

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION
OF THE
FORESTRY SECTOR PROJECT
IN
VIET NAM

July 1996

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CURRENCY EQUIVALENTS

(as of 10 May 1996)

Currency Unit	-	Vietnamese Dong (D)
D1.00	=	\$0.00009091
\$1.00	=	D11,000

ABBREVIATIONS

FAO	-	Food and Agriculture Organization
IEE	-	Initial Environmental Examination
MARD	-	Ministry of Agriculture and Rural Development
MOSTE	-	Ministry of Science, Technology, and Environment
NGO	-	Nongovernment Organization
POSTE	-	Provincial Office of Science, Technology, and Environment
PPMO	-	Provincial Project Management office

WEIGHTS AND MEASURES

ha	-	hectare
m	-	meter
mm	-	millimeter
m ³	-	cubic meter
km ²	-	square kilometer

A. Introduction

1. The Asian Development Bank (the Bank) has been requested by the Government of Viet Nam to finance the Forestry Sector Project (the Project) in support of the Government's program for forest and watershed protection and rehabilitation. To help the Government of Viet Nam (the Government) to prepare this Project, a technical assistance project was prepared in June 1995 by the Bank on the basis of a joint fact-finding mission with the Investment Center of the Food and Agriculture Organization (FAO). The lead agency for the Project is the Forest Protection and Management Department, which was under the Ministry of Forestry (in November 1995, this ministry was merged with the Ministry of Agriculture, creating the new Ministry of Agriculture and Rural Development [MARD]). The Investment Center was selected to implement the technical assistance under an existing cost-sharing agreement between the Bank and FAO. Findings during the field work (completed during 15 October - 20 December 1995 and January 24 - 10 February 1996) were used as the basis for Project preparation.

2. This Report covers: (i) a brief description of the proposed Project; (ii) a description of the existing environmental situation in each of the three watersheds; (iii) a screening of the potential environmental impacts associated with the Project and recommended mitigation measures; (iv) an analysis of environmental management institution; (v) community participation; and (vi) the findings and recommendations of the Initial Environmental Examination (IEE).

B. Description of the Project

3. Watershed degradation in Viet Nam is commonly associated with (i) forest clearing and degradation; (ii) migration into less accessible forested mountainous areas; (iii) reduction of the fallow cycles associated with shifting cultivation; (iv) poverty in rural upland areas; (v) inadequate policies for the allocating and pricing natural resources; and (vi) weak institutions responsible for managing watershed resources.

4. The objective of the proposed project is to stop environmental degradation and to improve the livelihood of the rural population in selected watersheds through protection of existing forests, reforestation and afforestation activities, and provision of support for sustainable farming systems. The major components of the proposed Project are:

- (i) **Resource Inventory.** This component includes mapping, surveying, zoning and demarcation of production, protection and special use forests.¹ This will involve (a) mapping of the Project area at a scale of 1:50,000 to show current land use; (b) detailed preparation/updating of village-level maps at a scale of 1:10,000 for about 130,000 hectares (ha) to develop commune/village development plans using the participatory approach; and (c) socioeconomic surveys of the affected population to assess their needs, development constraints, and potential contribution to participatory development;
- (ii) **Capacity Building.** This component include: (a) training of the national, provincial

¹ Production forest is allocated for harvesting in compliance with the approved management plan; protection forest is used to protect land and water resources in critical areas, and harvesting is very restricted; special use forest covers nature reserves and national parks for the conservation of biodiversity, cultural, historic and scenic importance.

and district level staff in forest management, agroforestry systems, and participatory land use planning; (b) training farmers and ethnic minorities in appropriate technologies for crop production, agroforestry, livestock production, and reforestation practices; (c) strengthening the present extension service, and holding workshops/seminars on sustainable forestry and agroforestry; (d) conducting field trips for villagers to visit and observe successful forestry and agroforestry projects in nearby areas; and (e) providing degree-oriented overseas training for selected staff;

- (iii) **Physical Development of Subprojects.** The core subprojects (covered in this IEE) will be developed in eight communes located in three priority watersheds (Ba, Chu, and Truc Kinh): (a) So Pai (720 ha); Ayun (3,540 ha); Dak Troi (684 ha); Son Xuan (477 ha); Son Ha (360 ha); and Son Nguyen (440 ha) in Ba; (b) Thanh Tan (1,280 ha) in Chu; and (c) Hai Thai (574 ha) in Truc Kinh (see Map 1). Apart from the 8 core subprojects, about 50 additional high priority subprojects will be developed in the three watersheds over six years. Project development will be preceded by reclassification of all medium and rich natural forests of the Ba and Chu catchments into protection and special-use forests covering an area of 79,000 ha. The physical activities (when fully implemented) will consist of: (a) afforestation of about 50,000 ha of bare land covering an area in the Ba and Chu watersheds; (b) enrichment planting using indigenous species in 2,060 ha of protection and production forests; (c) reforestation of 14,000 ha of degraded bare lands with exotic species; (d) establishment of about 16,000 ha of blocks forest plantations (using mixed species) using fast-growing exotic species; (e) agroforestry development of about 12,000 ha of crops such as coffee, cashew, cinnamon, and other species with commercially marketable by-products; (f) multicropping including irrigated agriculture on 13,000 ha (with provision of some small-scale irrigation facilities); (g) improvement of about 12,000 ha of pasture; and (h) planting of bamboo on 5,000 ha. In conjunction with the physical development of subprojects, the Project will provide support facilities, such as village roads, services, and materials; equipment; and consultants to assist Project implementation.
- (iv) **Strengthening Forest Policy Framework.** Existing regulations pertaining to forestry development need to be aligned with the overall objective of sustainable forestry development. There is a need to re-examine present policies concerning the following: (a) land classification and land allocation, (b) operation of state forest enterprises, (c) fuelwood utilization, and (d) cost recovery.

