REPORT ON INTRODUCTION, CONSTRUCTION, MAINTENANCE OF FUEL-EFFICIENT WOOD STOVE

Short-term Mission Report

by

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and

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On behalf of:

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH and

Mekong River Commission Secretariat
1. INTRODUCTION

The Center for Forestry Science and Technology Utilization (also known as the Forest Science and Technology Application Center) hereinafter referred to as 'the Firm of Consultants' has carried out the extension of economical cook stoves of BLN brand in more than one province and city, especially in Hanoi, Ha Tay, Vinh Phu, Tuyen Quang, Yen Bai, Lao Cai, Hoa Binh, Thai Binh, Son La, Lang Son, Thanh Hoa, Dong Nai, Song Be... the local people of which - in particular the poor and the poorest ones in the Uplands - have welcome these activities and eagerly accepted the technologies introduced.

Much more recently these activities have attracted the attention of the Mekong River Committee (MRC) and that of its project dealing with 'Sustainable Management of Resources in the Lower Mekong River Basin'. The Firm of Consultants in collaboration with the MRC Project Management based at Dak Lak has developed activities to introduce the fuel-efficient wood stove of BLN brand into a number of villages of Dak Phoi commune, in the district of Lak, province of Dak Lak, to help local people save fuel wood and the time for cooking, improve the fire-place environment, reduce the drudgery of women and children involved in fuel collection and cooking and lessen the pressure on forests and their resources.

2. SOCIO-ECONOMIC CONDITIONS OF LOCAL PEOPLE AT DAK PHOI, THEIR HABITS OF COOKING, NEEDS IN FUELS AND STOVE BUILDING MATERIALS.

2.1 Geographical location:

Dak Phoi, a back commune of hill tribes, is located at the central part of Lak district, about 10 km from the district capital town. It is bounded:
On its northern side by Dak Lieng commune;
On its western side by Dak Nue commune;
On its eastern side by Bong Krang Commune; and
On its southern side by Krong No commune.

There are 11 villages in the commune, some of which (e.g. Buon Nam, Buon Bu Yuk, Buon Jie Yuk, Buon Lieng Ke, Buon Du Mah, Buon Dung) are covered by the MRC project, with four others (Chieng Cao, Lieng Ong, Fayar, Cao Bang) not yet being involved in the same project.

2.2 Physical and socio-economic conditions of the commune:

Total land area: 10,481.61 hectares

Of which:

a) Forest and forest land accounting for 9,035 ha; of which:

- Natural forest under maintenance: 250.75 ha
- Man-made forest: 180 ha
- Natural forest under' contracted' protection: 153.1 ha

b) Farmlands (proper): 446.61 ha, of which wet rice field = 245.5 ha (yielding 2.5 t per ha).

Other lands are meant for the cultivation of:

- Upland rice: 380 ha (yielding 1.4 t per ha)
- Maize: 100 (yielding 2 t per ha)
- Coffee: 178.21 ha
- Cashew: 291 ha (newly established); and a variety of other food and cash crops such as cassava, ground nut, mung bean ...

c) Animal husbandry:

- Buffaloes: 25 head
- Oxen and cows: 419 head
- Pigs: 105 head

2.3 Ethnic minorities and population

Total population size: 3,592 people in 663 households, of which 1,245 are adult laborers.

Most local people are of M’Nong tribe, accounting for 91.19 per cent; some of them are of Tay ethnic origin (living in 51 households with 270 people or 7.54 per cent) and are said to have come from North Vietnam. The Lowlanders are few in number (only 9 households with 49 people or 1.36 per cent).

Wet rice cultivation is practiced by Tay and the Lowlanders; the M’Nong people only practice swiddening to produce maize, cassava and beans.
The food production as a rule is not very high as extensive methods of land farming and scattered farm crop cultivation for subsistence have been adopted for ages. Household incomes are mainly from the produces of swiddening, but the soil productivity is going to decrease sharply, thus making the living conditions in particular of the M’Nong tribesmen become increasingly difficult under the conditions of frequent food shortage. The average food production per person is estimated at only 250 kg per year.

On the other hand, animal husbandry is not yet developed; buffaloes and cows and pigs are mainly raised by the Tay farmers only.

Following a wealth rating 225 households in the commune (or 38%) are rated as poor ones, 265 households are experiencing food shortage, and 34 households (of Tay ethnic group) are found to be well-off (only 5%).

