Table XI-I-8 Average Farm Household Economy without and with Project Conditions

(unit : '000 kip)

	Without Project Condition				With Project Condition		
Main crop	Coffee	Slash&Burn	Lowland Rice	Average	Coffee	Lowland Rice	Average
No. of H.H.*1	(1,634)	(1,012)	(2,025)	(4,671)	(1,893)	(6,898)	(8,791)
Farm size	2.07 ha	1.19 ha	1.00 ha	1.91 ha	2.46 ha	2.50 ha	2.49 ha
1. Gross Income	(564)	(417)	(432)	(475)	(3,572)	(2,454)	(2,694)
- Farm Income	564	342	382	437	3,572	2,454	2,694
- Non-farm Income	0	75	50	38	0	0	0
2. Production Cost	125	26	35	65	643	814	777
3. Net Income	439	390	397	410	2,928	1,640	1,917
4. Living Expenses	(429)	(390)	(397)	(407)	(1,535)	(996)	(1,112)
- Food item	333	303	309	316	874	641	691
- Non-food item	96	87	89	91	661	356	422
5. Net Reserve	10	0	0	3	1,393	643	805

Note : Average is weight average based on No. of household (H.H)
Coffee price is using the 2005 future price based on the World Bank Price Prospect, 1994

Remarks : No. of H.H. is the number of beneficial farmers.
The living expense of farmers with project condition are applied the data of present average household expenditure in Urban area. (source : Agricultural Sector Memorandum, IBRD, 1995)

Part II Feasibility Study

II-1 ECONOMIC EVALUATION

II-1.1 Basic Assumption

The economic justification was carried out on the basis of Economic Internal Rate of Return (EIRR), calculated based on the estimated project costs and incremental project benefits. The justification was carried out for the whole and each proposed Projects. Major assumptions for the estimation of EIRR are summarized below :

i) Project life

The economic useful life of the each Project is 50 years,

ii) Price level

All prices are expresses at December 1995 price in kip. Price data before 1995 are updated using the manufacturing unit value index for foreign currency. The exchange rate of US$ 1.00 = Kip 920 as of average during November to December, 1995 is applied,

iii) Conversion factor

A standard conversion factor (SCF) of 0.99, calculated as shown in Table XI-II-1, is applied to domestic cost elements such as transport, handling and processing for estimation of economic value,

iv) Transfer payment

The transfer payment such as tax, duty, subsidy and interest are excluded for the evaluation.

v) Economic price

Economic price of farm inputs and tradable farm produce (coffee, tea, rice, soybean, groundnut and maize) are estimated on the basis of IBRD projection of world market prices for 2005 in constant 1995 term (see Table X-II-2). Economic prices of other non-tradable farm output and farm inputs are set at same financial prices, and

vi) Opportunity cost

The part of unskilled labor is converted to the economic value applying the conversion factor of 0.46.

II-1.2 Economic Benefit

II-1.2.1 Outline

The following benefits are expected from the implementation of the proposed projects, however, only direct benefits accrued from the irrigation development were counted in the calculation of EIRR for the conservative estimate of EIRR.

a) Irrigation development

- Increase in unit yields of crops,
- Increase in cropping intensity, and
- Diversification of cropping to high value crops.

b) Improvement of district and/or village road

- Saving of vehicle operation costs (VOC),
- Reduction in post harvest losses during the transportation of products, and
- Enhancement of conversion in land use from slash and burn to vegetables or lowland rice (development effects)

c) Introduction of rural water Supply system

- Increase of the beneficiaries in rural water supply.
- Saving of time of beneficiaries to spend the other purposes.

d) Highland Vegetable Trail and Demonstration Station

The trial farm is one of the essential components for the efficient extension of proposed farming practice. In addition, the station will contribute to expand the effect to the surrounding area. By this station, since farmers will be instructed about the way of sustainable farming such as the application of compost, etc, it will contribute the attainment of sustainable agriculture.

d
e) Wholesale market station

- Expansion of fair trading by strengthening of bargaining power of the beneficiaries through introduction of the wholesale system.
- Reduction of post harvest losses by making of selling chance and supporting of farmers transportation.
- Improvement of commercial sense of farmers and also quality of product.
- Diversification of cropping to high value crops.

II-1.2.2. Irrigation Benefit

Agricultural benefits accrued from the irrigation development are estimated by an increase in crop yields and cropping intensity. The anticipated crop yield under the irrigated condition is set out the average unit yields under irrigated condition in tropical area, due to the lack of data and information in Lao. Preset farming practice is mainly done by single cropping of upland crops, lowland rice and vegetables. However, under future development condition it will be changes to double cropping condition of these crops.

The economic crop budgets under future conditions are shown in Table XI-II-3 and XI-II-4, respectively. Based on the economic crop budgets, net production values under future condition without and with Projects are estimated as shown in Table XI-II-5. The economic incremental irrigation benefits of the each scheme were estimated on the net economic production values under future condition without and with Project as shown below :

(Unit : Thousand US$)

Items	Upper Champi	Upper Tapoung	Upper Kapheu	Lower Xe Set	Upper Tay-Un
1. Without Project	35	0	64	118	8
2. With Project	583	187	590	1,028	248
3. Incre. Benefit	548	187	484	910	239

It is estimated that the build-up period to achieve full benefit is five (5) years after the completion of physical works.

II-1.2.3 Other Development Benefits

Excepting agricultural benefit, the several benefits are expected to be born from the proposed projects as mentioned above. These direct benefits were not counted by monetary way in this report, and the evaluation was done based on the agricultural benefit and cost. However, these impact by the implementation of the Project are mentioned in Chapter II-3.

II-1.3 Economic Cost

II-1.3.1 Capital Cost

In this evaluation, the cost for rural road, water supply, and community developments, and for establishment of the highland vegetable trial and demonstration station and wholesale market were excluded from the project costs, since the benefits from them were not included as a direct project benefits. Consequently, the financial project costs excluding the transfer payment and price contingencies consist of following items, relating to irrigation and drainage development.

i) Construction cost for project works,
ii) O&M equipment,
iii) Administration costs,
iv) Engineering services,
v) Land acquisition, and
vi) Physical contingency

The financial costs were converted to the economic costs by applying a standard conversion factor (SCF) for local currency portion. The economic cost of each priority scheme are summarized as follows :

(Unit : Thousand US$)

Items	Upper Champi	Upper Tapoung	Upper Kapheu	Lower Xe Set	Upper Tay-Un	Whole 5 schemes
1. Construction cost	4,111	1,152	3,806	8,858	2,206	20,133
2. On-farm development	541	70	813	1,037	327	2,788
3. Others	1,231	275	1,381	1,909	560	5,356
Total	5,883	1,497	6,000	11,804	3,093	28,277

II-1.3.2 Annual O&M Costs

The annual operation and maintenance costs consist of salaries of project staff, project office expenses, operation and maintenance costs of facilities and equipment. The financial O&M costs were converted to the economic costs by using SCF and shadow wage rate for local currency portion. The annual economic O&M costs at full stage of each scheme is estimated as follows :

(Unit : Thousand US$)

Items	Upper Champi	Upper Tapoung	Upper Kapheu	Lower Xe Set	Upper Tay-Un	Whole 5 schemes
Annual O&M cost	52	21	45	102	32	252

II-1.3.3 Replacement Cost

The irrigation gates, O&M equipment and pumps have usually shorter useful lives than the project life. These equipment are assumed to be replaced in every their useful lives as

shown in the following table as estimated in Annex IX. These equipment are mostly tradable ones, therefore the economic replacement cost is equal to financial cost.

(Unit : Thousand US$)

Items	Useful life (years)	Upper Champi	Upper Tapoung	Upper Kapheu	Lower Xe Set	Upper Tay-Un	Whole 5 schemes
1. Gates	25	437	92	456	502	148	1,637
2. Pump	25	-	17	-	-	19	36
3. O&M equipment	20	192	192	192	192	192	961

II-1.4 Economic Evaluation

II-1.4.1 Economic Internal Rate of Return (EIRR)

Based on the economic costs and benefits, EIRR was calculated for the economic evaluation of each and whole Project. The results are shown in Table XI-II-6 and XI-II-7, and summarized as below :

Items	Upper Champi	Upper Tapoung	Upper Kapheu	Lower Xe Set	Upper Tay-Un	Whole Project
EIRR	7.3%	10.2%	6.9%	6.3%	6.1%	6.9%

II-1.4.2 Sensitive Analysis

In order to evaluate soundness of the whole Project to the possible changes in the economic condition in future, the sensitivity analysis were made for the following 5 cases.

