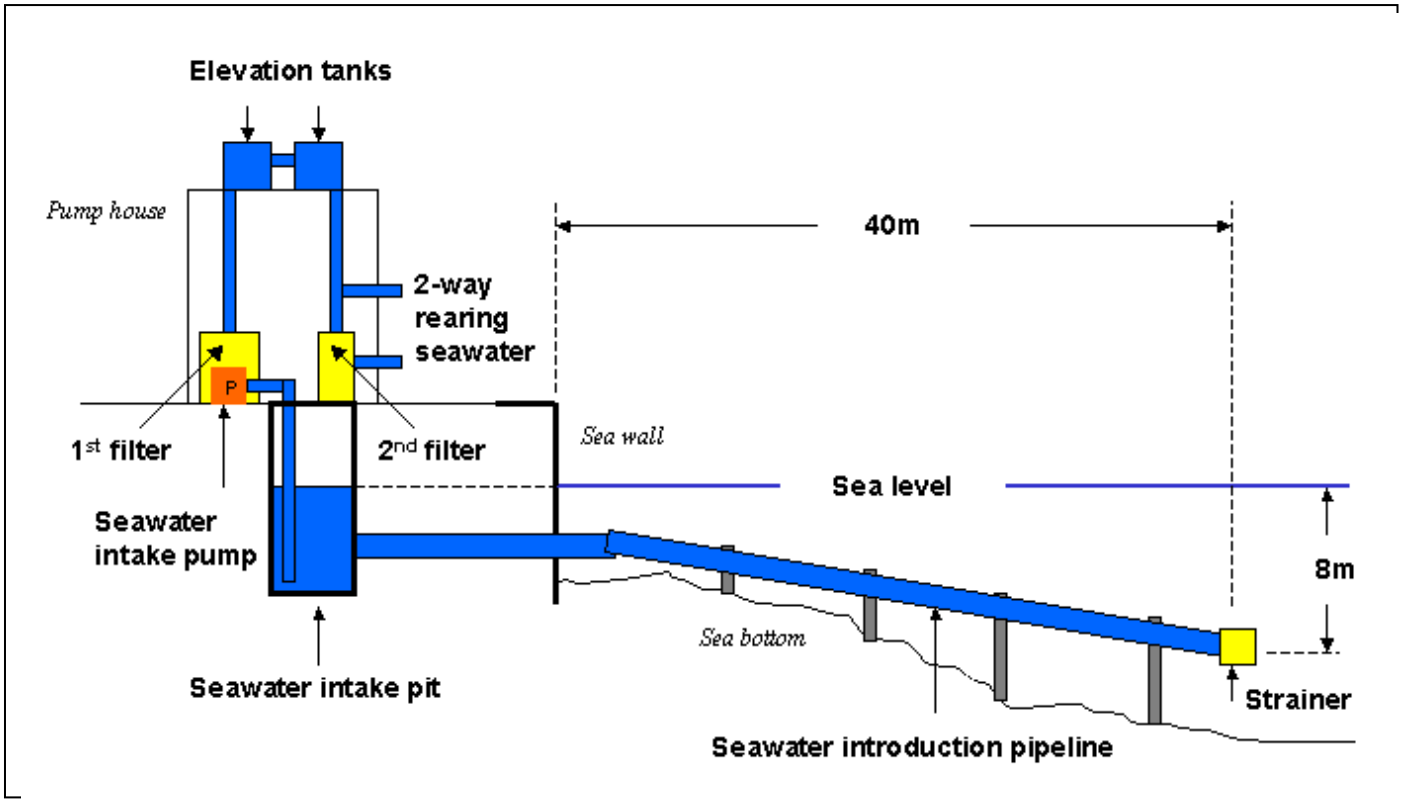
Example 3

BTS means a broodstock clam of *Tridacna squamosa*

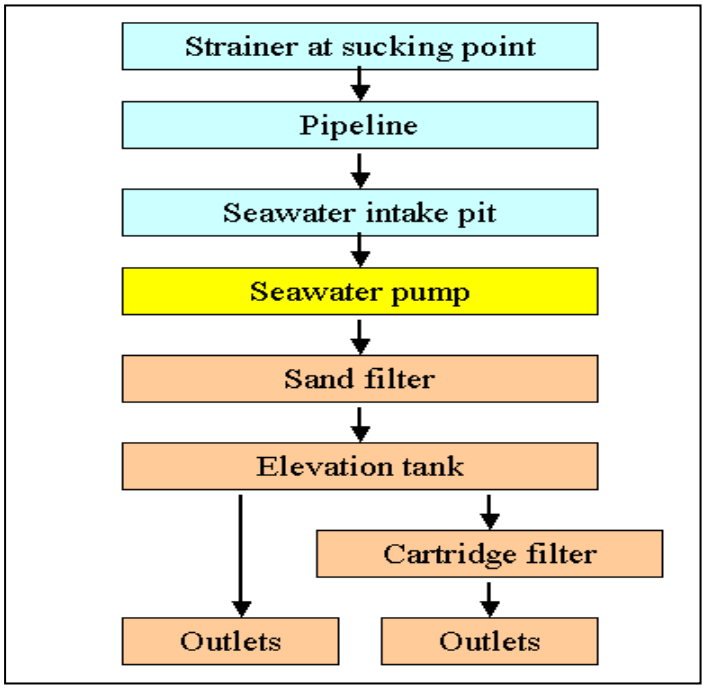
Example 4

TRM means the mixed batch of trochus

Appendix 3. Seawater supply system



3-1 Lateral view of water intake system of the VFD's hatchery



3-2 Diagram of the seawater intake system

The Project for Promotion of Grace of the Sea in Coastal villages in Vanuatu

TEMPORAL PUMP OPERATION MANUAL

Annex
付属資料: 水産局ハッチェリーポンプ運転マニュアル

June 2013

INTRODUCTION

Fisheries Department's hatchery faces a serious problem in supplying of quality seawater to reared marine species. Everyday salinity of rearing seawater varies regularly between 23-25 and 35-37 ppt. It was not known when the problem had started but so far the rearing seawater frequently changes its salinity in corresponding to tidal cycle, not to rain fall. By periodical monitoring, it was found that the salinity dropped below 25 ppt during a period from the lowest tide to about 2 hours before the highest tide. This lower end will be lethal to some animals. To avoid physiological problems among the animals, it had better to stop supplying of seawater during the low salinity period. It is of course needed to trace and solve the problem in the current water intake system, especially in the seawater introduction system.