2.4 Cultural and health conditions

Social and cultural lives still remain orthodox, having their roots deep in the mind of local people and as such have had their impacts on the living conditions of the M’Nong people. Illiteracy can be found everywhere in the commune, affecting almost 75 pct of the local population, in particular women. There are only few people having finished their secondary school; and children of school age have only a primary education.

Birth rate is high with women having up to 7 infants/children. However pernicious diseases (malaria, dysentery, tuberculosis ...) and malnutrition have taken a heavy toll among infants/children and also adults. Health care for villagers and their offspring become very difficult because of the scarcity of health stations (only one station in the commune) and transportation facilities. Health facilities in the commune seem to be seriously inadequate for timely health care for all members of the communities therein.

2.5 Fuel situation and habits of cooking in the commune

Farmer households in the commune use fuel wood for daily cooking of meals and pig feed at a very high rate of 17-23 kg of wood per day and per household on the average with some households consuming up to 30 kg of wood per day. Fuel wood collection is a drudgery of local women. Everyday, they go out searching for wood at least 3-5 km far away from their village, then late in the afternoon they take the same way home bringing on their shoulder a load of 40 kg and going through high slopes and deep fords to reach their houses in time for daily cooking of meals and pig feed.

Farmers here have 3 meals a day with heavy breakfast and dinner taken very early in morning and quite late in the evening respectively. At the same time, the cooking of pig feed is also a problem requiring a lot of hard labor and time. But the traditional stove is made of three stones so arranged to facilitate fuel wood combustion or is a tripod that provides the same conditions for cooking. Under these conditions, the cooking of daily meals and pig feed requires a lot of wood and emits large amount of smoke and dust to pollute the environment of the fire place and of the house. At the same time women have to spend hours to cook a meal for the family. For instance, they have to get up very early in the morning not later than 4 am to prepare breakfast for the household.

2.6 Stove building materials

The supply of stove building materials to villages is not difficult, as air-bricks of the sizes of 20 x 10 x 20 cm and 5 x 10 x 20 cm, cement, iron structures, lime and sand can be easily found at the district capital town and on neighboring watercourse banks respectively. At the village of Cao Bang, a household has made use of the earth from a termite-hill to build its stove following a model used by the uplanders in the North to dry/cure tea leaves.

3. ACTIVITIES FOR THE INTRODUCTION OF FUEL-EFFICIENT WOOD STOVE OF BLN BRAND

3.1 Designing the BLN cook stove

Following a brief survey to assess the socio-economic conditions of the commune, the source of fuel supply therein, the needs of local people in terms of fuel wood and stove building materials, and to better know the
habits of cooking in the area, the consultants began to design a model satisfying the preferences of local farmers, their ways of using the stove, and the appropriateness as expressed by the first informants.

3.2 Holding a training course

The first difficulty we had to encounter when working with the M'Nong was their lack of skills in masonry, which we had never got before in any provinces. Therefore, the first step was to train interested farmers in stone and brickwork.

Referring to previous experience in the introduction of BLN cook stoves elsewhere in the country, we paid much attention to the appropriate way of carrying out the training and its quality so that the trainees - who may later become trainers themselves - could obtain the necessary knowledge and skill for constructing and running the stoves for their sustainable use and development in the area.

The training course comprised two components:

- A class - hour session in which we tried to explain the structure of the stove, the principles for its running to the trainees and at the same time to show them the most frequent technical defects builders/users will meet, and the ways to shoot the trouble encountered; and
- A practical work session first for the technicians involved to get the necessary skill and then for a number of small groups in which all trainees could get the skill as required with the help of technicians.

3.3 Trial use of BLN stove and collection of information from the first users

Parallel with the training course, four (4) prototypes were built at Buon Nam village, a trial site for easier collection of information from both users and visitors.

A week later, the Project Management called for a meeting to which four (4) prototype users and three (3) delegates from Krong No commune not yet covered by the contract were invited.

At the meeting, a check was made to compare the performance of the BLN cook stove with that of the traditional tripod. Rice cooking using the same amount of water and rice was carried out on the two (2) types of stove. The results showed that one could save as much as 3 times the fuel wood used and that after 25 minutes the rice in the pot placed on BLN stove was well cooked but for the other pot on tripod, the cooking was done only after 32 minutes.

The users of the first prototypes on trial also pointed out that BLN stove could help save up to one-half the fuel formerly needed and something as one-third of the usual cooking time. However, some participants were of the opinion that the use of BLN in the rainy and cold seasons might prevent people from drying clothes and from warming up during long spells of bad weather. A final and appropriate solution was arrived at after further discussions, giving finishing touches to the model on trial. Participants then unanimously recommended further extension of BLN cook stove as planned in the commune. Delegates from Krong No also expressed their wishes to see the stove be extended to their commune.

