

UNITED NATIONS



UNCHS

Project VIE/86/020

Appropriate Technology Transfer in Construction

**HY CUONG COMMUNE
VINH PHU PROVINCE**



EVALUATION REPORT

November 1990
NCRPD, Hanoi.

Introductory note.

This document has been prepared by the members of the NCRPD (National Centre for Rural Planning & Development), and the CATTIC (the Centre for Appropriate Technology Transfer in Construction), in Hanoi. It has been written at the start of the VIE/86/020 sub-contract in Appropriate Technology Transfer in Construction, being undertaken with the assistance of the sub-contractors, Development Workshop and GRET.

The first phase of the sub-contract has focussed attention on the need to develop skills in evaluating the actions undertaken in by the NCRPD, in order to assess whether they are in fact "appropriate" and able to reach the people who need the most assistance in the villages.

This evaluation of work undertaken in the Commune of Hy Cuong represents only a first step in developing evaluation techniques: further work will need to be done, for example, in carrying out a much more detailed analysis of costs of the technologies which have been tried out, of their affordability and potential for social appropriation, and similarly in assessing their efficiency against the needs and priorities of the villagers. Nevertheless, the process of doing a preliminary evaluation and the process of producing this report has ~~been~~ raised awareness for the need to monitor performance more closely. The process has already served to highlight some aspects on which future work should focuss.

The report on Hy Cuong, and the two other similar reports, on Yen Bac and Dai Ang, also serve as a reference against which future actions and the reports which document them can be compared.

DW/GRET, November 1990

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Introduction

This document presents the information collected by the NCRPD and CATTIC staff regarding the resources and problems of Hy Cuong commune. It then describes the actions which have been taken to improve infrastructure and homes in the commune. These actions have now been evaluated, and the results are presented in section 5, followed by recommendations for future action in Section 6.

1. Project Background

1.1. Project Objectives.

The project activities aim to promote balanced growth in socio-economic conditions throughout the country by assisting in the further development of human settlements in rural area of Vietnam. This to be achieved by planning and implementing programmes of infrastructure development in selected places to provide means of livelihood and to improve living conditions to people in the country-side. To achieve these aims, the following immediate objectives have been assigned to project VIE/86/020:

- i. Improve the capacity within the Ministry of Construction (MOC) for human settlements planning and implementation in rural areas.
- ii. Develop a functioning advisory service in appropriate technology for implementation of infrastructure development projects in rural communes.
- iii. Develop the coordination of infrastructure development activity and their funding in the pilot rural communes as model for replication.
- iv. Increase knowledge transfer to staff of the Ministry of Construction in human settlements development in rural areas.

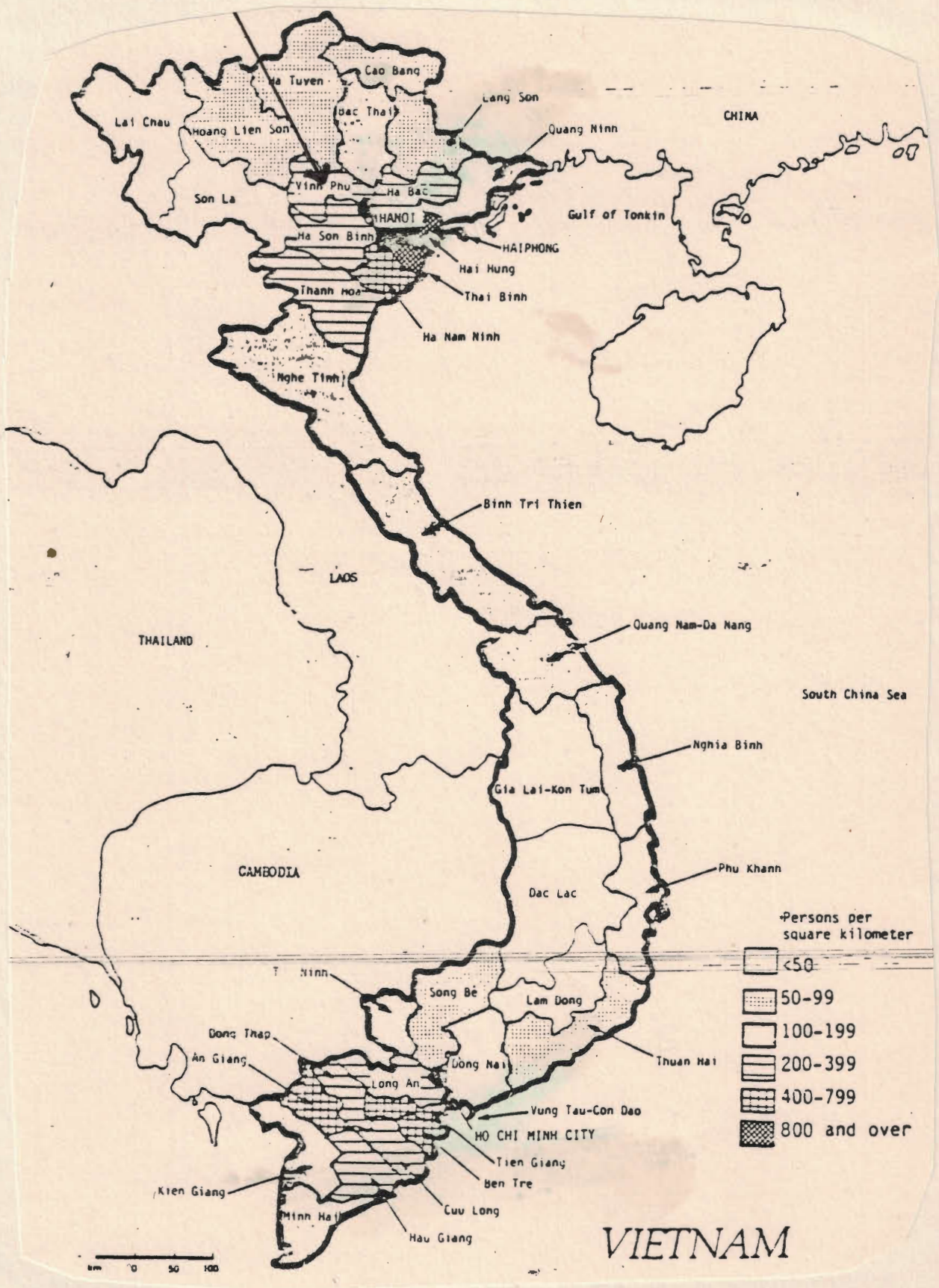
1.2. The pilot communes.

To serve as a learning process and testing grounds it was decided that the project would undertake actual infrastructure planning and appropriate technology (AT) application development in three pilot communes. This document concerns the experience of technology development and transfer in the Commune of Hy Cuong, in the hills of Vinh Phu Province (see location map).

The selection criteria used in choosing communes are as follow:

- i. Since the integrated rural development is the project objective, so the selected places were in rural areas.
- ii. The chosen communes were poor or of average wealth (but not too poor).

Location of Vinh Phu Province in Vietnam.



- iii. They are representative of 3 rural areas in the northern part of the country (such as the coastal, Red river delta, hill or mountain areas).
- iv. In the first phase, the selected communes would have an easy access, not far from Hanoi (max. 150Km).
- v. The communes are eager and capable to receive the new knowledge and realize the Project activities. They are in urgent need for the socio-economic and physical development.

The actual selection was based on the knowledge and experience of the NCRPD experts and the local leaders who have been working in the departments of rural planning and development, and followed field trips and discussions between the project staff and the local authorities.

Once the Commune had been selected, an agreement was drawn up between the province, the commune and the Ministry of Construction and UNDP/UNCHS.

For the implementation of practical action, a financial structure was developed which is divided up as follows from four different sources:

- i. Contribution cash or in kind from users in the communes.
- ii. Contributions in cash or in kind from district and provincial budget.
- iii. Contributions in cash from project VIE/86/020 Government counter part budget.
- iv. Contributions from VIE/86/020 UNDP budget.

1.3. The project in Hy Cuong.

The staff of the IURP (now working with the NCRPD) started their work in Hy Cuong in January 1988. Working together with commune representatives and the people, they analysed the commune's resources and identified the key problems which need to be addressed.

From February 1988 to October 1989, a certain number of projects have been constructed on a small scale basis to serve as prototypes to show examples of 'appropriate' technologies to the people of the commune. The commune participants all volunteered and were included in the programme on the basis that they would accept to participate in experimenting and testing and also pay some part of the prototype from their own funds.

In November 1989 a second series of projects were identified, and a specific project document signed between the Commune and the NCRPD.

2. Hy Cuong Commune: characteristics and resources.

2.1 The commune of Hy Cuong.

Hy Cuong commune is an underdeveloped commune in Phong

Chau District, Vinh Phu Province. It is one of the poorest communes in the Province, (of which about 30% of communes are very poor), with the net rice revenue per-capita lower than 280 Kg per annum.

The commune is a national cultural and historical site with the Hung King's Temple (the first king of the nation), well-known throughout the country.

Hy Cuong is about 100 Km from Hanoi by the national road #7, and is located in the centre of Phong Chau district, 10 Km to the north of Viet Tri city (see map). About three quarters of the commune is hilly and partially wooded, leaving only a quarter of the land in the valleys suited to growing rice.

