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3. KENNEDY GAVE GOOD RATING ON ALL ITEMS EXCEPT E, WHICH HE RATED ADEQUATE. DUE TO INTERNATIONAL TRAVEL, HE WILL NOT BE ABLE TO RESPOND DIRECTLY TO MISSION.

4. STEEN RATES THEM AMONG THE VERY BEST CONTRACTORS GIVING THEM GOOD OR VERY GOOD ON ALL ITEMS. THEY WERE VERY PROFICIENT IN PROCURRING ONE MILLION DOLLARS WORTH OF EQUIPMENT IN GUYANA PROJECT. QUALITY OF PERSONNEL FIELDED WAS OUTSTANDING. STEEN PRESENTLY ON SICK LEAVE, UNABLE TO RESPOND DIRECTLY. SHULTZ

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ENVIRONMENTAL PERSPECTIVE AND

AGRICULTURAL DEVELOPMENT IN

THE UPPER HUALLAGA

PERU

Evaluation prepared for USAID/Peru

Douglas J. Pool

May, 1981

Lima, Perú

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S C O P E

The purpose of this report is to evaluate the plan for coca reduction and or eradication and the alternatives for agricultural development in terms of integrated environmental management of the Upper Huallaga river Valley of Peru.

This evaluation, carried out during May, 1981, includes 6 field days of interviewing farmers and government officials, 2 overflights of the project area and 18 office days reviewing documents, discussing project alternatives with USAID officials and preparing the final report.

Specific terms of reference are:

1. Define the agro-ecosystem approach to agricultural planning and its application to the priority area.
2. Evaluate the actual and potential long term limitations on cattle production in life zones comprising the project.
3. Evaluate the existing and proposed land use in terms of compatibility with ecological and agronomic criteria.
4. Recommend a future program in agro-ecosystem design and implementation including data collection, research and training activities.

ISSUES AND CONCLUSIONS

1. Coca Substitution

The potential production area for coca in Peru is very large. Coca eradication in the Upper Huallaga, if successful, will increase prices and make illegal production more attractive, both on margins of this area and elsewhere. No proposed substitute crop will give farmers greater economic return than coca. The proposed agricultural development plant has the potential to replace an estimated 20% of the coca producing lands with appropriate annual and permanent crops. Livestock is an alternative use for level alluvial soils; however, those soils have a higher potential use determined by economic return. The remaining lands are too steep and should be managed for forestry or protection of valuable watersheds.

2. Lack of Technology

There is a chronic lack of technology transfer from experimental stations to the farm. Experimental research must be readily applicable to socio-economic and ecological conditions of the region. An adaptive on-the-farm research unit (similar to the North Carolina State Yurimaguas Experiment Station) should be established for proposed crop or animal production systems not yet proven on a commercial scale.

3. Target Group

Farmers in the project area can be collectively categorized as land speculators, small scale, part-time, and opportunists. However, it is difficult to characterize individual farmers since coca

cultivation masks the real economic situation emphasis of project investment and agricultural extension has the tendency to focus on medium to large scale farms disregarding the small farmers who will be most affected by the coca eradication program. These small farmers are capable of incorporating appropriate technology and input to improve family nutrition as well as production for regional and extra-regional markets. A variety of cropping and small animal production systems should be developed, thus avoiding the tendency to promote agricultural specialization where it is not appropriate due to ecological constraints or the capacity of the farmers to rapidly absorb new technologies.

4. Deforestation

At the regional level and estimated 50,000 ha. will be incorporated into production of annual and permanent crops corresponding to appropriate land capability. An estimated 10% of natural forest will be destroyed in land clearing. The remaining lands are already planted or in the early stages of natural forest regeneration. The majority of the forests are on sloping soils designated for managed production or watershed protection.

5. Cropping System

Once established, perennial crops may be preferred over annuals since they provide greater net returns per person day. Annual crops provide immediate cash flow, but are risky because of uncertain yields and fluctuating markets. A sustained yield cropping system should give priority to combinations of annual and perennial crops which naturally recycle nutrients, provide natural defense to insect pests or otherwise minimize the use of fertilizer and pesticides.

6. Livestock Production

The Upper Huallaga is not competitive with other meat producing areas of Peru which have large extensions of natural pastures that result in lower costs or production. The fertile alluvial soils of the Upper Huallaga should be cultivated to intensive annual crops rather than planted to pasture and devoted to livestock production which is a longer and potentially irreversible investment commitment. On poor sloping soils, the ecological limitations will lead to poor animal production, impoverished or degraded pastures and soil erosion. Minor livestock including pigs, ducks, milk cows, etc. should be considered in raising the nutritional level of rural families. Swine production should be considered utilizing yuca, plantains, rice hulls, and other locally available by-products.

7. Road Construction

New penetration and secondary road construction should be concentrated in areas of prime agricultural lands. It will be impossible to protect watersheds and forest reserves from spontaneous colonization if new roads are constructed into areas marginal, or poor, steeply sloping soils. Initial project development should be focused on lands and farmers immediately adjacent to the Tingo Maria-Tocache highway who have already eradicated coca.

