Current Socio-Economic Situation and Forest Resources in the Watershed of Dac Dro Stream in the Mekong River Basin

Consultancy Report

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TABLE of CONTENS

I. INTRODUCTION

Water, soil, and other related resources in the Basin of Mekong River provide livelihood and food for nearly 400 million of people, most of whom are farmers who essentially rely on water resources for agricultural production. Whereas, forest is an important factor that generates and regulates water flows in the downstream and provides irrigation water for production activities in this area. The watershed of Dac Dro stream alone in district of Krong No, province of Dac Nong, which runs through communes of Dac Mol, Dac Ro, and Nam Nung, provides livelihood and food for nearly 12,000 people. Therefore, watershed management interventions involve the interest and aspiration of stakeholders in both upstream and downstream, through negotiations among parties in order to arrive at sustainable management decisions so as to ensure water sources for production activities and life of people in the area.

The Watershed Management Component of the Cooperation Program between MRC and GTZ aims at achieving the following major goals:

- Select and develop sustainable upstream forest management modalities;
- Identify policy and regulatory prerequisites for successfully implementing sustainable forest management modalities;
- Support continued effective regional cooperation mechanisms; and
- Improve the quality of information and data management with respect to upstream forest management.

The survey collects basic information about socio-economic situation and forest resources in the forest of the watershed of Dac Dro stream of the Mekong basin, which is located in districts of Krong No and Dac Song. The survey is conducted to select pilot areas for watershed management and to determine potential activities for the various biological areas that lie along the stream of Dac Dro. This survey is the first field activity under the watershed management component, with the participation of a consultant at Forest Science Institute of Vietnam (FSIV), who led the entire survey processes, including design, methodology, topics, data system, and report writing.

The active participation of the component's coordinator, Mrs. Pham Thuy Co, in the preparation of the survey, of the Agricultural and Rural Development Department of province of Dac Nong, of People's Committee of two districts and communes of Dac Ro, Nam Nung, and Dac Mol, of State Forest Enterprises (SFEs) of Nam Nung and Dac Mol, and of rural development experts in two provinces, i.e., Dac Lak and Dac Nong, in the course of survey contributes to the success of this field survey.

II. OBJECTIVE AND APPROACH IN THE SURVEY, COLLECTION, AND ANALYSIS OF DATA

1. Objective of the survey

a. To collect basic information about socio-economic conditions in the watershed of Dac Dro stream, which lies in districts of Krong No and Dac Song; and

b. Determine a number of potential activities of each area, depending on its socio-economic and natural conditions, that lies along the stream of Dac Dro.

2. Approach in the survey, collection, and analysis of data

Often, experts are used in the conducting baseline surveys to gather data. Yet this survey adopts a participatory approach in all steps of the survey, including the preparation, implementation, and consolidation and analysis of data. The participation of parties, especially the participation of representatives of local governments and related agencies in the surveyed districts and communes and of consultants and rural

development experts, in the discussion and preparation of content, data templates, methodology, timeline, and implementation arrangements for the survey, helps eliminate the barrier between surveyors and respondents and between interviewers and interviewees. Instead, it is a dialogue, with the exchange and sharing of information of common interest, with respect to the management of upstream area.

a. *At the provincial and district levels:* a number of meetings with relevant agencies of province of Dac Nong have been held to exchange information about socio-economic conditions and development strategies for upstream areas. In particular, there has been discussion with staff of the Helvetas-funded Education and Training Support Program (ETSP) on activities and capacity of the agricultural extension system and of the project implementation areas.

b. *At the communal level*: A set of data templates, including 13 templates, have been prepared to collect information on:
   - Natural conditions (location, terrain, soil, pedology, flora) and assessment of the impact of natural conditions on socio-economic conditions and the management of resources in upstream areas;
   - General information about the use of land for agricultural, forestry, and husbandry activities;
   - Information about forest resources and the management and use of forest resources;
   - Information about the production of food and foodstuff and the management of plants and livestock;
   - Information about living conditions of households, such as income structure, poverty incidence, and socio-economic development situation at the communal level; and
   - Information about the assessment of opportunities and challenges in the future.

c. *Analyzing the current utilization of natural resources, broken down by altitude*: the Transect Walk method is adopted to assess the existing situation of natural resources, production activities and socio-economic situation of the entire upstream area of Dac Dro stream, regardless of the administrative borders among communes, villages, and state-owned farms. Results drawn out of the analysis of information obtained with the Transect Walk method are considered major findings of the survey so as to determine potential activities for each area in the pilot region for upstream management.

3. Scope of survey

The survey is conducted in two districts of province of Dac Nong:
- District of Krong No, including communes of Dac Ro and Nam Nung and the Nam Nung state-owned farm; and
- District of Dac Song, including the commune of Dac Mol and Dac Mol state-owned farm.

III. RESULTS OF THE SURVEY

1. Socio-economic situation and natural resources in commune of Dac Ro

1.1. Overview of natural conditions

a. Geographical location

The administrative border of commune of Dac Ro essentially coincides with the natural flow of four major streams, i.e., Dac Hoa, Dac Mam, Dac Hour, and Dac Dro. Dac Dro is one of the ten communes and towns in district of Krong No; the center of the commune is about 1.5 kilometers to the southeast of the town of Dac Mam. The commune borders:

- the town of Dac Mam and communes of Nam Da and Buon Choa to the north;
- the commune of Nam Nung to the south;
- the commune of Nam N'Dir to the east; and
- the commune of Dac Sac in district of Dac Mil and the commune of Dac Mol in district of Dac Song to the west.

b. Climate conditions

Commune of Dac Ro has a tropical monsoon climate of the central highland, with evenly high temperature all year round and with two typical seasons, i.e., rain season and dry season.

The rain season starts from May through November, with its precipitation accounting for 85-90% of the year's level. The precipitation peaks in August, at a level of 441.6 millimeters. Plants grow well in the rain season and it is also the key season for cultivating agricultural crops. However, this is also the season ridden with flood, soil erosion, and insects.

The dry season starts from December through April, during which period rain is scarce. The precipitation is lowest in January, at a level of 11.90 millimeters, which is associated with strong wind from the southwest, thus accelerating the evaporation process and causing drought. This is also the season vulnerable to forest fire.

c. Terrain conditions

Commune of Dac Ro is located on the highland of Dac Nong. Its terrain is divided by bowl-shaped hills and high mountains of steep slope, creating many water-gathering places, streams, and dry streams. The average altitude of the commune is about 600-800 meters above sea level, with slope varying between 10-30 degrees. The terrain slopes downward from south to southeast and from southeast to north-northeast.

d. Pedological features

The natural area of commune of Dac Ro is about 14.199 hectare, of which:

- Brownish red soil on Bazan rock: 9,412 hectares, representing 66.7% of the natural area. This soil is found in the southwest and northeast parts of the commune. Existing in thick layers, this soil is made of small particles, which are water absorptive and leakable, thus conducive to agricultural crops such as fruit trees, coffee, rubber, and vegetables;

- Reddish yellow soil on schist: 4,704 hectares, representing 32.3%. This soil is found mostly in sloping areas that are close to the center of the commune and scattered in the northeastern part of the commune; and
- Black soil, which is deposit product of bazan rock: 169 hectares, representing 1% of natural area.

e. Forest flora

Total area of forest land is 7,134 hectares, representing 50.5% of total land area. Of which:

- Land with natural forest: 7,038.1 hectares;
  - Land with production forest: 6,925.1 hectares;
  - Land with protection forest: 113 hectares;
- Land with plantation forest: 95.9 hectares.

1.2. Overview of socio-economic conditions

a. Population and its distribution

Figures of population from various sources vary. As such, in this report we use the figure released by the Project on Settlement of Free Migrants in commune of Dac Ro, in October 2004.