2.2. Hy Cuong: size and population.

Total area 776.69 Ha

Historical zone of Hung King's Temple 285.- Ha

Population:

- Total population (1987) 2892 inhabitants

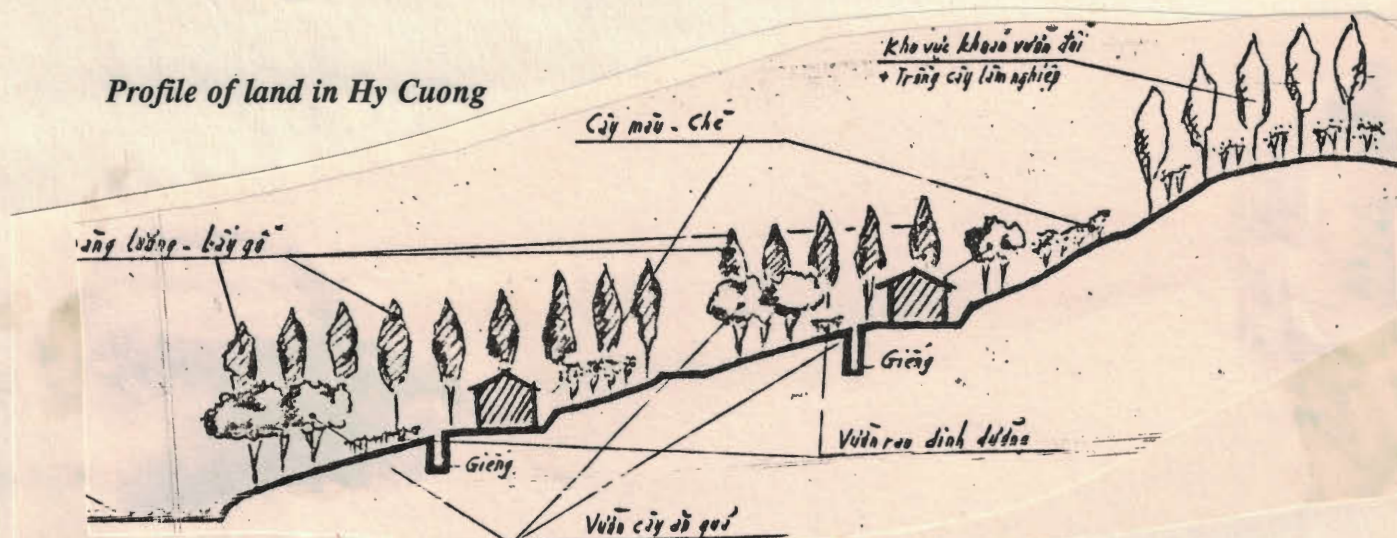
- Total households 630.

- Total labour force 657 people

Growth rate 2.2%

Low employment has led to the exodus of the young. Nevertheless there is still growth, and this is partly accounted for by people retiring from the army, etc.

Profile of land in Hy Cuong



Location of Hy Cuong Commune in the Province of Vinh Phu



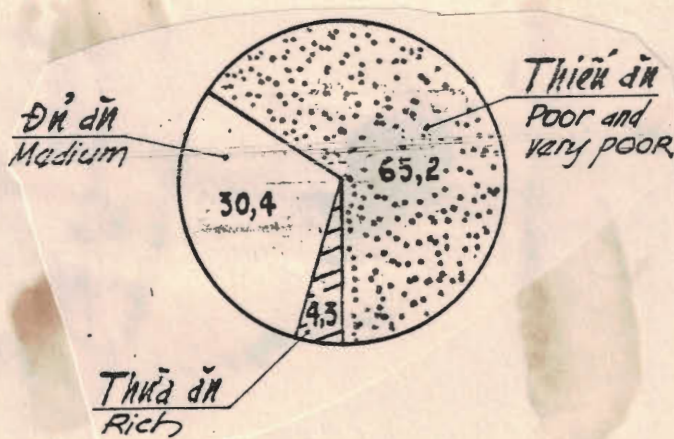
2.3. Employment structure.

There is an unbalanced profile of employment, with more women active than men, and a low overall level of mobilization, at about 25% of the total population.

- Farmers 442 people (82%)
- Handicraft 50 people
- Services and other 168 people

There are 15 builders, 40 people working for the water board, and 24 people who are cadre of the cooperative. 40 people work on lacquer ware production.

A breakdown of household prosperity, in terms of families have a good surplus ("RICH"), very slight surplus ("MEDIUM"), and no surplus at all ("POOR"), shows that there are 4.3% rich families, 30.4% medium families, and 65.2% poor families, of which 30% are always in great need, who are assisted by subsidies.



The infrastructure system is poor in both social and physical terms. The potential of land, labour force and service capacity for tourism and handicraft remain unexploited. The major share of gross commune production comes from agriculture, but it is essential for home consumption. The per capita rice quantity comes to about 250Kg/person year, against a national average of about 300kg/year. There is a farming cooperative working 250 hectares of land, administered by the People's Committee. The commune is located in the middle of an area which has three industrial centres producing paper, cement, phosphates for fertilizer.

Proportional distribution of "wealth" in commune

Non agricultural land uses cover the following:

Roads	13 ha
Water	14 ha
Homeland	85 ha
Services	26 ha
Cemetery	2 ha

Total agricultural area is 331 hectares, much of it sloping. There are two rice crops grown on 137.4 ha, and 1 crop on 15.5 ha. Cassava is grown on 81 ha, lacquer trees on 30 ha and fruit on 13 ha. There are 314 ha of forest land, although not all is covered by trees. Maise is becoming popular. On average each family has 1.5 pigs, at about 70 -80kg/pig. Fish farming is produces about 10 tonnes/year

The ground is basically composed of granite and laterite, with a surface soil of 30 to 60cm. Low land used for agriculture is quite worn out from intensive farming, and the hill land is eroded. Agricultural land is tending to diminish in favour of other uses such as building, garden plots etc. The temple lands are not exploited by the commune.

2.4. The climate.

(source Viet Tri Meteorological station)

The climate in general is favourable for living conditions and agriculture, although periods of low rainfall reduce the potential for cultivation without irrigation, and there is no third crop. Wind and solar energy could have some potential.

Temperature: annual average 23.3 degC

Hot months: May - September: Average 28c, max 35c.

Cold months: December - March: Average 17c, min 6-10c

Humidity: generally high with annual avverage of 84%, ranging from 80 to 87%

Rainfall: Annual average 1644mm.

Low rainfall in December to March with an average of 20 - 40mm; high rainfall from June to September, with an average of 200 - 300mm.

Wind is more or les the same all year, with calm days about 15% of total, and an annual average of 1.8m/sec, most in April (2.4m/sec) and least in November (1.4m/sec). Wind directions are East/South-east in the summer, and North/North-east in the winter.

Solar hours are high, with an average of 1662 hours per year, mainly from May to October (160-200 hours/month), and the least in February and March ((50 hours/month)..

2.5. Capital and material resources.

Animals are the main form of traction. There is 1 15hp tractor, 3 rice mills, 3 fodder processors, and one private generator. There are some hand drawn carts, and bicycles.

Fuel is (i) wood and branches, (ii) straw. There is an electric line along the main road (94kv) which supplies power on festive occasions only.

Water comes from wells (for drinking and household plot use), and for irrigation from three small reservoirs supplying 65% of the water for the paddy fields. Hill land is poorly irrigated. If it could be tapped, the subterranean water supply is good and pure.

Fertilizer. This comes mainly from manure, and all kinds of fertilizer included, amounts to about 1 tonne/hectare.

Lacquer production in one workshop produces 1.5 - 2million dong/year of goods in 1987.

There are two brick and tile kilns which produce together 52,000 bricks/year, and 42,000 tiles. There are also private small kilns. In addition about 30 tons of lime is produced locally each year.

2.6. Buildings.

Houses have been built mostly of earth, either using mud blocks or in-situ moulded earth. Richer families use some fired brick, and it is common to see a mixture of materials in one house. About 50% of houses have clay or cement tiled roofs, the rest are thatched.

Services: there is one school for 6 to 14 year old children, and three kindergardens. There is a health centre with four nurses/technicians and 7 beds. There is a cultural centre with 500 seats.

Map showing the proposed integrated planning to develop the communes reources.

3. Identification of problems and priorities

3.1. The process.

The process of identifying what problems needed to be addressed in Hy Cuong was based firstly on the analysis of natural, human and capital resources in the commune. The enquiry focussed on the existing use of land, water and the structure of the labour force in relationship with the level of socio-economic development, the economic benefits and income of households. In Hy Cuong commune we analysed the statistical data in land use, employment, and economic dynamic, combined with household interviews using the questionnaire shown in Annexe 1. A random selection of one hundred families were interviewed. These interviews showed the main problems of the commune. At the same time, interviews with the representatives of the Commune People's Committee, Cooperative and mass organizations (Women's Organization, Youth Organization, etc.) confirmed these main problems.

3.2. The problems.

The main problems are as follow:

Insufficient productive land: land resource for agriculture and forestry, in both cooperative fields and household plots, are still under exploited. Traditional farming methods are used. Rice yields are low (4 tonnes/ha/yr). There is on average only 1.6 crops/year. Household plots average 1200m² but there is a low level of use, mainly for cassava plantation with low yields. Animal raising in the household plots averages 1 cow and 1.5 pigs/family.

Woodland is being depleted.: Forestry land covers 120 ha. but only 40% is now covered by trees, and the rest is now wasteland. This is largely caused by overconsumption of wood for cooking, food drying and kilns.

Shortage of water and difficulty in extracting water: There are a number of small lakes and reservoirs for irrigation, but insufficient for the whole year. This contributes to the low productivity mentioned above. In the household plots 80% of families have a shallow earth well, from 5 to 12 metres deep depending on location, but there is a problem of how to get water out in sufficient amounts to meet needs of the family (drinking water, cooking, bathing and washing, and watering plants and animals in the garden plot).

Low employment level: only 40% of the potential labour force is mobilized in the fields, 13% work in household plots and home based productive activities (lacquer ware, brick making, rice and cassava processing). Non-farm work is not developed. Incomes are low, and this is made worse because labour demands are seasonal. Meanwhile, skills are also low.

Deterioration in level services and infrastructure: Whilst the population is growing, the quality and availability of services (school, health care centre) are deteriorating physically. For example, there are now 750 school children, and room at present for 600 with double shifts. The actual fabric of the building is not maintained. The clinic is temporarily located in a building in very poor condition.

Housing: 60% of houses are built with traditional earth or fired brick construction in good condition. But 40% are in poor condition, and there is a need to expand the house, as well as upgrade it. Housing demand is fuelled by the trend towards young families wishing to live apart from the older generation. In addition there are each year some new families moving to the commune. Overall demand for new houses is at about 10 per year.

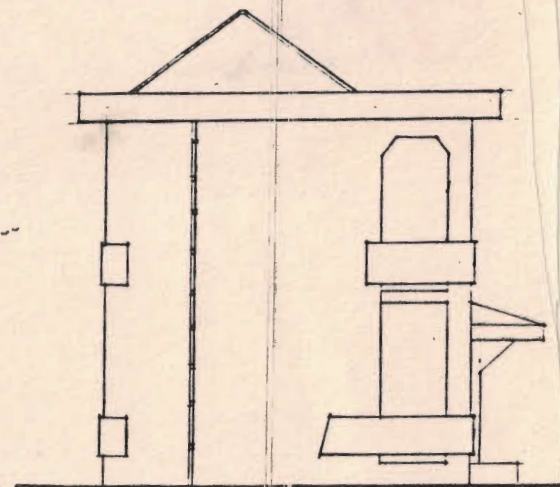
Poor knowledge of skills for improving living conditions.

3.3. Summary.

Based on this identification of problems, the Commune and the project agreed on the following actions, in order of priority.

