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SUSTAINABLE FISHERIES MANAGEMENT PROJECT (SFMP)

Training of Micro-Finance Institutions on Stove Performance Indicators and Financing Scheme

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THE UNIVERSITY OF RHODE ISLAND
GRADUATE SCHOOL OF OCEANOGRAPHY
CRC COASTAL RESOURCES CENTER

SNV SMART DEVELOPMENT WORKS

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Cover photo: Presentation on Stove Financing Scheme (Credit: SNV)

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SNV:	http://www.snvworld.org/en/countries/ghana
SSG Advisors:	http://ssg-advisors.com/

ACRONYMS

CCM	Centre for Coastal Management
CEWEFIA	Central and Western Region Fishmongers Improvement Association
CRC	Coastal Resource Center
CSLP	Coastal Sustainable Landscape Project
DAA	Development Action Association
DFAS	Department of Fisheries and Aquatic Science
DMFS	Department of Marine Fisheries Sciences
DQF	Daasgift Quality Foundation
FtF	Feed the Future
GIFA	Ghana Inshore Fishermen's Association
GIS	Geographic Information System
GNCFC	Ghana National Canoe Fishermen's Council
HM	Hen Mpoano
ICFG	Integrated Coastal and Fisheries Governance
MESTI	Ministry of Environment Science and Technology
MFI	Micro-finance Institution
MOFAD	Ministry of Fisheries and Aquaculture Development
NDPC	National Development Planning Commission
NGOs	Non-Governmental Organizations
SFMP	Sustainable Fisheries Management Project
SMEs	Small and Medium Enterprises
SNV	Netherlands Development Organization
SSG	SSG Advisors
STWG	Scientific and Technical Working Group
UCC	University of Cape Coast
URI	University of Rhode Island
USAID	United States Agency for International Development
WARFP	West Africa Regional Fisheries Development Program

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1.0 BACKGROUND

The Sustainable Fisheries Management Project (SFMP) being funded by USAID seeks to rebuild marine fisheries stocks and catches through the adoption of responsible fishing practices. The project contributes to the Government of Ghana's fisheries development objectives and USAID's Feed the Future Initiative. The Coastal Resource Center (CRC) of the University of Rhode Islands (URI) is the main implementer, working with international and local partners, including SNV Netherlands Development Organization.

Research has shown that the post-harvest processing techniques used in Ghana's fisheries sector pose significant health threats to both the consumers and processors. For instance, processors suffer from high smoke and heat exposure resulting in serious health problems. The smoked fish on the other hand retains high PAH levels, rendering the product unwholesome for human consumption. Also, fuelwood being the main source of energy for fish processing in Ghana, is contributing great depletion to the high deforestation rate in the country.

As a means of enhancing post-harvest processing activities by improving upon the quality of smoked fish whiles reducing fuelwood consumption, an improved fish smoking technology development program was initiated by SFMP in 2016 to come out with a solution to the menace. SNV has been the lead partner on this assignment with support from CSIR-Food Research Institute and Fisheries Commission. The services of both international and national stove consultants were also acquired. Out of this initiative, the Ahotor oven was developed.

A lot of awareness has been created on the Ahotor oven in the fishing communities, raising demand for the oven among fish processors. The fish processors appreciate the benefits of the Ahotor technology as against the Chorkor oven as an improved cook stove. However, many of the fish processors who have expressed interest in acquiring the oven are unable to pay upfront the cost of the oven and thus require some form of financial intermediation to facilitate stove acquisition.

Consequently, the project developed a stove financing model to support procuring of the Ahotor oven by fish processors. Under the financing model, the project is partnering selected financial institutions to provide loan support to fish processors to acquire the oven in a form of asset financing.

To educate Micro-Finance Institutions (MFIs) on the Ahotor stove technology and the project's financing scheme as well as their expected role in the partnership, a 3-day training program was organized for them on the stove performance indicators and financing scheme to ensure smooth implementation. This training took place from the 22nd to 24th August, 2017.

1.1 Workshop Objectives

The objectives of the workshop were:

- To educate MFIs on SFMP goals and the IEC messages
- To train MFIs on the stove financing model and their role for its sustainable implementation
- To train MFIs on stove performance indicators and standards to enable them monitor and evaluate stove standards effectively.