PROCEDURE

This is a temporal measure against the current problem.

Step1 Get a tide chart

To manage the quality of seawater, tides of Port Vila harbor must be known.

Step2 Learn how to use a refract-meter

A refract meter is used for measuring salinity of seawater. Adjust 0 before use (=Calibration). Clean thoroughly after every measurement with freshwater.

Step3 Learn the present seawater systems

The present seawater intake/supply system must be well understood.

Step 4 Pump operation for a stop

At 1 hour before the lowest tide

1) Close the main water delivery valve to fill up the elevated seawater storage tanks with strong strength seawater (Pic1). When the tanks become full, the water will overflow (Pic2,3). If salinity of the delivered seawater had been dropped below 30ppt, skip this step. In that case, the pump should be stopped as soon as possible.

Pic1 The main valve (w/ blue handle) is located outside the pump house.

Pic2 4” drain pipe from the elevated water storage tanks appears in the center of this picture taken at the water discharge pit.

Pic3 Discharge of overflowed water. Now the tanks at the top of the pump house become full.

2) Turn off the power switch for PUMP-1 (Pic4). Immediately close the stop-valve of the pump (Pic5).

Pic4 This power switch is located on the control panel.

Pic5 Close the stop valve for the seawater intake pump.

Pic6 Do not remove the plastic cover to protect the pump from drips of seawater.

3) Open the main valve again (Pic7) to supply a small seawater to tanks (Pic8) for maintaining the water level.

Pic7 Adjust delivery of rearing seawater by seeing water flows at the inlets of the tanks.

Pic8 Flow rates depend on weather.

Pic9 For example, seawater can be supplied for more than 3-hours at this flow-rate. If water supplies at the nomal flow-rate, the storage tanks become empty within 1 hour.

Let seawater run until the storage tanks become empty.

Step 5 Pump operation for a restart

At 2 hour before the highest tide

1) Restart the pump while backwash the sand filter (Pic10-12).

Pic10 Select the backwashing mode in the sand filter controller.

Pic11 Fully open the stop valve for the pump.

Pic12 Turn on the switch for the pump.

2) For replacing seawater in the water intake pit, backwash the sand filter then check salinity of newly introduced fresh seawater (Pic13 &14).

Pic13 Wash the filter material for a while (more than 10 minutes). Discharge muddy water into drainage.

Pic14 Check salinity of the seawater at the sand filter drain pipe.

If salinity is,

less than 27 ppt: Stop the pump and wait for another half an hour. Then repeat the same procedure.

27-29 ppt: Flow slowly until salinity recovers over 29 ppt.

More than 29 ppt: Go back to normal operation with proper flow rates.

NEVER fill up the empty tank with low salinity seawater.

3) Resume the operation (Pic15-17).

Pic15 Once stop the pump.

Pic16 Select the filtering mode in the sand filter controller. Then start the pump.

Pic17 Adjust the main delivery valve for the normal operation.

Go back to Step 4 after high tide.

Step 6 Pump operation for the night

Pump can be run after working hours by reducing water flow-rate.

1) Before go back home, just fully open some inlet valves for the tank that has no animals. For example the R-1 fiber glass tank is now available (Pic18). No need to adjust other inlet valves. The following day just close the valve to raise other inlet flows.

Pic18 The main valve (w/ blue handle) is located outside the pump house.

Management Guideline of Fish Aggregation Device (FAD) Fishery
North-West Efate (Mangaliliu, Lelepa, Tasiriki and Sunae)

The Management Committee of Fish Aggregation Device (FAD) Fishery (hereinafter referred to as "the Committee") at North-West Efate Area, comprising four communities, Managliliu, Lelepa, Tasiriki and Sunae, maintains the following guideline to manage and maintain the FADs in good condition. The committee activities under this guideline will be carried out as a program of the Project for Promotion of Grace of the Seas in Coastal Villages in Vanuatu Phase 2 (hereinafter referred to as "the Project"), implemented by Vanuatu Fisheries Department and IC Net Limited, a Japan-based development consulting firm.

1. Regular FAD Maintenance

The Committee members regularly conduct the following activities to maintain the FADs in good condition.

a. Daily maintenance:
- Remove the objects (plastics, etc.) from FADs
- Check the main ropes

b. Monthly maintenance:
- Check the buoys, swivels, etc.

c. Maintenance in 6 months:
- Check the appendages, sand bottles, and tarpaulins

2. Funding for FAD Management

The members agreed that the following fees will be collected and paid by FAD users for the maintenance of the FADs as follows:

a. User Fee for Commercial Purposes

The Committee collects a user fee from any persons and organizations which utilize the FADs for any commercial purposes such as charter and gaming fishing, domestic and international fishing competitions, etc. The standard rate of commercial users is 50,000 vatu per year.

b. Communities users Fee

The members agreed that community user fees for the communities of Mangaliliu, Lelepa, Tasiriki, and Suane will be paid as follow:

(i) Fishermen in each communities is oblige to pay an annual fee of 500 vatu per year to their respective community fishermen association

(ii) Fishermen association of Lelepa, Magaliliu, Tasiriki and Sunae to pay an annual FAD user fee of 5000VT per year on behalf of its members to the committee.

IK GW

c. Access Fees from Communities of Other Areas

The Committee collects an access fee from any boats in other communities and areas, who use the FADs for fishing. The standard rate of access fees is 5,000 vatu per boat per year.

