Changing the traditional land use system of the world renowned Ifugao rice terraces

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ABSTRACT

The rice terraces in the mountains of Northern Luzon are an ecologically balanced agricultural system developed by the Ifugao cultural communities. It is closely connected to swiddens and forests, and intensively interrelated to the social life of the Ifugaos. Very soon, this ecosystem will be changed by modern agricultural technologies and social developments. Therefore, the *status quo* was investigated to maintain the knowledge of the complex interrelations within this system, which could provide positive impulses to similar agroecosystems in tropical mountain areas. Occurring changes and damages of the ecosystem and possible solutions for conflicting problems are discussed.

Keywords: Traditional land use, pedictable changes, subecosystems, rice terraces, Ifugao

INTRODUCTION

The presented paper is an attempt to provide an ecologically oriented overview of both the traditional land use in Ifugao and its predictable changes caused by various influences. Among these, focus was on agricultural recommendations and programs, which were actually started or at least officially considered by government and development aid projects to significantly alter the traditional agricultural system.

MATERIALS AND METHODS

From May, 1981 to May, 1983, ecological studies were done in Ifugao, to compare rice fields at different altitudes.

Research focused mainly on ricefield flora, fauna, general limnology, resources, human activities and knowledge. Long-term field studies were conducted in 1980-1983 followed by visits in 1990, 1991.

While conducting these studies, the authors were confronted not only with the long established culture and traditions but also with newly emerged problems from social and agricultural influences. The material of the present paper derives mainly from field observations, ecological data and discussions with farmers and friends working in Ifugao.

THE SUBSISTENCE SYSTEM

The subsistence agroforest-swidden culture of Ifugao can ecologically be described as a system of closely interrelated compartments or subecosystems energetically connected by flow of water-carried nutrients and human activities

(Fig. 1). These subecosystems, listed in the general order of increasing agricultural involvement, are (Conklin, 1980: see ibid for more detailed information):

- grassland (*Imperata* sp. and others, source of outer roof thatch, minimally valued);
- forest (firewood, medicines, hunting, watershed etc.);
- caneland (runo: *Miscanthus* spp., construction material, fencing etc.);
- woodlot (fruit trees, palms, rattan etc.);
- swidden (sweet potato, manioc, corn etc.);
- house terrace (house and granary etc.);
- drained field (vegetable production);
- pond field (= "rice terrace").

With the exception of the grassland, all the other seven compartments can reversely be transformed to each of the remaining subecosystems (Conklin, 1967). These changes in the function of a compartment, however, are observed only at the periphery of an irrigated sector, whereas the land use in its central areas is characterized by its remarkable continuity (Conklin, 1967).

These irrigated pond fields are the subject of highest esteem not only of the Ifugao farmer but also of the ecologist, because by their special biotic and abiotic functions, they

- reduce sediment runoff and as such minimize erosion and loss of nutrients;
- provide an environment favorable for the growth of Azolla and blue-green algae which significantly increases the natural nitrogen input (Roger and Kulasooriya, 1980);
- create anaerobic conditions in the soil, thus preserve organic nitrogen against the nitrification and leaching (that occur in dryland soils), favor nitrogen conservation and fixation (Castro and Lantin, 1976);
- quickly recycle organic matter (Neue, 1984);
- produce aquatic protein food such as snails, fish, ducks etc...

The combination of these advantages makes irrigated rice fields, pond fields (Conklin, 1980) the most stable and successful agricultural system.

Environment in higher altitudes is also favouring rice production. So the biomasses of insects and weeds are decreasing with increasing altitudes of the rice terraces (upper limit 1500 - 1600 m a.s.l.). Due to this climatologically caused fact and to frequent handweeding, weeds are no longer a problem and parts of the ricefield flora are used as vegetables or compost fertilizer (Voggesberger and Margraf, 1988).

Inspite of the low insect populations and the high resistance of local varieties, outbreaks of cutworm, leaffolders, armyworm are occasionally threatening the harvest. However, the whole harvest is seldom destroyed because traditionally, several rice varieties are grown by one family (up to 40 varieties are distinguished by an experienced woman during one harvest season: pers. comm., (Conklin); and some villages are using natural insecticides very effectively.

