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## SUMMARIES OF GROUP DISCUSSION

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### Subject I

## Valuation of Ecosystem Services

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Ecosystem services can be described as all those visible and invisible benefits provided by the complex interaction of physical, chemical and biological properties of the environment. Natural landscapes such as forests, grasslands, mangroves and wetlands as well as managed ecosystems provide a range of 'services' to sustain human welfare. The services from these ecosystems include 'provisioning' services (food, water, timber, fibre and genetic resources) 'regulating' services (climate regulation, floods/drought regulation, water quality management and disease prevention), 'supporting' services (soil formation, pollination, pest management, nutrient cycling) and 'cultural' services (recreational, spiritual, religious). Due to the complex nature, even sophisticated technologies find it difficult to mimic it. But the importance of ecosystem services are not properly realised and recognised adequately in economic markets, government policies or land management practices. As a result, ecosystems and the services they provide are on decline, in quality and quantity. The societal, political and economic interventions in conservation and judicious use of ecosystem services can be improved if the economic value/worth of these services are estimated and projected. Such an attempt at local, regional and global level assumes relevance in this perspective. Assessing ecosystem service value thus is a pre-requirement for attaining millennium development goals (MDGs) through sustainable production approaches.

The theme for discussion in the conference was intended to focus on agroecosystems that are interrelated with agricultural production systems and those that affect the livelihood of large masses of poor. Thus the broad areas suggested were, valuation of externalities associated with the agricultural technologies and net impacts, farming systems, agroecosystems and environmental impact valuation, forest types and Total Economic Value, value of environmental impact of land use changes, evaluation and policy impacts, climate change impacts on ecosystem and its valuation and methodological challenges to valuation of ecosystems.

The discussions are grouped under five headings, basically following the ecosystem approach.

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## I

## AGROECOSYSTEM SERVICES

Agriculture has been managed for the direct provisioning services alone and ecosystem services from agriculture are not acknowledged properly. Agroecosystem valuation for the environmental attributes is an area which is less focused especially under developing country situations. The major points highlighted during the discussions are

1. The significance of ecosystem service valuation in land use planning;
2. Ecosystem service value of irrigated and rainfed farming systems with focus on soil quality aspects;
3. Watershed approach in development planning and ecosystem service value;
4. Mountain agriculture /upland farming ,livelihood dimensions externalities, impacts and PES;
5. Valuation of contribution of rangeland ecosystem towards livestock production systems and environmental quality;
6. Assessing the extent of ecosystem damage by the use of chemical management practices in agriculture and the present market structure and behaviour of these inputs;
7. Soil quality degradation due to intensive farming practices (soil salinity problem due to increased irrigation, monocropping and intensive farming);
8. The service value of integrated farming systems, agroforestry practices, homesteads etc.;
9. The wetland and water recharge functions of paddy fields and the ecological value;
10. Agricultural policy development in view of the ecosystem functions;
11. Assessment of conservation value and payment for conservation.

## II

## FOREST ECOSYSTEMS

The interlinkages between forests and agriproduction systems are to be quantified and valued in a holistic perspective. The direct and indirect, complex linkages between these two ecosystems are explained by many researchers and quantified. However, the role of forests as an ecosystem service provider essential for life systems is not accommodated in the present accounting procedure for policy decisions. Thus, the 'regulating' services (climate regulation, floods/drought regulation, water quality management and disease prevention), 'supporting' services (soil formation, pollination, pest management, nutrient cycling) and 'cultural' services (recreational, spiritual, religious) are not properly considered while some of the provisioning' services (food, water, timber, fibre and genetic resources) are

accommodated. The necessity of an alternate accounting system for valuation of forest resources are to be standardised in view of the initiatives towards the estimation of green GDP. The level of compromise on conservation and development is to be decided scientifically for which research support is essential.

Though one of the papers under this section attempted valuation of forest ecosystem services, the comprehensive approach for valuing all services were lacking. Further, the estimation of conservation value of forest resources (by forest dependent population) is also an equally important area to be addressed. Research focus on forest resource valuation in an ecosystem perspective assumes importance in the background of severe conflicts and pressures on forest wealth for *developmental* alternatives (dams, construction works etc). The Payment for Ecosystem Services (PES) in forest conservation activities (mangroves, sacred groves, private forests) through societal participation can be an effective policy instrument in conservation. In such instances the volume and pattern of payment can be decided based on realistic estimates of value of ecosystem services. The significance of forest dwellers in conservation efforts can be acknowledged through such policy interventions.

The need for resource/service flow between agriculture and forests systems was also stressed.

