India and the WSSD (Rio + 10), Johannesburg: Issues of national concern and international strategies

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Beginning with Stockholm Conference (1972), the notion of 'sustainable development' has been under repetitive brainstorming at various fora, for mounting a practicably operational framework. However, auditing the activities during the last three decades has revealed that the difficulty lies in translation into practical implementation of policy or programmes. India's efforts at national or regional levels have been significant, but far from accuracy and adequacy in many of the cases, particularly when we look these in the mirror of sustainability and governance. Owing to India's diversity of ecological complexes, economic-development needs and sociocultural settings, national priorities have to be taken care of while framing the agenda for the nation's stand within any international meet. The journey from Stockholm to Rio that witnessed Johannesburg for the World Summit on Sustainable Development, in September 2002, now calls for introspection and auditing of our efforts for meeting national or global agenda of environmental safeguards and sustainable development strategy. The present paper analyses major issues of sustainable development paradigm in the wake of the journey from Stockholm to Johannesburg, identifying Indian priorities for scientific and strategic concerns to be bargained at national and international platforms. It has advocated the priority attention on the issues of food safety in sustainable agriculture, and preventive disaster management, besides listing major scientific concerns for research, education and policy action. Concerns of international cooperation and strategies have also been discussed. It is suggested that participation in global agreements and international negotiations must be based on the indigenous sustainable development model and need for technological and financial cooperation to meet the challenges and commitments.

IT is a fashionable pastime nowadays for many policy executives, planners and development analysts, to collect and discuss different and incompatible definitions of 'sustainable development', but understanding the words and their origin manifests that defining it is not a difficult task. The actual difficulty is faced while determining the coordinated approach and the course of actions to be implemented to achieve the real goal. The UN-based Brundtland Commission launched the term 'sustainable development'[1]. Since then, it has been widely used and is today a major political aim of various national and international organizations as well as for national governments. *The Ecologist*[2] published '*A blueprint for survival*' and written therein was 'our task is to create a society which is sustainable and which will give the fullest possible satisfaction to its members'[3].

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Sustainable development – the concept journey

The term 'sustainable' is also not open to much dispute: it means enduring, lasting and 'to keep in being'. Sustainable development is, thus, about ensuring that some measure of human well-being is sustained over time[4]. The frequently-quoted statement of the Brundtland Commission Report is 'sustainable development is a development which meets the demands of today without destroying the possibilities for the future generations to satisfy their needs'[1]. Some have called this a definition and have then tried to express it in operational terms on the basis of scientific concepts. These attempts at 'operationalization' are dominated by two different approaches, one for economic concerns regarding the extent of allowable resource-utilization, and the other for the all important ecological concerns of sustainability.

The first UN Conference on 'Human Environment' took place in 1972 at Stockholm, and brought developed and developing nations together to discuss the future of the global environment. Most importantly, however, the con-

ference established the foundation for addressing environmental problems in a global context and initiated a process of negotiating international conventions within the United Nations framework. The World Conservation Strategy (1980) of the International Union for Conservation of Nature, the United Nations Environment Programme, and the World Wildlife Fund (IUCN/UNEP/WWF, 1980) is often referred to as the first global statement on sustainable development[5]. The three priority areas indicated in the strategy were:

- Maintenance of essential ecological processes
- Preservation of genetic diversity
- Sustainable utilization of species and ecosystems.

If the Stockholm Conference in 1972 may be considered as the official start of international environmental awareness; the 1992 Rio Earth Summit (UNCED) represented a partial 'coming of age' of international movement. The links between improved environmental management and economic development were at the core of the UNCED agenda. However, counting the enthusiasm and commitment by the Heads and Officials of the participating states at the Earth Summit in Rio de Janeiro (Brazil), it seems difficult to realize that a decade has passed since then without any major outcome[6]. The euphoria that was generated during the Rio Conference '92, had died down at the New York Conference '97. The week-long conference at New York reviewed the progress since the Rio Summit '92, and found that the planet's oceans, forests and atmosphere were still in trouble and its population of poor people was still growing[7].