5. Selection of the three watersheds was based on the following criteria: (i) incidence of poverty; (ii) pressure on and resulting degradation of the forest resources; (iii) existing and proposed infrastructure at risk to increased sediment loads (primarily downstream irrigation and hydropower systems); and (iv) diversity in terms of size, agroecological zones, silviculture and socio-economic conditions so as to be representative of a significant number of other watersheds in the country. Participatory rural appraisals were undertaken in several of the pilot communes to assess the social feasibility of the Project, minimize the risk of misunderstandings between the Government and the local people, and ensure that the Project conforms with national and local development policies and is targeted at local needs.

6. The executing agency will be MARD. The Project (estimated around \$61 million) will be implemented over six years. The core subprojects have been prepared during the Project preparation stage. The remaining investments and the associated environmental assessments will be prepared by MARD.

C. Description of the Environment

1. Ba Watershed

a. Physical Resources

7. The Ba watershed, situated in the Central Highlands and South Central Coastal regions of the country, drains an estimated 12,000 square kilometers (km²) and covers four provinces, Gia Lai (six districts), Phu Yen (four districts), and Kon Tum and Dac Lac (one district each). The Project covers 1,034,349 ha, including Gia Lai and Phu Yen provinces, and represents 86 percent of the total Ba Watershed. The land is steep and mountainous, with slopes ranging typically between 10 to 30 degrees. The area is dissected by wide valleys, particularly in the upper reaches between the Ba and Ayun rivers. Mountains with altitudes ranging between 700-1800 meters (m) dominate in the northern and northeastern portions of the watershed.

8. Rainy season occurs from May to November and a pronounced dry season from December to April. The average rainfall varies significantly within the watershed, from 1,200 millimeters (mm) to 2,200 mm. The two main rivers are the Ba and Ayun Pa. The annual discharge of the rivers is about 300 cubic meters per second (m³/sec), but with considerable variation between summer and winter. Water flows from the majority of streams throughout the year. In summer, three or four major floods occur each year in the major rivers and streams, causing loss of human life, property and crops.

9. Soils are predominantly haptic and ferric Acrisols, which dominate the hill and mountain areas. Other soil types include yellow-brown Ferralitic soils, reddish yellow Ferralitic soils (derived from granite), Arenosols and Fluvisols. Soils are acid and deficient in nitrogen and in organic matter. About 50 percent of the area has an erosion rate of less than 5 ton/ha/year, 25 percent has 5-20 ton/ha/year; and 11 percent has 21-200 ton/ha/year or more. About 3 percent are severely eroded. In the rest of the area, the soil loss rate is negligible.

b. Ecological Resources

10. The natural forest area in the watershed of the two principal provinces (Gia Lai and Phu Yen) is estimated to be 450,711 ha, of which most is production forest (75 percent of the evergreen forest and 84 percent of the deciduous forest) and 93,776 ha is protection forest. The three nature reserves in the Ba Watershed are the Kon Ka Kinh Nature Reserve (24,200 ha), the Kon Ka Chang Nature Reserve (7,600 ha), and the Krong Trai Nature Reserve (27,290 ha). The latter is under heavy attack by settlements and economic activities. The Kon Ka Kinh Special Use Forests are representative of the full biodiversity of the natural evergreen forests in the central highlands, including diverse species of plants and animals and a large number of precious and endangered species. This area seems well conserved, mainly because of difficult access. The major wildlife species recorded in the area include banteng (*Bos sondaicus*); gaur (*Bos gaurus*); Eld's deer (*Cervus eldi*); deer (*Cervus porcinus*); crocodile (*Crocodilus siamensis*); pheasant (*Rheinardtia ocellata*). Nevertheless, with increasing population migration to the area, illegal logging, encroachment of agricultural land, and shifting cultivation are becoming serious threats to the reserve. The deciduous forest is more fragile because of annual fire caused accidentally and intentionally for pasture generation and hunting, which are common in this type of forest.

c. Human and Economic Development

11. The population of the watershed area is about 380,000 (320,000 in Gia Lai and 60,000 in Phu Yen). An estimated 95 percent of the population live in rural areas. The population density ranges between 35 and 50 persons/km², but is increasing because of a high birth rate (estimated to range between 3.7 to 6.8 percent) and a recent increased in-migration. Both factors are leading to increased pressure on the watershed.

12. Over half of the population in Gia Lai is composed of ethnic groups other than Kinh, principally the Tarai and the Ba Nar. The ethnic make-up of Gia Lai province is a special challenge to watershed management. The Ba Nar adhere to a subsistence economy with little capacity and interest in market integration. Shifting cultivation is extensively practiced and there is a marked difference in living standards, health, and education between the Ba Nar and the Kinh. Their cultural distance from the Kinh is very pronounced and assimilation a difficult and slow process.

13. Agriculture is practiced on 17 percent of the land in the watershed. The main food crops are rice, maize and cassava. Only a small proportion (7 percent, 13,000 ha) of cultivated land is actually irrigated for paddy. An additional 13,500 ha will be irrigated following completion of the new Ayun Pa reservoir. Agroforestry and home gardens are part of the traditional practices of the Kinh people. Some farmers maintain an integrated fish production system using cow and pig manure to fertilize their ponds and crop residues as fish food. Shifting cultivation is still widespread in the watershed (76,955 ha for both provinces). Extensive livestock grazing is ubiquitous throughout the watershed. Large areas of grassland exist in the open semideciduous forest, but are considerably underutilized. Around 2,330 ha of forest plantations exist in the Project watershed area, representing less than 1 percent of the total bare land area. With industrial plantations, the total planted area represents less than 4 percent.