Case I 10 % Project cost increase
Case II 10 % project benefit decrease
Case III Combination of Case I and II
Case IV 10 % Project cost decrease
Case V 10 % project benefit increase

The effects of these changes on EIRR are shown in Table XI-II-8, and summarized as follows :

Items	Upper Champi	Upper Tapoung	Upper Kapheu	Lower Xe Set	Upper Tay-Un	Whole 5 schemes
1. Project cost 10% up	6.5%	9.2%	6.2%	5.6%	5.3%	6.1%
2. Benefit 10% down	6.4%	9.1%	6.1%	5.5%	5.2%	6.0%
3. Case 1 and 2	5.7%	8.1%	5.4%	4.8%	4.5%	5.3%
4. Project cost 10% down	8.2%	11.5%	7.8%	7.2%	7.0%	7.8%
5. Benefit 10% up	8.1%	11.4%	7.7%	7.1%	6.9%	7.7%

II-1-5 Result of Economic Evaluation

From the result of evaluation mentioned above, it is difficult that the all of projects is fully feasible. However, it is considered that the projects are viable from economic view point. Moreover, if the project be implemented, the farm household economy will be substantially increased and/or fairly stabilized. Consequently, the project implementation will largely contribute to improve the living condition. Therefore it is essential to commence the projects at the earliest possible time.

II-2 FINANCIAL EVALUATION

II-2.1 Evaluation of Farm Budget

In order to evaluate the project from the financial aspect of farmers, the farm budget analysis on the different types of farming are made under the with project condition. In this evaluation, farm budgets are calculated based on two expectable cases. One is to apply the present coffee price to the calculation and the other is to apply future price prospected by IBRD. The results of estimation are presented in Table XI-II-9 and summarized as follows:

(1) Case 1 : Farmgate coffee price is kip 1,100

(Unit :Thousand Kip)

Priority Area	Upper Champi		Upper Tapoung			Upper Kapheu
Farm Type	Coffee	Coffee+Tea	Coffee +Veg.-1	Coffee +Veg.-2	Coffee +Veg.-3	Coffee +Veg.
1. Gross Farm Income	4,455	4,110	1,520	2,256	1,997	2,888
2.Production Cost	600	594	179	351	276	308
3.Net Income	3,855	3,516	1,341	1,905	1,721	2,580
4.Living Expenses *	1,443	1,443	1,075	1,443	1,443	1,443
5. Net Reserve	2,412	2,073	267	462	278	1,137

Priority Area	Lower Xe Set		Upper Tay-Un			
Farm Type	Low. R.-1	Low. R.-2	Coffee+Lo.R -1	Coffee+Lo.R -2	Low. R. 1	Low. R.-2
1. Gross Farm Income	3,000	3,100	1,769	1,690	3,100	1,500
2.Production Cost	1,105	1,030	441	451	925	448
3.Net Income	1,895	2,070	1,328	1,240	2,175	1,052
4.Living Expenses *	1,443	1,443	1,075	1,075	1,443	958
5. Net Reserve	452	627	253	165	732	95

Remark : * Living expense is estimated based on the average expenditure of national average, urban, and rural in Laos. (source : Agricultural Sector Memorandum, IBRD, 1994)

(2) Case 2 : Farmgate coffee price is kip 670 (based on the IBRD prospected price)

(Unit :Thousand Kip)

Priority Area	Upper Champi		Upper Tapoung			Upper Kapheu
Farm Type	Coffee	Coffee+Tea	Coffee +Veg.-1	Coffee +Veg.-2	Coffee +Veg.-3	Coffee +Veg.
1. Gross Farm Income	2,714	2,627	1,256	1,815	1,556	1,856
2.Production Cost	600	594	179	351	276	308
3.Net Income	2,113	2,033	1,077	1,464	1,280	1,548
4.Living Expenses *	1,443	1,443	958	1,075	1,075	1,443
5. Net Reserve	670	590	119	390	206	105

Priority Area	Lower Xe Set		Upper Tay-Un			
Farm Type	Low. R.-1	Low. R.-2	Coffee+Lo.R -1	Coffee+Lo.R -2	Low. R. 1	Low. R.-2
1. Gross Farm Income	3,000	3,100	1,640	1,611	3,100	1,500
2.Production Cost	1,105	1,030	441	451	925	448
3.Net Income	1,895	2,070	1,199	1,160	2,175	1,052
4.Living Expenses *	1,443	1,443	1,075	1,075	1,443	958
5. Net Reserve	452	627	125	86	732	95

Remark : * Living expense is estimated based on the average expenditure of national average, urban, and rural in Laos. (source : Agricultural Sector Memorandum, IBRD, 1994)

(1) Upper Champi

- Although the income will be fairly fluctuated by coffee price, the farm income will increase to more than 2.5 million kip.
- They can keep the living condition of average of urban area.
- Net reserve of them will be over 0.5 million kip

(2) Upper Tapoung

- Although the income will be fairly fluctuated by coffee price, the farm income will be to more than 1.2 million kip.
- In fact, farm income of some farmers are considerably high at present, however, the condition is not consolidated. Therefore, they can manage their life constantly by the implementation of the project.
- They can keep the living condition of national average or urban areas.
- They can reduce their farm work in a year by changing their farming style from shifting cultivation to permanent farming.
- Net reserve of them may be over 0.1 million kip

(3) Upper Kapheu

- Although the income will be fairly fluctuated by coffee price, the farm income will be to more than 1.8 million kip.
- They can keep the living condition of average of urban area.
- Net reserve of them may be over 0.1 million kip

(4) Lower Xe Set

- Farm income will increase to 3.0 million kip
- Living condition also will be drastically improved, they can keep the living condition of average urban area.
- Net reserve of them may be over 0.5 million kip

(5) Upper Tay-Un

- Farm income will increase to 1.5 to 3.0 million kip
- Living condition of existing farmers also will be drastically improved.
- They can keep the living condition of at least average of rural area.
- While new immigrants from the other area can have one cropping field of paddy, they will get the stable income of 1.5 million kip.

II-2.2 Capacity to Pay

After the implementation of the projects, the operation and maintenance costs of the irrigation and drainage facilities, on-farm facilities, and rural infrastructure facilities are shouldered by beneficial farmers. O&M cost for the main system will be recovered from the water charge while O&M costs for the on-farm facilities will be met in the form of labor.

According to the government regulation, the farmers benefited by irrigation in the schemes will have to pay the water charge at kip 0.45 per one cubic meter. In this case, the water charges of each typical farmer are estimated at about kip 1,000 to 20,000 annually, which are equivalent to 0.1 to 10 % of net reserve. Therefore, they will have enough capacity to pay the charge.

On the other hand, the Government also say that the annual O&M cost of irrigation facilities should be shouldered by the beneficiaries. However, most farmers in the whole country have hardly paid the cost. Therefore the Department of Irrigation suggested to the

government that the farmers duty should be 30 % of O&M cost. In case that farmers have to shoulder 30 % of annual O&M cost, they would pay the charge as shown below.

(Unit :Thousand Kip)

Priority Area	Upper Champi		Upper Tapoung			Upper Kapheu
Farm Type	Coffee	Coffee+Tea	Coffee +Veg.-1	Coffee +Veg.-2	Coffee +Veg.-3	Coffee +Veg.
Net reserve	670	590	119	390	206	105
O&M cost	65	65	23	23	23	30

(Unit :Thousand Kip)

Priority Area	Lower Xe Set		Upper Tay-Un			
Farm Type	Low. R.-1	Low. R.-2	Coffee+Lo.R -1	Coffee+Lo.R -2	Low. R. 1	Low. R.-2
Net reserve	452	627	125	86	732	95
O&M cost	72	72	54	54	54	54

Except for the Upper Tay-Un area, farmers can easily shoulder the O&M cost. These are estimated at about 10 to 30 % of net reserve for the four (4) scheme. Even in the Upper Tay-Un scheme, the charge will be 7 to 60 % of net reserve. Since this net reserve results from high consumption of living expenses, it is considered that they have an enough capacity to pay the O&M charge.

Presently the water charge in the Laongam area is at kip 100 per cubic meter. In case that it is applied to the projects, the anticipated water charge of average household is about kip 15,000. Therefore, it could be considered as small portion among the net reserve.

II-3 PROJECT IMPACTS

II-3.1 Agricultural Impacts

The following agricultural impacts can be expected in future.

(1) Upper Champi Scheme

- Substantial increase of coffee and tea production. The expected amount is 750 ton and 120 ton, respectively, by 5 times of coffee and 3 times of tea of the present production.
- Highland vegetables and some upland crops is newly introduced and produced. The expected production is 2,200 ton and 330 ton respectively.
- The project works as well as the stabilized increase in production by the modernized farming system supported by the improved agricultural services would bring the high demonstration effect to the adjacent areas,
- The estimated area for control of slash-and-burn cultivation is about 240 ha.

(2) Upper Tapoung Scheme

- The present grass land of which is mostly not utilized for agricultural purpose will be converted to new agricultural land, and will produce 1600 ton and 240 ton of vegetables and upland crops,
- The cabbage area which is out side the scheme area, and cultivated under slash-and-burn cultivation system will be reduced drastically,
- The area will be the nuclear model scheme for extension of the permanent cropping system with highland vegetables development applying modernized farming system,
- The area converted from slash-and-burn cultivation to the permanent cropping system is estimated at 100 ha. Beside, outside the area, about 320 ha of slash-and-burn area would be converted to coffee and other permanent system.

