

## End of Project Report for the MURUKANAM (dry lowlands) Site Elick Guaf, NARI MRC Bubia

### 1. Project Site description

The MURUKANAM Community is in Ward 3, Sumgilbar Local Level Government, Bogia District, Madang Province, Papua New Guinea. It is a natural dry lowland site. The community is situated on mainly savannah grass land with an undulating landform at not more than 10masl. Access to Murukanam is by all weather roads. Income to household is from betlenut (*Areca catechu*) and small cocoa and coconut holdings. The major farming system is subsistence food crop and village livestock consisting native pig breeds and village chickens. Major staple crops include *Dioscorea esculenta* yam, banana spps, *Colocasia esculenta* taro, sweetpotato, cassava, *Xanthosoma saggitifolium* taro, sago and breadfruit. Most of the crops produced is consumed at the household with scraps feed to the livestock. Most of the planting materials is acquired from their old gardens and where extra material is require it is sourced from extended members of the family. A negligible quantity is obtained from outside the family circle and only in cases where unique taste and high volume of yield of popular staple is discovered. A major cause of low food production are soil water extremes the excess and deficit, soil fertility and pests & diseases. Low food production for the household has been observed however practices to sustain of food production is limited to long fallow

### 2. Site selection and prioritization

Murukanam was selected as a site in the lowland of PNG that has a pronounced and at times extended dry season. The initial fact finding site assessment visit revealed the following site specific characteristics which were captured through a SWOT analysis

#### SWOT analysis for Murukanam

<p><b>Strengths:</b></p> <ul style="list-style-type: none"><li>• Cash crops available (cocoa/coconut, betelnut) and cash income</li><li>• Range of protein sources</li><li>• Access of land for gardens</li><li>• Grow a range of different staple crops (undecided on most important)</li><li>• Alternate food sources available when some staples are in short supply (yam that can be stored, SP and banana non-seasonal)</li><li>• Good access to services</li><li>• Farmers generally don't rely on food crop production</li></ul>	<p><b>Weaknesses:</b></p> <ul style="list-style-type: none"><li>• Availability of sources of cash income prevents venturing in other enterprises (livestock)</li><li>• Availability of range of wild protein sources – less drive to invest in livestock</li><li>• Lack of motivation to improve water access and quality</li><li>• Water sources used by livestock &amp; people (pollution, water quality)</li><li>• Periodic water shortage in food gardens</li><li>• Irrigation and watering the food crops is not an option</li><li>• Lack of concern for water sources (Inappropriate use of pesticides etc for fishing)</li><li>• Not so easy access to land for alternative livestock based enterprises</li><li>• No use of or access to improved planting materials for food crops</li><li>• Yield reduction but may not sure about key issue (Decline in soil fertility, Pest and Diseases (esp SP weevil, taro beetle other insects, TLB and no action taken)</li><li>• Food crops grown on less fertile land and suffer severe moisture and fertility stress</li></ul>
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	<ul style="list-style-type: none"> <li>• Don't want to spend too much time on food production (change to 'unsustainable practices')</li> <li>• Use of traditional practices in food crop production</li> </ul>
<p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>• Labour saving food crop production techniques (increase efficiency)</li> <li>• Improving feed-systems for livestock</li> <li>• Introduction of improved varieties</li> <li>• Soil moisture conservation practices</li> <li>• Soil fertility improvement techniques</li> <li>• Interested in new practices and technologies</li> <li>• Good access to services and developing different businesses</li> <li>• Increase of food production (by settlers) to sell to</li> <li>• Introduction of improved water resource management practices</li> <li>• Simple water purification technologies</li> <li>• Domestic water supply system, which needs support from the community</li> </ul>	<p><b>Threats:</b></p> <ul style="list-style-type: none"> <li>• Increasing threat of Feral pigs and cattle destroying garden</li> <li>• Increase in stealing (people concentrating on betelnut and not food crops, so they steal)</li> <li>• HIV/AIDS (increasing risks with betelnut/dry coconut trade)</li> <li>• More irregular weather patterns</li> <li>• Longer dry season</li> <li>• Cocoa pod borer, BCS</li> <li>• Potential social unrest (landowners vs settlers)</li> <li>• Farmers don't pay a lot of attention to food crop production, which leaves the less prepared for times of drought</li> </ul>

As in the other sites, community members were engaged in a reporting back workshop to list their major constraints to agricultural production throughout the cropping calendar. Each community member was invited to participate in the prioritization of the major constraints and opportunities in their area and (Table 2). Only the top three to five priorities were considered for inclusion in the project. These constraints were later converted to project outcomes and prioritized based on their needs and understanding of the concept. Both gender had a fair representation in the workshop.