14. There are three major dams and diversion structures serving irrigation and hydro-electricity generation, i.e. the Dong Cam diversion weir (under rehabilitation) in Phu Yen Province

commanding 20,000 ha irrigation scheme; the lower Ayun Dam in Gia Lay Province commanding 13,500 ha of irrigated land, and the Hin River dam and hydroelectric plant (under construction) in Phu Yen Province. The road network is very poor, which affects production supplies and market access. In the rainy season, many communes remain isolated. The improvement of local communal roads is essential. A new cassava processing factory was established last year in An Khe. The other main industries are wood processing (furniture and timber) and some household scale sugar processing enterprises.

d. Quality of Life Values

15. Infrastructural development is minimal beyond Pleiku and the six towns in Gia Lai province and inland from Tuy Hoa in Phu Yen. Villages severely lack water supplies, education, medical facilities, and roads; the health conditions are very poor; and malaria is endemic throughout most of the watershed. On average, there is a food shortage for periods extending up to 5 months per year. People harvest wood and nonwood forest products to sell for money needed to buy food. This situation increases the pressure on natural forest areas.

16. The major causes of water pollution appear to be nonpoint sources in the form of agrochemical runoff and untreated wastewater. A tapioca industry in An Khe has a processing capacity of 200 ton/day of cassava. Effluent from the industry is treated through a series of eight oxidation ponds and meets national standards.

17. Rich natural forests are still fairly extensive in the watershed, which makes logging an important economic activity and a major threat to the forest resource. Forest exploitation is in the hands of out-of-area beneficiaries and local residents do not benefit from the resource.

2. Chu Watershed

a. Physical Resources

18. The Chu watershed is a tributary of the Ma River draining mainly the North Central Coast region of the country with a total watershed area of 28,400 km². The total Chu watershed area in Thanh Hoa and Nghe An Provinces is 375,000 ha; the rest is in the Lao People's Democratic Republic. The topography is moderately hilly, with an average elevation ranging between 500-700 m. The highest point is 1,560 m with increasing dissection toward the western parts of the area. The average slope is 25-32 degrees, and around 90,800 ha (86 percent) are sloping areas of more than 25 degrees. About 81 percent of the territory has a soil erosion rate of more than 200 ton/ha/year, 7 percent between 51 to 200 ton/ha/year, 1 percent between 5-50 ton/ha/year; and 12 percent has less than 5 ton/ha/year.

19. The climate is tropical monsoon with rainy season from May to October and dry season from November to April. Mean annual rainfall is approximately 1,733 mm with a range from 25 mm in January to 400 mm in September. The average temperature is about 21°C to 23°C ranging from 1°C to 41°C. The total discharge of the Chu river is estimated to be 5 billion m³/year ranging from 20 m³/sec to 6,700 m³/sec. Flooding is a significant problem in the area, occurring on average 1-3 times each year, and poses a significant threat to human life and crop production. Groundwater availability is good, and Than Hoa Province has mineral water springs.

20. Ferralitic soils, including yellow and red soils from different geological origins, cover about 88 percent of the total area. Soils are generally poor with moderate deepness. On the top of the hills and mountains, soils are shallow and rocky. Low pH levels limit the soil use to all except the most tolerant crops and can induce aluminum toxicity in many soils. Organic matter levels are also low to very low. However, soils are suitable for many tree species.

b. Ecological Resources

21. Land use is divided into forestry land (101,730 ha); agricultural land (3,052 ha); and others (roads, settlements, undetermined land use, etc. 483 ha). Natural forested land is entirely classified as protection forest and covers 62,420 ha, of which 18,581 ha are rich evergreen forests, 30,900 ha are mixed broad-leaved and bamboo forests, and 12,939 ha are sparse evergreen forests. Upland crop and shifting cultivation lands, 82 percent, are located on areas sloping over 25 degrees. There is considerable variation in vegetation cover. Hillsides near the road and close to the district town are covered with low bamboo and shrubs. Areas around villages are dominated by a palm that is harvested for thatch and weaving.

22. A recent flora and fauna inventory shows that the biodiversity of the remaining natural forest is still high. However, rich natural forest areas are decreasing because of unsustainable and often illegal extensive bamboo cutting practices, shifting cultivation, and extensive and unsupervised grazing. Shifting cultivation is estimated to affect an area of 22,785 ha.

c. Human and Economic Development

23. Of the total population of 96,000 in the Project area, 85,263 live in Thuong Xuan District. Most of the population are Thai (57 percent) and Muong ethnic minorities (2.5 percent), the remainder being largely of Kinh origin. The population growth rate is estimated at 1.8 percent per annum, mostly the result of growth in the Thai population (where illiteracy is highest).

24. The three main farming systems in the watershed are: (i) valley bottoms, which are mostly used for rice production where water is available, and sugarcane dominates the lowlands in some areas; (ii) gardens/homesteads, which are used for a mix of perennial crops (mainly fruit trees and betel palm), sugarcane for family consumption, and a variety of roots and other crops managed as multi-storey agroforestry systems (about 60 percent of households also maintain fishponds); and (iii) hillsides/forest land/ communal land and, although steep hillsides are classified as forest land (over 15 percent slope), some slash and burn agriculture and cassava fields were seen there.

25. Supplementary income to agriculture is earned from buffalo, bamboo cutting, sugarcane, and secondary forest products such as cinnamon bark, oil, anise seed, shellac and pine resin. The role of large ruminants (buffalo and cattle) in crop production is a central factor in the system. However, the large herds of grazing buffalo is a constraint to tree planting.

26. Transport infrastructure is a major constraint, since many roads are difficult to use in the dry season and impassable in the wet season. There is only a four km-long all weather asphalt road. The Chu river is also used for transport in addition to roads. Intensification of the farming system would be problematic without upgrading the road system. A pulp mill and a sugar

mill are near, but outside, the Project area. Both pose environmental problems because they discharge untreated effluent into the Chu river. The existing sugarcane factory already dominates agriculture in large parts of the Thuong Xuan District and plans are to triple its capacity. This would increase the pollution risks of high fertilizer and pesticide use. There are some environmental concerns regarding the pulpmill, since the raw material is drawn from bamboo forests which are technically protection forests but are progressively being depleted. Small private industries like brick and lime exist inside the Project area.

d. Quality of Life Values

27. The Project area is food deficient and the average shortage lasts approximately 6.3 months per year. Forty percent of the population is poor. The population is also at risk from poor nutritional status, anaemia, other diseases, and high rate of complications at pregnancy. A water supply system exists only in the district capital, and there is no sewage treatment. Villages have poor hygienic conditions and water sources can often be polluted, causing adverse effects on health.