1.2 Expected outcomes

Expected outcomes of the workshop included:

- Participants understand the stove financing scheme and employ it effectively for stove promotion.
- Participants understand and appreciate the need to promote Ahotor ovens to ensure healthy fish production.
- MFIs can verify and validate stove performance and standards.

1.3 Training Participants

Participants were drawn from financial institutions and post-harvest partners. Twenty-two (22) out of 23 expected participants participated in the training program as shown in Table 1 which lists the expected FIs and partners invited and the expected number of participants.

Table 1 Expected participants for the training workshop

Financial Institutions	Number of Participants	Post-Harvest Partners	Number of Participants
Ahantaman Rural Bank	3	SFMP/SSG Advisors	2
Gomoa Rural Bank	3	DAA	2
Microfin Rural Bank	3	SNV	2
Anlo Rural Bank	3	CEWEFIA	2
Akatakyiman Rural Bank	3		

2.0 TRAINING DETAILS

The overall goal of the workshop was to sensitize participating financial institutions on the importance of the Ahotor oven as the leading homegrown improved cook stove technology and on the modalities for operationalizing the stove financing model, so as to prepare them (financial institutions) towards the promotion of the Ahotor oven.

The training was sectioned in two main parts. The first part looked at the motive behind Ahotor oven promotion and the role of the financial institutions. The second section was focused on stove performance indicators and standards to enable MFIs monitor and evaluate stove standards effectively.

The methodology used for the training was made up of presentations, group discussions and field demonstrations.

2.1 Opening

The welcome address was delivered by Mrs. Benedicta Avega – SNV Project Manager for SFMP. She outlined the purpose of the training as being derived from SFMP project objectives, particularly the post-harvest value chain component, under which interventions are being carried out to address the current challenges in post-harvest management in the fisheries sector. She credited USAID for committing resources through SFMP to develop an improved oven - the Ahotor Stove - to address the issue of high PAH levels in smoked fish in the Ghanaian market and urged all participants to work together to promote this all important intervention as it bothers on food safety.

Following are briefings on the main topics treated.

2.2 PAH Levels in Ghana and Health Risk

This topic was intended to provide the background to the stove technology development and the need for some interventions in the post-harvest sector as it bothers on public health. The PAH contamination levels in smoked fish in Ghana and its impact on health were clearly elaborated to participants.

Emmanuel Kwarteng – Advisor, SNV, making the presentation explained that, the smoking and drying techniques of the traditional stoves have quality and food safety issues caused by high levels of Polycyclic Aromatic Hydrocarbons (PAHs) in smoked fish. He said that PAH are carcinogenic, fat soluble, nonvolatile and extremely persistent, and develop especially during the incomplete combustion of organic materials. Globally, PAH levels in food are monitored by regulatory agencies with a combination of four compounds (PAH4) being of specific interest: benz[a]anthracene, chrysene, benzo[b]fluorantene and benzo[a]pyrene. Under EU food standards, the level of PAH4 in smoked food products should not exceed 12 µg/kg and for benzo[a]pyrene (BaP) 2 µ/kg.

Recent SFMP analyses have shown that smoked fish contains PAH levels that were well above those recommended for human health, with the Chorkor stove some 7-10 times the EU standard. A recent study by UCC sampled hard-smoked fish (smoked with Chorkor ovens) from markets across multiple coastal regions and found PAH4 levels in excess of 400 µg/kg.

With respect to traditional fish smoking practices, PAH formation is dependent on the stove technology, fish species, wood type and smoking method. Through literature reviews, it appears that other influencing factors include the incomplete combustion of wood, dripping of fat into open fire, and exposure to excessive heat and smoke.

PAH levels on smoked fish from Ahotor oven are significantly low with average levels 0.60 µg/kg and 10.93 µg/kg for BaP and PAH4 respectively, which meets the EU standards. Figure 1 below shows the stove comparison of PAH levels in smoked fish to the EU standards.

2.3 The Ahotor Technology and Benefits

The presentation was made by Mr. Steven Nketia (CSIR-FRI). He explained how and why the Ahotor technology is an improvement over the Chorkor oven. Projecting a picture of the Ahotor oven, he explained that, the Ahotor oven is designed with a combustion system in place to cut down fuelwood consumption while reducing PAH contamination levels. The combustion system ensures efficient combustion of fuelwood causing less smoke emissions and making the oven more user friendly. He also explained that, the introduction of the fat collector is to channel the drippings of water, blood, and oil from the fish away from the fire. The oven produces high quality smoked fish with an attractive and appealing color. The reduction in fuelwood consumption also serves as savings for the payback on the Ahotor oven. The Ahotor technology reduces significantly PAH levels in smoked fish and makes it wholesome for human consumption.