8. Environmental Management

Evaluation of past colonization in the Upper Huallaga shows how insufficient planning results in over exploitation of resources, poor return on investment, and undesirable environmental impacts on the region

which are difficult to overcame. Selection of cropping, livestock and agro-silvicultural systems needs to be based on land capability, cultural acceptability, availability of labor, ecological constraints, profitability, and a marketing infrastructure. The best sustained agricultural production system is also the most ecologically sound management of regional ecosystems.

I. AGRICULTURAL BACKGROUND

A. TRADITIONAL AGRICULTURE

Shifting Cultivation: The Upper Huallaga river has been colonized in the shifting-cultivation form of traditional agriculture where short-term cropping cycles are interspersed with longer period of forest fallow. Generally, the forest is cut and burned and immediately planted with corn or other annuals which take advantage of nutrient releases by burning and become well established prior to severe weed competition. Frequently, newly felled forests lands are cropped with corn, rice, and yuca for only one or two cropping cycles and then abandoned due to decreased yields resulting from nutrient exhaustion and increasing weed and pest competition.

Tropical soils are generally poor in mineral nutrients. Conditions of high temperature and high humidity result in the rapid conversion of organic materials to their soluble mineral form which are highly susceptible to leaching from the soil by torrential rains. These mineral nutrients are continually recovered and recycled within the forest ecosystem. However, when the forest is felled the nutrient cycle is broken, and the soil suffers a dramatic loss in fertility in only a couple of years.

When rapid natural forest regeneration occurs the traditional agricultural system conserves the closed nutrient cycle and long-term soil fertility. However as a result of increasing population pressure on land increases, the cropping cycle is lengthened and the fallow period

is shortened, resulting in decreasing soil fertility and decreasing yields. Intensification of cropping within the shifting agriculture system tends to impoverish humid tropical soils as a result of excessive nutrient losses and soil erosion. Careful management, in combination with increased utilization of fertilizers and pesticides, is required to realize sustained agricultural productivity under intensified cropping.

Semi-permanent agriculture: Under circumstances of semi-permanent agriculture the shifting cultivator may interplant the annual crops with plantains, cacao, coffee, or other tree crops, thereby permitting the perennial crops also to take advantage of the available nutrients and reduced weed and pest competition. While the annual crops are providing food and a cash income during the first year after forest clearing, the permanent crops are becoming established and will provide ground cover and shade, thus substituting a food forest for successional stages of natural forest regeneration.

Perennials such as plantains can be harvested within a year after planting, whereas cacao, coffee, or forest trees will take 3-5 years to reach first harvest. The system of combining annuals and perennials provides a short-term source of income (annuals), imitates the natural forest succession, minimizes labor and material input for weed or pest control, and establishes long-term production (perennials) at low initial cost.

B. ECOLOGICAL CONSTRAINTS

It is important to emphasize that there are many areas of the Upper Huallaga that are not appropriate for a continuous economic agricultural activity due to the following ecological restrictions:

1. High precipitation and humidity.
2. Lack of a definite dry season encourages the propagation of insects and diseases, and also results in excessive moisture during harvest periods for annuals such as corn and rice.
3. Several types of sloping land formsare susceptible to severe erosion and land-slippage if the natural forest cover is removed.

The project area encompasses three life zones, all of which are classified as humid or perhumid (ONERN, 1976). Humid climates are characterized as areas where evapotranspiration is 50% to 100% of the total annual precipitation; in perhumid climates, the evapotranspiration is only 25% of the total annual precipitation (Holdridge, 1967).

In the priority area five months of the year have less rainfall averaging approximately 130 mm per month; the other seven months of the year average more than 300 mm precipitation monthly.

As one moves north along the Huallaga Valley, precipitation decreases. The Upper Huallaga (Tingo Maria, 3325 mm/year) is wetter than Tocache, 2408 mm/year or the Lower Huallaga (Yurimaguas, 2110 mm/year) (Figure 1). Likewise the monthly precipitation in Tingo Maria is always in excess of the evapotranspiration, whereas Tocache has a brief dry season, and Yurimaguas an even longer dry season.