Commune of Dac Ro has 1,442 households with total population of 8,690, or an average of 6 persons per household. The average growth rate of population is 4.4%. There are ten ethnic groups in the twelve villages. The composition of ethnic groups is listed in Table No.1 below.

Table 1. Composition of Ethnic Groups

Ethnic Group	Number of Households	Number of People	% of Population
Kinh	895	5,970	68.7
Tay	87	547	6.3
Thai	12	67	0.8
San diu	5	28	0.3
Nung	25	100	1.2
Dao	210	870	10.0
Muong	6	34	0.4
M'nong	186	975	11.2
Ede	10	63	0.7
Ba Na	6	36	0.4
Total	**1,442**	**8,690**	**100.0**

Table No.1 shows further that among the ten ethnic groups found in the commune, people of the M'nong, Ede, and Bana groups have been living in the region for longest. They live in mostly in villages named 9, K62, and Ol. People of other groups have just settled in the region over the last 20 years under programs for establishment of new economic zones or as free migrants. Most of the free migrants are of ethnic groups of Tay, Thai, San Diu, Nung, Dao, and Muong, who came from the northern part of the country during 1996-1997. According to statistical figures, the commune so far has 978 people of 183 households, who live mostly in villages of Dac Na, Dac Ri, Dac Luu,

and Dac Hoa, which are the upstream area of major streams that flow into the stream of Dac Dro.

b. Situation of Land Use

Statistical figures as of October 2003 on land use (area and structure) in the entire commune, broken down by users, are presented in Table No.2 below.

Table 2. Situation of Land Use

No	Type of land	Area (ha)	%	Broken down by eligible users				No users
				Households (ha/%)	Economic organizations (ha/%)	Commune People's Committee	Others	
I	**Agricultural land**	**3,772.35**	**26.7**	**2,108.75** */55.8*	**1,663.60** */44.2*			
1	Annual crops	2,741.85		1,693.25	1,048.60			
	+ Rice and other agricultural crops	246.60		246.60				
	+ Upland field	2,495.25	17.7	1,446.65 */57.9*	1,048.60 */42.1*			
2	Household garden	57.10		57.10				
3	Perennial trees	955.60		340.60 */35.7*	615.00 */64.3*			
4	Fodder							
5	Water surface for aqua products	17.80		17.8				
II	**Forest land**	**7,134.00**	**50.5**		**7,134.00**			
1	Land with natural forest	7,038.10			7,038.10			
	+ Production forest	6,925.10			6,925.10			
	+ Protection forest	113.00			113.00			
2	Plantation forest	95.90			95.90			
III	**Special use land**	**148.26**	**1.1**		**1.00**	**82.85**	**64.41**	
IV	**Residential land**	**45.19**	**0.3**	**45.19**				
V	**Unused land**	**3,019.20**	**21.4**		**2,224.80**			**794.40**
	Total area	**14,119.00**	**100.0**	**2,153.94**	**11,023.40**	**82.85**	**64.41**	**794.40**

Agricultural land

Total area of land reserved for agricultural production is about 3,772.35 hectares, representing 26.7% of total area under the administration of the communal government. Over half of this area, including upland field (2,108.75 hectares, accounting for 55.8%), is used by households. The rest area (44.2%) is allocated to economic organizations such as state-owned agricultural farms, State Forest Enterprises, and other economic organizations. The area for cultivating wet rice is limited (246.6 hectares). Food crops are mostly planted on upland field, the area of which is 2,495.25 hectares, representing 17.7% of total natural area or 66.1% of the

area of land reserved for agricultural production. Food crops planted on upland field are mostly short-term ones such as corn, cassava, and beans of various types.

The area of land for cultivating perennial trees is about 955.6 hectares, of which coffee is planted on 780 hectares, pepper on 31 hectares, cashew nut on 100 hectares, fruit trees on 37 hectares, rubber on 7 hectares, and coca on 0.6 hectare. Most of this area (64.3%) is allocated to economic organizations that are entitled to use the land for planting coffee.

With the analysis of the current use of agricultural land, it could be seen that households are in need of utilizing sloping land (shifting cultivation) to plant short-term agricultural crops for food, particularly households in villages (Dac Na, Dak Ri, Dak Hoa, and Dak Luu) that are far from the center of the commune and hardly accessible.

Forest land

The area of forest and forest land is 7,134 hectares, representing more than half (50.5%) of the total area of the commune and allocated to three State Forest Enterprises: Thanh Nien, Dak Mol, and Duc Lap. Of this area, the area of natural forest is 7,038.1 hectares, consisting of forest of poor conditions, IIIA, IIB, IC, and mixed forest as a result of extensive exploitation. Valuable timber is rarely found; the forest is left with timber trees of small diameter (20-40 centimeters) of types 6, 7, or 8. The area of plantation forest is about 95.9 hectares, with most of trees being TECH, *Senna siamea and Acacia auriculiformis x A.mangium* (KEO). Some area of *Acacia auriculiformis x A.mangium* (KEO) plantations has been used to grow cashew, the accurate figure of which has not been made available.

Box 1.

State Forest Enterprise of Dak Mol wants to grow forest on the bare land in the upstream area of stream of Dak Dro in commune of Dak Mol. The farm has to pay money for the clearance work carried out on land area that is the forest stand of the farm and that has been illegally used by such households for shifting cultivation.

Major activities of State Forest Enterprises include regeneration and protection of the existing area of natural forest and grow forest on bare land with material trees like *Prunus arborea* (XOAN), *Acacia auriculiformis x A. mangium* (KEO), and TECH. The plantation of trees on land without forest, or bare land as it is called by state-owned forest farms, faces numerous difficulties, as most of this area has been illegally used by households in and outside of the commune.

Unused land

Total area of unused land (forest land) is 3,019.2 hectares, representing 21.4% of the natural area. Economic organizations are entitled to use most of this area, 2,224.8 hectares or 73.7%. Therefore, economic organizations, the state-owned forest farms in particular, are allocated a large area of forest land (71.9%) relative to the entire area of the commune. Yet they virtually could not control and use effectively the

allocated resources. The evidence is that, over the last ten years, the commune of Dak Ro is where most of free migrants from the North settle.

The area of land where no owner has been identified is 794.4 hectares, accounting for 22.3% of total area of unused land. Most of this area is river, stream, and land that is not potential for agricultural or forestry production.

c. Production activities and household economy

The cultivation area, productivity, and output of key crops are listed in Table 3 below.

Table 3. Area, productivity, and output of crops

No	Type of crop	Area	Productivity (quintal/hectare)	Output (ton)
1	Wet rice	230	50	1.150
2	Upland rice	120	20	240
3	Corn	1,366	55	7,513
4	Cassava	300	50	1,500
5	Sweet potato	75	30	225
6	Green bean	130	10	130
7	Pea of various types	348	13	452.4
8	Soy bean	320	20	640
9	**Soy-bean**	360	15	540
10	Coffee	780	20	1,116
11	Pepper	28	20	560
12	Cashew	25	13	32.5

Source: statistical figures of district of Krong No, 2003.

The composition of crops is diverse, including annual agricultural crops and perennial crops. Corn is considered an essential crop in agricultural production (1,366 hectares) and grown a lot in the rain season (May through November), the productivity of which is relatively stable. Corn is appropriate with the soil and climate conditions in the area.

Husbandry activities

Statistical figures in 2003 indicate that commune of Dak Ro is potential for cattle and poultry husbandry. Table 4 shows the type, quantity, and the average number of animals per household.