28. Water pollution originates primarily from non-point sources, as nontreated sewage and agricultural runoff. However, two point sources of pollution identified in the middle Chu are the Muc Son Paper Mill (production capacity of 5,000 ton/year of wrapping paper based on bamboo and waste paper, and the wastewater disposed into the river (after passing through a single settling pond) and the Lac Son sugar factory (2,000 ton/day input) where wastewater is directly disposed into the river.

3. Truc Kinh Watershed

a. Physical Resources

29. The Truc Kinh River is a minor tributary of the Quang River, which drains an estimated 10,000 ha of which 5,000 ha is above the Truc Kinh dam and reservoir. The watershed area above the reservoir is moderately hilly with slopes not exceeding 15 degrees and elevations ranging from 20-150 m.

30. The climate is classified as tropical monsoon with a mean annual rainfall of 2,315 mm and a range varying from 26 mm in February to 650 mm in October. Droughts are common and represent a key constraint to production for both upland and paddy crops. Typhoons are common in September and October and represent a major agricultural constraint due to losses associated with intense rainfall and high winds. The average temperature ranges from a maximum of 40°C in June/July to a minimum in January of 12°C. Annual streamflow of the Truc Kinh river is estimated at 80 million m³. The area suffers from extreme floods.

31. The predominant soils of the southern part of the watershed are red-yellow ferralitic soils that are shallow, nutrient poor, severely leached, coarse textured, and with low water holding capacity. The northern portions of the watershed have higher potential basaltic soils that are more suitable for cultivation of tree crops. Top soils are badly eroded in places, especially on hilltops.

b. Ecological Resources

32. The original forest cover was entirely lost during the war and before. Presently, dense vegetation of grass and low shrubs covers the unplanted areas. Below the dam, next to the irrigation scheme, vast sandy areas predominate, and have been the subject of reforestation efforts and soil improvement projects by various agencies.

c. Human and Economic Development

33. The watershed within the Project area covers five communes with the estimated population of 25,000, but since watershed boundaries cut across communes, a few people may live in the watershed itself. The population growth rate is estimated to be 3.2 percent. The population has immigrated over the last two decades and is mainly Kinh. Small groups of ethnic Van Kien have also settled in the watershed.

34. Presently, over 40 percent of the area is planted with rubber and forest trees. Land use consists of forest plantation 2,000 ha (*Eucalyptus*, *Acacia auriculiformis*, and pines), rubber plantations in 2,100 ha, home gardens in 600 ha, bare land on 4,000 ha, agricultural land on 800 ha, and others (settlement, roads, etc.) on 500 ha. *Eucalyptus*, *Acacia* and *Casuarina* are also planted widely on open spaces at the edges of agricultural land, roads, and irrigation channels. The bare land is covered by grass and shrubs and is used for grazing cattle. Some areas are covered by *Imperata cylindrica*, which is typical of fire maintained, degraded savannah.

35. Every village has small land areas for paddy and root crops (taro, cassava, and sweet potato). Large amounts of manure and fertilizer are used on these crops to maintain fertility. Drought, flood and silting of canals are major problems for the rice production. On the basalt soils, home gardens are used for intensive intercropping systems. Coffee is the most important crop, followed by banana and then black pepper. Other trees grown in these intercropped systems include jackfruit and citrus. Income from these gardens is an important part of the household budget. Multiple vegetation storeys provide good ground protection that could minimize soil erosion caused by rain.

36. The majority of cultivated land in the watershed is controlled by state forest enterprises growing trees (mainly *Eucalyptus* and *Acacia*) on the poorer soils. Hilltops are used for pine tree plantations. Tree planting activities are part of the 327 Program to green the bare hills. Some land has also been distributed to households for tree planting. Forestry plantations are used for cattle grazing after trees are planted, but without enough protection for the small trees. *Eucalyptus* is sent to a chipmill in Da Nang, about 170 km from the Project area.

37. Almost all large ruminants in the area are cattle, which are an important part of the farming system, especially in villages with poor soils and limited potential for crop production. Cattle are also essential for crop production because they supply manure fertilizer. Tree planting will decrease the area of free grazing land and, as fodder supplies decline, may affect livestock and crop production. At present there is no control or management of range land.

38. Only small industries with some limited negative impact on the local environment exist in the Project area. These include brick production, rice mills, cattle feed, and rubber and wood processing. The Kinh reservoir stores water for 2,300 ha of paddy fields.

d. Quality of Life Values

39. Quang Tri is rated the poorest province in Viet Nam, and adequate supply of food is not ensured for most of the year. Plantation workers have a low, but stable income and plantations are generally still immature. Cattle is exchanged for rice during the lean season. The poorer groups support themselves by fuelwood sale and the often risky collection of bombshells and other war debris for sale as scrap metal. The groundwater table, which is about 10-20 m depth in the rainy season can go lower during the dry season. Drinking water is normally taken from wells.

D. Screening of Potential Environmental Impacts and Mitigation Measures

1. Potential Impacts

40. Environmental impacts were screened by taking into consideration environmental problems caused by location, design, construction works, and Project operation. All Project components were screened for their potential impacts on the environment. If environmental impacts were identified, mitigation measures were formulated and directly incorporated into the Project design. Considering the Project activities, the environmental impact of the Project was not expected to be a major issue. This report covers the screening of environmental impacts of the eight core subprojects. A separate IEE report will be prepared for the rest of the subprojects.