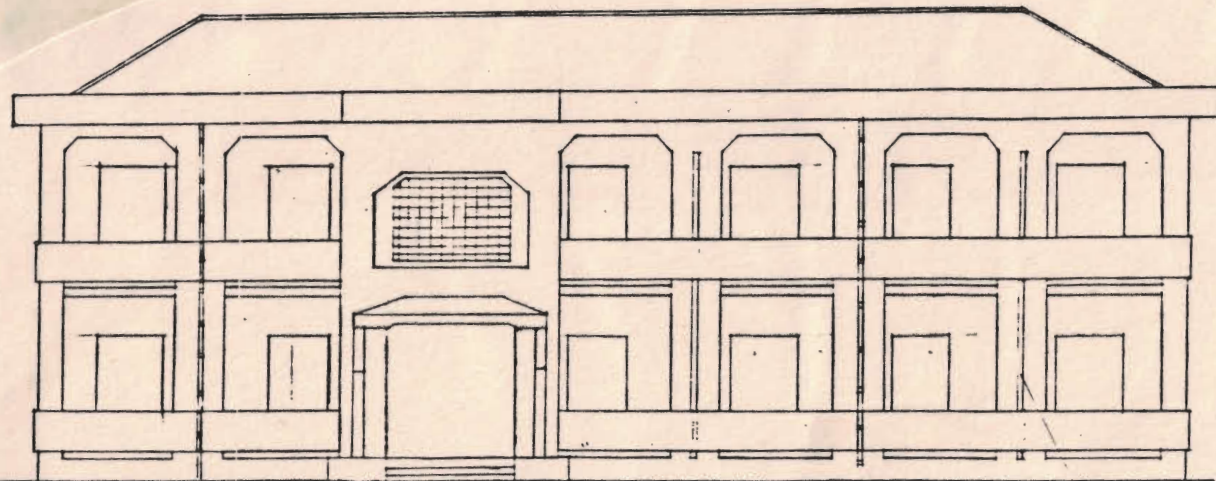
1. **Water supply: (A) upgrade reservoirs for irrigation; (B) improve garden and domestic water supply.**
2. **Household plot economic development: planting of fruit trees and intensive gardening. Improvement of stables and food preparation for animals. (Improved stoves to make animal food cooking easier).**
3. **Services improvement: school and clinic improvement. (New building).**
4. **Facilitate building construction: improved materials, training in skills for building.**
5. **Re-forestation: planting of trees; reduction in wood fuel consumption.**

Elevations of new school



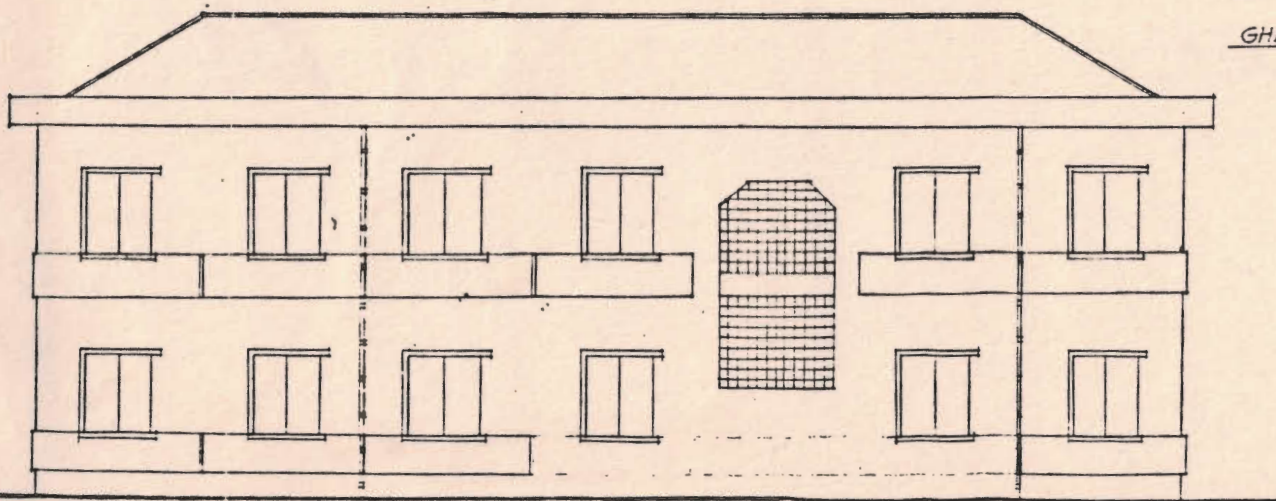
SIDE ELEVATION

Đường trung trục
rộng 100



FRONT ELEVATION - 1/100

- GHI CHÚ
- TƯỜNG MẶT NGOÀI QUÉT VỚI MÀU GHI SÂM HOẶC NÂU
 - MẶT NGOÀI LAN CAN, SẼ NÓ VÀ NHỮNG PHẦN GỖ NỘI QUÉT VỚI MÀU TRẮNG
 - CÁC MẶT TƯỜNG TRONG QUÉT VỚI MÀU VÀNG NHÀ.



REAR ELEVATION - 1/100

TRUNG TÂM PHÁT TRIỂN NÔNG THÔN	TRƯỞNG HỌC	T.K.K.T
GIAM ĐỐC	CÁC MẶT ĐÚNG	KT2
THIẾT KẾ	KIỂM	
<i>Nguyễn Văn Thiện</i> Nguyễn Văn Thiện	<i>Đàm Xuân Thiện</i> Đàm Xuân Thiện	<i>Hoàng Văn Quý</i> Hoàng Văn Quý

