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MONITORING REPORT

Project Title	Reducing the degradation of mangroves and other ecosystems through improved fish smokers and stoves
Project Start Date	September 2019
Project End Date	October 2024
Monitoring Report number	01
Date of Report	March 2024
Monitoring Period	February 2022 – February 2024
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1 PROJECT DETAILS

1.1. Summary Description of the Implementation Status of the Project

The greatest threat of mangrove forest in the littoral zone of Cameroun is the growing fish processing business. Fish processors rely on logs of mangrove wood are used to fuel their stoves. Fish smoking is an integral part of the daily lives of the population in Manoka, an island located in the Littoral region and Wouri department in Cameroun, between 3°51'19"N and 9°36'53"E.

There is a well defined task division in the fish sector. Men are responsible for fishing using their own canoes. Women have been historically active in fish processing and trade. Most women have learned fish smoking skills from their mothers and grandmothers. Women usually get fresh fish from within the family, husband or male family members and in rare cases purchase them from other fishermen. The scale of operations differs from one woman to another and range from those who process small quantities of fish to those who smoke large quantities. The processed fish is sold to wholesalers who visit the village.

The traditional fish smoking system consists of 'hot smoking' which involves smoking the fish for a longer period so that the final product has a shelf life of up to six months. The traditional ovens consist of four wooden poles supporting a grate on which the fish are placed. These ovens are either open-air or under a roof. They have obvious disadvantages linked to heat loss.

With the aim of reducing the degradation of mangrove forest in the zone, The African Women's Network for Community Management of Forests (**REFACOF**) in collaboration with Cameroun Ecology, The Center for International Forestry Research (CIFOR) and the University of Douala installed one improved fish smoker made with bricks in Dahomey and 2 metallic stoves in Dahomey and Nyangadou, where large number of women processors are living .

Providing improved fish stoves and ovens, the project aims to provide economic and social support to women fish processors in Manoka. Additional income is generated from the increase in quantity of processed fish and the reduction of smoking time and firewood consumption.

Benefits associated with the improved fish smoking models

The improved fish smoking systems introduced in Manoka are of two types: one is an oven made with brick and the other is a metallic stove. The main objective of the project is to reduce mangrove and other ecosystem degradation by reducing the quantity of wood needed for smoking. The improved models are therefore more energy efficient than the traditional ones.

The associated benefits include shortened processing time and better quality (colour and flesh texture) of processed fish which generate additional income for women processors, better control of heat and smoke compared to traditional models, minimizing the risk of fire and health problems due to heat and smoke.

1.2. Project Developer

Organization name	REFACOF (The African Women's Network for Community Management of Forests)
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1.3. Other Entities Involved in the Project

Organization name	WOCAN
Role in the project	Technical support for application of the W+ methods
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1.4. Project Start Date

The improved fish smokers were implemented on September 2019 in Manoka.

1.5. Project Crediting Period

The crediting period is 2 years: February 2022 – February 2024

1.6. Project Location

The project was implemented in Manoka, an island located in the coastal region of Cameroon, in the Douala VIth (6th) district, between 3°51'19"N and 9°36'53"E



1.7. Title and Reference of W+ Methods

Measuring changes in fish women processors income/assets generated through the implementation of improved fish smokers and stoves

2. IMPLEMENTATION STATUS

2.1. Implementation Status of Project Activities

The project started in September 2019 and improved smokers were delivered until November 2020. Fish smoking women are still using the improved smokers in 2024.