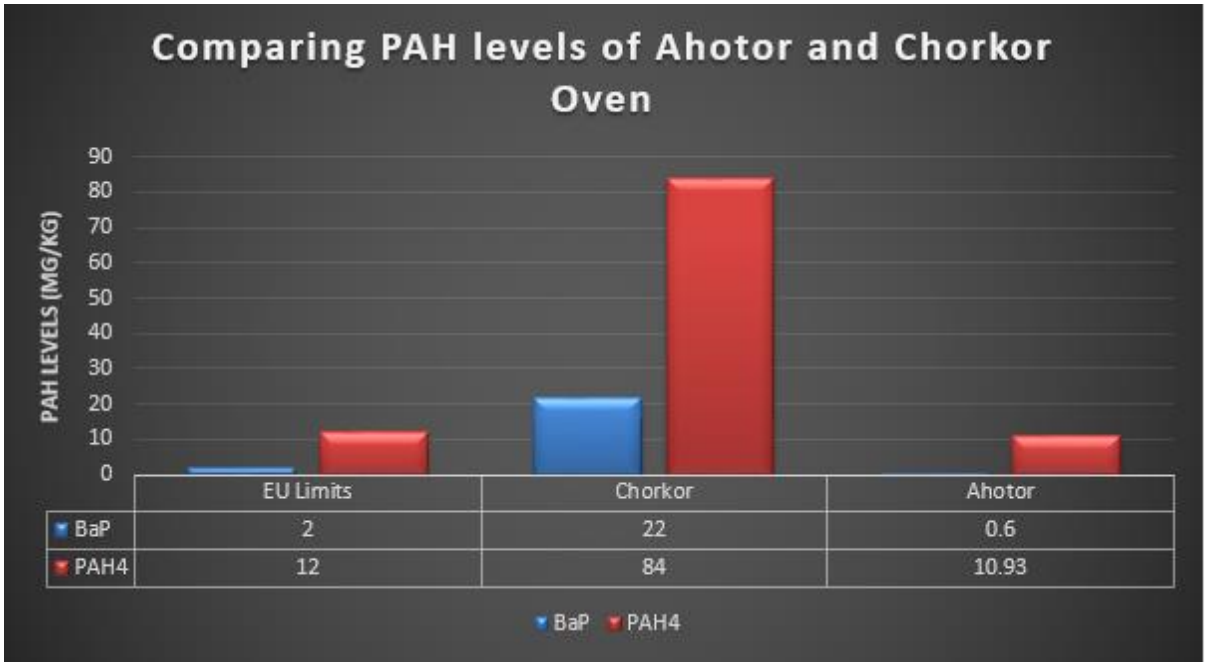

Figure 1 A chart comparing the PAH levels in smoked fish from Chorkor and Ahotor Oven

2.4 Stove financing module

Emmanuel Kwarteng (SNV) presented on the stove financing partnership model. The roles and responsibilities of financial institutions in the partnership were elaborated. The SFMP provides an early adopters' incentive of 30% of the total cost of the stove limited to the first 200 beneficiaries. Afterwards the incentive package ends, the stove would be purchased at full cost. He explained that, the financial institutions are the fulcrum for the sustainability of the scheme. Figure 2 below shows a graphical explanation of the stove financing scheme

