OUR DETERIORATING UPLANDS AND WHAT CAN WE DO ABOUT IT

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Much has been said of the deteriorated state of our upland areas and the reasons for its insidious expansion (Aspiras, 1978; Domingo, 1978; Sajise, 1979; Cool, 1980). These areas are characterized as generally having slopes greater than 18%, dependent on rainfall, remote, impaired in hydrology and nutrient status, and low in productivity. With these conditions, an integrated approach to improve these areas is necessary, considering the prevailing socio-economic and bio-physical conditions.

The Upland Hydroecology Program (UHP) of the University of the Philippines at Los Banos, during the last three years, has blended the expertise of an interdisciplinary team of 21 scientists to focus their efforts toward the understanding of this "ecological leprosy" of Philippine environment. This is based on the premise that if the uplands are not protected, the lowland and aquatic ecosystems will soon collapse. In the face of burgeoning human population, this will prove more catastrophic in the long run than the energy crisis.

One major thrust of UHP is the study of upland occupancy as it relates to the plight of the small upland shifting cultivators branded as "kaingeneros", who are considered instrumental in the degradation of the upland areas. But with the population pressure and the global dwindling of renewable and non-renewable resources, our present society would be forced to recognize *"kaingeneros"* as part of the "cultural majority" and the uplands as the Shangrila (or Hell?) of the future.

This paper will attempt to bring together the information gathered by UHP which tends to clarify and reiterate some interrelationships of *institutional, economic* and *cultural* factors which enhance bio-physical changes in upland areas, eventually leading to its degradation. Toward this end, suggestions on changes and possible strategies which can possibly reverse the present degenerative trend of upland areas in the country will be enumerated.

Information were derived from five case studies of upland communities of Puting Lupa, Calamba, Laguna; Bo. Villarica, Pantabangan, Nueva Ecija; Ikalahan Cultural Community, Imugan, Nueva Vizcaya; Buhi, Camarines Sur and; Hamtik, San Jose, Antique. These different upland areas represent different ethnicity patterns, cultural, economic, climatic and bio-physical conditions.

Status of Upland Production System

Generally, most types of upland production systems in the country today enhance depletion of soil nutrients, cause impairment in water and nutrient balance which, overall, result in declining farm productivity and expansion of marginal areas. This soil nutrient depletion process resulting from excessive soil erosion and removal of plant biomass is the reason for the occurrence of natural fallow periods in upland areas. Increasing population and upward migration of people threaten to shorten this natural fallow period which will consequently result in imbalance of natural carrying capacity of upland areas (Rice, 1979). Pacardo and Samson (1979) reported an annual soil loss of 10 tons per hectare in a kaingin area at Mount Makiling, Puting Lupa, Calamba, Laguna (Table 1).

Table 1. **Average soil erosion (kg/ha) in five ecosystems and three slopes (Pacardo and Samson, 1979).**

ECOSYSTEM[1]	SLOPE (%)			
	36	50	70	Mean
OK	19,701.70	4,864.54	7,167.38	10,577.87
NK	12,691.74	6,671.95	9,937.40	9,657.03
SF	60.77	169.53	243.15	157.82
PF	83.12	631.39	1,547.09	753.87
G	300.99	140.11	78.30	173.13
Mean	6,657.66	2,495.50	3,794.66	

1. Run-off is greater in grassland than PF. But erosion in PF > G.
2. Run-off in G > SF and PF; but erosion G < PF.
3. In grasslands, erosion decreased with increasing slope. In forests, run-off and erosion increased with slope. However, the absolute values are still very small compared to *kaingin* system.

[1] OK refers to old kaingin;
NK refers to new kaingin;
SF refers to plantation forest planted with *Gliricidia sepium* and *Leucaena leucoceophala*

In the same area, upland cover consisting of cogon-talahib *(Imperata-Sacaharum)* grass, secondary forest and ipil-ipil-kakawate *(Leucaena-Gliricidia)* forest plantation gave soil erosion values of only 0.17, 0.16, and 0.75 tons per hectare per year of sediment load respectively. The same study also reported that soil erosion in a *kaingin* area is highly correlated to amount of total rainfall and soil moisture conditions. This means that *kaingin* areas with high rainfall and soil moisture conditions are more erosion-prone than areas which are relatively dry and with relatively lower total rainfall amounts (Table 2). Erosion is also enhanced by the steep slopes and loose soil structure.