2.2. Where applicable, describe how non-double counting measures are being implemented.

NA

2.3. Where applicable, describe how non-permanence risk factors are being monitored and managed.

NA

2.4. Methodology Deviations

There were no method deviations

2.5. Project Description Deviations

NA

2.6. Results and key findings

The Income & Assets W+ Domain was applied to measure the changes in women's income and assets. The following is a summary of findings in the Income & Assets domain:

- The total increase in income for women using the improved fish ovens and stoves is 765,976 FCFA per household compared of that earned by the Non-users.
- The average percentage of change is 125.4% from baseline conditions
- The total number of women Users is 160

3. RESULTS

3.1. Data and parameters

3.1.1. Data and Parameters Available

Data / Parameter	Number of women Users
Data unit	Wc.p
Qualitative data	NA
Description	Number of women using the improved fish stoves and oven
Source of data	W+ income survey
Justification of choice of data or description of measurement methods and procedures applied	The sample size parameters are as follows: • Population size = 160 • Assumed proportion 50% • Level of acceptable error = 5% • Level of significance= 95% • Required sample size = 61 • Final considered sample size = 142 Two sets of surveys were applied: Users of improved fish smoking oven and stoves, and non-Users to serve as a control population.
Purpose of the data	The purpose of the data was to establish the gross income earned by Users of improved fish smoking oven and stoves by comparing it to non-Users
Comments	NA

3.1.2. Data and Parameters Monitored

Indicator	Income
Data unit(s)	Total number of Users
Description	Average income generated by sales of smoked fish
Source of data	Surveys undertaken from 09 to 19 January 2024
Description of methods to collect information and procedures to be applied	Enumerators were trained and employed to apply the surveys. Data was collected using paper questionnaire. At the end of each day, enumerators submitted their results.
Purpose of the data	This corresponds to the income/assets formula
Comments	NA

Indicator	Income
Data unit(s)	Increase in income generated by using improved fish oven and stoves
Description	Established by comparing income survey results of Users with that of non-Users, calibrated on a per person basis
Source of data	Survey
Description of methods to collect information and procedures to be applied	Enumerators were trained. Data was collected using paper questionnaire. At the end of each day, enumerators submitted their results.
Purpose of the data	This corresponds to the income/assets formula
Comments	NA

3.1.3. Monitoring Plan

Results Chain	OUTCOME	INDICATORS
Outputs	Increase in income	Large proportion of women users perceived that their income has increased
Immediate Outcomes	Increase in assets	Additional income from the use of improved oven and stoves provided opportunities for women to generate additional income and assets.
End outcomes	Increased perception of well being	Women Users perceived improved well- being through income generated by the use of improved fish smoking oven and stove

Do No Harm indicators

Indicators	Women Users report on the challenges they face in participating in the project
Question (s)	Did you encounter any problems or challenges in the implementation of improved fish oven/stove project?

	What type of problems/challenges did you face?
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3.2. W+ Results

3.2.1. Results

W+ Domain	Income and Assets
Indicator	Increase in income and assets from the use of improved fish smoking models implemented by the project
Description	- Income for women increases by using the improved fish smoking models. - Users were able to invest the additional income to households' goods and education of their children 125,4% change from baseline conditions - Savings of women Users increase from the additional income generated by the use of improved fish oven/stove. - More than 80% of users (54% of non-Users) are members of saving groups 84% of users stated that the increase in income is significant
Situation	Compared to large number of women processors in Manoka and the large quantity of fish they can process daily, the number of improved stove and oven is not enough.
Prospects	To make sure improved stove and oven continue to offer significant income to women in the fish camps of Manoka, the following issues should be considered: - Increasing number of improved stoves and oven in the different fish camps to promote women processors' access of these new fish processing systems - Ensuring maintenance of the improved stove and oven - Enhancing organizing capacity of AFUMA (Association of Fish smoking Women in Manoka) members to enhance their leadership skills

3.2.2. Summary Analysis of Results

Current Performance

REFACOF implemented the project in Manoka in 2019 to introduce improved fish smoking models to support the reduction of mangrove and other ecosystems degradation. Approximately 160 women benefited from this project by improving their incomes.