41. Screening of environmental impacts of the Project indicates that nearly all interventions result in positive or insignificant adverse environmental impacts, because the major objective of the Project is to rehabilitate degraded environments by improving vegetation cover through afforestation of barelands, enrichment planting, tree and bamboo plantation, agroforestry, home garden, pasture development/improvement, and small scale irrigation. The summary of Project interventions, their environmental impacts, mitigation measures, and institutional implication is presented in Table 1.

42. Some of the Project interventions, such as tree plantations and construction of some physical structures such as irrigation and road components could have adverse environmental impacts if not properly designed.

a. Environmental Impact from Project Location

43. None of the core subprojects are located in areas with high archeological, historical, or cultural values. There will be no major conversion of land use and no loss of economically valuable land. No agricultural land will be converted for plantation development, with the possible exception of areas on hillsides classified as forest lands.

44. The Project will focus on rehabilitating lands previously degraded by overlogging and improper agricultural practices stemming from high population pressures. Communal and private plantation activity will be undertaken on bare lands, pasture development/rehabilitation will be carried out on areas where overgrazing prevails and has caused some environmental deterioration, and enrichment planting will be done only on poor and understocked forest. As such activities will not lead to reduce production from any land, the environmental and social impacts will be minimal. Several nurseries will be established, with a maximum area of 2 ha each, and a total area of around 10 ha in the three watersheds. As the nurseries will be located on opened

land, this impact will be insignificant. The road component consists mostly of rehabilitating the existing roads, hence no loss of valuable land is anticipated. The small-scale irrigation will only include construction of small weirs (to be confirmed during detailed design) and village irrigation canals on opened land. Therefore, no major environmental impacts are anticipated.

45. Ethnic minorities are part of the population in the Project areas, e.g. the Ba Nar in Ba watershed, and the Thai and Muong in Chu watershed. They are not isolated people, but they rely on traditional agricultural systems and adhere to a subsistence economy. Land-use intensification will not be forced on them, but they will be involved and given the opportunity to participate in deciding land development options.

b. Environmental Problems Caused by the Design

46. The Project will include detailed resource inventory, mapping, and zoning. This will include procurement/preparation of maps for the entire watersheds at a scale of 1:50,000 and updating/preparation of detailed land-use maps for the communes (at a scale of 1:10,000) covering 130,000 ha. Although there will be no major physical activities in the field, to minimize environmental impacts (e.g., due to possible conflicts) the preparation of land use plans will be assisted by qualified land-use planners, and participatory rural appraisals will be conducted to ensure public participation in the planning process. The mapping will have positive impacts, since the new land-use maps will include a new land category (i.e., ecologically significant areas) that was not considered in the previous land use.

47. Reclassification of forest lands to agricultural lands may cause significant impact if not properly implemented. Safeguards will be designed into the Project through institutional strengthening measures directed at the district forest department to ensure that no additional forested lands will be reclassified to agricultural lands. An explicit guideline will be prepared during detailed design and provided to the District People's Committees tasked with plan approval. Forest Department strengthening activities have been included and costed out in the natural forest management sub-component.

48. The Project will facilitate the passage to local districts and communes of (i) forest management and control, and (ii) the responsibility of production forests. District and communal bodies will be strengthened before being delegated the contracting and monitoring authority for forest harvesting operations. Strengthening activities for district and communal bodies have been included and costed out in the Support for Forestry and Agricultural Development sub-component.

49. Natural forest management (such as resource inventory, establishing fire-breaks in areas prone to forest-fires, tending forests, and natural forest enrichment) will not cause significant environmental impacts. The Project will also support afforestation/reforestation activities emphasizing replanting degraded forest land and enrichment planting with native species. The species to be used for the enrichment planting include *Pterocarpus macrocarpus*, *P. pedatus*, *Toona febrifuga*, *Hopea odorata*, *Canarium album*, *C. nigra*, *Dipterocarpus alatus*, *Manglietia glauca*, *Erythrophelum fordii*, *Tarretia javanica*, *Endospermum sinensis*, *Cassia siamea*, *Shorea cochinchinensis*, *Parashorea stellata*, *Talauma gioi*, *Liquidambar formosana*, *Sindora cochinchinensis*, *Chukrasia tabularis*, *Cinnamomum inerma*, *Hexaneurocarpon brilletii*, *Spondias pinnata*, *Peltophorum tonkinensis*. The use of native species and the growth of natural vegetation will increase the biodiversity of the area and improve effectiveness of soil protection.

Expansion of the existing vegetative cover will increase the mosquito population, which carries malaria. However, the sharing of this program between more than 100 communes of the Ba and Chu watersheds will limit the area planted in each location, thus minimizing the disease increase.

50. The State Forest Enterprise as well as by local people have planted exotic species in the Project area. The Project will minimize adverse environmental impacts from such exotic species through the following measures: (i) wherever land and soil are suitable, indigenous species will be planted, especially high value species that are economically viable and locally proven viable for wood and nonwood forest products (fruit, bark, fodder, seeds, etc); (ii) exotic species (Eucalyptus, Acacia, and Cassuarina) will only be planted where indigenous species cannot thrive because of degraded soils; such species will be planted in a mixture, not as a monoculture (e.g. Eucalyptus and Acacia together, as has been practiced in several sites in the Project area); (iii) exotic species will be planted only if acceptable to the community; (iv) a 10-m strip at both sides of streams will be maintained as natural vegetation, and pockets of natural vegetation (if available) will be maintained to enhance the biodiversity of the area. Selection of species and mixtures will also be based on their effectiveness for controlling soil erosion on sloping areas. These plantations may reduce harvesting pressure on natural forests.

51. Agroforestry and home garden improvement/development will probably cause significant environmental impacts. To avoid disturbance to the present production system, only environmentally suitable plant species that are acceptable to the community will be planted. The relatively large number of species present will lead to better biodiversity, and vertical vegetation stratification will intercept rainfall thus minimizing splash erosion. Hence, the agroforestry development will: (i) improve production of traditional agroforestry systems by promoting mixed cropping systems, (ii) conserve biodiversity, and (iii) control soil erosion and conserve soil fertility in sloping lands.