Table 4. Husbandry activities of households

No	Type of cattle or poultry	Number	Average per household
1	Buffalo and cow	600	0.42
2	Goat	60	0.04
3	Pig	5,000	3.47
4	Poultry	25,000	17.34

Household economy and poverty reduction

Housing condition: according to the housing classification standards of the Ministry of Labor, War Invalids, and Social Affairs (MOLISA), the percentage of solid houses in the commune is very small (0.3%), or only 4 households have solid houses. The rest households live in either semi-solid houses or temporary houses, of which the latter accounts for 50% (721 households).

Poverty incidence: according to statistical figures from various sources over the years, Table 5 shows that poverty incidence in the commune tends to rise. Many reasons are attributable to the increase of poverty incidence; yet an important one is that free migrants come and settle in the commune, most of them are already poor, lack investment capital, and have land in areas far from irrigation water and road.

Table 5. Poverty incidence in the commune

Year	Poverty Incidence (%)	Source of data
2004	12.04	Statistical figures on poverty of the district in 2004
2003	10.00	Project on settlement of free migrants in commune of Dac Ro
2000	5.20	Report on zoning of land use in the commune for 2001 – 2010 period

The percentage of better-off households is insignificant, just 2%. Most households are classified as average ones, accounting for 86%. Income is mainly from plantation and husbandry activities. Income from services and handicraft activities represents a very small proportion in total income of households.

d. Infrastructure and welfare facilities

The provincial road No. 684 is important to socio-economic development in the area, as it connects Dak Ro with cultural centers and adjacent markets in district of Krong No and province of Dak Lac. The road section that runs through the commune is paved and 6 kilometers long, meeting transportation and travel needs of local people.

Total length of inter-village roads in the commune is about 54.2 kilometers; such roads are divided into six major routes. Of this length, rock has been laid on 18 kilometers. The rest 36.2 kilometers, which are divided into three routes linking the commune's center to four villages, i.e., Dak Hoa, Dak Luu, Dak Na, and Dak Xuan, are trails. Therefore, these villages are hardly accessible in the rain season.

Seven out of twelve villages in commune of Dak Ro are connected to the national power grid. A total of 656 households get access to electricity, representing 45% of total number of households in the commune.

e. Health care and education

The commune has one medical station, which is a temporary house with seven rooms. There are four health care staffs, including one doctor and three physicians. In

general, health care services have met the needs of local people with respect to health care, environmental sanitation, disease and epidemic prevention, and family planning.

The school system of the commune consists of kindergarten, elementary school and junior high school. In general, school facilities are adequate for education needs of pupils.

- The kindergarten has six classrooms, which is located in the center of the commune. It has a total of seven teachers and 172 pupils.
- The elementary school has 22 classrooms, which are located in three populous areas of the commune. The school has a total of 45 teachers and 948 pupils.
- The junior high school has seven classrooms. It has 20 teachers and 521 pupils. Classes are held in two shifts.

2. Socio-economic situation and natural resources in commune of Nam Nung

2.1. Overview of natural conditions

a. Geographical location

Two communes, i.e., Nam Nung and Nam N'Dir, were just established on 29 August 2003, as a result of the breakup of the largest commune of Nam Nung (22,135 hectares) of district of Krong No. Commune of Nam Nung is located along the stream of Dac Dro, bordering commune of Dac Ro to the north. As such, commune of Nam Nung is considered a commune that lies in the watershed of stream of Dac Dro. The commune borders:

- Commune of Dac Dro, district of Krong No, to the north;
- Commune of Nam N'Dir, district of Krong No, to the south;
- Commune of Nam N'Dir, district of Krong No, to the east; and
- Commune of Dak Mol, district of Dak Song, to the west.

b. Climate conditions

Similar to commune of Dac Ro, commune of Nam Nung also has a tropical monsoon highland climate, with evenly high temperature throughout the year and two seasons: rain season and dry season.

The rain season starts from May through November, with 85-90% of the total precipitation of the year. Rain peaks in August, with the precipitation of 441.6 millimeters. The precipitation peaks in August, at a level of 441.6 millimeters. Plants grow well in the rain season and it is also the key season for cultivating agricultural crops. However, this is also the season ridden with flood, soil erosion, and insects.

The dry season starts from December through April, during which period rain is scarce. The precipitation is lowest in January, at a level of 11.90 millimeters, which is associated with strong wind from the southwest, thus accelerating the evaporation process and causing drought. This is also the season vulnerable to forest fire.

The average temperature is 22.2 degree Celsius, with maximum temperature of 36.6 degree and minimum temperature of 7.6 degree. The differential of temperature between day and night is about 9-10 degree.

c. Terrain conditions

Commune of Nam Nung is located in the highland of Dac Nong. Its terrain is divided by hills and mountain ridges about 530-720 meters high above sea level. In between mountain ridges and hills are streams, large and small, and valleys. The terrain slopes downward in two directions:

- Northwest – southeast: in this direction, streams flow through the territory of commune of Duc Xuyen and then into river of Krong No.
- Southwest – northeast: the streams flow into the mainstream of Dak Dro river, through the territory of commune of Dak Dro, and then into the Krong No river.

d. Pedological features

Total area of commune of Nam Nung is 7,726 hectares, of which:

- Brownish red soil on Bazan rock: 1,950 hectares, representing 25% of the natural area. This soil is found in the northern part of the commune, which is adjacent to commune of Dak Ro. Existing in thick layers, this soil is made of small particles, which are water absorptive and leakable, thus conducive to agricultural crops such as fruit trees, coffee, rubber, and vegetables;
- Reddish yellow soil on schist: 5,156 hectares, representing 67% of the natural area of the commune; and
- Annually accumulated alluvial soil: 620 hectares, which is found along the main streams in the northeastern part of the commune.

e. Forest flora

Total area of forest land is 4,653.87 hectares, representing 53.7% of total land area. Of which:

- Land with natural forest: 4,474.07 hectares;
- Land with production forest: 4,474.07 hectares;
- Land with plantation forest: 179.8 hectares.

2.2. Overview of socio-economic conditions

a. Population and its distribution

According to statistical figures available when the commune was established in August 2004, commune of Nam Nung had 804 households with 3,563 people, of which 2,137 people are in the labor force, or an average of 4.8 people per household. The average population growth rate is 2.2%. People of five ethnic groups live in six villages of the commune. The composition of ethnic groups is described in Table 6 below.

Table 6. Composition of Ethnic Groups

Ethnic Group	Number of Households	Number of People	% of Population
Kinh	386	1,470	41.2
Tay	7	28	0.8
Thai	106	515	14.5
Dao	48	256	7.2
M'nong	257	1,294	36.3
Total	**804**	**3,563**	**100.0**

Table No.1 shows further that among the six ethnic groups found in the commune, people of the M'nong group have been living in the region for longest. They live in mostly in villages named R cap, Gia ra, and Yok Ju. People of other ethnic groups such as Kinh, Thai, Tay, and Dao have just settled in the region over the last 10 years. Most of them are free migrants who came from the northern part of the country during 1996-1997. According to statistical figures, the commune so far has 257 free migrants of 47 households, who live mostly in village of Tan Lap and the Three-Levels Slope, which are located in the watershed of major streams that flow into the stream of Dac Dro.

b. Situation of Land Use

Statistical figures as of August 2003 on land use (area and structure) in the entire commune are presented in Table 2 below. A review of the land area, broken down by users, has not been conducted, as the commune has just been established. Therefore, Table 7 just shows the area and types of land.