Experimentation with a cinva ram press



Rammed earth construction at Hy Cuong commune for the new school

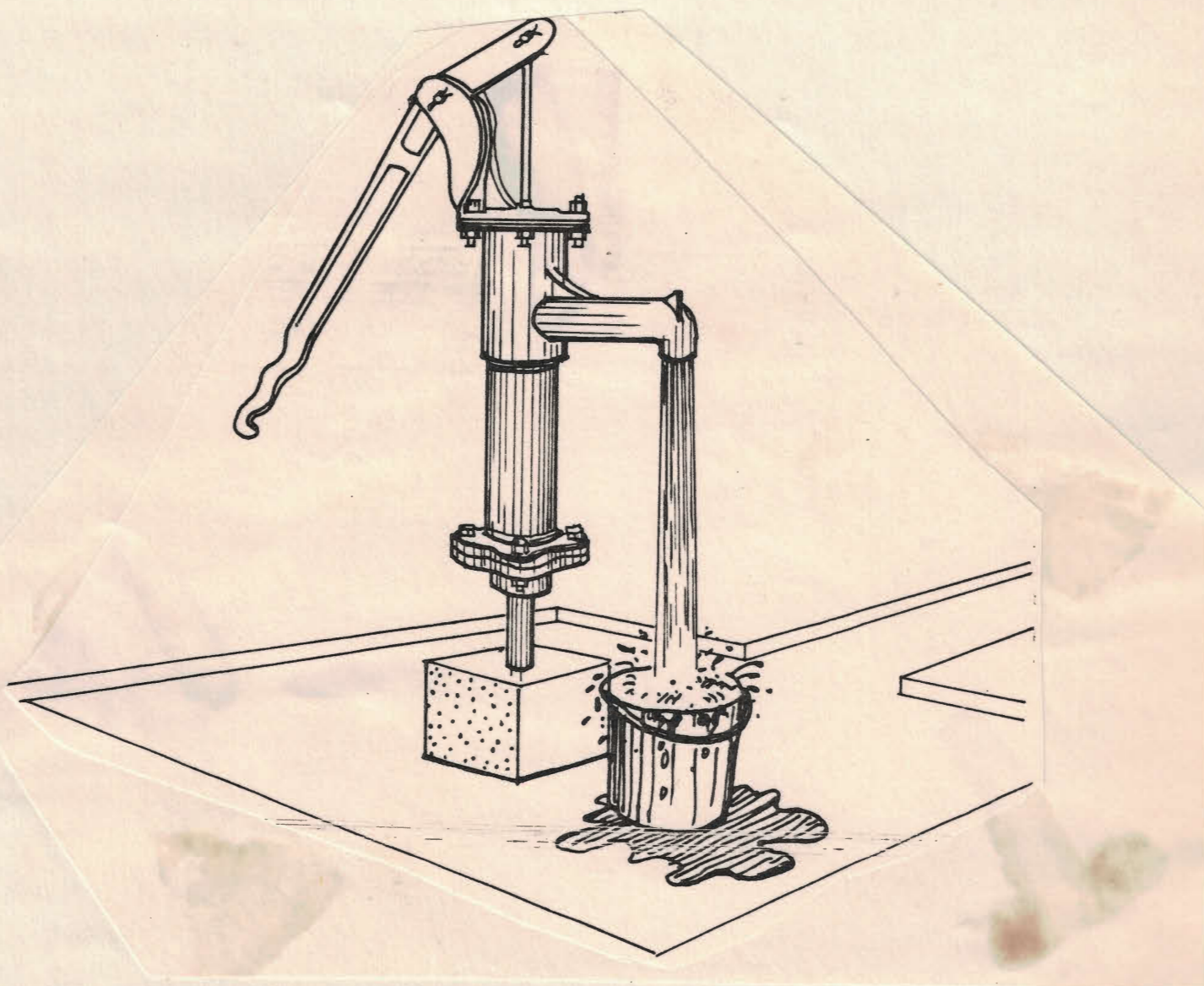


4.3. Fresh water supply.

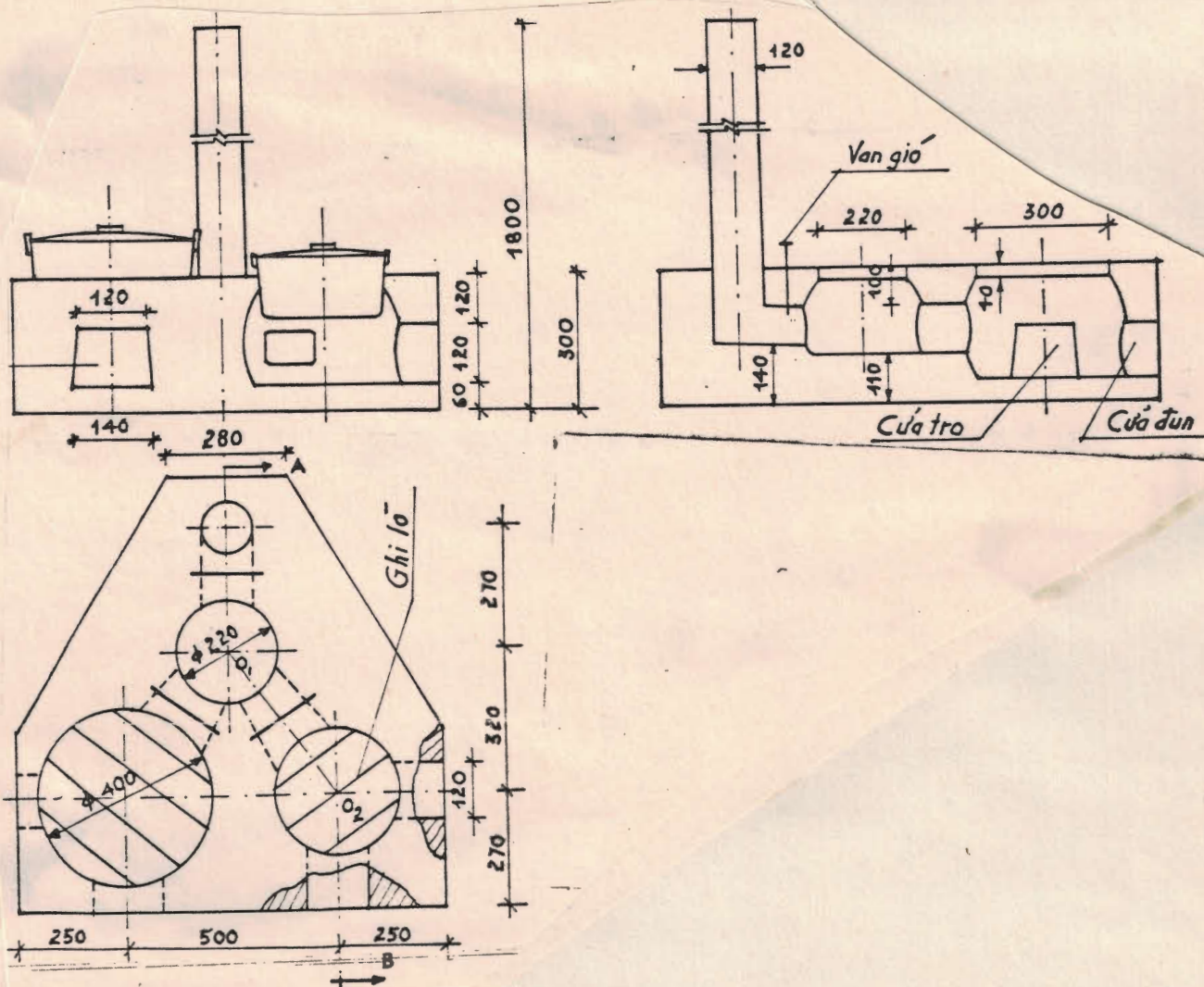
Almost every household in Hy Cuong commune has a well, which is rather deep (average 7-8 m in depth). Water is relatively good in quality. The land area of every household is rather large (800-1500 sq.m) and is being cultivated with different kinds of plants and trees. However, if there is not enough water the plantation will not grow well and give low productivity, since the land easily dries out (hill land characteristics).

Because of the depth of the water, it is difficult to get the water from the wells for domestic use and for garden irrigation. This problem will be solved with hand water pumps provided under the Project with a financial participation from the families. 20 hand water pumps installed for 20 families (divided among housing group) will help people in improving living conditions and household plot economics.

The selected pump is model VN-6 produced locally under UNICEF Project assistance. (see illustration).



The VN-6 pump selected by the project and made in Vietnam



Three compartment improved stove

4.4. Energy supply.

Fuel saving and forestry protection is also problem of attention in the commune development programme. With improved smokeless stoves people can save 25-30% of fuel consumption. 200 improved stoves will be built under the Project to help people to save fuel consumption (straws, wood, branches, leaves,..) for other use, and at the same time safeguard the forestation project supplying raw materials for BaiBang paper mill nearby (assisted by Sweden). The technical details are shown here, as well as an explanatory sheet used for training local builders to make the stove.

The Biogas Plant application will help people on one hand to take full advantage of wastes (animal manure, leaves, excreta,..) for better fertilizer resources for cultivation and good sanitation and, on the other hand, to make use of gas for cooking and lighting (see diagram). The biogas plant is re-designed and improved by the project staff, and the revised plan is shown on overleaf. This prototype has been built in 3 places under the Project assistance. However, the cost of construction and equipment is still high for the average farmer to afford, so only 5 units are proposed to be built as prototypes under the Project funding in Hy Cuong commune.

One page explanation sheet used by the project staff to explain the stove

TRÌNH TỰ XÂY BẾP CẢI TIẾN

GẠCH KHÔNG NUNG ĐUN RƠM RA, CÚI

1. CHUẨN BỊ VẬT LIỆU

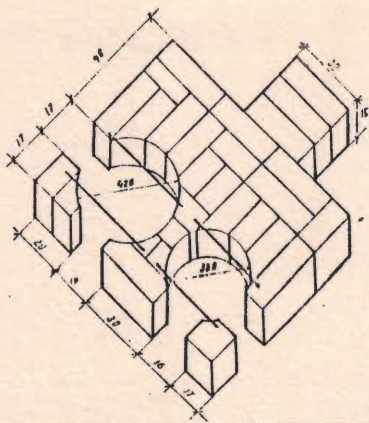
- GẠCH KHÔNG NUNG : 50x70 VIÊN
- CÁT: 0,5 m³
- GHI SẮT $\phi 10 + \phi 14$: 2 m
- ỚNG SẮT: 1,5 m; ỚNG SÀNH: 3
- KÍCH THƯỚC GẠCH: 10x15x30 cm

2. XÁC ĐỊNH VỊ TRÍ

- NỀN BẾP CAO BẰNG MẶT NỀN GIÀN BẾP, Ở VỊ TRÍ THUẬN LỢI, ĐẶT CÁC NỒI VÀO VỊ TRÍ TƯƠNG ỨNG LÃY KÍCH THƯỚC SỐ BỘ
- VẬT LIỆU: ĐẤT, GẠCH KHÔNG NUNG HOẶC GẠCH B

3. XÂY BUỒNG LỬA

- DÙNG GẠCH ĐẪO VÁT XÂY QUẦY XUNG QUANH CÁCH THÀNH NỒI MẪU 30 mm THEO BỀ ĐÚNG VIÊN GẠCH 15cm
- CHÚ Ý CHỮA CỬA ĐUN CỬA CỐI TRO THEO KÍCH THƯỚC CẦN THIẾT.
- ĐẶT GHI ĐỔ NỒI.
- TRÁT XI MĂNG CÁT BẢO VỆ MẶT GẠCH PHÍA TRONG

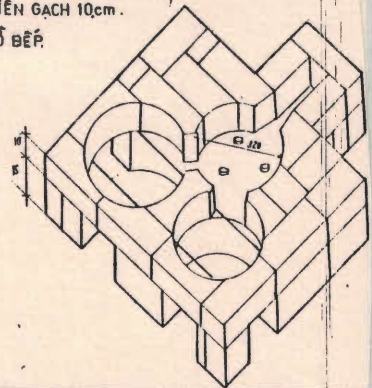


7. HOÀN THIÊN

- KHI BÊ TÔNG KHÔ SAU 5, 7 NGÀY, THÁO CÁT LÂM NIÃN MẶT TRONG, MẶT NGOÀI, TRÁT PHẪNG ĐẶT MẪU KÈ NỒI

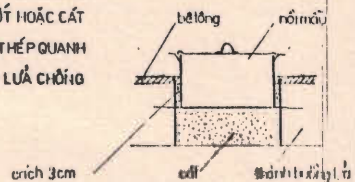
4. XÂY ĐƯỜNG KHÓI NGĂN TẬN DỤNG

- ĐƯỜNG KHÓI NGANG MẶT GHI ĐỐI DIỆN CỬA ĐUN BẰNG CHIỀU CAO VIÊN GẠCH 10cm.
- RỘNG TỬ CỔ BẾP



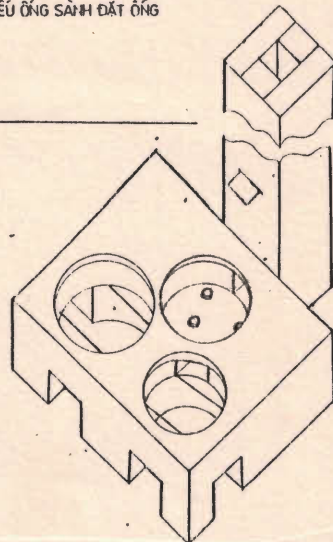
5. ĐÓ BÊ TÔNG MẶT BẾP

- ĐỔ DÂY 3cm LÂM KHUÔN BẰNG ĐẤT ỚT HOẶC CÁT
- ĐẶT CỘT DÂY THÉP QUANH MỆNG BUỒNG LỬA CHỖNG NỬT.



