May 2012

Vol 56

YOJANA

Chief Editor : Rina Sonowal Kouli
Editor : Manogyan R. Pal

Joint Director (Production) : V.K. Meena
Cover Design : Ruby Kumari
E-mail (Editorial) : yojanace@gmail.com
(Circulation) : pdjucir_ jcm@yahoo.co.in
Website : www.yojana.gov.in

Let noble thoughts come to us from every side
Rig Veda

CONTENTS

Our Representatives : Ahmedabad: Amita Maru, Bangalore: B.S. Meenakshi, Chennai: I. Vijayan, Guwahati: Anupoma Das, Hyderabad: V. Balakrishna, Kolkata: Antara Ghosh, Mumbai: Minakshi Banerjee, Thiruvananthapuram: VM Ahmad.

YOJANA seeks to carry the message of the Plan to all sections of the people and promote a more earnest discussion on problems of social and economic development. Although **published by the Ministry of Information and Broadcasting**, Yojana is not restricted to expressing the official point of view. Yojana is published in Assamese, Bengali, English, Gujarati, Hindi, Kannada, Malayalam, Marathi, Oriya, Punjabi, Tamil, Telugu and Urdu.

EDITORIAL OFFICE : Yojana Bhavan, Sansad Marg, New Delhi-110001 Tel.: 23096738, 23042511.
Tlgm.: Yojana. **Business Manager (Hqs.) :** Ph :24367260, 24365609, 24365610

For new subscriptions, renewals, enquiries please contact : Business Manager (Circulation & Advt.), Publications Division, Min. of I&B, East Block-IV, Level-VII, R.K. Puram, New Delhi-110066, Tel.: 26100207, Telegram : Soochprakasan and Sales Emporia : Publications Division: *Soochna Bhavan, CGO Complex, Lodhi Road, New Delhi -110003 (Ph 24365610) *Hall No.196, Old Secretariat, Delhi 110054(Ph 23890205) * 701, B Wing, 7th Floor, Kendriya Sadan, Belapur, Navi Mumbai 400614 (Ph 27570686)*8, Esplanade East, Kolkata-700069 (Ph 22488030) *'A' Wing, Rajaji Bhawan, Basant Nagar, Chennai-600090 (Ph 24917673) *Press road, Near Govt. Press, Thiruvananthapuram-695001 (Ph 2330650) *Block No.4, 1st Floor, Gruhakalpa Complex, M G Road, Nampally, Hyderabad-500001 (Ph 24605383) *1st Floor, 'F' Wing, Kendriya Sadan, Koramangala, Bangalore-560034 (Ph 25537244) *Bihar State Co-operative Bank Building, Ashoka Rajpath, Patna-800004 (Ph 2683407) *Hall No 1, 2nd floor, Kendriya Bhawan, Sector-H, Aliganj, Lucknow-226024(Ph 2225455) *Ambica Complex, 1st Floor, above UCO Bank, Paldi, Ahmedabad-380007 (Ph 26588669) *KKB Road, New Colony, House No.7, Chenikuthi, Guwahati 781003 (Ph 2665090)

SUBSCRIPTION : 1 year Rs. 100, 2 years Rs. 180, 3 years Rs. 250. For neighbouring countries by Air Mail Rs. 530 yearly; for European and other countries Rs. 730 yearly.
No. of Pages : 60

About the Issue

India's journey on the path of sustainable development has been marked both by reasons for celebrations and introspection. The story dates back to the 1980s and early 1990s which mark the beginning of economic reforms, catalyst for India's phenomenally faster growth rates since, and coinciding with a time when countries around the world acknowledged and started addressing environmental concerns, such as at the Earth Summit in Rio on 1992. India's faster gross domestic product growth over the last two decades have been unprecedented, but at the same time India's rankings in terms of human development index (HDI) as well as indices measuring environmental sustainability are yet to reflect this growth.

The key challenges have become sharper in the past two decades. The 2009 State of the Environment Report by the Ministry of Environment and Forests clubs issues under five key challenges faced by India, which are climate change, food security, water security, energy security and managing urbanization. Climate change is intruding the natural ecosystems and is expected to have substantial adverse effects in India, mainly on agriculture on which 58 percent of the population depends for livelihood, water storage in the Himalayan glaciers which are the source of major rivers and groundwater recharge, sea level rise and threats to a long coastline and habitations.

Sustainable development in terms of environmental concerns has been a recurring theme in Indian policy and planning. The pillars of sustainable development are embedded in the fundamental rights guaranteed by the Constitution. Article 21 conferring the Right to Life has been assigned the broadest interpretations by the judiciary to encompass the right to a clean environment, right to livelihood, right to live with dignity and a number of other associated rights.

The National Environment Policy 2006 has attempted to mainstream environmental concerns in all developmental activities. Government through its policies, has been factoring ecological concerns into the developmental process so that economic development can be achieved without permanently changing the environment. Challenges are huge. Meeting rising energy needs in an energy poor country with still limited access is a challenge, along with accelerated urbanization and manufacturing to create more jobs.

At the same time, there is a strong sense of progress made at the community level. India has made remarkable gains so far in sustainable development as measured for example in three summary outcome indicators. One is life expectancy, rise in forest cover and third, gains in literacy among younger women.

India is committed to meeting the challenges of climate change and has set out the priorities for a sustainable and inclusive, lower carbon development path. Inside, authors and experts bring forth issues on environment and sustainable development in the Indian and the global context and the need to address them and appropriate responses to deal with the challenges. ❑

Do Ecology–Pathway to a Green Economy

M S Swaminathan

What we need is a culture of "do ecology", ie, meeting the needs of the current and future generations without ecological harm

2012 marks the 40th anniversary of the UN Conference on the Human Environment held in Stockholm in 1972, and the 20th anniversary of the UN Conference on Envrionment and Development held at Rio de Janeiro in 1992. In Stockholm Indira Gandhi added the dimension of social sustainability to the measurement of economic growth without environmental harm, in the following words:

"On the one hand the rich look askance at our continuing poverty – on the other, they warn us against their own methods. We do not wish to impoverish the environment any further and yet we cannot for a moment forget the grim poverty of large numbers of people. Are not poverty and need the greatest polluters? For instance, unless we are in a position to provide employment and purchasing power for the daily necessities of the tribal people and those who live in or around our jungles, we cannot prevent them from combing the forest for food and livelihood; When they themselves feel deprived, how can we urge the preservation of animals? How can we speak to those who live in villages and in slums about keeping the oceans, the rivers and the air clean when their own lives are contaminated at the source? The environment cannot be improved in conditions of poverty. Nor can poverty be eradicated without the use of science and technology"

A few months before her death in 1984, she pleaded for the protection and wise management of our life support system comprising land, water, forests, biodiversity, oceans and the atmosphere in her message on the occasion of the World Environment Day:

Vegetation forms a green 'security blanket', protecting the fertile yet fragile soil, maintaining balance in atmospheric conditions, safeguarding supplies of fresh water and moderating their flow to prevent flood and drought. Animal and human life is dependent on

The author is Member of Parliament (Rajya Sabha) and Chairman, M S Swaminathan Research Foundation, Chennai.

vegetation in a myriad ways. But the green cover, especially in our forests, is under attack by the greed of the rich and the needs of the poor.

The challenges before those working for sustainable development are curbing the fast spreading greed revolution and destroying the poverty trap in which millions of our countrymen are caught. Delivering a lecture on "Agriculture in Spaceship Earth in 1973, I referred to the need for a "Do Ecology" approach in our country to environment protection. I quote what I then said :

"The environmental policy advocated in the richer nations is designed to protect the high standard of living resulting from the unprecedented growth in the exploitation of natural resources during the last century from serious damage by the very processes of such growth. It is of necessity a policy based on a series of don'ts. This is inevitable since the aim is to undo some of the damage already done or to prevent further damage along the same lines.

The poorer nations, however, are faced with the desire and need to produce more food from hungry soils, more clothing and more housing. They are aware that historically a rising standard of living has depended on the ability of agriculture to release manpower to other more industrial pursuits. They hence naturally wish to develop more industries and to find productive and remunerative employment for their growing population. For them, conditions of poverty and inadequate arrangements for human and other waste disposal may be greater causes of water and air pollution than the effluents from factories or fertilizer from the fields. Since the causes of pollution are by and large different, the solutions will have to be different too and it would be a grave mistake to attempt to copy the policies now being propagated in the developed world". What we need is a culture of "do ecology", ie, meeting the needs of the current and future generations without ecological harm.

When Indira Gandhi returned as Prime Minister in 1980, she asked me to move to the Planning Commission as Acting Deputy Chairman and later as Member. She wanted that the VI Five Year Plan (1980-85) should show the way to promoting a Green Economy characterized by Inclusive Growth in our country. This led to our including for the first time in the history of planning in India two new chapters – one on Environment and Development, and another on "Women and Development". The thrust of these chapters was to mainstream the environmental and gender dimensions in all developmental projects. In other words, the VI Plan provided a pro-nature, pro-women and pro-poor orientation to planned development.

The Rio conference of 1992 led to the adoption of Global Conventions in the areas of Climate and Biodiversity, as well as Agenda 21, a road map for environmentally, economically and socially sustainable development. We are now in the midst of assessing the progress made since 1992 in spreading the message "good ecology is good business". In the areas of mitigation and adaptation to climate change, we have expressed our commitment to a low carbon pathway of development. Since food and water security will be seriously affected by unfavourable alterations in temperature, precipitation, drought, flood and rise in sea level, several steps have been taken to develop and spread climate-resilient farming techniques. supply augmentation and demand management in the case of water and now receiving serious attention. The Ministry of Water Resources launched four years ago a National Farmer Participatory Programme for increasing yield and income per drop of water. The Department of Science and Technology has initiated an imaginative programme titled WAR for Water (Winning, Augmentation and Renovation).