RECENT INFLUENCES

Ifugao farmers, still managing this complex and ecologically balanced though not static ecosystem, are nowadays confronted with a series of new influences of which each (and more the combination of them) has the capacity to seriously alter the traditional system. These influences are identified as:

- recent agricultural technologies
  - new rice varieties, allowing a second crop per year
  - government programs to promote large-scale growing of vegetables and potatoes
  - portable gasoline consuming machineries
  - recommended pesticides and fertilizers

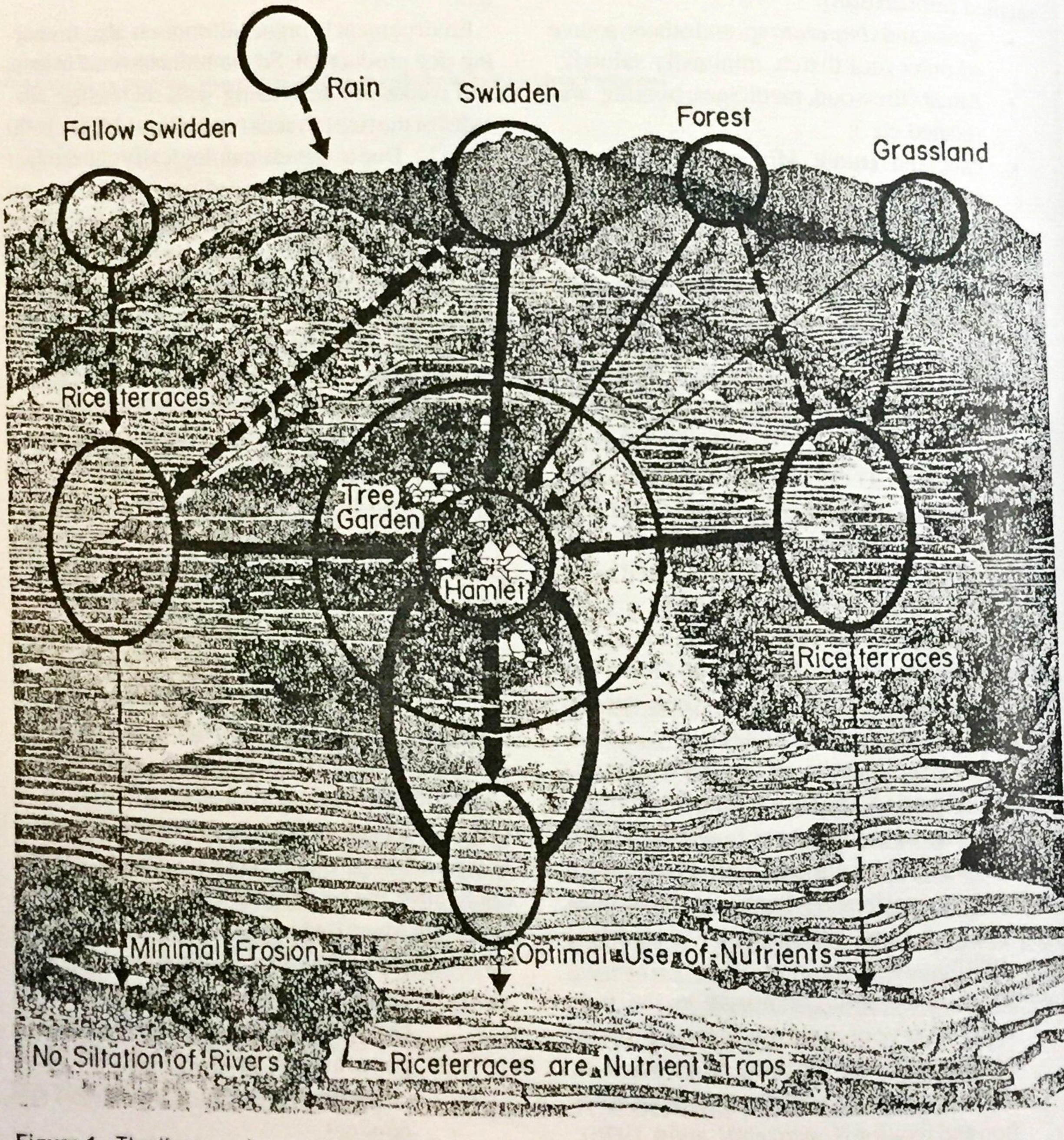

Figure 1. The Ifugao subecosystems.

- tourism
- increasing population
- raised expectations of out-of-school youth (graduates)
- large-scale international development programs.

Figure 2 shows the interrelations and possible consequences of these influences (education and increasing population were not interlaced for graphic clarity, but placed at the center to demonstrate their important impact) and points out today's main pathways to either:

- the maintenance of the traditional or slightly changed rice terraces and the cultural ingenuity of their builders, or
- to the most destructive consequences of unbalanced water regimes, starting with the expansion of vegetable production and leading to the irreversible loss of what is still called "wonder of the world".