6. XÂY, ĐẶT ỚNG KHÓI

- XÂY CAO 0,5m TRÊN ĐẤT CỬA ĐIỀU CHỈNH KHÓI
- NẾU ỚNG KHÓI XÂY, XÂY TIẾP
- NẾU ỚNG SÀNH ĐẶT ỚNG



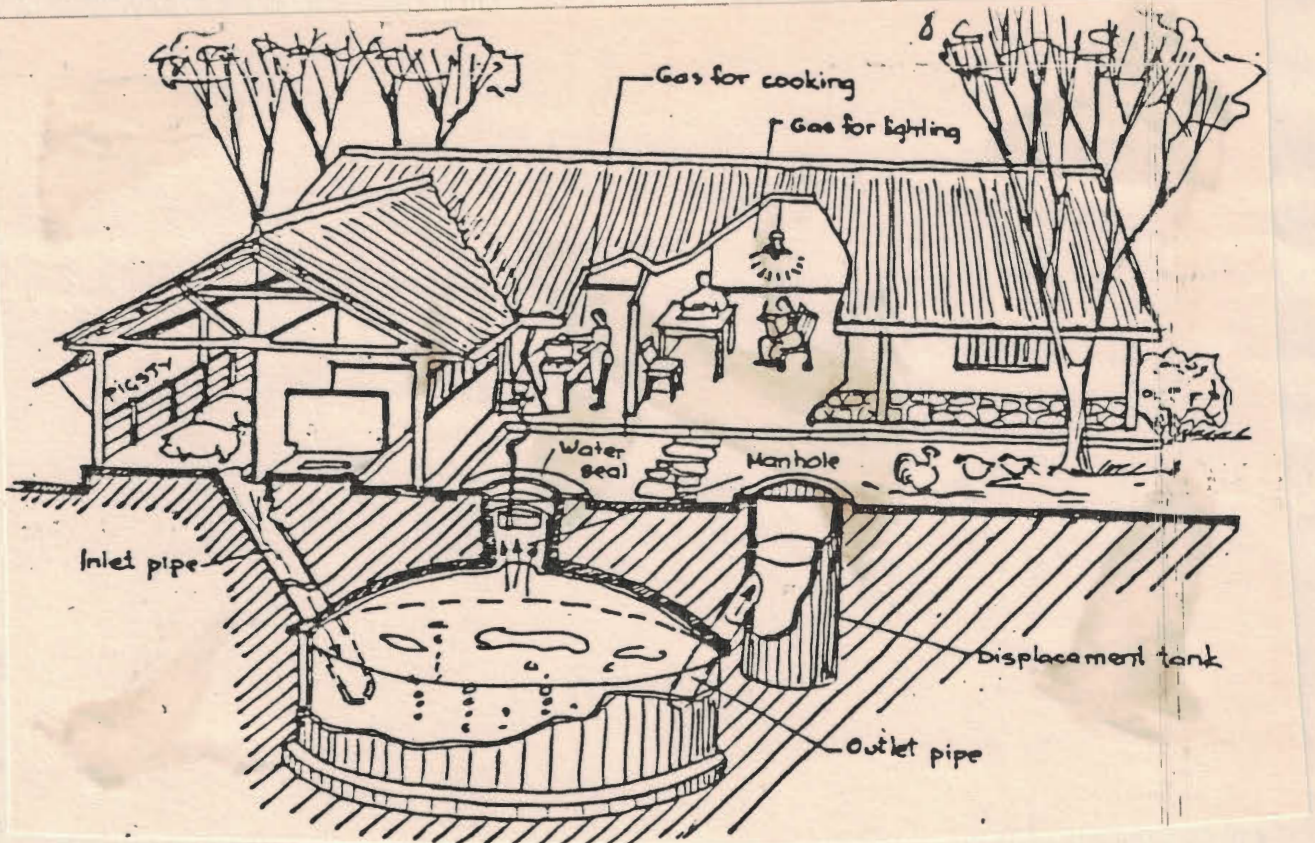


Diagramme of the biogas plant with pigsty.

4.5. Improved latrines for better sanitation.

Details of the biogas plant

The latrines currently used are not suitable from the acceptable requirements on sanitation and comfort. This situation will be overcome considerably with the construction of 40 improved latrines in a first step under the assistance of a small

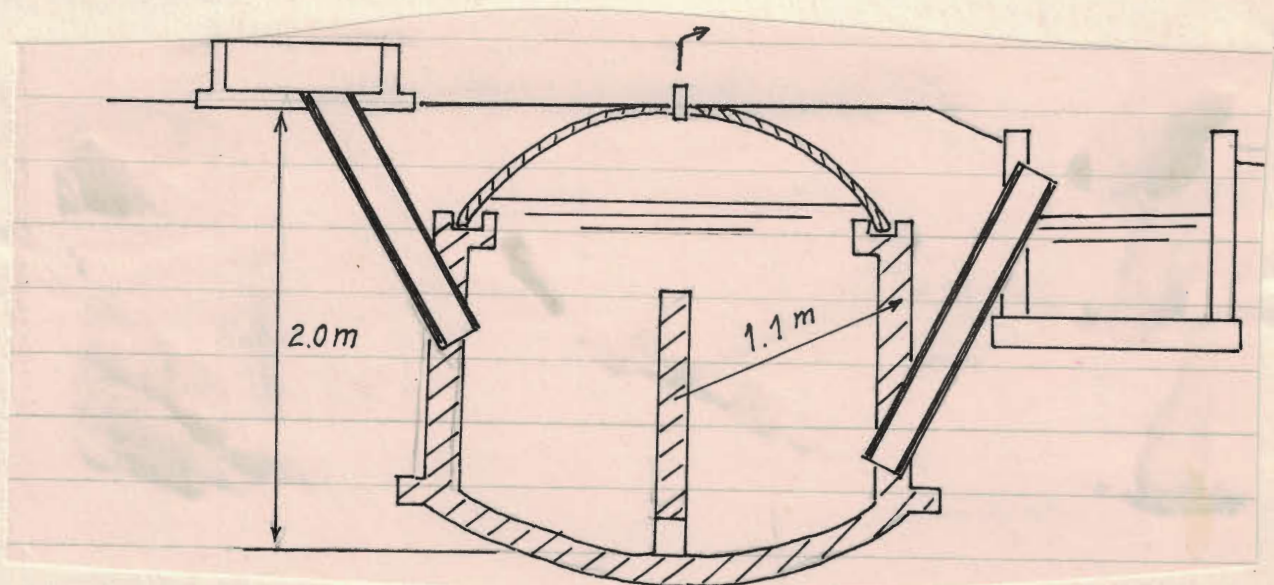
The prototype of biogas plant has three main parts : inlet mixer, outlet hole and digester. Beside it has burner and gas pipes.

About digester, it has a volume of 3.5 m³ with 2.2 m of diameter and 2.0 m in depth (see drawing next page). The wall of tank of digester is made of brick and concrete.

Differ from biogas plants in the low-land, because of good soil for construction in Hy Cuong, when we build biogas plant, we should have use cement plaster applied directly to earth wall of the tank. It would be cheaper than using bricks.

The biogas dome was made with steel mesh (1mm x 1mm x10mm) and iron bars (6mm and 4 mm), with cement mortar (20 mm thin / cure 21 days)

Details of the biogas plant.



4.5. Improved latrines for better sanitation.

The latrines currently used are not suitable from the acceptable requirements on sanitation and comfort. This situation will be overcome considerably with the construction of 40 improved latrines in a first step under the assistance of a small budget from the Project funds.

4.6. Budgets.

The following table shows the budget allocations and sources of money for the actions planned in 1989 and 1990. Some of these will be carried over into 1991.

PROTOTYPES IMPLEMENTED IN HYCUONG COMMUNE 1988-1989
(Unit = 1000.-Dong)

PROTOTYPE CONSTRUCTIONS	MANNER AND QUANTITY	MATERIAL	PRICE OF UNIT	TOTAL COST	SOURCES OF INPUT (1000.-Dong)		
					PEOPLE	SUBSIDIZED FUND	PROJECT
1>Fruit nurser trees	2000.		1.0	2,000.	500.		1,500
2>Clinics	80sqM	earth brick	200	16,000	6,000	4,000	6,000
3>Hand water pumps	2 set		300	600	100		500
4>Improved stoves	25	brick cement	50	1,250	450		800
5>Biogas Plant	2	Brick cement iron	900	1,800	600		1,200
TOTAL COST				21,650	7,650	4,000	10,000

Fig. ESTIMATED BUDGET FOR THE PROTOTYPE CONSTRUCTIONS IN HYCUONG COMMUNE - 1990 -(Unit=1000.-Dong)

PROTOTYPE CONSTRUCTIONS	MANNER AND QUANTITY	MATERIAL	PRICE OF UNIT	TOTAL COST	SOURCES OF INPUT (1000.-Dong)		
					PEOPLE	SUBSIDIZED FUND	PROJECT
1>Primary School	2 storey	earth concrete		70,000	15,000	20000	35,00
2>Family House	05 House	-	7000	35,000	25,000		10,000
3>Hand water Pumps	20 units		300	6,000	3,500		2,500
4>Improved Stoves	200 units	brick cement	50	10,000	8,500		1,500
5>Biogas Tanks	05 units	brick cement iron	900	4,500	2,500		2,000
6>Improved Laterines	40 units	brick cement	100	1,000	3,000		1,000
TOTAL COST				129,500	57,500	20000	52,000

4.7. Finished products.

In November 1990, the following inputs have been completed.

1. Primary School 1 [3 classrooms (ground floor)].
2. Biogas 2
3. Improved stoves 30
4. Hand pumps 2
5. Clinic 1 (80m²)
6. Reservoir expansion 2
7. Biomass and fruit plantation 10 Ha.

The following section presents the evaluation of items 1 to 4 listed immediately above.

5. Evaluation

5.1. Criteria and methods.

The evaluation has involved three main steps. First, the establishment of criteria against which each technology can be evaluated, secondly, the evaluation in the field of each AT, through discussion and observation during visits to households. And thirdly, a more detailed economic analysis of certain techniques of comparable performance, to see whether the innovations being introduced are making it easier to improve living conditions.

The evaluation sheet used on the following pages lists the criteria that have been agreed upon in discussion by the VIE/86/020 team and the consultants. At the same time, the evaluation has addressed the question "Who is the target group and is the technology reaching them?" Distinction has been made between four groups of users in the commune:

1. The Public.
2. Rich Families with a good surplus.
3. Medium families with a tiny surplus.
4. Poor families, who in many cases need subsidies to survive.

Following the field visit in early November to Hy Cuong, the team working on Hy Cuong filled in the evaluation sheet for each technique, and discussed the results. This led to the establishment of several conclusions and some recommendations for the future. Summary conclusions are shown at the bottom of each evaluation sheet, and an overview is given in the next section, No. 6.

5.2 Evaluations

Evaluation

1. Rammed Earth Wall: stabilized with cement, unstabilized.

TECHNOLOGY EVALUATION SHEET (1)

A. STABILIZED
B. NON-STABILIZED

NAME OF TECHNOLOGY: RAMMED EARTH WALL

PLACE: HI CUONG

DATE OF EVALUATION: 5/XI 190

NAMES OF EVALUATORS: N.T.T NHA

DOES TECHNOLOGY REACH TARGET GROUP?

CRITERIA	TARGET GROUP		FAMILY		MEDIUM		POOR	
	A	B	A	B	A	B	A	B
AFFORDABLE TO MAKE?	2	2	2	2	1	2	0	2
CHEAP TO MAINTAIN?	2	0	2	1	2	1	2	1
ALLOWS SELF HELP?	2	2	2	2	1	2	0	1
USE LOCAL MATERIAL?	2	2	2	2	1	2	0	2
TECHNOLOGY EASY?	2	2	2	2	2	2	2	2
ORGANIZATION EASY?	2	0	2	2	2	2	1	2
TRANSPORT EASY?	2	0	1	0	1	0	1	0
MAINTENANCE EASY?	2	0	2	1	2	1	2	1
REPLICABLE?	2	2	2	2	2	2	2	2
SUITS ENVIRONMENT?	2	2	2	2	2	2	2	2
DURABLE?	2	0	2	1	2	1	2	1
CREATES INCOME?	2	2	2	2	2	2	2	2
SAVES ENERGY	1	2	1	2	1	2	1	2
SUITS LOCAL HABITS?	2	2	2	2	2	2	1	2
	<u>26</u>	<u>18</u>	<u>26</u>	<u>23</u>	<u>23</u>	<u>23</u>	<u>18</u>	<u>22</u>

ANSWER '0' FOR NO OR BAD
'1' FOR MEDIUM
'2' FOR YES OR GOOD

CONCLUSIONS: This technology is suitable with all target groups.
Recommendation:
• Non stabilized rammed earth wall must be improved to prevent cracking.
• Plaster for unstabilized earth wall should be paid attention.

