

International Sustainable Biosphere Initiative: a participatory research agenda for India

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Since ecological issues in developing countries such as India are poverty related, they demand participatory research involving local communities in order to ensure sustainable development. Effective linkages between ecological process and social process studies need to be established in order to give a new orientation to research. Such studies are limited; the jhum system and tribal development in northeastern India is one of the very few examples. The International Sustainable Biosphere Initiative (ISBI), a new initiative developed at Cuernavaca, Mexico, in June 1991, provides the basis for such a worldwide programme.

THERE IS AN INCREASING realization throughout the world that environmental problems resulting from human activities pose a threat to sustainability of global life support system. The growing human population and its increasing use and misuse of resources are adversely affecting the resiliency of the natural ecosystems. Many of these problems that challenge human society are ecological in nature. Thus, for example, decisions concerning the use of resources cannot be made effectively without a fundamental understanding of the ways in which ecosystem processes operate. Ecological knowledge is needed to evaluate consequences of a wide range of human activities and to plan for the management of natural and man-made ecosystems in a sustainable manner.

Driven by these concerns for integrating ecological sciences with resource management and development, the Ecological Society of America proposed the Sustainable Biosphere Initiative (SBI), an ecological agenda for the 1990s (ref. 1). This agenda was taken further in a workshop in Cuernavaca, Mexico, in which leading ecologists from fourteen countries recommended the establishment of a cooperative programme as a global venture, the *International Sustainable Biosphere Initiative* (ISBI). The central goal of the initiative was to 'facilitate the acquisition, dissemination, and utilization of ecological knowledge to ensure the sustainability of the biosphere'.

Issues and components

The concept of sustainability (Box 1) implies the use of ecological systems in a manner that satisfies current needs without compromising the needs or options of

future generations. There are obvious trade-offs. Achieving a better understanding of these trade-offs has been set as one of the fundamental objectives of the ISBI².

The ISBI recognizes, and rightly so, that the environmental issues are not only scientific but would include human perceptions, expectations, education and

Box 1. The guiding principles of ecologically sustainable resource management (Adapted after ref. 7)

- * Inter-generational equity: providing for today while retaining resources and options for tomorrow
- * Conservation of cultural and biological diversity and ecological integrity
- * Anticipatory and precautionary policy approach to resource use, erring on the side of caution
- * Limits on natural resource use within the capacity of the environment to supply renewable resources and assimilate wastes
- * Qualitative rather than quantitative development of human well-being
- * Pricing of environmental values and natural resources to cover full environmental and social costs
- * Global rather than regional or national perspective of environmental issues
- * Efficiency of resource use by all societies
- * Strong community participation in policy and practice in the process of transition to an ecologically sustainable society

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judgement. Therefore, an important aspect of the approach to the study under the ISBI umbrella will have to be based on new ways of organizing research projects and implementing their findings since effective integration of natural and social sciences is envisaged. A highly interactive participatory research is visualized wherein ecologists could join hands with planners and administrators, resource managers, disciplinary specialists and society at large. In this respect ISBI has to operate at a variety of levels linking up the actions of global decision makers at one end of the spectrum with rural peasants on the other extreme.

There are three important components envisaged (Figure 1). In order to be able to take the research outcome to decision makers, it is imperative that the research planning and implementation should be such that the results permit sound generalizations and interpretation. Indeed, education at all levels—school and university levels—should aim at creating a new breed of ecologists with training that includes both natural and social sciences. Nonformal education and training for the lay public and development of strong links with the media are also critical if the human dimension is to be adequately taken care of. Apart from demonstrating the benefits of ecologically sound practices to the community, education has to be a two-way interaction, assimilating and adapting traditional knowledge and technologies wherever required so as to develop the concept of sustainability on a value system which people can understand and appreciate and hence participate in the process of development itself.

The ISBI recognizes that the lessons learnt from previous international research programmes should be adequately integrated into the programme and suggests a few elements that should be included in its strategic approach (Box 2).