Strengthening our ecological security is the major goal of the Mahatma Gandhi Rural Employment Guarantee Programme (MGNREGA). This is one of the largest social protection programmes in the world which provides a legal right to work. MGNREGA is designed to strengthen ongoing efforts in the areas of water harvesting, watershed management and soil health care and enhancement. Although the work to be performed is described as "unskilled", the work actually involves the marriage of brain and brawn. I have hence been pleading for instituting Environment Saviour Awards for the best MGNREGA teams in the areas of water harvesting and watershed development. This will give the workers a sense of purpose and pride in the work they are doing.

A few years ago, I suggested that the National Plant Variety Protection and Farmers' Rights Authority (PVPFRA) should institute "Genome Saviour Awards" to recognize and reward tribal and rural women and men for their invaluable contributions to agro-biodiversity conservation and enhancement. This has already been done by the PVPFRA and several tribal and rural communities have received recognition. So far, such communities have been conserving valuable biodiversity for public good at personal cost. The least we can do is to express our gratitude to them by giving their work social prestige and recognition. We need to accord similar recognition to the conservers of valuable animal breeds.

The FAO has recently started recognizing the agricultural heritage regions of the world under a programme titled Globally Important Agricultural Heritage Systems (GIAHS). The purpose of GIAHS is to recognize "Remarkable land use systems and landscapes which are rich in globally significant biological diversity evolving from the co-adaptation of a community with its environment and its needs and aspirations for sustainable development". In our country so far the following sites have received recognition under this proramme :

1. Traditional Agricultural System, Koraput, Odisha
2. Below Sea Level Farming System, Kuttanad, Kerala

In the Koraput system, women have played a key role in the conservation of biodiversity. The Kuttanad system was developed by farmers over 150 years ago to ensure their food security by learning to cultivate rice and other crops below sea level. The Kuttanad System is now attracting worldwide attention since one of the effects of global warming is sea level rise. It has therefore been an act of vision on the part of Kerala government to have decided to set up an International Research and Training Centre for Below Sea Level Farming in Kuttanad. Adequate funds have been provided for this purpose in the Kerala Budget for 2012-13. The Government of India has also sanctioned considerable funds for the eco-development of Kuttanad and adjoining areas around the Vembanad Lake.

Another example of "Do Ecology" is the conversion of the Silent Valley National Forest in Kerala into a biosphere reserve. The evolutionary age of the Silent Valley evergreen rainforest is believed to be more than 50 million years. The then Government of Kerala decided in 1978 to sacrifice a part of this unique forest for generating 240 Mega Watts of electricity. On my visit to this forest in 1979 (I was then Secretary, Agriculture and Rural Development and Principal Secretary, Ministry of Agriculture of the Government of India), I developed a plan for saving this priceless gift of Nature by addressing the needs for which the forest was about to be destroyed. These are electricity generation, irrigation of 10000 hectares in the Malappuram and Palghat districts and generation of employment for about 3000 persons. I had made the following suggestions in my 1979 report to meet the above needs :

- The immediate electricity needs of the Palghat and Malappuram area could be met by developing suitable transmission lines from the Idukki Project area. Transmission schemes for Kerala costing about rupees 45 crore have been approved in the Sixth Plan. Also, Idukki Stage II of 3 x 130 Mega Watt at a cost of 15.5 crore has already been approved by the Planning Commision. A long term energy profile and strategy may be prepared by a group of national experts with the help of the Kerala State Electricity Board, taking into account potential developments in the utilization of solar energy.
- Steps should be taken to promote suitable industries in the area so that additional opportunities for generation of employment can be created. A Palghat and Malappuram Employment Generation Consortium may be set up for preparing employment and income generation programmes based on sustainable resource utilization strategies.
- The amount of rupees 200 lakhs provided for SVHP in the State Budget for 1980-81 could be utilized for ground water development, establishment of transmission lines from Idukki and for suitable industrial and agricultural projects. An adequate allocation should be made in the Plan budget during the Sixth Plan period

for the rapid ecodevelopment of the Palghat –Malappuram region. Preferably, the entire allocation for SVHP should be reserved for this purpose."

My above suggestions were to meet the objectives for which a part of the forest was to be utilized. We need greater expertise in the country in the field of "Do Ecology", so that we can show how to achieve a developmental goal without ecological harm. Instead of just saying "don't do this", we should learn to say, "do this way so that your action confers lasting benefits to the people".

Fortunately, before the hydro-electric project could be implemented, Smt Indira Gandhi became Prime Minister and appointed a committee headed by Prof M G K Menon to develop the entire forest area as a biosphere reserve as proposed in my report.

The consequences of climate change will be felt more by poor nations and the poor in all nations, since they have very low coping capacity to meet the consequences of climate change induced catrostophies. Therefore in addition to global action for achieving a balance between carbon emissions and carbon absorption, we should strengthen the capacity of local communities in meeting the challenges arising from higher mean temperature, more frequent drought and flood and a rise in sea level. The M S Swaminathan Research Foundation has developed a programme for training one woman and one male member of every Panchayat as Climate Risk Managers. Such Community Climate Risk Managers will be well versed in the science and art of climate change mitigation and adaptation. They will be trained to operate drought and flood codes to minimize the adverse consequences of deficient or excess rainfall. They will also know how to maximize the benefits of a normal monsoon season through a Good Weather Code. They will promote the planting of fertilizer trees, operate biogas plants and harvest the rainwater in *Jalkunds*. Thus, national efforts like those envisaged under the Prime Minister's Eight Missions to deal with climate change will have to be supplemented with local level climate literacy and climate change mitigation and adaptation plans. Building soil carbon banks through fertilizer trees will confer double benefits, namely, increasing crop productivity and reduced carbon emissions into the atmosphere.

The Rio +20 event affords us an opportunity for developing an Agenda 21 for the rest of this century based on the principles of ecology, economics, ethics, employment generation and social and gender equity. ❑

India's Second National Communication to the United Nations Framework Convention on Climate Change

The Union Cabinet has approved India's Second National Communication to the Secretariat of the United Nations Framework Convention on Climate Change towards fulfilment of the reporting obligation under the Convention. Studies on key sectors were conducted in the short to medium and long time frame using latest models and know-how so as to bring out extant and projected high regional and sectoral variability and vulnerability. The estimations about GHG emissions have helped in quantifying the extent of India's GHG emissions and its rate of growth, so as to help policy makers with appropriate information.

This report shall benefit state/national level policy makers in enhancing the understanding of the issues related to climate change and its impact and create general awareness of the stakeholders relating to Government of India's proactive commitment towards addressing the challenges due to climate change. The range of studies included in this report has been conducted broadly at the national level, with some specific case studies highlighting the enormous diversity of India and their regional imperatives. India is a Party to the United Nations Framework Convention on Climate (UNFCCC).

The Convention, in accordance with its Article 4.1 and 12.1, enjoins all Parties, both developed and developing country Parties, to furnish information, in the form of a National Communication (a national report), regarding implementation of the Convention. This project has been implemented with the financial support of USD 3.5 million provided by GEF and matched by a support of USD 3.0 million from the Government of India (in the nature of co-financing).

From protests to where in 2012?

Sunita Narain

It is also a fact that these movements represent voices that are asking for different ways of development. These movements stand for rights to land, water, forest and mineral resources

2011's person of the year, according to Time magazine, is "the protester". Clearly, this is the image that has captured the world—from dissent against the lack of democracy and repression in large parts of West Asia to anger against economic policies in vast and disparate parts of the world. People, all over, are saying enough is enough. But what will happen to these voices in the coming years? Will the movements of protesters be enough to change the way the world runs its business? Do these movements even know what they want?

It is important to understand that there are similarities and yet huge differences in protest movements against economic policies in the rich and the getting-rich world. The US-born Occupy Wall Street movement's slogan is "we are the 99 percent who will no longer tolerate the greed and corruption of the 1 percent". The movement, which began in New York and then spread across many states, has been squelched in many places by aggressive city governments. But protesters say they will be back. They will overcome.

It is difficult to gauge how this will pan out in the coming year. The movement prides itself in being leaderless and people-powered. It has no manifesto and no actionable agenda on how Wall Street must be reformed or how the global economy must be restructured so that it can meet the needs of all. In this way, it is easy to dismiss this movement as just one more protest that will go nowhere. It is not the Arab Spring, but the American Winter that will prevail.

But there is another possibility. The fact is that this movement—as with many similar movements in the rich-but-economically-troubled world—has struck a chord. Today, the same rich world, which was secure in its consumption and comfort, is finding the going tough. Things it took for granted are no longer easily available—from homes and medical facilities to education and jobs. Ordinary people are being hit by what governments call necessary austerity measures. They are hitting back in every way they can.

The author is Director General, Centre for Science and Environment, New Delhi.

In Atlanta, the occupy-our-home movement wants to take over houses of people who will be thrown out by banks because of default in mortgage payments. It says the current assessment of property values is too high and banks have too much power to throw out people, even if they default on one payment. In Washington, the occupy-the-vote-DC movement is demanding electoral representation for the federal city. The list goes on.