Table 2 **Significant correlation coefficients (r) of runoff, with various erosivity indices (Pacardo and Samson, 1979).**

Erosivity Index		**Slope (%)**	r
1.	Rainfall amount (A)	36	0.68
		50	0.85
		70	0.72
2.	Max. intensity (I_m)	36	–
		50	–
		70	–
3.	Max. 30-minute intensity	36	–
		50	–
		70	–
4.	Soil moisture (M)	36	0.43
		50	–
		70	0.42
5.	$A \times I_m$	36	0.55
		50	0.66
		70	0.57
6.	$A \times I_{30}$	36	0.70
		50	0.63
		70	0.52
7.	A x M	36	0.81
		50	0.85
		70	0.74

The cropping/farming system practiced by upland farmers (farmers tilling hilly lands) and the cultural practices associated with this system determine the degree of soil erosion or degradation of upland *(kaingin)* farms. The upland farmer usually plants 40-50 varieties of crops, which could be classified as annuals or perennials and cash or subsistence crops (UHP Annual Report, 1977; Bennagen, 1977; Schlegel, 1979). The *annual crops* have rapid turnover rates since the planting to harvesting period is short. However, annual crop production generally lacks the permanency of cover offered by perennials which prevent soil erosion. Intensive soil cultivation practices are also associated more with annuals than perennials. Therefore, in an area with a given soil erosion potential due to fixed factors such as soil type, rainfall, vegetation cover, decomposer flora and fauna and slope, soil erosion is enhanced by the preferential growing of annual crops.

One very basic question, therefore, is *why upland farmers prefer to plant annual crops and consequently resort to erosive crop cultivation practices in inherently erosion-prone upland areas?*

Why Upland Farmers Prefer Annual Crops

Economic factors

In a subsistence-cash type of upland economy at Bo. Puting Lupa, Calamba, Laguna, Nguu and Corpuz (1979) have shown that annual crops can account for an average of 31-82% of the income of the upland farmers (Table 3). Likewise, the dominant crops planted account for about 60% of the total crops planted (Fig. 1).

The *prevailing market system,* which tends to favor products of annual crops such as garlic, ube, rice, corn, vegetables, ginger, sweet potato, and others, promote planting of annuals because of short term cash returns.

If an upland farmer would shift to perennial crop production, the high initial cost of establishment of perennial crops requires that a farmer should have an outside source of income other than those derived from the farm. This is initially necessary because generally, the resources of the upland farmer are negligible since his income is very low (approximately ₱3,000.00/year) (Gwyer, 1977). Nguu and Corpuz (1979) have shown that the average monthly income of an upland farmer is between ₱313.22 - 389.45/month (Table 4).

Availability of labor is another critical economic variable that influences upland crop production. If labor supply is readily available, the size of an area intended for annual crop production may increase especially if the productivity of the present kaingin or upland farm is already low (Nguu and Corpuz, 1979).

Family needs

If there are many children studying in the family or whom the parents feel should go to school, there remains a preference for annual crop production which can provide immediate cash. Nguu and Corpuz (1979) have shown that 25-29% of the income of the upland farmers is spent for school fees of their children. Also, about 72% of household members of upland farmers in Bo. Villarica, Pantabangan, Nueva Ecija are below the age of 21 (Samonte, et al., 1979).

Large family size means more basic food needs which are mostly derived from annual crops in the farm. These relationships simply mean that the potentially large "sink", represented by family size and needs of upland farm families can dictate the need for a "source" with faster turnover rate which is filled in appropriately by erosive annual crop production in upland areas.