3.4 Field activities for BLN stove construction

Immediately after the meeting activities for the construction of BLN cook stoves in all villages began as planned and agreed upon by the Project. The trainees were then divided into two (2) groups, each under the direct control of one consultant. The process of constructing BLN stoves on the spot went on step by step from Buon Nam and then other Buon (villages) such as Jie Yuk, Bu Yuk, Dung, Lieng Ke, Du Mah successively to finish.

However the speed of work depended very much on the skills of the stove builders and the supply of building materials by local farmer households, all of which required careful arrangements and coordination to make the process go smoothly.

While the stoves were being constructed, the technicians and the stove builders in charge, taking the opportunity offered, explained the working of the stove and showed the ways how to use and maintain it to the beneficiaries.

The total number of BLN cook stoves constructed were: 44 instead of 42 as planned, because many farmers
in the villages during that process of stove building and before it had asked for stove being constructed in their houses, the Project Management responding to these requests had only agreed to build two (2) stoves more.

- Number of BLN stoves, constructed with 'fired bricks': 38 pcs
- Number of same, constructed with 'non-fired bricks': 6 pcs

The non-fired brick-built stoves were distributed one to each village (except for Tlong Village) so to suggest a newer potential for the making of BLN stove in the village in case of fired brick shortage.

3.5 Instructions for use

When the stove got dry, i.e. one week later, local technicians under the direct management of consultants went to villager's to give instructions for use. These included instructions on how to kindle a fire, to conduct a rational cooking, and to repair the stove when so required. Questions from the users were answered carefully so to make them well aware of the technology adapted for better use of the stove.

4. EVALUATION OF FIRST RESULTS AND RECOMMENDATIONS

Evaluation was carried out 50 days after the date of construction of the first cook stoves. The consultants have returned to the villages to evaluate the results obtained and collect further information on the use of the stoves by users. The main points are given below:

- Number of cook stoves constructed: 44 pcs
- Number of cook stoves being used: 40 pcs ( = 90%)
- Number of cook stoves not yet used: 4 pcs.

The reason why four (4) cook stoves have not been used was that rearrangements in the respective kitchens were being made at the time of stove construction. The old kitchens had to be removed and stoves had to be built outside them. When the new kitchens are in place, the cook stoves will be running.

All the households now using the BLN stoves have got rid of the traditional stoves and tripods. Some users have given us interesting information. Mrs. Y Par Dak Cil in Buon Dung said, "with a traditional stove I've used up to two - third of a shoulder - load of fuel wood per day, by now I can use the same amount of fuel for 3 days with this new cook stove". Mrs. Y Mang Lieng in Buon Nam told us that the new cook stove could help her save as much as half the time formerly used for making a family meal. Other villagers met have expressed their wishes to get a new BLN stove built in their old kitchen for cooking, for easier drying/storage of their agriculture produces and more convenience for all their household members.

Good maintenance of the newly constructed stoves have been noticed in the commune, with stoves being quite clean and ready for use in daily cooking. Some stoves built on floors of houses on stilts have experienced small shakes at the extended part of the fuel-feeding opening onto the floor because of much trampling of foot by people on the floor at the time of stove building. These have been made good again by the users themselves. Some cook stoves have got a very nice look in the local environments, for instance those of Mr. Y Sieng Ton in Buon TLong, Mr. Y Nghe Luk in Buon Dung ... Mr. Y Huu M'Bom in Buon Nam on the other hand has prolonged the stove with a new stand for accommodating kitchen-ware. All these things - the maintenance of, the care given and the additions to the cook stoves - show that the M'Nong people are proud of the new installations, that they respect what the Project has done for them and that they would like further extension of the technology.

However some other points seem to require special attention. These are:

- Some BLN cook stoves being constructed in the open have not been taken care carefully through regular watering as prescribed; they have got some small shakes at their surface, which however are of minor relevance to the running of the stoves.
- A number of stoves constructed with non-fired bricks were made at the end of the campaign when the weather was very bad with continual rains and very high relative humidity. The bricks then were not dry, and the plastering with lime and water was made immediately after brickwork. As a result the
bricks - in particular at the time of using the stoves - shrunk and caused some parts of the corners of the stoves to break away but without much damage to their surface. Under these conditions, the use of the stoves can be continued, and if some small repairs are made, the stoves will function well and look quite nice as the ones built with ordinary bricks.

