

## Capitalization document on fuel efficient stoves

### **ACF experience: Pilot fuel efficient stoves construction: to reduce firewood consumption through alternative stoves**



**A pilot experience from integrated Food Security and Livelihoods & Water, Sanitation and Hygiene program (2011-2014)**

**ACF Myanmar Mission, Kayah State, November 2014**

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## 1. Brief glimpse of the project area

Kayah State is located in the Eastern part of Myanmar, bordering Thailand. It is considered as one of the poorest States in Myanmar. Decades of military rule and conflict have impacted lives and livelihoods of most of the people, and led to temporary and permanent displacements of populations between the 1990s and the beginning of 21<sup>st</sup> century. In mid 2012, the Union Government and the last remaining strongest ethnic armed group KNPP<sup>1</sup> signed a cease fire agreement. Both opened the door for humanitarian agencies to carry out development programs in the State. Moreover, the Union and State governments have engaged in efforts to improve roads, health facilities and schools. However, the needs of the population are still very high: poor water access, chronic food shortage, low electricity supply, lack of health facilities functioning, insufficient road network ...

The majority of the population is rural (70% of 316,714 persons<sup>2</sup>) and is primarily working in the agriculture sector. Communities are relying on small-scale agriculture as the main livelihood.

ACF intervenes in this area since 2008, providing support to vulnerable populations, with a focus on mitigating conflict related vulnerabilities, mainly through Food Security and WASH activities.

Fuel efficient stoves activity has been implemented for 3.5 years between 2011 and 2014 in the framework of the project “Integrated WASH and Food Security Project for Uprooted Communities in Kayah State, Union of Myanmar”, funded by EuropeAid and in partnership with KMSS (Karuna Loikaw), KHB (Kay Htoe Boe association, KPBA (Kayah Phu Baptist Association) and KBA (Kayah Baptist Association):

- o Overall objective: To contribute to the improvement of the status (livelihood and health) of uprooted people in selected townships of Kayah State, Union of Myanmar.
- o Specific objective: To create viable foundation for future development of the concerned areas through improved food security and livelihood, and access to water, sanitation and hygiene for at least 4,000 households in Demoso, Loikaw and Hpruso townships.

The expected result for the fuel efficient stoves activity is: “Decrease the cutting of firewood in the forest through awareness and alternatives stoves”.

## 2. Rationale

With an economy mainly relying on agriculture and natural resources, Kayah is vulnerable to environmental degradation, such as deforestation:

- **“Slash and Burn” cultivation.** Farming is practiced in both highland and lowland areas. Highland shifting cultivation predominates and is practiced on hilly slopes, the main crops being upland rice and maize. This traditional rain-fed farming system relies on seasonally cutting and burning large areas of forest for cultivation. After a set period of years (1 to 3 years), the land under cultivation is allowed to go fallow and then another area of forest is cut, burned and cultivated. Then, hundreds of forest acres are cut and burnt annually for farming purpose. This farming system is sustainable when enough time is let between 2 cycles for forest and soil regeneration. However, as the population density grows, there is evidence that fallow periods have decreased

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<sup>1</sup> Karenni National Progressive Party

<sup>2</sup> Myanmar Information Management Unit (2011); Myanmar Statistical Yearbook (2011); and Ministry of Health (2011)

in some areas (from 8-10 years to 4-6 years)<sup>3</sup>, which leads to a decrease in soil fertility and forest degradation.

- **Logging.** One of the main causes of deforestation is related to unsustainable logging practices, including large-scale legal logging concessions (managed at Union level), large-scale illegal logging and small-scale unsustainable forest use by communities. Nearly all villages in Kayah use firewood as their primary fuel. The populations are also relying on the forestland resources for cooking (for family members and animals), lightening, heating, and construction. Each household collects till 3.5 to 5 metric tons of firewood from the forest annually<sup>4</sup> to meet these needs. The combination of unregulated logging with limited replanting is creating serious environmental challenges.



• Pictures 1 & 2: A forest being cut and burnt for shifting cultivation (left); Stock of firewood under a rural household's house (right)

In this context, ACF action was aimed at reducing pressure on natural resources and at encouraging appropriate natural resources management through the promotion of fuel efficient stoves that reduce the use of firewood and awareness raising on forest conservation and community forest management, in link with aspects of land protection and water conservation that are already tackled through other activities.

A previous projects implemented through SDC<sup>5</sup> funding (2009-11) has shown that clay stoves could reduce the consumption of firewood till 30-40% compared to open stoves that are usually used. Other monitoring findings indicate:

- Reduction of workload on women and children. They are responsible for cutting and carrying firewood (generally annual collection). For each cooking (twice a day), women use at least 6 to 10 pieces<sup>6</sup> of firewood in an indoors open fire. But when they are in a hurry mode or organizing important farming activities the wood consumption can scale up to 10 to 15 pieces of firewood.
- Reduction of the diarrhea cases. The stoves promotion is linked with hygiene promotion aspects, especially to water treatment, since the stoves also impact the quality of water boiling (better combustion, less time spent and wood used).