Evaluation

3. Energy: traditional stove, improved stove, and biogas.

TECHNOLOGY EVALUATION SHEET (1)

NAME OF TECHNOLOGY: TRADITIONAL STOVE (A) - IMPROVED STOVE (B) - BIOGAS (C)
 PLACE: HY CUONG (HILL COMMUNE)
 DATE OF EVALUATION: 5/11
 NAMES OF EVALUATORS: NGUYEN DINH KHOI (Chief planner)

DOES TECHNOLOGY REACH TARGET GROUP?

CRITERIA	TARGET PUBLIC			FAMILY RICH			MEDIUM			POOR		
	A	B	C	A	B	C	A	B	C	A	B	C
→ 1/ AFFORDABLE TO MAKE?	2	2	1	2	2	1	2	2	0	2	2	0
2/ CHEAP TO MAINTAIN?	2	2	1	2	2	1	2	2	1	2	2	1
3/ ALLOWS SELF HELP?	2	2	1	2	2	1	2	2	0	2	2	0
4/ USE LOCAL MATERIAL?	0	1	0.5	0	1	0.5	0	1	0	0	1	0
5/ TECHNOLOGY EASY?	2	2	1	2	2	1	2	2	0	2	2	0
6/ ORGANIZATION EASY?	2	1	1	2	2	0	2	2	0	2	2	0
7/ TRANSPORT EASY? (FLEXIBILITY IN USE)	1	1	2	1	1	2	1	0.5	2	1	0.5	2
8/ MAINTENANCE EASY?	2	2	1	2	2	1	2	2	1	2	1	0
9/ REPLICABLE?	2	2	1	2	2	1	2	2	1	2	2	0
10/ SUITS ENVIRONMENT?	0	2	2	0	2	2	0	2	2	0	2	2
11/ DURABLE?	2	1	1	2	1	2	2	1	2	2	1	2
12/ CREATES INCOME?	0	1	2	0	1	2	0	1	2	0	1	2
→ 13/ SAVES ENERGY	0	1.5	2	0	1.5	2	0	1.5	2	0	1.5	2
14/ SUITS LOCAL HABITS?	2	1	0	2	1	0	2	1	0	2	1	0
TOTAL	19	21.5	16.5	19	22.5	16.5	19	22.0	13	19	21.0	11

ANSWER '0' FOR NO OR BAD
 '1' FOR MEDIUM
 '2' FOR YES OR GOOD

CONCLUSIONS:

+ The improved stove has the highest value in all groups, so it's appropriate and popular to apply in large scale.
 + The Biogas has certain limitations, especially the cost is still high and unaffordable for medium and poor groups, and the output is in liquid form and not suitable to the local habit of use.

Evaluation

4. Water extraction: by bucket, and by hand pump.

TECHNOLOGY EVALUATION SHEET (1)

NAME OF TECHNOLOGY: *Water extraction : A/ by Bucket B/ by Hand Pump*
 PLACE: *Hy Cuong Commune*
 DATE OF EVALUATION:
 NAMES OF EVALUATORS: *Nguyen Dinh Khoi*

DOES TECHNOLOGY REACH TARGET GROUP?

CRITERIA	TARGET GROUP		FAMILY		MEDIUM		POOR	
	A	B	A	B	A	B	A	B
→ 1/ AFFORDABLE TO MAKE?	2	2	2	2	2	1	2	0
2/ CHEAP TO MAINTAIN?	2	2	2	2	2	1	2	0
3/ ALLOWS SELF HELP?	2	1	2	1	2	0	2	0
4/ USE LOCAL MATERIAL?	1	0	1	0	1	0	1	0
5/ TECHNOLOGY EASY?	2	1	2	1	2	1	2	1
6/ ORGANIZATION EASY?	2	2	2	2	2	2	2	2
7/ TRANSPORT EASY? <i>FLEXIBLE IN USE</i>	0	2	0	2	0	2	0	2
→ 8/ MAINTENANCE EASY?	2	1	2	0	2	0	2	0
9/ REPLICABLE?	2	2	2	2	2	1	2	1
10/ SUITS ENVIRONMENT?	1	2	1	2	1	2	1	2
11/ DURABLE?	1	1	1	2	1	2	1	2
+ 12/ CREATES INCOME?	0	2	0	2	0	2	0	2
13/ SAVES ENERGY	0	2	0	2	0	2	0	2
14/ SUITS LOCAL HABITS?	2	2	2	2	2	2	2	2
	<u>19</u>	<u>22</u>	<u>19</u>	<u>22</u>	<u>19</u>	<u>18</u>	<u>19</u>	<u>16</u>

ANSWER '0' FOR NO OR BAD
 '1' FOR MEDIUM
 '2' FOR YES OR GOOD

*Comments: + The cost of "B" is high, and requires skill to maintain
 + It's justifiable for public and rich family if the equipment is more reliable and reaches deeper water level (> 7m deep → 15m deep)*

CONCLUSIONS:

↳ *To select and apply other technologies for water elevation to suit poor and medium family afford. Those AT are more simple, cheap and more effective than the usual one.*

Comparative evaluation of wall costs.

The following sheets present, firstly, the cost per cubic metre of wall for each of the following construction techniques:

Cinva ram blocks with cement/lime stabilizer. 14 cm thick.

Fired bricks. 11 cm thick

Rammed earth with cement and pozzolana. 20 cm thick

Rammed earth with lime. 20 cm thick.

Rammed earth with pozzolana. 20 cm thick.

Rammed earth and no stabilizer. 20 cm thick.

The last sheet compares all these materials, for the construction of the walls of a specific house, and includes for each wall type the necessary foundations. The foundations can be seen to play an important part in modifying the cost for each wall type. These calculations are for the single storey house shown on page 16. The conclusion is that for most situations, given the good quality of soil and the local climate, stabilization of walls is not needed.

Cinva ram blocks with cement/lime stabilizer. 14 cm thick.

TECHNOLOGY EVALUATION SHEET

NAME OF TECHNOLOGY: CINVA RAM BLOCKS (COST/m³ of wall)

PLACE:

DATE OF EVALUATION:

NAMES OF EVALUATORS:

DOES TECHNOLOGY REACH TARGET GROUP?

ITEMS	UNIT COST	QUANTITY	TOTAL COST
DIGGING EARTH	3000 Đ/m ³		
BRICKS	100 Đ/UNIT		
BLOCKS	200 Đ/UNIT	240 p	48,000 đ
LOCAL CEMENT	220 Đ/Kg	45 KG	9,900 đ
LIME	75 Đ/KG	11 KG	825 đ
SAND	15000 Đ/m ³	0,2 m ³	3000 đ
POZZOLANA	60 Đ/KG		
BAD LIME	35 Đ/KG		
LABOUR			
EXTRAS			
TOTAL			61,725 đ

Fired bricks. 11 cm thick

TECHNOLOGY EVALUATION SHEET

NAME OF TECHNOLOGY: FIRED BLOCKS (COST/m³ of wall)

PLACE:

DATE OF EVALUATION:

NAMES OF EVALUATORS:

DOES TECHNOLOGY REACH TARGET GROUP?

ITEMS	UNIT COST	QUANTITY	TOTAL COST
DIGGING EARTH	3000 đ/m ³		
BRICKS	100 đ/UNIT	586 blocks	58,000 đ
BLOCKS	200 đ/UNIT		
LOCAL CEMENT	220 đ/KG	74 KG	16,280 đ
LIME	75 đ/KG	18.1 KG	1357,5 đ
SAND	15000 đ/m ³	0,32 m ³	4,800 đ
POZZOLANA	60 đ/KG		
BAD LIME	35 đ/KG		
LABOUR	11200 đ/m ³	1m ³	11,200 đ
EXTRAS			
TOTAL			91,637 đ

Rammed earth with cement and pozzolana. 20 cm thick

TECHNOLOGY EVALUATION SHEET

NAME OF TECHNOLOGY: RAMMED EARTH WITH CEMENT AND POZZOLANA (COST/m³ of wall)

PLACE:

DATE OF EVALUATION:

NAMES OF EVALUATORS:

DOES TECHNOLOGY REACH TARGET GROUP?

ITEMS	UNIT COST	QUANTITY	TOTAL COST
DIGGING EARTH	3000 đ/m ³	2 m ³	6000 đ
BRICKS	100 đ/UNIT		
BLOCKS	200 đ/UNIT		
LOCAL CEMENT	220 đ/KG	45 KG	9900 đ
LIME	75 đ/KG		
SAND	15000 đ/m ³		
POZZOLANA	60 đ/KG	128 KG	7680 đ
BAD LIME	35 đ/KG		
LABOUR	20000 đ/1m ³	1 m ³	20000 đ
EXTRAS			

TOTAL

43580 đ

Rammed earth with lime. 20 cm thick.

TECHNOLOGY EVALUATION SHEET

NAME OF TECHNOLOGY: RAMMED EARTH WITH LIME (COSTS / m³ of wall)

PLACE:

DATE OF EVALUATION:

NAMES OF EVALUATORS:

DOES TECHNOLOGY REACH TARGET GROUP?

ITEMS	UNIT COST	QUANTITY	TOTAL COST
DIGGING EARTH	3000 đ/m ³	2 m ³	6000 đ
BRICKS	100 đ/UNIT		
BLOCKS	200 đ/UNIT		
LOCAL CEMENT	220 đ/KG		
LIME	75 đ/KG		
SAND	15000 đ/m ³		
POZZOLANA	60 đ/KG		
BAD LIME	35 đ/KG	184 KG	6,440 đ
LABOUR	20000 đ/m ³	1 m ³	20000 đ
EXTRAS			
TOTAL			32,440 đ

Rammed earth with pozzolana. 20 cm thick.

