4. ETHICS IN RELATION TO DEVELOPMENT AND MANAGEMENT OF ENVIRONMENTAL CAPITAL STOCK

> "Nature provides for everybody's needs, but not for everybody's greed"
>
> *– Mahatma Gandhi*

4.1 Introduction

Ethics in environmental affairs and the management of natural resources are concerned with the impact of human actions on natural entities and nature as a whole. There is a dual nature of ethics (human to nature/human to human) in managing environmental capital stock, represented by land, water, forests, biodiversity and oceans. There exists among humans inequality with respect to those who perpetrate, those who benefit and those who suffer the most from unethical environmental activities. Humankind has begun to realize that the practice of 'high input and high return' in agriculture, forestry and fisheries might also create various other kinds of problems, having a negative impact on local and global scales. Science and technology based development efforts must include an ethical framework to guide human interaction with nature towards promoting and supporting humane and sustainable societies, so that future generations will not be deprived of access to an adequate and healthy natural resource base.

The interplay between the need to ensure intra- and inter-generational equity will be fascinating and exacting, and the outcome will be critical to the future of humankind.

4.2 Land

The Asia-Pacific region has 23% of world's total land area and is home to about 56% of the world's population. The distribution of land to agriculture, the primary and largest private sector industry in Asia is as follows:

Table 4.1.

Region	*Agricultural land (1,000 sq km)*	*Irrigated land % of crop land*
East Asia and Pacific	2 331	37.6
South Asia	2 128	42.0
World	15 219	19.7

Source: UNESCO. EOLSS, Vol. 2. 2002.

Five South Asian countries, India, Pakistan, Bangladesh, Nepal and Sri Lanka, have 21% of world's population on only 3% of its land. The population density per hectare of arable land in South Asia is 6.0 as against 3.8 for the rest of the world.

This highlights the intense interaction of people and land in Asia, in general, and in South Asia, in particular. The major ethical considerations in land use and management are: arresting land degradation, reclaiming degraded lands, ensuring land tenure rights and public policies for promoting sustainable land use and management.

Agriculture is practiced in 5 major categories of land: irrigated lands, high quality rain-fed lands, densely populated marginal lands, urban and peri-urban agricultural lands and extensively managed marginal lands. The arid zone, semi-arid zone, coastal ecosystems and hill and mountain ecosystems are the ones where human interaction, purely from the point of view of short term economic gains in the past, are threatening the biodiversity and sustainability of the livelihood systems in these zones mainly due to improper land husbandry.

Improper land and water husbandry practices in the region has resulted in land degradation by various processes, such as water and wind erosion, water logging and salinization, lowering of water tables and soil fertility decline.

Water erosion is extensive and severe throughout the Himalayas, South Asia, Southeast Asia, and large areas of China, Australia and the South Pacific. More than half the world's irrigated land affected by water logging and salinization is located in Asia-Pacific. About 35% of the productive land in Asia is now desert.[1] The countries suffering most from desertification are China, Afghanistan, Mongolia, Iran, Pakistan and India.

The contribution of human activities to land degradation in the Asia-Pacific region is estimated as follows: removal of vegetation cover 37%, overgrazing 33%, unsustainable agricultural practices 25%, over exploitation through construction of infrastructure 5%.[2] The estimates of economic loss due to land degradation in South Asia are given below:

Table 4.2. Provisional estimates of the cost of land degradation in South Asia

Type of degradation	*Cost, billion US$ per year*	*Notes*
Water erosion	5.4	On-site effects only
Wind erosion	1.8	Assessed relative to water erosion
Fertility decline	0.6-1.2	Tentative estimate
Water logging	0.5	
Salinization	1.5	

Source: World Soil Resources Report No. 78, 1994, FAO.

[1] UNEP 1997. Global Environment Outlook, http://www.grida.no/geo1.

[2] ibid.

Oldeman[3] (1998) estimated the average percentage cumulative loss of productivity at 12.8% for cropland and 3.6% for pastureland in Asia due to the impact of land degradation. The total land area affected by human induced land degradation in South and Southeast Asia is around 960 million ha as noted below. (See Table 4.3)

Table 4.3. Impact of human induced soil degradation on changes in food productivity and areas (in million ha) affected under different management levels for South and Southeast Asia

Level of productivity change	*Level of management*					
	High		*Medium*		*Low*	
	Impact	*Area*	*Impact*	*Area*	*Impact*	*Area*
Large increase	Negligible	67	–	–	–	–
Small increase	Light	171	Negligible	78	–	–
No increase	Moderate	82	Light	135	Negligible	30
Small decrease	Strong	41	Moderate	74	Light	119
Large decrease	Extreme	11	Strong	51	Moderate	69
Unproductive	Extreme	0	Extreme	–	Strong	30
Total area affected: **958**		372		338		248

Source: Oldeman (1998).