The challenge to manage our ecosystems and our immediate surroundings that we live in and to prevent or contain the likely disasters remains, and realizing the hot mode the countries agreed (a fortunate happening) to work out 'sustainable development strategies'. The unfortunate part of this welcome beginning is ignorance about the actual commitment. Thus, a large hue and cry on this issue in every sector is predominately without understanding 'what sustainable development really means'. The solution to this lies in the scope of 'ecology' as it is the only science through which the 'scientific philosophy of sustainable development' could be understood and achieved[6,8].

Ecology: Applied science for sustainability

During the period since the Stockholm conference (1972), ecology has become an integrated discipline that links the social and natural sciences. It retains a strong basic root in biological sciences but is no longer just a biological subject. Ecology as a 'hard' science includes ecological research involving the concepts and tools of mathematics, chemistry, physics and so on. But it is also a 'soft' science in that human behaviour has a lot to do with the structure and function of the ecosystems. Ecology as an integrated natural-social science that has a tremendous potential for application to human affairs, since real world situations almost always involve a natural-science component, and a social, economic and political component. The two cannot be dealt with separately if one expects to find lasting solutions to critical problems[9].

Ecology, even though the most important of the sciences from the viewpoint of long-term human survival, is the least understood subject[10], primarily due to: (i) lack of interdisciplinary approach in R&D and environmental education, (ii) inadequate consideration in the planning process or project decision making, and (iii) lack of awareness among public-policy executives on actual environmental issues. These often predominate in the developing countries because of the rare flexibility for coordination among the agencies or institutions working on different scientific components of the so-called 'environmental assemblage' and are coupled with the fact that at the policy-planning front, the materialistic face of socio-economic considerations often outweighs the ecological or long-term issues with just a note at the end that 'adequate care should be taken'. Influenced by many factors, such as large population, shortage of natural resources and degraded environments, transition from traditional illusion of 'economic development' to modelled sustainable development seems to be the difficult task. It is also well understood that no development is sustainable if life, property or other land-use resources are vulnerable to adverse environmental impacts or a disastrous event. The relationship between 'disaster reduction' and 'sustainable development', thus, has to be an imperative consideration in environmental and/or economic planning of regions.

World Summit and Indian environmental priorities

The World Summit on Sustainable Development (WSSD), held at Johannesburg in September 2002 (Rio + 10), followed the Stockholm Conference (1972) and the Rio Summit (1992). The three-decade long journey from Stockholm to Johannesburg began with the recognition of negative influences of human activities on environment, and was followed by a paradigm that sees environment and development inextricably linked. While national and international discussions still keep incubating about 'what are the key concerns to be addressed globally', some experts and organizations have already suggested the following few:

- Poverty eradication and sustainable livelihood
- Financial resources for environmental improvement
- Technology transfer
- Production and consumption patterns.

It is of the utmost need to review and audit the efforts towards sustainable development objectives at the global level so as to discuss and evolve a more effective strategy to make this world safer not only for our future generations but for all the natural life forms to be in ecological

harmony. However, global and international issues can only be targetted properly if the initiatives of policy, programmes, cooperation or negotiations are formulated with due consideration to national scenario of the member countries, owing to their developmental status, technological strength, ecology and socio-cultural base.

The national level discussions and programmes from 1972 onwards (when the first National Committee on Environmental Planning and Coordination was set up), and subsequent involvement in various international fora have demonstrated India's concern about the following global environmental issues[11]:

- Biodiversity conservation, protection of biological-diversity habitats/origins, and interest of communities fostering it.
- Climatic change and effects, including those that may occur due to greenhouse gases and other atmospheric pollutants, and also the effects like sea-level rise and alteration of bioproductivity, etc.
- Moderation in the use of ozone depleting substances and their substitutions.
- Moderation of the use of hazardous substances and keeping a check on their shortage and transportation, including transboundary movements.
- Impacts on forestry, water, air, soils and issues arising from industrial and urban growth.