(3) Upper Kapheu Scheme

- About 700 ha of land composed of bush, upland rice and secondary forest lands which are mostly under the slash-and-burn cultivation system at present will be converted to the permanent cropping field for coffee and lowland rice,
- The project works as well as the stabilized increase in production by the modernized farming system supported by the improved agricultural services would bring the high demonstration effect to the adjacent areas.
- The expected crop production is 1350 ton or 8 times of that of the present. About 400 ton of lowland rice will be produced newly,
- The area converted from slash-and-burn system is estimated at 680 ha.

(4) Lower Xe Set Scheme

- The expected increment of crop production is 4500 ton of paddy, 1,500 ton of upland crops under the stabilized farming system with irrigation development,
- More than 1,000 ha of bush, grass, secondary forest and upland rice field under slash-and-burn system will be converted to the permanent cropping field,
- The project works as well as the stabilized increase in production especially by the lowland rice field would be the high demonstration effect to the adjacent areas as well as to contribute to improve staple food supply,
- The area converted from slash-and-burn system is estimated at 1,150 ha. Beside, outside the area, about 630 ha would be used for reforestation.

(5) Upper Tay-Un Scheme

- The project works as well as the stabilized increase in production especially by the lowland rice field would be the high demonstration effect to the adjacent areas as well as to contribute to improve staple food supply,
- The newly opened lowland rice field would be distributed to the farmers who have no lowland rice field at present, and more over some immigrants would be invited to provide with some of the new lowland rice field,
- The project works as well as the stabilized increase in production especially by the lowland rice field would be the high demonstration effect to the adjacent areas as well as to contribute to improve staple food supply,
- About 390 ha of slash-and-burn area would be converted to the permanent cropping system.

II-3.2 Rural Development Impact

Agricultural development will achieve its target through both direct measures for increasing production and indirect ones for improving rural infrastructure and living conditions, which will be an integrated balanced agricultural development. Impacts on rural infrastructure improvement are recognized as various kinds of forms, some of which provide tangible benefits as described below.

(1) Road improvement

Good transportation facilities, particularly well functioned road network encourages farmers to introduce and expand improved farming and crop diversification, as well as marketing of farm inputs and outputs. Improved roads will also contribute largely to people's socio-economic activities.

(2) Water supply development

Provision of rural water supply will ease the burden of women and children, who now have to bring water from streams or rivers. Good water also means better health. In addition, the water supply facilities in such public facilities as clinics, schools and markets will contribute to their better functions.

(3) Primary school improvement

Rehabilitated schools will give better conditions to both teachers and school children. Those schools will encourage the children to go to school more often and continuously, resulting in increasing literacy rate of children.

(4) Village community hall

The hall can be used for several purposes such as cooperative work, agricultural extension services, farmer training, health care services, meeting, propagation of rural life improvement and improvement of women's social status, day care, social education to adult people, entertainment, etc. Therefore, it will contribute largely to rural life improvement.

II-3.3 Social Development Impact

(1) Increase and stabilization of farm income

Farmers have to live upon limited as well as unstable agriculture output due to the operating of inefficient farming practices such as slash and burn farming and rainfed farming. The farmers' income will be increased and stabilized considerably after implementing of the Projects, because of the increase and stabilization in crop production and improvement of

marketing system. The increase and stabilization of the net farm income will function to provide motive power in the improvement of living standards of the farmers as well as rural economic development.

(2) Improvement of rural life and correction of living differentials

The direct effects on improvement of living and health conditions in the Project areas will be expected directly by the programs of rural water supply system for supplying clean and safe water for villagers. In addition, it is expected that the community development will stimulate increase of literacy, public health, nutrition and housekeeping. This in turn will progress and stabilize rural living conditions. The improvement of living conditions translates into a rise in the social status of women, which can be expected to contribute rural socio-economy. These circumstances will promote better rural living conditions, functioning to expand the improvement of rural society and living differentials with the area and surrounding urban areas will be anticipated.

(3) Expansion of women's activity

In addition, the women's activities will be improved and expanded through the community development, establishment of water supply system and clinics, improvement of road, and rice bank. By incorporating women into the project activities such as rice bank operation, women can be members of village association which operate the village activities. Through this activities, the women will have a knowledge and also power for management of their lives.

(4) Increase in employment opportunity

The project implementation will increase employment opportunity in the each priority area in terms of farm labors and construction workers. In addition, enhancement of marketing activities will also generate the employment in related sectors.

II-3.4 Environmental Impact

(1) Matrix Assessment

The project is designed to improve the living standard of the people in the five priority areas, made up of 26 villages. Project benefits are as described in the preceding sections. From a review of proposals, the project is seen to implement a range of benefits. The adverse impacts are few and of a temporary nature only. The living standard of rural people, are being enhanced by attention to the physical environment through implementing a series of conservation actions designed to enhance productivity, eliminate pollution and, among others, make the production processes sustainable.

It would also be relevant to consider the "no project" option, i.e. the situation that would arise if the project is not implemented. The people of the project areas live in poverty. Their livelihood is closely linked to what can be obtained from nature, to sustain them through a subsistence form of living. Often, when weather is unfavorable, people are short of food and water and life becomes increasingly difficult. This leads people to shifting cultivation; growing paddy and other upland crops. In a situation such as this, depletion of natural resources will continue until these become exhausted. If the project proposals are in any way not to be implemented, the people will continue to live the way they are used to. In the long-term, more resources will get degraded and be turned into unproductive land or deforested land for example. The population will increase and will face more and more health-related problems under continuing poor nutrition levels. Education will stagnate at present levels and there will be a general degeneration of the quality of life.

Project impacts are qualitatively assessed and mitigation measures are proposed for those likely to be of an adverse nature which are grouped into low, medium and high impact classes. Some adverse impacts will be caused during the construction phase and relevant mitigation measures are discussed in section 3.8. These are assessed as having a medium impact as they are of a temporary nature. Pesticides used in cabbage cultivation are some of the extremely toxic kinds and it is suspected that water in the Upper Tapoung area may be contaminated. The following table is an assessment of the impacts of the project on the environment. In view of the large number of anticipated beneficial impacts, it is concluded that the project will not cause any harm to the environment.

Issue and Activities	Upper Champi	Upper Tapoung	Upper Kapheu	Lower Xe Set	Upper Tay-Un
1. Environmental Issues					
(1) Wildlife	N	N	N	N	N
(2) Forest	B	B	B	B	B
(3) Water quality	N	*	N	N	N
(4) Health	B	B	B	B	B
(5) Living condition	B	B	B	B	B
(6) Human resources	B	B	B	B	B
2. Project Activities					
(1) Construction	M	M	M	M	M
(2) Land Use	B	B	B	B	B
(3) Improved farming system	B	B	B	B	B
(4) Institution aspect	B	B	B	B	B
(5) Monitoring	B	B	B	B	B
(6) Environmental Planning	B	B	B	B	B

Remarks : Key to impact assessment is indicated as follows :
H : High adverse impact, M : Medium adverse impact, L : Low adverse impact,
N : No adverse impact, B : Beneficial impact, * : To be assessed

(2) Reduction of Slash and Burn Cultivation

Through the implementation of the projects, the potential land for shifting cultivation in all schemes is being converted into arable land. The total areas is estimated at 2,560 ha within the priority scheme areas. Beside, about 630 ha in the homer Xe Set scheme area, 320 ha in the Upper Tapoung scheme area would be used for other than slash-and-burn cultivation such as reforestation and coffee plantation.. Apart from shifting cultivation, these land categories are used by people for grazing their cattle and also to obtain firewood and minor forest produce.

Tables

Table XI-II-1 Standard Conversion Factor of the Lao PDR (based on recent last 5 years)

(Unit : US$)

Items	1989	1990	1991	1992	1993	Average
	583.6	706.4	702	715.2	716	
Total Imports CIF	197.0	276.0	292.0	265.0	299.0	265.8
Total Exports FOB	63.0	146.0	113.0	132.0	166.0	124.0
Import Duties	12.2	7.6	14.2	19.7	30.7	16.9
Export Duties	2.5	17.9	15.3	15.0	4.3	11.0
SCF	0.964	1.025	1.003	0.988	0.946	0.985

Source : Economic Memorandam, IBRD, 1994

Table XI-II-2 Economic Price Structure for Tradable Commodities (1995 constant price)

(1) Coffee (Export parity)

Item	Unit	2005
Projected CIF price at New York and Humburg <1	US$/ton	1,497
Quality adjustment	US$/ton	1,048
(for Robusta & quality discount : 70%)		
Freight and insurance	US$/ton	150
FOB Someck	US$/ton	898
Transport and handling costs <2	US$/ton	72
Green coffee equivalent	US$/ton	826
Economic Farm Gate Price (hulling rate : 63%) <3	US$/ton	520
(1US$ = 920 kip)	kip/kg	479

Remarks : <1 Based on World Bank Commodity Price Forcast 1990 - 2005 (Feb. 1996) in constant 1990 prices, adjusting to 1995 constant price by applying MUV index.
<2 Net figure for all internal transport, storage and handling costs, multiplied by 0.985 as SCF
<3 Taxes and duties excluded.

