

# SEMINAR PROCEEDINGS

Seminar on

## 'ENVIRONMENTAL ISSUES: ACHIEVING A SUSTAINABLE FUTURE'

held on Saturday, 15th March, 2008  
at Vidya Mandir Auditorium, Kolkata



**J. D. BIRLA INSTITUTE**

(Affiliated to Jadavpur University)

Departments of Home Science, Management & Commerce

# **J. D. BIRLA INSTITUTE**

**Department of Home Science, Commerce & Management**

**FOUNDED IN MEMORY OF**



**Smt. Jawahari Devi Birla**

## **Institute Premises**

**Main Campus:** 11 Lower Rawdon Street, Kolkata 700 020

**Satellite Campus:** 1 Moira Street, Kolkata 700 017

## THE INSTITUTE



Smt. J. D. Birla Institute came into existence as an informal body that was sponsored by the Calcutta Ladies Association. The association began informal classes in basic Home Science subjects with a view to helping housewives in social etiquette, flower decoration, needlework, painting, music and cooking. When these classes became popular, the idea to develop it into a regular Home Science college took root. The vision and foresight of the Late Smt. Sushila Devi Birla, wife of Late Shri L. N. Birla, the great industrialist led to the establishment of Smt. Jawahari Devi Birla Institute of Home Science. Thus, the institute began its formal career in June 1962, satisfying a much-needed demand for scientific training in homemaking for girls.

After its establishment in 1962, the ensuing 44 years have seen the Institute make pioneering strides in the field of education. Imparting quality and holistic education to its students has always been its guiding mission, growth and development its foci. While the initial years saw consistent achievements in Home Science Education, the year 1997 saw the establishment of its Department of Commerce. In 2002, the Department of Business Administration was founded when the Institute was rechristened as 'Smt. J. D. Birla Institute'. It exists today as a full-fledged institution providing graduate, post-graduate and doctoral degrees, with affiliation to the highly accredited Jadavpur University, located at Jadavpur, Kolkata 700 032.

Today the name has been further modified simply to J. D. Birla Institute. It exists today as a full-fledged institution providing graduate, post-graduate and doctoral degrees, with affiliation to the highly accredited Jadavpur University, Kolkata. The University has been awarded a 5 star (\*\*\*\*\*) rating and the institute has been accredited with B+ Grade (Institutional score of 75 – 80%) by the National Assessment and Accreditation Council (NAAC).

The Institute boasts of a well-designed campus with spacious classrooms, laboratories equipped with the most-modern equipments, an auditorium that can accommodate 200 students, an audio-visual studio, two state-of-the-art computer training centres (for undergraduate and postgraduate levels), EDP units, and two departmental libraries with classic and rare collections of books, journals and periodicals.

The dedicated teaching staff guides and trains the students at the most personal level, and this is facilitated by an impressive teacher-student ratio. Emphasis is laid upon hands-on experience in the practical classes along with intense classroom sessions. Regular assignments, projects and seminars help the students in self-analysis and appraisal, while also providing additional motivation for greater performance. Frequent educational visits to social, educational, technical and commercial centres help gain valuable experience, while the visiting faculty from vocational and academic fields provides the much-needed in-depth knowledge of the complex areas of the curricula.

Necessary revision of the curricula/syllabi is done periodically to keep them at par with the international standards of education and to conform to the emerging attitudes, environmental factors and living patterns.

The education program is complemented with co-curricular activities such as debates, quiz, dramatics and sports to ensure the all-encompassing development of the young students.

**SEMINAR on 'ENVIRONMENTAL ISSUES: SELECTING A SUSTAINABLE FUTURE'  
PROGRAMME SCHEDULE**

<b>INAUGURAL SESSION (10:00 a.m to 11:30 a.m) – 90 minutes</b>				
Sl. No.	Particulars	Time	Topic	Resource Person
1	Lightning of the Lamp	10:00 a.m to 10:05 a.m – 5 minutes	—	—
2	Welcome Address	10:05 a.m to 10:10 a.m – 5 minutes	—	Dr. (Ms.)Deepali Singhee, Principal, J D Birla Institute
3	Film Show	10:10 a.m to 10:30 a.m – 20 minutes	An Inconvenient Truth'	Al Ghore
4	Inaugural Address by Chief Guest	10:30 a.m to 10:45 a.m – 15 minutes	—	Mr. Debol Roy, Member Secretary, West Bengal Pollution Control Board
5	Key note AddressBy Guest of Honour	10:45 a.m to 11:20 a.m – 35 minutes	'Holistic Approach on Environment- Problems & Issues'	Prof. (Dr.) Anando Dev Mukherjee, Ex-Vice Chancellor, Vidya Sagar University, Midnapore, West Bengal, EMERITUS Professor & Director, School of Oceanographic Studies, Jadavpur University, Kolkata
6	Vote of Thanks	11:20 a.m to 11:30 a.m – 10 minutes	—	Dr. (Ms.)Deepali Singhee, Principal, J D Birla Institute

**TEA BREAK (11:30 a.m to 11:45 a.m) – 15 minutes**

<b>DISCUSSION: Bird's Eye View on Environmental Issues (11:45 a.m to 1:15 p.m) – 90 minutes</b>				
Sl. No.	Topic	Resource Person	Time	Designation
1		CHAIRPERSON		Prof. (Dr.) Anando Dev Mukherjee, EMIRITUS & Director, School of Oceanographic Studies, Jadavpur University, Kolkata
2	Human Face of Sustainable	Prof. (Dr.) Suman Mukerjee	11:45 a.m to 11:55 a.m – 10 minutes	Director, J D Birla Institute and Environmental Fellow, USAEP
3	Green Buildings	Mr. Pradip Chopra	11:55 a.m to 12:05 a.m – 10 minutes	Chairman, Education Committee & Governing Board Member, CREDAI
4	Use of Information Technology in the Aid of Urban Environment Management	Mr. Tapas Kumar Ghatak	12:05 a.m to 12:15 a.m – 10 minutes	Project Director, Kolkata Metropolitan Development Association (KMDA)
5	Global Warming	Dr. Achintyo Chattopadhyay	12:15 a.m to 12:25 a.m – 10 minutes	Zoological Survey of India, Central Entomological Laboratory
6	Biodiversity	Dr. Soumen Ghosh	12:25 a.m to 12:35 a.m – 10 minutes	Senior Research Officer West Bengal Biodiversity Board
7	Wet Lands	Prof. Subash Chandra Santra	12:25 a.m to 12:35 a.m – 10 minutes	Head, Department of Environmental Science, Kalyani University, West Bengal

**Question & Answer Session (12:45 p.m to 1:15 p.m) – 30 minutes**

**LUNCH (1:15 a.m to 1:45 a.m) – 30 minutes**

<b>Technical session – I: GLOBAL ISSUES (1:45 a.m to 3:15 p.m) – 90 minutes</b>				
Sl. No.	Topic	Resource Person	Time	Designation
1		CHAIRPERSON		Prof. (Dr.) Siddharta Dutta, Pro-Vice Chancellor, Jadavpur University, Kolkata
2	Disaster Management	Prof. (Dr.) Dilip Sinha	1:45 p.m to 2:10 p.m – 25 minutes	Ex-Vice Chancellor, Visva Bharati University, Shantiniketan, West Bengal
3	Pollution Control & Problem in the Society & Industry	Mr. Sutanu Ghosh	2:10 p.m to 2:35 p.m – 25 minutes	Managing Director, Ghosh Bose & Associates
4	Environmental Laws & Legal Issues	Mr. Nandan Nawn	2:35 p.m to 3:00 p.m – 25 minutes	Lecturer, National University of Juridical Sciences (NUJS)

**Question & Answer Session (3:00 p.m to 3:30 p.m) – 15 minutes**

**TEA BREAK (3:15 p.m to 3:30 p.m) – 15 minutes**

<b>Technical session – II: INDUSTRIAL ECOLOGY (3:30 a.m to 5:00 p.m) – 90 minutes</b>				
Sl. No.	Topic	Resource Person	Time	Designation
1		CHAIRPERSON		Prof. Sujay Basu, Ex-Director, School of Energy Studies, Jadavpur University
2	Energy Audit	Prof. Sujay Basu	3:15 p.m to 3:40 p.m – 25 minutes	Ernst & Young
		Mr. Subhendu Bose	3:40 p.m to 4:05 p.m – 25 minutes	
3	Industrial Ecology & Carbon Trading	Mr. Surojeet Bose	4:05 p.m to 4:30 p.m – 25 minutes	Principal Consultant, Sustainable Services, Price Water House Coopers

**Question & Answer Session (4:45 p.m to 5:00 p.m) – 15 minutes**

<b>VALEDICTORY SESSION (4:45 p.m to 5:00 p.m) – 15 minutes</b>				
1		Vote of Thanks		Dr. (Ms.)Deepali Singhee, Principal, J D Birla Institute
2		National Anthem		—

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## **CONTENTS**

<b>1</b>	<b>Human Face of Sustainable Development: Environmental Management in 21<sup>st</sup> Century</b> Prof. (Dr.) Suman Kumar Mukerjee	<b>12 – 22</b>
<b>2</b>	<b>Green Building Gaining Popularity</b> Mr. Pradip Chopra	<b>23 – 27</b>
<b>3</b>	<b>Digital Governance in West Bengal Municipalities with application of GIS</b> Mr. Tapas Ghatak	<b>28 – 30</b>
<b>4</b>	<b>Global Warming</b> Dr. Achintyo Chattopadhyaya	<b>31</b>
<b>5</b>	<b>Biodiversity: For a Better Future</b> Dr. Soumen N Ghosh	<b>32 – 33</b>
<b>6</b>	<b>Priorities on Wetland Conservation - Need of the Hour</b> Mr. Subash Chandra Santra	<b>34 – 38</b>
<b>7</b>	<b>Whither Changing Paradigms on Disaster Management?</b> Prof. (Dr.) Dilip Kumar Sinha	<b>39</b>
<b>8</b>	<b>The Carrying Capacity Approach To Regional Planning</b> Mr. Sutanu Ghosh	<b>40 – 41</b>
<b>9</b>	<b>Environmental Laws and Legal Issues - An overview</b> Mr. Nandan Nawn	<b>42 – 47</b>
<b>10</b>	<b>Industrial Ecology &amp; Carbon Trading</b> Prof. Sujay Basu	<b>48 – 51</b>
<b>11</b>	<b>Industrial Ecology &amp; Carbon Trading</b> Mr. Surojit Bose	<b>52</b>

## Human Face of Sustainable Development Environmental Management in 21<sup>st</sup> Century

**Prof. (Dr.) Suman Kumar Mukerjee**

*Director, J D Birla Institute*

*11 Lower Rawdon Street, Kolkata 700 020*

### Section A

The concept of sustainable development implies balancing environmental protection with the generation of increased opportunities for employment and improved livelihoods. However, the breach between environmentalists and development officials reflects a deep divide over how to implement the rally cry of the World Bank Conference: 'Sustainable Development'. Sustainable development is something of an oxymoron. The term derives from two verbs, 'to sustain' and 'to develop', with almost opposite meanings. Whether one puts the emphasis on 'sustaining' or 'developing' can lead to quite different policy prescriptions. This, in fact, is one of the reasons the trade and environment debate has received such broad attention.