Consequently, ISBI has identified research priorities in three facets of sustainability: diversity and sustainability, sustainability in a changing biosphere, and human dimensions of sustainability. Ecological research must be directed in those areas of ecosystem function upon which sustainability of our biosphere depends and

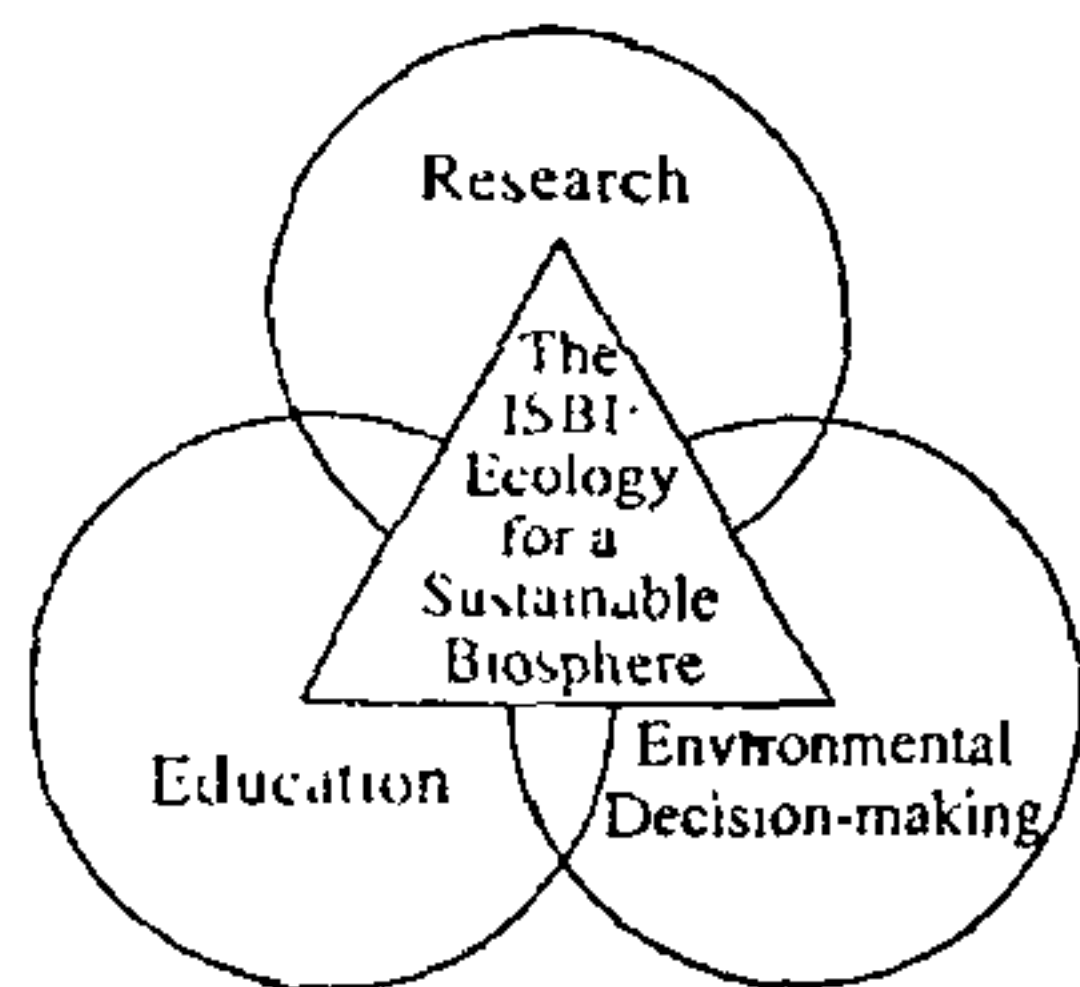


Figure 1. Interdisciplinary interactions called for by ISBI.