<sup>3</sup> Kayah State Socio-Economic Analysis, September 2013.

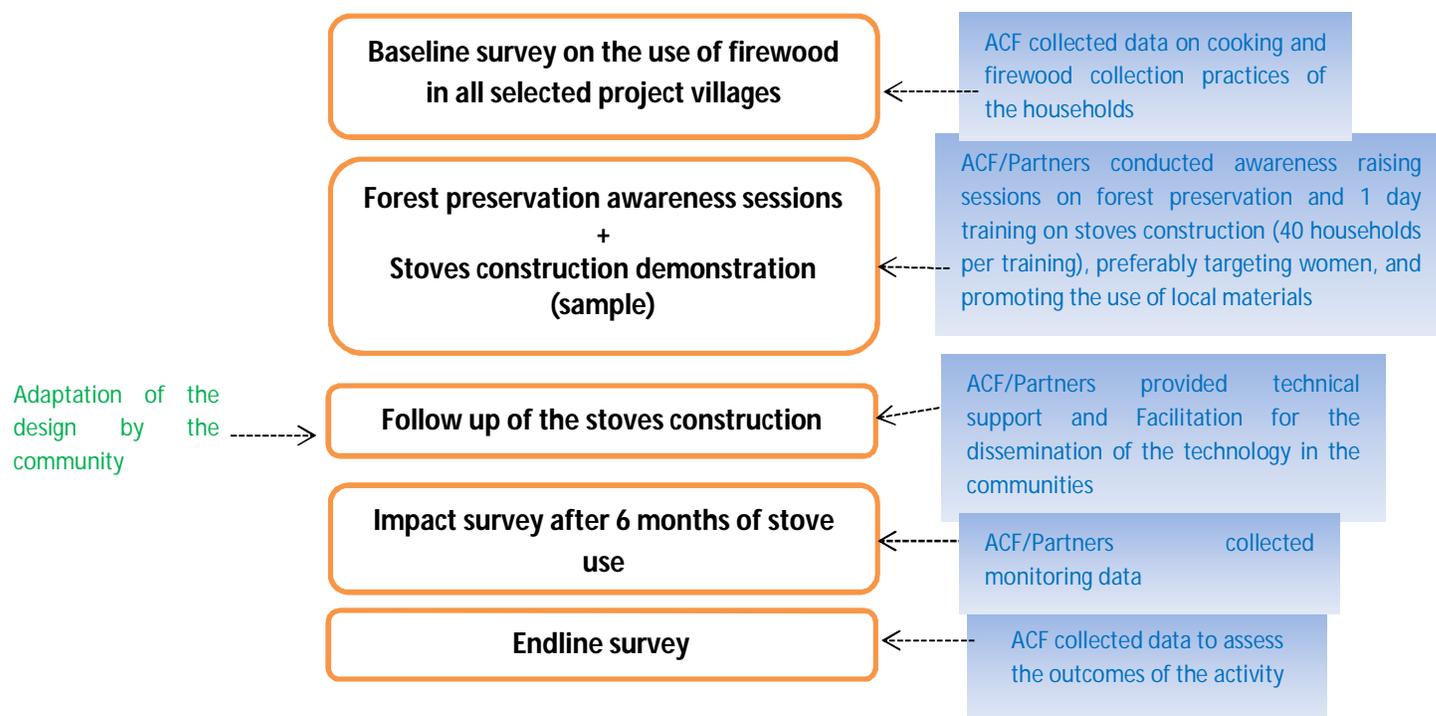
<sup>4</sup> ACF 2011 baseline report

<sup>5</sup> Swiss Agency for Development and Cooperation

<sup>6</sup> A piece of dry wood is equivalent to 1 kg

- Reduction of the quantity of smoke diffused in the house with the decreased use of firewood, meaning that efficient stoves reduce the prevalence of respiratory diseases. During cooking with open fire, the whole house, generally reduced to one big room next to the open fire, is full of smoke, leading sometimes to breathing difficulties.

### 3. Steps of implementation



All the targeted households have been invited to awareness raising sessions on forest conservation, provided as a supplement to other activities such as water supply (addressing the issue of springs preservation) and agricultural trainings (addressing the issue of soil preservation) – see **Annex 1**. In addition, they received 1 day training of stove construction (see **Annex 2**). These sensitization sessions and trainings mainly targeted women, as they are responsible for firewood collection and cooking. In order to foster sustainability, the promoted stoves design used local techniques and local materials such as clay, cow manure, rice husk and salt. A stove is built within half day and dried for 1 week (5 days indoors and 2 days outdoors).

After training the interested beneficiaries were followed by ACF and its partners during their stove construction.