3. Rules of FAD Uses

The Committee members keep the following rules for using the FADs.

a. Admission of FAD uses

- Only boats registered to the Committee will be allowed to conduct their fishing activities around the FADs.
- Any boats from other communities, who intend to use the FADs for any purposes, have to pay access fee to the Committee in advance.

b. Restriction of Fishing Gears

- Spear-gun and gill-net fishing are not allowed around the FADs.
- Trolling fishing has to be conducted 20 meters away from the FADs.
- Drop line for bottom fish, such as Poulet (snapper), has to conducted 300meters away from the FADs.

c. Avoidance of Any Damages to FADs

- Any boats and ships are not allowed to moor the FADs.
- Any activities damaging the FADs are not allowed.

4. Regular Meeting

The Committee holds following meetings regularly to share the experiences of FAD fishing and maintenance and discuss the future FAD management.

a. Community Meeting

Each community group, Lelema (Managaliliu and Lelepa) and Moso (Tasiriki and Sunae), hold a meeting regularly, for example twice in month.

b. General Meeting

The Committee will hold a general meeting, when it has to discuss an important agenda with all committee members. The representatives of Fisheries Department and Shefa Fisherfolk Association also attend the meeting as supervisors.

c. Annual General Meeting

The Committee will hold an annual general meeting.

5. Fishing Activity Record

The Committee members keep fishing activity records to discuss and improve their fishing activities with the FADs. The following items will be recorded daily.

- Fishing places
- Type of fishing gears / methods
- Fish catch by fish kinds
- Expense of fishing activities (fuel, ice, etc.), and etc.

6. Public Information

The Committee makes effort to inform the FAD location and regulation to the public by any media, such as radio, newspaper, and television, and to other nearby communities by the awareness activities, such as attendance of community meetings and special lectures in local schools.

7. Safety Issue

a. The Committee will collect weather forecast information from the Meteo Office to keep safety on FAD fishing and maintenance activities.

b. The committee will encourage safety standard for fishermen all times.

For the Project

(20/12/2012)

Mr. Graham Nimoho
Manager of Coastal Fisheries
Development Division
Vanuatu Fisheries Department

Dr. Akiya Seko
Leader of the Project
IC Net Limited

For the Committee

Mr. Ismael Kaltuk
Chairman
Management Committee of FAD Fishery

Member List of Management Committee of Fish Aggregation Device Fishery
North-West Efate (Mangaliliu, Lelepa, Tasiriki, and Sunae)

	Name	Community	Position in Committee
1	Mr. Ismael Kaltuk	Mangaliliu	Chairman
2	Mr. Terry Fictor	Tasiriki	Vice Chairman
3	Mr. Abel John	Sunae	Secretary
4	Mr. Manu Lalo	Lelepa	Vice Secretary
5	Mr. Lesly Kalruk	Mangaliliu	Treasurer
6	Mr. Jerry Lor	Mangaliliu	Vice Treasurer
7	Mr. Joe Kalotiti	Managaliliu	Member
8	Mr. Patrick Kaloruk	Lelepa	Member
9	Mr. Madsen Kalotiti	Lelepa	Member
10	Mr. Derek French	Sunae	Member
11	Mr. Lapsaru Kaloruk	Mangaliliu	Member
12	Mr. Max Kalsong	Lelepa	Member
13	Mr. Harry Kaltamat	Mangaliliu	Member
14	Mr. Kalsong John	Tasiriki	Member

IA BN

Member List of FAD Management Committee in North-West Efate

(22th November 2012)

Project for Promotion of Grace of the Seas in Coastal Villages, Phase 2

			
Terry Fictor	Joe Kalotiti	Patrick Kaloruk	Madsen Kalotiti
Tasiriki	Mangaliliu	Lelepa	Lelepa
542-7075			710-2885
Vice Chairman			

			
Jerry Lor	Derek French	Lapsaru Kaloruk	Ismael Kaltuk
Mangaliliu	Sunae	Mangaliliu	Mangaliliu
560-0064	775-7772	777-2372	
Vice Treasurer			Chairman

			
Max Kalsong	Aber John	Lesly Kalruk	Manu Kalo
Lelepa	Sunae	Mangaliliu	Lelepa
710-2892	777-9010	779-5786	547-9285
	Secretary	Treasurer	Vice Secretary