**Table 2. Results of a voting exercise options addressing agricultural production constraints and opportunities at the workshop in Murukanam.**

Options voted on in Kopafa	Voters		
	Women	Men	Both
5. Integrating management of chickens, fish and ducks for food and income	5	18	23
1. Improving Production of banana, yam, taro, etc	4	15	19
2. Introduction of new crops or new varieties of other crops in my farming system	5	13	18
9. Improving the soil of my plots to have stable and sustain food crop production	8	5	13
11. Protecting our water sources to improve our livelihoods	0	13	13
6. Diversifying livestock holdings to increase food (meat, milk, eggs) production	0	11	11
4. Improving management and feeding of pigs to save food gardens and gain cash income	6	3	9
10. soil moisture conservation to have stable and sustain food crop production	0	7	7
3. Adding value to my staple crops through processing into feed and food	5	0	5

7. introduction of grazing animals in natural pastures and plantations to diversify livestock holdings	0	3	3
8. Protecting the soil of my plots to have stable and sustain food crop production	0	0	0
<b>Total votes</b>	<b>33</b>	<b>88</b>	<b>121</b>
<b>Total voters</b>	<b>10</b>	<b>30</b>	<b>40</b>

### 3. Interventions implemented at the site and summary of achievements

Table 3 shows an overview of outputs achieved and participation of different community members in relevant learning workshops and demonstrations that were conducted in Murukanam communities. There were usually a number of learning events conducted per output and some community members chose to participate in only one of the events while others participated in all events for that output.

**Table 3. The various outputs and participation of community members in relevant technology demonstration and learning events at Murukanam Pilot site**

	Outputs.	Farmers Trained	Male farmers	Female Farmers	Model Farmers
O	Increased capacity for using integrated livestock farming practices for inland fish, ducks and chicken production by selected farmers in Murukanam community	11	9	2	7
O2	Improved capacity for using integrated goat -coconut system by selected farmers	6	4	2	1
O3	Capacity for growing yam using improved locally acceptable production practices and farmer-selected varieties increased in the Murukanam Community	61	37	24	3
O4	Capacity for growing cassava using improved locally acceptable production practices and farmer-selected varieties increased in the Murukanam Community	15	12	3	3
O5	Farmer-preferred drought tolerant sweetpotato varieties identified and available to the Murukanam community	32	17	15	3
O6	Farmer preferred Taro varieties identified and available to the Murukanam community	27	17	10	3
O7	Farmers have knowledge and skills on most pertinent soil fertility constraints and their causes to address limitations on crop production.	16	13	3	0

The planned activities under each of the technical components were delivered through field demonstration trials, training demonstrations and field days and culinary and taste preferences for the introduced crop varieties were also done. Table 4 shows a summary of technologies or innovations introduced and farmer impressions during implementation.

**Table 4. Technologies/ innovations disseminated as part of project interventions at Murukanam pilot site and farmer impressions.**

Output	Description of intervention	Innovation	Farmer impressions during implementation
O1	Increased capacity for using integrated livestock farming practices for inland fish, ducks and chicken production by	Introduction of ducks and duck-fish farming techniques	•

	selected farmers in Murukanam community		
O2	Improved capacity for using integrated goat -coconut system by selected farmers	Introduction of goats; grazing system in coconut blocks	•
O2	Capacity for growing yam using improved locally acceptable production practices and farmer-selected varieties increased in the Murukanam Community	Yam husbandry practices (mini-setting; staking; density); new yam species	•
O3	Capacity for growing cassava using improved locally acceptable production practices and farmer-selected varieties increased in the Murukanam Community	9 Drought tolerant, low cyanide cassava varieties	•
O4	Farmer-preferred drought tolerant sweetpotato varieties identified and available to the Murukanam community	Planting techniques, 8 improved varieties;	•
07	Farmer preferred Taro varieties identified and available to the Murukanam community	Improved varieties; taro beetle management	•
08	Farmers have knowledge and skills on most pertinent soil fertility constraints and their causes to address limitations on crop production.	Soil fertility status and measures to improve	•

#### 4. Challenges and Suggestions during Project Implementation.

**Table 5. Issues of significance that impacted the project implementation schedules**

Issues arising during implementation and lessons learnt		Type of action required/suggested taken to resolve problems and delays etc.
1	The unexpected long dry season affected rice fields and the planned rice and duck integrated farming did not proceed as planned when the rice field failed. Rice was planned rather late in the previous year	Livestock activities that rely on crops will have to take account of cropping calendars as well as variability of the rainfall pattern.
2	Inland fish farming is difficult to maintain in a dry environment like Murukanam. The current and future planned activities in fisheries will have to rely heavily on water from river streams, and hence the fish ponds will have to be located on the river banks.	Fortunately there are a few all season river streams in Murukanam and all aquaculture related activities will be related to the rivers.
3	During the teams trip to train farmers on the different yam cultivation/production technology (24th November – 1st December, 2013) a death occurred in the community and at the same time a major church event held for two days in the community thus affected the number of farmers' attendance during the training.	The death (of an elementary student) occurred on first night of the team's arrival in the village so the team donated store food and cash in line with the cultural obligations or requirements. After participating in the cultural requirements, the team was allowed to freely carry out their planned