Box 2. Key elements for ISBI research approach
(After ref 2)

- * An operational research programme, setting short-, medium- and long-term goals, must be formulated to guide the programme and against which to evaluate its progress
- * A cornerstone of the ISBI should be investigator-initiated, peer-reviewed research within agreed research agendas or programmes
- * Participation in international programmes such as the ISBI provides an invaluable source of inspiration to researchers working in industrialized countries, and particularly to researchers in often isolated, rural communities of less developed countries where the need for such stimulation is greatest
- * The ISBI research programme must complement and be recognized by other international scientific endeavours, such as the International Geosphere-Biosphere Programme, the Man and the Biosphere Programme, and the Biodiversity Strategy and Action Plan
- * In view of the urgency and importance of these problems, and the limited resources currently available for environmental research, scientists must set rigorous criteria for the selection of priorities, otherwise such decisions might be taken by others
- * Innovative funding strategies need to be developed to satisfy the demands of this global, interdisciplinary project

this should also be set against the background of global change. Though there are well-established international efforts in some of these areas, the emphasis in ISBI effort is to strengthen those that are most relevant to achieve global sustainability and to complement efforts where appropriate. In all these initiatives, the human dimension was recognized as the key element. Indeed, during the SCOPE General Assembly discussions in Seville, Spain, in January 1992, the human dimension in the ISBI activity was emphasized to be the key element that sets apart ISBI from other international efforts considered so far (Box 3).

ISBI: an agenda in the Indian context

In India and other developing countries, during the recent past, there have been continuing conflicts between environmental considerations and developmental issues. Often the issues are either not properly focused or the scientific basis for a given environmental

Box 3. Human dimensions of sustainability
(After ref. 2)

Human population and perceived resources

Goal: To understand the relationships between the human population and renewable resources

- 1) What are the local, regional and global population growth trends, and how do they relate to perceived resource availability?
- 2) What are the cultural constraints on how people perceive environmental degradation? How does community participation in sustainability planning influence perceptions of the rate and direction of environmental change/degradation?
- 3) How is human regional migration related to perceptions of trends in environmental quality/degradation?
- 4) How can traditional knowledge and established production systems be incorporated into strategies for sustained development?

Human values and beliefs and resource degradation

Goal: To understand the role of various beliefs and value systems in generation differences in the dynamics of resource depletion or resource conservation at the local and regional level

- 1) How do local and regional values and belief systems constrain or promote the degradation of natural resources?
- 2) How can traditional values be incorporated into strategies for maintenance of biological diversity?

Cultural styles and environmental change

Goal: To understand how various life styles and socioeconomic regimes are related to ecological impacts

- 1) What is the relationship between equity of resource access/allocation and the sustainable use of natural resources?
- 2) What are the relative environmental impacts of different human life styles?
- 3) What are the ecological consequences of alternative industrial technologies?

lation pressures on the one hand, and efforts to rapid industrialization on the other, India is a land of contrasts. Whilst a major proportion of the population is involved in subsistence activities which lead to rapid degradation of the natural resource base, a small fraction on the affluent side are placing heavy demands on the nonrenewable resource base without replenishing the capital, and thereby exhausting the nonrenewables.

Diversity and sustainability

The 'hot spots' for conservation of biological diversity in India are often linked with tribal/traditional societies. Thus the north-east is one such region of the humid tropics where over 200 different tribes live and the social and cultural differences are often manifest over very short distances. The Western Ghats region in southern India where many traditional societies live has an equally rich biological diversity as the north-east. The Bastar region in central India is another important forest ecosystem with rich species diversity. The Andaman and Nicobar Islands and the mangrove forests of the Sunderbans also have many traditional societies integrated into the ecosystem. Therefore, conservation of these ecosystems is often linked to scientific management and development of these traditional societies.

The concept of biological conservation is closely linked to sustainable development. The launching of the world conservation strategy in 1980 was a significant turning point involving an integration of nature conservation with sustainable development of both human and natural resources. This implies that ecological integrity is to be maintained not only to meet human needs but also to achieve equity with social justice and provisions for maintenance of cultural diversity.