IK 6N

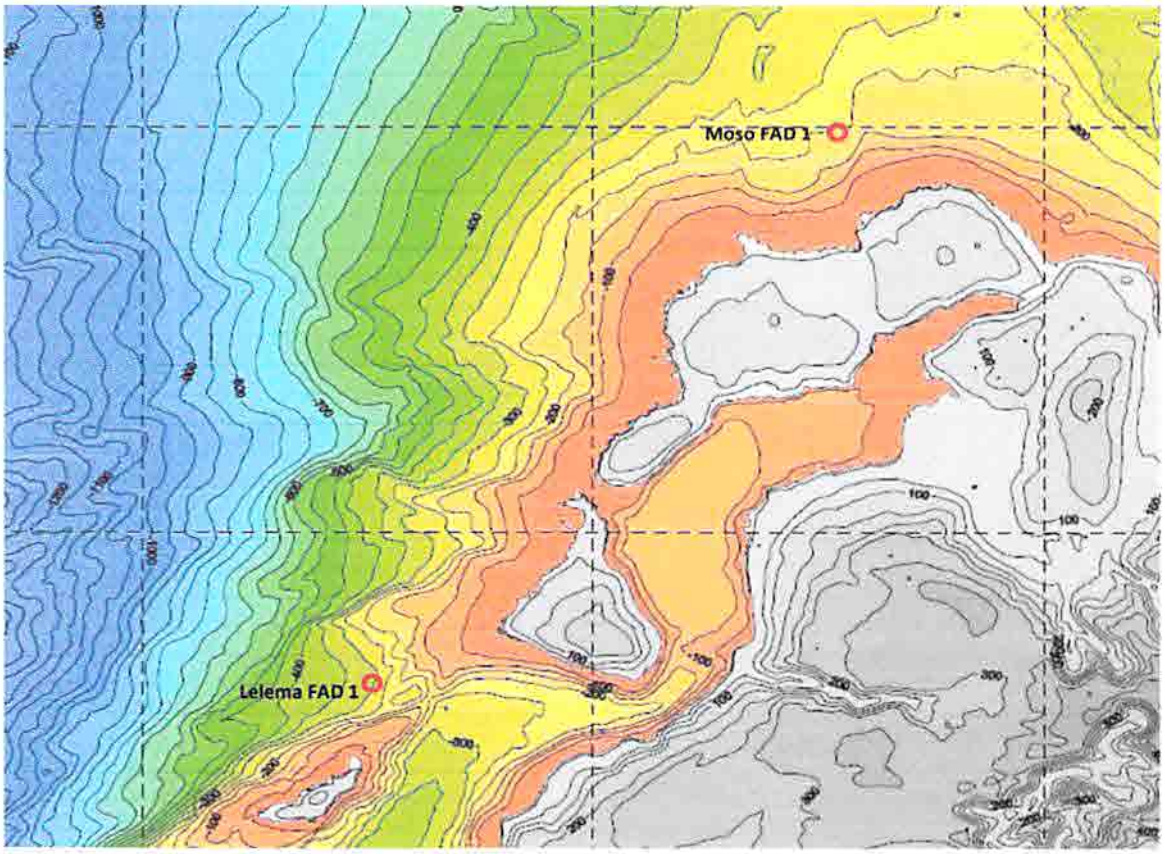
			
Harry Kalo	Kalsong John		
Mangaliliu	Tasiriki		
777-2021	771-9947 544-6516		

IK ON

Information on FADs in NW Efate

(Nov 2012)

FAD ID	Coordinate (Anchor position)	Coordinate (Flag position)	Depth of Water	Distance	Date of Deployment
Lelema FAD 1	S 17° 36. 823 E168° 09. 752	S 17° 37. 030 E168° 09. 965	314m	2.5NM NW off Mangaliliu landing site	2012/Nov/21
Moso FAD 1	S 17° 29. 797 E168° 15. 679	S 17° 29. 811 E168° 15. 544	189m	3NM N off Sandy beach, offshore-side, middle of Moso island	2012/Nov/21



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Management Guideline for the management of the Fish Aggregation Device (FAD) Fishery at Central of Malekula inside project site i.e. Uri, Uripiv and Crab bay

The Management Committee of the Fish Aggregation Device (FAD) Fishery (hereinafter referred to as "the Committee") at Lakatoro, Malekula, comprising of communities between Mapes and Uripiv island community, maintains the following guideline to manage and maintain the FADs in good condition. The committee activities under this guideline will be carried out as a program of the Project for Promotion of Grace of the Seas in Coastal Villages in Vanuatu Phase 2 (hereinafter referred to as "the Project"), implemented by Vanuatu Fisheries Department and IC Net Limited, a Japan-based development consulting firm.

1) RULES & REGULATION

The management committee members agreed to adopt and to apply the following rules and regulations for the better management of the FADs for all.

a) Fishermen are not to moor fishing boats and canoes on to the FADs.
b) Fishermen within the project site must pay membership fee
c) Non member, who are non residence in the project site i.e. between Uripiv and Mapes must pay access fee to the FAD management committee to fish around the FAD
d) The Committee must provide progress report to the members
e) The Committee must provide financial report 3 times in 1 year
f) Fishermen must provide regular catch data by fishing trip to the committee
g) The Committee must meet 3 times in one year
h) Fishermen must have the acquire the basic knowledge on sea safety
i) The committee must provide sufficient awareness to nearby communities of the FAD management committee, the rules and how to access the FAD and the benefit of the FADs.
j) The responsibility to look after the FADs is the responsibility for every fishermen
k) The Fisheries office in Malampa province and the FAD management committee must be consulted first for any problems associated with the FADs
l) Any dispute between fishermen with regards to FAD fishing must be refer to the FAD management committee
m) The fisheries officer for Malampa province must be consulted for best maintenance and repair technical advice (FAD) on good and cheaper maintenance options

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n) The committee must have the list and number of fishermen and fishing boats in central area of Malekula, especially fishing boats within the project site.

o) Any FAD fishing development plan or program must be made known to the members

p) Fishermen must have an affiliation or a member of an established fishermen association

q) No FAD fishing is allowed on Sunday[1]

r) The Fisheries Office in Malampa has the responsibility to provide access to facilities in order for the committee to produce its reports

s) The FAD management committee must have its own bank account

t) The committee must ensure that members must have sufficient information on the right fishing tools, fishing methods and the appropriate safety equipment.

2) FAD MAINTENANCE

The Committee members agreed to carry out maintenance of the FADs under a *Maintenance Routine Plan* that would include the following:

a) Every fishermen has the responsibility to regularly check during their daily fishing operation around the FADs

b) The Fisheries Department and the management committee to produce maintenance and repair checklist on which vulnerable parts of the FAD to check for any faulty from natural cause.

c) The committee must ensure that through maintenance and repair check on the FADs is conducted on monthly basis.

d) Any damages or faulty sited in the FAD must be reported to the committee along with the list of damaged parts that needs urgent repair or replacement.

e) Any Maintenance and Repair work on the FAD must be done or authorized by the FAD management committee

f) The FAD management committee must allocate a FAD Maintenance and repair budget from its own generated fund

g) The committee must acquire the appropriate training on the handling of FAD maintenance and repair and the appropriate safety measures during carrying out maintenance operation

3) FUNDING FOR FAD MANAGEMENT

The members agreed and endorsed that the management of the FADs should generate its own funds from the following avenues:

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[1] No fishing on Sunday is related to religion but as a management measure