These movements represent many uncomfortable and inconvenient issues that are refusing to go away. The rumbling that began in mid-2008 with the bankruptcy of the Lehman Brothers has become a roar as more banks and national economies collapse. This is in spite of governments doing all they can to portray that they have arrested the financial collapse. The problem is that the world's economic managers do not believe there is any real option to restructure economies so that they consume less, pollute less and still grow in well being if not in wealth. The problem is that we are wedded to this one ideology of growth. It is for this reason that in spite of all the perturbations and upheavals, the same people who have put us in this place continue to be in charge of fixing the problems of growth. It is no wonder that the protest movements are also on the rise. And even if they do not have the answers to the problems, they know that the current policies are not working. Their anguish reminds us that real change must happen, tomorrow or the day after.

The movements of protests in the emerging world are of many kinds and by many kinds of people. On the one hand, we have protests happening on the streets of urban India against corruption. This has certainly captured popular imagination and media attention. But there are many more protests—mutinies against displacement and pollution across the country—we rarely hear about and forget too soon.

These movements of small groups of people fighting for survival are real and intensifying. In a democracy there will be some hearing. Many of these protests—against land acquisition, water takeover, mining, dams, power projects or pollution—are getting some measure of official response. This is not to say that every protest will be successful. Far from it. But it is also a fact that these movements represent voices that are asking for different ways of development. These movements stand for rights to land, water, forest and mineral resources. And, as I have written before, these movements are collectively teaching us that we will have to build different pathways for economic growth that is inclusive and sustainable.

Therefore, even if these protest movements do not have a ready blueprint for future economic model, they have enough practice of prompting us to think of different ways. Most importantly, these movements are a response to real survival threats. They are here to stay until we find big answers to the big questions they raise.

This is then the challenge of 2012 and beyond. The world is on the boil and the steam of anger will not dissipate. The question is whether these protests can be channeled to etch new, better pathways of growth. ❑

Government reaches out to Corporate India to participate in improving livelihood of tribals

In a first major initiative of involving corporate India in developmental work, the Government of India has sought its partnership in setting up the Bharat Rural Livelihood Foundation (BRLF). Rural Development Minister Jairam Ramesh has written letters to corporates like Tatas, Reliance, Wipro and Infosys to join the Foundation as contributing partners, to improve the livelihood of tribals, mostly living in Central and Eastern India. Public sector NABARD and the National Dairy Development Board have also been roped in.

The BRLF will be set up with a corpus of ₹1,000 crores. Government of India will contribute ₹500 crores, while the rest will come from other partners.The latest proposal, evolved jointly by the Ministry of Rural Development and the Planning Commission, envisages a concerted effort by the Centre, the State governments concerned, and civil society to transform the lives of the tribals, living in 170 districts, of which nearly 78 have been affected by Naxal violence and have not seen any development.

The government hopes that such initiatives will promote inclusive growth by taking the fruits of development to the tribal population living in remote areas. Since these tribals have remained mostly excluded from the benefits of growth, they have become vulnerable to Maoist propaganda.

The Foundation will focus on strengthening local level institutions, developing adivasi leadership and spreading the Self-Help Group movement. The foundation will support developmental activities in the areas of watershed management, dairy, fisheries, agriculture, forestry, skill-development, among others.

Environment, Development and Disaster : The Panchtatva Equilibrium

Santosh Kumar

Sustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life

CLIMATE CHANGE is one of the most complex challenges of our young century. No country is immune. No country alone can take on interconnected challenges posed by climate change, including controversial political decisions, daunting technological change, and far reaching global consequences- Robert B. Zoleeick, President, The World Bank group.

I was delivering a lecture in the conference hall of Federation Of Indian Chambers of Commerce and Industry (FICCI) on environment, development and disaster with special reference to the poverty and vulnerability. A few questions were raised during the discussions such as how the scope of environment be determined in the discourse of development, climate change, disaster and sustainability? Whether Environment encompasses everything that comes under one umbrella which includes all man-made and natural activities or is it different? What is then the scope of environment and what framework it has, which may lead to sustainable and inclusive development? Do we have enough policy and the legislation to deal with it What are institutional mechanism we have in India to address these issues. The questions are valid and they need to be addressed holistically. And, how the other institutions created for development and handling disasters' risks are working closely with each other?

The Issues

Indian economy is booming. Since 2003, it has been able to maintain its consistent growth rate of over 7-8 percent per annum. And, India is aspiring to even enhance it to 8-9 percent growth rate or even higher. The higher growth rate is very much the need of the country to fight against unemployment and poverty amongst 354 million of the population, which is nearly 27 percent of the world's poor.

Growth of India's economy is led by good performance of the industrial sector, impressive growth in manufacturing sector which includes electronics and information technology, textiles, pharmaceuticals and basic

The author is Professor & Head, Policy, Planning & Cross Cutting Issues Division, National Institute of Disaster Management, New Delhi.

chemicals. Rapid economic growth have also influenced consumption pattern in the country. Over the years, it has changed drastically. This change has also influenced country's environment and natural resources capacity to carry out the higher growth rate. The pressure has already increased exponentially. Hence, in the context of high population density, vulnerable ecology, extreme climate and a significant dependence of the economy growth on the natural resource base-environmental sustainability might be the greatest challenge along India's sustainable development path. Thus the goals of economic and social development must be defined in terms of sustainability in all the countries-developed or developing, market-oriented or centrally planned. Interpretations will vary, but must share certain general features and must flow from a consensus on the basic concept of sustainable development and on a broad strategic framework for achieving it.

The satisfaction of human needs and aspirations are the major objectives of development. The essential needs for food, clothing, shelter, jobs-are not being met for majority of the population, and beyond their basic needs these people have legitimate aspirations for an improved quality of life. A world in which poverty and inequality/inequity are endemic will always be prone to ecological and other crises. Sustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life.

The scope of environment

Literally, environment means the surrounding external conditions influencing development or growth of people, animal or plants; living or working conditions etc. Environment refers to the sum total of condition, which surrounds point in space and time. The scope of the term Environment has been changing and widening with the passage of time. In the primitive age, the environment consisted of only physical aspects of the planet earth's land, air and water as biological communities. As the time passed on, human beings extended the environment through his/her social, economic and political activities.

Environment consists of four segments as following :

Atmosphere: The atmosphere implies the protective blanket of gases, surrounding the earth.

Hydrosphere: The Hydrosphere comprises all types of water resources oceans, seas, lakes, rivers, streams, reservoir, polar icecaps, glaciers, and ground water.

Lithosphere: Lithosphere is the outer mantle of the solid earth. It consists of minerals occurring in the earth's crusts and the soil e.g. minerals, organic matter, air and water.

Biosphere: Biosphere indicates the realm of living organisms and their interactions with environment, viz atmosphere, hydrosphere and lithosphere.

The environmental studies are about the importance of protection and conservation of our indiscriminate release of pollution into the environment. Now a days, environmental issues are growing in size and complexity, threatening the survival of mankind on earth. It is essentially a multidisciplinary subject that brings about an appreciation of our natural world and human impacts on its integrity. It is an applied science as it seeks practical answers to making human civilization sustainable on the earth's finite resources.

The Status

India is still a developing country and like other countries is stuck with many environmental issues. Poverty being a major concerned area causing a number of problems including inadequate sanitation and clean drinking water facilities. High growth rate of population is causing lowering of natural resources and deforestation On the other hand, economic growth and technological advancements are also playing major role in disturbing natural environment resulting in air, water and nuclear pollution. Though Government of India is paying attention to major environmental issues and formulating many environmental policies to keep pace with this alarming situation, yet there is a lot remained to be translated at the ground.

The key environmental concerns are climate change, global warming, natural disasters, soil and land degradation, loss of biodiversity, air and water pollution. All these do disturb the balance of the living environment in a big way.

Conclusively, in the entire gamut of environment and development, what I have realized is that the peaceful human existence is gradually becoming a pipe dream. The major impending disasters scenario are looming large on the better existence of life on the mother earth. It is all happening because we have lost the balance in the keys of human existence i.e *Panchtatva* (air,water, earth, fire and land) which are responsible for our survival. If the equilibrium of *pachtatva* is lost, the existence will become endangered. The risks of life will be multiplied manifold. All the natural disasters are happening because of some variations in the *panchtatva*. The frequency and intensity of Hydro-meteorological and related disasters–cyclone, floods, drought, avalanche, heat waves and cold waves have gone up exponentially in the last one and half decades. It is not only in India

but also across the globe and is a greater cause for concern.

The Growing Contrasts

Thirty years ago, half the developing world would live in extreme povert (US $ 1.5 a day)-today a quarter. Critical to the progress, rapid economic growth driven by technological innovation and institutional reforms, particularly in the middle income countries where per capita income have doubled yet the needs remain enormous, with the number of hungry people having passed the billion mark in the year 2010, for the first time in the history. With so many in hunger and poverty, growth and poverty alleviations remain the overarching priority in most of the developing countries including India.

Climate change only makes the challenge more complicated. First, the impact of changing climate are already being felt with more floods, droughts, stronger storms, and more heat and cold waves leading to enormous economic loss-taxing individuals, firms and government, drawing resources away from development. Second, continuing climate change, at current rates, will pose increasingly more severe challenges to development. By century end, it could lead to warming by 5 degree C or more compared with pre-industrial times. Even our best of efforts are unlikely to stabilize temperatures at anything less than 2 degree C above pre-industrial temperatures, warming that require substantial adaptation. Hence the challenge before us is how to maintain the equilibrium between the development need and climate change phenomenon.