Most industrialized countries see sustainable development along the lines of the definition developed by World Commission on Environment and Development. The Brundtland Commission called for development that 'meets the need of the present without comprising the ability of future generation to meet their own needs. Its report noted that poverty is the central cause of ecological stress, but the Commission focused primary attention on the integration of longer-term and broader policy perspectives into economic and environmental decision making. Consequently, issues of inter-generation equity such as resources depletion, bio-diversity and management of the global commons were dealt with. Others seek to address global environmental issues such as climate change.

In contrast, developing countries tend to stress the importance of alleviating poverty on discussions on sustainable development and on the "ethical dimensions of sustainable development to make them consistent with 'ecological imperative'. This centres on short-term needs and basic public health amenities. Although the impact of soil erosion, deforestation and other ecological harms can be devastating to their people, officials in many developing countries treat environmental degradation and resource depletion as second order considerations; global environmental issues are barely a priority at all.

These preferences are not illogical. The World Bank has estimated that every year more than two million people in developing countries die from illness attributable to polluted water and billions of people fall ill from water borne diseases. Moreover, to people who have life expectancy of 45 to 50 years, the prospects of getting skin cancer or cataracts when they are 70 years of age from sun exposure exacerbated by depletion of the ozone layer seem very remote indeed. Under these circumstances truly long-term problems such as climate change in 50 to 100 years carry almost no weight. An interesting exception to this principle is the very active participating in the recent climate change negotiations of the island nations are the Pacific and the Caribbean islands as they recognize that their very existence is threatened by sea level rise.

While resources conservation and other sustainable development concepts have no resonance with the very poor, the merely poor can and often do make decisions to trade-off short term gain for longer term opportunities, particularly if the social structures of their communities, such as land tenure policies give stem incentives to do so.

Moreover, how can afforestation policies make sense to the poor who sell firewood to hedge against destitution? In many sections of Africa the current consumption of fuel wood exceeds annual growth in supply by as much as 30 to 200 per cent.

It is now widely accepted that the links between poverty, high population growth and environmental degradation are circular and mutually reinforcing. Investing in people is an urgent moral imperative. This will reduce poverty and population growth and in the long run arrest environmental degradation.

The principle that concern for social and environmental sustainability must permeate all development activity is fundamental to the concept of sustainable development. To promote this principle, it is essential to understand the link between rapid population growth, poor agricultural development and environmental degradation. New ways must be evolved to examine ways of averaging these links so as to stop and reverse the cycle: which is possible through access to markets; investment in education, health, agricultural services and infrastructural development in the face of rapid population growth. It is all the more relevant to increase per capita agricultural production and income and improve natural resource management. This will ensure economic stability and arrest the spread of both rural and urban poverty.

From a practical perspective interventions that leverage the environment-development nexus to achieve improvement in human well-being and in the health of the environment can be divided into three broad categories:

- Resources development interventions that seek to improve the material well being of the poor.
- Human development intervention such as those that improve health, nutrition and education to foster efficient utilization of natural resources, thereby enhancing productivity and physical well being.
- Social development interventions that will ensure that the development process touches those who need it most - The poor and needy.

Environmentally sustainable development is based on two axioms. The first axiom is that reducing poverty and investing in people are essential for environmental sustainability. The second axiom is, that promoting the efficient use of resources benefits both the environment and the economy. A model of development based on these actions, can create a coherent approach that will help to link economic growth to peoples' aspirations.

## **Section B**

The concept of sustainable development implies balancing environmental protection with the generation of increased opportunities for employment and improved livelihoods. This calls for the need to protect and enhance the environment based on a four-fold agenda:

- Assisting countries in setting priorities, strengthening institutions and implementing programmes for environmentally sustainable development
- Minimizing the potential adverse environmental and social impacts of development projects.
- Building on positive linkages between poverty reduction, economic efficiency and environmental protection
- Addressing global environmental challenges.

**From Policy to Practice**, the liberalized regimes must seem to highlight the following:

- The need for the governments to strengthen their ministries, agencies and other institutions to deal more effectively with environmental issues.
- Greater integration of environmental concerns into economic and sector work. A growing emphasis on the social aspects of sustainable development

### **Main Themes for the Future**

- Learning from implementation
- Expanding the scope of environmental assessment > Reinforcing the social dimension
- Mainstreaming global concerns
- Leveraging private initiative
- Building on the Synergies between Development and the Environment
- Poverty Reduction and the Environment
- Efficient Resource Use and the Environment
- Addressing: Regional and Global Environmental Challenges
- Regional environment Initiatives
- Global Environmental Programmes
- Strengthening the Private Sector Role
- Transforming the soul of business to environmental consciousness): Industrial Ecology - Issues and approaches
- 'Green' marketing strategies

The true nature and the extent of the micro-economic problems, both urban and rural that are now among the most urgent of any confronting the international community must be looked into.

Against the backdrop, the overall objective is two-fold; one is increase the world's awareness of the problems, and a second is to awaken it to the potentials of human settlements as important inputs to social progress and economic growth. But this potential can be realized only if we convince the global community that on an urbanized planet we have no choice: our cities, towns and villages must be healthy, safe, just and sustainable. It is time to end the platitudes and clinches. It is time to act.

There are many questions that have to be addressed in developing countries and international countries alike. And the private sector has a major role to play; we urgently need its support if we are to succeed.

## **Section C**

### **Problems and Consequences of Liberalization**

**Problem Statement:** As seen in the Survey report of NCAER, the main problems relate to resource extraction, deforestation green revolution, urbanizations and industrialization.

The most serious challenges that cause environmental degradation are:

- **Resource Extraction:** This arises out of coal, oil and gas production; poor handling of materials; and normal transport activities and major spills.

- **High Rate of Deforestation:** This is endemic to most of the region.
- **Related to Agriculture:** Efforts to ensure food security has led to implementation of high yielding variety package programs, popularly called the 'green revolution'. These without a doubt have increased the yield per acre of most Asian and South-east Asian use of fertilizers, water logging, and the effluent going into the river and waterways creating problems in fisheries and marine life.
- **Related to Industry:** In the textile sector, inappropriate fabric technology is noticed in the use of acids and dyes. In the shoe industry, poor adhesive handling occurs frequently. In other areas, careless use of mercury and lead is observed. In the electronics sector, the disposal of CFC's (chlorofluorocarbons) adds to the problems of urbanization.

**Consequences:** These problems have led to a general degradation of the environmental life, high infant mortality from water-borne diseases, and waste dumps everywhere. As a consequence of this critical environmental degradation major problems have surfaced. Some of these are:

- The quality of the environmental life is quite low.
- There is a very high infant mortality rate arising from water borne diseases (e.g., Nestlé's problem with its powder milk formula being used with unsafe water)
- Invariably waste-dumps seem to show up near the poor.

The basic problems in the environment will focus first on environmental problems that are in the study community and then expanded into regional concept to address problems that affect the community from the city, region and state. Some 'typical' problems that could be addressed are:

- a. High Rate of Deforestation:** Dependency on Firewood  
Causes of the problem will be studied as well as effective solution concerning the land that has been deforested to prevent soil erosion and misuse.
- b. Inadequate Water and Sanitation Facilities**  
Alternative solutions will be examined to provide adequate resources that can be provided from within the community. Solutions in many instances to be self-sustaining by using products or wastes from all community for beneficial purposes (water for fertilizer, etc.).
- c. Local Air Pollution**  
Air pollution can be caused by sources outside of the region and by many sources within the neighborhood or community. High density living with small rooms (especially in cooking areas) causes smoke pollution and smoking is especially hazardous in these situations. Reducing the reliance on petroleum use of transportation would also reduce air pollution at a local level.
- d. Solid Waste Accumulation**  
The organization of solid waste collection within communities and various forms of 'clean-up' is an important first step in the elimination of solid waste. The USP of wastes in building structures (straw, rubber, cans, etc.) would be another means of reducing waste. Introduction of solid waste systems for use in urban regions would be analyzed. The centre would determine the local and regional problems and then coordinate the alternative types of solutions to best answer the problems.

**e. Industrial Environmental Pollution**

This type of pollution is the pollution that is caused by factories, such as lead in air, chemicals, and the acids and dyes from the textile factories to mention a few. Many poverty areas are to be located next to these industries and thus have to live adjacent to harmful effluents in the air, soils and waste. Even in the electronic sector, the disposal of CFCs (chlorofluorocarbons) adds to the problems of urbanization. The centre would serve as a voice for the people affected by this type of pollution as well as being a bridge to businesses to provide solutions in the short and long terms.

**f. Pollution Related to Agriculture**

Since agricultural and horticultural production is an important part of the self-sustaining community concept the pollution caused by several 'green revolution' practices needs to be examined and use technology that eliminates the poor use of fertilizers, soil erosion and compaction, water logging, and nitrogen pollution of waterways and ground water. Simple crop rotation and tilling can be very beneficial by reducing the buildup of predator insects typical with mono-crop production. The use of non-hybrid seeds is another means to encourage 'healthy' agriculture with low input costs.

**g. Urbanization and Industrialization**

Most cities are overcrowded and lacking in adequate infrastructure, thus contributing to poor quality of life for all residents. Especially affected are those who are poor and otherwise disenfranchised? The health of people is an environmental problem. The spread of disease by fleas and rats is just one example.