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(1) Membership fee of 1000vt per year per boat owner.
(2) Canoe is exempted but not encourage to fish around the FAD for safety reasons.
(3) Open public fundraising to be organized by fishermen
(4) Annual access fee for non-members[2] of 2500vt
(5) Trespass fee or fine of 5000vt
(6) Damage fee – any damages on the FAD must be referred and deal with under the fisheries regulation order 28 of 2009.
(7) Tourism activities fee dealing with FAD (Blue water fishing) that will be decided by the FAD management committee base on the scale of the activity
(8) Encourage fisherman's day event and community fish sale
(9) Hiring of fishing equipment
(10) Encourage fishing competition tournament
(11) Increase the number of FADs in the project site[3], including Crab bay to increase access for fishing and collection of fees

4) TECHNOLOGY DEVELOPMENT

The members agreed to seek technical advice and training from the Fisheries Department on:

a) New FAD fishing technique
b) Basic safety requirement during FAD fishing

5) COMMITTEE MEETING

(1) It is agreed that the committee meeting should take place 3 times per year
(2) Extra ordinary meeting for the executive when necessary to address:
    a) FAD Monitoring measures
    b) Financial situation of the FAD committee
    c) Making agendas for members general meetings

6) AWARENESS ACTIVITY

a) The members felt that public awareness is vital to ensure that the whole population within the project site has access to information on FAD and therefore encouraged to utilize whatever communication media available such as: -
    (i) The local TV such as "*Television blong Vanuatu*"

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[2] Non-members refer to adjacent communities outside the project site i.e. between Mapes and Uripiv
[3] Project site refer to the area between Uripiv and Mapes

(ii) Local Radio such as VBTC and other FM radio stations

(iii) Local Newspapers

(iv) Posters

(v) FAD Members advertise in person

b) Members agreed to work in collaboration with stakeholders such as Police, Fisheries Department, Province, NGOs and community leaders to disseminate information on FAD and its benefits to the communities

(7) FISHING ACTIVITY RECORD

(i) The members emphasize the importance of regular data collection and proper record keeping of fish catch in order to measure the effectiveness of the FAD. The members agree to fill up the log-sheet provided to collect the fish catch data required and MUST submitted the log-sheet to the FAD management committee.

(ii) The essential fish catch data required, as specify in the log-sheet, include:

(i) Total catch per fishing trip

(ii) The type of fish species

(iii) The value of the fish catch by species

(iv) Total fishing time per fishing trip

(v) Which FADs and area has fishing has taken place

(vi) What type of fishing technique has been used

(vii) How much has been spent on fishing gears such as fishing line, hook.

(viii) How much has been spent on other fishing cost such as fuel, ice block, labor, eskie etc.

For the Project

(7/12/2012)

Mr. Graham Nimoho
Manager of Coastal Fisheries
Development Division
Vanuatu Fisheries Department

For the Committee

MK

Mr. Malili Malisa
Chairman
Management Committee of FAD Fishery

GN

Dr. AkiyaSeko
Leader of the Project
IC Net Limited

Mr. Kevin Moris
Fisheries Development Officer
Malampa Province Fisheries Department

Member List of Management Committee of Fish Aggregation Device Fishery at Lakatoro, Malekula, comprising of communities between Mapes and Uripiv island community

	Name	Community	Position in Committee
1	Mr. Malili Malisa	Uripiv	Chairman
2	Mr. Steward Roy	Uripiv	Vice Chairman
3	Mr. Kalpea Kenneth	Uripiv	Secretary
4	Mr. Malkom Shemia	Louni	Vice Secretary
5	Mr. Kalwas Noel	Barrick	Treasurer
6	Mr. Brendon Timothy	Potindir	Vice Treasurer
7	Mr. Kalen Abbie	Lingarak	Executive Member
8	Mr. Kalmasing Peter	Llatbol	Executive Member
9	Mr. Locklen Malsale	Uripiv	Executive Member
10	Mr. Bulemis Thomas	Uripiv	Member
11	Mr. William Ismael	Louni	Member
12	Mr. Philip Ria	Uripiv	Member

13	Mr. Wollika Longa	Uripiv	Member
14	Mr. John Sandie	Uripiv	Member
15	Mr. Wolten Ishmael	Uripiv	Member
16	Mr. Amos Kaskas	Louni	Member
17	Mr. Septy Marty	T.F.C.	Member
18	Mr. Thomson Noel	Barrick	Member

Participant List of FAD Fishery Workshop (Malakula)

3th to 7th December2012

Project for Promotion of Grace of the Seas in Coastal Villages, Phase 2

			
MaliliMalisa	Bulemis Thomas	William Ishmael	Philip Ria
Uripiv	Uripiv	Louni	Uripiv
546-5136		771-8760	593-6823
Chairman (Scale& Data sheet)		Data sheet	Data sheet

			
Wollika Longa	Kalpea Kenneth	LocklenMalsale	John Sandie
Uripiv	Uripiv	Uripiv	Uripiv
	562-7674		710-8192
	Secteatary	Member	

			
Steward Roy	MalkomShemia	Wolten Ishmael	Kalwas Noel
Uripiv	Louni	Uripiv	Barrick
568-5767	537-9714	590-6371	
Vice chairman (Deta sheet)	Vice secretary (Scale、Data sheet)		Tresure (Data sheet)