Simulated scenarios for temperate-climate mountain sites suggest that continued warming could have similar consequences. Species and ecosystems with limited climatic ranges could disappear and, in most mountain regions, the extent and volume of glaciers and the extent of permafrost and seasonal snow cover will be reduced. Along with possible changes in precipitation this would affect soil stability and socio-economic activities such as agriculture, tourism, hydropower and logging. Resources for indigenous populations and recreational activities would also be disrupted.

These changes will potentially have wide-ranging effects on the natural environment as well as on human societies and economies. Scientists have made estimates of the potential direct impacts on various socio-economic sectors, but in reality the full consequences would be more complicated because impacts on one sector can also affect other sectors indirectly. To assess potential impacts, it is necessary to estimate the extent and magnitude of climate change, especially at the national and local levels. Although much progress has been made in understanding the climate system and climate change, projections of climate change and its impacts still contain many uncertainties, particularly at the regional and local levels. (IPCC report on climate change)

Stress on water will multiply manifold. Water is essential not only to survival but is also equally or even more important than nutrients in food production. Agriculture accounts for nearly 70 percent of the water consumption, with some estimates as high as 85 percent (Hanasaki et al., 2008a,b). Water scarcity will affect over 1.8 billion people by 2025 (WHO, 2007). This could have major impacts on health, particularly in rural areas, and thus also major impacts on farmer productivity. Although of great significance, such indirect effects are not considered here. Current projections suggest that water demand is likely to double by 2050. Estimates project water withdrawals to increase by 22–32 percent by 2025 (De Fraiture et al., 2003) and nearly double by 2050, for all SRES scenarios (Shen et al., 2008). For poor countries with rapid population growth and depletion of groundwater, water-deficit induced food insecurity is a growing problem (Rosegrant and Cai, 2002; Yang et al., 2003). One major factor beyond agricultural, industrial and urban consumption of water is the destruction of watersheds and natural water towers, such as forests in watersheds and wetlands, which also serve as flood buffers (UNEP, 2005).

Policy Instruments, Institutions and Challenges

Climate change, environment protection legislation policy is not a simple choice between a high growth, high carbon world and a low growth, low carbon world - a simpler question to ask is whether to grow or to preserve the planet?

Pollution: Water, land and air contamination associated with growth are increasing exponentially. Rapid investment in the manufacturing sector, that includes 17 highly polluting industries that are on the Central Pollution Control Board's "Red List", has fuelled this growth. The share of the most polluting sectors in India's exports has increased dramatically during the last decade suggesting that India could be emerging as a net exporter of pollution-intensive commodities. These trends indicate the need for greater investment in environmental management.

Natural Resources, Ecosystems and Biodiversity: In rural areas, poverty has become intertwined with resource degradation - poor soils, depleted aquifers and degraded forests. To subsist, the poor are compelled to mine and

overuse these limited resources, creating a downward spiral of impoverishment and environmental degradation. There is growing pressure to better protect country's pockets of mega-biodiversity which are increasingly recognized as being of immense significance for global biodiversity, yet are increasingly threatened. Greater investment in the protection of these natural assets would yield a double dividend of poverty alleviation and the improved sustainability of growth.

Coastal Zone Management: India's coastal zone is endowed with fragile ecosystems including mangroves, coral reefs, estuaries, lagoons, and unique marine and terrestrial wildlife, which contribute in a significant manner to the national economy. Economic activities such as rapid urban-industrialization, maritime transport, marine fishing, tourism, coastal and sea bed mining, offshore oil and natural gas production, aquaculture, and the recent setting up of special economic zones have led to a significant exploitation of these resources. In addition to the contribution of increased economic activity, coastal development and livelihoods are under stress due to a higher incidence of severe weather events, which have the potential to inflict irreversible damage to lives and property, for communities that are traditionally poor and vulnerable to economic shocks.

Environmental Governance: The pace of infrastructure investments, which could reach $500 billion in the 12th Five Year Plan, calls for integrated and coordinated decision-making systems. This is made especially challenging by fragmented policies and multiple institutional legal and economic planning frameworks, with often conflicting objectives and approaches.

Environmental Health: The health impacts from pollution are comparable to those caused by malnutrition and have a significant impact on the productivity, health and the quality of life. Environmental health challenges are largely caused by poverty-related risks associated with poor access to basic services, such as safe drinking water and sanitation, and poor indoor air quality. The contamination of surface waters and the spread of pathogens are promoted by the alteration of catchments and watersheds that have accompanied rapid urbanization and intensive farming. Despite significant improvements in rural water supply and sanitation over the past few decades, water-related diseases still account for a large number of avoidable child deaths every year.

Climate Change: India is highly vulnerable to climate change due to a combination of; (i) high levels of poverty, (ii) population density, (iii) high reliance on natural resources, and (iv) an environment already under stress (for instance water resources). By mid-century, the mean annual temperature in India is projected to increase 1.1º to 2.3 º C under the moderate climate change scenario of the Intergovernmental Panel on Climate Change (A1B), with anticipated deterioration of agro-climatic conditions. In the higher portion of that range, the loss to Indian GDP would be greater than the world average, and could be close to 5 percent. Simultaneously, there is likely to be greater variability in rainfall, leading to higher risk of increased frequency and severity of droughts, floods and cyclones.

Reflecting the size of its economy and population, India is ranked as the sixth largest emitter of greenhouse gas emissions in the world. However, by most measures, India would be classified as a low carbon economy. It has: (i) a low intensity of emissions per unit of GDP (on par with the world average); (ii) per capita emissions that are among the lowest in the world (at about 10 percent of the developed country average) and (iii) forest cover that has stabilized. However, India's emissions are set to grow substantially due to its sustained economic growth.

Disaster Risk Management and Preparedness : Realizing the increasing trend of disaster incidents in the country, Government of India has gone for paradigm shift approach from relief and response centric to comprehensive ex-ante disaster risk management approach. New institutional arrangements have been made at national, state and district levels. Government of India through National Act on Disaster Management, 2005, has created National Disaster management Authority, National Institute of Disaster Management, National Disaster Response Force at the national level and State Disaster management Authority, District Disaster Management Authority at the state and district level respectively. National policy on disaster management 2007 has focused on integration of disaster risk reduction into all the development programmes and projects. This has also advocated for the integrated framework for disaster risk reduction, climate change and development as a new development principles.

Government of India has made a substantial effort in attempting to address environmental challenges in a more integrated and comprehensive manner. Our country has enacted stringent environmental legislation and has created institutions to monitor and enforce legislation. The National Environmental Policy (NEP) recognizes the value of harnessing

market forces and incentives as part of the regulatory toolkit, and India is one of only three countries worldwide which has established a Green Tribunal to exclusively handle environmental litigation. On environmental governance, the GOI is contemplating the establishment of the National Appraisal and Monitoring Authority (NEAMA) to carry out environmental appraisals.

Development, Impact of environmental degradation, climate change and disaster risk reduction are no longer a separate issue. It is much more holistic and integrated with the sustainable development framework.

In the 11th Five Year Plan, the Government issued regulations to promote an integrated and inclusive approach to coastal zone planning and the sound management of hazardous wastes, issued a number of critical policies (e.g. revised river conservation strategy and the National Biodiversity Plan), and established a Wildlife Crime Control Bureau to supplement existing conservation measures for species at risk, such as tigers. In response to the threat of climate change, the Prime Minister's National Council on Climate Change issued India's first comprehensive National Action Plan in June 2008. In the run-up to Copenhagen, India also volunteered its own target to reduce carbon intensity by 20 to 25 percent by 2020 against a 2005 baseline and established an Expert Group on Low Carbon Growth to identify how best to meet this challenge.

MoEF and a few legislations for Environment Protection

Ministry of Environment and Forests (MoEF), the nodal ministry of Government of India for the environment and forest management has brought many other legislations and policies to bring control on the environmental degradation. Ministry enacted the Water Act in 1974 for prevention and control of water pollution. The Act also was brought keeping in the mind maintaining or restoring wholesome water in the country. The Air (Prevention and Control of Pollution) Act was enacted in 1981 and amended in 1987 to provide for the prevention, control and abatement of air pollution in India. The Environment (Protection) Act was enacted in 1986 with the objective of providing for the protection and improvement of the environment. The Act was last amended in 1991. The Biological Diversity Act 2002 was born out of India's attempt to realize the objectives enshrined in the United Nations Convention on Biological Diversity (CBD) 1992. The Act aims at the conservation of biological resources and associated knowledge as well as facilitating access to them in a sustainable manner and through a just process. The Forest Conservation Act 1980 was enacted to help conserve the country's forests. It strictly restricts and regulates the de-reservation of forests or use of forest land for non-forest purposes without the prior approval of Central Government. To this end the Act lays down the pre-requisites for the diversion of forest land for non-forest purposes. The Government of India enacted Wild Life (Protection) Act 1972 with the objective of effectively protecting the wild life of this country and to control poaching, smuggling and illegal trade in wildlife and its derivatives. In 1995 the Central Government established the National Environment Tribunal [through the National Environment Tribunal Act 1995] to provide for strict liability for damage arsing out of accidents caused from the handling of hazardous substances. National Environment Appellate Authority Act 1997 led to the setting up of National Environment Appellate Authority (NEAA) to address cases in which environment clearances are required in certain restricted areas.