**h. Local Financial Pollution**

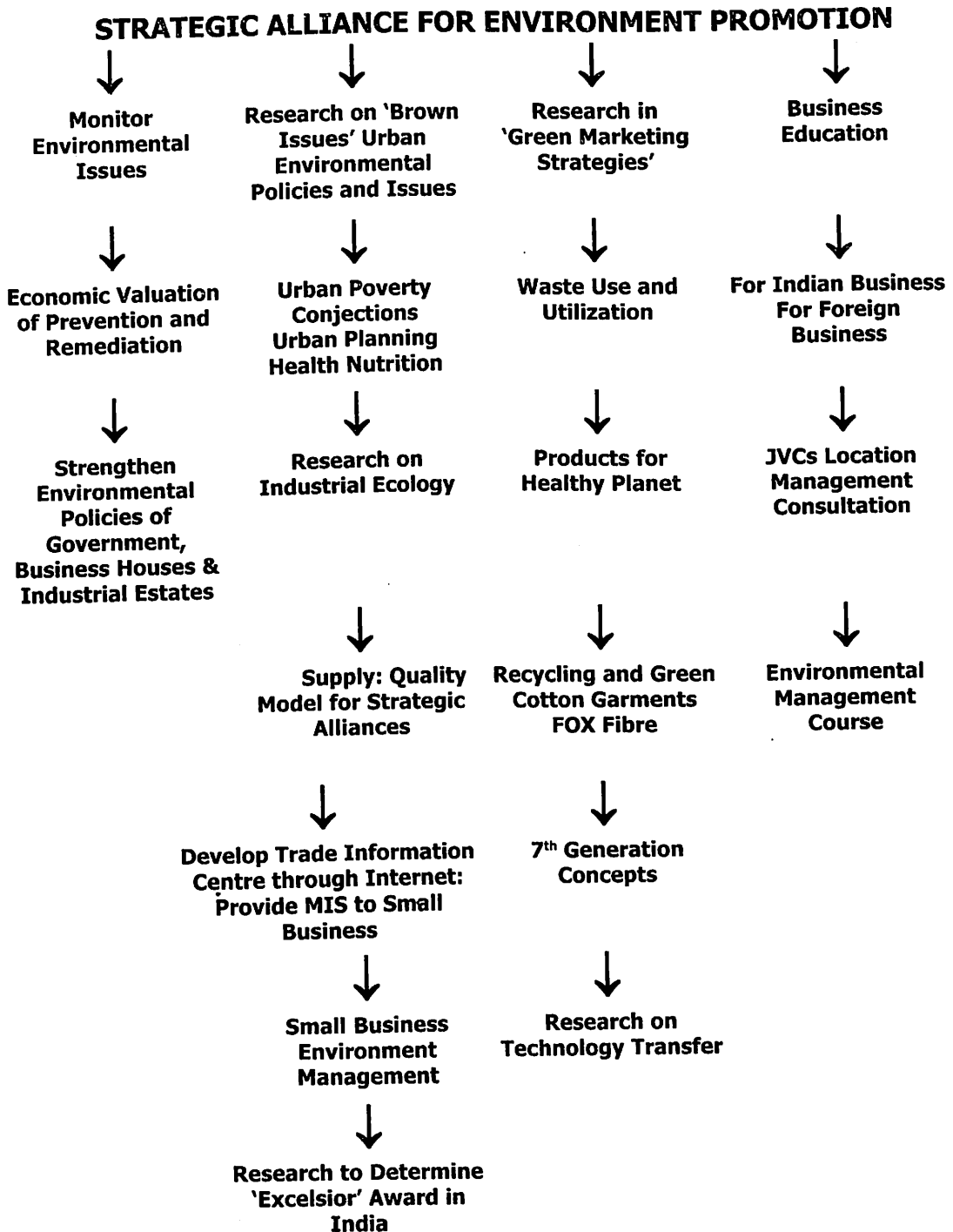
People living in poverty in most cases in disenfranchised from financing for improving themselves other than several welfare programs. In most countries the welfare programs have to be restructured so that the people are helped by their own efforts, or helped by recognition of their problems of which they have no control over. The process of 'redlining' is a case in point and it prevents people from helping themselves. The processes both political and financial that keep communities in poverty have to be reexamined in context to a total improvement program of urban solutions.

**i. Other Pollution Problems**

There are many other environmental problems that will be in specific communities and they would be recognized as each project is studied. The SAFE would be .the center where evaluations of the environmental problems would be studied and providing solutions in conjunction with people in the community.



The gamut of issues to be covered by SAFE are seen in the following schematic framework:



## **Section D**

### **Environmental Policy For Business: An Agenda For Growth Cost-Benefit Analysis**

- a. The state should mandate a complete review of current laws and regulations relating to the EPA (Environmental Protection Agency) and all agencies regulating environmental matters to make sure that current science, realistic risk assessments, net health analysis, and cost benefit analysis shall apply in order to reduce, condense or eliminate regulations.
- b. The state and the EP A should require risk assessment, scientific benefit and cost/benefit analysis before new environmental, safety or health regulations reenacted, taking into account how they will impact small business, individual property, rights and property values. In evaluating impact, costs should meet some such test as percent of gross sales. The regulated community, including small business, should be included in any final cost/benefit studies or reports.
- c. Federal and state legislation is needed to force environmental agencies to base their evaluations of proposed regulations on sound scientific criteria and to require the agencies perform risk analysis on all proposed regulations.
- d. When the government passes any regulation requiring specific technology and/or procedures for protecting the environment, it must demonstrate a measurable, quantifiable benefit in proportion to the cost of the compliance. In addition, the regulation should include a funding mechanism, which will facilitate compliance. Where natural physical conditions warrant, reasonable compliances should be accepted as conforming to the intent of the regulation. In addition, the state must review existing regulations and ensure they adhere to the same standards as new environmental regulations.
- e. The Environmental Protection Agency should follow the due process concept of notice and provide assistance for compliance. Risk assessment should weight the cost versus benefit of regularity compliance. Any 'taking' of private property would require an economic impact study and provide for just compensation.
- f. Risk Assessment / Cost Benefit: The state should enact legislation subjecting new and existing environmental regulations to an assessment process to determine if they are scientifically sound; economically cost effective; have regional equity and flexibility; produce tangible environmental results based on valid analysis of statistical data; create no enforcement duplication; and that no agency levied fines are used for funding the agency.
- g. Economic and social impact of environmental regulations. Environmental protections have been legislated, enacted and enforced with inadequate concern for their economic and social impact on American lives and families. Additionally, the uncertainty and conflict on unclear and conflicting laws, regulations and definitions greatly increases their cost impact because of the expensive litigation and the cost of the holding unproductive property. There is need to modify such acts as the resource Conservation and Recovery Act, Ocean Water Act, and Ocean Air Act, Endangered Species Act, and National Environmental Policy Act to remove these issues from courtroom litigation and to emphasize non-punitive compliance based on incentives, with only mediation and arbitration to be used for setting disputes. Additionally, penalties should only be levied against those who deliberately violate these laws. Finally, all new environmental protections should be held to these same standards.
- h. The enforcements system for regulations is inconsistent and does not focus on the needs and constraints of small business. The EPA should modify that system to assure equitable treatment for small businesses, focusing on constructive enforcement, innovative penalties,

alternative dispute resolution, including the naming of small business grievance panels to arbitrate compliance issues and rewarding exceptional environmental performance.

- i. The state should direct the EP A to adhere to the following inspection and enforcement policies:
  - Voluntary compliance audits to be available with no fines issued;
  - No fines should be imposed following enforcement inspections if a company is found to be in substantial compliance, considering the company's overall compliance efforts and the potential for significant environmental harm;
  - Fines should be based on a sliding scale relative to the size of the business;
  - The EPA should be reviewed to confirm that both consider the real potential for environmental harm.

### **Property Rights / Takings**

- a. Any governmental action, law or regulation that deprives a property owner of any value or benefits of his or her private property shall constitute a "TAKING" for which said property owner shall be entitled to full 'Fair Market Value' compensation.
- b. In order to eliminate significant reductions in property value due to regulatory restriction, the state should shift the burden of proof from land owners to government that land use prohibitions do not constitute regulatory takings.
- c. The state should direct the following changes in inland wetlands laws and regulations.
  - To the extent regulations adopted after the date of property acquisition affect a property or its value, the Government for the loss in value should compensate the property owner.
  - The Army Corps of Engineers should be given sole jurisdiction of Section 404.
  - Differing degrees of regulation should be allowed based on the relative importance of a wetland to the local environment; and
  - A statutory definition of 'wetlands' should be adopted, defining a wetland as land that is saturated at the surface during the growing season.
- d. The state could learn from the US example, which in its fifth amendment to the United States Constitution says... 'Nor shall private property be taken for public use- without just compensation'. The policies of regulator agencies such as the Environmental Protection Agency often result in a 'taking' of the value of the assets of small businesses. The state shall make provision for the compensation at fair market value of that part of the holding of the private property owner that is devalued or rendered unusable by excessive federal regulation.
- e. The state should analyze the method of evaluation under which private property is taken for environmental protection. Specifically, examine the economic impact before property is taken and prohibit the taking of property without just compensation. Compensation should be guaranteed to those landowners when government through direct actions or negotiations has taken some or all of their property.

### **Superfund**

- a. The state should reform the Superfund program so that small businesses are not held liable for past legal disposal of regulated substances. Even an expedited de minimus

settlement process cannot solve the problems of expensive legal fees and contributions nor the financial uncertainty created by the continuing threat of liability. To ensure that small businesses are no longer unfairly burdened by Superfund, the state should repeal retroactive joint and several liabilities.

- b. The state should enact environment legislation to:
  - Eliminate retroactive liability prior to January 1, 1987
  - Require good science and realistic risk assessments in assessing hazards from waste sites.
  - Require good science and realistic risk assessments in establishing clean-up standards. This would include a realistic consideration of future uses of the site.
  - Eliminate 're-openers' - reopening the re-mediation process at a site after it has been dosed.
  - Offering alternative funding strategies for site cleanups.
  - Greater use of de minimus or micromis exemptions
- c. Small business should be protected from the exorbitant cost of Superfund litigation by legislation, which would apportion cleanup costs based on the business contribution of hazardous material to the Superfund site.
- d. The state should eliminate 'joint and several' liability and replace it with fault based liability and compel the EPA to more actively utilize 'de-minimus' release authorizations for small business. The state should ensure; (a) that prior to enacting proposed regulations or enforcement action that the EPA conduct extensive poor reviews of proposed regulations and actions addressing all assumptions, uncertainties, risk assessments and cost/benefit analyses for each proposal; (b) the elimination of retroactive liability.
- e. The state should reform the existing Superfund (CERCLA) legislation by eliminating the retroactive and strict liability provision. Re-drafting 'de-minimus' settlement provisions to compel EPS to settle with minor contributors and strengthen protection to financial institutions from potential Superfund liability.
- f. Current landowners and businesses can be held liable for pre-existing environmental problems regardless of fault, which can result in loss of land use and/ or the inability to obtain financing. The state should revise the Superfund Act to eliminate the 'no fault liability scheme' and impose a 'fault-based liability scheme'.

### **Audit Privileges**

- a. The state should enact legislation establishing a self-evaluation privilege under the environmental laws and regulations (Title 40). Specifically, this privilege should create a presumption against the imposition of administrative, civil or criminal penalties for voluntary disclosure so long as the entity making the disclosure initiates appropriate efforts to achieve compliance within a reasonable time frame.
- b. The state should enact environmental audit privilege and voluntary disclosure legislation under the environmental laws and regulations. This privilege create a presumption against impositions of administrative, civil or criminal penalties for voluntary disclosure so long as the entity naming the disclosure initiates appropriate efforts to achieve compliance within a reasonable time frame.