		activities in the village, but first on the sites at Dibor and Tawa and then after the burial conducted the training and planting in the main village of Sarmahn
4	Due to some differences between the community members the yam trials at all three (3) sites were not well managed. Both the African yam evaluation trial evaluation/demonstration trials at Sarman and Tawa were over grown by weeds. It was noted that the trials site at all three sites were managed only by the model farmer and their household but with little or no assistance from the communities from those 3 respective sites.	Model farmer Mr. Jeffery Tamor and his wife took the initiative to maintain the trial site at Sarman (African yam, cassava and taro evaluation/demonstration trials) by hiring church women groups in the community has labour to weed and manage the trial site. The women were paid K2.29 per hour every Tuesdays and Thursday from 6am – 8am. The model farmer and his wife commented that hiring labour seem to be the only way to manage the trial site. They asked if the project could step in and assist them hire labour to maintain the trial site

## 5. Final Assessments and Comments

Final site assessments in Kopafu took place in November 2015. The following Tables 6 and 7 show a summary of responses on technology performance and responses of representative farmers during focus group discussions.

**Table 6: Technology performance in Murukanam Community as assessed by representative community members**

Technology	Performance -Better -Same -Poor	Area Cultivated (for crops)			Do they plan to continue in the future (livestock)? -Yes -No	General Interest from the community- High (H) Medium (M) Low (L) Give Reason	Engage in Market. If Yes, What is the price?
		Old practice	New Practice	Plan to Expand, If yes by how many			
Farmer-preferred taro varieties	Better (taste and bigger combs)	≈5000 -10,000 m <sup>2</sup>	≈ 162- for research only, El Nino destroyed lot of seeds.	Yes, depend on seed availability	<ul style="list-style-type: none"> <li>• Fish and Duck (Yes)</li> <li>• Goats (Not really)</li> <li>• Goats were newly introduced and farmers are not familiar and also because of its destructive behavior.</li> </ul>	<ul style="list-style-type: none"> <li>• Duck &amp; Fish (H)- easy to look after, for protein &amp; income generation</li> <li>• Goat (L)- Not easy to look after-</li> </ul>	<ul style="list-style-type: none"> <li>• Duck (Yes), K50-</li> <li>• Drakes-K60,</li> <li>• Eggs (K1)</li> <li>• Chickens K40</li> <li>• Goats were quite difficult to sell as villages were not familiar with goat meat</li> </ul>
Improved practices for yam and farmer-selected varieties	Better (withstood drought)	≈ 2000+ m <sup>2</sup>	≈162m <sup>2</sup> Experimental plots,	Yes, bigger but size depend on seed availability Farmers have distributed seeds to other farmers as well.			<ul style="list-style-type: none"> <li>• Farmers were not able to sell other crops because they were not able to make garden during the El Nino induced drought.</li> </ul>
Improved production practices for cassava and farmer-selected varieties	Some were Better, able to withstand drought condition	2500 + m <sup>2</sup>	10 m by 10 m (100 <sup>2</sup> m)	Yes, larger than the experimental plot (100+ m <sup>2</sup> ) depending on the cuttings. Farmers have also distribute cuttings to other villages			
Farmer preferred drought tolerant sweet potato varieties	Some, Better (Taste, sizes) others were same	≈2500+m <sup>2</sup>	≈100 m <sup>2</sup>	Yes, depend on seeds/cuttings			

Improved knowledge and skills on soil fertility constraints, their causes and how to address these	<i>Soil survey showed depletion of specific soil nutrients. Farmers were taught on how to management soil nutrient through reforestation</i>		
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**Table 7: Responses from Focus Group at Kopafu during final assessment on food production and priorities**

<b>Periods of Food Shortage</b>	<b>August to December</b>
<b>Views on whether improved technologies would improved food shortage period</b>	<ul style="list-style-type: none"> <li>• Farmers expressed their satisfaction on the introduced taro, sweet potato, cassava and yam varieties,</li> <li>• Improved crop varieties especially cassava and African yam, they can plant and narrow the food shortage period to some extent.</li> <li>• Also some cassava which are have short maturity duration can be used to provide food while the farmer work establish their new gardens.</li> </ul>
<b>5 Years ago, communities voted on certain priorities. Do these still remain important or have now changed?</b>	<ul style="list-style-type: none"> <li>• Interventions voted which still remain important for the benefit of the community.</li> <li>• Farmers failed to vote for water and water became a major problem during the drought as most of the crops and livestock introduced suffered under water deficit condition.</li> <li>• Some farmers were</li> </ul>