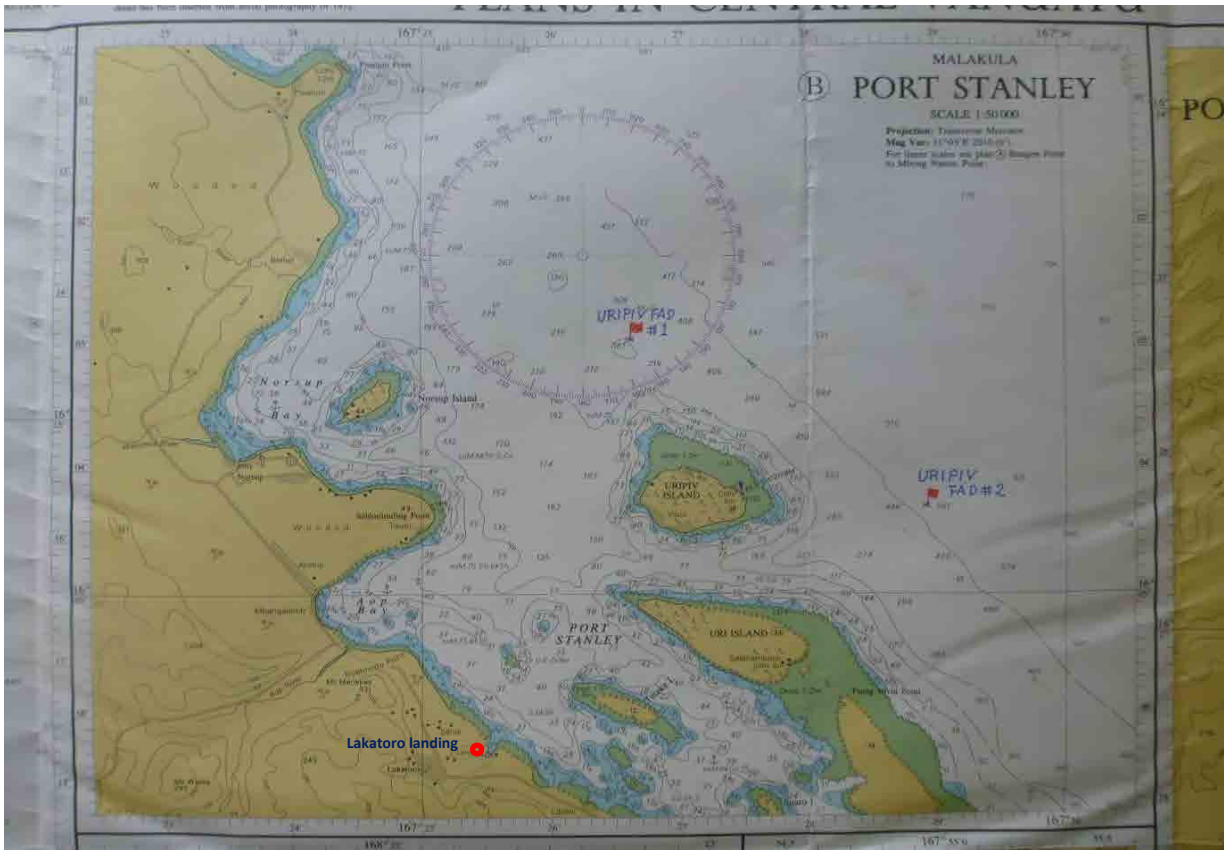
			
Brendon Timothy	Amos Kaskas	KalenAbbie	Sefty Marty
Potindir	Louni	Lingarak	T.F.C.
596-9587	543-9478	541-6579	597-7385
Vice treasure (Data sheet)		Momber (Data sheet)	Scale (Data sheet)

			
Thomson Noel	Kalmasing Peter		
Barrick	Hatbol		
777-8132	Member (Data sheet)		

Information on FADs in Malakula

(Dec 2012)

FAD ID	Coordinate (Anchor position)	Coordinate (Flag position)	Depth of Water	Distance	Date of Deployment
Uripiv FAD #1	S 16° 03. 012	S 17° 37. 030	200m	1NM NNW off Uripiv island, 2.1NM NNE off Lakatoro landing site	2012/Dec/05
	E167° 26. 792	E168° 09. 965			
Uripiv FAD #2	S 16° 03. 999	S 17° 29. 811	550m	1.2NM E off light house in Uripiv island, 3.8NM NE off Lakatoro landing site	2012/Dec/05
	E167° 28. 732	E168° 15. 544			



Management Guideline For The Management Of The Fish Aggregation Device (FAD) Fishery At Aneityum

The Management Committee of the Fish Aggregation Device (FAD) Fishery (hereinafter referred to as "the Committee"), comprising of communities of Analgauhat, Port Patrick and Umej, on its first meeting at Analcauhat, Aneityum on the 17th December 2012, maintains the following guideline to manage and maintain the FADs in good condition.
The committee activities under this guideline will be carried out as a program of the Project for Promotion of Grace of the Seas in Coastal Villages in Vanuatu Phase 2 (hereinafter referred to as "the Project"), implemented by Vanuatu Fisheries Department and IC Net Limited, a Japan-based development consulting firm.

1) RULES & REGULATION

The FAD management committee members agreed to adopt and to apply the following rules and regulations for the better management of the FADs for all.

a) All fishermen must be registered to fish near FAD
b) All users of the FADs, who are either fishermen or non-fishermen members such as divers and sailors, must pay a user commission to the FAD management committee.
c) All fishermen has to responsibility to report any damages sighted on the FAD to the FAD management committee
d) Any FAD repair work or additional materials to be added to the FAD must not be carry out without the permission of the FAD committee
e) Fishermen and other FAD users must not undertake trolling fishing activities not less than 50m away from floating FAD buoys.
f) Fishermen and other FAD users must not undertake and set mid-water and deeper water vertical long-line fishing activities not less than 50m away on the up-current position from the floating FAD buoys.
g) No person shall remove any materials from the FAD or relocate the FAD or cause damage to the FAD or destroy the FAD.
h) Fishermen are not to moor fishing boats and canoe on to the FADs
i) Night fishing around the FADs is prohibited
j) The committee and the Aneityum Fishermen association must have regular meetings to build better working relationship and common understanding on the management of the FAD.
k) The committee has the obligation to provide report to the Intasalep (Aneityum) council of chiefs of any FAD development activities in Aneityum.
l) The committee must have a maintenance fund bank account.
m) The Committee must provide progress report to the members

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n) Fishermen must provide regular catch data per fishing trip to the committee on a monthly basis

o) The committee must provide sufficient awareness about the function of the committee, rules and how to access the FAD and the benefit of the FADs to the communities.

p) The responsibility to look after the FADs is the responsibility for every users

q) The FAD management committee must be consulted first for any problems associated with the FADs

r) Any dispute between fishermen with regards to FAD fishing must be refer to the committee

s) The committee must ensure that fishermen must have sufficient information on the right fishing tools, fishing methods and the appropriate safety equipment required for FAD fishing activities.