Table 7. Situation of land use

No.	Type of land	Area (hectares)	%
I	**Agricultural land**	**1,796.33**	**31.6**
1	Annual crops	943.83	
	+ Rice and other food crops	14.20	
	+ Upland field	929.63	12/51.8
2	Household's garden	22.60	
3	Perennial trees	826.10	
4	Fodder		
5	Water surface for aqua products	3.80	
II	**Forestry land**	**4,653.87**	**53.7**
1	Land with natural forest	4,474.07	
	+ Production forest	4,474.07	
	+ Protection forest		
2	Plantation forest	179.80	
III	**Special use land**	**122.20**	**1.4**
IV	**Residential land**	**32.60**	**0.3**
V	**Unused land**	**1,121.00**	**13.0**
	Total area	**7,726.00**	**100.0**

Agricultural land

The area of land reserved for agricultural production is about 11,796.33 hectares, representing 31.6% of total area of the commune. More than half of this area (51.8%) is the area of upland field (929.63 hectares), most of which belongs to the use right of households. Main crops on upland field are short-term agricultural crops such as corn, upland rice, cassava, bean, and pea. The area of lowland field is small, just 14.2 hectares, which is mostly used for planting hybrid rice.

The area of land reserved for perennial trees is 826.1 hectares, which is mostly used to plant rubber and coffee. The area of rubber in 2004 planted by the joint venture between Nam Nung state-owned forest farm and Dak Lac Rubber Company is 100 hectares. The plantation of rubber draws the participation of about 120 households.

The analysis of the use of agricultural land shows that the need for using sloping land (shifting cultivation) of households that grow agricultural crops to produce food is evident, in particular for village of Tan Lap and the Three-Levels Slope, which are far from the center of the commune and hardly accessible.

Forest land

The area of forest and forest land is about 4,653.87 hectares, representing more than 53.7% of total area of the commune, and allocated to Nam Nung state-owned forest farm. Of this area, the area of natural forest is 4,474.07 hectares, consisting of forest of poor conditions, IIIA, IIB, IC, and mixed forest as a result of extensive exploitation. Valuable timber is rarely found; the forest is left with timber trees of small diameter (20-40 centimeters) of types 6, 7, or 8 (according to assessment made by the Nam Nung state-owned forest farm).

Major activities of this farm include regeneration and protection of the existing natural forest, plantation, and timber logging. The annual timber output of the farm is about 1,000 cubic meters.

The area of plantation forest is 179.8 hectares, planted mostly with TECH and MUONG, and financed by investment capital of the farm. With respect to protection of plantation forest, there has been a cooperation model between local households and the farm, with the piece rate of VND 20,000/hectare/year. However, there is only one household that enters into this cooperation arrangement with the farm for the protection of 30 hectares planted with TECH and MUONG.

Unused land

Total area of unused land (forest land) is 1,121 hectares, representing 13% of the natural area. Most of this area (84%) is unused mountain, hill, river, stream, and land that is not potential for agricultural or forestry production. This is a big potential for expanding agricultural and forest activities in the commune.

c. Production activities and household economy

The cultivation area, productivity, and output of key crops are listed in Table 8 below.

Table 8. Area, productivity, and output of key crops

No	Type of crop	Area	Productivity (quintal/hectare)	Output (ton)
1	Wet rice	**15**	**40**	**60**
2	Upland rice	**210**	**20**	**420**
3	Corn	**687**	**40.5**	**2,782.3**
4	Cassava	**160**	**50**	**800**
5	Sweet potato	**52**	**30**	**156**
6	Green bean	**80**	**10**	**80**
7	Pea of various types	**78**	**13**	**101.4**
8	Soy bean	**135**	**20**	**270**
9	Coffee	**410**	**18**	**738**
10	Rubber	**622**	**-**	**-**
11	Pepper	**13**	**20**	**260**
12	Cashew	**17**	**13**	**22.1**

Source: statistical figures of district of Krong No, 2003.

The composition of crops is diverse, including annual agricultural crops and perennial crops such as rubber and coffee. Upland field cultivation is the main activity of households, with key crops being corn, upland rice, cassava, and sweet potato. These crops are grown a lot in the rain season (May through November). Relative to commune of Dak Ro, the productivity of short-term agricultural crops is lower.

Table 8 also shows that total area of perennial trees such as rubber, coffee, pepper, and cashew is larger than the statistical figure listed in Table 7. This means that part of the area of upland field has been used to grow perennial trees.

Husbandry activities

Statistical figures in 2003 indicate that commune of Nam Nung is also potential for cattle and poultry husbandry; the average number of cattle per household is 4.6. Table 9 shows the type, quantity, and the average number of animals per household.

Table 9. Husbandry activities of households

No	Type of cattle or poultry	Number	Average per household
1	Buffalo and cow	3,685	4.6
2	Pig	3,450	4.3
3	Poultry	10,500	13.0

Household economy and poverty reduction

Housing condition: according to the housing classification standards of the Ministry of Labor, War Invalids, and Social Affairs (MOLISA), the percentage of solid houses in the commune is very small (0.5%), or only 4 households have solid houses. The rest households live in either semi-solid houses or temporary houses, of which the latter accounts for 49.5% (398 households).

Poverty incidence: according to statistical figures from various sources in 2004, Table 10 shows that poverty incidence is concentrated in villages where indigenous ethnic people and free migrants live. For example, of 47 households in village of Tan Lap, 23 households are poor, accounting for 49% of the total number of households. The poverty incidence in the entire commune is 17%, with 138 households.

Table 10. The number of poor households, broken down by village

No	Name of village	Number of poor households	Note
1	R cap	23	Indigenous ethnic people
2	Gia ra	38	Indigenous ethnic people
3	Yok ju	17	Indigenous ethnic people
4	Dak Ro	10	Free migrants and those settled under new economic zone program
5	Nam Tien	27	Free migrants and those settled under new economic zone program
6	Tan Lap	23	Free migrants and those settled under new economic zone program
	Total	**138**	

The percentage of better-off households is low, just 7.5%. Most households are classified as average ones, accounting for 75.5%. Income is mainly from plantation and husbandry activities. Income from services and handicraft activities represents a very small proportion in total income of households.

d. Infrastructure and welfare facilities

The length of inter-commune road is five kilometers. This road has been paved and thus meeting transportation and travel needs of local people.

Total length of inter-village roads in the commune is about 50 kilometers. Of this length, about road of about 2.5 kilometers has been paved and the rest has been laid with rock. In general, the road system in the commune is relatively convenient for travel.

Three out of seven villages in commune of Nam Nung are connected to the national power grid. A total of 250 households get access to electricity, representing 31.1% of total number of households in the commune.

e. Health care and education

The commune has one medical station, which was built in 1983 and which is in dilapidated condition. There are two health care staffs, including one physician and one nurse. In general, services are not adequate with respect to health care, environmental sanitation, disease and epidemic prevention, and family planning needs.

The school system of the commune consists of kindergarten and elementary school. There are twelve classrooms of low quality. There are two teachers at the kindergarten and 26 teachers at the elementary school. Eighty children go to the kindergarten while 550 pupils go to the elementary school.

3. The management of forest resources at Dac Mol state-owned forest farm

3.1 Background information

The Dak Mol farm has its headquarters located in commune of Dak Mol, district of Dak Mil, province of Dak Nong. It is located close to the national way No. 14B and is 60 kilometers far from city of Buon Ma Thuot. After several adjustments of administrative borders, the farm at present is allocated with 17,639 hectares of forest and forest land. The forest stand of the farm is located on the administrative territory of two communes, i.e., Dak Mol and Dak Song, in district of Dak Song. It borders:

- Thanh Nien State Forest Enterprise to the north;
- Dak Rung State Forest Enterprise to the south;
- Nam Nung State Forest Enterpriseto the east; and
- Thuan An State Forest Enterpriseto the west.

Both communes, i.e., Dak Mol and Dak Song, are populous. There are in total 3,669 households with 17,732 people of 12 ethnic groups.