Calculation of the percent of change

Sample size

The sample size for the survey was 142, which included 68 users of improved fish smoking systems, and 74 non-users. Interviewee samples were from the villages of Dahomey, Nyangadou, Plateau and Sandje fish camps located in Manoka Island, in the littoral zone of Cameroun.

Sampling frame

Sample size was calculated in compliance with the general guidance on sampling. The final sample size using this method is as follows.

Table 1: Sampling details

Population size	160
Assumed proportion	50%
Level of acceptable error	10%
Level of confidence	95%
Required Sample Size	61 Users 61 Non-Users
Final considered sample size	142 (68 Users and 74 Non-Users)

Calculation of results

The total increase in income for women benefiting from the introduction of new models of fish smoking is calculated by comparing the increase in their income with those of non-users.

Table below shows the monthly income of the Users and non-Users households. The average total monthly income of the user's households is 1,376,618 FCFA (2273 US\$) /month, compared to 610,642 FCFA (1008 US\$)/month that of non-users.

During the peak season, one woman using the improved oven /stove can sell up to 4 – 5 baskets of dried fish per week and non-user women, 2-3 baskets.

Table 2: Average monthly income of project-supported user and non-users' households

Household Type	n	Monthly average Income (FCFA) / US\$	Std Dev (FCFA/US\$)
Users (TTsu)	68	1,376,618 / 2273	523,460 / 864
Non-Users (TTsnu)	74	610,642 / 1008	247,801 / 409

Increase in income by using the improved technology is equal to 1,376,618 FCFA - 610,642 FCFA = 765,976 FCFA (1265 US\$)

Final Calculation of Percent of Change

In order to calculate the percent change in income increase from baseline, we calculated the average income gained by Users compared to that of non-Users women and then divide it by baseline value.

To calculate the percent change, we took the difference between the average income gained by the users and that of the non-users and then divide it by the baseline value and multiply the result by 100.

$[(\text{Income of Users} - \text{Income of non-beneficiaries}) / \text{Income of non-beneficiaries}] * 100$

The table below details the calculation of the percentage change of the income:

Table 3: Calculation for income

Income change (User income -Non User income)	765,976 FCFA / 1265 US\$
Percentage Change of income from baseline [(User income- Non-User income)/Non user income] * 100	125,4%
Total Users (Wc,p)	160
Total W+ units¹ [Wc,p*% change if income*0.1= 100*125.4*0.1]	2007

¹ Every 10% difference from the baseline =1 unit per women



APPENDIX

Detailed Analysis of Findings

Surveys location

Dahomey, Nyangadou, Plateau and Sandje were purposively selected for the survey. Nyangadou and Dahomey are the fish camps where the improved model of fish stoves and oven were installed. Sandje is one of the fish camps where all of women processed fish and some of women in Plateau are also using the improved systems. Table below shows the locations for the surveys for Users and non-users.

Table 4: Geographical distribution of respondents

Clusters	Users		Non-Users		Total	
	n	%	n	%	n	%
Dahomey	35	51%	28	38%	63	44%
Nyangadou	30	44%	29	39%	59	42%
Plateau	3	4%	4	5%	7	5%
Sandje	0	0%	13	18%	13	9%
Total	68	100%	74	100%	142	100%

Family size

The mean family size is eight, including two adult men, two adult women and four children, both for Users and non-Users.

Table 5: Family size

Members in HHs	Users	Non-Users
Adult Men	2	2
Adult Women	2	2
Children	4	4
Family Size	8	8

Income

The main source of income for the women in the fish camps is the sale of smoked fish. Income earned by women fish processors varies considerably according to fish seasons. During the high season, from November to March, fishermen can catch fish more than four times than during the low season (April to October). For the W+ measurement, the average monthly income for both seasons was used.

Income from fish sales is used to meet household and fishing and fish processing expenses such as labor costs, repairing / purchasing of motors and canoes, fuel.

According to the table, women users of the improved stoves and oven introduced by REFACOF can earn as much as more than twice than the non users women.