Out of 958 million ha, around 18% has negligible impact, 44% light impact, 23% moderate impact and 14% strong to extreme impact on food productivity. Hence, sustainable agriculture can only be ensured through sound land husbandry practices and should be central to ethics in agriculture.

Prime agricultural landscapes have been developed over thousands of years throughout Asia. UNESCO's World Heritage listing of the Ifugao Rice Terraces in the Philippines as a living cultural landscape is a fitting recognition of the achievements of indigenous people. Reinforcement of these multi-crop agro ecosystem practices strengthens the cultural identity and the people-nature linkages. Unfortunately, due to urbanization and industrialization, prime agricultural lands are being converted away from agriculture. National land use policies and town planning policies of cities must take care of arresting this trend.

Aquaculture production in agricultural lands, both inland and coastal, is expanding at a rapid pace. The annual growth rate in aquaculture production in Asia-Pacific was 12.8% in the decade, 1989-99, and amounted to about 90% of the world production in 1996. China is the most dominant country in aquaculture

[3] Oldeman, L.R. 2000. "Impact of Soil Degradation: A Global Scenario," in Proceedings of International Conference on Managing Natural Resources for Sustainable Agricultural Production in the 21st Century, New Delhi, Feb 14-18, pp 79-86.

production in the world. Large-scale development of aquaculture in the coastal areas has resulted in salinization of fields and contamination of underground water. Chakaria Sundarbans in eastern Bangladesh has been completely cleared for aquaculture.

Some of the other negative impacts of aquaculture are: loss of estuarine habitats, inadvertent introduction of competitors, predators, parasites and diseases, and genetic modification of wild stocks by inevitable escapes. Best water management and effluent treatment measures must be ensured to prevent the permanent and irretrievable damage to the land and water resources of the area.

Equity and social considerations of anthropogenic climate change due to land and forestry management practices demand, as the main 'climate agreements' repeatedly stress, equity and fair burden sharing, including the need for fair burden sharing among developed countries themselves based on the norms of responsibility or guilt, capacity and need. The United Nations Conference on Environment and Development, 1992, put forth "Agenda 21" as the framework for nations to take appropriate land husbandry plans of action for sustainable development. The commitment of all stakeholders in implementing this plan of action is vital for sustainable development.

4.3 Water

Asia, Europe and Africa are the continents of highest water stress in terms of water availability per person, which will accentuate during the present century leading to inequity in the availability of even drinking water. The estimated availability of fresh water as run off in Asia is given below (Table 4.4), which is the maximum potential among all the continents.

Table 4.4. Availability of Freshwater Run-off

Area 10^3 Km^2	*Population Million*	*Run off Km^3/year*
43 475	3 108	14 410

Source: UNESCO. EOLSS. Vol. 2.

The major unethical activities in water resource development and management are: inequity in water allocation and use in the watershed, depletion of groundwater, pollution of surface and ground water, and inadequate response to mitigate the hardships encountered by people and livestock during floods and drought.

Due to unethical human activities, arising out of a mind-set not placed in favour of a pro-nature approach, the natural hydrological cycles of most river basins are becoming more and more interfered and transformed. Although the major effects of reservoir construction on the hydrological cycles are run off control and an

increase in ground water table, the ethical considerations of minimizing the loss of area and its biodiversity due to inundation of water, and humane efforts in proper rehabilitation of displaced people, must be an integral part of the planning and execution of major dams.

The conflicts that can occur between activities for hydrological cycle and water transfer links upstream in a catchment with the problems and denied opportunities for the people downstream need to be harmonized by compromise-building efforts of all the communities in the watershed. In such compromise-building, sufficient attention must be given to secure environmental sustainability through ethical considerations such as: land must remain productive, water must remain usable all the way down to the mouth, agricultural products must remain unpolluted and edible, and crucial ecosystem services must be protected.