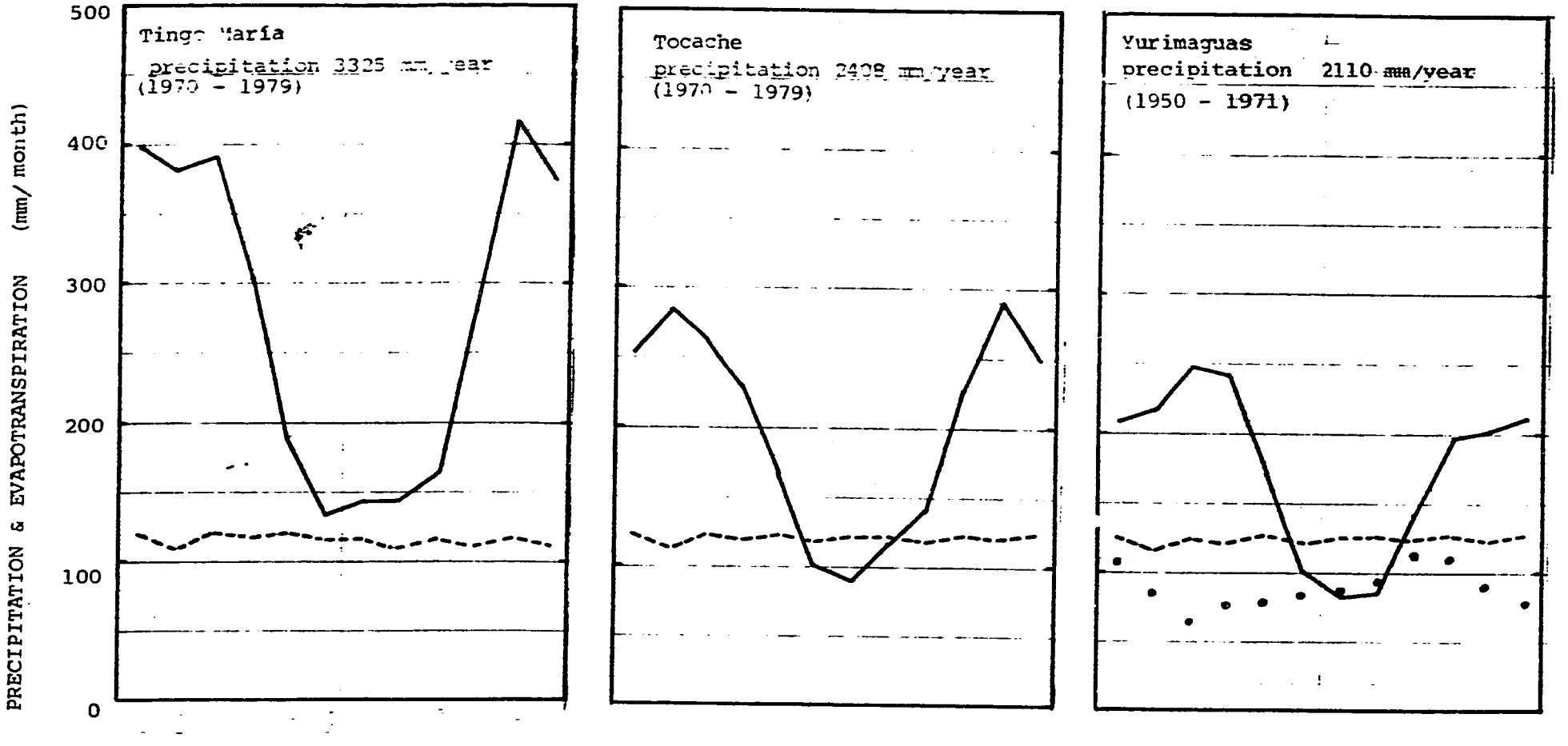


Fig. 1 : Comparison of average monthly precipitation (solid lines) and evapotranspiration (dashed lines) at Tingo María, Tocache, and Yurimaguas, Peru. Dots show measured pan evaporation at Yurimaguas, 1978 - 1979.

Because of the variation in climatological conditions, specifically decreasing rainfall, there is a tendency for crop production conditions to improve moving north along the Huallaga River Valley. This is reflected by increasing net returns per hectare. For example, in the subzones of Uchiza and Tocache the profitability of annual crops is greater than Tingo Maria and Aucayacu due to higher yields (FDN, 1980).

As a simple warning, in planning the agricultural development in the Upper Huallaga, it must be recognized that climatological conditions are not identical. This means that agricultural technologies which have proven successful in drier portions of the Huallaga Valley will necessarily be successful in the more humid zones.

C. EXISTING CONDITIONS

Agricultural conditions in the Upper Huallaga can be summarized as follows:

1. The level soils of the valley are cultivated primarily in permanent crops (bananas, citrus, pastures), or have been abandoned to natural forest regeneration. Exceptions to this pattern are found where small areas of fertile soils are intensively devoted to annuals such as rice, corn, and beans. In contrast, the sloping soils of the surrounding terraces and hills are cultivated in a patch-work pattern of annual and perennial crops (including coca), and natural forest. Further east and west away from the Huallaga River valley floor, steeply sloping soils remain predominant in forest cover. The farms in this zone focus on coca production, since their remote location makes transport of low-value food crops uneconomical. Remote location also reduced the risk of police intervention. Subsistence crops are often, but not always, planted on these remote farms.

2. The more fertile and level alluvial soils have already been occupied through the original land titling scheme. However, an estimated 80% titled parcels are uncultivated or abandoned. Production within the original colonization area can be intensified by introducing intermediate level technology which includes small machinery, fertilizers, and pesticides. Further, subdivision of existing lots would reduce farm sizes to an uneconomic level. A more realistic approach to the land tenancy problems would be to facilitate the land transfer process permitting acquisition and/or consolidated of land holdings by bonafide farmers.