(2) Tea (Export parity)

Item	Unit	2005
Projected CIF price at London <1	US$/ton	1,727
Quality adjustment	US$/ton	1,209
(for quality discount : 70%)		
Freight and insurance	US$/ton	65
FOB Someck	US$/ton	1,144
Transport and handling costs to Factory	US$/ton	75
Processing cost	US$/ton	374
Transport and handling costs to farmgate	US$/ton	15
Farm gate price <3	US$/ton	679
(1US$ = 920 kip)	kip/kg	625

Remarks : <1 Based on World Bank Commodity Price Forcast 1990 - 2005 (Feb. 1996) in constant 1990 prices, adjusting to 1995 constant price by applying MUV index.
<2 Net figure for all internal transport, storage and handling costs
<3 Taxes and duties excluded, SCF is 0.985

(3) Soybean (Import parity)

Item	Unit	2005
Projected CIF price at Rotterdam <1	US$/ton	286
Freight and insurance	US$/ton	67
CIF Someck	US$/ton	353
Transport and handling costs	US$/ton	36
Farm gate price <3	US$/ton	317
(1US$ = 920 kip)	kip/kg	292

Remarks : <1 Based on World Bank Commodity Price Forcast 1990 - 2005 (Feb. 1995) in constant 1990 prices, adjusting to 1995 constant price by applying MUV index
<2 Net figure for all internal transport, storage and handling costs
<3 Taxes and duties excluded, SCF is 0.985

(4) Maize (Import Parity)

Item	Unit	2005
Projected FOB price at Rotterdam <1	US$/ton	98
Freight and insurance	US$/ton	50
CIF Someck	US$/ton	148
Transport and handling costs <2	US$/ton	20
Farm gate price <3	US$/ton	128
(1US$ = 920 kip)	kip/kg	118

Remarks : <1 Based on World Bank Commodity Price Forcast 1990 - 2005 (Feb. 1996) in constant 1990 prices, adjusting to 1995 constant price by applying MUV index.
<2 Net figure for all internal transport, storage and handling costs
<3 Taxes and duties excluded, SCF is 0.985

(5) Rice (Import parity)

Item	Unit	2005
Projected FOB price at Bangkok <1	US$/ton	274
Quality adjustment (for glutinous rice : 85%)	US$/ton	233
Freight and insurance	US$/ton	60
CIF Someck	US$/ton	293
Transport and handling costs <2	US$/ton	28
Dry rice equivalent	US$/ton	321
Conversion from rice to dried paddy (60 %)<3	US$/ton	193
Transportation and handling cost to local market <2	US$/ton	9
Farm gate price <4	US$/ton	184
(1US$ = 920 kip)	kip/kg	169

Remarks : <1 Based on World Bank Commodity Price Forcast 1990 - 2005 (Feb. 1996) in constant 1990 prices, adjusting to 1995 constant price by applying MUV index.
<2 Net figure for all internal transport, storage and handling costs
<3 Processing costs are assumed equal to he value of by processing
<4 Taxes and duties excluded, SCF is 0.985

(6) Groundnut (Import parity)

Item	Unit	2005
Projected CIF price at Rotterdam <1	US$/ton	328
Freight and insurance	US$/ton	67
FOB Someck	US$/ton	395
Transport and handling costs <2	US$/ton	36
Dried Groundnut	US$/ton	360
Farm gate price <3	US$/ton	360
(1US$ = 920 kip)	kip/kg	331

Remarks : <1 Based on World Bank Commodity Price Forcast 1990 - 2005 (Feb. 1996) in constant 1990 prices, adjusting to 1995 constant price by applying MUV index. Groundnut price is assumed as 115% of Soybean price.
<2 Net figure for all internal transport, storage and handling costs
<3 Taxes and duties excluded, SCF is 0.985

(7) Farm Input - Urea - (Import parity)

	Unit	2005
Projected FOB price at N.W.Europe <1	US$/ton	147
Freight and insurance	US$/ton	61
CIF Someck	US$/ton	208
Transport and handling cost (Someck - Pakse) <2	US$/ton	28
Marketing and dealer's cost	US$/ton	31
Transport and handling cost to farmgate	US$/ton	9
Farm gate price	US$/ton	276
(1US$ = 920 kip)	kip/kg	254

Remarks : <1 Based on World Bank Commodity Price Forcast 1990 - 2005 (Feb. 1996) in constant 1990 prices, adjusting to 1995 constant price by applying MUV index.
<2 Net figure for all internal transport, storage and handling costs
<3 Taxes and duties excluded, SCF is 0.985

Table XI-II-3 Present Economic Crop Budget for 5 Priority Development Schems

Items	Unit	Upper Champa						Upper Kaphaw						Upper Tayun					
		Tea			Coffee			Upland Rice			Coffee			Upland Rice			Lowland Rice		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income																			
(1) Yield	(kg)	340	625	212,500	230	479	129,330	1,500	169	253,500	325	479	155,280	1,380	169	233,220	1,670	169	282,230
B. Production Costs																			
B-1 Farm Input																			
(1) Seed	(kg)	12,000	1	12,000	625	1	625	80	169	13,520	625	1	625	80	169	13,520	50	169	8,450
(2) Fertilizer																			
Urea	(kg)	0	254	0	0	254	0	0	254	0	0	254	0	0	254	0	0	254	0
16-20-0	(kg)	0	254	0	0	254	0	0	254	0	0	254	0	0	254	0	0	254	0
(3) Agro-chemicals																			
Insecticide	(lit)	0	9,236	0	0	9,236	0	0	9,236	0	0	9,236	0	0	9,236	0	0	9,236	0
Pesticide	(lit)	0	9,236	0	0	9,236	0	0	9,236	0	0	9,236	0	0	9,236	0	0	9,236	0
Sub total				12,000			625			13,520			625			13,520			8,450
B-2 Labour Requirement																			
(1) Hired Labour	man-day	0	469	0	22	469	10,318	0	469	0	0	469	0	0	469	0	0	469	0
(2) Family Labour	man-day	190	469	89,110	148	469	69,412	198	469	92,862	320	469	29,330	198	469	92,862	148	469	69,412
B-3 Animal Power	head-day	0	938	0	0	938	0	0	938	0	0	938	0	0	938	0	0	938	0
B-4 Machinery Power	kg	0	0	0	270	20	5,310				320	20	6,304						
B-5 Others				4,980			4,210			5,239			4,268			5,239			3,835
Total				106,090			89,893			111,621			90,927			111,621			81,697
C. Net Return (A-B)				106,410			39,437			141,879			62,353			121,599			200,533

Items	Unit	Upper Tayun						Lower Kaet								
		Upland Rice			Lowland Rice			Upland Rice			Lowland Rice			Groundnuts		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income																
(1) Yield	(kg)	1,380	169	233,220	1,670	169	282,230	2,050	169	346,450	2,560	169	436,160	1,470	331	486,570
B. Production Costs																
B-1 Farm Input																
(1) Seed	(kg)	80	169	13,520	50	169	8,450	80	169	13,520	50	169	8,450	70	331	23,170
(2) Fertilizer																
Urea	(kg)	0	254	0	0	254	0	0	254	0	0	254	0	0	254	0
16-20-0	(kg)	0	254	0	0	254	0	0	254	0	0	254	0	0	254	0
(3) Agro-chemicals																
Insecticide	(lit)	0	9,236	0	0	9,236	0	0	9,236	0	0	9,236	0	0	9,236	0
Pesticide	(lit)	0	9,236	0	0	9,236	0	0	9,236	0	0	9,236	0	0	9,236	0
Sub total				13,520			8,450			13,520			8,450			23,170
B-2 Labour Requirement																
(1) Hired Labour	man-day	0	469	0	0	469	0	0	469	0	0	469	0	0	469	0
(2) Family Labour	man-day	198	469	92,862	148	469	69,412	198	469	92,862	148	469	69,412	90	469	42,240
B-2 Animal Power	head-day	0	938	0	0	938	0	0 0	938	0	0	938	0	0	938	0
B-3 Machinery Power																
B-5 Others				5,239			3,835			5,239			3,835			3,220
Total				111,621			81,697			111,621			83,697			68,630
C. Net Return (A-B)				121,599			200,533			234,829			364,463			417,920