For example, the Chao Phraya basin covers approximately one third of Thailand's land area. The basin is composed of four rivers. Transferring water from the middle to the lower part of Chao Phraya basin in the past has created opportunity cost to the upstream of the basin. Also, transferring water from the Mae Klong basin to the lower of Chao Phraya basin resulted in shifting the water resources from an area of higher economic return to one of lower. Appropriate policy for water allocation systems, within and between river basins, therefore, should be considered for both equity and efficiency factors of water use.[4]

The most significant distortions of the hydrological cycle are being observed in urbanized areas. Impermeable surfaces in urban areas result in a great reduction of infiltration and evaporation. This can mean that the rainfall flood volumes may increase by several times. Rainwater harvesting techniques need to be widely adopted in urban townships and cities to make an effective reuse of harvested rainwater and to increase the recharge of the aquifer.

Over-exploitation of ground water for intensification of agriculture in many Asian countries is resulting in unsustainable use of this resource, and may lead to water crisis and water famine in some areas. The classical example of this practice is being witnessed in the Indo-Gangetic plains of India. If ground water is extracted from confined aquifers below impermeable layers, the ground water table is only slightly, or not affected at all. However, in many coastal areas, as observed in quite a number of Asian countries, the over extraction of ground water leads to seawater intrusion which may lead to water insecurity for both present and future generations. Therefore, inter-generational ethical considerations demand that the utmost scientific principles and practices be adopted by the people in the

[4] Sombat Sae-hae and Acharee Sattarasart 2002. "Farmers' Preferences for Agricultural Activities under Limited and Uncertain Water Condition in the Chao Phraya Basin, Thailand," in International Symposium on Sustaining Food security and managing natural resources in Southeast Asia – challenges for the 21st century, Chiang Mai, Thailand, Jan 8-11.

augmentation and equitable use and management of ground water resources, lest it will lead over time to water crisis and water famine.

One of the major sources of water in tropical Asia is the glaciers in the Himalayan mountain range. Global warming will result in the faster melting of glaciers and increasing risks of glacial lake floods. A lowering in the flow of rivers fed by snow will occur, affecting hydroelectricity generation, and water supplies to urban settlements and agriculture.

Water pollution has increasingly reached a severe magnitude in the region due to the discharge of domestic sewage, industrial effluence and run off from activities such as agriculture and mining. It has been estimated that river transport of inorganic nitrogen and phosphorous due to excessive fertilization in select areas has increased several fold over the last 150-200 years. This practice can cause toxic algal blooms, oxygen depletion and other expressions of **eutrophication**. Rivers, lakes and lagoons are natural sinks into which untreated wastes from domestic, industrial sectors and agricultural lands are dumped. It is estimated that 54% of the lakes in Southeast Asia suffer from eutrophication problems.

Ethical considerations are more important than ever before for the management of water. The emerging water crisis of today calls for awareness building and education concerning water resources, and for the adoption of regulative, economic and communicative instruments and covenants by all stakeholders, as is being promoted by the World Water Forum.

4.4 Biodiversity

Six of the twelve 'mega-diversity' countries identified by McNeeley, et al,[5] are located in this region – namely, India, Malaysia, Philippines, Indonesia, Thailand and China.

Agro-biodiversity, that is, the varieties of crops and breeds of animals derived through centuries of natural and human selection, by design and by default, is the base on which agriculture of the world is built. Rapid industrialization and modernization have largely been responsible for the erosion of agro-biodiversity in various parts of the globe. By 2005, India is expected to produce 75% of its rice from just 10 varieties compared with the 30,000 varieties traditionally cultivated. In Indonesia, 1500 varieties of rice disappeared during the period 1975-90.

Plant and animal breeders need to access a wide range of genetic resources when developing new varieties and breeds. Such new varieties and breeds may be

[5] McNeeley, J.A., K.R. Miller, W.V. Reid, R.A. Mittermeier, and T.B. Werner, 1990. Conserving the World's Biological Diversity. WRI, World Conservation Union, World Bank, WWF-US, and Conservation International, Washington and Gland, Switzerland.

necessary as economies develop, people's needs and tastes change and diversify. More importantly, the mixing of the global gene pool will help protect past achievements in agriculture, fisheries and milk and meat production. Modern plant and animal breeding science establishments have always made use of material selected, used and maintained by farmers without the historic necessity of acknowledging the latter's contributions. While the sellers and users reap the benefits of such research and value added material, the burden of continuity and maintenance falls on the primary and secondary conservers. Primary conservers are individuals and communities who conserve biodiversity under in-situ conditions, while secondary conservers are institutions responsible for maintenance of collections made from primary conservers.