3. It may be necessary to redefine some farm boundaries to establish economic units. Farms are presently delimited by straight block-shaped boundaries, and may include poorly drained, nutrient poor, or sloping soils rendering the farm unit uneconomic.

II. DESCRIPTION OF THE AGROECOSYSTEMS

A. Shifting Cultivator

There are numerous small farmers cultivating 3-5 ha. in the traditional system of shifting agriculture. Those farmers who obtain land title usually move quickly to permanent crops such a cacao, coffee, bananas, and citrus after the initial forest clearing. Typically yields are not very high due to limited fertilizer application. The dooryard subsistence crops and small animals including guinea pigs, ducks, chickens, and pigs augment the family diet, whereas a combination of annual and perennial cash crops are marketed in Tingo Maria or to truckers. This type of farmer is a survivor and has adapted his cropping pattern to the natural environment as well as the local infrastructure of markets, labor supply, credit, availability, etc.

B. Small-Scale Farm

A few farms generally 5-20 ha. in size and are situated on level fertile soils. These farms focus on the intensive cultivation of rice, corn, and some soybeans and require a higher level of management than the shifting cultivator. Careful management of drainage problems, soil compaction, and weed control is necessary on these intensely cultivated farms. In addition to the annual crops which are the principal source of income, this group of farmers also produces permanent crops (coffee, plantains, cacao) for sale and small animals for domestic consumption. This group of farmers could capably incorporate new intermediate level technologies to present operations and expect favorable increases in net returns.

C. Livestock Farmers

The livestock producer has pasture ranging in areas from 15 to 40 ha. Unfortunately, numerous pastures have been situated in low areas with a high water table and poorly drained soils. Poor pastures and consequently poor animal production seem to be a frequent complaint of these livestock producers. In the entire project areas there are an estimated 23,265 head of livestock and approximately 31,000 ha. of pasture, with 80% of the pasture areas in native grasses (torourco) (FDN, 1981). Carrying capacity of pastures is estimated to average less than one head per hectare.

D. Cocaleros

Coca is a perennial shrub which is grown on sloping soils with good drainage throughout the Upper Huallaga area. Because of the illicit nature of much of the production, it is difficult to characterize the coca farmer. Information from farmer interviews is unreliable concerning this crop, and local government officials have diverse opinions concerning the true ownership patterns of the cocaleros. It appears that within the area subdivided and titled as the result of previous colonization projects, the coca fields belong to the title-holder. However, most of the coca is produced on non-titled lands. On the basis of interviews with local government officials it appears that there is a high proportion of absentee ownership of these coca plantings; the crop being tended by hired labor.

It has been estimated that 30,000 ha. of coca is planted in the Upper Huallaga area (Strug, 1981; USAID 1978; FDN, 1981). Virtually

all of this production occurs on sloping soils (Table 1). Only occasionally is the coca interplanted with other crops, with tree crops (e.g. oranges) being planted in coca fields which are being withdrawn from production. The opportunity for re-planting of fields which have been in continuous coca production for a number of years is constrained due to the tendency of coca cultivation to severely degrade the soil. After a number of years coca production fields are characteristically eroded and low in nutrients, making the establishment of alternative crops unattractive due to the effort required for transport to the nearest road.

Coca producers within the areas of titled land parcels tend to plant coca as part of a diversified farming system. On the other hand, farms which are more remote from the road and which are not on titled land appear to plant coca as a monoculture, with only limited production of subsistence crops for household consumption. Reliable information on the ownership of these numerous remote coca farms is not available. They may be second operations run by farmers in the original colonization scheme; they may be financed by "opportunists" from the local commercial sector or from outside of the region, or they may be privately operated by former landless laborers.

TABLE 1 - ESTIMATED COCA PRODUCTION

(Distrito Agropecuario, Tingo Maria, 1981)

Coca Production	Projected		
Land Type	Land Use a/	Area (Ha.)	%
Level, mechanizable	intensive annuals	3,000	10
Level to slightly sloping	permanent crops	9,000	30
Slightly to moderate sloping	pasture/permanent crops	4,500	15
Moderately to steeply sloping	forestry or protection	13,500	45
ESTIMATED AREA IN COCA		30,000	100

a/ An estimated 20% of the present coca producing lands can be substituted with annual and permanent crops (F.D.N., 1981).

The remaining agricultural lands are peripheral to the project area.

III. EVALUATION OF LIVESTOCK POTENTIAL IN THE HIGH SELVA

The intensification of livestock production in humid lowland tropics has received much attention since there are large extensions of land available. However, these lands are not necessarily appropriate for livestock production. The constraints to successful livestock in the Upper Huallaga are summarized as follows:

1. Low meat production (150 Kg/ha/year) results in marginal economics under even ideal conditions.

2. Degraded pastures due to weed invasion results in poor animal nutrition. The good growth of improved pastures based on fertilization or rapid growth following forest clearing and burning lasts approximately four years. As pasture quality is reduced the carrying capacity is reduced from 2-3 head per hectare to less than one head per hectare. In the Upper Huallaga there are many abandoned fields where planted pasture has completely disappeared and natural grasses (torourco) have invaded the area due to loss of soil fertility or conditions of poor drainage.