52. The pasture development component will support improved pasture development by encouraging the growth of highly productive species through sowing strips of seed complemented by legumes. To mitigate pressure on the grassland from increased cattle populations resulting from Project support, some form of controlled access will be introduced by the Project (e.g. rotational grazing and cut-and-carry).

c. Environmental Problems Associated with Construction Works

53. Road improvement will cover the construction of small bridges and fords, and the irrigation component will cover improvement and construction of small scale irrigation. Road improvements will include the repair and reconstruction of particularly bad sections of roads within communes. These sections are significant obstacles to transport and on average may total only 7-8 km per commune. No new roads will be supported by the Project. Therefore, this component is not likely to interfere with ecologically sensitive areas (e.g. natural forest) or to alter the hydrological regime. Erosion and landslide prevention measures will be incorporated in the Project design. The Project will ensure that all precautions are undertaken to minimize environmental impact during construction. The irrigation component (about 260 ha in the eight core subprojects) will include the improvement and construction of small-scale irrigation in villages, and is unlikely to cause significant environmental impacts.

54. Because the road and irrigation components are minor in scale, no major earthworks are anticipated. Nonetheless, mitigation measures will be undertaken, such as proper disposal of construction spoils from roads and irrigation works to prevent increased soil erosion by runoff during rains. Adequate provision will be made during the detailed design stage, and environmental guidelines will be prepared and implemented during construction. Mitigation measures for environmental impacts will also be ensured by incorporating them in tender documents, and their implementation will be monitored.

d. Environmental Problems Resulting in Project Operation

55. The area to be planted with exotic species will be minimized, and indigenous species will be given the priority. Government policy on the rehabilitation of bare lands within production forest land allows the use of exotic species only in the first planting; after harvesting, they will be replaced with indigenous species (or pines). The Project will be implemented in areas with adequate rainfall. Although there has been no significant change in the groundwater over the past several years in Hai Thai, Truc Kinh watershed (where extensive plantation forest has been established), groundwater will be monitored. Agroforestry and home gardens are not likely to cause significant environmental impacts.

56. Grazing may cause environmental problems if not properly controlled, especially when the livestock population increases. Grazing management under the Project will include planting of highly productive indigenous fodder species with controlled access on a pilot basis. This may affect herding of livestock, which is traditionally released in the forests and pastures, because, proper management of pastoral land is required to ensure sustainable utilization of the pasture. Controlled access (rotational grazing) and cut-and-carry system approach, if properly implemented, could ensure sustainable use of the pasture and forests.

57. The Project will not procure agrochemicals, but agrochemical use could increase with agricultural intensification. To mitigate this possibility, the national integrated pest management is currently being implemented in each Project area.

58. The preparation of commune-level land use and development plans is an important Project activity that will support sustainable land use activities in each of the watershed. To reduce the effect of road improvement on rates of natural resource extraction, the Project will ensure that land-use and development plans are completed before the road is rehabilitated. A representative of the Provincial Office of Science, Technology, and Environment (POSTE) responsible for environmental issues will be included in the review and approval process.

59. The Project will ensure that the measures to mitigate environmental impacts will be adopted during Project implementation and the environmental quality related to the Project will be regularly monitored to avoid problems in the future.

2. Development Alternatives

60. The ecological balance in all three watersheds is threatened by demographic and economic pressures. The situation is more serious by the free access, which has accelerated watershed degradation. Considering these conditions, the current available alternatives are to (i) leave the land as it is; or (ii) rehabilitate the land to restore the environmental capacity to sustain

economic growth and to prevent future degradation.

61. The first alternative is not recommended, as the present resource utilization is unsustainable and is leading to the continued deterioration of the environment. The most important factors contributing to the deterioration of the environment are (i) increasing population pressure: the population grows by 2.1 percent or 1.5 million persons per year, about 60 percent of this population is rural, and lowland agriculture is unable to absorb greater numbers, as farm sizes are already too small in most areas to ensure food security; (ii) increasing wood demand: tropical forests in Viet Nam have been receding progressively for a long time, demand for all types of wood is strong and increasing due to rapid economic growth, and plantations are not established fast enough to fill the gap and are often uneconomical because of remoteness from markets and depressed market prices for timber and fuelwood; (iii) forest decline: the forest decline has impoverished the natural resource base of the country by reducing the value of timber stands, increasing soil and fertility losses, reducing biodiversity, and weakening the protective properties of the watersheds for downstream areas; (iv) inappropriate ownership and management: remote and anonymous responsibility for natural resources has established a free access in all forests under state ownership; and (v) Government policy: the settling of ethnic minorities and lowland immigrants in upland provinces has not successfully introduced land-use practices that are ecologically and financially attractive and sustainable.

62. The second alternative (as proposed by the Project) will arrest the trend of environmental degradation. The development options in each subproject area are selected in consideration of the land capacity and capability, and the social set up of the population.

3. Environmental Benefits and Cost-Benefit Analysis

a. Expected Benefits from the Environment

63. The main benefits expected from the sustainable management of the natural resources of the three watersheds are (i) environmental improvement by providing vegetation cover; (ii) soil conservation and erosion prevention; (iii) improvement of living conditions of the local population, mainly of minorities through income generation, basic infrastructure improvements, and the satisfaction of their primary needs; (iv) protection of downstream hydroelectric and irrigation facilities from flooding and sedimentation; (v) a contribution to biodiversity conservation and improvement; and (vi) afforestation and tree planting have the effects of carbon sequestration which slows down global warming.