- Kinh group: 3,172 households with 15,069 people;
- M'nong group: 274 households with 1,651 people; and
- Other ethnic groups: 223 households with 1,012 people.

Key functions of the farm:

- Manage and protect the existing area of natural forest;
- Exploit, process, and sell forest products;
- Develop agro-forestry production models toward diversifying products;
- Make investment to enrich forest and build infrastructure.

The annual output of timber in 2003 is about 2,000 cubic meters.

3.2 Terrain and pedological features

The terrain of the farm's forest stand is divided, in a very complicated manner, by streams, mountains, and watershed of many streams, i.e., Dak Dro, Dak Mam, and Dak Pri, which all flow into the river of Krong No. The altitude rises from northwestern part to southeastern part. The average altitude is 850 meters.

There are five types of soil in the forest stand of the farm. Of which, Bazan red soil accounts for 70%, reddish yellow soil for 14%, yellowish soil for 8%, brownish yellow soil for 4%, and alluvial soil for 4%.

3.3 Forest resources

By administrative territory: total area of forest and forest land is 17,639 hectares, of which:

- Commune of Dak Song: 3,779 hectares; and
- Commune of Dak Mol: 13,860 hectares.

By type of forest and level of forest resource:

- Protection forest: 1,645 hectares, representing 12.6% of total area, of which:
- Natural forest: 1,586.7 hectares, with a resource of about 319,597 cubic meters;
- Plantation forest: 58.3 hectares, without any resource.
- Production forest: 15,994 hectares, with a resource of 1,646,395 hectares.
- Plantation forest: 19.9 hectares, without any resource.
- Plantation land: 1,240.1 hectares.
- Other land: 3,743.5 hectares.

3.4 Personnel and Organization

Total number of staff working for the farm is 34, of which seven possess undergraduate degree, another seven possess intermediate diploma. The rest 20 people are forest protectors and supporting staff.

The organizational structure of the farm is as follows:

- The directorship;
- Administrative division;
- Economic affairs division;
- Technical division;
- Forest protection force; and
- Forest plantation force.

3.5 General assessment

Given the current situation of the management of forest resources and the information collected from interviews with the farm's staff, the following advantages and difficulties have been identified:

Advantages

- Total area of rich and average forest is 8,084 hectares; and exploitation plan could be designed to get up to 5,000 cubic meters of large timber annually;
- The Bazan soil is good and fertile for cultivating many marketable agricultural crops;
- The area is populous with a higher number of labor, which could be mobilized into forest activities;
- The contingent of staff at the farm is experienced and capable of handing over technologies and techniques to local people;
- The farm has prepared a business restructuring plan with a closed cycle: exploitation – processing – sales – reinvestment for enriching forest.

Difficulties and challenges

- The forest stand of the farm is located in the territory of two populous communes. As such, the pressure caused by these people on the forest resources of the farm is significant. In particular, free migrants of large number are living in the forest stand of the farm and causing a lot of complicated problems.

- The key production modality of local people is slash-and-burn cultivation. As such, forest of the farm is often vulnerable to invasion.

Box 2

Quality of forest and forest land	Area (hectare)	%
Resource of II B level	46.8	4
Resource of III A2 level	398.5	36
Resource of III A3 level	347.2	31
Upland field	320.3	29
Total	**1,112.8**	**100**

- The fertility of Bazan red soil, which is conducive to the plantation of marketable agricultural crops, draws special interest of local people and free migrants. Therefore, the farm is unable to control and monitor the changes of area of forest and forest land. For example, the an area of 320.3 hectares of forest in the watershed area of Dak Dro stream has been invaded by local people, representing 29% of total area reserved for upland cultivation (a more detailed analysis of the utilization of this forest shall be made available in the section named "analysis of the utilization of forest resources by altitude and a forecast of potential activities").

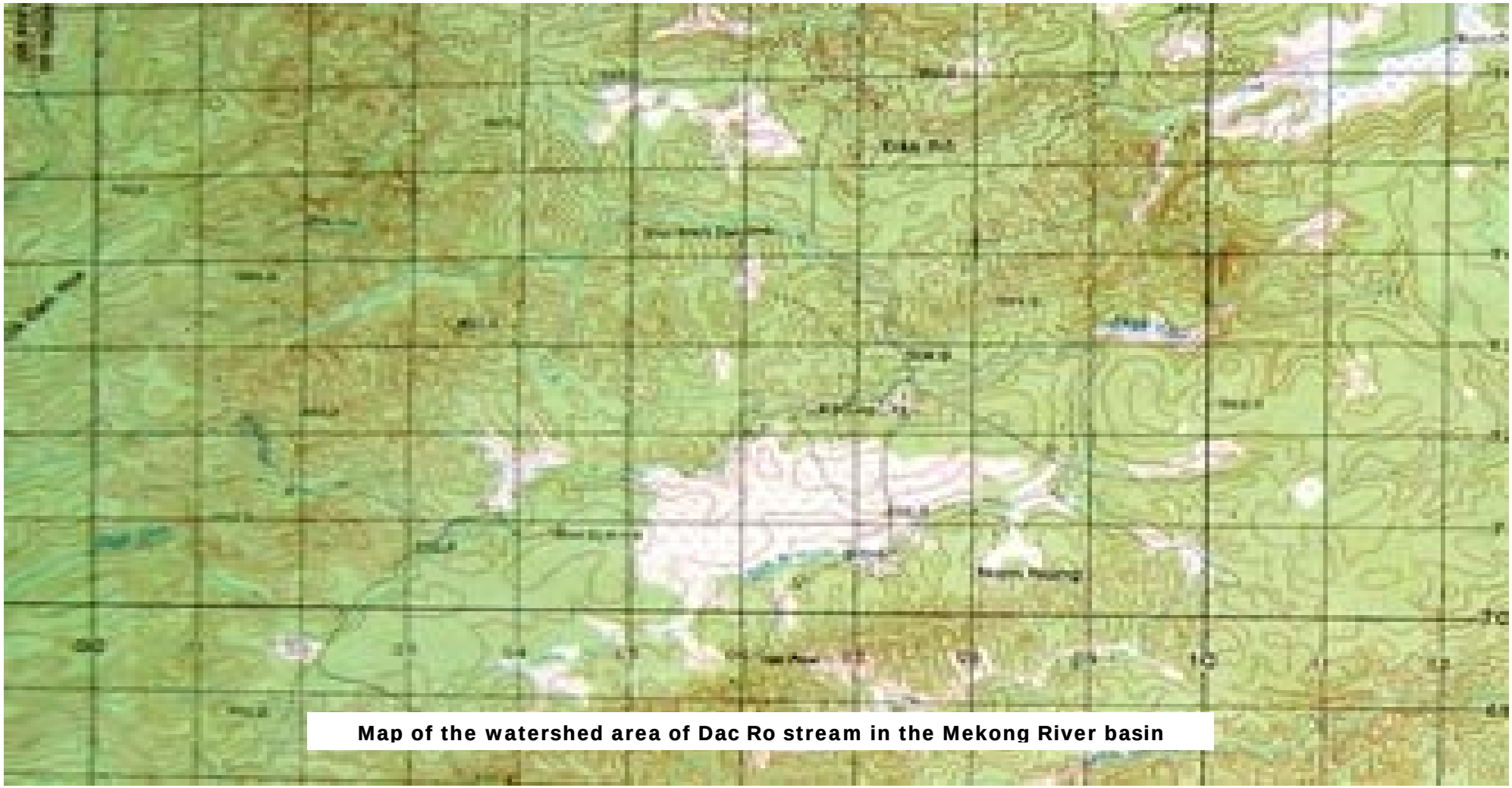
- The farm has yet played the role of a real owner with respect to the forest resources under its management.

