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SOME CONSIDERATIONS FOR SETTING POLICY ON AGRICULTURAL BIODIVERSITY

by

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INTRODUCTION

Agriculture is an essential repository of biodiversity. Resolution 3 of the Convention on Biological Diversity (CBD) discusses the interrelationship between the CBD and the promotion of sustainable agriculture. The body of the resolution details the action needed and in some cases provides timelines for implementation. Article 2 of the CBD defines "sustainable use" as the use of components of biological diversity in a way and at a rate that does not lead to the long term decline of biological diversity, thereby maintaining its potential to meet with the needs and aspirations of present and future generations". While this conveys a general idea of the goal to be aimed for, any discussion on sustainable agriculture or agricultural biodiversity that leads to policy considerations, requires the terms sustainability and agriculture, to be very succinctly defined. Only such discipline can facilitate the design of meaningful policies to further the goals of the convention on Biological Diversity (CBD). One term, agriculture is reasonably well understood as the management of biological organisms or their environments to supply human consumption systems. Further differentiation along lines of specalization such as the management of aquatic systems, lead to fisheries or the management of tree dominated ecosystems, lead to silviculture etc. Thus the term agriculture, is used today to denote management systems that encompass annual or perennial crops and livestock. an activity critical to the well being of humanity as it represents the food production system and on which global-scale food security rests (Pinstrup-Adersen and Pandya-Lorch 1995). The other term, sustainability has also been widely discussed. Sustainability is usefully defined by Conway (1985) to mean the ability of any system to recover from perturbation and stress. When applied to agriculture, Douglass (1985) points out that, it means different things to different people. He identifies three major schools of thought:

1. The "productivity" school, where sustainability is seen as supplying enough food to meet everyone's demand and economics become the primary factor of concern.

2. The "stewardship" school, where sustainability is seen as an ecological phenomenon and the environment becomes the primary factor of concern.

3. The "community" school, where sustainability is seen as the conservation of social phenomena such as social organization and culture. Here the quality of rural life becomes the primary factor of concern.

There have been many suggested measures of sustainability, each referring to a particular set of measurements. A comprehensive discussion of each is given in Liverman et al. (1988). The emerging theme is the need to integrate the often conflicting needs of economic, social and ecological values to generate some general unit of measure. It has been suggested that this is best expressed as the sign and value of a negotiated vector (Senanayake 1991).

Agriculture has always impacted the status of native biodiversity. Sometimes, as in the case of long rotation slash and burn the impact may have had a positive effect, but more often than not it reduces the opportunities for native species and has a negative effect on native biodiversity. In terms of managing for the goals of the CBD the effect of agriculture on the natural system paralyses any possibility for development unless the different biodiversity identity between

agricultural and natural systems are accepted. If the measure of biodiversity used is based on indigenous species, all measurements of agricultural and human modified systems will yield low values. However, when traditional agricultural systems are measured in terms of all organisms, these ecosystems often demonstrate some of the highest biodiversity values (Pimentel et al 1992). The organisms that contribute to this gain are often exotic in origin. In some anthropogenic ecosystems many indigenous species have been lost, but other exotic species have taken their place. In the lowland forest gardens of Sri Lanka, over 70% of the 43 species of trees found were exotic (Senanayake 1987).

As the optimal biodiversity measure for natural systems may vary from the optimal measure for anthropogenic systems, two fundamental units of measure may be considered, one for natural biodiversity and the other for hybrid or anthropogenic biodiversity. (Senanayake 1994).

Biodiversity considerations at the scalar levels

In the setting of biodiversity measures there is also the question of scale. For instance, alpha diversity will tend to show a series of peaks and troughs if an ecosystem is measured along a scalar gradient. A clump of grass extracted from a forest meadow provides an illustration. If the clump is examined microscopically it will yield high biodiversity values, at the scale of the grass plant it will have low biodiversity value, at the scale of the meadow the grass will be a component of a system with high biodiversity. This suggests the need for an index that accommodates the phenomenon of scale, perhaps a measure of some indicator species that confirm the condition of the cascade of smaller ecosystems which is needed by that particular species for its survival may be of utility. Scale also affects alpha and beta diversity values. In habitat patches larger areas increase alpha diversity while greater numbers of patches increase beta diversity (Pimm and Gittleman 1992).

Thus agricultural biodiversity must be addressed on all three scalar levels identified by the CBD (UNEP1992), genetic, systematic and ecosystemic. The hierarchical nature of these scalar levels will mean that extreme care has to be taken when management and policy settings based on biodiversity are to be set.

However, it is important to remember that agriculture involves culture in an integral fashion. Thus, cannot be addressed only from the perspective of production science. sustainability at the social level :

Society, the association of interdependent things, has produced varied patterns in all organisms, ranging from corals, to termites, to humans. Each level of organization having different abilities to influence its environment. In humans, association over time has produced varied patterns of beliefs, values, language and behavior woven around land management systems. Much of human society still possesses this diversity of expression, although the inroads of modern consumerist society, the present claimant to the status of global society, is rapidly homogenizing many traditional societies. Often it is neither democratic nor requested by traditional people. This loss of cultural knowledge has been identified as an area of concern in the Global Biodiversity strategy (Anon 1992), a policy statement made by the IUCN/WWF/WRI.