64. Expected downstream benefits are reduced sediment load in rivers and reduced flooding from reestablishing a tree cover in the watersheds, but those benefits have not been quantified in this Report. The immediate on-site benefits are greater than the downstream benefits, because the benefits of watershed management measures become obvious only after the trees mature (e.g., 10 years from fast-growing species and up to 50 years for indigenous species).

b. Cost-Benefit Analysis

65. The total cost of the Project is estimated at \$61 million. The costs of environmental impact mitigation and monitoring measures have been incorporated in the Project costs. The

economic and financial rates of return have been calculated for each core subproject. The economic internal rate of return ranges from 14.0 percent to 25.2 percent, and the financial internal rate of return ranges from 10.5 percent to 22.2 percent.

E. Institutional Requirements and Environmental Monitoring Program

1. Project Management

66. A Project Management Office will be set up in Hanoi with a Project Director, a senior staff member of MARD, working parttime. The Project Director will be supported by an accountant, a secretary and a driver. Office equipment and one vehicle will be funded under the Project, as well as recurrent expenses through the project period.

67. A Provincial Project Management Office (PPMO) will be established in the Departments of Agriculture and Forestry of the Gia Lai and Phu Yen provinces. The PPMO will be responsible for supervising and coordinating project implementation. The PPMO will report to a Provincial Project Steering Committee, composed of the heads of provincial departments associated with implementation of Project activities, and representatives from the respective District People's Committees. The PPMO will be responsible for supervising and coordinating local project implementation in close cooperation with the districts and communes.

68. A forestry and watershed monitoring unit will be established as part of the National Project Office in Hanoi. Under the supervision of the national Project Director the Unit will work with consultants and subcontractors to carry out four principal tasks during the Project period: (i) the mapping of land use, soils, topography, climate, and population in the watersheds at 1:50,000 in order to facilitate communal land-use planning; (ii) the soil, water and biodiversity monitoring in the Project watersheds; (iii) macro-level land use zoning of the watersheds to provide the framework for participatory communal planning; and (iv) preparation of a feasibility study to define the rationale, function, and costs of watershed management boards.

69. The Committee for Ethnic Minorities and Mountain Areas has been established with ministerial rank. The Committee is responsible for settling ethnic minorities in mountain areas who practice shifting cultivation. The Committee is represented in 34 provinces, 200 mountain and upland districts and 2,000 communes. The Project will work closely with the Committee regarding the ethnic minorities.

2. Ministry of Science, Technology, and Environment (MOSTE)

70. Viet Nam's environmental requirements were established under the Law on Environmental Protection (1993) and subsequent Government Decree No. 175/CP (Guidance for the Implementation of the Law on Environmental Protection, 1994). Under MOSTE, national environmental department was created and was charged with general environmental matters including environmental assessment. At the provincial level, environmental units are in POSTEs. These units are typically staffed by only one or two people. There are no environmental institutions below the provincial level.

71. At the provincial level, following review and recommendations by POSTE environmental units, decisions are taken by the People's Planning Committees (PPC). Issues involving two or more provinces are addressed by the creation of a multi-provincial committee. Issues considered to be of national significance fall directly under the responsibility of MOSTE. While most of the line ministries have environmental responsibilities, there is no capacity in environmental planning and management. The Project will strengthen the relevant POSTEs through training in environmental planning and management and establishing a water quality monitoring program.

3. Environmental Monitoring

72. Monitoring activities will be operated by the Forestry and Watershed Monitoring Unit to be organized under the Project. Project activities will be monitored during implementation for their environmental impacts. The monitoring activities will include, among other things (i) hydrology and groundwater related to forestry, agro-forestry, plantations, and the enrichment plantings; (ii) the use of agrochemicals as a consequence of agroforestry and agricultural activities; (iii) social conflict caused by pasture and land-use development activities; (iv) expansion of development activities because of construction works (roads and irrigation schemes); and (v) issues related to biodiversity conservation (e.g. pressure on natural forests, hunting, etc).

4. Community Participation And NGO Involvement

a. Community Participation

73. The participatory rural appraisal conducted in villages revealed that most people are aware of the risk of natural resources degradation. The unsustainable use of natural resources is mainly caused by the scarcity of land, and low agricultural productivity. The interest in protecting the forest is very clear among minorities because the forest is traditionally considered as a natural reservoir of resources to be used if food is lacking.

74. Most of the villagers of the targeted watersheds tend to use a participatory approach to village governance. Decisions are taken after building consensus by consulting all the relevant groups, and equity in the distribution of available resources can be readily observed. Project implementation will take advantage of this behavior and work within the existing associations to identify resource persons selected for their capability, dynamism and willingness to improve their socioeconomic conditions.

75. To foster people's participation in the formulation of the village development plan, the commune development plan, and the project activities, the Project will identify and work continuously with the existing village institutions: the village management group, women's union, youth union, veteran's association, and the Communist Party.

76. Women's Unions will be utilized in mobilize women to improve their knowledge of agriculture and to improve their family welfare. Women were observed to be dynamic and hold potential for making great contributions to the social and economic development of the area. Women will be fully involved in land-use planning and in training for improved agriculture, health, and nutrition through access to training and services.

77. The Project will give special priority to working with youth. The population is predominantly young and appears to have a sufficiently large labor force to undertake development activities. Each village has a youth association that undertakes activities such as the construction of a youth house, small irrigation structures, the maintenance of paths, etc.

78. The Project will consider the Communist Party at the village and communal level, as one of the institutions that can foster people participation. The Communist Party appears to be very well organized in all the villages visited. The party leaders are aware of the difficulties villagers are facing, have a good general knowledge, and are capable of mobilizing people and explaining the rationale behind specific Project activities.

b. NGO Involvement

79. Technical support to commune planners will be provided by three district officers: a cadastral officer, an engineer and a forest protection officer. This team will be guided by the Land-use Adviser; Participatory Rural Appraisal Adviser (during the planning phase of the communal development plans); and an Agroforestry Adviser (during planning and implementation). As this expertise is usually missing from district and provincial offices, the specialists will be recruited directly by the Project under contract, preferably through a NGO. Some NGOs are emerging in response to the recent development policy; however, they generally have inadequate experience in participative land-use planning and watershed management. Suitable NGOs will be identified to assist Project implementation, and promising NGOs will receive training from the Project so that they are sufficiently skilled to undertake the needed tasks.