DISCUSSION

Sure enough, a society whose livelihood is mainly based on subsistence land use today will have to face social and financial problems as a result of increasing population, modern education, various religious influences, high consumer expectations and foreign visitor's behavior and opinion.

The more educated youth still finds jobs in the cities or abroad, but these desired opportunities are known to become rare. Youth coming back from the center of education and employment will hardly like to continue the maintenance of labor-intensive rice terraces and will easier accept cash crop production.

But on the long run, this would lead to the over utilization of natural resources if no ecologically adapted land use patterns are imposed simultaneously. Such impositions could be:

- levelling also of other irrigated rice terraces

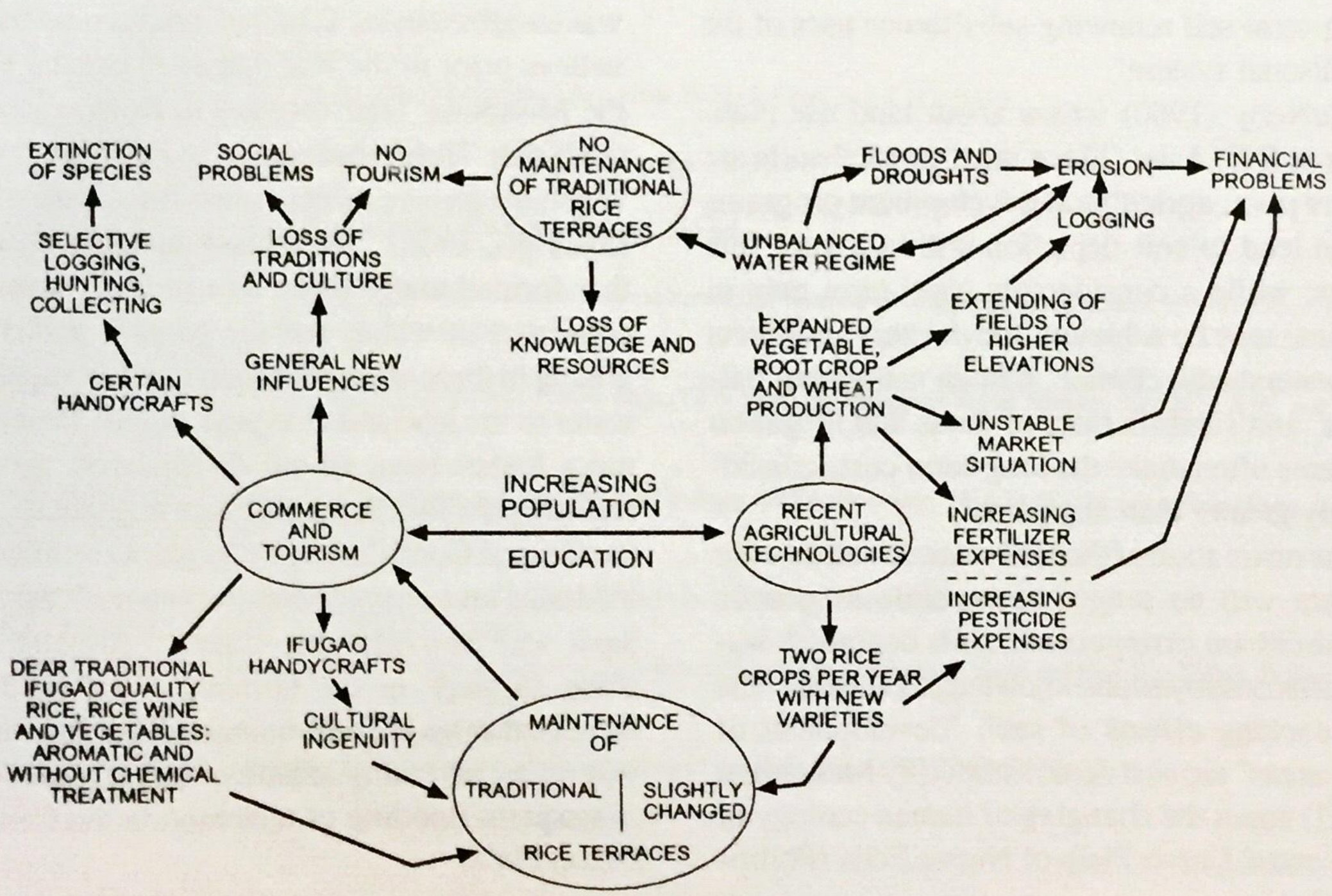

Figure 2. Stabilizing and destabilizing effects of development of the socio-ecology of Ifugao people.