Table 3. **Pattern of income generation* of two kaingineros at Puting Lupa, Calamba, Laguna, May, 1978 to April, 1979 (Nguu and Corpuz, 1979).**

	NA AMPING		NA VITO	
	5/77 – 4/78	5/78 - 4/79	5/77 – 4/78	5/78 – 4/79
	(—————	₱	—————	)
Annual crops	1,960.70	1,845.53	3,097.85	2,253.15
Perennial crops	1,271.00	2,425.70	589.60	1,109.60
Livestock	–	1,293.00	–	250.00
Others	107,00	443.85	70.00	147.10
TOTAL	3,338.70	6,008.08	3,757.45	3,759.85

*Excluding the value of some products consumed by their families, friends and relatives, and that of cooking and heating fuels.

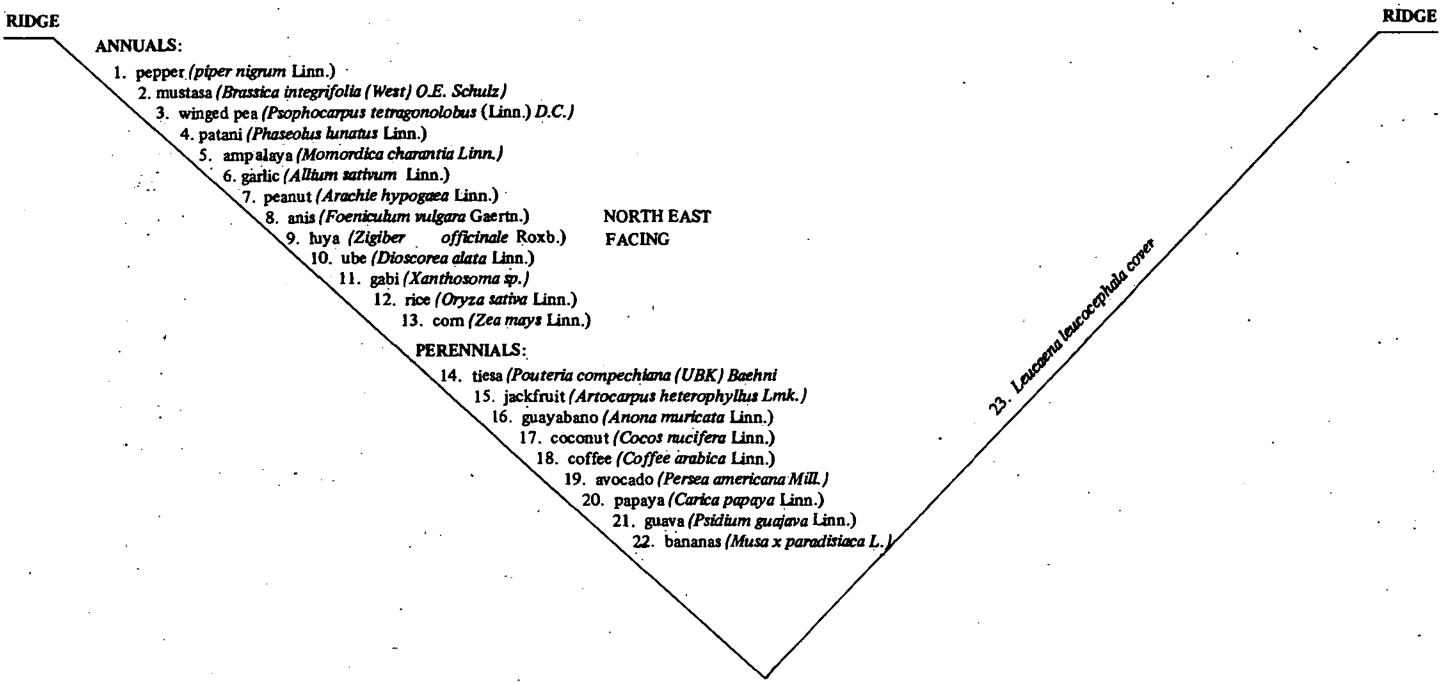

Fig. 1. **Topographic stratification of crops, kaingin farm, Puting Lupa, Calamba, Laguna (Nguu and Corpuz, 1978).**