TECHNOLOGY EVALUATION SHEET

NAME OF TECHNOLOGY: RAMMED EARTH WITH POZZOLANA (COST/m³ of wall)

PLACE:

DATE OF EVALUATION:

NAMES OF EVALUATORS:

DOES TECHNOLOGY REACH TARGET GROUP?

ITEMS	UNIT COST	QUANTITY	TOTAL COST
DIGGING EARTH	3000 đ/m ³	2 m ³	6000 đ
BRICKS	100 đ/UNIT		
BLOCKS	200 đ/UNIT		
LOCAL CEMENT	220 đ/KG		
LIME	75 đ/KG		
SAND	15000 đ/m ³		
POZZOLANA	60 đ/KG	150 Kg	9000 đ
BAD LIME	35 đ/KG		
LABOUR	20000 đ/m ³	1 m ³	20000 đ
EXTRAS			
TOTAL			35000 đ

Rammed earth and no stabilizer. 20 cm thick.

TECHNOLOGY EVALUATION SHEET

NAME OF TECHNOLOGY: UNSTABILIZED RAMMED EARTH (COST / m³ of wall)

PLACE:

DATE OF EVALUATION:

NAMES OF EVALUATORS:

DOES TECHNOLOGY REACH TARGET GROUP?

ITEMS	UNIT COST	QUANTITY	TOTAL COST
DIGGING EARTH	3000 đ/m ³	2m ³	6000 đ
BRICKS	100 đ/UNIT		
BLOCKS	200 đ/UNIT		
LOCAL CEMENT	220 đ/KG		
LIME	75 đ/KG		
SAND	15000 đ/m ³		
POZZOLANA	60 đ/KG		
BAD LIME	35 đ/KG		
LABOUR	20000 đ/m ³	1m ³	20000 đ
EXTRAS			

TOTAL

26,000 đ

Cost comparison for walls.

PROTOTYPE HOUSE COST ANALYSIS OF WALL AND FOUNDATION
HOUSEHOLDER : Mrs.HOA

TYPES OF BUILDING	FOUNDATION			WALL			TOTAL.
	Cost/m ³ (Φ)	Volume (m ³)	Total cost (Φ)	Cost/m ³ (Φ)	Volume (m ³)	Total cost (Φ)	
A) RAMMED EARTH :							
+ WITH CEMENT AND POZZOLANA	43,580	5.66	246,662	43,580	18.4	801,872	1,048,534 Φ
+ WITH LIME	43,580	5.66	246,662	32,440	18.4	596,896	843,558 Φ
+ WITH POZZOLANA	43,580	5.66	246,662	35,000	18.4	644,000	890,662 Φ
+ <u>UNSTABILIZED</u>	43,580	5.66	246,662	26,000	18.4	478,400	<u>725,062 Φ</u> → min.
B) CINVA RAM BLOCKS	61,725	3.22	198,754	61,725	12.9	796,252	994,977 Φ
C) <u>FIRED BLOCKS</u>	91,637	8	183,274	91,637	10.1	925,533	<u>1,108,807 Φ</u> → max.

6. Overall conclusions and recommendations for Hy Cuong activities. (Infrastructure and construction).

6.1. Appropriate Technology planning process.

The team has identified resources and needs, but (a) priorities are not clear (e.g. water supply technologies/biogas/earth construction), and (b) designs and implementation procedure have not been discussed enough (for example for the improved stoves).

6.2. Implementation process.

- i. Have trained local artisans but not local technicians.
- ii. More information should be aimed at poor and medium wealth family groups.
- iii. There should be more participation for self-help.

6.3. Technical aspects.

6.3.1. Earth construction.

The cost analysis has been insufficient, with a lack of a feasibility study comparing the cost of the cinva-ram and rammed earth techniques.

The use of cement stabilizer in earth construction increases the cost considerably.

Recommendation: Rammed earth construction without stabilizer (but using shuttering) would be good for most house construction and upgrading.

6.3.2. Biogas

The main cost is in the tank wall (50%) so more attention in reducing wall construction is needed. In the case of Hy Cuong one just needs a good plaster applied directly to the earth sides of the biogas pit.

We recommend that first the stables (pigsty) and latrines should be organized and completed, so as to guarantee that manure and waste accumulated is of good quality and quantity for digester inputs.

There needs to be more study to see how to convert the liquid waste from the digester into composting waste outflow.

The overall cost of the biogas unit is still high, and is unaffordable to the poor and medium families.

6.3.3. Improved stoves.

Though fuel for cooking is not so critical in Hy Cuong, the improved stoves technology does help to reduce fuel consumption and by that way educate people to safeguard the forestation projects both for environmental reasons and for supplying the local paper mill.

There is a need to improve flexibility in use, such as having a hole which will take pots of different sizes.

The design should be adapted to be able to take larger fuel, since here people use mostly branches and wood.

There needs to be work to improve the heat and fire resistance of the plaster used on the stove.

6.3.4. Water extraction with the hand pump.

The nationally made pump is not really reliable, and it requires frequent maintenance and good skill to install and maintain it.

The cost is still high and unaffordable by poor and medium families.

There is a need to select other techniques which are simpler and cheaper, such as: well head lifting devices, chain and washer pumps, rower hand pump, etc., which could better suit the needs of poorer families.

Annex 1. Resource survey questionnaire used in the commune at the planning stage.

Địa chỉ:

Family questionnaire
MẪU ĐIỀU TRA GIA ĐÌNH

Name of head of family

I- GIA ĐÌNH : on family

Họ tên chủ hộ : _____ tuổi *age*

Văn hóa : _____ (Cấp I, II ghi 1, cấp III ghi 2, đại học 3, mù chữ không)
Education

Số người trong gia đình _____ năm định cư _____
Size of family When they settled

Trong đó: dưới 6 tuổi _____ Số cháu đi nhà trẻ mẫu giáo _____
No children under 6 How many go to kindergarten

Từ 6 đến 15 tuổi _____ Số cháu đang đi học _____
From 6 - 15 yrs How many go to school

Từ 16 đến 60 tuổi _____ số lao động chính _____
From 16 - 60 Number of workers

Trên 60 tuổi _____

Trình độ văn hóa cao nhất của gia đình _____ ghi như mục văn hóa
The highest education level of the family.

II- HIỆN TRẠNG XÂY DỰNG EXISTING HOUSE.

HOUSE SIZE (MAIN)

Diện tích nhà ở _____ m² năm xây dựng _____
WALLS? If earth 1 brick 2

Trồng nhà _____ mái nhà _____ (tranh 1, ngói 2)
root? patch 1 tile 2

Nhà phụ _____ m² tường _____ mái _____ (ghi tương tự)
2nd house? wall roof

Nhà bếp _____ tường _____ mái _____ (ghi tương tự)
Kitchen wall roof YES GOOD

Nhà tắm _____ (không có ghi 0, tạm ghi 1, xây ghi 2)
Bath/Toilet Lies or NO TEMPORARY

Giếng nước _____ (không có ghi không, đất 1, xây 2) NO=0 EARTH WELL=1 BUILT WELL=2
WELL YES

Chất lượng nước _____ (xấu ghi 0, trung bình 1, tốt 2)
QUALITY OF WATER BAD MEDIUM GOOD

Độ sâu _____ m mực nước mùa cạn _____ dm
WATER DEPTH DRY WET SEASON

Hố xí _____ (không có ghi 0, một ngăn 1, hai ngăn 2)
LATRINE NO 1 COMPARTMENT 2 COMP.

Lô đất ở _____ m² diện tích xây dựng _____ m²
PLOT SIZE BUILDING AREA

Diện tích vườn phải nộp thuế _____ m² diện tích ao _____ m²
TAXED AREA OF GARDEN POND SIZE

III- HÌNH HÌNH SẢN XUẤT GIA ĐÌNH (trong năm)

Diện tích trồng cây lâu niên _____ m² thu nhập _____ INCOME B
Area of long term tree

Diện tích trồng cây ngắn ngày _____ m² thu nhập _____ INCOME B
Area of short term plantation

- 2 -

ANIMALS COWS PIGS WEIGHT SOLD/yr

Chăn nuôi : số trâu bò số lợn sản xuất chuồng tạ/n

POULTRY Gia cầm weight con cá Fish kg

Phân chuồng Manure tạ weight 100 kg = Tạ 360 m² 36 m²

Đất ruộng khoán Contracted land for rice 360 m² sào vườn 36 m²

Sản phẩm qui thóc weight dry rice kg vượt khoán net weight kg

Sản phẩm thu được từ khoán khác qui thóc kg

Income from other land/crops in value of rice

Ngành nghề: số người tham gia thu nhập nghìn đồng

No of family in non farm activity income other sources

General income (thiếu ghi 1, đủ 2, thừa 3) Surplus

Mức ăn gia đình (thiếu ghi 1, đủ 2, thừa 3) Surplus

Khả năng tích lũy cho sản xuất Capacity for investment

Cho xây dựng For production

Cho vật dụng gia đình For other facilities

(ba mục này nếu mục nào có khả năng ghi 1, không ghi 0) YES OR NO
CAPACITY FOR DEVELOPMENT IN 3 YEAR TERM.