### III

#### WETLAND ECOSYSTEM

Wetlands are considered as resource for life. The silent services on water balance and quality regulation by these ecosystems are not considered as production inputs in agriculture. The Ramsar convention was the international event which highlighted the importance of wetlands. Three papers addressed the valuation of wetlands while one paper was on mangroves in wetlands.

The major points of discussion were:

1. The total economic value of wetlands (both man-made and natural) is to be undertaken nationwide and should be accounted in the accounting system of Local Self Governments.
2. The stakeholder benefits and livelihood dependence on wetlands is to be assessed and should form the basis for making policy decisions regarding its management.
3. The valuation of river ecosystems, though complex, need to be taken up and it can form the basis of water sharing and conflict resolutions.
4. Institutional forms for wetland management and policy for the same need to be researched upon.
5. Water recharge and quality management functions of wetlands and interlinkages with agri and fishery production systems.

## 6. Irrigation water pricing and resource value of water.

Mangroves are considered as the kidneys of earth and have been gaining attention since the tsunami that struck the shores during 2004. The storm and wave protection function and other ecosystem benefits of mangroves are seriously researched now. The papers on this aspect assessed the ecological functions of mangroves and stressed the need for multidisciplinary research in view of the interlinkages with agriculture, fisheries and other livelihood impacts.

### IV

#### CLIMATE CHANGE AND ADAPTATION STRATEGIES

Agriculture is highly sensitive to climate variability and weather extremes, such as droughts, floods, and severe storms. Studies on climate change report rainfed agriculture as more vulnerable in view of its high dependency on monsoon and the likelihood of increased extreme weather events due to aberrant behaviour of South West monsoon. Aberrations in South West monsoon which include delayed onset of monsoon, long dry spells and early withdrawals, all of which affect the crops, and strongly influence the productivity levels. These aberrations are likely to aggravate in future. The performance of agricultural systems, thus will be, largely influenced by the technological support, mitigation mechanism and adaptive strategies followed by the communities. The following areas need focus under this section

1. The vulnerability mapping of climate sensitive areas considering the geographical, agronomic and socio-economic aspects.
2. Impact assessment of extreme events and climate change on agri-production systems and its value.
3. Cost of mitigation and adaptation strategies and the economic justification.
4. Indigenous technical know how in the management of climate change.
5. Economically viable policy options in the management of climate change related damages.
6. The effects of climate change on the livelihood of the rural population.

### V

#### METHODOLOGICAL CHALLENGES

The focus of discussion during the session mostly revolved around the methodological approaches and challenges in valuation. The concern of attempting valuation of any single ecosystem function was raised by many, while most of the ecosystem functions were interrelated and complex in nature. There were serious interactions on sample identification, sample size, data collection and analytical tools while taking up empirical studies in this topic.

As agricultural economists, the scientific understanding of ecosystem functions and potential environmental impact of technologies are fairly good, among the researchers. However the capacity building exercises on valuation techniques may be very helpful in sharpening their research skills further. The future agricultural development envisages safe technologies which are socially acceptable, ecologically sound and economically efficient. Further, the scattered studies addressing different ecosystems using different methodologies fails to come up with comparable results in the national perspective. Considering these it was suggested that

- A network project on ecosystem valuation of agroecosystems may be initiated, ideally by the Ministry of Environment and Forests in collaboration with Ministry of Agriculture. This project can also help in natural resource accounting and estimation of Green GDP. Mechanism for national environment accounting may be developed on the lines of national income accounting with participation of different stakeholders including government, non-government and private agencies in collaboration with green economy campaign.
- Institutional arrangements for assessing the extent of environmental loss, the victims and agency responsible for negative externalities and regulatory mechanism for its monitoring and prevention is need of the hour. It was felt that one can establish a centre for Policy Dialogue for sensitising the public and policy makers on integrating ecosystem value in policy decisions. (on subsidies, pricing, EIA, conflict resolution etc.).
- Capacity building programmes for teachers and researchers are to be organised on a regional regular basis.
- Reference documents on status of environmental resources and guidelines for economic valuation exercise under different scenarios may be prepared, eg: Working paper series and manuals on specific topics (eg., CVM), text books for masters programme, training manuals and policy briefs.
- Studies on technology impact and climate change effects may be focused on. The national initiatives on management of climate change in agriculture should include the social perspectives and thus there should be agricultural economists trained in environmental valuation in these bodies.
- The major policy decision on technology adoption (eg., GM crops) may have to be taken only upon assessing and estimating the gains and damages to the ecosystem. The national body on this should include an agricultural economist trained in environmental analysis.