It is not that the loss of traditional society went unbemoaned into oblivion until just yesterday, humanity has spoken of this passing for a long time. One of the most eloquent statements on the passing of traditional society was made by Chief Seattle in1854 demonstrates the sensitivity that such societies had for their environment and the pain in its destruction.

"The red man has always retreated before the advancing white man, as the mist of the mountains runs before the morning sun. But the ashes of our fathers are sacred. Their graves are holy ground, and so these hills, these trees, this portion of the earth is consecrated to us. We know that the white man does not understand our ways. One portion of the land is the same to him as the next, for he is the stranger who comes in the night and takes from the land whatever he needs.

This earth is not his brother, but his enemy, and when he has conquered it, he moves on. He leaves his father's graves behind and he does not care. He kidnaps the earth form his children, he does not care. His father's grave and his children's birthright are forgotten. He treats his mother, the earth and his brother, the sky, as things to be bought, and plundered, sold like sheep or bright beads. His appetite will devour the earth and leave behind only a desert."

The present state of biodiversity and ecosystem sustainability seems to echo these words.

Traditional societies which cannot withstand the input of modern society, succumbs and is recorded as being non-sustainable. In fact, the destruction of traditional society for the establishment of "modern" consumer society has been often validated as representing the progress of civilization. The social impact of this action is discussed eloquently in Coomaraswamy (1979), and raises important questions as to the consequences of such a view of civilization. Is this the view of civilization that is being chosen to represent global society? His quote of Gill's statement on progress:

"We who are proud to call art significant, not knowing of what. are also proud to progress, not knowing where." clearly identifies the modern dilemma.

Interestingly, the ecological impact of modern agriculture produces similar patterns as traditional agriculture becomes replaced with modern agriculture (Perelman, 1976). Biodiversity at all levels are impacted. The Southern Corn leaf blight of the 1960's or the Russian Wheat epidemic of the 1970's have been clearly identified to have been caused by a reduction of the genetic diversity (Fowler and Mooney 1991). In examining the question of societal sustainability the question of scale is again fundamentally important. What size of societies is sustainability being sought for? Are the goals being set for small societies that represents the globe or for a global society that includes everything ? If the goal of global development process are to level all of humanity to consumers of an increasing smaller spectrum of goods, a process that has been identified to be a contributory factor to the present global diversity crisis (UNEP1995), then development goals can be set at international levels and consequences at smaller scales do not matter. On the other hand if the plurality of human society is recognized. the consequences at smaller scales do matter and have to be accounted for.

The world view of organizations that claim a global mandate must address the plurality of global society. Unfortunately, The emerging view of global society, as reflected in the literature of some global institutions demonstrates a definite departure from traditionally understood concepts. To quote from a study by an international agricultural institution :

"The primary objective of agriculture is not to enhance the resource base on which agriculture depends, and certainly not to enhance environmental quality. These requirements therefore seem to reflect the views of advocates of sustainable agriculture in Western countries rather than the views of farmers in developing countries. Harmsen and Kelley "(in Press)

This rapacious perspective of agriculture, is certainly not shared by most traditional societies. In fact this view of agriculture is alien to the traditional farmer who takes pride in the appearance of the field, stock and the appearance of the home. It would be antithetical to the "Cultivator-to-plant-"I-thou" relationship of indigenous people (Wilkes 1991). A hallmark of many societies is the characteristic appearance of their landscaping, an act that has nothing to do with production and all to do with improving the environment. The rice fields and landscaped watercourses of Bali, The forest gardens of Sri Lanka or the highland villages of Papua New Guinea are some examples. In Papua New Guinea the characteristic landscaping identifies different societies in the highlands, Tree Datura, with its long pendulous white flowers for groups in the north Huon Peninsula, to Yellow and Green Cordyline for the villages around Tep Tep in the central highlands, To Yellow Croton and Palms near Wau.

Yet, there is a body of thought that suggest traditional societies are non sustainable or have nothing major to contribute to the emerging world view. For instance, a study set up by UNDP to develop farming techniques which are sustainable from environmental, production and socioeconomic points of view (UNDP 1992), provides some interesting case studies, all of which however, are either manned by or advised by westerners. This, type of approach allows others within the global system with no contact with the real world to pronounce statements such as that quoted above. It also allows international documents to take on an uninformed, cynical view of the concept of sustainability as being important "If only because the donor community seems to attach a lot of importance to it." (Harmsen and Kelley, in Press). In such narrowly assumed models, the farmer is reduced to a mathematically defined moron with no social or ecological context and made to cavort to the modelers assumptions.