Table XI-II-4 Economic Crop Budget with Project Condition for 5 Priority Schems

	Unit	Tea			Coffee			Cabbage			Potato		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income													
(1) Yield	(kg)	1,000	625	625,000	1,500	479	718,500	20,000	97	1,940,000	20,000	109	2,180,000
B. Production Costs													
B-1 Farm Input													
(1) Seed	(kg)	12,000	1	12,000	625	1	625	1	200,000	160,000	1	290	232
(2) Fertilizer													
Urea	(kg)	0	254	0	0	254	0	250	254	63,500	250	254	63,500
16-20-0	(kg)	0	254	0	0	254	0	0	254	0	0	254	0
16-16-16	(kg)	300	277	83,100	300	277	83,100	250	277	69,250	250	277	69,250
(3) Agro-chemicals													
Incecticide	(lit)	0	9,236	0	0	9,236	0	2	9,236	18,472	2	9,236	18,472
Pesticide	(lit)	0	9,236	0	0	9,236	0	2	9,236	18,472	2	9,236	18,472
Sub total				95,100			83,725			329,694			169,926
B-2 Labour Requirement													
(1) Hired Labour	man-day	0	469	0	70	469	32,830	0	469	0	0	469	0
(2) Family Labour	man-day	215	469	100,835	135	469	63,315	95	469	44,555	80	469	37,520
B-3 Animal Power	head-day	0	938	0	0	938	0	0	938	0	0	938	0
B-4 Machinary Power	kg	0	0	0	1,500	20	29,550	0	0	0	0	0	0
B-5 Others				9,650			10,314			18,432			10,217
Total				205,585			219,734			392,681			217,663
C. Net Retun (A-B)				419,415			498,766			1,547,319			1,962,337

	Unit	Soybeans			Lowland Rice			Groundnuts		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income										
(1) Yield	(kg)	2,000	292	584,000	4,000	169	676,000	2,000	331	662,000
B. Production Costs										
B-1 Farm Input										
(1) Seed	(kg)	60	292	17,520	50	169	8,450	45	331	14,895
(2) Fertilizer										
Urea	(kg)	0	254	0	70	254	17,780	0	254	0
16-20-0	(kg)	350	254	88,900	200	254	50,800	350	254	88,900
16-16-16	(kg)	0	277	0	0	277	0	0	277	0
(3) Agro-chemicals										
Incecticide	(lit)	2	9,236	18,472	4	9,236	36,944	2	9,236	18,472
Pesticide	(lit)	2	9,236	18,472	0	9,236	0	2	9,236	18,472
Sub total				143,364			113,974			140,739
B-2 Labour Requirement										
(1) Hired Labour	man-day	0	469	0	0	469	0	0	469	0
(2) Family Labour	man-day	80	469	37,520	153	469	71,757	85	469	39,865
B-3 Animal Power	head-day	0	938	0	0	938	0	0	938	0
B-4 Machinary Power	kg	0	0	0		0			0	
B-5 Others				8,909			14,287			13,030
Total				189,793			200,018			193,634
C. Net Retun (A-B)				394,207			475,982			468,366

Table XI-II-5 Economic Incremental Benefit for 5 Priority Schemes

Crops	Without Project Condition					With Project Condition					Icremental Benefit	
	Cropped Area	Production	G. income	Prod. cost	Net Benefit	Cropped Area	Production	G. income	Prod. cost	Net Benefit	by Kip	By US$
	(ha)	(ton)	(000kip)	(000kip)	(000kip)	(ha)	(ton)	(000kip)	(000kip)	(000kip)	(000kip)	(000US$)
1. Upper Champi												
Coffee	460	138	59,492	41,351	18,141	500	1,500	359,250	109,867	249,383		
Tea	130	39	27,625	13,792	13,833	120	120	75,000	24,670	50,330		
Upland crops *1	0	-	-	-	-	110	330	64,240	20,877	43,363		
Vegetables *2	0	-	-	-	-	110	2,200	226,600	33,569	193,031		
Total	590		87,117	55,142	31,974	840		725,090	188,983	536,107	504,132	548
2. Upper Tapung												
Vegetables *2	-	-	-	-	-	80	1,600	164,800	24,414	140,386		
Upland crops *1	-	-	-	-	-	80	240	46,720	15,183	31,537		
Total	0	0	0	0	0	160		211,520	39,597	171,923	171,923	187
3. Upper Kapheu												
Coffee	540	162	82,771	49,101	33,671	900	2,700	646,650	197,761	448,889		
Upland crops *3	-	-	-	-	-	100	200	66,200	19,363	46,837		
Lowland Rice	-	-	-	-	-	100	400	67,600	20,002	47,598		
Upland Rice	180	270	45,630	20,092	25,538	-	-	-	-	-		
Total	720		128,401	69,192	59,209	1,100		780,450	237,126	543,324	484,115	526
4. Lower Xe Set												
Lowland Rice	100	260	44,616	8,170	36,446	1,200	4,800	811,200	240,022	571,178		
Upland crops *3	90	135	43,791	6,174	37,617	800	1,600	529,600	154,907	374,693		
Upland Rice	130	273	45,039	14,511	30,528	-	-	-	-	-		
Fruit *4	20	240	4,433	783	3,649	-	-	-	-	-		
Total	340		137,878	29,638	108,241	2,000		1,340,800	394,929	945,871	837,630	910
5. Upper Tay-Un												
Lowland Rice	20	34	5,645	1,634	4,011	400	1,600	270,400	80,007	190,393		
Upland crops *3	-	-	-	-	-	80	160	52,960	15,491	37,469		
Upland Rice	30	42	6,997	3,349	3,648	-	-	-	-	-		
Total	50		12,641	4,983	7,659	480		323,360	95,498	227,862	220,203	239

Remarks : *1 Upland crops are represented by groundnut.
*2 Vegetables are represented by cabbages.
*3 Upland crops are represented by soybeans.
*4 Fruits are represented by banana.

Table XI-II-6 Economic Cost and Benefit Stream of Each Project

(1) Upper Chanta (Unit : '000 US$)

Year	Cost: Construct.	Cost: O & M	Cost: Replace.	Cost: Total	Irrigation Benefit	Balance
1	1,258	0		1,258	0	-1,258
2	3,674	0		3,674	110	-3,564
3	898	0		898	110	-788
4	52	0		52	219	167
5		0		0	329	329
6		0		0	438	438
7		7		7	548	541
8		15		15	548	533
9		22		22	548	526
10		30		30	548	518
11		37		37	548	511
12		45		45	548	503
13		52		52	548	496
14		52		52	548	496
15		52		52	548	496
16		52		52	548	496
17		52		52	548	496
18		52		52	548	496
19		52		52	548	496
20		52		52	548	496
21		52		52	548	496
22		52		52	548	496
23		52	262	314	548	234
24		52		52	548	496
25		52		52	548	496
26		52		52	548	496
27		52		52	548	496
28		52	437	489	548	59
29		52		52	548	496
30		52		52	548	496
31		52		52	548	496
32		52		52	548	496
33		52		52	548	496
34		52		52	548	496
35		52		52	548	496
36		52		52	548	496
37		52		52	548	496
38		52		52	548	496
39		52		52	548	496
40		52		52	548	496
41		52		52	548	496
42		52		52	548	496
43		52	262	314	548	234
44		52		52	548	496
45		52		52	548	496
46		52		52	548	496
47		52		52	548	496
48		52		52	548	496
49		52		52	548	496
50		52		52	548	496
51		52		52	548	496
52		52		52	548	496
53		52	437	489	548	59
54		52		52	548	496
	5,883	2,338	1,398	9,618	27,510	17,891
	7.59					

(2) Upper Treang (Unit : '000 US$)

Year	Cost: Construct.	Cost: O & M	Cost: Replace.	Cost: Total	Irrigation Benefit	Balance
1	316	0		316	0	-316
2	1,092	0		1,092	37	-1,055
3	79	0		79	56	-23
4	10	0		10	112	102
5		0		0	187	187
6		0		0	187	187
7		3		3	187	184
8		6		6	187	181
9		9		9	187	178
10		12		12	187	175
11		15		15	187	172
12		18		18	187	169
13		21		21	187	166
14		21		21	187	166
15		21		21	187	166
16		21		21	187	166
17		21		21	187	166
18		21		21	187	166
19		21		21	187	166
20		21		21	187	166
21		21		21	187	166
22		21	218	239	187	-52
23		21		21	187	166
24		21		21	187	166
25		21		21	187	166
26		21		21	187	166
27		21	109	130	187	57
28		21		21	187	166
29		21		21	187	166
30		21		21	187	166
31		21		21	187	166
32		21		21	187	166
33		21		21	187	166
34		21		21	187	166
35		21		21	187	166
36		21		21	187	166
37		21		21	187	166
38		21		21	187	166
39		21		21	187	166
40		21		21	187	166
41		21		21	187	166
42		21	218	239	187	-52
43		21		21	187	166
44		21		21	187	166
45		21		21	187	166
46		21		21	187	166
47		21		21	187	166
48		21		21	187	166
49		21		21	187	166
50		21		21	187	166
51		21		21	187	166
52		21	109	130	187	57
53		21		21	187	166
54		21		21	187	166
	1,497	989	654	3,101	9,556	6,455
	10.76					

(3) Upper Kaphea (Unit : '000 US$)