2) FAD MAINTENANCE

The Committee members agreed to carry out maintenance of the FADs as follow:

a) The committee must ensure that thorough maintenance and repair check on the FADs is conducted as follow:

   i) Fishermen and other users to check regularly during their daily fishing operation

   ii) FAD maintenance team to check instantly upon receiving a report on any damages sighted.

   iii) FAD maintenance team to conduct routinely check on monthly basis.

b) The committee must appoint a "*maintenance team*" amongst members of fishermen who have attended the FAD training workshop to oversee the FAD maintenance and repair.

c) The committee to maintain the FAD-check record or log book to keep account of every FAD maintenance activities and checks.

d) The Fisheries Department and the committee to produce "*Maintenance and Repair checklist*" on which vulnerable parts of the FAD to be check for any faulty.

e) Any damages or faulty sited in the FAD must be reported to the committee along with the list of damaged parts that needs urgent repair or replacement.

f) The committee to provide storage facilities for the FAD materials.

g) The committee must allocate a FAD Maintenance and repair budget from its own generated fund

3) THE FAD MANAGEMENT COMMITTEE

a) The term of the committee must be for 2 years term and is renewable subject to the approval from the members annual meeting

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b) The selection criteria:
   i) Must be a FAD workshop participant
   ii) Interest to work at any sea condition
   iii) Right person who has sound knowledge on FAD construction, deployment and maintenance
c) FAD committee meetings must be contacted regularly:
   i) On Monthly basis
   ii) Any time as the chairman may see fit to address urgent matters
d) FAD committee must maintain good working relationship at all times with the Fishermen association and the Mystery island MPA

4) FUNDING GENERATION ACTIVITY

The members agreed and endorsed that the management of the FADs should generate its own funds from the following activities:

(1) Fishermen annual membership fee of 1000VT/year
(2) User fee for non-members of 1000VT per boat per fishing trip.
(3) Member contribution of 400VT per person per "Eat and Donate" fundraising event
(4) Donor project development with the assistance of Fisheries Department and any other stakeholders
(5) Tour operator's commission of 10% per trip per tourist cruise ship[1].
(6) A total of 10% off fishermen's catch per FAD fishing trip
(7) Hire fee of 200VT for the use of FAD Tools & Equipment
(8) To establish a fishing gear *Retail shop* for the supply of FAD fishing gears, fuel and other necessary fishing gears.
(9) Allocation a fishing day or fish diving day for the FAD development management.
(10) Open public fundraising to be organized by fishermen

4) TOOLS & EQUIPMENT

The members realized the importance for the committee to have access to essential tools and equipment to respond to appropriate FAD maintenance issues. The committee agrees on the following:

(1) An appropriate boat design specifically to:
   (i) carry out FAD deployment
   (ii) carry out repair work at sea.
   (iii) Safety and rescue operation for FAD fishing
   (iv) FAD monitoring and maintenance

[1] This commission only applies in cruise ship day at Mystery island

(2) Portable VHF radio for the committee to use during deployment operation and repair and maintenance operation
(3) Eco-sounder (Fish-finder) and GPS for FAD deployment and other fishing purposes
(4) Appropriate safety tools and equipment for FAD fishing
(5) Additional spare FAD materials to enable the committee to replace or repair and FAD immediately
(6) Appropriate training associated with the proper use of the tools and equipment mentioned above.

6) AWARENESS ACTIVITY

a) The members felt that public awareness is vital to ensure that the communities of Aneityum, local organizations and groups, relevant authorities such as the Intasalep council of chiefs, Fisheries Department and the Ports and Harbor and other stakeholders have access to information on FAD and therefore encouraged to utilize whatever communication media available to disseminate the following FAD information such as:

   (i) The location of the GPS location of the FAD
   (ii) The land mark estimates the would lead to the location of the FAD
   (iii) Distance of FAD from the nears land and village
   (iv) Depth of the FAD anchor position
   (v) No fishing close to FAD information to avoid the FAD being damaged
   (vi) Put up posters containing FAD information
   (vii) The committee members advertise in person

b) Importance for the communities to report through chiefs or any community leaders on any incident or damages on the FAD

c) Importance for the communities to report to the committee any fish caught around the FAD

d) Dissemination of the FAD information through the Intasalop council of chief network

e) The importance for the communities to report to the Fisheries Department and the Ports & Harbor, through the committee any damages of the FADs caused by domestic and international ship

f) The importance for the communities to report to the Fisheries Department and the Ports & Harbor, through the committee any suspected foreign fishing vessels fishing illegally around the inshore FADs. The report must have the following information:

   (i) Date and day
   (ii) Time
   (iii) Call sign at the bow of the vessel

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(7) FISHING ACTIVITY RECORD

(i) The committee emphasizes the importance of regular data collection and proper record keeping of fish catch in order to measure the effectiveness of the FADs. The members agree to fill up the log-sheet provided to collect the fish catch data required and MUST submit the log-sheet to the Fisheries Department/ICNET through committee.