3. Grazing in areas of high rainfall results in costly programs of animal health and present potential soil compaction problems.

4. High cost of land clearing and fencing need to be calculated as long term expense.

5. Research results for livestock production from El Porvenir Experimental Station near Tarapoto have been inferred to be applicable to the Upper Huallaga. Growing conditions for livestock and pasture are much more favorable in the El Porvenir area because it receives less

than 50% of the total rainfall of the Upper Huallaga project area.

Several livestock specialists have claimed that the pastures in the Upper Huallaga have deteriorated due to poor management including lack of fertilization or supervised maintenance. However, poor animal production and degraded pastures are more likely due to the ecological limitations, primarily the humid environment and poor soils. In conclusion, the project area is not competitive with other meat producing areas with large extensions of natural pastures which have lower costs of production.

IV. ASSESSMENT OF PROPOSED ACTIONS AND ALTERNATIVE

A. CROPPING SYSTEMS

The proposed crop and livestock plan consists of 50,000 ha of annuals and perennials, 12,000 ha of African oil palm and 10,000 ha of pasture to be incorporated during a five to seven year period. Based on incomplete soil studies and agency estimates there is sufficient land available for agricultural development (Table 2 and 3).

The estimates of land available for project incorporation have been based on the following constraints:

1. Previous agricultural development projects in Peru have successfully incorporated only 2000 ha of new lands per year. However, the Upper Huallaga has an infrastructure (roads, government support agencies, etc.) established that will allow for rapid incorporation of appropriate areas if incentives and inputs are available as prescribed.

2. There are over 6,000 farmers in the project area (Table 2) of which an estimated 80-90% will be incorporated to the project at the end of five years. It is imperative that during the first stages of project implementation that appropriate soils, extension, credit and other necessary inputs be well-planned in order to insure the future success of the project. Happy farmers realizing a profit will be the best promotors of an agricultural development program.

3. Present development plans are limited by the existing of land parcelization. The land tenancy policy of the project areas must be liberalized in order to give the landholders the freedom to buy, sell, or exchange their lands.

Table N° 2 : Summary of Farm Characteristics in Upper Huallaga [a]

Zone	Total Area (ha.)	Total Area classified as agricultural	Total Cultivated Area	Total No. Farmers	Average Farm size (ha.)	Area Annual crop per farm (ha.)	Area permanent Crop per farm, (ha.)	Area Pasture per farm (ha.)
Aucayacu	120,941	16,123 [b]	10,309	689	22-26	3-15	3	4
Total Upper Huallaga Project	1,052,218	79,350	33,000	6360-6480	8-28	4	3	6

a/ Estimates based on surveys conducted by Ministry of Agriculture in 1978 and F.D.N., 1981

b/ Sum of Class II-III, V Lands (F.D.N., 1981).

TABLE 3 - SUMMARY OF AREAS AVAILABLE FOR AGRICULTURAL USE IN THE UPPER HUALLAGA (F.D.N., 1981)

Areas		Hectares
Area of mapped soils in Class II-III, V a/		98,570
Agricultural area of Tingo Maria (Zone 2) b/		7,780
Occupied Lands c/		
ENDEPALMA (Oil Palm)	6,000 ha.	
Palmas del Espino (Oil Palm)	10,000	
Pacocha (Oil Palm)	6,000	
COPSA	5,000	
TOTAL	27,000	27,000
Estimated Available Land for Agriculture d/		79,350

a/ Class II and III lands can be utilized for intensive annual crops; whereas Class V lands include soils with poor drainage, slopes, and poor fertility. Part of Class V lands would be appropriate for irrigated rice.

b/ Estimates based on preliminary crop plan for annual and perennial crops (FDN, 1981).

c/ Estimates based on interviews with Ministry of Agriculture officials in Tingo María.

d/ Dr. Hugo Villachica proposed a crop plan of 30,000 ha. with an additional 10,000 ha. proposed for livestock development (FDN, 1981). Proposed crop plan has an estimated 64,750 hectares of annuals, permanent tree crops, and African oil palm.

B. CROP SELECTION

Crops that are ecologically adapted and economically beneficial under existing conditions in the Upper Huallaga include rice, cacao and plantains and to a lesser extent African oil palm. Additional annual crops and permanent tree crops are and will be planted, but are either subject to fluctuating markets or have not been proven commercially. Portions of the proposed crops are already established and require upgrading and maintenance (cacao, coffee, citrus) while the widespread planting of rice will be established for the first time on abandoned or under utilized lands (Table 4).

Soybeans and peanuts have been recommended as rotational crops with rice, but these are recently introduced crops that have little commercial experience especially in the high rainfall areas of the Upper Huallaga. Since harvesting of either soybean or peanuts requires a dry season, these crops may be more successful if planted further north toward Tocache. Jute may be considered as an alternative rice rotation crop.

Additional crops that were not considered in the preliminary analysis but are adapted to the existing ecological conditions and should be considered include pejebeye palm (heart of palm and fruit), Euterpe palm, aguaje, citrus, and other tropical fruits.