## **Other Recommendations**

- a. The state should enact legislation directing EPA to specify the circumstances under which it would and would not sue a business that is involved with a state approved site reclamation project. For such 'brown field' projects in which cleanup is commensurate with the intended use of the property, the legislation should direct EPA to enter into legally binding agreements (like covenants not to sue) with the parties assuring that no future federal action will be taken.
- b. Cost is an effective deterrent to small business investment in pollution control equipment. And loans may not be as available to them as to larger corporations. The state should provide tax incentives to small businesses- deductions or credits- for equipment purchase, remedial costs and/or pollution prevention/control measures.
- c. Flexible approach to waste product disposal. The state should revise the resource conservation and recovery act to provide for environmentally sound, market-driven solutions to municipal and industrial disposal and recycling, to be accomplished through state agencies.
- d. The state should adopt changes in environmental statutes and regulations in order to provide an even playing field across the country in environmental regulation. Specifically, the state should have a Clean Air Act to eliminate Air Quality Regions and substitute these provisions with a countrywide standard for air-pollution abatement requirements. The state should require the EPA to establish and demonstrate substantial fairness in the enforcement of environmental laws and regulations between the EPA regional offices.
- e. The state should pass legislation to encourage continued usage of old industrial sites, and preserve farmland, a Bill should be introduced to include manufacturing plants currently in operations, establishes a process for industrial site clean up, and provides protection for clean up liability for lending institutions, and development agencies. The program would protect the environment and promote economic growth in depressed areas.
- f. Financial Incentives: The state should create fiscal incentives for small business to fund environmental compliance. Options include: (1) Loans, administered by existing agencies with funds generated from fees and fines (2) tax deductions or credits for cost of remediation, purchase of pollution abatement equipment, and/or implementation of prevention measures.

## **Section E**

### **SOHO & Liberalization: The Environment Manager & The Business Community**

Many believe that typical US business is a large fortune 500 Corporation with thousands of employees, This has never been true and today large corporations account for an even smaller part of the US economy, than they did 10 years ago.

Just as computers are becoming smaller so are businesses. Businesses have fewer employees because the combination of tele-communications and computers called 'telecommuting' has reduced the need for corporate staff; most of who are highly educated, talented, and experienced. As corporations shed these knowledge workers many join the growing small Office/home office enterprise economy known as the SOHO movement. There are 21 million business enterprises in US today. Only 14,000 have more than 500 employees. The rest are small and mid size businesses. Many are family owned enterprises. These include partnerships, sole proprietorships and un-incorporated home business. Small business is increasing at an annual rate of 2 to 3%. The entrepreneurial economy is growing stronger,

- Today 50% of US exporters are small business with fewer than 100 employees. In some regions more than 80% of exporters have fewer than 100 employees.
- Small and midsize business with fewer than 500 employees now account for 50% of US exports measured by dollar value.
- Many of the US' most famous big business from Microsoft and Apple computer to Ford Motor company and Dismay - began as home-based business.

The SOHO movement has important social and demographic implications. It provides a safety value for those caught in turbulence of corporate downsizing. It creates new possibilities for small town and rural economy because so many in movement want to live there. The SOHO movement will also shape tomorrow's urban areas- including how and where people live and how they are connected to home and family and work place colleagues.

The expansion of the SOHO movement is likely but not automatic. It is likely because technology is moving in the direction of smaller units, niche markets and distributed work. But there are also obstacles. Some are public policy obstacles, like zoning regulations, discriminatory taxation and burdensome unnecessary paperwork.

There are also cultural barriers. Many employers and institutions have difficulty shedding old industrial age habits. Other obstacles arise out of business policies and practices in the private sector. These include discriminatory pricing and practices for insurance, telephone professional services that are essential to the SOHO operator.

The lessons are obvious for a liberalized economy changing old attitudes and reversing bad policies should be top national priority. India's growing entrepreneurial economy is to be shaped by several key factors

- Home based business
- Growth of computers and advanced telecommunications. For e.g., a third of all homes in US have computers, 40% of home computer owners have modems, more than four million users are linked into on-line services. Americans buy 50,000 computers a day where nearly half of them are equipped with CD-ROM, giving home users access to a large volume of multimedia information and huge storage capacities.

## **Green Building Gaining Popularity**

**Mr. Pradip Chopra**

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The world is now slowly realizing the importance of environmental conservation. The construction industry also has shown considerable awareness towards preserving the ecological balance through various green practices. India's contribution in this field too has been growing in the last few years. Awareness is being translated into practices and eco-friendly real estate projects, products and services are emerging faster than ever.

### **Green Buildings are steadily gaining popularity because of the following benefits:**

- Energy Efficiency
- Good indoor air quality
- Resource conservation
- Better performance and longer durability
- Environment friendly
- Low maintenance cost
- Greater comfort and lower utility bills
- Beneficial to health
- Covers community design issues
- Truly cost-effective

### **Green Architecture is made up of the following factors:**

- Reduced heat penetration
- Low energy consumption
- Minimum disturbance to the environment
- Effective use of recycled and recyclable materials
- Use of indigenous materials and systems
- Conservation of natural resources.
- Healthy environment for the occupants.

### **Sick Building Syndrome and Human Health**

- Most of us breathe yesterday's air, inhale each other's carbon dioxide, work in monotonous space and pretend it is all healthy because our workplace is air-conditioned.
- The financial benefits of improving office climates could be 8 to 17 times higher than the costs of making those improvements. We can save substantial amount of money by preventing sick-building illness.

## **Causes for Sick Building**

- Carbon monoxide and other contaminants are sucked into a building especially when air-intake vents lie close to exhaust-filled loading docks and parking garages.
- Volatile chemicals seeping out of building materials, furniture, office equipment, carpet, paint and pesticides.
- Moulds and bacteria funneled through muck-filled heating, ventilation and cooling systems.

## **Solution**

- Designing offices and homes that protect occupant health through improved air quality and heat island effect.
- Carbon dioxide monitoring system, which keeps carbon dioxide concentration in the room below 0.3% as a useful index of the adequacy of ventilation.

## **High Quality of Air**

- Fresh air drawn in a ventilation duct to keep the oxygen percentage at the minimum acceptable level.
- For example, according to the ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) 1975 standard the requirement for ventilation is 8.5 m<sup>3</sup> h<sup>-1</sup> per person.
- Injection of O<sub>2</sub>. The oxygen generator is enclosed in a well-ventilated area outside the oxygen-enriched room.

## **Green Building Movement & LEED**

To encourage green movement, the US Green Building Council has formulated a set of parameters called Leadership in Energy and Environmental Design (LEED), which promotes refreshing whole-building approach across five key areas;

### **To ensure least impact on the environment**

1. Sustainable site development
2. Water savings
3. Energy efficiency
4. Materials selection

### **To ensure better health for the occupants**

5. Indoor environmental quality

### **LEED to accomplish the following:**

- Define green building by establishing a common standard of measurement.
- Promote integrated, whole building design practices.
- Recognize environmental leadership in the building industry.



- Stimulate green completion.
- Raise consumer awareness of green building benefits.
- Transform the building market.

## **LEED Rating**

- The LEED rating is a responsible mechanism by which a building's green orientation is measured in a transparent way.
- It takes into account how a building has been designed with regard to the sustainable use of energy, water and other resources. The position is reinforced with a certification like the LEED rating.

## **Green Building**

- **Green Building** is for increasing the efficiency of buildings and their use of energy, water, and materials, and reducing its impacts on human health and the environment, through better, design, construction, operation, maintenance, and disposal – the complete building life cycle. Green building can lead to;
- Reduced operating costs by increasing productivity and using less energy and water,
- Reduced environmental impacts by, for example, lessening storm water runoff and the heat island effect.
- Improved public and occupant health due to improved indoor air quality.

## **The projected benefits from this:**

- 20% annual savings in energy costs
- 20% reduction in water costs
- 38% reduction in waste water production
- 22% reduction in construction waste
- Earning from the sale of carbon credits.

## **For Beauty and Elegance**

Let us consider our building as a living organism. It should be allowed to breathe. Which means natural or conditioned air should be allowed to enter and exit.

A building that breathes effectively will function effortlessly and as a bonus, will also possess a beauty and elegance, which nobody can resist.

## **For Energy Efficiency**

For people light is essential. But this same light also brings in heat and ultra violet rays, which are unpleasant and harmful.

The heat enters the building typically from roof, walls, fenestrations and base.

## Roof

Let us look at the roof first. Heat penetration from the roof can be arrested by a number of simple ways:

- Give additional height to the upper floor. This extra volume will create an air space, which will have an insulating effect.
- Sloping roofs for the uppermost floor are a very effective solution since the additional volume acts as an insulating layer.
- On the roof, plant a few trees and plan for a roof garden. If possible maintain a green ground cover on all the exposed roof space. This option is possible only if planned at construction stage.
- Apply a heat reflective paint on the terraces.
- A simple and cheap way is to provide a bamboo frame and tie the *thatti* to it in multiple layers. It is important that a gap of at least 1' is maintained between the slab and the *thatti*. This is very simple and effective; the only drawback being that our terrace cannot be used.
- Under the roof slab provide a suspended ceiling. Maintain a gap of at least 1' between the slab and the ceiling. Have a layer of insulation, above this false ceiling.
- Ideal scenario will be to have both under-deck and over-deck insulation.

You could also try to cover the terrace by utility structures such as lift machine room, staircase room and slab for clothesline. If these are planned over the bedroom areas, the power consumption for air-conditioning will reduce.

## Walls

Before treating the walls study the building's orientation. The walls facing south and southwest should be treated differently than the walls facing North and Northeast. If you are constructing a new building you can use cavity wall construction - Outer wall of 9" + air cavity of at least 1" + inner wall of 4 1/2". This air cavity can be filled with any of the insulating materials such as glass wool or PUF.

- Walls built with fly ash concrete blocks of minimum 25 cm also act as effective blocks against heat penetration.
- If yours is an existing building you can go for interior wall paneling with insulation.
- It's important that all the unwanted cracks around window frames are sealed.
- You can plan to have thicker walls on the south side or alternately go for wall claddings in any of the natural materials such as stone, wire-cut bricks or recycled wood.
- Avoid metal claddings since they only generate more heat and glare. Metal cannot breath like any of the natural materials.
- Walls can be protected against heat by buttresses, roof overhangs, louvers, pergolas, trelliswork and ivy-effective shading devices, adding beauty too.

## Windows and Fenestrations

These are the most sensitive parts of the building and lot of care has to be taken while detailing the windows.