It is, hence, ethical to fix the social responsibility of giving due recognition and sharing of benefits upon the sellers and users, recognition and benefits that rightly go to a large number of women and men whose knowledge and efforts have generated the value added materials. It is precisely with such consideration that several recent legally binding international agreements, like the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources (ITPGR), have recognized the material and knowledge contribution of farmers, who are the primary conservers. The Convention on Biological Diversity (CBD), signed by more than 168 countries, is a global convention aiming at conservation, sustainable use, and fair and equitable sharing of benefits resulting from such uses. The International Treaty on Plant Genetic Resources (ITPGR) has been signed by 78 nations including India, Bangladesh, Bhutan, Democratic People's Republic of Korea, Thailand, Malaysia, and Myanmar from the Asia-Pacific region.

Over the last one century or so, secondary conservers, mostly those involved in *ex-situ* conservation efforts, like gene banks, botanical gardens, zoos and parks, have increasingly realized the growing economic cost of conservation. Among the various causes for this inflation are the rising cost of electricity, cost involved in growing out, characterization, presence of a large number of duplicate samples, non-viability of seeds, heavy maintenance and replacement costs. With the global slow down of publicly funded research, it has become increasingly difficult to continue these efforts.

The burden on primary conservers is much heavier than those faced by secondary conservers. With the industrialization of agriculture, large areas that were rich in agro-biodiversity have been replaced with crops and varieties of a narrow genetic base. This change is inextricably linked to land, lifestyles, beliefs, customs and traditional knowledge. Since a crop or a variety has to be cultivated and used year after year, the effort and cost involved is far more expensive than *ex-situ* conservation.

Rapidly shrinking agro-biodiverse areas, on the one hand, and increasing costs of *ex-situ* methods, on the other, have brought to the fore *in-situ* conservation issues.

In-situ conservation cannot be dealt with in isolation without addressing ethical and equity issues. While value addition to material derived through traditional knowledge and practice is crucial, it is equally important to acknowledge the contributions made by primary conservers of the past and the present.

It is crucial to distinguish the difference between conservation by modern science and conservation by traditional communities. There is little doubt that the burden of in-situ conservation has been shifted more and more to the primary conservers. Recognizing the overburden to primary conservers, ethical considerations are now being built-in through recognition, reward and benefit sharing. A new drug called Jeevani, a restorative, immuno-enhancing, anti-stress, anti-fatigue agent from arogyapaach, developed by scientists at the Tropical Botanical Garden and Research Institute (TBGRI) and based on the medicinal knowledge of the Kani tribe in Kerala, Southern India, is a good example. Three Kani tribal members divulged their traditional knowledge to Indian scientists who isolated 12 active compounds and filed two patent applications for the drug. The technology was then licensed to Arya Vaidya Pharmacy Ltd., an Indian pharmaceutical manufacturer pursuing the commercialization of Ayurvedic herbal formulations. A Trust Fund was established to share the benefits arising from the commercialization of the Traditional Knowledge based drug "Jeevani."[6]

Material and knowledge conserved and used by communities are difficult to recognize and reward, unlike modern breeders who are individuals or groups of people. It is also important to recognize that there are many ways of recognition, reward and benefit sharing, because the values placed on material, honour and dignity, differ from group to group. While benefit sharing is largely addressed as a monetary mechanism, non-monetary forms of social recognition linked to honour and dignity may be as important as well. For example, recognition could be positive incentives through formal institutions in the form of subsidies, or the development of common facilities like schools, roads, transport etc., in exchange for the material and knowledge conserved.

The ethical and equity dimension should not only focus on recognizing the primary conservers. Special efforts must be made to understand the disaggregated segments of the community who made significant contributions to the cultivation of the resources and generation of associated knowledge. Given this consideration, integrating a gender perspective is essential given the major role women play as conservers, cultivators and breeders. This is so because gender is a social construct that governs the roles and responsibilities assigned to individuals within a cultural context, which leads to the generation of gendered knowledge.

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[6] Anuradha, R.V. 2000. Sharing the Benefits of Biodiversity: The Kani-TGBRI Deal in Kerala, India, IIED and Kalpavriksh, Pune, 43 pp.