F. Findings and Recommendations

80. The Project areas have been undergoing strong population pressures, which, coupled with the low level of income, is leading to degradation of the environment and overutilization of resources. The Project aims to rehabilitate the areas to make them more productive and to provide better income for the people. Hence, all interventions will generally result in positive environmental impacts. The Project is designed to fit the environmental conditions of the area, and to be undertaken through participatory and bottom-up planning approaches. The environmental impact screening has not identified significant adverse impacts. Minor impacts will be mitigated properly, and a budget has been provided for this purpose. Therefore, a full-scale environmental impact assessment is not required.

G. Conclusions

81. The three targeted watershed are under severe pressure from increased population, high demand on agricultural land, inappropriate ownership and management, and unsuitable regulation and policing to protect the forest.

82. The analysis and results derived from the IEE indicate that the proposed Project will generally have a positive impact on the environment of the three watersheds when compared with a "without project" scenario. Most interventions will serve to (i) improve land-use management by supporting village and commune-based land-use and development planning; (ii) reduce soil erosion through increased vegetative cover; (iii) reduce pressure on upland forests through rehabilitation and expansion of valley irrigation systems, improved grazing, and establishment of

cash crops and wood plantations; and (iv) increase protection of biodiversity.

83. The environmental impact screening of the proposed Project has not identified any adverse environmental impact of major significance. Mitigation measures have been formulated and incorporated in the Project design to ensure that environmental impacts of the Project are within acceptable levels. No further studies are required to complement the IEE.

Appendix 1

MATRIX OF PROPOSED ACTIVITIES AND ENVIRONMENTAL IMPACTS

Strategies		Intervention Description	Impacts			Possible Damage to the Environment	Mitigation Action	Institutional Implication
			Positive	Negative Small	Negative Major			
1	Participative and integrated Land-use Planning							
	1 Forest policy reform	<ul style="list-style-type: none"> - Forest land reclassification into agricultural lands - Passage of forest mgmt responsibility to local communes 	X	X	-	<ul style="list-style-type: none"> - Conversion of ecologically significant land into agriculture - Overexploitation of forest resources due to lack of control 	<ul style="list-style-type: none"> - Training of forest district and communal bodies - Guidelines for plan approval 	<ul style="list-style-type: none"> - MARD/ Forestry Department - District and communes
	2 Supporting activities	<ul style="list-style-type: none"> - Commune-based land-use planning and allocation 	x	x	-	<ul style="list-style-type: none"> - Environmental degradation due to improper planning 	<ul style="list-style-type: none"> - Training of land-use advisers and POSTE personnel - Inclusion of ecologically significant areas - Participation of POSTE staff in plan approval 	MARD and MOSTE/ POSTE
2	Integrated Watershed Management							
	1 Natural forest management	<ul style="list-style-type: none"> - Resource inventory, mapping, and zoning 	X	X	-	<ul style="list-style-type: none"> - land-use conflict 	<ul style="list-style-type: none"> - Involvement of land-use planner and public participation in the planning process 	MARD
		<ul style="list-style-type: none"> - Forest protection and biodiversity conservation 	X	-	-	-	-	Nature Conservation and Environment Division
		<ul style="list-style-type: none"> - Natural forest enrichment and maintenance 	X	-	-	-	-	MARC/ Forest Department

Strategies	Intervention Description	Impacts			Possible Damage to the Environment	Mitigation Action	Institutional Implication	
		Positive	Negative Small	Negative Major				
2	Land rehabilitation through plantation, agro-forestry, agriculture, and grassland improvement	- Forest plantations	X	X	-	- Increased exotic species	- Improved plantation design (see text)	MARD/ Forestry Department
			X	x	-	- Soil disturbance	- Avoid steep land for the plantation	MARD/ Forestry Department
		- Agroforestry and home- garden				- Increased population of disease vector	- Block plantations will limit plantation area in each location	MARD/ Forestry Department and Health Center
		- Pasture Development				- Upset the production of the existing system	- The use of suitable species and community participation in species selection	MARD/Agriculture Dept. and commune
		- Irrigated foodcrop				- Land-use conflicts between forest and livestock, and over-use of pasture land	- Provision of consultant services	MARD/Forest Dept. and communes
						- Increased agrochemical use	- Land-use planning, participatory approach, rotational grazing, and cut-and-carry system	
							- The use of Integrated Pest Management	MARD/Agriculture Dept. and commune

	3 Support for forest and agricultural development	<ul style="list-style-type: none"> - Road improvement - Small-scale irrigation 	X x	X x	- -	<ul style="list-style-type: none"> - Increased erosion and interfere hydrology - Increased use of agrochemicals and water pollution 	<ul style="list-style-type: none"> - Phased road development linked with land-use and development plan - Proper disposal and provision of drainage - Training of farmers and irrigation engineers - Provision of technical assistance 	<p>MARD</p> <p>MARD</p> <p>MOSTE</p> <p>MARD/Agriculture Dept.</p>
3	Institutional Strengthening Strategies							
	1 Enhance the capacity of MARD staff in undertaking participatory approach to manage the natural resources	<ul style="list-style-type: none"> - Institutional strengthening of the Dept of Agriculture and Rural Development at provincial and district levels - Training for provincial and district-level staff of the Dept. of Agriculture and Rural Development - Support for extension material - Adaptative research - Improvement of input supply services 	X	-	-			MARD

	2 Project Management Development of a mechanism for effective coordination and collaboration among Government agencies, projects, NGOs and private sectors	- Institutional strengthening of National Project Office, Provincial, and District Project Management Offices	X	-	-			MARD/Provincial and district agencies
	3 Enhance monitoring capabilities	- Establish the Forestry and Watershed Monitoring Unit	X	-	-	-	-	National Project Office