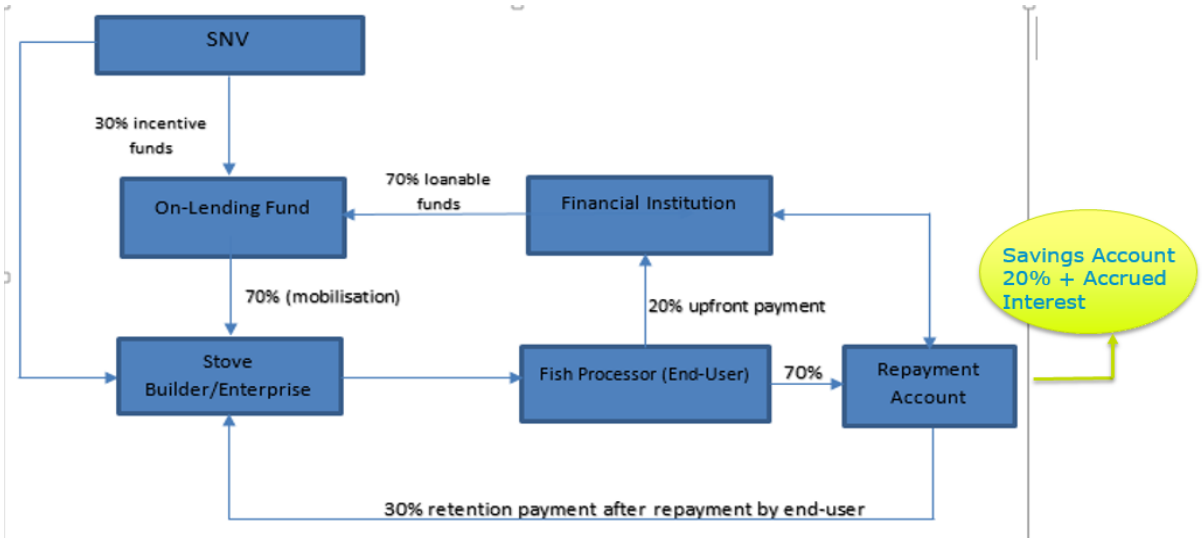

Figure 2 A graphical representation of the financing scheme for Ahotor oven promotion

Meanwhile, the financial institutions who have not yet signed onto the partnership were encouraged to sign on in time since the project is limited with time. Participants' questions were centered on their various responsibilities and clarifications on the cost of processing the loan. Microfin Rural Bank shared its successful experience in Year 1 under the promotion of the Morrison stoves using similar financing scheme and this got the other financial

institutions more interested since it is a workable principle. Microfin stated that, there were few challenges with the quality of the Morrison technology itself (stove developing cracks and construction delays) which caused delay in some of the repayment. Notwithstanding the challenges, default liability was less than 5%. These challenges have been addressed in the Ahotor technology. The introduction of GHS50 incentive for financial institutions is to cater for the processing fee for each loan processed.

Table 2: A table showing strategies for Ahotor technology diffusion in Ghana from the FIs perspective

GROUP 1	GROUP 2
• Use influential leaders to promote the technology • IEC materials be placed at banks for adverts. • Introduce products to possible businessmen and other customers • Involve MFI in awareness programs • Continuous education to end-users • Consider risk sharing (MFI and NGOs) • Awards to early adopters • 2 in 1 product for end-users (Store product and working capital) • Financial guarantee from NGOs • Highlight disadvantages of Chorkor oven • Evaluation by end-users	• Beneficiaries should be grouped for easy identification • There should be registration of participant with ID cards. • Get people who have used the technology to talk about it • The MFIs should be involved in the promotional campaigns. • The FIs should work with the CSOs - (DAA, CEWEFIA etc.) • The FIs should create market for the Ahotor users.
GROUP 3	GROUP 4
• Create market for Ahotor oven • NGOs open account for MFI • Concessional interest rate for Ahotor oven • Flexible repayment schedules • Showcase in souvenirs (T-shirts) • FIs to support the initiative as a CSR Using investment impact tool to measure impacts.	• Systemic education in Ahotor oven • Branding of Ahotor oven (location)- • posters showing distinctions • smoked fish branding • Supply Chain Network for smoked fish from Ahotor oven • 3 in 1 product, school fees, labour • Processing fee captured in loan • Customized grace period • Monitoring with canny eye

2.5 Strategies for Ahotor technology diffusion and upscaling

Furthermore, participants were put into working groups to come up with ideas to enhance the promotion of the Ahotor technology. The facilitator made sure participants from the same financial institutions did not end up in the same group to avoid groupthink. It is noteworthy that most of ideas that came up during the group presentations, were crosscutting. Table 2 outlines the ideas from each group.

2.6 Environmental Compliance – USAID requirement

On environmental compliance, Mrs. Benedicta Avega focused her presentation on factors needed to be considered before an area is approved for stove construction. Her presentation targeted the site selection considerations and sources for raw materials for the construction. She educated participants on the need for stove builders to desist from extracting soil products from waterways or ecologically sensitive areas. Several factors including dump sites, wet areas, protected area, public toilet, and slope among others determine if a location is acceptable according to the USAID policy.