4.5 Forests

It is estimated that globally about one-third of the land area occupied by forests has disappeared in the last 2000 years. The Asia-Pacific region has 655 million ha of forest area, (which is 17% of the world's forest area) which is less than one fifth of the land area. Three countries, Australia, Indonesia and China account for 52% of the forest cover in the region. The average per capita forest area for the whole region is 0.21 ha. The lowest per capita forest cover is found in South Asia at 0.08 ha. The world's highest rate of deforestation, at 1.2% per year, has been recorded in Asia. At the current rate of harvesting, the remaining timber reserves in Asia may not last for more than 40 years.

The major ethical considerations in forest management are deforestation, loss of biodiversity, forest as a resource for the community, forest fire prevention, wildlife protection and eco-tourism. The degree and manner in which society impinges on these aspects of forestry determine the extent of degradation and scope for sustainable management and use of forest wealth.

Some of the most biologically and ecologically diverse forests are under threat. About 500 species are listed by FAO as threatened and require some immediate assessment and plans for their survival prospects. About 97% of the forest cover represents natural vegetation and 3% are plantations of industrial value. A great deal of science and technology work needs to be done on selection and genetic tree improvement *in-situ* in tropical plantations.

The age-old practice of shifting cultivation (slash and burn system of forest clearing) in the hill and mountain regions of Asia has been instrumental for the decline in forest area and loss of biodiversity. This may not only influence climate through the water and energy cycles, but due to biomass burning may add to CO_2 emissions. Considerable changes in the scale and frequency of flooding (for example in the Ganges basin) are related to the intensity of deforestation in local mountainous regions.

Better alternatives of land management to shifting cultivation are available, and promotion through community participation and supportive public policy initiatives in the matter of community forest management, sharing of benefits such as forest food, fodder, fuel wood, medicines, gums, resins, construction material, and legal entitlements, need to be institutionalized for the conservation and sustainable use and management of forests.

Strengthening the stewardship responsibility of local communities who are granted access to forest resources under a long term tenurial agreement, and making them responsible for the reforestation efforts from part of the sale proceeds, are a couple

of the measures which will be part of the community-based Joint Forest Management strategy.[7]

The last decade has seen increased emphasis on achieving sustainable forest management. This approach balances environmental, socio-cultural and economic objectives of management in line with the *Forest Principles* agreed at UNCED in 1992.

The prevention and control of forest fires, extreme cases of which have been experienced in tropical Asia and Oceania in the last two decades, is a strong ethical concern, as they quickly lead to loss of precious forest biodiversity nurtured over years. International travel and global economy also will ensure the continued introduction of new pests in forests. Fire control and pest management should be an integral part of good forest management systems. Loss of wildlife (due to human action) in forest ecosystems, jeopardizes the nutritional base on which many local communities depend, can lead to the collapse of local economies and may permanently alter forest ecology.

4.6 Ocean

The Law of Sea 1982 (UNCLOS) became effective in 1994, granting coastal States, a large number of which are in Asia-Pacific, the legal rights to regulate and manage aquatic resources up to 200 nautical miles from their coast. In it, the Exclusive Economic Zone (EEZ) reserves exclusive rights to exploit, develop, manage and conserve all natural resources in and under the sea within 200 miles of the shore, including fish, oil, gas, sand, gravel, minerals, etc. The inland capture fisheries production and marine capture fisheries production has been growing in the Asia-Pacific region, marking a 5.7 and 2.5% growth rate, respectfully, in the decade 1989-99. Fish captures are now showing a declining trend so that effective management to preserve marine resources and a sustainable level of harvesting shall be practised. Returning captured, juvenile fish back to the sea and banning fishing in important juvenile rearing areas needs to be promoted. Reduction of unwanted by-catch is also important, as about 20-30% of the total catch is discarded every year.

Asia has the largest fishing fleet (42% of the world's total Gross Registered Tonnage). This fishing fleet has twice the capacity needed to extract what the ocean can sustainably produce. This results in a vicious circle where, as catches per vessel fall, profits decline and the fishermen over fish to maintain supplies. Further, the deep fishery resources of the Pacific island countries are being exploited by distant water fishing nations (mostly Japan, USA, Taiwan (China), China, and South Korea, which realize around 95% of the revenues from tuna fish.

[7] M.S. Swaminathan Research Foundation. 2002. The Mangrove Decade and Beyond: Activities, Lessons and Challenges in Mangrove Conservation and Management, 1990-2001. Manual no. 5. MSSRF, Chennai. 40 pp.