- The discrepancy of inventory-taking data and actual area of causes difficulties in determining the type of forest that should be allocated, on a long-term basis, to households.
- The farm has prepared a business restructuring plan though; it just describes the restructured areas, without pointing out specific activities. In particular, post-inspection has yet been conducted to determine the situation of forest and no business models have been introduced to induce the participation of local community in the management and protection of forest and in the sharing of benefits.

- Investment capital of the farm is limited.

IV. ANALYSIS OF THE UTILIZATION OF FOREST RESOURCES BY ALTITUDE AND A FORECAST OF POTENTIAL ACTIVITIES

CURRENT UTILIZATION OF NATURAL RESOURCES BY ALTITUDE IN THE WATERSHED OF DAC DRO STREAM



Map of the watershed area of Dac Ro stream in the Mekong River basin

Areas broken down by the altitude of stream of Dac Dro	Watershed of Dac Dro stream in the forest stand of Dac Mol State Forest Enterprise Attitude : 600 - 550 m	Watershed of Dac Dro stream in communes of Dac Ro and Nam Nung Altitude : 593 - 500	Area in between key streams, sloping cultivation land and wet rice cultivation land in communes of Dac Ro and Nam Nung Altitude : 600 - 550 m	Watershed near the downstream of Dac Dro stream, in commune of Dac Ro Altitude: 590 - 450 m	Lowland, household garden and wet rice cultivation land in commune of Dac Ro Altitude: less than 400 m
Natural Conditions	- Bazan red soil, with layer of more than 1 meter, accounting for a major area. - Slope varies between 10 - 15^0. - Watershed of Dac Dro stream has little water in dry season. - Accessible by trail or by road used to transport timber, which has been downgraded. About 40 kilometers far from center of commune of Dak Mol.	- Bazan red soil accounts for 70% of total area, with a thick layer. - The rest is grey soil, with a thin layer. - The sloping degree is about 15 - 25^0 ; the highest peak is about 593m. - The main stream is Dak Dro, which is not dried off in the dry season. The rivultets in the watershed, however, are usually dried off in the dry season.	- Red soil accounts for most of the area, with layer of more than 1 meters. - Slope varies between 15 and 25 degree. - Along rivulets are accumulated alluvial soil, which is called “Dat Na” by M'nong ethnic people and used for growing industrial crops, agricultural crops, and dry rice. - The underground water source is about 15 - 20 meters deep from the surface. - The main stream gets additional water from rivulets in the territory of Dac Dro	- The terrain is divided. - Bazan red soil accounts for 5%, with layer of moren than 1 meters. - Grey soil, which was generated on Gralit rock and shale, with thin layer of less than 0.3 meter. - Slope is about 15 - 20^0 degree. - Underground water is about 10 – 15 meters deep from the surface. - The main stream gets additional water from rivulets flowing from the divided terrain, which is short of water in dry season.	- Lowland area, with black soil mixed with clay acumulated on the banks of streams. - Swampy land is rehabilitated into field for cultivating wet rice. - The layer of cultivating soil is thick. - Irrigation water is not stable for cultivating wet rice ; water is short for about four months in dry season. Flood in some areas occurs in rain season.

			commune, which is not dried off in the dry season.		
Assessment of Resources	- Natural evergreen forest, subject to a lot of exploitations. High level of tree density, timber of groups 5-7, including Tram, de, cho xot, v.v... Total area is about 1,088 hectares, 31% of which are forest of III A3 type, 36% are forest of III A2 type, 4% are forest of IIB type, and 29% milpa. - There is no non-timber forest products (NTFP). - Forest and forest land are ilegally used by people in neighboring communes for upland cultivation and for plantation of industrial trees (coffee). - Water from the stream is used to irrigate the exisiting area of coffee.	- Natural poor forest, which has been exploited significantly (the forest looks like the skin of a spotted puma) for cultivation land. The forest is left only on the top of hills or in the main rivultet of stream of Dak Dro, where the slope is very steep. - The forest cover is 30 %, with low inventory of timber, which is of low quality (groups 6, 7, and 8). There is no valuable timber: *Pterocarpus macrocarpus* (Huong), *Xylia xylocarpa* (cam xe), *Dalbergia oliveri* (cam lai), etc. - Most of the bare land area (with bamboo and brushes) behind the upland field is not yet used.	- Forest is exploited rampantly, which looks like the skin of a spotted puma, for land for cultivating industrial and agricultural crops. - The existing forest is found near rivulets and sloping land areas that lie along the two banks of the main rivulet flowing into stream of Dak Dro. The land area covered by forest accounts for about 20%. The inventory of timber is low, with low-quality timber (groups 6, 7 and 8). There is no valuable timber *Pterocarpus macrocarpus* (Huong), *Xylia xylocarpa* (cam xe), *Dalbergia oliveri* (cam lai), etc. The bare land area (with bamboo and brushes) behind the upland field is not yet used.	- The area is potential for building a resevoir to provide irrigation water. - Forest land is mostly used for milpa cultivation. - The forest is poor and depleted, with low forest cover of about 15%. Few hilltops and rivulet banks are covered by forest. They are mostly covered by bamboo and bushes.	- The area is potential for cultivating wet rice ; productivity of crops is stalbe if adequate irrigation water is available. - Soil is suitable for many agricultural crops and intensive cultivation and increase of cropping seasons are possible. - Many opportunities for developing household gardens. - This area receives most benefits from the sustainable management and utilization of natural resources in the watershed of stream of Dak Dro.

Existing utilization of land	- Natural evergreen forest sections are blended with upland fields that are under regeneration. - The area of forest planted with keo la tram is 25 hectares, - Upland fields are located along the two banks of stream of Dac Dro, the width of which on each bank is about 200 meters. Key crop is coffee, with productivity of 3 tons per hectare. - There are six hectares of plain area near the stream, which is used to plant rice and other agricultural crops such as hybrid corn, with productivity of 4.5 tons per hectare, and cassva, with productivity of 20 tons per hectare.	- The forest is exploited rampantly for cultivation land. - There are two residential clusters. The first includes villages of Dak Na and Dak Ri, in commune of Dak Dro, which were set up in 2000 by ethnic groups (the red Dao) who migrated from the North in 1996. These villages are located along the stream of Dak Nam, which is adjacent to commune of Dac sak, district of Dak Mil. Another residential cluster is village of Tan Lap, commune of Nam Nung, which is also resided by the red Dao ethnic group. These three villages use a large area of 350 hectares for agricultural production in the watershed of three main rivulets of stream of Dac Dro. - Forest and forest land	- The forest is planned to be production forest, mostly found in territory of commune of Dac Dro. Yet most of the area of forest and forest land is used for planting agricultural crops. - Key crops are wet rice, cassava, and hybrid corn, which are planed in an area of 300 hectares, with low productivity. - Coffee is grown on highland area; yet the area of coffee cultivation is insignificant, as it is far from water sources. - The land ridge between two rivulets in the territory of commune of Dac Dro houses three residential clusters. Sloping-land cultivation is the main activity of people living in these	- Sloping land area is eroded and wiped off. - No windshield trees are planted. - Cashew is planted on about 100 hectares, of which 30 hectares are planted with cashew in 2000, where coffee with low productivity used to be planted. - Pepper is planted on 31 hecateres, with a productivity of 1.9 tons per hectare. - Dry rice is planted on 120 hectares, mostly by ethnic minority groups, with a productivity of 1.5 tons per hectare. The cultivation area is not stable, as soil is impoverished and as productivity is contingent on climate conditions each year. - This is not a populous area, and most cultivation land is milpa. - The area is easilly accessible.	- This area is where most people of the cmmune live. It has 8 villages. The area is easilly accessible. - Wet rice is planted for one cropping season in an area of 200 hectares. - The area where hybrid rice is planted accounts for 30 - 40%. The rest area has been used in recent years for planting and testing some hybrid rice such as Nhi u and Bac u. - The average productivity is 4 tons per hectare. - Coffee is planted on about 782 hectares, of which 70 hectares are on bazan soi area, with productivity of 1.5 - 2 tons per hectare. The rest coffee-planted area is on grey soil, with productivity of 1 – 1.2 tons per hectare in the same cultivating