- In Mediterranean countries, traditionally the window sizes will reduce on upper levels. This is to lessen the penetration of sunrays on upper floors.
- The sunrays are welcome. They bring in life, light and cheer into our homes and work places. But the accompanying heat and the glare isn't desirable in our climate.
- This can be tackled by the right choice of glass. Double glazing (or sandwich panels) is becoming increasingly popular. There are glass types, which increase light penetration, reduce heat intake and effectively arrest the harmful UV rays.
- Avoid sliding windows since they cannot be made fully airtight. Hinged or pivoted type windows are desirable since they are airtight and they provide 100 per cent open area.
- Protect the windows from rain and glare by providing sunshades and roof overhangs at least on the sunny side, if not on all sides.
- You can have louvered shutters in addition to glass shutters fixed on the outside. At peak-hot times the louver shutters can be kept closed and glass shutters open. These louvers also look very attractive.
- Use of inner courtyards and running verandahs are time-tested methods of keeping the building cool.
- A water body planned in the inner courtyard will act as a heat sink. Inner courtyards allow us to control the exposure of our walls to the sun; at the same time allowing light and privacy.

The various methods and solutions listed above help the building in two ways. One, they will arrest the heat from entering the building and two, they will arrest the conditioned cool air from escaping out, thereby reducing the energy consumption.

## **Digital Governance in West Bengal Municipalities with application of GIS**

**Mr. Tapas Ghatak**

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The objectives of the project on urban governance in West Bengal are to provide an environment conducive to socio-economic growth and ensure delivery of services to all sections of the population in order to reduce inequalities in opportunity among residents. At the same time, the administration must attempt to maintain maximum possible fiscal sustainability through efficient revenue generation and collection. E-governance is the use of information technology to deliver public services in a much more convenient, people-oriented, cost-effective, and altogether different and better way.

Two significant achievements are the transition from animosity and fears of computers and computerization to a realization amongst councilors and municipal staff that technology can be used to improve the efficiency of the administration as well as the quality of life of the poor. A second important consequence is the change in people's perception of the local body – better and quicker service, reduction of corruption, greater transparency in decision-making and allocation of resources and a more people friendly government.

### **Brief of the City / Theme / Technology**

The key specific objective of the project is to establish a GIS/MIS database in all 50 Municipalities/Municipal Corporations. The key strategy is to introduce GIS in all the municipalities in West Bengal to facilitate decentralised planning involving community with emphasis on social sectors and disadvantaged groups especially women and children.

### **The need and details of the Initiative being discussed**

Decentralization encourages local-level accountability and increasing scrutiny of city management by citizen groups. As a result, urban decision-makers need to provide greater transparency and utilize citizen feedback more explicitly in developing urban strategies. In these circumstances, a change in the methods of governance is urgently needed to meet changing demands and fulfill new objectives. The reinvention of governing methods requires an enabler to foster teamwork and knowledge-sharing, something that would attract the involvement of political leaders and the media, something that would be useful to business, relevant to citizen's everyday lives and address their personal needs and circumstances. Geographical Information System (GIS) is one such tool and strategy that is being employed as the most appropriate enabling technology towards achieving this end. E-governance is the use of information technology to deliver public services in a much more convenient, people-oriented, cost-effective, and altogether different and better way. It affects an administrative body's dealings with citizens, businesses, and other public agencies as well as its internal business processes and employees.

## **Description on the changes in the Scenario/Quality of Life/Cost Cutting/Improvement in the Governance/Access to people:**

Some of the key elements that have contributed towards above factors of the project are:

- The wide participation of the people, the municipal staff as well as the elected councilors together with the innovative use of technology ensured its low cost and local ownership both of the data as well as the process. Another key factor was ensuring the immediacy of useful results to the local body. These could be used to increase the tax revenue of the municipality and consequently ensure further support to this initiative.
- There is a great demand for expansion of this project to cover all the remaining ULBs. Some ULBs are taking their own initiative and have started work.
- The initiative is being documented. A brochure in Bengali and English for Councilors, a brochure in Bengali and English for the general public. Two other documents are under preparation.

## **The Outcome (Policy Change effected / Institutional Framework redefined / Employment created / Capacity Building Initiated etc.):**

- Focus on improving services for the disadvantaged sections by identification of families and households where there is a deficiency of service or lack of utilization of a service. Further, mobilizing municipal and government functionaries to reach out to these identified families/households for ensuring utilization of that service, and in some instances initiating advance action for the protection of the health of the mother and the child.
- The initiative catered to the needs of all segments of the population – quicker approvals, objective basis for tax assessment.

## **Conclusion**

- The participatory processes of building up database and maps are as important as the final products.
- Secondly, the work must be done in the premises of the municipality and with their own staff. The elected representatives and the staff must be taken into full confidence and be fully involved at all stages of the project. The more the elected representatives are involved in the different activities, the better they understand, own, implement and monitor the project. All work must be done on site and not away from the Municipal premises. This will destroy the myth that GIS is a highly technical project requiring a different level of skills and competencies.
- Thirdly, the project must deliver results within a short span of time of 3 to 4 months. Projects, which are too long in delivering, run the risk of losing the primary stakeholders. The results must prove useful to the primary stakeholders, that is the Municipality and their immediate use of these results will provide the project with the desired political and administrative support.

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## **Acknowledgement**

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## **Global Warming**

**Dr. Achintyo Chattopadhyaya**

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Warming of the globe is a natural phenomenon for the sustenance of life. Energy from the sun enters through the blankets of air columns surrounding the earth, reaches the upper crust of the earth and a part of it is radiated back into the atmosphere and ultimately into the space. Presence of materials like H<sub>2</sub>O, CO<sub>2</sub>, methane, different nitrogenous oxides decrease the rate at which heated energy is being radiated back to the space and this leads to an increase in temperature. If a balance between the incoming and outgoing infrared radiation is maintained, which had been prevailing for 1000's of years, it is possible to sustain the environment.

Population explosion, change in land-use practices, massive agricultural innovation and industrialization, increased utilizing of fossil fuels that produces gases like methane, CFC etc. at an alarming rate, have shattered the natural equilibrium of the thermoregulation process. Such man-made green house effect has cast its evil shadow on every compartment of the ecosystem, both in the inanimate and the animated world. Though the emission of CO<sub>2</sub> and other such destructive gases have been found to a maximum in the industrialized countries, both per capita and cumulative production. India and China being the two populous nations have exhibited also a huge production of CO<sub>2</sub> and other gases, Kyoto protocol has been signed by about 175 nations and aims at minimizing such effects of global warming. India and China though have not being entrusted with any yardstick of reduction in emission, the situation demands a thorough examination of the use and emission of energies and the other gaseous substances for better sustainability.

## Biodiversity: For A Better Future

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Biodiversity is the base of our sustenance and civilization. Realising its importance, the scientists/ environmentalists have been advocating from eighties for its conservation and wise use. This will enable the future generations to benefit out of bio-resources and the environment at large. Finally, at the United Nations Conference on Environment and Development (1992) held at Rio-de-Geneiro, the Convention on Biological Diversity (CBD) has been adopted. Since then issues on Biological Diversity or Biodiversity has attained formal and institutional concern all over the world. The CBD defines Biodiversity as '**the variability among living organisms from all sources including interalia, terrestrial, marine and other aquatic ecosystem and ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems**'.

CBD recognises the importance of biological diversity for evolution and maintaining life sustaining systems of biosphere and declares that conservation of biological diversity is a common concern of humankind.

Since appearance, human being has been using bio-resources for their survival. Till date efforts are going on to ease our life, utilising the biodiversity. The benefits out of biodiversity can be categorised broadly as **Economic** (food & drink, medicine, industrial material etc.), **Ecological** (bio-remediation, eco-system maintenance, various ecological services), **Ethical** (cultural & moral values) and **Evolutionary** (appearance of life & its functioning).

However to sustain the rapidly growing population and to meet up their never ending demands biodiversity is being threatened by various means such as overexploitation, habitat destruction, modern agricultural practices, industrialisation, pollution and climate change.

Bestowed with the treasure of biodiversity (home to 7.28% of global biodiversity) and considered as one of the mega-diversity countries of the world, India has taken several positive steps in accordance with the pledges of CBD. The most important of which is to introduce 'The Biological Diversity Act' in the year 2002 with the following major objectives - conservation of biodiversity, sustainable use of biodiversity, equitable sharing of benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto. For implementation of this act a three-tier system has been introduced -National Biodiversity Authority (NBA) > State Biodiversity Board (SBB) > Biodiversity Management Committee (at every local body).

A number of regulations and restrictions on access to biological resources have been prescribed in the Act and subsequently rules have been framed. The most important regulation includes prior intimation to SBB for obtaining biological resource for the purpose of commercial utilisation, bio-survey and bio-utilization.

Beside enactment India has strengthened other initiatives on bio-diversity related issues. They include the following:

- a) Conservation of biodiversity both in in-situ and ex-situ conditions.



- b) Sustainable use of biodiversity in sensitising people, in finding out alternate source of income.
- c) Documentation of biodiversity through scientific institutions to develop database.
- d) Documentation of indigenous and traditional knowledge related to biodiversity.

These activities are being supplemented by the documentation of bio-diversity and related traditional knowledge and practices through Biodiversity Management Committee at local level with the active participation of local community members in the form of People's Biodiversity Register (PBR). This ground level decentralised approach aims to make people aware of the bio-diversity around them, to ignite their feelings on biodiversity surrounding them and also to understand their perception of managing biodiversity. This may be the only and ultimate means to conserve biodiversity for the sustenance in future. To achieve this goal West Bengal Biodiversity Board has initiated this mammoth task in this state, as per the Act and subsequent guidelines. Successful completion of this programme can only lead to prepare meaningful strategies for managing biodiversity in a sustainable manner. But without active participation of conscious people, particularly of those who feel for biodiversity and environment as a whole, the objective will not be fulfilled.

**Let us act together to conserve biodiversity for better future !!**

## Priorities on Wetland Conservation - Need of the Hour

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Over the years of studies on aquatic ecosystems, we realized that wetland is important an environmental activity. Thus, there is a great need for their conservation and maintenance. Unfortunately, with the rapid urban expansion, wetlands are mostly transformed at the expense of environmental imbalance. There is great need for societal awareness on the aspect of wetland conservation & management.

### Wise Use of Wetlands

The three main components of Wetland are (*Mitsch and Gosselink, 1986*):

- Wetlands are distinguished by the presence of water.
- Wetlands often have unique soils that differ from adjacent uplands.
- Wetlands support vegetation adapted to the wet conditions (hydrophytes), and conversely are characterized by an absence of flood-intolerant vegetation.