MoEF has issued guidelines for making environmental impact assessment as a mandatory feature for the clearing the projects. Environmental impact assessment is intended to ensure that proponents assume primary responsibility for protection of any environmental values that may be affected by their proposals and address environmental management for the expected life of proposals, contribute to statutory decisions on whether a proposal should proceed, and if so, decide what environmental management and monitoring conditions should apply, and where legislation allows, incorporate community and stakeholder views in assessment and decision-making processes.

Conclusion

Issues related to environment, development, climate change and disasters risks have emerged out of the imbalance which are occurring in the *Panchtatva* with unplanned human interventions. Environment has become more fragile and risks prone. People and the eco-system have increasingly become more vulnerable. Poor and vulnerable groups will have even larger impact. The probability of occurrences of Black Swain event will be much more. The uncertainties and risks will have different dimensions. In this context, it is even more important to see the environment more holistically. The solutions must flow from an integrated framework and it is equally important that all the stakeholders –national and international must work together in translating policy, legislation and programmes on the ground so that the disturbed equilibrium of the *Panchtava* is restored or otherwise the consequences would be much more disastrous. ❑

Wealth in My Backyard

Naushad Alam

Taken by communities living outside the urban compass defy all the divisions set over time. Taking a leaf from Gandhiji's wisdom, they became the change they wished to see around them, this time for their environment

THE THICK forests in the tranquil village of Jirwa in Simariya Tehsil of Chatra district in Jharkhand belie a gloomy past. With bare land where a lush forest cover stood, the forests had been felled over the years by indifferent and greedy hands.

A magic wand seems to have changed all that. A magic wand held up by several hands. The miraculous makeover was not achieved in the blink of an eye but over a long period of time backed by unity and hard work of the various communities that came together to create that magic.

The unique experiment of collective forest management was initiated by the Jirwa Panchayat. "About a decade ago, our rich forests had turned to barren land with no pasture left for the cattle. Some stumps and shrubs were the only reminder of what had been," remembers Indranath Bhokta, member of the Jirwa Panchayat. "Villagers were facing several problems caused by the loss of forest cover. Less bamboo meant no beams for roofs of our houses. That is when villagers realised what they had done."

Community meetings were organised under the leadership of the Panchayat to work out what needed to be done. Everyone agreed to come together to stem the crisis. That collective realisation set the tone for the present day voice of the community.

The initial work gained momentum without any outside support, not even the Forest Department that was expected to sustain the natural wealth with its access to knowledge and resources. Later initiatives of the Forest Department led to the creation of Forest Committees in these villages. The Joint Forest Management was launched in 2001 to make villagers aware about the protection of forest resources. The Southern Forest Division, under which the Jirwa Panchayat falls, has succeeded in its efforts in some parts of Chhatra District but Village Jirwa continues to work independently,

blissfully unaware of the Joint Forest Management Programme or the committees.

The determination and will of the people helped overcome the difficulties that cropped up and problems were solved effectively. Here, dwellers of seven villages have joined hands to protect the forests in an organised manner. A systematic distribution of the forests in different divisions has been done by the villagers with each group taking charge of the protection of the adjacent forest area.

Explaining the methodology adopted, Manoranjan Singh, the head of the Panchayat says, "Every forty-five days, the local communities meet to discuss the security of the forests. The main agenda of such meetings is to tackle a variety of issues like laxity in protection of the forests and identifying threats to the harmony of the forests." As a result of such meetings, people come up with innovative and strict measures to punish the guilty. Imposing a fine of up to Rs 500 on the culpable was one such step. "These people have learnt the art of sustainable development which is indicated by the fact that they use a certain amount of forest products which could be naturally gained in a specific time-frame," he added.

The people follow an annual ritual of worshipping the forest Goddess. In a country where emotions and religious beliefs play a central role in the lives of people, the idea of worshipping the forests was an intelligent way to establish a sensitive relationship between people and forests. At the festival, ceremonies include offering prayers and chanting mantras. The most intriguing ceremony at the festivities is the tying of a security thread around the tree which, like the popular festival of *Raksha bandhan*, symbolises a commitment to protect.

The communities relied on rustic and effective means. Of the seven villages, Kathara, a native *Adivasi* village, played a central role. The close relationship that tribal communities share with water, forest and land became a source of inspiration for the people of Jirwa Panchayat. They shared with villagers the traditional art of protecting and invigorating the forests, helping them to renew the green cover. "The tribal communities participated in the discussions in large numbers. Their contribution in regenerating the forest can't be ignored," says Singh.

Joint efforts by various communities to save the forests, starting with awareness, have become an integral part of the lives of its people. The success of the Community Forest Management is evident from thousands of teak, Asan and Chakodi trees that stand tall today, adding to the natural wealth of the village. Such steps taken by communities living outside the urban compass defy all the divisions set over time. Taking a leaf from Gandhiji's wisdom, they became the change they wished to see around them, this time for their environment.

Charkha Features

YOJANA invites its readers to send in their valuable feedback and suggestions about the articles carried in the journal at the e-mail id yojanace@gmail.com

Water-Sanitation Nexus more complex than Toilet-Cell Phone Comparison

Ranjan K Panda

The Water and Toilet imbalance is a huge issue that has to be addressed in this country. With water getting scarcer this imbalance will further grow

THE CENSUS 2011 data have just come in. People concerned with the water and sanitation situation of the country have found out some reason to cheer because the figures point out a better coverage of drinking water facilities. While this is not much to be cheered about considering the pitiful status of sanitation coverage, inaccessibility of water may well have been one of the major factors for people not going for toilets in this country. Analysts have been making it large about the fact that more people have mobile phones than toilets. However, many seem to have conveniently forgotten that cell phone cannot be compared with toilets in more than one senses. First, having a cell phone cannot be considered as a 'right' and second, a cell phone does not require water to run. Access to and use of a toilet necessarily requires access to sufficient water and this is exactly why 'Right to Water' is a pre-condition to 'Right to Sanitation'.

State of Drinking Water and Sanitation

As per the Census 2011 data, in so far as amenities available with the households, 43.5 percent of households are using tap of which 32.0 percent of water is treated and 11.6 percent remains untreated. 42.0 percent use handpump/tube well, 11.0 percent use well of which only 1.6 percent of well are covered and rest are uncovered. Lastly 3.0 percent use other source for drinking water. In rural areas people 51.9 percent of the house holds depend upon hand pump/ tube well followed by 31.8 percent has tap water. While

The author is Convenor, Water Initiatives, a water researcher and practitioner and senior freelance journalist.

only 47 percent of the households have source of water within the premises while 36 percent of households have to fetch water from a source located within 500 metres in rural areas/100 m in urban areas and 17 percent still fetch drinking water from a source located more than 500 metres away in rural areas or 100 m in urban area.

58 percent of the households have bathing facility within the premises, showing an Increase of 22 points over 2001. It means 45 percent and 87 percent rural and urban respectively have bathing facility. 47 percent of the households have latrine facility within premises with 36 percent households have water closet and 9 percent households have pit latrine. There is an 11 pt decline in households having no latrine from 64 percent to 53 percent in 2011.

From a simple analysis of the data it can be concluded that there has been an improvement in access to water but the progress with regard to sanitation has not been that encouraging. So, as per Dr. Indira Khurana of Water Aid, a charity working on water and sanitation in the country which has analysed the Census Data immediately as it was released, "the progress on sanitation needs to be accelerated. Poor sanitation has direct linkage with the consistent anaemic levels of children under five as well as women. It also has a direct impact on the morbidity and mortality of children, especially those under five".

More than half of the country do not have toilets

For a country which is struggling to pose as an economic super power, this is no good news. What is also discouraging is the fact that we are yet to be able to prevent millions of women from walking kilometres to fetch water, a lifesaving resource that is supposed to be provided as a matter of 'right'. Toilets remain a distant dream still, as almost half of the households of the country still do not have one of this essential tool that can help them fight against health and hygiene hazards. There are contesting figures available which find almost two third of the country without toilets.

Access to water, as the Census claims, is much better. However, what is most important to note is that majority of the country still use taps that are common and are outside their premises. A substantial chunk – almost 17 percent - of women of rural India has to walk at least half a kilometre to fetch water. There is no figure on the original distance these women have to cover. In many of the remote, tribal dominated and forested pockets, as our experience shows, women have to walk several kilometres to fetch drinking water – that too from contaminated and untreated sources. The Census says only 43.5 percent of people of the country use tap water almost about 25 percent of which is untreated. It therefore means that almost about 70 percent of the country drinks water that is untreated.

The country is still vulnerable to huge health hazard risks. Even though the Census puts the people defecating in the open at 49.2 percent, the Joint Monitoring Programme (JMP) of Millennium Development Goals (MDG) assesses it at almost 61 percent. In March this year, the MDG target JMP for Water and Sanitation (JMP) was released by UNICEF and WHO reconfirming that sanitation is still a challenge and India is lagging by 11 years to meet MDG target by 2015. Actually there are various sets of data available in this country (See Box: Variation in data) and this speaks how badly we need a thorough monitoring in place.

Variation in data

An analysis by the Water Aid finds out clearly that there appears to be considerable variation between the data reported in the Census and the data reported in the official government site for the same time period. The table establishes this properly.