- intercropping with soil stabilizing plants
- protection of watershed forests
- maintaining a long-term (at least 30 years) shifting cultivation circle as e.g.: secondary forest - terraced cash crops - cane land - secondary forest and so on.

If left to the pressure of "progress", the farmers will usually be compelled to make maximum income in shortest time. Since the land is the property of the farmer, only guidelines can be given for their own decisions. If programs and recommendations are not based on the profound knowledge of the long established man-made ecosystem and its social implications, agricultural efforts - though started with best intentions - will lead to an ecological back lash. Instructive examples can be encountered all over S.E. Asia and are generalized by Kunstadter (1980): "Extractive, energy intensive technologies emphasizing single products and short-term economic gains are being substituted for the multiple, long-term self renewing subsistence uses of the traditional system".

McNelly (1980) writes about land use planning in S.E. Asia: "Since most tropical soils are rather poor, agricultural development programs often lead to soil depletion within a very few years; while a considerable short-term gain in income may be achieved, the deleterious effects on watersheds, climate, human settlement patterns, and siltation rates of dams and irrigation systems often make the long-term costs considerably greater than any gains".

The restoration of the old balanced subsistence system will no longer be possible as genetic resources are extinguished, soils degraded, watersheds destroyed and knowledge vanished. The far reaching effects of such "development of rural areas" are best demonstrated by McLennon (1982) about the changing of human ecology in the Central Luzon Plain of Nueva Ecija (Philippines):

"The lowland forests once retarded the flow of water to the sea, modifying the seasonal highs and lows. With the disappearance of these forests, the rivers become engorged and flood-prone throughout the rainy season while the land bakes in the sun during the dry months.

But the growing aridity of the Central Plain finds its causes beyond the Plain proper as well. Lumbering and swidden farming in the surrounding uplands have stripped much of the watershed of its forests. At the end of World War II, a building boom in the Philippines, Japan and the United States created a tremendous market for Philippine lumber. Commonwealth forest laws were relaxed under the Republic. The pine and mossy oak forests of the Central Cordillera fell prey to the lumbering boom, and cleared land, much of it in the Mount Data National Park and Central Cordillera Forest Reserve, was opened for homesteading early in the 1950s by Executive Order 180. Market gardening, which was localized in the Trinidad, Lucban and Guisad valleys prior to the war, began to expand along the Mountain Trail forward to Bontoc early in the 1950s. Today there are over 1,000 hectares of vegetable terraces where moss forest once stood (Rodrigo, 1968). The mossy humus-rich soils that formed under these forests were excellent conserves of water, and the streams and rivers arising in these areas provided a steady supply of water to the lowlands the year round. Today the moss forests have all but disappeared, and the resulting decline in hydro-electric generation at the Central Cordillera's power plants is reflected in Manila's recurring power "brownouts". Springs have vanished with the forests; gullying and slope slippage in the uplands is matched by increased rates of sedimentation behind reservoir dams; and rainy season runoff is rapid with consequent flooding of farmland in the Central Luzon Plain.

Certainly, Ifugao's part in the Central Cordillera's landscape still changes slowly as privately owned and protected rice, swidden and forest land is still managed carefully, as traditions are still alive and as climatical conditions enhance rapid recovering of forests. Nevertheless, the first steps towards a drastic and rapid change are foot-printing the old subsistence system which provided livelihood for centuries and which is nowadays attracting visitors from all over the world by its sublimity.

Only a careful and ecologically balanced insertion of modern technologies combined with the maintenance of the sub-ecosystems of forest lands and irrigated pond fields can result in both economic gain and long-term stability.

SUMMARY

The traditional form of land use in Ifugao is based on closely interrelated subecosystems energetically connected by flow of water-carried nutrients and human activities. This complex and ecologically balanced though not static ecosystem is nowadays influenced by new agricultural technologies, tourism, increasing population and high expectations of out-of-school youth. Cash crop production which would greatly minimize the areas of the subecosystems of irrigated rice terraces and forests will not lead to long-term stability of income and could furthermore threaten natural resources by erosion and destruction of the watershed. Ecologically adapted land use programs have to be based on the existing traditional knowledge.

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