Year	Cost: Construct.	Cost: O & M	Cost: Replace.	Cost: Total	Irrigation Benefit	Balance
1	1,298	0		1,298	0	-1,298
2	2,673	0		2,673	53	-2,621
3	1,966	0		1,966	105	-1,861
4	63	0		63	210	148
5		0		0	316	316
6		0		0	421	421
7		6		6	526	520
8		13		13	526	513
9		19		19	526	507
10		26		26	526	500
11		32		32	526	494
12		39		39	526	487
13		45		45	526	481
14		45		45	526	481
15		45		45	526	481
16		45		45	526	481
17		45		45	526	481
18		45		45	526	481
19		45		45	526	481
20		45		45	526	481
21		45		45	526	481
22		45		45	526	481
23		45	236	281	526	245
24		45		45	526	481
25		45		45	526	481
26		45		45	526	481
27		45		45	526	481
28		45	456	501	526	25
29		45		45	526	481
30		45		45	526	481
31		45		45	526	481
32		45		45	526	481
33		45		45	526	481
34		45		45	526	481
35		45		45	526	481
36		45		45	526	481
37		45		45	526	481
38		45		45	526	481
39		45		45	526	481
40		45		45	526	481
41		45		45	526	481
42		45		45	526	481
43		45	236	281	526	245
44		45		45	526	481
45		45		45	526	481
46		45		45	526	481
47		45		45	526	481
48		45		45	526	481
49		45		45	526	481
50		45		45	526	481
51		45		45	526	481
52		45		45	526	481
53		45	456	501	526	25
54		45		45	526	481
	6,000	2,023	1,384	9,407	26,353	16,946
	6.99					

(4) Lower Xe Set (Unit : '000 US$)

Year	Cost: Construct.	Cost: O & M	Cost: Replace.	Cost: Total	Irrigation Benefit	Balance
1	304	0		304	0	-304
2	2,344	0		2,344	0	-2,344
3	5,861	0		5,861	182	-5,679
4	3,294	0		3,294	273	-3,021
5		0		0	546	546
6		0		0	910	910
7		0		0	910	910
8		15		15	910	895
9		29		29	910	881
10		44		44	910	866
11		58		58	910	852
12		73		73	910	837
13		88		88	910	822
14		102		102	910	808
15		102		102	910	808
16		102		102	910	808
17		102		102	910	808
18		102		102	910	808
19		102		102	910	808
20		102		102	910	808
21		102		102	910	808
22		102		102	910	808
23		102	244	346	910	564
24		102		102	910	808
25		102		102	910	808
26		102		102	910	808
27		102		102	910	808
28		102	502	604	910	306
29		102		102	910	808
30		102		102	910	808
31		102		102	910	808
32		102		102	910	808
33		102		102	910	808
34		102		102	910	808
35		102		102	910	808
36		102		102	910	808
37		102		102	910	808
38		102		102	910	808
39		102		102	910	808
40		102		102	910	808
41		102		102	910	808
42		102		102	910	808
43		102	244	346	910	564
44		102		102	910	808
45		102		102	910	808
46		102		102	910	808
47		102		102	910	808
48		102		102	910	808
49		102		102	910	808
50		102		102	910	808
51		102		102	910	808
52		102		102	910	808
53		102	502	604	910	306
54		102		102	910	808
	11,804	4,047	1,492	17,293	45,591	27,298
	6.39					

(5) Upper Tawiya (Unit : '000 US$)

Year	Cost: Construct.	Cost: O & M	Cost: Replace.	Cost: Total	Irrigation Benefit	Balance
1	651	0		651	0	-651
2	1,987	0		1,987	48	-1,939
3	433	0		433	72	-361
4	21	0		21	143	122
5		0		0	239	239
6		0		0	239	239
7		5		5	239	234
8		9		9	239	230
9		14		14	239	225
10		18		18	239	221
11		23		23	239	216
12		27		27	239	212
13		32		32	239	207
14		32		32	239	207
15		32		32	239	207
16		32		32	239	207
17		32		32	239	207
18		32		32	239	207
19		32		32	239	207
20		32		32	239	207
21		32		32	239	207
22		32		32	239	207
23		32	218	250	239	-11
24		32		32	239	207
25		32		32	239	207
26		32		32	239	207
27		32		32	239	207
28		32	167	199	239	41
29		32		32	239	207
30		32		32	239	207
31		32		32	239	207
32		32		32	239	207
33		32		32	239	207
34		32		32	239	207
35		32		32	239	207
36		32		32	239	207
37		32		32	239	207
38		32		32	239	207
39		32		32	239	207
40		32		32	239	207
41		32		32	239	207
42		32		32	239	207
43		32	218	250	239	-11
44		32		32	239	207
45		32		32	239	207
46		32		32	239	207
47		32		32	239	207
48		32		32	239	207
49		32		32	239	207
50		32		32	239	207
51		32		32	239	207
52		32		32	239	207
53		32	167	199	239	41
54		32		32	239	207
	3,093	1,441	770	5,304	12,933	9,999
	6.14					

Table XI-II-7 Economic Cost and Benefit Stram of the Whole Project

(Unit:US$1000)

Year	Cost				Irrigation Benefit	Balance
	Construction	O & M	Replacement	Total		
1	2,821			2,821		-2,821
2	7,105			7,105	138	-6,968
3	8,708			8,708	343	-8,365
4	6,202			6,202	758	-5,445
5	3,441			3,441	1,234	-2,207
6		3		3	1,722	1,719
7		17		17	2,300	2,283
8		38		38	2,410	2,372
9		74		74	2,410	2,336
10		111		111	2,410	2,299
11		147		147	2,410	2,263
12		183		183	2,410	2,227
13		216		216	2,410	2,194
14		238		238	2,410	2,172
15		252		252	2,410	2,158
16		252		252	2,410	2,158
17		252		252	2,410	2,158
18		252		252	2,410	2,158
19		252		252	2,410	2,158
20		252		252	2,410	2,158
21		252		252	2,410	2,158
22		252	218	470	2,410	1,940
23		252	454	706	2,410	1,704
24		252	262	514	2,410	1,896
25		252	244	496	2,410	1,914
26		252		252	2,410	2,158
27		252	109	361	2,410	2,049
28		252	623	875	2,410	1,535
29		252	437	689	2,410	1,721
30		252	502	754	2,410	1,656
31		252		252	2,410	2,158
32		252		252	2,410	2,158
33		252		252	2,410	2,158
34		252		252	2,410	2,158
35		252		252	2,410	2,158
36		252		252	2,410	2,158
37		252		252	2,410	2,158
38		252		252	2,410	2,158
39		252		252	2,410	2,158
40		252		252	2,410	2,158
41		252		252	2,410	2,158
42		252	218	470	2,410	1,940
43		252	454	706	2,410	1,704
44		252	262	514	2,410	1,896
45		252	244	496	2,410	1,914
46		252		252	2,410	2,158
47		252		252	2,410	2,158
48		252		252	2,410	2,158
49		252		252	2,410	2,158
50		252		252	2,410	2,158
51		252		252	2,410	2,158
52		252	109	361	2,410	2,049
53		252	623	875	2,410	1,535
54		252	437	689	2,410	1,721
55		252		252	2,410	2,158
	28,277	11,368	5,196	44,841	122,174	77,333

EIRR = 6.9%

Table XI-II-8 Sensitivity Analysis for the Projects (1/2 : Each Scheme)

1. Base Case

(1) Upper Chamo (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	1,258	0	0	1,258	0	-1,258
2	3,674	0	0	3,674	110	-3,564
3	898	0	0	898	110	-788
4	52	0	0	52	219	167
52		52	0	52	548	496
53		52	437	489	548	59
54		52	0	52	548	496
	5,893	2,338	1,398	9,618	27,510	17,892
	7,346					

(2) Upper Teyup (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	316	0	0	316	0	-316
2	1,092	0	0	1,092	37	-1,055
3	79	0	0	79	56	-23
4	10	0	0	10	112	102
52	0	21	109	130	187	57
53	0	21	0	21	187	166
54	0	21	0	21	187	166
	1,497	969	654	3,101	9,556	6,455
	10,296					

(3) Upper Kachou (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	1,298	0	0	1,298	0	-1,298
2	2,673	0	0	2,673	53	-2,621
3	1,966	0	0	1,966	105	-1,861
4	63	0	0	63	210	148
52	0	45	0	45	526	481
53	0	45	456	501	526	25
54	0	45	0	45	526	481
	6,000	2,023	1,366	9,407	26,353	16,946
	6,996					

(4) Lower Xe Set (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	304	0	0	304	0	-304
2	2,344	0	0	2,344	0	-2,344
3	5,861	0	0	5,861	182	-5,679
4	3,294	0	0	3,294	273	-3,021
52	0	102	0	102	910	808
53	0	102	502	604	910	306
54	0	102	0	102	910	808
	11,804	4,947	1,492	17,793	45,591	27,798
	6,356					

(5) Upper Tay-Un (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	651	0	0	651	0	-651
2	1,987	0	0	1,987	48	-1,939
3	433	0	0	433	72	-361
4	21	0	0	21	145	124
52	0	32	0	32	239	207
53	0	32	167	199	239	40
54	0	32	0	32	239	207
	3,093	1,441	770	5,304	12,213	6,909
	6,156					

2. Cost 10 % Up

(1) Upper Chamo (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	1,384	0	0	1,384	0	-1,384
2	4,041	0	0	4,041	110	-3,932
3	988	0	0	988	110	-879
52		57	0	57	548	491
53		57	481	538	548	10
54		57	0	57	548	491
	6,671	2,571	1,538	10,780	27,510	16,979
	9,779					