Sustaining cultural diversity is an important mechanism to promote conservation. The case study of northeastern India⁴ inhabited by a large number of tribal societies is an example to illustrate this point. Shifting agriculture which is the chief land-use system here and valley land agriculture and home gardens differ significantly depending upon social and cultural differences of the people. Consequently, the variety of nonconventional crop plants conserved by them is remarkable indeed.

Religion and culture form important factors for promoting conservation in traditional societies. Many tribes of northeastern India maintain sacred groves protected for cultural reasons. They believe that the spirits of their ancestors and their gods live in these forests. The fact that these sacred groves once formed part of each village is suggestive of the value attached to conservation by traditional societies. With the

issue not adequately developed. Consequently, objectivity often has been clouded by emotion. With emphasis on controlled consumerism, one needs to reconcile short-term interests for long-term benefits³.

Given the widespread poverty and increasing popu-

advent of modernity, it is unfortunate that these values have been rapidly eroded. There is need for a revival of these traditions.

Realizing that conservation of all species known or as yet not catalogued is an impossible task, priorities have to be determined. The criticality, from a conservation point of view, may be defined both in terms of ecosystem fragility and biological diversity. In such a definition, diversity sustained through human activities such as agriculture is also significant. The concept of the biosphere reserve, where the needs of human populations are integrated with conservation strategies, offers a unique approach for biological conservation. The ultimate objective should be to integrate conservation strategies with the existing or altered life styles of the human population.

Sustainability in a changing environment

The build-up of greenhouse gases and the consequent change in atmosphere and related global warming are mainly the result of energy overconsumption in the industrialized world. However, deforestation and desertification through overuse of natural resources in the developing world do pose major problems at local and regional levels, contributing to global change, though in a smaller measure than the polluting industries. Indeed, there are also international dimensions to problems such as deforestation where First World economies exploit tropical forests, an area that will require a suite of ecological studies that will differ in scale and application from those that are exclusively First World issues: Third world issues such as desertification, sedimentation, sanitation and malnutrition. It is, however, also important to consider issues such as appropriate technologies for rural development that would contribute to a healthier environment based on a value system with which people can identify themselves as shown through the interdisciplinary case study from northeastern India (Box 4).

In developing countries, exploitation of natural resources do not extend to any worthwhile restoration activity. Tropical deforestation is a good example. With world population increasing at an alarming rate of 80 million people per year and demographic pressures being more pronounced in the developing world, deforestation in the tropics is essentially a human problem. While good ecological/silvicultural principles should be the basis for any rehabilitation programme, narrow-based forestry initiative alone cannot tackle it. A broader-based interdisciplinary approach⁵ will facilitate the sharing of knowledge arising out of the three major components of the management strategy: ecological, social and economic, and silvicultural.

In the Indian context, forest resources and mineral

Box 4. Shifting agriculture (jhum) and sustainable development in northeastern India (After ref. 4)

For improving the system of land use and resource management in northeastern India, the following strategies suggested by Ramakrishnan and his coworkers are based on a multidisciplinary analysis. Many of these proposals have already been put into practice.

- * With wide variations in cropping and yield patterns under jhum practised by a hundred tribes under diverse ecological situations, where transfer of technology from one tribe/area to another alone could improve the jhum, valley land and home garden ecosystem. Thus, for example, emphasis on potato at higher elevations compared to rice at lower elevations has led to a manifold increase in economic yield despite low fertility of the more acid soils at higher elevations.
- * Maintain a jhum cycle of minimum 10 years (this cycle length was found critical for sustainability when jhum was evaluated using money, energy or soil fertility as currencies) by greater emphasis on other land-use systems such as the traditional valley cultivation or home gardens
- * Speed up fallow regeneration after jhum by introducing fast-growing native shrubs and trees
- * Condense the time span of forest succession and accelerate restoration of degraded lands based on an understanding of tree growth strategies and architecture, by adjusting the species mix in time and space
- * Improve animal husbandry through improved breeds of swine and poultry
- * Redevelop village ecosystems through the introduction of appropriate technology to relieve drudgery and increase energy efficiency (cooking stoves, agricultural implements, biogas generation, small hydroelectric projects, etc.). Promote crafts such as smithy and products based on leather, bamboo and other woods
- * Strengthen conservation measures based upon the traditional knowledge and value system with which the tribal communities could identify, e.g. the revival of the sacred grove concept based on cultural tradition which enabled each village to have a protected forest once upon a time, although few are now left