Based on ecological constraints, project goals, and existing socio-economic conditions the following guidelines should be considered:

1. Initiate the crop production plan in the priority zone until more detailed information is available to locate appropriate livestock producing areas.

2. Emphasize rice, cacao, and plantains before encouraging implementation of non-adapted or non-commercial crops.

3. Include non-conventional crops (i.e., palms) and small animal production in the adaptive on-the-farm research program.

TABLE 4: SUMMARY OF PROPOSED CROPS FOR THE UPPER HUALLAGA

(Revised 6-1-81) a/

CULTIVO	ZONA					TOTAL	
	1	2 b/	3 (ha.)	4	5	HA.	%
Arroz c/	6000	4000	2000	2000	8000	22000	44.0
Soya d/	(3000)	(2000)	(1000)	(1000)	(4000)	(11000)	(22.0)
Maíz	1400	600	1700	600	1700	6000	12.0
Yuca	500	500	500	200	300	2000	4.0
Cacao	2300	1300	1500	500	900	6500	13.0
Plátano	2100	750	1200	300	650	5000	10.0
Café	700	2500	-	-	300	3500	7.0
Cítricos	400	500	-	100	-	1000	2.0
Piña	350	300	-	50	-	700	1.4
Papaya	200	150	-	50	-	400	0.8
Achiote	400	100	300	100	200	1100	2.2
Yute	450	1000	200	-	150	1800	3.6
Oil Palm			(6000)		(12000)	(18000)	
TOTAL (ha)	14800	11700	7400	3900	12200	50000	100.0

a/ Preliminary estimates based on data provided by F.D.N., 1981; Fullerton, INTSOY-Peru. Areas may have to be adjusted based on updated land capability prepared by Aubert.

b/ Zone 2 includes estimates for Monzon Valley.

c/ Upland and paddy rice combined.

d/ An estimated 11,000 ha of soybeans could be rotated with rice.

Note: There is a law prohibiting continuous rice in the selva due to increased pest control problems. Consequently, rotational rice should be encouraged until further investigation of continuous rice is conducted.

Mayor Crops

The proposed cropping plan is divided into major and minor crops (Table 4). With the exception of soybeans, major crops are categorized as ecologically adapted, marketable, and currently produced in the area.

Caution is needed in planning the crops to be rotated with irrigated rice. Although corn and soybeans could both serve as rotation crops, high rainfall could limit soybean production due to the lack of a definite dry season for harvest and drying. Further north, in Tocache where the rainfall is less than the priority zone, soybean production may be more successful.

Currently an estimated 250 ha of soybeans are produced in the Upper Huallaga (Fullerton memo, May, 1981). Furthermore, farmers interviewed said they would consider producing soybeans if there was a ready market. Consequently, before planting large areas, further information is needed concerning markets, and the feasibility of constructing an oil extraction plant and related facilities for preparation of soya-based foods.

Cacao is highly adaptable to the climate and soils of this area and is one of the permanent crop to be encouraged in the project. It is already widely planted in the area and is a highly marketable product.

When grown under partial shade, cacao requires less intensive management and less fertilizer. In the Upper Huallaga, high timber species, pejebeye palm, and/or leguminous native forest species can be used for shade. Present yields in the area are approximately 400 kg/ha; with improved management yields could be expected of 800 kg/ha. Fermentation is the most important step in processing high quality chocolate, according

to Dr. Pablo Alvim. Before drying, wet beans require five days of fermentation. Considering the high cost of fossil fuels, wood burning fueled driers need to be considered for this project. This type of drier is currently used in Brazil.

Production system for the major crops should include low to medium level technology such as extension and credit, for existing farmers. The target group will include a large number of small (10 ha) farmers and to a lesser extent larger farmers (50 ha).

Technology might include small tractors and related equipment in the 14-25 HP range which are readily adapted to small scale operations and currently being tested by farmers near Yurimaguas. Project planning should avoid promoting government administered machinery pools and encourage individual farmers to purchase their own machinery and operate in cooperation with neighbors.

Minor Crops

The minor crops can be grown in the priority area, but lack a steady market before production is initiated on a commercial scale. Citrus, papaya, yuca, and other tree crops could be produced on a larger scale if agro-industrialization can provide the outlets. Consequently, production of minor crops should commence in the second or third year of project implementation in order to research market and industrialization possibilities. It is strongly recommended that an adaptive research program should consider non-conventional crops such as pejebeye, aguaje, jute, etc., as potential for commercialization.

G. CROP YIELDS

Under the present conditions crop yields are low due to utilization of areas not appropriate for agriculture or crops not adapted to high rainfall conditions. The yields proposed by the project (FDN, 1981) (Table 5) are realistic assuming the technology transfer of utilizing fertilizer and pesticides is successful. Summary of proposed crops, planting and harvest dates, limiting factors and crop scheduling is given in Table 6 and Figure 2.

D. INTEGRATED PEST MANAGEMENT

Insect, disease, nematodes, and weed pests will require the discretionary use of pesticides if acceptable economic yields are to be obtained. There are three characteristics which might provoke such conditions.