Table 4. **Monthly income* of two kaingineros at Puting Lupa, Calamba, Laguna, May, 1977 to April, 1979 (Nguu and Corpuz, 1979).**

	NA AMPING	NA VITO
May, 1977	142.25	259.00
June, 1977	405.50	113.00
July, 1977	223.45	89.50
Aug., 1977	245.10	160.70
Sept., 1977	250.00	123.90
Oct., 1977	359.30	553.90
Nov., 1977	298.60	232.50
Dec., 1977	301.85	229.75
Jan., 1978	78.90	95.10
Feb., 1978	120.00	145.05
Mar., 1978	241.95	296.05
Apr., 1978	671.80	1,459.00
May, 1978	476.05	234.25
June, 1978	968.25	587.90
July, 1978	1,508.80	381.20
Aug., 1978	277.90	141.95
Sept., 1978	533.80	181.10
Oct., 1978	324.08	570.15
Nov., 1978	240.10	21.60
Dec., 1979	1,065.60	207.05
Jan., 1979	144.15	203.90
Feb., 1979	178.30	216.00
Mar., 1979	310.65	343.35
Apr., 1979	180.40	468.50
Average	389.45	313.22

*Excluding the value of some products which were consumed by their family, friends and relatives and that of cooking and heating fuels.

Cultural factors

Specific preference for some annual crops such as *rice, corn, sweet potato* and other root crops are inherent in various cultural groups. This is critically important for subsistence farming groups.

Migration Pattern and Transfer of Lowland Farm Technology

As more lowlanders migrate to upland areas, pressure for natural fallow period becomes exceedingly great and demand for annual crop production also increases.

Migrant lowlanders also bring with them erosive and permanent lowland farming technology such as *intensive soil cultivation, annual crop production, monoculture* and others.

Institutional factors

Lack of adequate and appropriate *credit facilities* and *extension programs* for upland farmers which could provide seeds and planting materials, especially those of perennial crops and fruit trees, tend to perpetuate preferential growing of annual crops. This is also tied up to the inadequate resources and capability inherent to upland farmers cited earlier in this paper. The high initial cost of perennial crops' establishment and unavailability of good planting stocks will necessitate an additional resource input if upland farmers will be encouraged to increase their farm production components by establishing perennial crops in their farm. Such a farming system would be a protection of upland soils from erosion.

In all four upland areas with varying levels of ethnicity – from resettled families at Pantabangan, cultural communities at Buhi, Camarines Sur and Imugan, Nueva Vizcaya and migrant farmers at Mount Makiling, Laguna to the more permanent upland families in Antique – the most strongly expressed fear is *uncertainty in land ownership or instability of land tenure.* This condition has brought about among others, extensive and short term exploitation of the land resulting to excessive soil erosion brought about by the preference for annual crop production with excessive soil cultivation, overgrazing and uncontrolled burning.

Samonte et al. (1973) have shown that at Bo. Villarica, Pantabangan, Nueva Ecija, 45% of the resettled families consisting of 53-65% upland farmers expressed fear of unstable land tenure in their farms. This led to the continuous planting of upland rice and other annual crops resulting to excessive soil erosion. It was only when the Bureau of Forest Development

(BFD) granted *kaingin* permits that they resorted to mixed planting of annuals, and perennials, especially fruit trees. After a massive farmer education campaign done through the Samahan ng Magsasaka sa Mataas na Bundok (SAMABUN) by the UHP, the farmers' concern for soil conservation was enhanced.

Uncertainty of land tenure has been a hindrance to land conservation by terracing at the upland Agroforestry project at Buhi, Camarines Sur. Even after terraces were constructed through a joint funding by the BRBDP (Bicol River Basin Development Program) – USAID start up project and the landowners, the tenants were hesitant to plant permanent crops because of the uncertainty of sharing long-term agricultural products generated from the terraced areas. Landowners were also apprehensive that their tenants would lay claim to lands they have terraced, thus, they sometimes refused to have their lands terraced. We could try the strategy of having a third party, *trusted* by both farmer-tenants and landowners who could catalyze a dialogue for long term agreements regarding product sharing in the improved upland areas.