Table 6 : Monthly income

	Users		Non-Users	
	Mean	SD	Mean	SD
Monthly income from sale of fish in high season (Nov-March)	1917206	748170	868378	376851
Monthly income from sale of fish in low season (April-Oct)	836029	372150	352905	175410
Average monthly income from both seasons	1376618	523460	610642	247801

Perception of increased income

Users and non-Users perceived an increase in their income compared to last year. More than three fourth of the users have this perception, while only 58% confirmed that for the non-Users. This increase in income is significant for 84% and 57% of Users and non-Users respectively.

Perception of increased income from last year

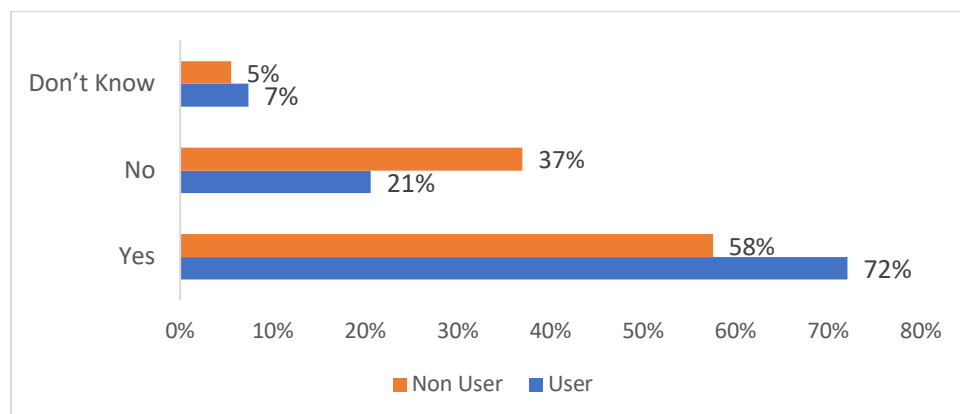


Table 7: Perception level of increased income

	Users		Non-Users	
	N	%	N	%
Significant	41	84%	24	57%
Moderate	6	12%	10	24%
Low	2	4%	8	19%

For the users of improved fish smoking models, the increase in income comes mainly from the increase in processed fish (stated by 85%), better smoked fish quality and access to better technology and equipment.

Table 8: Reasons of the income increase

Reasons	Users		Non-Users	
	n	%	N	%
Better access to market	24	45%	16	35%
Increase in production	45	85%	35	76%
Better quality of smoked fish	40	75%	16	35%
Less expense costs	32	60%	12	26%
Access to better technologies and equipment	37	70%	10	22%
Savings from technology and equipment access	27	51%	12	26%
Others	10	19%	12	26%

Use of additional income

Additional income is used mainly for the expenses related to education of children, food consumption and improving housing. For users, it is also used to re-invest in their business such as renewing fishing nets, purchasing canoes or other equipment, rehabilitate kitchen. Additional income is also invested for improving housing either in the fish camps or in their country (Nigeria).

Table 9: Use of additional income

Use of Income on	Users		Non-Users	
	n	%	n	%
Properties	21	40%	11	24%
Improve housing	41	77%	36	78%
Re invest in business	37	71%	26	57%
Education of children	49	92%	36	78%
Food consumption	46	87%	37	80%
Technology/communication	37	70%	27	59%
Entertainment/ Recreation	22	42%	18	39%
Savings	28	53%	24	52%
Health	42	79%	34	74%
Asset purchase	33	62%	26	57%
Purchase of beauty items	30	57%	21	46%
Others	11	21%	10	22%

Other benefits from additional income

The supplemental income is associated with significant improvements in health. Among the users, 91% stated that the additional income contributes to opportunities for better health.