IV- KHẢ NĂNG PHÁT TRIỂN TRONG 3 NĂM TỚI

Production

Cho sản xuất (có ghi 1, không ghi 0) YES/NO

Cho xây dựng nhà ở m² (nếu không ghi 0) If not 0

Building m² house

Cho xây dựng các công trình khác m² (không ghi 0)

Other building

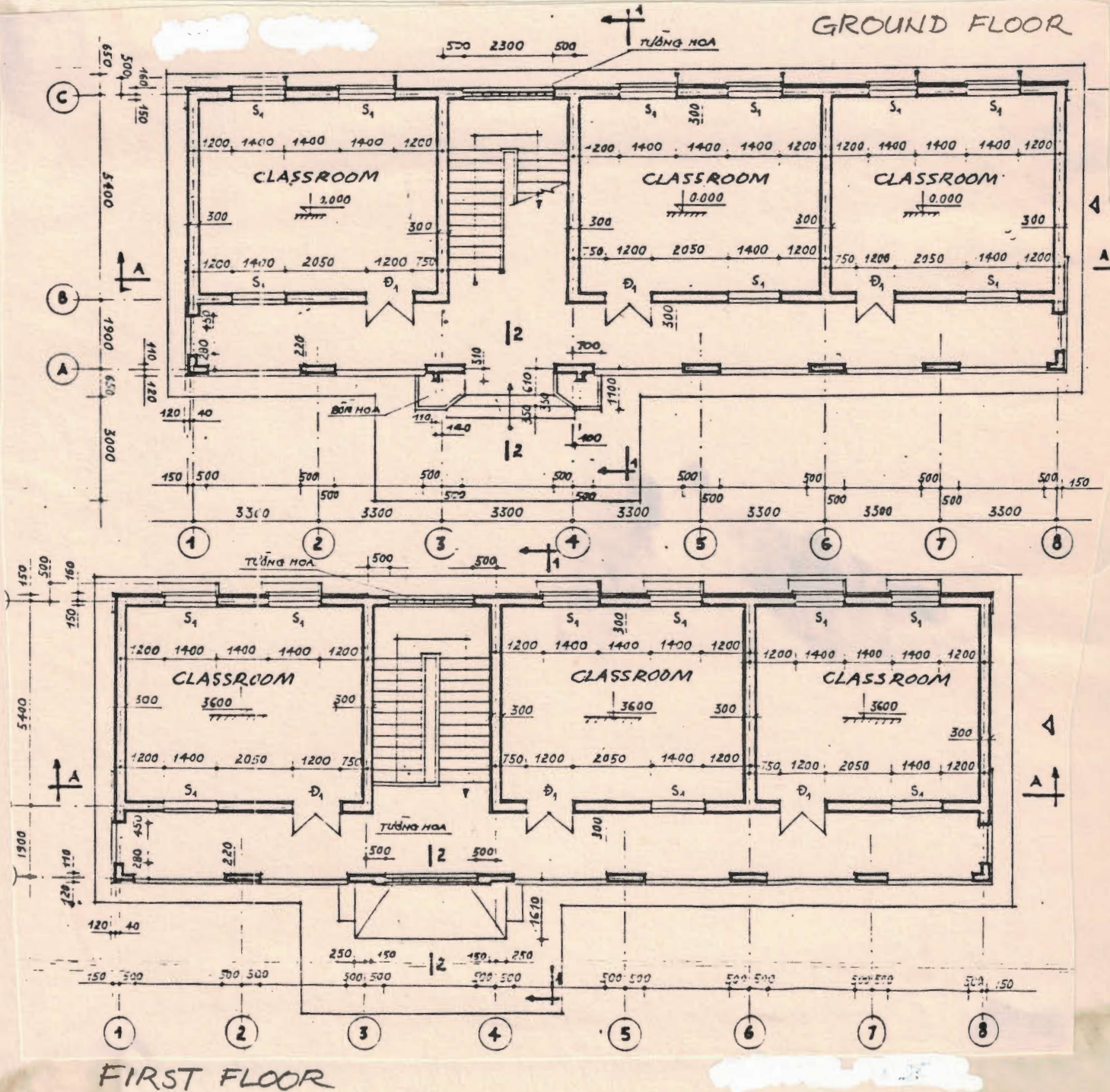
Vật dụng hiện có (không có ghi 0, đồ gỗ quý 1, đồ điện quý 2, ~~thiết bị khác 3~~)

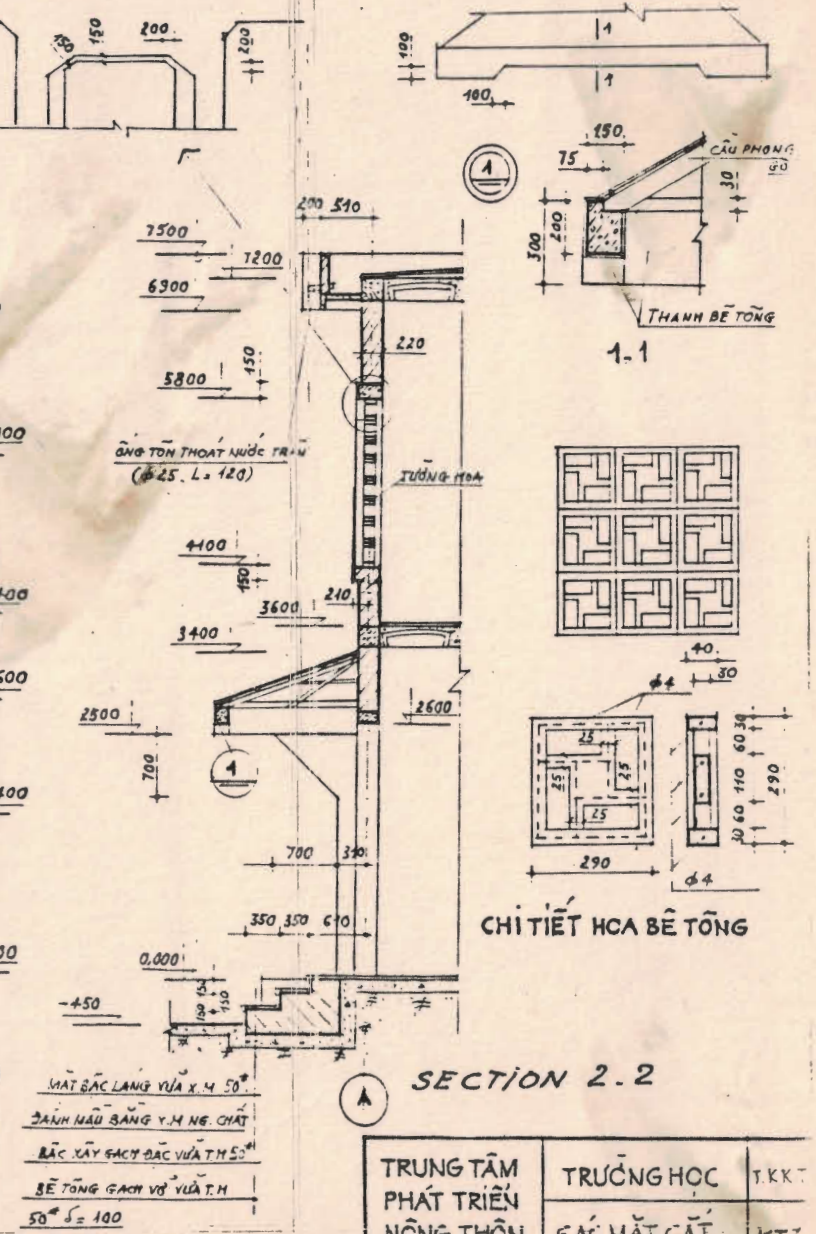
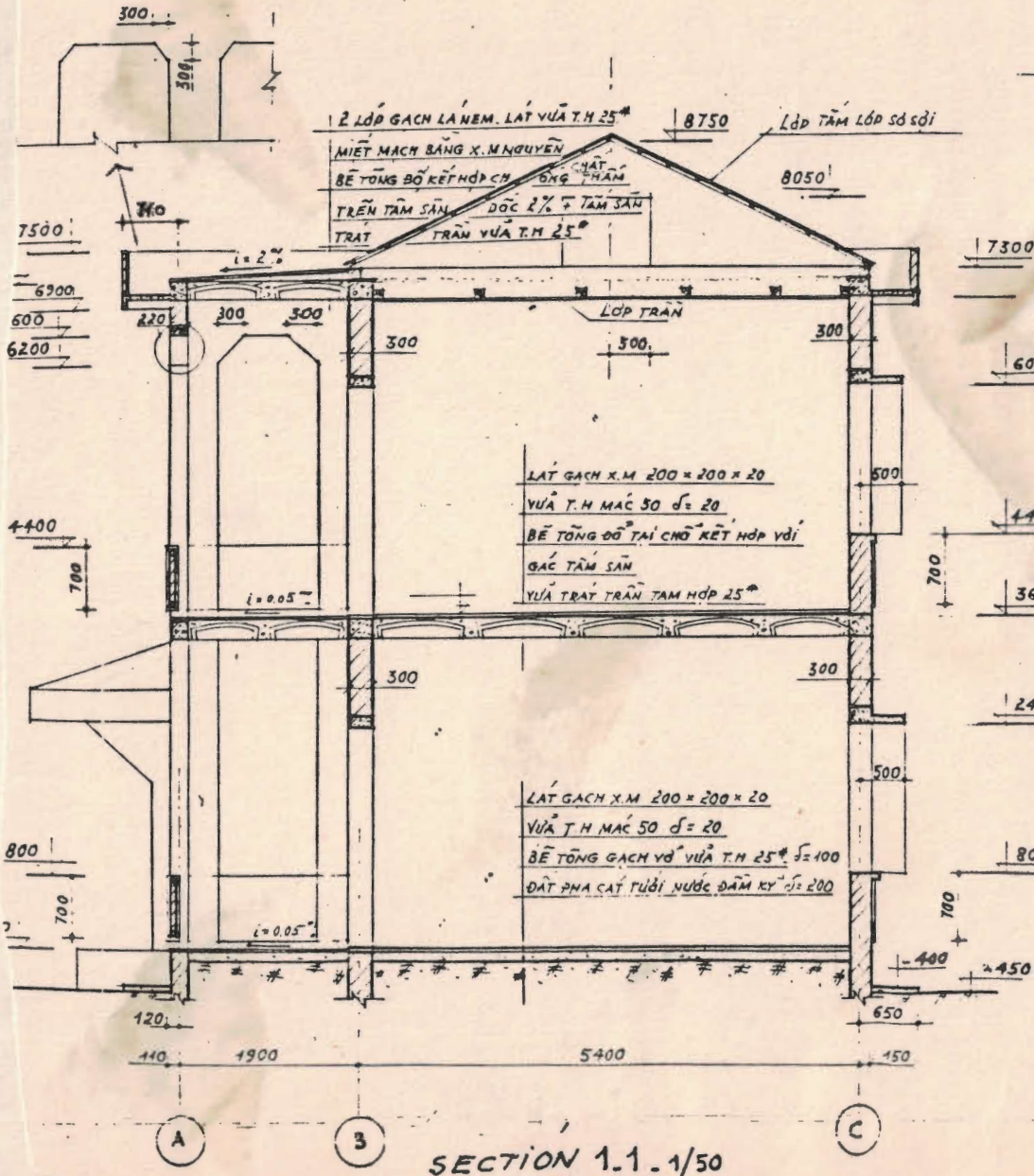
Furniture/equipment electric/motorcycle TV, extra

Họ tên điều tra viên ngày tháng năm

Interviewer date month yr.

Annex 2. Details of the Hy Cuong School





TRUNG TÂM PHÁT TRIỂN NÔNG THÔN	TRƯỞNG HỌC	T.K.K.T
GIAM ĐỐC	THIẾT KẾ	KIỂM
<i>Nguyễn Văn Tấn</i>	<i>Nguyễn Văn Tấn</i>	<i>Nguyễn Văn Tấn</i>