		have also been invaded and fenced off by people from adjacent communes, for upland cultivation. - Dry rice, coffee, and cashew are planted on two sides of rivulets and on hillsides, which are relatively flat. No accurate statistical figure has been collected for area planted with these crops. Productivity is not stable, contingent on the weather conditions in each year.	clusters. - The lower land area in the territory of commune of Nam Nung is where most people of the commune live. Wet rice cultivation is their main production activity. - The Krong No Business and Investment Company leases 385 hectares of land for growing material forest. - There are about 7 hectares of land planted with coffee, which is under the ownership of Duc Lap state-owned forest farm. - Relatively easy to access.		conditions. - Hybrid corn is the key crop in this area, which is planted on an area of 1,366 hectares. Depending on weather conditions, however, that hybrid corn is planted in two cropping seasons in the year ; productivity in the autumn season is 5 – 5.5 tons per hectare, while that in the winnter season is 4 – 4.5 tons per hectare.
Exploitation and utilization	- Natural evergreen forest in high land areas is protected and regenerated naturally. - The state-owned forest farm grows forest for paper material *Acacia*	- Natural evergreen forest in high land areas continues to be protected and regenerated by state-owned forest farms. - Part of the area of forest land is allocated	- Natural forest sections left over near rivulets are kept for protecting the source of water supply. - Forest land is converted into land for planting annual	- Milpa cultivation is the key activity, with few agro-forestry techniques adopted. - Forest is exhausted due to exploitation and is unable to protect or regulate the	- Most land area with potential for growing wet rice has been used up. - If there are irrigation lakes and canal networks, the cultivation area could

	auriculiformis (keo la tram). - All timber of good quality, which belongs to groups 1 and 2, has been exploited ; the rest includes only regenerated trees. - Forest and forest land are invaded by people in neighboring communes to grow agricultural and industrial crops (coffee).	by such farms to the local government for other purposes, for example, for the settlement of stabilization of the residency of free migrants in the area. - The rest area of forest and forest land is invaded by people (free migrants and indigenios people from other communes) in the region for agricultural cultivation.	agricultural crops and coffee. - Forest and forest land are exploited and invaded by people (free migrants and indigenious people from other communes).	flow of water.	be expanded to 450 hectares and it could be used to carry out two cropping seasons instead of one at present. Then, it means that some high land areas that are currently used for growing non-rice crops could be used to grow wet rice. - Most of the land in this area has been used up for growing annual and perennial trees and for residential area. - Some indigenous households lease out the cultivated area for growing wet rice.
Management – Use Right	- Production forest is allocated to Dac Mol state-owned forest farm for nurturing, protection, and exploitation of timber. - About 30% of the area of forest and forest land have been ilegally used by people from	- The entire area of forest and forest land is planned to be production forest, which is allocated to two farms for management, protection, and exploitation. The Thanh Nien farm is	- Forest land is allocated or leased to organizations, individuals, and households for planting annual agricultural crops and coffee. - Most of forest land, after converted into	- Forest and forest land in the forest stand of state-owned forest farms are not allocated to local community. - Most land area, after converted into agricultural land, is allocated to	- Most agricultural land area has been allocated to households and individuals (certificate of land use right has been issued).

	neighboring communes. - The farm has three checkpoints in the area. - It employs a number of ethnic minority people to exercise the management and protection of forest.	responsible for managing the forest stand in the territory of commune of §ac Ro (villages of Dac Na and Dac Ri), while the Nam Nung farm shall take care of the forest stand in the territory of commune of Nam Nung. - Residential land and land for cultivating agricultural crops, about 250 hectares in total, of two villages, i.e., Dac Na and Dac Ri, have been handed over by the Thanh Nien farm to the local government. However, this area so far has not been measured and issued with certificate of land use right. - About 100 hectares of residential land and land for cultivating agricultural crops have been handed over by Nam Nung farm to households in village of Tan Lap.	agricultural land, has been allocated to households and individuals (certificate of land use right). - The exisiting area of forest and forest land are under the management of the state-owned forest farm and yet alllocated to the local community.	households and individuals (certificate of land use right).	

Support	- The farm makes investment, with its own investment capital, into the forest for producing paper materials. Households that have cultivated land in the area provide labor for this activity.	- Project No. 132 allocates land to and rearrange residency for people of ethnic minorities. - Investment for cashew planted on land under Project No. 132 is assigned to households.	- Project No. 132 allocates land to and rearrange residency for people of ethnic minorities. - Investment for cashew planted on land under Project No. 132 is assigned to households. - An agro-forestry model was implemented in 2002, including: fruit tree (mango from Hoa Loc) + cashew + *Acacia auriculiformis x A. mangium* (replaced by rubber). The model has ben implemented over an area of 20 hectares, with twenty households invovled. . - Agricultural extension program for annual crops.		- The auto-run irrigation system with a semi-solid damn is solidified annually with the support of the State. - Some indigenous ethnic households are provided with rice seeds. - The annual agricultural extension program includes the experimentation of 1 - 2 new corn species, one model for cross-breeding and fattening cow species ; two models for intensive farming of hybrid rice, and the provision of 3 kilograms of seeds and VND 200,000 to two households. - The small-scale rubber cultivation program (2004) under the Agricultural Diversification Project, 7.4 hectares for six households.
Difficulties	- The forest is neighboring many communes; as such	- Forest and forest land are often invaded for cultivation purposes.	- Forest and forest land are often invaded for cultivation purpose. .	- There are no trees to cover and protect agricultural land from	- Wet rice cultivation is not stable ; many areas planted with wet

	forest and forest land are invaded. The farm faces many difficulties in protecting the existing resources of the forest. - The farm does not apply forest nurturing technical measures for this forest area. - The legal basis for determining the right to use forest and forest land has not been strictly observed. - The farm is unable to carry out its production activities according to plan. - The cooperation between the farm and neighboring communes in forest management and protection is not effective. - The monitoring of developments of forest resources does not involve other stakeholders. - The area is hardly accessible, with no	- Zoning and issuance of land use right are implemented very slowly and not transparently. Such activities are not up to the expectation and the need of people. - The farms could not supervise forest resources. Conflicts often occur between those granted with land use right and the actual users of land (the invaders) with respect to the use of forest and forest land. - The pressure created by free migrants on forest resources, in the form of using forest land for cultivation purposes, causes low productivity, short land abandonment period, and land erosion. - Local people hardly have the opportunity to participate in the development and protection of forest. - Transportation	- The right to use forest land is not clear. - The developments of forest resources are not closely monitored. - Land zoning and planning activities always lag behind the requirements of production activities. - Local people do not have many opportunities to participate in the protection of forest. - Inter-village roads are bad. - The discrepancy of inventory figure and the figure of actual forest causes difficulties in determining the type of forest that should be contracted out, on a long-term basis, to households.	erosion, resulting in the rapid degradation and erosion of agricultural land. - Agricultural crops have been degraded, with low productivity. - The terrain is divided, thus difficult for adopting irrigation measures for agricutural crops. - There has been no support provided to address the degradation of resources.	rice are damaged due to long drought or flood in the rain season. This means the area of wet rice cultivation varies according to weather conditions. - Irrigation water for agricultural production is not stable. - Rice varieties currently used, such as the IR64, has been denegereated over many years of cultivation. - The techniques for intensive farming are limited, especially among ethnic minority indigenous people. - Intra-field roads are of bad quality. - Garden land is planted with a variety of fruit trees, which originate from the region and generate low productivity and low income.