To rule out the defects mentioned it is necessary to remind farmers of frequent watering of the stoves as prescribed; in particular when the stoves are constructed in the open, it is advisable to increase the watering of the stoves built by 2 - 3 times more often than usual. For stoves built with non-fired bricks, it is also advisable to plaster first their surface and then to wait till the non-fired bricks have got dry before plastering the whole body of the stoves so to obtain nice-looking and strong cook stoves for sustained use.

- Mention should be made here of the stove built for Mr. Y Tro Noyan in Buon Dung. The stove was constructed on the bamboo floor of a house lacking strong support. Some wooden posts have been used at the time of stove building to support the floor just under the cook stove. However as the frame supporting the floor as a whole is not very strong, there could be a risk of floor collapsing in the case of the posts being displaced due to shaking and trampling of foot. It is necessary to remind Mr. Y Tro of frequent checking of the floor under the stove and the working of the supporting posts. Prompt replacement and strengthening of the floor seem to be much more advisable.

- Through people interviewing and results evaluation at Dak Phoi, it has been found that BLN cook stoves suits well the conditions of the M’Nong and other forest peoples living in the commune and at Tay Nguyen. The extension of the BLN stoves will bring in good success when carried out in other communes of Lak district and in many other areas of Tay Nguyen as well.

For further extension of the model in particular for the benefit of the poor and the poorest there, the range of building materials - in particular of bricks - should be broadened to include non-fired bricks, sun-dried bricks ... It is also possible to use the earth from termite-hills, to knead and shape it into stoves and then to dig the necessary combustion chambers, the pot holes and other outlets for the making of economical cook stoves, the upper face of which can be plastered with lime, cement, sand and water. However some assistance in terms of cement and iron structures ... from outside still remains necessary as the forest peoples in the area are very poor.

- The training course held at the commune has allowed us to train as many as seven (7) stove builders for extension activities in Dak Phoi. However as their educational level is quite low, the trainees cannot act as instructors when so required. Therefore, it is vital to pay much more attention to and to strengthen the local training capability for further extension activities.

- By now, local people are using wood as their main source of energy. But for running the BLN stove, a wider range of other fuels such as corn cob, branches and twigs and leaves from home gardens ... can be also used. It is advisable to organize awareness campaigns in the villages to encourage people to use other source of energy in particular from agriculture and forest residues.

During our field activities at Dak Phoi, the Project and local authorities have done their best to help us carry our tasks. We highly appreciate the support from Mr. Thanh, Mr. Nghi, Mr. Ywel, Mr. Tri and the leadership of Dak Phoi commune and the personnel of the district department of Agriculture and Rural Development. In particular we are appreciative of the support from Mr. Michael Glueck and Ms. Pham Phuong Hoa. We take this opportunity to present our sincere thanks and to express our gratefulness to the above staff, personnel and organizations.

At the same time, we believe that the MRC / GTZ Project entitled "Sustainable Management of Resources in the Lower Mekong River Basin" when trying to introduce improved cook stoves into the back areas where forest peoples are living under very difficult conditions, is scoring good success and effectively contributes to forest protection and environment conservation in Vietnam now and in future.

LIST OF TRAINEES IN DAK PHOI COMMUNE, LAK DISTRICT, DAK LAK PROVINCE

1. Y Bang Cil
2. Y Krang Bkrong
3. Y Bang Mcrong
4. Y Nghe Luk
5. Y Sieng Triek
6. Y Na
7. Y Hui Mbom
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**Total (21+23) = 44 pieces**
PHOTOS SHOWING FIELD ACTIVITIES FOR THE INTRODUCTION OF FUEL-EFFICIENT WOOD STOVES OF BLN BRAND INTO THE M'NONG COMMUNITIES OF DAK PHOI COMMUNE, DISTRICT OF LAK, DAK LAK PROVINCE (FSTAC Photos)

House on stilts at Buon Dung

Traditional cook stove

A TRAINING COURSE FOR THE EXTENSION OF BLN STOVE
Class-hour session

Practical work session
Checking of results of rice cooking for comparison, using fuel-efficient wood stove and the traditional in a meeting to collect information from local users.

CONSTRUCTING BLN STOVES FOR USE BY LOCAL FARMER HOUSEHOLDS

BLN Stove Constructed in house on stilts

EVALUATION OF FIRST RESULTS BY THE TARGET GROUP AND THE CONSULTANTS