The measures taken in India so far touching on both national and global issues, do indicate about having walked several steps on the road to sustainable development. However, these cannot be claimed to be adequate and much more is to be done for conservation of energy, water and raw materials, using cleaner technologies of production, promotion of renewable energy sources, properly valuing natural resources, decentralizing management of common property resources, securing the economic base of our poor people, and recognizing the contributions that all the stakeholders can make to promote sustainable development. On behalf of the Ministry of Environment and Forests, Government of India, the Ahmedabad based NGO – Centre for Environment Education convened regional and national consultations for the preparation to the Johannesburg Summit 2002. Two major issues projected by the organizers were: (1) sustainable agriculture and (2) cleaning of rivers. However, the major deliberations and discussions during these workshops highlighted the thrust on national self-introspection and review for setting the priorities and agenda for India's protocol of action within the country and its stand in the World Summit. This entire exercise must be based on the quality-of-life issues, ecological settings, sociocultural and economic development requirements for safer-sustainable civilization. Auditing the environment–development interface in India, in the present scenario, suggests the following major thrust areas for scientific concern and action:

- Food security: environmentally sustainable agriculture
- Water resources reuse, recycling, recharge and conservation
- Energy: conservation, alternatives sources and efficient distribution
- Urban environmental infrastructure and immigration control
- Reduction in emission of global hazard gases and enhancement of sinks
- Greening the land-uses: forestry and ecosystem replications
- Community concern in management of biodiversity resources and habitat
- Industrial safety, accident prevention and occupational health
- Natural hazard assessment, preventive measures and emergency management
- Gender issues for rooting the equality and eco-culture in the family environment and society.

Impact assessment of Rio Summit and Agenda-21

The Earth Summit at Rio (1992) marked the beginning of a new era of cooperation between the rich and poor countries to save the global environment. International Conventions on 'climate' and 'biodiversity' were signed by the majority of nations that attended the summit[12]. The deliberations of the summit made it clear that sustainability in physical terms can only be achieved through new dimensions of cooperation among nations and peoples of our planet and, most of all, a new basis for relationships between rich and poor both within and among the nations. The Rio Summit represented the most comprehensive programmes ever agreed to by governments for shaping the future. There have been significant achievements, which demonstrate that the transition to sustainable development called for at Rio is possible[13].

Tragically, implementation of Agenda-21 has been at best feeble, and at worst completely inadequate to deal with the social and environmental crisis that we face. Ten years on, 2 billion people – one-third of the world's population – live in extreme poverty, lacking clean water, adequate sanitation and access to energy. Many of the world's poor suffer from the effects of land degradation that has reduced the productivity of up to two-third of the world's agriculture areas. Land clearing has continued unabated and half of the world's tropical rainforests and mangroves are now lost forever[14]. In 1997, seven years after Agenda-21, the Global Environmental Outlook Document (GEO-1997) prepared by United Nations Environment Programme for the Asia-Pacific region identified the following priority environmental problems:

1. Deforestation
2. Degradation of land resources
3. Downward trend in quality and availability
4. Urban congestion and pollution

5. Marine and coastal degradation
6. Industrial pollution
7. Sea-level rise
8. Waste disposal
9. Over-consumption of chemical fertilizers and pesticides
10. Acid rain and natural disasters.

Such an irony of the situation led the UN Secretary General Kofi Annan to state in his report issued on 20 December 2001 that 'progress towards the goals established at Rio has been slower than anticipated and in some respects conditions are worse than they were ten years ago'. The report claimed that Agenda-21 still serves as a 'powerful and long-term vision' and remains as valid today as it was at Rio. Nevertheless, while progress has been made in some areas to protect the environment, it found that the state of the world's environment is still fragile and conservation measures are far from satisfactory.

There are now corrective actions from the developing world along with increasing national investments for sustainable development. For example, in India, government assistance on a rough and ready basis in the last ten years for environment, forestry, wildlife and relevant areas of agriculture and development sectors (excluding investments to improve social development indicators) runs to about US $ 500 million[15]. However, tools like natural resource accounting or budgeting, strategic environmental assessment, and life-cycle assessment are yet to be placed in proper practice. India has taken big strides in meeting the follow-up of Agenda-21 objectives. A series of legislative measures has been enacted to address and regulate the environmental issues. Several conservation programmes and plans like the National River Water Action Plan, Project Tiger and Project Elephant, and National Environmental Awareness Campaign, etc. are in place. Following are the important post-Rio policy initiatives and projects in India that had potential impact:

1. Public Liability Insurance Act, 1991
2. National Conservation Strategy, 1992
3. Policy Statement for Abatement of Pollution, 1992
4. EIA Notification, 1994
5. Introduction of Environmental Audit (Statement), 1992
6. National River Conservation Directorate
7. National Afforestation and Ecodevelopment Board
8. Regulations on Hazardous Chemicals, Hazardous Wastes, Plastic, Municipal Waste, Emergency Planning, etc.
9. Biodiversity Act, 2002, and National Biodiversity Strategy and Plan
10. Wildlife Conservation through Species/Genera/Habitat-Specific Projects
11. National Natural Resource Management System
12. National Action Programme to Combat Desertification
13. Capacity Building Project on Industrial Pollution Control
14. Capacity Building Project on Industrial Safety and Disaster Prevention
15. Disaster Management Bill, 2002.

Despite all the above efforts and investments into environmental safeguards and remediation, a fresh multisectoral and objective assessment of all critical environmental issues in the country is imperative so as to prioritize the cases and help arrive on a consensus mode of integrated action towards sustainability. A principal target of Agenda-21 was the development of National Sustainable Development Strategies and a target of 2002 was set[16] in 1997. However, it has to be ensured that these guidelines must serve as a set of coordinated mechanisms and processes to help societies work towards sustainable development, not as 'master plans' that often add to the workload of governments and get increasingly out of date.

Food safety and sustainable agriculture

The concept of 'food security' has undergone an evolutionary change during the last fifty years. In the 1950s, food security was considered essentially in terms of production. In the seventies, it was related with the purchasing power for access to balanced diet, and thus, to jobs and livelihood opportunities. But, it was later realized that despite the availability and satisfactory access, biological absorption of food is related to the consumption of clean water, environmental hygiene, primary health-care and education. Finally, even if physical and economic access to food is assured, ecological factors will determine the long-term sustainability of the food security systems[17]. Based on these facts, the M.S. Swaminathan Research Foundation, under UN World Food Programme, has prepared a Food Insecurity Atlas of Rural India[18]. However, the ecological risk-management criteria often rely on the preventive approach rather than only curative measures, and hence, 'food safety' has to be given equal concern as the land–water interface and the food chain is under the stress of contamination resulting from excessive use of chemicals in agriculture and other human activities. A recent study[19] has concluded that highest levels of pesticide residue are seen in human tissue in India, severely affecting the central nervous system. Extremely high levels of pesticide residues were found in drinking water and dairy products and even baby foods. Besides this, pests have become resistant to most pesticides due to excessive application[20]. Thus, food safety must be considered as an important criterion for measuring food security and agricultural success for human sustainability.

India's land resources are under immense pressure as reflected by the fact that it shares only 2% of the world's geographical area, but supports more than 18% of the world's population and over 15% of the world's livestock. A current estimate shows that about 62% of country's land suffers from soil erosion, waterlogging and salinity[21]. The declining trend in the carrying capacity of land and other natural resources has drawn the attention of the scientific community to look for an alternative approach for sustainable and ecofriendly agricultural practices.

The present agricultural system that has evolved from the Green Revolution, is mainly being governed by a policy of economic development that emphasizes on high productivity for commercial purposes. This has led to agricultural intensification involving improved cultivars, expanding areas under single crop or cultivars leading to devastating deforestation, and above all these, intensive use of agrochemicals like fertilizers, pesticides, synthetic growth regulators, surfactants, etc. All these unilateral approaches of increasing production have generated severe undesirable impacts, viz. loss of biodiversity, degradation of land and water resources, environmental pollution and factors inducing climatic alterations.

Ten out of 40 action points included in Agenda-21 adapted at UNCED, Rio directly related to sustainable agriculture[22]. According to the Consultative Group on International Agricultural Research, 'Sustainable agriculture is the successful management of resources to satisfy the changing human needs, while maintaining or enhancing the quality of environment, and conserving natural resources'. Hence, the key to sustainable agriculture lies in the coordination of organic farming strategy with the following:

- Diversified agriculture practices, including agroforestry
- Integrated water resource management and recharge
- Integrated pest management based on biopesticide application and natural control
- Ecotechnologies for soil-health healing and biofertilizer application
- Participatory issues and integration with rural development.