For the Project

Mr. Graham Nimoho
Manager
Fisheries Development & Capture Division
Vanuatu Fisheries Department

Dr. AkiyaSeko
Leader of the Project
IC Net Limited

For the Committee

Mr. Joseph Yasifu
Chairman
FAD fishery Management Committee
Aneityum

Tony Nemtia
Mystery Island MPA Representative
Aneityum

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Participant List of FAD Fishery Workshop (Aneityum)
12th to 17th December 2012

Project for Promotion of Grace of the Seas in Coastal Villages, Phase 2

Member List of Aneityum FAD Fishery Management Committee

(18 Dec 2012)

			
Joel Rawai	Jonah William	Clement George	Elio Allan
Anelcauhat	Anelcauhat	Umeji	Anelcauhat
778-9703	779-6269		7773514
			Assistant Secretary
Data sheet	Data sheet		Data sheet

			
Makency Jesei	Yanip Robinson	Meki Rakau	Joseph Yasifu
Anelcauhat	Anelcauhat	Port Patrick	Anelcauhat
7796568		7775530	7109779
Executive Member	Secretary	Vice Chairman	Chairman
			Scale x 2
Data sheet	Data sheet	Data sheet	Data sheet

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Nicolas Leye	Belam Joel	Alfred Yakam	John Karupi
Umeji	Anelcauhat	Anelcauhat	Anelcauhat
		7789662	7797295
Treasurer	Assistant Treasurer		
Data sheet		Data sheet	Data sheet

			
Wesly Nirinuput	Ruben Neriam	Tony Nemtia	Collen Netodi
Anelcauhat	Anelcauhat	Anelcauhat	
	779-6157	771-8978	
Executive Member	Executive Member		Observer
Data sheet	Data sheet		Data sheet

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Information on FADs in Aneityum

(2012 Dec)

FAD ID	Coordinate (Anchor position)	Coordinate (Flag position)	Depth of Water	Distance	Date of Deployment
Keamu FAD #1	S 20°16. 822 E169°44. 164	S 20°16. 844 E169°43. 945	250m	2.5NM SW off Mystery island, 3.7 NM SW off Analcahat landing site	2012/Dec/14
Keamu FAD #2	S 20°11. 523 E169°42. 665	S 20°11. 601 E169°42. 636	270m	2NM W off nearest coast line, 4.7 NM NW off Analcahat landing site	2012/Dec/13

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Pacific Shell Jewel

Artisanal Craft

Made in Havannah harbour (North Efate)

Vanuatu

Your support for the Community -Based Coastal Resource Management (CBCRM).

The part of the sales of this product will be utilized for the CBCRM for the sustainable use of the coastal marine resources.

Pacific Shell Jewel

Artisanal Craft

Made in Malakula

Vanuatu

Your support for the Community -Based Coastal Resource Management (CBCRM).

The part of the sales of this product will be utilized for the CBCRM for the sustainable use of the coastal marine resources.

Your support for the Community-Based Coastal Resource Management (CBCRM).

The part of the sales of this product will be utilized for the CBCRM for the sustainable use of the coastal marine resources.

Somewhere in the Pacific

Mystery Island

Pacific Shell Jewel

Artisanal Craft

Made in Mystery Island

Vanuatu

Mekem Shell Craft

Wanem tool blong usum


Hand drill


San pepa


Tebol Kraenda


Sefti Klas mo Mask


Droem design long shell

Krim blong Polish

How blong mekem shell handicraft

Smutum wetem Kraenda

Katem shape long Drill


Polishim wetem San Pepa


Mekem Hole wetem Drill


Putum ol Fittings


Polishim wetem Krim antap long kaliko

Project for Promotion of Grace of Sea in Costal Villages Phase 2

Vanuatu Fisheries Department
Japan International Cooperation Agency
IC Net limited

SAMFALA SHELL CRAFT WE PROJEK I PROMOTEM

WORKSHOP BLONG SHELL CRAFT

FISHERIES DEPARTMENT STAP GIVIM ADVAES BLONG USUM ECO-TAG OLTAEM BLONG PROMOTEM ENVIRONMENTEL KOSTAL RISOS MANAJMEN

Fisheri Dipatmen I stap promotem bolong mas usum Eco-Tags long ol local shell crafts I go long ol produsa mo retailers. Eco-Tag hemi gat tugala pepes long ol kostal komuniti.

Hemi shoem se yu mekem shell craft blong yu insaed long ol local komuniti mo kontribut lo kostal risos manajmen; mo,

Local komunity I save karem sam profit aot long kostal risos manajmen activity aot long ol sels bolong Eco-Tags I go long ol produsa mo retailer.

BOLONG KASEM MOA INFOMESEN LONG HAO BOLONG MEKEM SHELL CRAFT KONTAKTEM:

Capture & Development Division
Vanuatu Fisheries Department
PO Box 9045, Port Vila
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TEKNIKEL BUKLET LONG HAO BLONG MEKEM SEA SHELL CRAFT

Project for Promotion of Grace of the Sea in Coastal Villages, Phase 2

Vanuatu Fisheries Department
Japan International Cooperation Agency
IC Net Limited

EQUIPMEN, TUL MO MATERIAL

	
Set blong handikraf dril	Graenda
	
San Pepa	Eye Glace & Mask
	
Krim blong polish	Plier

WORKSHOP BLONG SHELL CRAFT

	Checkem saes blong troka bifo yu katem. Saes blong troka hemi mas bi 9.0cm
	Werem sefti eye glas mo mask blong yu stap mekem shell craft.
	Droa shep mo katem stret shep folem droa long shell. **TOKSAVE: No mas westem eni pat blong shell!!**

1. KLINEM SHELL CRAFT

Klinem ol shell wetem graedakasem taem we u luk wan pearl layer I kamaot.


2. KATEM SHELL CRAFT

Katem wan design aot long shell wetem drill, mo usum drill blong raonem en o kona kona long shell design blong mekem shep ikam stret.


3. SMUTUM SHELL CRAFT

Usum san pepa blong smutum sefes blong ol shells blong mekem I smut.


4. MEKEM HOL LONG SHELL CRAFT

Usum hand drill blong mekem hol blong fiting long shell craft.


5. POLISHIM SHELL CRAFT

Polishim shell craft wetem polishing krim antap long wan kaliko blong mekem I smut mo.


6. PUTUM FITING LONG SHELL CRAFT

Putum fiting long hol blong shell craft.


7. PUTUM TAG LONG SHELL CRAFT

Putum tags long ol shell craft blong atractem tourists mo mekem save se hemi wan lokal product.


8. SALEM OL SHELL CRAFT

Salem shell crafts we i gat Eco-Tag long hem long ol local markets.