Agrarian societies, have existed on this world for a very long time. Many in existence today have historical records that attest their capacity for sustainability. The challenge is to understand their structure well enough, so that it provides the paradigm for development. Development, in this context will mean capacity building within the traditional paradigm. The aspects of globalizing such a plurarity are challenging, it requires addressing phenomena, that have meaning to all members of such a plurality. For instance, climate change is a global phenomena that has the potential to affect all agrarian society. Sustainability of the production base is another. Sustainability of agrarian society, is synonymous with the sustainability of agriculture. Agriculture, is production by biological systems. Thus agricultural sustainability must consider biological sustainability. A sustainable system oscillates between inflexible boundary conditions. If the boundary conditions are exceeded, a change in state occurs so that the system loses its original identity and potential. Thus, the sustainability of such a system is

determined by its boundary conditions as well as its internal dynamics. A biological entity is a product of its temporal and genetic history in varying environments. There are environmental thresholds that cannot be transcended without extinction. While acclimatization often allows an individual or species to change its measured thresholds (McLeese, 1956), there exist lethal thresholds beyond which an organism cannot transcend (Hart, 1957). So, sustainability when applied in the biological context will be seen to be defined by inflexible boundaries. If the degree of perturbation or stress makes it transcend the boundaries it looses its identity as an organism or an ecosystem.

Agrarian societies with long histories, posses the credibility of having sustained themselves successfully under the rigor of survival in a natural world. The concern for the future is that the model chosen for sustaining future global agrarian society is an energy and resource demanding production system. Yet, no investment is being put into developing traditional societies and to include them as partners in achiveing global food security.

The burgeoning populations of the future may have no other option than high energy input agriculture to sustain them simply because we have not invested in examining any other option. Some of the reasoning may lie in thinking that in responding to the need of feeding a rapidly growing world population, socioeconomic problems, can be resolved through reductionist, technological approaches (Lappe and Collins 1986, Conway and Barbier 1990). However, it is becoming evident that the present resource expensive system of agrarian production will become increasingly more expensive to maintain. This phenomenon is a result of increasing input costs and decreasing productivity of the land. The predicted global climate effects will also make large areas of monocultures risky. Thus there may be value in examining other options.

The value in maintaining diversity is the constant availability of a large number of options. This applies equally well, weather in the case of marketing products or responding to disease or episodic or climatic event. Thus the question to be examined by designers of global society is "how much diversity can be conserved within the emerging global society? If the lessons learnt at the level of local societies are anything to go by, the goals of sustainability will be achieved best by conserving the diversity of global society.

But it means that we will have to recognize that other societies have equal value to ours. That they can contribute to modern society as much we claim we can contribute to theirs. The use of the Pitta bird by traditional farmers in Sri Lanka can contribute to agricultural production as much as their choice of the modern plough design (Senanyake 1983). The monitoring of frogs calls by rural residents of Australia can contribute as much as a weekly salt monitoring program by the university system (Senanayake 1993).

If global sustainable development is to be achieved we have to learn to understand what the indicators are. One prominent indicator is diversity, both societal and biological. Such indicators provide us with landmarks and identifiable goals on the path to sustainable development . In a global society where we recognize the strengths and talents of others as well as the fact that we are interdependent, cultural diversity will often become a feature of a sustainble agricultural production base. To do otherwise will be to create a global

monoculture dependent on an ever increasing input of energy to keep it from collapse, from chaos.

National Policy Concerns

From the discussion above it will be seen that conserving agro-biodiversity cannot be restricted to a consideration of genes or even seeds. The ecological and social context of every agricultural situation must be incorporated into development planning and policy settings, if the goals of the CBD and CSD are to be addressed. Consideration of the need to conserve sustainable agricultural landscapes must feature prominently in national agricultural development plans.

National policy in agriculture needs to ensure that the genetic base of all crops grown within a country are as broad a possible. The creation of large regions of monocultures or production systems that require large volumes of external inputs should pay the real price of energy use, biodiversity erosion and reduction of sustainability. The practice of growing crops outside their bioregion of natural occurrence should be discouraged as it entails the excessive use of external inputs.

The critical role of agriculture in responding to the needs of global food security is well recognized, the question now is what type of agriculture ? The problem may not be as simple as the dichotomy between production-oriented agriculturists and environmentalists as suggested by Paarlberg (1994). It is now clear that policy facilitating a rise in short term production could have dire long term consequences (Goldsmith1993). Agricultrual practices will have at address long term and landscape considerations. Thus the identitiy and distribution of agroecosystems within it will become important in managing landscape sustainability. The biological and environmental links to the other ecosystems that abut agricultural fields are maintained by the mutually available biodiversity. This is true of aquatic, terrestrial or sub-fossorial systems that support any given type of agriculture.

The consideration of Agriculture by the CBD entails the consideration more complexity and variability than on the conservation of natural systems. It also requires consideration of ecological and social factors very different to the conservation of natural systems. In agricultural and other anthropogenic systems there is a range of possible responses from monocultures to polycultures, each with a different set of biodiversity values. Clarification of these differences will yield a robust policy environment.

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