Besides these, issues of biosafety and protection from threats of genetically modified organisms in the wake of international regulations for Intellectual Property Rights are important, as many biotechnology companies sell themselves as visionaries working to solve humanity's food problems, but their research focuses exclusively on commercially valuable crops, not crops that are important to the poor, and they would like to 'own' the living cells they produce in every sense of the word[23].

Preventive disaster management

In recent decades, a number of major disaster events (natural, technological and ecological) have made the global community aware of the immense loss of human lives and the productive resources that are caused regularly by such calamities[24]. Thus, natural as well as man-made disasters are the major obstacles in the activities for achieving the aim of sustainable development. The losses related with various disasters (natural and anthropogenic) often affect Gross National Product and thus severely influence the balance between nature, society and economy[25]. However, issues related to disaster management have not been given proper concern in the strategic designs, planning, research or implementation in many developing countries like India. 'A disaster is an event, be man-made or natural, located in time and space, that produces the conditions whereby the continuity of structure and processes of social units becomes problematic'.

On an average, disaster killed more than 1.2 lakh people and affected more than 13.5 lakh people every year between 1971 and 1995. Floods killed the maximum number in Asia (39,072). In 1999, nearly 40% of the total disasters in the world took place in Asia. Significantly, the number of non-natural disasters, including industrial accidents, has gone up[26] by 18% since 1995. Disasters are simply classified as natural and man-made, based on origin of hazards. Natural disasters are floods, droughts, earthquakes, cyclones, landslides, erosion, etc. whereas technological mishaps, chemical accidents (fire, explosion, toxicity, radiation) and environmental extremes are man-made hazards of concern.

With the realization that 'prevention is better than cure', the issues of hazard identification and mitigation besides risk reduction have become an obligatory concern for managers studying disasters. Unfortunately, the common practice in many developing countries, including India, is that disaster management is dealt by Revenue Officials who know relief and rehabilitation as the only potential measures. The term 'prevention' is often wrongly defined and is just quoted as a synonym to preparedness and warning alert. However, now there is involvement of the technical and scientific community in disaster risk identification and planning, and the role of Environmental Impact and Risk Assessment and Auditing and Risk Mapping Approach, in a broader sense is being accepted. The schematic process of disaster management can be categorized in five steps: disaster prevention, disaster mitigation, forecasting and warning, on-site rescue, relief and rehabilitation. Exercise for disaster management planning may involve hazard identification, hazard analysis, total environmental impact assessment, selection of risk minimization and mitigation measures, emergency planning and mock-drills. Research, training and awareness are the measures to be integrated for ensuring the effective implementation of disaster management strategy on regional basis.

Recently, a Disaster Management Bill (2002) has been notified (draft), but the provisions therein are inadequate from the viewpoint of preventive strategy. A policy tool must provide the comprehensive and objective cover of guidelines for hazard and vulnerability analysis, risk-based planning, issues related to science and technology application in disaster management, and organizational framework to minimize the calamities and to manage the emergencies. Issues related to prevention and management of natural and man-made disasters must be imperatively integrated and emphasized adequately in the proposed National Strategy for Disaster Management. Research and training on issues of disaster prevention and management is in a poor state in the country and needs strong academic investments to be backed with political will and wisdom.

Community participation and role of village-governments

The solution to the present-day environmental crisis lies in the people's movement, now calling for a new model of development that provides benefits for all without stripping the environment and destroying livelihood[27]. During late 1970s, the government, NGOs, the media and numerous others began to realize the significant connection between poverty and the need for rational and equitable environmental management[28]. Public participation provides an opportunity to evaluate the technical views in the mirror of social preferences[29].

Development of local economy while managing common pool resources has become an integral part of sustainable development policy in developing countries in the past few years. The interest has emerged largely as a consequence of the widespread failure of centralized government schemes to provide sufficient incentives to resource users to manage local resources on a sustainable basis. It is argued that the organized civil society can play an important role to address many economic issues like internalization of ecological externalities, provision of local public goods, and the access of the poor to credit that neither the market nor the state can reliably offer[30].