Thus while comparing census 2011 data with MDWS data as per census 2011 out of total 167,826,730 rural households, it shows that there is difference of 23.2 percent in number of households having latrine

	JMP 2012 (Estimates based as on Dec 2010)	Census 2011 (Houselisting & Housing Census data–Period Feb 2010 to Sep 2010)	MDWS (Jan 99– Dec 2010)
National Drinking Water Coverage	92 %	82.4 %	90 % (As on Date)
National Sanitation Coverage	39 %	30.7 %	74 % (As on Nov 2011)
Open Defecation (National)	61% (67 % Rural; 14 % Urban)	49.2 %	
Rural Sanitation Coverage	33 %	30.9 %	53.09 %
Urban Sanitation Coverage	86 %	81.6 %	NA
Rural Drinking Water Coverage	90 %	77.9 %	Approx 70 %
Urban Drinking Water Coverage	97%	91.9 %	NA

facility reported in MDWS which is higher than census 2011 data. In addition to the above variation of data, recently on 6th March to assess progress made MDG target Joint Monitoring Programme for Water and Sanitation (JMP) was released by UNICEF and WHO which again reconfirm that sanitation is still a challenge and India is lagging by 11 years to meet MDG target by 2015, 59 percent of those defecating in the open: a whopping 626 million! This cannot be accepted in a country which is trying to become an economic super power.

According to the March 6th release of the JMP for Water and Sanitation, even as MDG target on drinking water has been reached 5 years ahead of the 2015 deadline, sanitation continues to pose serious challenges. This new update of JMP dated 2012 analyses estimates of data of 1990 and 2010. The trend in India too has been the similar. Although India has performed above average globally and regionally for access to drinking water, yet it accounts for 59 percent of those defecating in the open, says the JMP. But this progress in drinking water does not mean the situation has really improved for the country. In fact, the progress of India and China on drinking water not only dominates their respective regions, but is also nearly half of the global progress towards the drinking water target. And, of these 780 million, China and India combined are home to 216 million people without access to improved water supplies. This represents 28 percent of the global population that remains unserved. In India, 97 million continue to be without access to drinking water, according to the JMP.

Water and Sanitation Distress need to be addressed together

The sanitation distress we face today does not only speak of the underdevelopment we are in but also indicates how poor in this country continue to bear the brunt of this. It easily shows how our poverty statistics heavily discount the people without sanitation and safe water supply. Poor water supply and sanitation alone speak volume of distress as we observed in the findings of some recent reports. Women, among the vast majority of water-sanitation deprived population, bear the maximum drudgery as they are in charge of fetching water for their families. The Lancet Study published in the British Medical Journal, in August 2011, said how the country continues to be plagued with high anaemia amongst

the women and children. It alarmed how almost 40 percent of the 5 year olds are anaemic in India. The HUNGama Report in December said 42 percent of children under five are underweight and 59 percent stunted. It further reported that the prevalence of underweight among low birth weight children is 49.9 percent while that among children who were born with a normal weight (2.5 kg or more) is 33.5 percent.

The way ahead

The media as well as others find it interesting that the country has more cell phones than toilets. Women are not demanding toilets, complained Jairam Ramesh recently. What seems to have missed the mainstream is the gap between water availability and toilet ratio. A cell phone can be maintained without water, a toilet out. The question is why would a woman fetch water from kilometres to use a toilet rather than defecating in the open? The same question is relevant for men as well. The Water and Toilet imbalance is a huge issue that has to be addressed in this country. With water getting scarcer this imbalance will further grow. If the country wants sanitation coverage to catch up with that of water, these two have to be linked and not separated. The country is starting to recognize that water and sanitation are basic human rights, as has been proposed in the Draft National Water Policy 2012. However, segregation of water and toilets in our plans and programmes would not help. What we need is an enabling environment to integrate these. What is also important is to accord, in legally enforceable terms, priority of water allocation to water and sanitation and water for livelihoods. This if we are serious to convert the toilet geography of the country from 'open defecation' to 'defecating with dignity'. ❑

DO YOU KNOW?

NATIONAL SKILL DEVELOPMENT CORPORATION

What is the National Skill Development Corporation (NSDC)?

NSDC is a first-of-its-kind Public Private Partnership (PPP) in India set up to facilitate the development and upgrading of the skills of the growing Indian workforce through skill training programmes. The NSDC was set up as part of National Skill Development Mission to fulfil the growing need in India for skilled manpower across sectors and narrow the existing gap between demand and supply of skills. A large part of the organisation's efforts are directed at the private sector and towards developing the skills in the unorganised sector in India. NSDC supports skill development efforts, especially in the unorganised sector in India by funding skill training and development programmes. It also engages in advocacy and training programmes, in-depth research to discover skill gaps in the Indian workforce, and developing accreditation norms. The objective of NSDC is to contribute significantly (about 30 percent to the overall target of skilling 500 million people in India by 2022), mainly by fostering private sector initiatives in skill development programmes and providing viability gap funding.

Why is there a need for an organisation like NSDC?

A growing economy like India requires a large and skilled workforce. However, the lack of quality trainers and training institutes has created roadblocks to growth. Skills shortage is evident in every sector of the economy. NSDC seeks to fill the gap between the growing demand for, and the scarce supply of, skilled personnel across sectors, by funding skill training programmes. The primary goal is to foster private sector and industry participation in skill training and development.

How does NSDC function?

NSDC is a not-for-profit company set up by the Ministry of Finance, under Section 25 of the Companies Act. It has an equity base of Rs 10 crore, of which the private sector holds 51 percent, while the Government of India controls 49 percent. This makes NSDC a one-of-its-kind public private partnership in education in India.

The corporation has a tiered structure - a 12-member Board and the National Skill Development Fund (NSDF), a 100 percent government-owned trust -which work in sync to fulfill the NSDC's strategic objectives.

Who manages NSDC?

NSDC is a Public Private Partnership (PPP), and is managed by a team of experienced professionals. It has a team of professionals and an end-to-end decision-making process in place. A tiered decision-making structure - a Board, Board Sub-Committees and the Executive Council - helps the organisation formulate strategies and run it effectively.

Which sectors does NSDC provide services for?

The NSDC provides services for 21 sectors including

1. Automobile/auto-components
2. Electronics hardware
3. Textiles and garments
4. Building and construction
5. Food processing
6. IT or software
7. Media, entertainment, broadcasting, content creation, animation
8. Healthcare
9. Banking/ insurance and finance
10. Education/skill development
11. Unorganised sector

What is the role of NSDC?

NSDC's key roles are:

- Funding and incentivising
- Enabling support services Shaping/creating

NSDC Role

The NSDC will facilitate or catalyse initiatives that can potentially have a multiplier effect as opposed to being an actual operator in this space. In doing so, it will strive to involve the industry in all aspects of skill

development. The approach will be to develop partnerships with multiple stakeholders and build on current efforts, rather than undertaking too many initiatives directly or duplicating efforts currently underway.

To scale up efforts necessary to achieve the objective of skilling / upskilling 150 mn people, the NSDC will strive to:

- Develop ultra low cost, high-quality, innovative business models
- Attract significant private investment
- Ensure that its funds are largely "re-circulating"; i.e. loan or equity rather than grant
- Create leverage for itself
- Build a strong corpus

Keeping this in mind, the NSDC will play three key roles:

- **Funding and incentivising**: In the near term this is a key role. This involves providing financing either as loans or equity, providing grants and supporting financial incentives to select private sector initiatives to improve financial viability through tax breaks etc. The exact nature of funding (equity, loan, grant) will depend on the viability or attractiveness of the segment and, to some extent, the type of player (for-profit private, non-profit industry association or non-profit NGO). Over time, the NSDC aspires to create strong viable business models and reduce its grant-making role.
- **Enabling support services**: A skills development institute requires a number of inputs or support services such as curriculum, faculty and their training, standards and quality assurance, technology platforms, student placement mechanisms and so on. The NSDC will play a significant enabling role in some of these support services, most importantly and in the near term, setting up standards and accreditation systems in partnership with industry associations.
- **Shaping/creating**: In the near term, the NSDC will proactively seed and provide momentum for large scale participation by private players in skill development. NSDC will identify critical skill groups, develop models for skill development and attract potential private players and provide support to these efforts.

What are the Focus Areas of NSDC?

Skill development: The challenge of skilling / upskilling 500 million by 2022 will require both fundamental education reform across primary, secondary and higher education and significant enhancement of supplementary skill development. In the near term, the NSDC will focus primarily on supplementary skill development and strive to create seamless tracks within the education system.

Foster private sector initiatives: In strengthening supplementary skill development, NSDC will focus on fostering private sector led efforts that will include both non-profit and for-profit initiatives with the goal of building models that are scalable.