Ownership of ancestral lands was modified when the Ikalahan people in the Mountains of Imugan, Nueva Vizcaya, through a Memorandum of Agreement (leasehold) with the Bureau of Forest Development (BFD), were given authority to embark on a development program for total upland development (Rice, 1979). This model taps the existing community organizational structure by having community elders sit on the Board of Trustees of the Foundation, which governs the utilization/allocation of the resources of the leased ancestral land.

These two institutional models would be workable models, *only if* the following components go with it:

a. There is a strong and stable indigenous community organization with ample regulatory powers, and

b. There is a strong infusion of information leading to the development of appropriate upland technology and attitudes/perception towards the target upland community.

How Can We Reverse the Trend in Philippine Uplands

The above-mentioned socio-economic factors tend to promote preference for annual crop production and excessive cultivation in upland areas, thereby promoting ecological deterioration such as excessive soil erosion, impaired hydrologic properties and nutrient cycling in watershed areas. These conditions will eventually result in the low productivity of upland areas. Thus, we see the cycle of low productivity→ poverty→ increasing ecological instability in upland areas.

To reverse the present widespread degradation of upland areas, we must resolve the different factors which were identified as constraints for the proper development of a productive and ecologically protective base for upland human communties.

Based on the experiences gathered from five pilot upland development programs around the country, the possible mechanism to attain a productive and protective mode of production is the *establishment of a new institutional "control valve"*. This was described by Sajise (1979) in a recent paper read at the International Workshop on Agroforestry for Rural Communities sponsored by UNESCO at Chiang Mai University, Thailand on November 12-16, 1979.

Since the *spectrum* of upland conditions and the upland development process is dynamic, what is needed is an institutional set-up that can act as a *control valve* to harmonize the flow of materials and information from national institutions to the community organizations and finally to the individual members of the community. At present, the UPLB Upland Hydro-ecology Program is studying the effectivity of these various "institutional control valves". These "institutional control valves" possess differences in structure (agency composition and levels, interdisciplinary combinations and perception levels) and functions (responsiveness, stability, effectivity in program planning and implementation). This spectrum is shown in Fig. 3.

The "institutional control valve" must possess the following characteristics: (1) interagency concern, (2) interdisciplinary quality and capability, (3) substantive local concern, and (4) built-in checks and balances for self correction and flexibility. Such "institutional control valves" presently assume a *barangay, provincial, tribal* and *regional/river basin* character. It is not yet certain at this point which model of institutional valves or a combination of those various institutional control valves is most effective and appropriate. It is worthwhile to try replicates of these models in other parts of the country while continuously evaluating the existing ones.

Set of Processes/Functions of Institutional Control Valves to Alleviate Constraints for Proper Upland Cropping System/Development

Based on the five case studies, the following processes were undertaken by these various institutional control valves which led to the resolution of a major constraint to upland development especially on the appropriate mode of production (Upland Hydro-ecology Annual Report, 1979).

1. Identification of pilot upland community and project management staff to constitute the "institutional control valve". This is accomplished by (1) conducting baseline socio-economic surveys (2) utilizing