1. Environmental conditions are favorable for pest and disease proliferation.

2. Under the proposed project considerable more lands will be intensively cultivated (in space and time) in a monocultural system as compared to the widely dispersed intercropped, polycultural planting system of shifting agriculture. The more intense cropping systems will only be incorporated a the individual farm unit, but will also form part of the regional patter particularly concentrated in mechanizable areas of fertile alluvial soils on the valley floor.

Where appropriate, non-chemical control methods will be incorporated into the proposed cropping system to the extent that such technology and experience are available. This would include the use of hand weeding or hoeing, water level management (particularly in rice), and intercropping to control weeds; resistant varieties for plant pathogens and polycultural

Table 5: Yield Estimates of Proposed Crops (F.D.N., 1981)

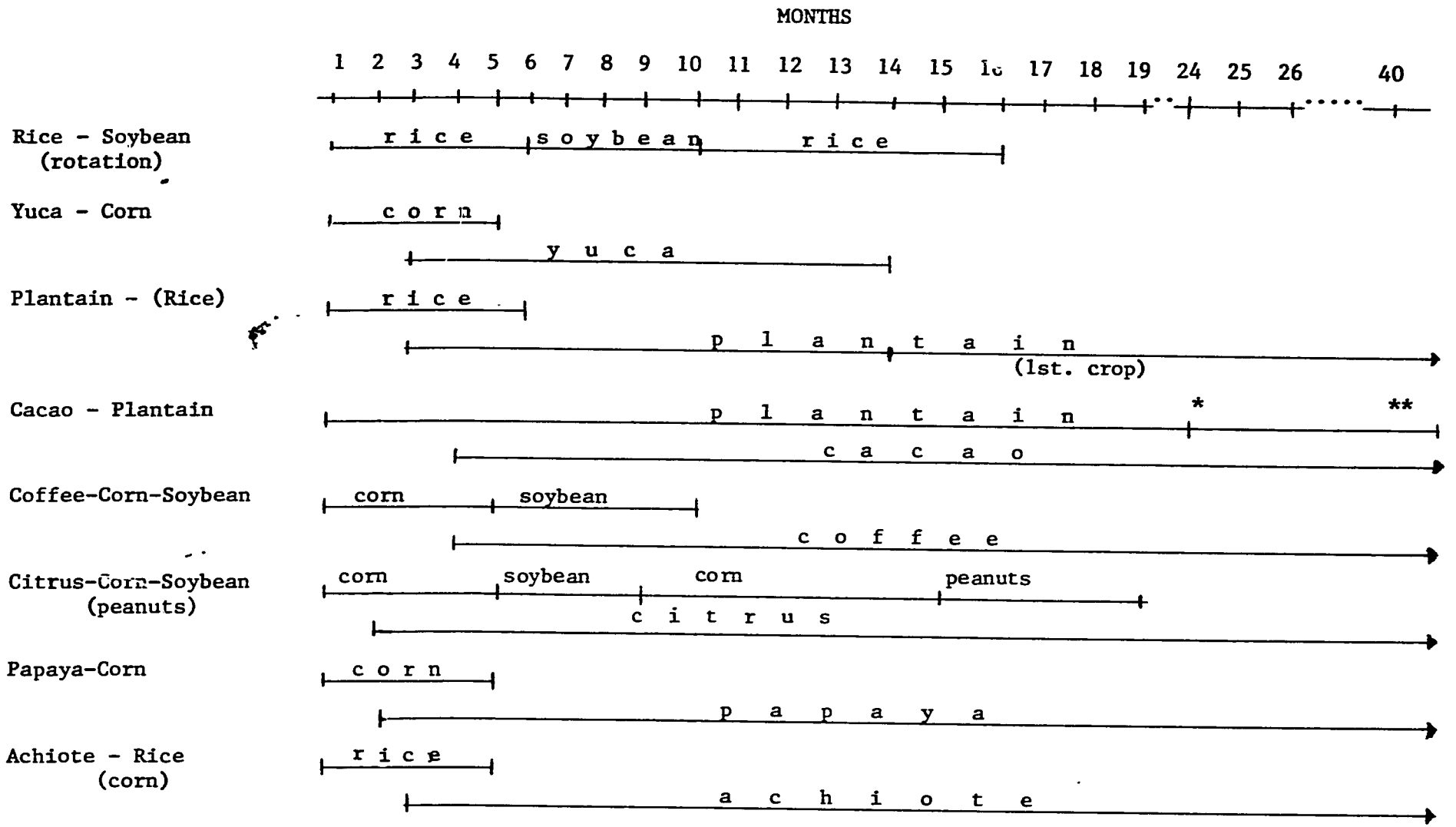
CROP	UNIT	CURRENT YIELDS	PROJECTED YIELDS a/
Rice	T/ha.	1.5	3.0
Corn	T/ha	1.4	3.2
Soybeans	T/ha	---	2.0
Plantain	T/ha	5.9	9.0
Coffee	Kg/ha.	447	1375.0
Cacao	Kg/ha.	237	800.0
Citrus	T/ha.	---	25.0
Yuca	T/ha.	8.4	20.0
Peanuts	T/ha.	---	3.5
Achiote	T/ha.	---	2.0
Jute	T/ha.	---	2.0
Pineapple	T/ha.	---	12.0
Papaya	T/ha	---	26.0
Pejebeye	- no data -		
Pigeon Peas	- no data -		

a/ Yield estimates for inundated rice may reach as high as 5-6 T/ha. (Fullerton-INTSOY, 1981 and P. Sanchez, personal communication).