wealth are located in areas where traditional/tribal societies live. Because of the terrain conditions that are hilly, the ecological systems pose unique problems in terms of sustainability⁶. This is true for the northeastern region, the entire Himalayan zone, the central Indian Bastar area, the Eastern and the Western Ghats chains of mountains in the south, the tribal belts of

Bihar or Orissa or the traditional societies of the Aravallis in Rajasthan. While mining mineral resources, ecological issues should be linked to issues on redevelopment/rehabilitation of traditional communities. This obviously has to be based on a value system with which people can identify themselves. The human dimensions of sustainability cannot be delinked from ecological process studies when relating to perceived resource availability, resource degradation and the consequent environmental changes.

Sustainable development upon people's initiatives

India has a large number of nongovernmental organization groups working in the area of sustainable development with people's participation. A compilation of the more important of these case studies with particular emphasis on traditional tribal societies where much of the country's forest, water and mineral resources are located would be useful. Tribals in different parts are governed by different sets of rules in terms of their access to the resource base. This determines to some extent the exploitative versus conservative strategies adopted by them. This should be considered. Exploitation partly also originates from outside the region. These interactions and the externally imposed value system should be evaluated.

Sustainable development of local resources has to be based on a value system that people can understand and appreciate and therefore participate in the process of development. Traditional knowledge and skills should be integrated. In many societies a cluster of villages and in some cases even a village will have to be the unit for development. The size, whether it is a catchment area or something larger or smaller, will have to be location-specific. Much of the natural resource development in a country such as India (agriculture/animal husbandry/forest/domestic sectors) has to consider water as a limiting resource for a major part of the year, since the climate is monsoonic.

While district-level governmental structures exist for handling development plans, these could be tied with subdistrict level units that are ecologically more homogeneous and economically viable. Village-level institutions with participation of governmental and nongovernmental agencies and with special representation for women could form the basis for a bottoms-up approach to institution building up to the district level, while scaling up.

For a country like India, land degradation is a priority area for people-oriented sustainable developmental effort since rural societies by and large are

dependent upon land-based economic activities.

While theories of sustainable development make token mention of health aspects, in reality these are seldom taken into account when planning or implementing environment-related community development activities. Nongovernmental organizations both in the areas of health and environment are inherently sectoral in their approach with narrow perspectives on the linkages between health and environment. For those involved in health activities, related environmental issues are seen to be mainly in the domain of water and sanitation while for those engaged in environment-friendly activities disease is recognized only in its grossest manifestations and not as a gradual weakening or debilitation of the system as a consequence of constant exposure to pollution and toxic waste. The concept of environment has to be therefore broadened to encompass the home, work and social environments with their associated hazards. A truly successful case study must have surpassed the confines of sectorality.

Conclusions

It is increasingly felt all over the globe that ecological studies should be closely linked to human perceptions. In a world scenario, where one cannot visualize any ecosystems that are not human-impacted to a greater or lesser degree, it is no longer possible to view ecology merely as a natural science discipline. One may hasten to add, however, that natural sciences do form the foundation for ecological process studies. However, one needs not only to draw parallel between ecological process studies with social process studies but seek out the cross connections⁴ that are key to a sustainable biosphere. The International Sustainable Biosphere Initiative (ISBI) is aimed at providing such a perspective to ecology.

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