The post-independence era has, unfortunately, seen a gradual subjugation of people's institutions and custodianship of natural resources in India, as evident from the history and current status of *Van Panchayats* (or Forest Management Councils) in Uttaranchal[31]. However, there are excellent recent examples of self-reliance in community-based natural resource management in many rural areas in different parts of India[32,33]. Community-based natural resource management is a practice that emphasizes natural resource management by, for, and with local communities[34] with objectives of (i) improving livelihood and social security of local people, (ii) enhancing environmental conservation, and (iii) empowering the local people. Local communities perform natural resource management activities only when they see tangible benefits, unobstructed access and property rights over resources[35]. Formal and non-formal community groups play a significant role in perception of natural hazards, vulnerability, and in the participatory mode of capacity building for disaster prevention, preparedness, response and relief measures[36].

The main objectives of introducing *Panchayati Raj system* is to extend democracy to the grassroots level and ensure involvement of people in all governmental processes and developmental activities. *Panchayat* that caters to the day-to-day needs of the people can provide for people's participation and initiative[37]. However, uninterrupted interaction and collaboration among state, *Panchayat* and regional NGOs are necessary to avoid any conflict at later stages, and help ensure sustainability in long-term programmes and credibility in short-term decisions.

Conclusion

Based on the deliberations in various meetings and fora, and on analysing the facts about the strengths and weaknesses of environmental programmes of the country, it is likely that we need a very serious, long, hard and critical introspection of the efforts from policy to the project-level implementations. For achieving the goals of sustainable quality-of-life supported by adequate natural resource base (ecological footprint), a holistic, integrated and coordinated approach is required in planning, decision-making and implementation monitoring. Along with the two major issues discussed above, viz. food safety and sustainable agriculture, and disaster management, the following aspects of environmental science and governance call for strengthening and action focusing on:

- Coordinated efforts must be initiated to workout the National Sustainable Development Strategy involving multisectoral approach and covering all relevant issues in the prevailing statements, guidelines or regulations on environmental pollution, waste, natural resources, biodiversity, natural hazards, industrial hazards, and traditional ecological-knowledge base.
- Recognition and encouragement of the discipline 'Environmental Impact Assessment and Auditing' within the academics as a scientific area of activity, and facilitation of adequate research and training on the subject to broaden and sharpen its scope of applicability.
- Setting up of a Council of Environmental Research and Training, as an apex scientific body at the national level as an umbrella for institutions/agencies dealing with environment, biodiversity (forest and wildlife), natural disasters, industrial safety, etc. to coordinate both the R&D and the environmental education activities in the country.
- Application of bioremediation principles and tools in pollution control, waste management, land-resource reclamation, water treatment, etc.
- Consideration of 'environmental–occupational health and hygiene' as a priority issue and the scientific measures to be translated from laboratory trials to field in the prevention of deleterious health disorders and diseases due to environmental pollution.
- Prudent environmental planning of regions for urban growth, industrial locations, forestry or other human activities, considering ecological features, carrying capacity, hazard-risk issues, etc. The recently suggested 'environmental risk mapping approach'[38] may prove to be a preferable tool over the earlier approaches.
- Efforts must be initiated to control the quality of environmental services by public and private sector agencies in the country, research and development, and in professional environmental training, so as to ensure the accuracy and confidence in policy decisions.

While the major negotiations and responsibility-sharing subjects in different upcoming international and global

conventions/treaties are to revolve around minimizing carbon dioxide and other greenhouse gas emissions; encouragement of non-CFC technology, biodiversity trade and rights, intellectual property and common property rights over species modification, biosafety, technology transfer, poverty alleviation, etc.; it appears wise and prudent that we, in India, prioritize our own environmental issues to develop an indigenous model for sustainable development, and to negotiate for support from the technologically and financially rich nations/agencies, using such fora, besides rational involvement in international agreements. This shall strengthen our national efforts of achieving sustainable development targets and contributing to international environmental goals. It is of pivotal importance that the crucial interconnection between food, economic, social and ecological security is understood in all its varied aspects. It has also to be ensured that the depressed and backward, social and economic groups are not further marginalized, and relegated to the background but that their status improves and they willingly participate to contribute towards the national efforts of the all important sustainable development.

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