Table 10 : Other benefits from additional income

Other Benefits	Users		Non-Users	
	n	%	n	%
Improve decision making at household level	27	51%	17	39%
Better access to community decision	23	43%	16	36%

income equality at the household level	21	40%	10	23%
Improve business	44	83%	29	66%
Time for income-generating activities	21	40%	13	30%
Improved Health	48	91%	37	84%
Well being	37	70%	27	61%
Other	13	25%	9	20%

Saving group membership

The purpose of saving groups is to provide simple savings and loans facilities to members. In Manoka, access to formal financial services is still a challenge for the population, mainly to women. Women get together as part of informal savings and credit groups. 81% of users stated that they are members of savings groups and they can invest in average as much as 114,815 FCFA monthly.

Saving group membership

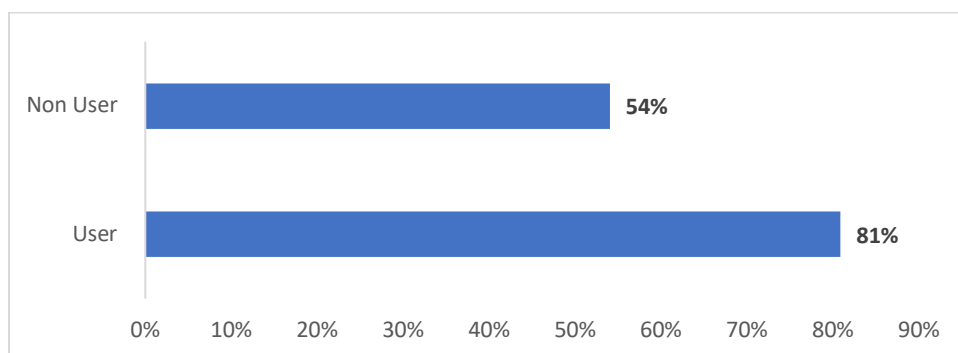


Table 11: Average monthly savings

Type	Average Saving per month (FCFA)	Min	Max
User	143959	10000	800000
Non-user	114815	5000	500000

Do No Harm assessment

During the survey, questions related to do no harm assessment were asked to the users of improved fish smoking systems introduced by the project: (1) did you encounter any problems in implementing the project? and (2) what type of challenges did you face?

More than half of them (54%) stated that they have problems like spending too much time earning income from using the improved stoves. Women processed larger quantity of fish with the new systems and therefore spend more time on smoking activities. Some of them (37%) highlighted

that they did not voluntarily implement the project as they did not participate in the project kick-off meeting and the improved stoves and oven were installed in some of AFUMA committee members. During the meeting, some issues were decided such as the changes of the dimensions of improved smoking oven and stoves and where they will be put in place. Some of the processors complained that not only the number of improved smoking was not enough but where they are located now did not allow many women to fully benefit from the project. The households where the ovens are installed are the primary beneficiaries.

Table 12 : Did you encounter any problems or challenges?

	No	%
Yes	37	54%
No	31	46%
Total	68	100%

Table 13 : What type of problems/challenges did you face?

	Beneficiary (N=68)			
	Yes		No	
	n	%	n	%
Did the time needed to participate in project prevent you from participating in other income-generating activities or employment?	12	18%	56	82%
Did you have to invest too much time building the income or assets you gained from the project?	20	29%	48	71%
Has the income gap between women and men increased?	17	25%	51	75%
Have you had to sell assets (jewelry, livestock etc.) in order to pay for aspects of the project?	0	0%	68	100%
Has increase in income or assets led to any physical abuse?	0	0%	68	100%
Has the increased income from using the improved oven created any emotional abuse?	0	0%	68	100%
Has the increase in income from the use of the improved oven created any social sanctions?	0	0%	68	100%
Has the increase in income from the use of the improved stove lead to violence?	0	0%	68	100%
Has increase in income or assets led to any marital troubles?	1	1%	67	99%
Has increase in income or assets led to any other problems?	1	1%	67	99%
Did you voluntarily implement the project (Yes)	43	63%	25	37%