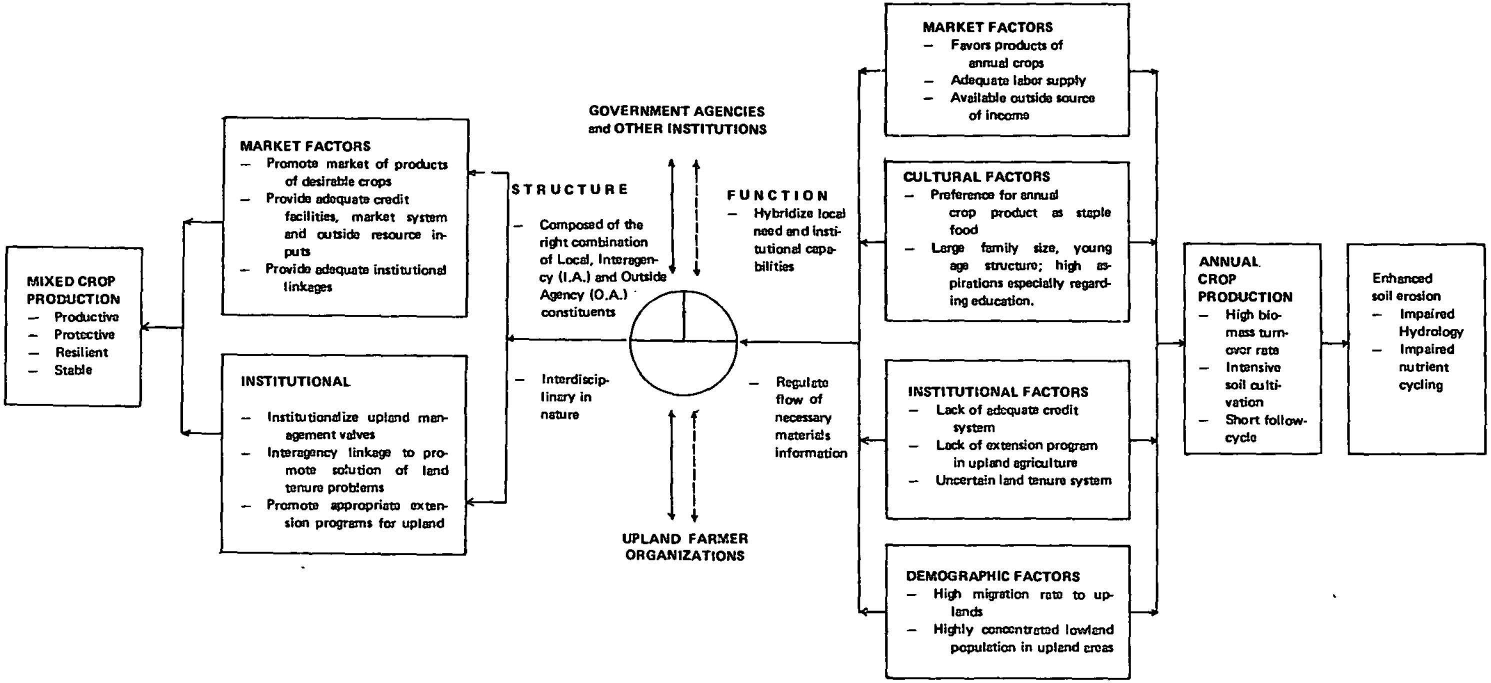

Fig. 2. Conceptual relationship of institutional, cultural, economic and biophysical forces in upland areas resulting to degradation or regeneration.

perception of a well-exposed team in upland technology and development programs and (3) an action research group for social development or any combination of the above.

2. Training amd proper exposure of "institutional control valve" to provide a *common concept or philosophy*, spectrum of technology, and attitudes necessary for upland development.

3. Setting up of demonstration area and nursery. Identification of a proper entry point in the community is also necessary.

4. Seminar of interested farmers involved in entry point activity. Leadership training for farmers is also necessary which will eventually lead to the formation of upland farmer organizations.

5. Assistance to farmer organizations in solving institutional problems such as land tenure, marketing, source of planting materials, and by strengthening institutional linkages of farmers' organizations.

6. Designing of regular training programs and activities for farmer organizations to formulate upland concepts and technology identified together with the farmers.

7. Holding of regular self-evaluation of institutional control valves to sustain commitment.

8. Reinforcement of research capability of institutional control valves to monitor and predict socio-economic, ecological and biophysical changes associated with the upland development process.

These functions will be necessary to promote *endemic* and *sustainable* long-term process of upland development at the grassroots level.

An institutionalized structure should carry the appropriate functions for upland development . This process will reverse the deteriorating trend in our uplands, and hopefully, break the cycle of poverty if we are *sensitive* and if we *respond early enough* to this critical situation.

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