Wetlands have a wide range of natural functions, which are of value to humanity. They are also one of the most threatened habitats because of their vulnerability and attractiveness for developments. The first global conservation convention, the Ramsar Convention, focused solely on wetlands and its has recently been strengthen and elaborated with regard to the wise use of all wetlands, non just those with statutory protection.

### Ramsar Convention, 1971

The convention of wetland of international importance especially as waterfowl habitats (Ramsar Convention) defines wetlands as 'areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt including areas of marine water, the depth of which at low tide does not exceed six meters and may include riparian and coastal zones adjacent to the wetland or islands or bodies of marine water deeper than six meters and may include riparian and coastal zone adjacent to the wetlands, or islands or bodies of marine water deeper than six meters at low tide laying within.

In additions wetlands are eco-tones since they are transition zones from uplands to deep-water aquatic systems. This transition position also often leads to high diversity in wetlands and has given some wetlands the distinction of being cited as amongst the most productive ecosystems on Earth.

### Specific Values of Wetlands

The following are some of the values of Wetlands:

Genetic conservation, water treatment, nutrient removal, freshwater fisheries, productivity, firewood, coastal fisheries, nurseries for ocean fisheries, tourism, flood preservation, coastal protection, energy and carbon dioxide storage, wildlife habitat.

## Wetland Functions and their Human Utilization

- Store/Sink
- Pathway
- Buffer
- Producer
- Sink

### Role: Store/Sink

Elements	Function	Importance to humankind	Unwise use
Rare, threatened or endangered plant and animal species and communities	Genetic diversity re-colonization source	Gene pool Science/ education, Tourism, recreation, Heritage	Excessive or uncontrolled harvest, damage removal or pollution
Representative plant and/or animal communities	Ecological diversity Habitat maintenance	Gene pool Science/ education, Tourism, recreation, Heritage	Excessive or uncontrolled harvest, damage removal or pollution
Peat	Nutrient, contaminant and energy store, Habitat support water storage	Fuel, Palaeo- environmental data Horticultural use Heritage Medicinal products	Drainage Harvest faster than accumulation, Destruction
Human habitation sites	Archeological remains	Heritage/cultural Scientific recreation	Destruction Lowering the water table.

**Role: Pathway**

<b>Elements</b>	<b>Function</b>	<b>Importance to humankind</b>	<b>Unwise use</b>
Terrestrial nutrients, water and detritus	Food chain support, Habitat support	Food production, water supply, waste disposal	Interruption or abnormal change of flows Pollution
Tidal exchanges of water detritus and nutrients	Food chain support, Habitat support, Nursery for aquatic organisms	Fish, shellfish and other food production, waste disposal	Pollution Barriers to flow
Animal population	Support for migratory species including fish	Harvest	Recreation
Science	Over exploitation interruption of migration routes	Lakes and rivers	Waterways
Navigation	Obstruction, Reduced flows and levels	—	—

**Role: Buffer**

<b>Elements</b>	<b>Function</b>	<b>Importance to humankind</b>	<b>Unwise use</b>
Water bodies, vegetation, soils and depressions	Flood attenuation	Reduced damage to property and crops	Filling and reduction of storage capacity
Water bodies, vegetation, soils and depressions	Detention and retention of nutrients	Food production, Improved water quality	Removal of vegetation, Drainage and flood protection

*Continued*

**Role: Buffer**

<b>Elements</b>	<b>Function</b>	<b>Importance to humankind</b>	<b>Unwise use</b>
Water bodies, vegetation, soils and depressions	Groundwater recharge and discharge	Water supply, Habitat maintenance, Effluent dilution, River fisheries, Navigation	Reduction of recharge, over pumping Pollution.
Water bodies and peat	Local and global climate stabilization	Equable climate for agriculture and people	Desiccation
Water bodies	Large volume large area	Cooling water	Drainage Filling, Thermal pollution

**Role: Producer**

<b>Elements</b>	<b>Function</b>	<b>Importance to humankind</b>	<b>Unwise use</b>
Production of plants	Food materials and habitat for migratory species and grazing animals	Harvest of timber, thatch fuel and food Science Recreation	Overgrazing Overexploitation Drainage Excess change to dry land or other agricultural uses
Animal production	Fish, shellfish, grazing and fur-bearing animals	Harvest and farming	Over exploitation, Excess change Habitat degradation
Organic matter	Methane production nutrient cycling	Fuel Plant growth	Drainage Desiccation

## Role: Sink

Elements	Function	Importance to humankind	Unwise use
Lakes, deltas floodplains	Sediment deposition of detention	Raised soil fertility Clean downstream channels Improved water quality downstream	Channelization Excess reduction of sediment throughout
Lakes, swamps and marshes	Bio-chemical self-purification Nutrient accumulation	Natural filter for contaminants Treatment of organic wastes, pathogens and effluents	Destruction of the ecosystem Overloading of the system

## Threats to Wetlands

Wetlands cover 6 per cent of the world's land surface, and are found everywhere, in all climates and countries, from the tundra to the tropics. However, wetlands everywhere are under threat from agricultural intensification, pollution, major engineering schemes and urban development. The conterminous 48 states of the United States had lost, by the mid-1970s, 54 per cent of their original wetlands with 87 per cent of the recent losses being to agriculture (*Tiner, 1984*). California has lost 91 per cent of its wetlands; the Louisiana delta has been losing 104 km<sup>2</sup> each year recently (*Buffington, 1987*) and the national loss rate for wetlands in the 1970s was 185,000 hectares a year (*Tiner, 1984*).

## Conservation Strategies in Perspective of Wise Use Managements

The strategies are site protection, wilderness preservation/livelihood support programme, legislative support programme, and public participation in conservation programme

## **Whither Changing Paradigms on Disaster Management?**

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Any etymological connotation of 'disaster' conveys some sort of negativity that affects life, property, human settlements, livelihood, societies and overridingly, ecosystems and environment. Disasters, natural or otherwise (chiefly man-made), even if occurring initially as hazards, make vulnerabilities bad to worse. Sustainable development, the two indispensably keywords in any environmental discourse, has to be treated globally not just as a matter of expediency but more than that, with a sense of unalloyed urgency. The negativity of the impact on fragile ecosystems hardly needs any iteration because of exacting nature of the severity and enormity of disasters. Human activity, often, exacerbates or reduces the vulnerability of societies when exposed to hazards. The International Strategy for Disaster Reduction (ISDR) forms the pivot in the global system for promotion of linkages and often synergies between activities and programmes for mitigation of disasters and developmental of endeavors. How to go in for supplementing this with policy integration? If we are to aspire for an environmentally sustainable society, we can ill afford to miss ventures for developing disaster-resilient communities. Definitely, sustainable development has to be, then, a major component of disaster management. Our country has gone in for a public infrastructure on disaster management, but unless there is a studied mobility to rope in individuals, NGOs, global organizations, etc., we can hardly create a culture of disaster prevention. We have to envisage strategies inextricably linked with ISDR, so that Millennium Developmental Goals can be realized. Perhaps, to our perception, the corresponding road map pertaining to Indian setting is yet to be carved out. If disaster management process has to reckon contemporaneity of compulsions on climatic change, resilience and natural security should discernibly coexist. Shouldn't it be critical for risk managers to be equipped with as much as they possibly can work upon? Perhaps, the forte there lies in using an efficient management structure that has to reflect globosity and locality of disaster milieus, particularly in a developing country like ours.

## The Carrying Capacity Approach to Regional Planning

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### Introduction

Many regions of our country is witnessing a surge in developmental activities as part of 'Resurgent India', involving a varied activity mix of industrial, commercial and residential complexes. While such a trend is generally welcome, it is imperative to parallel assess the region's capacity to cope and sustain such development. How much can the area withstand and digest, keeping in view its infrastructural resources and environmental attributes? An answer to this question is vital, if the development is to be sustainable over a satisfactory period. The solution can only be achieved through a systematic 'Carrying Capacity' analyses of the important components, the guiding principles of which are outlined in the next few sections.

### Definition of Carrying Capacity

The concept of carrying capacity of an area is the total number of plants and animals that can be supported by a particular ecosystem without reducing the long-term ability of environment to sustain life at the desired level & quality. Each ecosystem has limits to sustain urban development. An analysis of human and natural resources base helps find out

- Capacities of resources in a region to support the production demands which in turn supports demands for goods and services for the people;
- Infrastructure capacity for distribution of production resources and goods and services to the people in the area; and
- Assimilative capacity of environment for its air, water, soil and biological components.

An exercise on carrying capacity, therefore, helps finding out cushions available in the ecosystem comprising human and natural resources base of the region. The notion of carrying capacity is used as a tool for sustainable development of an area. Intrinsically, the term implies fitness of a region's natural environment serving as a reservoir of resources to support human activities.

In other words, carrying capacity based planning approach requires the optimisation of environmental resources use through human activities within the regenerative capacities of a region's resources and sinks. Different environmental parameters and indicators and their measurements help identify potentials of the region to absorb shocks.

The developmental activities leads to burdens on existing infrastructure like road, rail, communication, power, water, urban utilities, land and housing, quality of air, water and soil sustaining the biological pool of a region. Therefore, assessment of carrying capacity requires determination of norms on absolute standards in respect of several environmental resources such as pollution emission standards, air quality standards, water supply standards, wastewater discharge standards, solid waste discharge standards etc.



The carrying capacity of an area is also dependent upon the sensitivity of an area. It also depends upon the type of soil and its productivity, climate, cultivation methods used, water quality, air quality, biological interaction, socio-economic and cultural aspects etc.

## **Carrying Capacity Analysis**

The analysis of carrying capacity pertaining to each environmental discipline is conducted bearing in mind the following benchmarks:

- Inventory of resources and environmental quality based on the primary data generated and the secondary data collected.
- Identification of limiting resources and environmentally critical areas
- Estimation of supportive and assimilative capacities based on the analysis of the most limiting resource and for the most critical environmental area
- Evaluation of sectoral plans vis-à-vis carrying capacity analysis

In order to carry out the carrying capacity analysis, threshold limits for various parameters in different disciplines or in other words, environmental yardsticks are set. Such threshold levels are determined through a study of the applicable laws, rules, standards, etc, coupled with the aspect of environmental impacts covering both biotic and abiotic components. The validity of the specific environmental standards with respect to the region is evaluated. Values for environmental indicators in specific disciplines may be adopted as possible yardsticks.

## **Envisaged Outputs and Recommendations**

The envisaged outputs through a carrying capacity analysis consist of the following:

- Current situation description
- Development of action plans/environmental management systems for critical environmental areas
- Directions for development of alternate growth scenarios with appropriate environmental safeguards
- Guidelines for future and preferred activity mix, including industrial typology.
- Indication of preferred future land-use pattern with sectoral zoning strategies along with estimation of land requirement for alternate development scenarios.
- Corresponding institutional and financial arrangements required as back up support including cost recovery tools.