Most small island States have not succeeded in converting these rights into concrete economic gains. In many cases, commercially viable, exportable fish are found outside the small island's EEZ. Even when there are stocks within the EEZ, rather than develop domestic fishing fleets and processing sectors, small islands generally opt for the easiest option: licensing long-range fleets from countries with domestic processing industries (Japan, USA, Taiwan (China), China, and South Korea to fish in their EEZ. A classic case is the tuna sector: Fifty-five percent of the world's supply of canned tuna comes from the Pacific islands, but very few are caught by locals, and a negligible share is processed by local plants.

Currently, EEZ access fees range from 2.2-10% of gross revenue for the right to fish in their EEZs. In 2000, there were 949 tuna fishing vessels in the EEZ of the Pacific islands. Small islands in the Pacific received around US$60 million in access fees from foreign fishing activity in 1999, compared to $15 million in 1982.[8] In the face of insignificant access fees, to yield greater benefits from their fisheries, the Pacific islands decided to force domestication of the tuna industry during the 1990s by duplicating the activities of long distance fishing fleets. The Pacific countries believed that the benefits of developing a fishing industry exceeded those of other economic sectors, because of the abundance of resources; the close proximity to fishing grounds (hence, lower freight costs); the low cost of labour; and the lack of alternative natural resources in the region. Unfortunately, whatever natural advantage the small islands did have with the easy access to tuna, they did not have a comparative advantage with other key factors: high risks, high costs, and high skill requirements.

Thailand, Fiji and Philippines are currently under threat from tourism-related development activities; uncontrolled growth of such development leads to over exploitation of fragile land and water systems and environmental pollution of these resources. Conversion of mangrove to shrimp mariculture and unsustainable fishing practices such as blast fishing are widespread. Thailand lost about 200,000 ha of mangrove from 1961-1993.

Sea level rise due to global warming is a contemporary phenomenon. In the 20th century, sea level rose globally by 108 mm, but regionally and locally it rose 2 to 3 times more. The impact of a more rapid rise in sea level, due to unethical ecosystem and natural resource management, may affect island States and coastal areas by intensified flooding and submergence, increased erosion of shorelines, intrusion of saline water into estuaries and coastal aquifers, drainage problems and depletion and destruction of coral reefs. The rates of loss of coral reef and mangrove habitats in the region are among the highest in the world. Occurrence of 'red tides', a special plankton bloom, causing death of aquatic organisms and

[8] Gillette, R., et al. 2001. Tuna: a key economic resource in the Pacific Islands, A report prepared for the Asian Development Bank and the Forum Fisheries Agency, Manila, ADB, p. 13. http://www.adb.org/

paralytic shellfish poisoning, has been an environment problem of major concern in the coastal areas of the region.

4.7 Epilogue

Economic growth and development processes, both in the rural and urban areas in the region, are affecting the health of the environmental capital stock. Migration from rural to urban areas accounted for some 40% of urban population growth between 1970 and 1990 in most developing countries of the region. Urbanization and industrialization are causing environmental problems by increasing pollution levels with the concentrated discharge of gaseous, liquid and solid wastes into the environment.

There are other environmental problems in the Pacific islands such as: threats to freshwater resources, marine and coastal environmental degradation, land and forest degradation, urbanization and waste management issues, depletion of biological diversity, energy-related environmental concerns, adaptation to climate change, variability, extreme weather conditions, and sea level rise, and weak environmental management capacities and related governance issues. The impact of industrialization is increasing the problems of disposal of solid waste and wastewater. In terms of direct impact on the environment, farming activities are a major contributor to soil erosion, loss of nutrients from topsoil, expansion of agricultural areas into forest areas and marginal lands, and land salinization.

The overall Environment Impact Assessment in the region suggests a need for more legislation, regulations, guidelines and public awareness. Promoting economic growth and development, while maintaining and strengthening protection of the environment and natural resources, is one of the great policy challenges for the region. That conservation, equitable use and decontamination of natural resources need not be exclusive to economic growth and development needs to be realized and internalized in all development activities. In fact, this is the crux of ethics in an ecosystem approach to development. In all developmental pathways, Economic Impact Assessment and Environment Impact Assessment have been internalized. A third dimension that needs to be incorporated in future is an **Ethical Impact Assessment**, so that ethical obligations of society are kept in view in all developmental activities.

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3. FAO 1994 World Soil Resources Report No. 78, page 75, FAO, Rome.

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5. UNESCO-ELOSS 2002. Encyclopaedia of Life Support Systems, Volumes 2 & 3.