	people living in the area. Yet the bazan red soil is an important resource for agricultural cultivation. - The discrepancy of inventory figure and the figure of actual forest causes difficulties in determining the type of forest that should be contracted out, on a long-term basis, to households.	difficulties result in the isolation of such villages, thus the limitations on management and protection of forest. - The farms are responsible for an excessively large area of forest, which lies on the territory of many communes and districts. This causes a difficulty in the coordination of forest management and protection activities. - The discrepancy of inventory figure and the figure of actual forest causes difficulties in determining the type of forest that should be contracted out, on a long-term basis, to households.			
Solutions	- Apply existing legal framework to determine benefits and right to use forest and forest land. - Study and introduce	- Strengthen the participation of local community in the protection and rehabilitation of forest. - Enhance the role of the	- Cashew is planted on an area of 200 hectares under Project No. 132 by ethnic minority people in three villages since	- Set up programs to address the degradation of resources, especially to enhance the protection capability of	- Feasibility study for the reservoir and damn for the Dac Ro Irrigation System, with total area in the watershed of 130

	appropriate benefit-sharing mechanism to draw the interest of people in regenerating and rehabilitating exploited natural forest.	farms as the owner and the provider of technical services. - Study and introduce agro-forestry models or production models on sloping land.	2003. - Stable zoning for residential area and production area. - Draw the participation of people in four villages in the management and protection of forest. - The residential and production settlement program for 2004 should setttle the free migrants in four villages. - The small-scale rubber plantation and agricultural diversification program convert 400 hectares, which is being used for planting coffee and agricultural crops, to an area for planting rubber.	forest, to directly and effectively protect the Dac Ro irrigation resovoir. - Change the structure of crops, by growing crops in rows to prevent soil erosion.	square kilometers and with State capital of VND 127 billion. Implementation timeframe is not clear. - Semi-solid damn is built each year. - Irrigation cooperative is established.
Expected Activities	- Forest land, which is being used to plant agricultural crops, is being allocated to households that have cultivated land in	- Prepare zoning plan at the village level and allocate forest and land to local community and households. - Draw up plan for	- Land use planning and zoning and the allocation of land and forest should be carried out at the village level.	- Draw plan for the development of villages in the watershed, which is near the downstream of Dac Dro stream and	- Make further investment to develop agricultural and forestry extension models. - Draw plan for

	forest. - Develop models for contracting out the regeneration of existing natural forest. - Monitor and assess forest resources with the participation of stakeholders to ensure sustainable management of forest. - Continue employing local people to work as workers of the farm.	developing villages in the watershed area. - Develop agro-forestry models or models for cultivation on sloping land. - Seek and improve sustainable watershed forest management and protection modalities for groups of households or for local community. - Train and hand over techniques through agricultural extension activities. - Regenerate and plant additional forest - Grow forest	- Grow new forest, with indigenious trees, and regenerate exisiting forest. - Draw plan to develop households' garden. - Introduce new crops, with high productivity, to replace degraded ones. - Make further investment into agricultural and forestry extension models. - Ensure stable zoning of residential area and make investment into infrastructure works.	has cultivated land in this area. - Seek and improve sustainable watershed forest protection and management models for groups of households or for local community. - Grow new forest with indigenous trees and regenerate forest. - Conduct training to disseminate techniques for cultivating on sloping land. - Grow fodder in rows to prevent soil erosion, and provide revolving loans to support husbandry activities. - Improve the rural clean water supply.	developing household gardens. - Provide techniques for intensive farming of wet rice. - Introduce new varieties with high productivity to replace the degenerated ones. - Draw plan for developing villages in the low-land areas.

V. FINDINGS AND RECOMMENDATIONS

The impacted forest is actually exploited forest that is located in the forest stand allocated to State Forest Enterprises. After exploitation activities, therefore, the farms should properly supervise the nurturing and protection of forest or re-assess forest resources, with the participation of local people, to allocate forest on a long-term basis to households in accordance with Decision No. 178. Then, the rights and obligations of related parties would be specified.

All communes already have land utilization and zoning plans for the 2001-2010 period. Yet the approach taken in the preparation of such plans could be described in the following phrase: “two downs and one up”, meaning that the direction is given by the higher authority – the lower authority follow the direction – the higher authority approve the result. As such, the connection between different plans such as agricultural development plan, forestry development plan, and water resources plan is very vague; and the preparation of such plans does not represent a multidisciplinary approach. For example, total area of watershed forest of the Dac Ro reservoir is 130 square kilometers (feasibility study for the Dac Ro Irrigation Works). Yet there are no activities supporting socio-economic development in the watershed area, neither are measures for preventing erosion and leaching of the reservoir. Therefore, training activities should be undertaken to enhance knowledge of watershed management. Watershed management activities should be a multidisciplinary task and go beyond the administrative borders of villages, communes, as well as districts.

Population pressure, especially that put by spontaneous migrants on resources of forest in the watershed area of Dac Dro stream, is huge. Yet the traditional modalities for sustainable use of forest as adopted by Thai, Tay, and Dao minorities in the northern mountainous areas are not undertaken and adapted to the natural, environmental, and biological conditions. The reason is activities taken by such spontaneous migrants are not considered legal. Therefore, plans for settlement of spontaneous migrants should be developed using the bottom-up approach. Concomitantly, technical assistance should be provided to prepare plans for developing villages in order to identify and revitalize sustainable forest management modalities in the watershed area of Dac Dro stream.

The downstream area of Dac Dro stream is rather populous. Yet there are also many villages located in the watershed area. Therefore, the experimentation of watershed management activities carries significant meaning, as it helps settle spontaneous migrants in the watershed area and improve the supply of irrigation water not only to the downstream area but also to the Mekong River basin.

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3	Nguyen Dinh Hoa	Manager, Forestry Division
4	Dang Thanh Liem	Expert, Dak Lac Rural Development Project
5	Pham Dinh Bo	Vice Chairman, district of Dak Song
6	Hoang Van Hung	Head of Station, Agriculture and Forestry Extension Station, district of Dak Song
7	Hoang Van Dai	Director, Dak Mol state-owned forest farm
8	Ho Ngoc Tien	Official, Technical Division, Dak Mol state-owned forest farm
9	Nguyen Hoang Minh	Chairman, commune of Dak Mol
10	Dang Thanh Quang	Vice Chairman of district of Krong No
11	Tran Cong Thanh	Head of Office of People's Committee of district of Krong No
12	Bui Tan Buu	Manager of Agricultural Division, district of Krong No
13	Nguyen Ngoc Quang	Official, Agricultural Division, district of Krong No
14	Bui Van Dam	Official in charge of settlement and new economic zones, district of Krong No
15	Thai Huu Van	Head of Party's division, commune of Dac Ro, district of Krong No
16	Ngo Van Luong	Cadastral official, commune of Dak Ro, district of Krong No
17	Pham Ngoc Kieu	Chairman of Farmers' Association, commune of Dac Ro, district of Krong No
18	Doan Gia Loc	Chairman, commune of Nam Nung, district of Krong No
19	Dinh Xuan Phung	Head of Office of People's Committee of commune of Nam Nung, district of Krong No
20	Kieu Van Tai	Official, Nam Nung state-owned forest farm, district of Krong No
21	Patrick Rossier	Technical Advisor, Helvetas Project
22	Nguyen Van Bang	Provincial Coordinator, Helvetas Project