(2) Upper Teyup (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	347	0	0	347	0	-347
2	1,201	0	0	1,201	37	-1,164
3	87	0	0	87	56	-31
52		23	120	143	187	44
53		23	0	23	187	164
54		23	0	23	187	164
	1,647	1,066	719	3,431	9,556	6,125
	9,278					

(3) Upper Kachou (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	1,428	0	0	1,428	0	-1,428
2	2,941	0	0	2,941	53	-2,888
3	2,162	0	0	2,162	105	-2,057
52		49	0	49	526	477
53		49	502	551	526	-25
54		49	0	49	526	477
	6,600	2,225	1,522	10,347	26,353	16,006
	9,294					

(4) Lower Xe Set (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	335	0	0	335	0	-335
2	2,578	0	0	2,578	0	-2,578
3	6,448	0	0	6,448	182	-6,266
52		112	0	112	910	798
53		112	552	665	910	245
54		112	0	112	910	798
	12,984	4,947	1,641	19,573	45,591	26,018
	5,958					

(5) Upper Tay-Un (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	716	0	0	716	0	-716
2	2,186	0	0	2,186	48	-2,138
3	477	0	0	477	72	-405
52		35	0	35	239	204
53		35	184	219	239	20
54		35	0	35	239	204
	3,402	1,585	847	5,834	12,213	6,379
	5,356					

3. Benefit 10% down

(1) Upper Chamo (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	1,258	0	0	1,258	0	-1,258
2	3,674	0	0	3,674	99	-3,575
3	898	0	0	898	99	-800
52	0	52	0	52	493	441
53	0	52	437	489	493	4
54	0	52	0	52	493	441
	5,893	2,338	1,398	9,618	24,759	15,140
	8,459					

(2) Upper Teyup (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	316	0	0	316	0	-316
2	1,092	0	0	1,092	34	-1,058
3	79	0	0	79	50	-29
52	0	21	109	130	168	38
53	0	21	0	21	168	147
54	0	21	0	21	168	147
	1,497	969	654	3,101	9,600	6,499
	9,198					

(3) Upper Kachou (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	1,298	0	0	1,298	0	-1,298
2	2,673	0	0	2,673	47	-2,626
3	1,966	0	0	1,966	95	-1,871
52	0	45	0	45	473	428
53	0	45	456	501	473	-28
54	0	45	0	45	473	428
	6,000	2,023	1,366	9,407	23,717	14,311
	6,196					

(4) Lower Xe Set (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	304	0	0	304	0	-304
2	2,344	0	0	2,344	0	-2,344
3	5,861	0	0	5,861	166	-5,695
52	0	102	0	102	819	717
53	0	102	502	604	819	215
54	0	102	0	102	819	717
	11,804	4,947	1,492	17,793	41,032	23,239
	5,456					

(5) Upper Tay-Un (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	651	0	0	651	0	-651
2	1,987	0	0	1,987	43	-1,944
3	433	0	0	433	65	-369
52	0	32	0	32	215	183
53	0	32	167	199	215	16
54	0	32	0	32	215	183
	3,093	1,441	770	5,304	10,992	5,688
	5,356					

4. Cost 10 % down

(1) Upper Chamo (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	1,132	0	0	1,132	0	-1,132
2	3,306	0	0	3,306	110	-3,197
3	809	0	0	809	110	-699
52	0	47	0	47	548	501
53	0	47	393	440	548	108
54	0	47	0	47	548	501
	5,304	2,104	1,258	8,657	27,510	18,853
	7,759					

(2) Upper Teyup (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	284	0	0	284	0	-284
2	983	0	0	983	37	-945
3	71	0	0	71	56	-15
52	0	19	98	117	187	70
53	0	19	0	19	187	168
54	0	19	0	19	187	168
	1,348	864	589	2,791	9,556	6,765
	11,454					

(3) Upper Kachou (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	1,168	0	0	1,168	0	-1,168
2	2,406	0	0	2,406	53	-2,353
3	1,769	0	0	1,769	105	-1,664
52	0	40	0	40	526	486
53	0	40	410	451	526	75
54	0	40	0	40	526	486
	5,400	1,821	1,246	8,466	26,353	17,887
	3,896					

(4) Lower Xe Set (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	274	0	0	274	0	-274
2	2,109	0	0	2,109	0	-2,109
3	5,275	0	0	5,275	182	-5,093
52	0	92	0	92	910	818
53	0	92	452	544	910	366
54	0	92	0	92	910	818
	10,624	4,066	1,343	16,034	45,591	29,557
	7,256					

(5) Upper Tay-Un (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	586	0	0	586	0	-586
2	1,788	0	0	1,788	48	-1,741
3	390	0	0	390	72	-318
52	0	29	0	29	239	210
53	0	29	150	179	239	60
54	0	29	0	29	239	210
	2,783	1,297	693	4,774	12,213	7,440
	7,056					

5. Benefit 10% up

(1) Upper Chamo (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	1,258	0	0	1,258	0	-1,258
2	3,674	0	0	3,674	121	-3,553
3	898	0	0	898	121	-778
52	0	52	0	52	603	551
53	0	52	437	489	603	114
54	0	52	0	52	603	551
	5,893	2,338	1,398	9,618	30,261	20,642
	8,159					

(2) Upper Teyup (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	316	0	0	316	0	-316
2	1,092	0	0	1,092	41	-1,051
3	79	0	0	79	62	-18
52	0	21	109	130	206	76
53	0	21	0	21	206	185
54	0	21	0	21	206	185
	1,497	969	654	3,101	10,311	7,410
	11,496					

(3) Upper Kachou (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	1,298	0	0	1,298	0	-1,298
2	2,673	0	0	2,673	58	-2,615
3	1,966	0	0	1,966	116	-1,850
52	0	45	0	45	579	534
53	0	45	456	501	579	78
54	0	45	0	45	579	534
	6,000	2,023	1,366	9,407	29,988	19,581
	7,791					

(4) Lower Xe Set (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	304	0	0	304	0	-304
2	2,344	0	0	2,344	0	-2,344
3	5,861	0	0	5,861	200	-5,661
52	0	102	0	102	1,001	899
53	0	102	502	604	1,001	397
54	0	102	0	102	1,001	899
	11,804	4,947	1,492	17,793	50,150	32,357
	7,158					

(5) Upper Tay-Un (Unit : '000 US$)

Year	Construct.	Cost O & M	Replace.	Total	Irrigation Benefit	Balance
1	651	0	0	651	0	-651
2	1,987	0	0	1,987	53	-1,935
3	433	0	0	433	79	-354
52	0	32	0	32	263	231
53	0	32	167	199	263	64
54	0	32	0	32	263	231
	3,093	1,441	770	5,304	13,434	8,130
	6,958					

Table XI-II- 8 Semsitivity Analysis of the Projects (2/2 : Whole 5 Schemes)

Case-1 : Base Case (Unit:US$1000)

Year	Cost				Irrigation Benefit	Balance
	Construction	O & M	Replacement	Total		
1	2,821			2,821		-2,821
2	7,105			7,105	138	-6,968
3	8,708			8,708	343	-8,365
4	6,202			6,202	758	-5,445
5	3,441			3,441	1,234	-2,207
49		252		252	2,410	2,158
50		252		252	2,410	2,158
51		252		252	2,410	2,158
52		252	109	361	2,410	2,049
53		252	623	875	2,410	1,535
54		252	437	689	2,410	1,721
55		252		252	2,410	2,158
	28,277	11,368	5,196	44,841	122,174	77,333
EIRR =	6.9%					

Case-2 : Cost 10% UP (Unit:US$1000)

Year	Cost				Irrigation Benefit	Balance
	Construction	O & M	Replacement	Total		
1	3,103			3,103		-3,103
2	7,816			7,816	138	-7,678
3	9,579			9,579	343	-9,236
4	6,823			6,823	758	-6,065
5	3,785			3,785	1,234	-2,551
49		277		277	2,410	2,133
50		277		277	2,410	2,133
51		277		277	2,410	2,133
52		277	120	397	2,410	2,013
53		277	685	963	2,410	1,447
54		277	481	758	2,410	1,652
55		277		277	2,410	2,133
	31,105	12,504	6,876	49,325	122,351	72,849
EIRR =	6.1%					

Case-3 : Benefit 10% dowm (Unit:US$1000)

Year	Cost				Irrigation Benefit	Balance
	Construction	O & M	Replacement	Total		
1	2,821			2,821		-2,821
2	7,105			7,105	124	-6,981
3	8,708			8,708	308	-8,399
4	6,202			6,202	682	-5,521
50		252		252	2,169	1,917
51		252		252	2,169	1,917
52		252	109	361	2,169	1,808
53		252	623	875	2,169	1,294
54		252	437	689	2,169	1,480
55		252		252	2,169	1,917
	28,277	11,368	5,196	44,841	109,956	65,116
EIRR =	6.0%					