Pictures 3 & 4: Demonstration of construction of fuel efficient clay stove using local materials (left); Fuel efficient clay stoves are dried indoors (right)

#### 4. Achievements, challenges faced and outcomes

The activity started in 64 villages in 2011, resulting in the construction of 1181 stoves (see table below).

| Activity  | Target                                       | Achievement at the end of project (October 2014)  |
|---|--|---|
| Awareness raising sessions on forest preservation | 64 villages (80 sessions)<br>4000 households | 64 villages<br>3579 households  |
| Fuel efficient stoves construction                | 64 villages<br>4000 stoves                   | 64 villages<br>1181 stoves (lower than planned due to activity revision in 2013 – see part 5) |

Mobilization has been difficult and beneficiaries did not show a high interest for this activity due to various reasons mentioned below.

- **Large availability of forest wood.** In the targeted areas, the wood is largely available. In parallel, no sustainable forest management restricts massive logging by big companies in neighboring areas.
- **Lack of resistance of the stoves.** Contrary to the previous project, the observations indicated that the first promoted design led to quite fragile stoves and that the clay could show problems of resistance to heat (cracks on the stoves). This could be explained by the lower quality of the clay in the targeted areas.
- **Small size of the stoves.** One of the main constraints was that the stoves size was too small for the households' use of large cooking pans. Food preparation usually requires big pots, as stoves are also used for animal food cooking.
- **Lack of heat.** Unlike an open fire, the use of fuel efficient stoves does not always allow sufficient warming of the houses during the winter and does not allow to dry crops and clothes. This is mainly related to the design of the stove.
- **Slow cooking.** Some households reported that it takes longer to cook rice with an efficient stove than with an open stove.

To overcome the stove quality issue, from March 2013, ACF has developed a second model in which cement and iron plate are introduced (these materials have been provided by ACF), for a total cost of 200 MMK per stove<sup>7</sup> (instead of almost 0 MMK for the 1<sup>st</sup> model). This makes the stove stronger and more durable (1 year maximum with the previous model). The stove is dried only within 3 days and the iron plate allows easy removal of ashes, increasing cooking speed. However, cement is a lower insulator than clay.

To take into consideration the low participation of the communities, in July 2013, the activity has been reviewed. Initially, training on stoves construction was done for every beneficiary participating in the awareness raising sessions on forest preservation. But as the quantitative achievement was quite low compared to the initial target, and taking into consideration donor's advices and feedbacks from beneficiaries and the team, ACF decided to transform this activity into a pilot and scale down the implementation. It has been decided to maintain the awareness raising sessions on forest preservation and to readapt the stoves building component. The existence of alternatives stoves was mentioned to beneficiaries during awareness sessions, but technical support (and cement) was only provided to households asking for it.

Results and indicators have been modified:

|   |  |
|---|--|
| <b>Previous result</b><br>Increase of the forest preservation around the selected villages                    | <b>Previous indicator</b><br>75% of the 4000 targeted households reduced their firewood consumption by at least 20%                            |
| <b>New result</b><br>Decrease the cutting of firewood in the forest through awareness and alternatives stoves | <b>New indicator</b><br>90% of the households requesting support in constructing pilot fuel efficiency stove reduce their firewood consumption |

ACF endline survey conducted in October 2014 indicated that 92% of the interviewed households were using their fuel efficient stove, out of which 78% were using it on a daily basis. 98% mentioned that fuel efficient stoves allowed a 50% reduction of the consumed firewood, in comparison to open stoves.

Fuel efficient stoves have potentially additional positive outcomes:

- *Time saving* for households who collect firewood.
- *Reduction of noxious smokes and health benefits* (e.g. reduction of respiratory infections).

They also present various advantages, such as:

- *Low cost.* Fuel efficient stoves construction uses low cost material (even with the use of cement and iron plate).
- *Accessible technique.* Construction technique is quite simple and easy to disseminate. Local expertise is available within the State as some local organizations are also promoting this activity in other villages.

## 5. Lessons learnt and recommendations

<sup>7</sup> 1 euro is equivalent to around 1,327 Myanmar Kyat.

- An in-depth feasibility study that looks carefully into the various interrelated aspects (natural resources management, technical efficiency, environmental impact...) that affect the implementation process will be instrumental in assuring adequate planning.
- As the use of firewood is directly linked to ancient practices and relies on an easy access to forestland in the rural areas, the expected outcomes depend on a real behavior change. Advocacy for sustainable resources management at State level, replanting program should be also considered to contribute to forest conservation.
- It is still relevant to consider this type of activity as Kayah remains vulnerable to the environment degradation. But to ensure better effectiveness, the fuel efficient stove construction should target low income households from urban areas, with restricted access to firewood.
- Besides, the design (size and materials) should be reviewed to fulfill the communities' needs.
- Constant and long term awareness raising on natural resources management should be promoted and strengthened.
- As some NGOs are developing their own activity of fuel efficient stoves construction, sharing of experiences might be useful for comparing the stoves design and implementation process.
- Recently, fuel efficient stoves models from Thailand appeared in local markets but at much higher cost than the one promoted by ACF: 3000-5000 MMK for the small size and 10.000-15.000 MMK for the big size.



## ANNEXES

- 1- Forest conservation awareness session poster
- 2- Stove making poster



Annex 2. Stove making poster

## စွမ်းအားဖြင့် လောင်စာလျော့သုံးမီးဖိုပြုလုပ်နည်း

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