## Environmental Laws and Legal Issues - An Overview

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The concern for environment, in general, has become an integral part of the vocabulary of the academia, policymakers, NGOs, newspapers and the like. These concerns are however not new. Since time immemorial, they are being raised. Consider religious texts for example. One finds strictures restricting use and abuse of natural resources, sermons against pollution, etc. Further down the timeline, one will find similar concerns and corresponding suggested actions in *all* the dominant political ideologies at least since the industrial revolution. For instance, Gandhian village centric model or welfare liberals or Marxists or even the German fascists, all have a distinct view of environmentalism. The approaches differ of course across these political thoughts, and so were the instruments or the role of the state towards protection of the environment.

In very recent times, at the international level the 'concern' for environment among policymakers had received a vigorous thrust in 1972 with the Stockholm UN Conference on Human Environment. India was no exception. In the largely democratic socialist model like the one followed in India, the role of the Parliament as the forum of decision-making, State as the institution for implementing the decisions and the Law as instruments of implementing the decisions is paramount. Thus among the series of measures following Stockholm, the first was the setting up of a committee in 1980 by the then Prime Minister, to recommend legislative measures and administrative machinery for protection of the environment under the then Deputy Chairperson of the Planning Commission, Mr. N D Tiwari. As one of the follow up actions, Department of Environment was set up, which later will be turned into a full-fledged Ministry of Environment and Forests. In other words, the administrative set up for correcting anomalies arising in the field of environment is not so old.

This is not to deny the existence of laws towards protection of environment before 1972. Historically, Indian environmental laws originated with the British, with the Bengal Smoke Nuisance Act, 1905, "for the abatement of nuisances, arising from the smoke of furnaces or fire-places in the towns and suburbs of Kolkata and in Howrah and other areas of Bengal". The main purpose of this Act was to preserve the dazzling whiteness of the fine huge white-marble structure of Victoria Memorial Hall. Since then, a number of legislations have been enacted pre as well as post independence at the Central as well as the State level encompassing almost all areas of the 'environment' but focussing only on the pollution aspect<sup>1</sup>.

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<sup>1</sup> There were legislations like Poison Act, 1919, Factories Act, 1948, Insecticides Act, 1968, Prevention of Food Adulteration Act, 1954, Ancient Monument and Archaeological Sites and Remains Act, 1958 at the central level; Mysore Destructive Insects and Pests Act, 1917, Andhra Pradesh Agricultural Pest and Disease Act, 1954, Orissa River Pollution Prevention Act, 1953, Maharashtra Prevention of Water Pollution Act, 1969<sup>1</sup> among many others.

**Source:** [http://www.cpcb.nic.in/News%20Letters/Archives/Bio-Monitoring %20of%20Water/Environment\\_related\\_Legislation.html](http://www.cpcb.nic.in/News%20Letters/Archives/Bio-Monitoring%20of%20Water/Environment_related_Legislation.html)

In 1950 at the time of adoption, the Constitution of India had a directive principle linked to environment, referring to the material resources. Art 39 reads 'The State shall, in particular, direct its policy towards securing....' (b) That the ownership and control of the material resources of the community are so distributed as best to sub serve the common good, (c) that the operation of the economic system does not result in the concentration of wealth and means of production to the common detriment...

With the Constitution (Forty-second Amendment) Act<sup>2</sup> 1976, Article 48A was included that reads, the state shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country.

Parallel to this state-driven 'top-down' approach, distinct and significant developments were taking place: actors were participants of the social movements, judiciary and civil society organizations. There are a large number of reasons behind this development: one of them is the growing lack of confidence over the state apparatus to protect the environment owing largely to ineffective implementation of the regulations. In the course of this development, many changes took place that includes increasing consciousness among the citizenry, better accountability of the government machinery and overall mainstreaming of the issue of protection environment. In this process, law, lawyers, judges, legal institutions did play a significant role, and hopefully will continue to play. In this short piece, broad contours of this contribution will be touched upon. In section I, a brief overview has been provided of the Rights based approach, where both the judiciary and the civil society had played key role. Section II will touch upon the environmental wrongs and their remedies. In Section III, role of the judiciary is discussed with specific emphasis on social action litigations that has served as one of the important elements in the armory of the common public against environmental pollution. Section IV will provide a framework for understanding the structure of laws related to environment, in broader terms.

## **Section I: Environmental Rights and Duties**

Rights based approach to environmental protection owes its origins to human rights movement. Degradation of environment was perceived to violate universally approved human rights. Further, other legal options, especially in India, towards environmental protection namely from tort, criminal law and statutory legislations have inherent, specific problems resulting helplessness among concerned citizens who in turn sought remedy from Courts on the basis of rights derived from a variety of sources. They include, among other things, custom, common law, statutes and subordinate legislations, international human rights instruments apart from fundamental rights enshrined in the Indian Constitution. Indian judiciary in turn also responded positively to this development and subsequent interpretations and actions led to emergence of rights-based approach to environmental protection in India.

One may note here that no Fundamental Right *per se* deals with the protection of environment. It is only through the broader interpretation of couple of fundamental rights, namely, Right to Life (Art. 21), Right to Equality (Art. 14), and Right to Trade [Art. 19(1)(g)]

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<sup>2</sup> This amendment (came into effect on 3<sup>rd</sup> January 1977) had also resulted in inclusion of a new Part, IVA (Fundamental Duties) that included Art. 51A of which section (g) read 'to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures'.

notion of (Fundamental) environmental rights has come to existence. Various judgments have widened the ambit and meaning of these articles, and one may not be surprised to see newer interpretations in the future. As early as 1991, the Supreme Court had held that 'Right to Life' includes right of enjoyment of pollution free water and air. Supreme Court clarified that if anything endangers or impairs that quality of life in derogation of laws, a citizen has the right to have recourse to article 32 (Social Action Litigation or Public Interest Litigation). Art 14 prohibits arbitrary or unreasonable state actions, as every such action violates the principle of equality enshrined in it. If an action, say mining lease or crushing of stones, has far-reaching consequences on natural wealth apart from pollution, the Court stated that the government should not grant permission of such action without appropriate environmental impact assessment. Art. 19(1)(g) that provided right to practice any profession or to carry on any occupation, trade or business does not mean that, as Gujarat High Court has held, it is not subject to any restriction; rather, no one has the right to carry the business so as to cause nuisance to the society.

## **Section II: Environmental Wrongs and Remedies**

As stated earlier, environmental laws exist prior to this rights-based approach. These laws used a somewhat different route to tackle pollution: that of wrongs and the corresponding legal remedies. Broadly one can classify the remedies as a backward looking like compensation for damages and forward looking like injunction for preventing an activity. Most of the times, however, the awards by the courts are a mix of the two. Alternatively the classification can be done on the basis of the nature of the wrong itself, that is, whether it is a civil one or criminal one. The differences on this count are especially relevant for a Public Nuisance, for which remedy can be found in Indian Penal Code (1860), Code of Criminal Procedure (1973) and Code of Civil Procedure (1908). While the former two will call for criminal proceedings, a civil action will result from the last one.

## **Section III: Judicial Procedures, Improvisations and their Limitations**

Courts, most notably the Supreme Court and a few High Courts have considered matters related to environment in a different light since 1980's. Contribution of few judges like J. V R Krishna Iyer, J. Bhagwati and J. Kuldip Singh stand out in the form of decisions that are seen to be upholding protection of environment and at times against the so called 'development'. Be it through improvisations of judicial techniques or liberal interpretation of terms the Courts have performed more than its share of its duty that has often been subject to criticism. Whether the role was just or not is a debatable issue. But, it is *this* aspect of environmental law that has made the latter an increasingly important field of study for purely academic reasons or for serving as a tool for civil society organizations in the field of protection of environment or to for making the industry more environment friendly. One of the important tools of this judicial intervention was social action litigation.

Public interest or social action litigation has the basic aim of protection of interest of the society or the community or class of people as distinguished from individual or private interest. Unlike the private litigations, PILs are not strictly bipolar: rather petitioner here seeks to champion a public cause for the benefit of the society. Over the years Supreme Court had taken several steps so as to bring justice within the reach of the poor masses through this PIL. For instance, consider the relaxation of *Locus Standi* requirements and allowing 'representative standing'. The court has allowed any member of the public to seek judicial redress for a legal wrong caused to a person or to a determinate class of persons who by reason of poverty, helplessness

or disability or socially or economically disadvantaged position is unable to approach the court directly. In the cases involving environmental pollution, where victims in most of the cases do belong to the classes of people who may not be having the means to access justice, this particular step was a significant and far reaching one.

Apart from the developments in PIL front, two other innovative or novel mechanisms of courts were judicial review of the decisions made by the Government and its agencies and sensitive handling of writ petitions on environmental matters. The latter became very popular owing to reasons of relative speed, simplicity and inexpensiveness. On the other hand, judicial review turned out to be one the central reasons for the building up of the conflict between the executive and the judiciary on the matters of respective spheres of jurisdiction. At the end, while role of the Courts towards protection of environment has been hailed with a capital H, at the same time it is also important to understand the limitations of the Courts in performing the role of other branches of the Government, namely executive and legislature. Without appropriate steps being taken at other ends, orders by Courts that are often quite radical in nature was bound to unruffled feathers. Moreover, in a democratic structure, it becomes difficult to sustain the tempo against growing criticism of the Courts overstepping their jurisdiction. The backlash of this 'judicial activism' can be witnessed even within the highest judiciary itself: in a number of judgments, not very kind or supportive wordings have been used, mainly against the 'culture' of PILs.

#### **Section IV: Structural Framework of Environmental Laws**

As stated earlier, broadly speaking, environmental laws in India are focused only on the protection aspect. But unlike the more industrialized countries, in India, there are a large number of people who are dependent on the natural resources for their survival. Unfortunately regulations governing the allocation of these resources, say, land and forests are not usually seen within the framework of the 'environment'. What is provided below is the more comprehensive framework of the laws involving natural resources, their allocation as well as their protection. A list of important legislations pertaining to the protective aspect only has been provided in the annexure.

Protective		Planning	
For Human Beings	For Non-human Beings	For Production	For Distribution
Water Air Noise Nuclear Radiation Toxic Substance	Wild Life Marine Life Flora	Land Utilization Irrigation Industry Mining Grazing Land Catchment Areas Wet Land Estuaries	Land Ceiling Town Planning Slums Housing Recreational Areas Parks Sanctuaries Biosphere

*Source: Singh, Chhatrapati (1987: 261)*

Even with such an elaborative legal framework, extent of environmental pollution is increasing day by day. This dark fact about reality proves that simply by enacting appropriate legislations the problems cannot be solved. The judiciary had taken and continues to take actions that it finds as important: but judges cannot come out to streets everyday and perform the routine activities of the executive. The civil society organizations know very well about their limitations in getting influential and powerful business barons prosecuted. Politicians plead their helplessness in addressing pollution, as it is perceived as against the development/employment.