Case-4 : Case 1+Case2 (Unit:US$1000)

Year	Cost				Irrigation Benefit	Balance
	Construction	O & M	Replacement	Total		
1	3,103			3,103		-3,103
2	7,816			7,816	124	-7,692
3	9,579			9,579	308	-9,270
4	6,823			6,823	682	-6,141
50		277		277	2,169	1,892
51		277		277	2,169	1,892
52		277	120	397	2,169	1,772
53		277	685	963	2,169	1,206
54		277	481	758	2,169	1,411
55		277		277	2,169	1,892
	31,105	12,504	5,716	49,325	109,956	60,632
EIRR =	5.3%					

Case-5 : Cost 10% down (Unit:US$1000)

Year	Cost				Irrigation Benefit	Balance
	Construction	O & M	Replacement	Total		
1	2,538			2,538		-2,538
2	6,395			6,395	138	-6,257
3	7,837			7,837	343	-7,494
4	5,582			5,582	758	-4,825
50		227		227	2,410	2,183
51		227		227	2,410	2,183
52		227	98	325	2,410	2,085
53		227	561	788	2,410	1,622
54		227	393	620	2,410	1,790
55		227		227	2,410	2,183
	25,449	10,231	4,676	40,357	122,174	81,817
EIRR =	7.8%					

Case-6 : Benefit 10 % up (Unit:US$1000)

Year	Cost				Irrigation Benefit	Balance
	Construction	O & M	Replacement	Total		
1	2,821			2,821		-2,821
2	7,105			7,105	152	-6,954
3	8,708			8,708	377	-8,331
4	6,202			6,202	833	-5,369
50		252		252	2,651	2,399
51		252		252	2,651	2,399
52		252	109	361	2,651	2,290
53		252	623	875	2,651	1,776
54		252	437	689	2,651	1,962
55		252		252	2,651	2,399
	28,277	11,368	5,196	44,841	134,391	89,550
EIRR =	7.7%					

Table XI-II-9 Future Farm Budget of Each Farm Type (1/2)

(1) Case 1 : Applying of present coffee price (Unit : Kip 1000)

Priority Area	Upper Champi		Upper Tapoung			Upper Kapheu
Farm Type	Coffee	Coffee+Tea	Coffee+Vegetables	Coffee+Vegetables	Coffee+Vegetables	Coffee+Vegetables
Irrigated Field	Coffee : 2.7 ha	Coffee : 2.3 ha	Vege.-Up.C : 0.3 ha	Vege.-Up.C : 0.3 ha	Vege.-Up.C : 0.3 ha	Coffee : 1.6 ha
(Cropping Pattern)	- -	Tea : 1 ha	- -	- -	- -	Low.R.-Up.C. : 0 ha
Non-irrigated fields	- -	- -	Coffee 2 ha	Coffee 3 ha	Coffee 3 ha	
	- -	- -		Vegetables 0 ha	Upland rice 0 ha	
No. of Household	40 H.H.	186 H.H.	76 H.H.	160 H.H.	26 H.H.	431 H.H.
1. Gross Income	(4,455)	(4,110)	(1,520)	(2,256)	(1,997)	(2,888)
1-1 Farm Income	4,455	4,110	1,520	2,256	1,997	2,888
1-2 Non-farm Income	0	0	0	0	0	0
2. Production Cost	600	594	179	351	276	308
3. Net Income	3,855	3,516	1,341	1,905	1,721	2,580
4. Living Expenses	(1,443)	(1,443)	(1,075)	(1,443)	(1,443)	(1,443)
4-1 Food Items	820	820	623	820	820	820
4-2 Non-food Items	623	623	452	623	623	623
5. Net Reserve	2,412	2,073	267	462	278	1,137

Remarks : Future living expense level is classified into three type as satisfy, average in national level, and average in rural level, based on the data from Agricultural Sector Memorandum Report (IBRD, 1994)

(Unit : Kip 1000)

Priority Area	Lower Xe Set		Upper Tay-Un			
Farm Type	Lowland Rie	Lowland Rie	Coffee+Lowland R	Coffee+Lowland R	Lowland R	Lowland R
Irrigated Field	Low.R.-Low.R : 2.5 ha	Low.R.-Up.C. : 2.5 ha	Low.R.-Low.R : 1.2 ha	Low.R.-Up.C. 1.2 ha	Low.R.-Up.C. 2.5 ha	Low.R.-Fallow : 2.5 ha
(Cropping Pattern)	- -		- -	- -	- -	- -
Non-irrigated fields	- -	- -	Coffee 1.3 ha	Coffee 0.8 ha	- - ha	- - ha
	- -	- -			- - ha	- - ha
No. of Household	80 H.H.	320 H.H.	17 H.H.	48 H.H.	29 H.H.	71 H.H.
1. Gross Income	(3,000)	(3,100)	(1,769)	(1,690)	(3,100)	(1,500)
1-1 Farm Income	3,000	3,100	1,769	1,690	3,100	1,500
1-2 Non-farm Income	0	0	0	0	0	0
2. Production Cost	1,105	1,030	441	451	925	448
3. Net Income	1,895	2,070	1,328	1,240	2,175	1,052
4. Living Expenses	(1,443)	(1,443)	(1,075)	(1,075)	(1,443)	(958)
4-1 Food Items	820	820	623	623	820	623
4-2 Non-food Items	623	623	452	452	623	335
5. Net Reserve	452	627	253	165	732	95

Remarks : Future living expense level is classified into three type as satisfy, average in national level, and average in rural level, based on the data from Agricultural Sector Memorandum Report (IBRD, 1994)

Table XI-II-9 Future Farm Budget of Each Farm Type (2/2)

(2) Case 2 : Applying of future coffee price.

Priority Area	Upper Champi		Upper Tapoung			Upper Kapheu
Farm Type	Coffee	Coffee+Tea	Coffee+Vegetables	Coffee+Vegetables	Coffee+Vegetables	Coffee+Vegetables
Irrigated Field	Coffee : 2.7 ha	Coffee : 2.3 ha	Vege.-Up.C : 0.3 ha	Vege.-Up.C : 0.3 ha	Vege.-Up.C : 0.3 ha	Coffee : 1.6 ha
(Cropping Pattern)	- -	Tea : 1 ha	- -	- -	- -	Low.R.-Up.C. : 0 ha
Non-irrigated fields	- -	- -	Coffee 2 ha	Coffee 3 ha	Coffee 3 ha	
	- -	- -		Vegetables 0 ha	Upland rice 0 ha	
No. of Household	40 H.H.	186 H.H.	76 H.H.	160 H.H.	26 H.H.	431 H.H.
1. Gross Income	(2,714)	(2,627)	(1,256)	(1,815)	(1,556)	(1,856)
1-1 Farm Income	2,714	2,627	1,256	1,815	1,556	1,856
1-2 Non-farm Income	0	0	0	0	0	0
2. Production Cost	600	594	179	351	276	308
3. Net Income	2,113	2,033	1,077	1,464	1,280	1,548
4. Living Expenses	(1,443)	(1,443)	(958)	(1,075)	(1,075)	(1,443)
4-1 Food Items	820	820	623	623	623	820
4-2 Non-food Items	623	623	335	452	452	623
5. Net Reserve	670	590	119	390	206	105

Remarks : Future living expense level is classified into three type as satisfy, average in national level, and average in rural level, based on the data from Agricultural Sector Memorandum Report (IBRD, 1994)

Priority Area	Lower Xe Set		Upper Tay-Un			
Farm Type	Lowland Rie	Lowland Rie	Coffee+Lowland R	Coffee+Lowland R	Lowland R	Lowland R
Irrigated Field	Low.R.-Low.R : 2.5 ha	Low.R.-Up.C. : 2.5 ha	Low.R.-Low.R : 1.2 ha	Low.R.-Up.C. 1.2 ha	Low.R.-Up.C. 2.5 ha	Low.R.-Fallow : 2.5 ha
(Cropping Pattern)	- -		- -	- -	- -	- -
Non-irrigated fields	- -	- -	Coffee 1.3 ha	Coffee 0.8 ha	- - ha	- - ha
	- -	- -			- - ha	- - ha
No. of Household	80 H.H.	320 H.H.	17 H.H.	48 H.H.	29 H.H.	71 H.H.
1. Gross Income	(3,000)	(3,100)	(1,640)	(1,611)	(3,100)	(1,500)
1-1 Farm Income	3,000	3,100	1,640	1,611	3,100	1,500
1-2 Non-farm Income	0	0	0	0	0	0
2. Production Cost	1,105	1,030	441	451	925	448
3. Net Income	1,895	2,070	1,199	1,160	2,175	1,052
4. Living Expenses	(1,443)	(1,443)	(1,075)	(1,075)	(1,443)	(958)
4-1 Food Items	820	820	623	623	820	623
4-2 Non-food Items	623	623	452	452	623	335
5. Net Reserve	452	627	125	86	732	95

Remarks : Future living expense level is classified into three type as satisfy, average in national level, and average in rural level, based on the data from Agricultural Sector Memorandum Report (IBRD, 1994)