2.7 Training on stove performance indicators and field visit

Financial Institutions have the responsibility to monitor and evaluate the performance of the ovens to enable them validate justification for the issuance of the 30% final payment to stove companies. To equip them to carry out this task, a field demonstration was organized to conduct physical measurement on the various components of the oven as a means of verifying the performance of the Ahotor oven. They were also trained on other indicators that shows that the stove is complete. These indicators may include, the combustion grate, fat-collector, the hood and trays if applicable. A checklist has been developed for this purpose to facilitate the process.

Figure 3 Field demonstration and physical measurement of Ahotor oven using checklist

Participant found this exercise very useful since most of them had not even seen the Ahotor oven before as well as its components. The field demonstration gave them more understanding of the technology and how it operates.

2.8 Lessons Learnt

Participants on the third day were asked to write down their new knowledge and the lessons learnt over the training period as means of assessing the impact of the training. The following summarizes participants' feedback on the training:

Participants indicated their increased understanding of the Sustainable Fisheries Management Project and its post-harvest interventions as well as the background for developing the Ahotor

technology. They indicated they have acquired new knowledge on the benefits of the Ahotor technology with respect to Polycyclic Aromatic Hydrocarbon (PAH) levels. In-depth knowledge has also been acquired on the use and maintenance of the Ahotor stoves together with the environmental concerns and consciousness.

Meanwhile, the workshop has fueled the interest of financial institutions to team up with the project in contributing to solving public health hazards associated with PAH levels through the promotion and adoption of the Ahotor ovens. This is being considered not only from the business point of view but also with the perspective of corporate social responsibility.

On the other hand, the workshop has helped reveal and address all the banks' hidden charges that usually adds up to the cost of loans and make it difficult to pay back.

Finally, participants indicated that through their experience from the training, they can confirm that the Ahotor oven is beneficial to the end-user and the Ghanaian public as a whole. There is therefore the need to expound the benefits of the Ahotor oven and educate the fishmongers about the effect of smoke on health.

3.0 CONCLUSIONS

Participants' contributions in the form of submissions and questions indicated their willingness to support the course of healthy fish promotion program for the Ghanaian market. The training increased participants' knowledge on fish post-harvest processing interventions as well as the financing scheme calculations.

Although participants understood the financing scheme and endorsed it, each MFI has its own working policies and conditions. The interest for example will vary from one financial institution to the other depending on the prevailing working policies of the bank. The project however appealed to the FIs to offer the best minimum interest rates to enable more processors adopt the technology.

Financial institutions were ready to give additional loans to interested fish processors who will opt for working capital apart from the stove loan after all the necessary due diligence have been carried out.

On the whole, the training was very successful with all the objectives achieved.

APPENDIX 1

Checklist for stove performance verification

Beneficiary:			**Location:**				
Number of Units:		**Contact:**			**Date of Request:**		
Lat:		**Long:**		**Elevation:**		**Accuracy:**	
Stove Company/Builder:				**Date of Completion:**			

Stove Part	**Breath**				**Length**				**Height**			
	mm	Checked	Inches	Checked	mm	Checked	Inches	Checked	mm	Checked	Inches	Checked
Stove Wall	960		37 ¾		1075		42 ¼		915		36	
Primary Air Inlet	100		4		335		13 ¼		355		14	
Firewood Entrance	254		10		630		24 ¾		285		11	
Combustion Tube	150		6		150		6		445		17 ½	
Secondary Air Inlet	254		10		350		13 ¾		285		11	
Combustion Chamber	254		10		740		29		660		26	
Oil Collector	880		34 ¾		800		31 ½		75		3	
Grate	252		9.9		400		16		75\80		3	

Indicators	Yes	No	Remarks
1. Is the combustion chamber built with bricks?			
2. Is the stove wall built with bricks or cement blocks?			
3. Is the floor of the oven well cemented?			
4. Is the combustion chamber built with clay/anthill mortar?			
5. Is the outer wall of the stove built with cement mortar?			
6. Are the fat collector tubes well sealed with cement mortar?			
7. Is the fat collector positioned at an angle of $25° \leq 30°$			
8. Are the number of trays up to the agreed quantity?			
9. Was the beneficiary's choice of mesh considered in the material selection?			
10. Are the grates provided?			
11. Are the fat collectors provided?			
12. If applicable, are the hoods provided?			
13. If applicable, is the oven cement coated?			
14. Is the beneficiary satisfied with the services of the stove builder?			