## Conclusion

Ink is still dry on the decision by the hon'ble Kolkata High Court over the holding of proposed Kolkata Book Fair at Park Circus ground. The court upheld the right of the residents: green crusaders were jubilant. On the other hand, all those living in the city of Kolkata using public roads are constantly facing the air and noise pollution literally. On account of court decisions almost all the tanneries have been shifted to Bantala complex equipped with Common Effluent Treatment Plant. But, a cursory glance at the *nalas* flowing through the city tells us that things are far from being correct. In short, battle against the pollution is far from over: it has just begun. As long as human activities will continue, wastes will be generated, and so will be the possibility of pollution. The point is to find measures so as to control it, minimize its impact, and take appropriate corrective actions for the remaining pollution. Zero pollution worlds is a utopia: then all of us will cease to exist.

It is important therefore for all of us to equip ourselves with the knowledge about the rights and wrongs so far as environment is concerned, about the modes of corrective actions and the institutions that have the statutory power and so on. Last, but definitely not the least is sensitisation of the political establishment and the administration: after all it is them who are supposed to run the show and the show must go on.

## Annexure

### Classification of Environmental Laws, as per the Ministry of Environment and Forests

1. Water Pollution
2. Air Pollution
3. Environmental Protection
  - Coastal Regulation Zone
  - Delegation of Powers
  - Eco-marks Scheme
  - Eco-sensitive Zone
  - Environmental Clearance – General
  - Environmental Labs
  - Hazardous Substances Management
  - Loss Of Ecology
  - Noise Pollution
  - Ozone Layer Depletion
  - 2-T Oil

4. Public Liability Insurance
5. National Environment Appellate Authority
6. National Environment Tribunal
7. Animal Welfare
8. Wildlife
9. Forest Conservation
10. Biodiversity

There are a number of legislations in each of the areas. A list of some of the most cited legislations has been provided. Along with it, associated rules and notifications have been listed.

1. The Water (Prevention and Control of Pollution) Act, 1974, amended 1988
2. The Water (Prevention and Control of Pollution) Cess Act, 1977, amended 1992
  - Central Board for the Prevention and Control of Water Pollution (Procedure for Transaction of Business) Rules, 1975 amended 1976
3. The Air (Prevention and Control of Pollution) Act 1981, amended 1987
  - **Notifications:** Ambient Air Quality Standard for Ammonia (NH<sub>3</sub>), 1998
  - National Ambient Air Quality Standards, 1994
4. The Environment (Protection) Act, 1986, amended 1991
  - Notifications:** On Establishment of Coastal Zone Management Authorities at the State Level, 2002
  - Declaration of Coastal Stretches as Coastal Regulation Zone (CRZ), 1991 amended 3/10/2001
  - The Scheme on Labelling of Environment Friendly Products (ECOMARK)
  - Environmental Impact Assessment Notification-2006.
5. The Wild Life (Protection) Amendment Act, 2002
6. Forest (Conservation) Act, 1980, amended 1988
7. The Biological Diversity Act, 2002

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## Industrial Ecology & Carbon Trading

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The Intergovernmental Panel on Climate Change (IPCC) in its latest Fourth Assessment Report releases in 2007 has indicated that the increasing concentration of greenhouse gases, mainly carbon-dioxide in the atmosphere may lead to an increase of global average temperature at the end of this century or 2100 AD anywhere between 1.1 to 6.4 degrees Celsius. The most likely figure is 3 degree.

### **What does this rise really mean? What can happen?**

The Working Group II of the IPCC has presented, on the basis of an extensive study by world-class experts the following for Asia.

Glacier melt in the Himalayas is projected to increase flooding and rock avalanches from destabilized slopes and to affect water resources within the next two or three decades. This will be followed by decreased river flows as the glaciers recede.

- Fresh water availability in Central, South, East and Southeast Asia, particularly in large river basins is projected to decrease due to climate change, which could adversely affect more than a billion people by the 2050s.
- Coastal areas, especially heavily-populated mega-delta region in South, East and Southern Asia, will be at greater risk due to increased flooding from the sea and in some mega-deltas, flooding from the rivers.
- Climate change is projected to impinge on sustainable development of most developing countries of Asia, as it compounds the pressure on natural resources and the environment associated with rapid urbanization, industrialization and economic development.
- It is projected that the crop yields could increase upto 20% in East and Southeast Asia while they could decrease upto 30% in Central and South Asia. Taken together and considering the influence of rapid population growth and urbanization, the risk of hunger is projected to remain very high in several developing countries.
- Endemic morbidity and mortality due to diarrhoeal disease primarily associated with floods and droughts are expected to rise in East, South and Southeast Asia due to projected changes in the hydrological cycle associated with global warming. Increase in coastal water temperature would exacerbate the abundance and / or toxicity in South Asia.

### **The Working Group III has advocated for mitigation of climate change the following:**

Improved energy supply and distribution efficiency, more fuel efficient vehicles, modal shift from road to rail and public transport system, non-motorised transport/ (Cycling, walking), efficient lighting, more efficient end-use electrical equipment, heat and power recovery etc.



To cut down the greenhouse gas emission the best option is to improve energy efficiency and reduce losses to the maximum possible extent. Energy is to conserve to ward off the catastrophic climate change effects. It is a plain survival strategy that cannot be overlooked any more. Centre of Energy and Environment Management (CEEM) solicits the support of all in its humble efforts in increasing awareness and promoting conservation of our precious reserves.

## Conservation only can ensure a safe future

### Points to Ponder

#### 1. Reserves of Fossil Fuels

Sl. No	Global		
1	Oil	136 Billion Ton	730 Million Ton (India – 0.5%)
2	Gas	145 Tri. Mtr. CubeN	720 Million Mtr. CubeN (India – 0.5%)
3	Coal	995 Billion Ton	80 Billion Ton (India – 7.8%)

#### 2. Consumption of oil has reached 85 Million Barrels per day globally in 2006.

#### 3. At the current rate of consumption global reserves of:

Oil will last another	45 years
Gas will last for another	54 years
Coal will last for another	172 years

#### 4. World Population Growth

1800	1 Billion
1900	1.6 Billion
1987	5 Billion
1999	6 Billion
2050	7.5 – 10 Billion ( <i>projected</i> )

#### 5. Share of energy production as in 2004

Fossil Fuels (coal, oil & gas)	80.3%
Nuclear	6.5%
Renewable (hydel, biomass, others)	13.2%

#### 6. The six Green House gases, listed in Kyoto Protocol

Sl. No.	Name	Major Source	Contribution to Global Warming
1	Carbon Dioxide	86% from Fossil Fuel Burning	65%
2	Methane	Production & Transportation of oil, gas, digestive system of animals and wet paddy cultivation	20%
3	Nitrous Oxide	Nitrogenous fertilizer reaction with soil, reaction of atmospheric Nitrogen and Oxygen at high temperature as in Thermal Power Plant	6%
4	Sulphur Hexa Fluoride (SF6) Hydrofluorocarbon (HFCs) Perfluorocarbon (PFCs)		3%
5	From other sources		6%

## 7. Carbon Dioxide emissions in tons per person (World Average – 4.2)

USA	19.7
OECD	11.9
Russia	10.6
Japan	9.5
China	3.7
Asia	1.2
India	1.0
Africa	0.9

*The pledges taken at Live Earth on 07/07/07 held in 9 cities in 7 continents before 2 billion people pledge*

- a. To demand that my country join an international treaty within the next 2 years that cuts global warming pollution by 90% in developed countries and by more than half worldwide in time for the next generation to inherit a healthy earth;
- b. To take personal action to help solve the climate crisis by reducing my own CO<sub>2</sub> pollution as much as I can and offsetting the rest to become "carbon neutral",

- c. To fight for a moratorium on the construction of any new generating facility that burns coal without the capacity to safely trap and store the CO<sub>2</sub>;
- d. To work for a dramatic increase in the energy efficiency of my home, workplace, school, place of worship, and means of transportation;
- e. To fight for laws and policies that expand the use of renewable energy sources and reduce dependence on oil and coal;
- f. To plant new trees and to join with others in preserving and protecting forest; and,
- g. To buy from business and support leaders who share my commitment to solving the climate crisis and building a sustainable, just, and prosperous world for the 21<sup>st</sup> century.

## Industrial Ecology & Carbon Trading

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Corporate Sustainability is a business approach that creates long-term shareholder value by embracing opportunities and managing risks deriving from economic, environmental and social developments. Corporate Sustainability leaders create a strategy and management, which enables them to produce new and innovative sustainable products and services, and at the same time successfully avoiding and reducing sustainability costs and risks.

Companies the world over realize that to succeed in the long-term, they have to consider economic, environmental and social issues and address the concerns that are relevant to their key-stakeholders.

Sustainability implies consideration of all issues that nurture an organization and help it retain long-term shareholder value. It is important to understand environmental, social and economic issues that surround organizations in order to understand how our actions would impact the lives and aspirations of not only our present stakeholders, but also our future generations. One of the key challenges is on the front of climate change, which has far reaching consequences for living forms, and looms large as a threat to the future of mankind on the planet. This year's Nobel Prize for climate change science to Al Gore, the ex-US Vice President and Dr. R. K. Pachauri, head of IPCC, the global scientific body of knowledge on climate change, has shifted greater focus on this issue.

Almost all sectors of business have responded to climate change, as this issue is critical to business continuity itself and long-term sustainability. While climate change poses several risks to business, there are opportunities as well for early movers who harness benefits of switching to less carbon intensive energy sources and manufacturing methods. Companies in the developing world such as in India and China have already scored significant success in the area of emission striding under the Kyoto Protocol.

The Clean Development Mechanism (CDM) is the principal mechanism under the Kyoto Protocol through which developed country signatories (so called Annex I Parties) are able to cooperate with developing country signatories (non-Annex I Parties) in order to meet international greenhouse gas (GHG) commitments. The CDM was designed to promote technology transfer and support the transition to sustainable development, whilst offering

developed countries some flexibility in meeting Kyoto targets. By increasing flexibility, these mechanisms are designed to decrease the costs of reducing emissions.

The CDM covers emission reduction activities on a project basis in Asia Pacific countries, which are not subject to binding targets. CDM projects generate carbon credits (called 'certified emission reductions' or CERs), which can be used for compliance either by government or by companies in national or regional schemes; for example, the EU Emissions Trading Scheme (EU-ETS) which has been the most actively traded market to date.

**Disclaimer: the views expressed here are those of the author and do not purport to be the views of the organization he works for.**

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