TABLE 6 - SUMMARY OF PROPOSED CROPS, PLANTING AND HARVEST SEASONS, YIELDS AND LIMITING FACTORS (F.D.N., 1981)

Crop	Plant	Harvest	Limiting Factors	Comment
Rice/Corn	Oct.-Nov.	Mar.-Apr.	low yields	several areas appropriate for paddy rice
Soybeans	April-May	July-Aug.	humid climate	limited commercial-scale experience
Yuca	intercropped anytime	9-11 mos.	limited market	need to consider industrialization for pelleted feed and flour
Plantain/ bananas	anytime	12 months	limited market	industrialization potential for flour
Coffee	Oct.-Mar.	Apr.-June	disease	prices subject to market fluctuations
Cacao	-	concentrated in June-Aug.	low yields, black pod, low quality	improved fermentation would result in higher quality cacao
Arican oil palm	-	3 yrs.	need large areas	industrial scale, currently operating
Pineapple	-	-		well adapted to acid soils
Achiote	-	-	limited market	need market research

FIGURE 2: CROPPING SCHEDULE AND SEQUENCE FOR ANNUAL AND PERENNIAL CROPS



* Partial Elimination
** Total Elimination

cropping system which take advantage of natural predators of insect pests.

Pest build up can also be expected in stored grain but can be controlled using fumigants and experience from other grain storage centers in Peru. An alternative to avoid stored grain pests is to immediately move the grain out of the project area after harvest, thus reducing the need for large storage facilities.

E. MAJOR AND MINOR LIVESTOCK

Livestock: The proposed livestock plan proposed the establishment of 500 units of 20 ha each to produce double purpose (meat and milk) cattle. The exact location of this 10,000 ha of pasture has not been identified. The areas must be carefully selected in order to avoid soil compaction. Since the entire Upper Huallaga is extremely wet, areas with steep slopes or poorly drained soils must be avoided. In addition pastures established on Class II or III soils would be underutilization of the soils resource. The best pasture soils are also those same areas considered for intensive rice production. Consequently, the only appropriate pasture areas are terraces of soils with less than 15% slope.

Further northward toward the Huallaga Central or Tarapoto would be a natural area much more conducive for livestock production since that area receives less than 50% of the rainfall that falls near Tingo Maria.

An additional constraint to livestock production is the criterion that pastures need to be located next to accessible roads since milk has to be collected twice daily. Given the limited success of livestock production in the areas, is recommended to carefully follow the land capability classification in selecting areas for potential development.

Pigs, chickens, ducks: Although there has been little planning effort to increase small animal production, there exists a potential to utilize by-products such as rice hulls, or excess production of citrus, yuca or plantains. There are two distinct levels of production that need to be considered in project planning. The first is designing a project that will help raise the level of protein in the diet of the small scale farmer. Pigs could be left free to consume yuca, plantains, and any household garbage that is available. Likewise chickens eat insects and rice and corn that is spilled around the patio but do not necessarily need to be fed expensive imported concentrates. Ducks, naturally adapted to wet climates, could live on poorly drained or depressional areas. Any combination of raising a small number of pigs, ducks, chickens would improve the diet and any exces production could be sold to neighbors or marketed locally to Tingo María.

The second type of project should consider swine production on a commercial scale utilizing by products and feeds produced in the area. There has been very little adaptive research to utilize pelleted yuca leaves, citrus waste, or rice hulls as a feed source for livestock or small animals.

V. REFERENCES

Fundación para el Desarrollo Nacional. 1980-81. Estudio Preliminar del Proyecto Rural Integral del Alto Huallaga, Vol. 1 - V, Lima. (AID Contract No. 527-420/T)

Holdridge, L.R. Life Zone Ecology. Tropical Science Center, San José, Costa Rica. 1967.

ONERN. 1976 Mapa Ecológico del Perú, 146 pp. Lima.

Servicio Cooperativo Interamericano de Fomento. Evaluación e Integración del Potencial Económico y Social de la Zona "Tingo María-Tocache", Ministerio de Fomento y Obras Pública, Lima, 1962.

Strug, D.L.; and C. Fonseca. An Analysis of Coca Leaf Cultivation in the Upper Huallaga Valley of Peru. 1981. (AID Contract No. 527-0166-C-00-1021-01)

USAID. 1978 Coca Crop Production and Reduction in Peru Phase I; Coca Crop Substitution and Control in Peru Phase II (AID Contract No. 136-00-04)