The NSDC will adopt a differentiated approach to supporting private sector initiatives depending on the target segment. Based on the marketability of the skill group and income level of the student population, there are three segments across which the NSDC will focus:

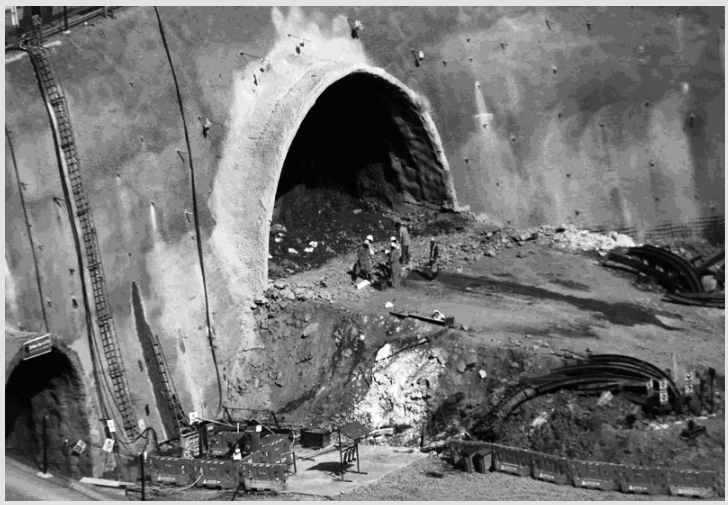
- **Attractive segment**: Given that the market automatically works, the NSDC will only play a reactive role and support the scale-up by various players.
- **Viable segment** but with marginal economics or involving high risk/ uncertainty: This will be a key focus area of NSDC particularly in the near term, with the aim being to make this segment much more attractive for private investment.
- **Completely unviable segment**: Over time, NSDC will aspire to work in this segment in collaboration with government departments and help develop innovative business models which can move players from this segment to the viable segment. ❑

J&K WINDOW

INDIA'S LONGEST ROAD TUNNEL IN J&K

The arduous trek to Kashmir may soon be a thing of the past. A new passage to Srinagar now under construction will not only bring the regions of Jammu and Kashmir closer but will also end the isolation of the valley from the rest of the country. A number of state-of-the-art tunnels are being dug through the Pir Panjal ranges, among others, for easy roadways and a pioneering railway line both of which will give easy access to the valley.

Even as the railways are planning a 90-km-long network of tunnels, the National Highways Authority of India (NHAI) has undertaken a project to upgrade the present national highway (NH 44) stretch from Jammu to Srinagar into four lanes. The project includes two major tunnels. The 288-km distance between Jammu and Srinagar will be reduced to 238 km but more importantly the 10-hour journey will be covered in just about five hours, avoiding perilous points such as Khooni Nala (bloody path) where shooting stones slide at the speed of a bullet taking a heavy toll of life.



The two tunnels will also end the snow-related traffic jams that last several days. The Chenani-Nashri Tunnel which is being blasted through the Mury formation range of the Shivalik range — derived from Mury village in Pakistan from where it starts — at an elevation of 1.2 km is 9 km long and will be the longest tunnel in the country when completed in 2016, the deadline for the entire project estimated to cost ₹10,600 crore.

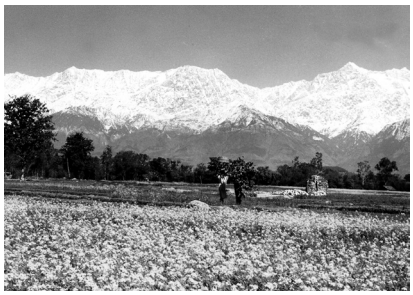
The proposed two-lane tunnel with a separate escape route avoids Patnitop, a tourist spot during the winter for its snow, and the steep Nagroda bypass which the State government declared unfit for use after truck drivers found it difficult to negotiate not only the steep gradient but also the sharp and narrow bends on the range.

However, twin tunnels with inbuilt escape routes in case of snow storm or blizzards, are being provided through Pir Panjal from Banihal to Quazigund at an elevation of 1.8 km. Though their entrances are not free from snow, experts maintain clearing a four-lane road of snow would be much easier than a two-lane one. Moreover, the mountains are steep and unstable posing a challenge to travellers. Engineers also consider it difficult to carve out a single four-lane road and intend to adopt the split road technology separating the ascending and descending stretches which will require erecting flexible steel tunnels during the construction period to protect existing traffic from falling stones.

NHAI is yet to award the contract for the 43-km-long Udhampur-Ramban and 36-km-long Ramban-Banihal stretches due to various reasons, including the fact these are among the toughest sections of the project. However Virendra Singh, Director of the project, said the proposals were likely to be cleared with revised cost estimates by the Union government and would be completed by June 2014. ❑

Development and its Environmental Implications

Subhash Sharma



We may say that development should be socially equitable, ecologically sustainable, politically participative and empowering, culturally acceptable (to local community), and economically income-generating

DEVELOPMENT IS the planned change in a desired direction while economic growth measured in terms of Gross Domestic Product and per capita income is a narrow concept, not implying the disparity, illiteracy, hunger, disease, and infant/child/maternal mortality. Actually development should give capability, choices and freedom to earn for the betterment of life or wellbeing. Development should have concern for all five basic elements (Panch Mahabhutas) : earth, water, fire, space and air. Finally we may say that development should be socially equitable, ecologically sustainable, politically participative and empowering, culturally acceptable (to local community), and economically income-generating; in short, it should be holistic. In different cultures the conception of development has been different in history. For instance, in developing countries like India it is less materialistic (rather spiritualistic, transcendence) than that in the West. Similarly, in our society collective progress/ wellbeing in terms of community, region, nation or even the whole world ('Vasudhaiva Kutumbakam' – the whole earth is a family) has been the overall goal while in the West individualism has been in the centre and community, nation or world are in the periphery. Furthermore in the west nature is often seen as empty, barren, savage and detached from social life, hence to be filled, to be civilized and to be conquered by the humans. On the other hand, developing societies like India see nature and culture as interdependent, harmonious and mutually supportive. Finally, in our society time is seen as unbroken and eternal, hence past, present and future are perceived as different stages of one whole process. On the other hand, in the west time is seen reduced to the present only in terms of 'here and now', as phenomenologists call it.

There are many perspectives on development. First is development as modernization which equals to westernization. Modernization

The author is from the Indian Administrative Service.

theory's goal is to 'catch up development' following the path of the west – that is, west is the best. Further it prefers nuclear family to joint family, role specificity to diffuseness, achievement to ascription. Further individual is the lowest unit of action and rationality is the basis of decision-making. Finally, capital accumulation, gross domestic product and free market are key to the economy. W. W. Rostow, in his book 'Stages of Economic Growth : A Non-Communist Manifesto (1960), observes that every society passes through one of five stages :-

- traditional society stage (rigid ascriptive social structure + agricultural economy)
- preconditions for take–off stage (some impulse from outside, increase in trade, service and mining)
- Take off stage (growth of trade leads to rise of investment to 10percent of national income; socio-political conditions reshaped)
- Drive to maturity stage (consolidation-science and technology extended to all spheres of economy.
- Age of high mass consumption

UNDP's Human Development Approach views that high GDP is not a guarantee for development, or poverty and unemployment reduction - 9 percent annual growth rate in India in first decade of twenty first century but no substantial poverty and unemployment reduction. Here main concept is human development index (HDI) : longevity, education and per capita income – three aspects better than only one aspect of economic growth (per capita income)

- longevity is measured by life expectancy at birth
- educational attainment is measured by adult literacy (15 years+) – 2/3rd weight – and combined gross primary, secondary and tertiary enrolment ratio (1/3rd weight)
- real GDP per capita income measures standard of living - HDI is measured between 0 and 1; 0.8 and above indicates high HDI, 0.5 to 0.8 shows medium HDI and below 0.5 shows low HDI :

Further Social Development Approach was adopted by Council for Social Development, New Delhi (also UNICEF and WHO). Council for Social Development brought out first Social Development Report in 2006 because Human Development Index is not representing all aspects of development. It proposed SDI with six types of indicators and later in 2008 two more types of indicators (last two) were added:

a) Demographic Indicators: contraceptive prevalence rate (CPR), total fertility rate (TFR), Infant mortality rate (IMR)

b) Health Indicators: percentage of institutional delivery, percentage of undernourished children

c) Educational Attainment Indicators: literacy rate, pupil –teacher ratio,

d) Basic Amenities Indicators: percent of households living in pucca houses, percent of households having access to safe drinking water, percent of households having access to toilet facilities, percent of households having electricity connection.

e) Economic Deprivation Indicators: Gini coefficient ratio for per capita consumption expenditure, unemployment rate

f) Social Deprivation Indicators: disparity ratio between SCs and general population in literacy rate, disparity ratio between STs and general population in literacy rate, disparity ratio between females and males in literacy rate, ratio between female unemployment rate to total unemployment, disparity ratio of per capita expenditure of Muslims to that of total population, child sex ratio

g) Social Groups Indicators: demographic indicators (CPR, TFR, IMR), health indicators (percent institutional delivery and undernourished), educational attainment indicators (literacy rate and dropout rate), basic amenities indicators (percent pucca house, safe drinking water, toilet facilities, and electricity connection), economic deprivation indicators (people living below poverty line, and unemployment rate)

h) Gender Indicators: health indicators-IMR, percent of undernourished children, educational indicators – literacy rate, and higher secondary complete and above, economic deprivation indicators – unemployment rate, wage rates for males and females

Environmental Implications: Following are major issues of environment: pollution, land degradation, water scarcity, deforestation, etc. Social Costs of Pollution in different countries is increasing multi fold for example: -

A) Europe - 4 percent of GDP
B) USA - upto 12 percent of GDP
C) India - 4.5 percent of GDP - $ 10 billion (1992)
- water pollution in India costing $5.7 billion

Land Degradation: Following problems are noteworthy:

- 5-7 million ha of agri land eroded annually in the world
- 53 percent of total land area in India is susceptible to serious environmental degradation
- 60 percent of cultivated land mass in India requires immediate soil conservation measures
- 40-100 tonnes of top soil per ha of Deccan black soil is lost annually in India; Soil erosion costs India 4–6 percent of agricultural income.
- Area affected by floods 40 mha (1981)
- Due to silting of river beds/ reservoirs India loses 60,000 ha annually
- 80 percent of landholdings in India are below 2 ha

Water : Water is becoming very contentious issue these days. Main problems relating to water are as follows:

- South Asia with over 1/5th (22 percent) of world population has only 5 percent of renewable water resources
- 70 percent of available water in India is polluted –community wastes four times to industrial effluents
- 8 million workdays are lost annually due to water-related diseases (India)
- during 1999-2004 bottled water consumption globally doubled (Earth Policy Institute, Washington) – in India it tripled during that period.
- Bottled water is not healthier than tap water even in developed countries but is 10,000 times more expensive

Forest: Following damages to forests are notable:

- Over 13 million ha of tropical forests was lost every year before 1990. During 1990-2000 8.9 mha forest lost annually during 2000-5 forest loss annually was 7.3 mha per year(world) deforestation for cultivation, habitation (resettlement of refugees in Dandakaranya), dams, roads, industries, timber/fuel wood for houses etc – world is losing 2 percent of forest cover every year.
- 300 years back India had 3 times forest as today; deforestation costs India 214 million dollars annually.
- Against the minimum 1/3rd areas as forest, India has 20 percent of its total area as forest (75 mha)–mostly degraded forest
- National committee of Environmental Planning – only 12 percent area under adequate forest cover – as per GOI India's forest cover increased 2.90 lakh ha per year during 2000-2005 due to plantations
- IUCN – India's 2.5 mha of mangrove forests in first 80 years of 20th century were lost
- World has 31 percent forest cover (FAO, 1985)

The Road Ahead:

Substantial increase in public investment in agriculture, especially in watershed management, soil conservation and health, agro-forestry, sustainability of common property resources, and infrastructure – public investment stimulates private investment – ₹400 Cr (2011-12 budget) for green revolution in eastern India is like a drop in the ocean/Chemical fertilizers /pesticides /insecticides/ weedicides should be replaced by bio-fertilisers, (green manures-compost, vermiculture, sanai etc) bio pesticides like neem (integrated pest management); organic agriculture to be popularized. Massive plantation – especially agro and social forestry should be launched as a movement. 'Small is beautiful' (Schumacher) – appropriate technology should be adapted specifically suited to local agro –climatic zone (in place of 'one size fits all' view). Contract farming should be avoided as it brings insecurity to farmers as soil degrades due to over-use. Costs of production in agriculture should be minimized by protecting indigenous seeds, popularising of short-duration seeds etc. A 'paradigm shift' is required from green revolution to 'evergreen revolution' (M.S. Swaminathan). Industrial development should be in harmony and symbiotic relationship with sustainable agriculture (interdependence) – sustainable development means 'meeting the needs of the present generation without compromising the needs of the future generations' (Brundlandt Commission – 'for Common Future' (1987). Job-led growth, distributive justice, ecological sustainability, gender-justice, reproductive and child health, sanitation, and quality education should be integrated in the social development paradigm. Need versus greed is the key. As M K Gandhi said – 'Earth has everything to fulfill everybody's need, but not anybody's greed'. ❑

DURBAN Conference : The Road Ahead and Lessons for India

Srikanta K Panigrahi

The principle of equity found its place back and life was infused into Kyoto Protocol which will now continue to be in force beyond 2012

IN RECENT past, the seventeenth conference of parties (COP 17) of United Nations Framework Convention on Climate Change (UNFCCC) is concluded at Durban International Convention Centre where 195 nations of the globe participated. The people from throughout the world were anxiously waiting for the positive and stronger outcomes breaking many roadblocks created since the last two COPs at Copenhagen and Cancun. In Durban right from the beginning there were a lot of obstructions in the negotiations and irrespective of intense consultation and dialogue, a common consensus was not reaching out for which the host country South Africa extended the time period of the conference for further thirty six hours. European Union (EU) along with Association of Small Island Countries and United States (US) were insisting that Kyoto Protocol should come to an end and India and China must take a legally binding deal with some financial commitments towards global climate change mitigation. Although China in it's action, was not very strong initially, India from the beginning along with other BASIC countries and G-77 put forward the issues of "Equity", "Intellectual Property Right (IPR)" and "Barriers to Trade", asking some more in planet's carbon space so that it can take a new deal at least after 2015, as per it's cabinet decision.

Major Decisions / Out Come in Durban Climate Change Conference

- New Deal in a post Kyoto Protocol to be finalized by 2015 and launched by 2020

The Author is Director General, Carbon Minus India (CMI), New Delhi, and was Member Secretary of a Working Group at Planning Commission to prepare National Action Plan for Operationalizing CDM in India.

- Second Commitment Period in Kyoto Protocol to be operational in 2013 and continue
- Green Climate Fund (GCF) Launched to boost *technology transfer* and promote *Clean Tech*
- " Equity " finds a place back in future Climate talks
- More importance to Adaptation mechanism

Geo-political Impacts of the Negotiations

- India regains Leadership of the Developing World
- Developed Nations Leadership remains in EU's hand
- Small Island States weakens their ties with G-77, becoming EU front
- BASIC Counties look more united, although China was in weak bond at the beginning

India's Gains

- Equity along with Common But Differentiated Responsibility (CBDR) Principle retained
- Secures 10 years of Economic Growth without Carbon containment

India's Losses

- IPR and technology not as well anchored in new deal
- Emissions from Agriculture Sector finds more importance in Negotiation texts

Agenda ahead for India

- Ensure that review of existing commitments of developed world is mandated
- Smooth Introduction of Kyoto Protocol's Second Commitment Period

The United Nations Climate Change Conference, Durban 2011, delivered a breakthrough on the international community's response to climate change. In the second largest meeting of its kind, the negotiations advanced, in a balanced fashion, the implementation of the Convention and the Kyoto Protocol, the Bali Action Plan, and the Cancun Agreements. The outcomes included a decision by Parties to adopt a universal legal agreement on climate change as soon as possible, and no later than 2015. The President of COP17/CMP7 Maite Nkoana-Mashabane said: "What we have achieved in Durban will play a central role in saving tomorrow, today."

- Fight to place Equity, IPR and Trade issues in right prospective before all
- Negotiations for 5 years the hard talks that would set out terms of new global regime

Let us now see how important is Durban conference from India's perspective? Although India was pleading constantly on Common But Differential Responsibility (CBDR), equity and IPR and unilateral technical barrier to trade issues, along with historical burden sharing to have an equitable right on per capita basis; India managed to retain equity with CBDR into negotiation's text and got the extension of Kyoto Protocol to its second commitment period 2013–17 and a new treaty could be finalized by 2015 which would be operational from 2020. These will certainly provide India and other developing countries some more breathing space to facilitate their citizens to grow and to have access to some of the basic necessities where the developed nations will also get some little time to meet their Kyoto commitments, which unfortunately none of them have achieved even 15 percent so far. The technical details of gains and losses will emerge in coming days as deeper assessments are made, but India certainly took the centre-stage and regained its position as the leader and moral voice of the developing world. The principle of equity found its place back and life was infused into Kyoto Protocol which will now continue to be in force beyond 2012. During Durban Climate Change Negotiations, India enjoyed a strong support and backing of African nations particularly on Equity and Common but differentiated responsibility issues.

India very strongly put its stand to go with *Bali Action Plan* which should be implemented in next two years and *Cancun Agreement* should be operationalized along with funds and technology as promised, but said no to a legally binding treaty now. India is one of the least CO2e emitter and

many of its people don't have an access to common basic necessities like food, clothing, shelter and electricity. In 2010, the per capita CO2e emissions were estimated at 16.9 tonnes for the US and 9.2 tonnes for the EU as compared to 1.5 tonnes for India and 6.8 tonnes for China. When small island countries broke away from G-77 and joined EU and the US in demanding a new deal, India was backed by BASIC countries and developing economies like Egypt, Indonesia and Pakistan. It seems the negotiators from the industrialist countries were able to remove tactfully the text of historical burden sharing from *Cancun Agreement* and a lot of damage was caused to negotiations, particularly in last two COPs.

Another positive outcome of Durban conference is regarding the modalities of a Green Climate Fund (GCF). Although GCF remains an empty shell with no new funding commitment, it was decided that the fund will start operating from 2013 and G20 would look into the details of modalities during it's sessions in 2012. Nations have backed an intention to raise $100 billion fund in climate cash by 2020 which would be run by a 24 member board, split evenly between developing and developed countries. The World Bank would remain as an interim trustee subject to a review after 3 years and would be accountable to the board. The fund will provide money and other assistance like technology transfer relating to clean energy technologies and help poorer nations shift towards low emissions power generation and adapt to the impacts of the climate change. Poorer nations can access funds via multi lateral lending agencies or specialist UN bodies or directly after an accreditation process. Countries can nominate domestic agencies to access funds after vetting. The United States desired greater emphasis on the role of private sector and also favoured a model based on multilateral banks playing a leading role with World Bank.

It is at the same time, a matter of concern that emission level of all the individual countries as well as that of the planet is constantly increasing. The 512 metric ton increase amounted to a near 6 percent rise between 2009 and 2010, going from 8.6 to 9.1 billion metric tonnes. These increased emissions released into the atmosphere is the result of burning coal and gas, largely contributed by China, the US and India, the world's top three Green House Gas (GHG) emitters. GHG Emissions from the US has increased to 5.25 in 2010 from 5.04 billion tonnes in 2009 and similarly EU-27 had a rise from 3.94 in 2009 to 4.25 billion tonnes in 2010. In terms of absolute annual emissions, India emitted 1.84 billion tonnes of CO2e in 2010, just 35 percent of the emissions of the US, even though the population of the US is one third of India. More over, India has already announced a cut of 20-25 percent in it's Carbon Intensity by 2020.

Another important discussion of the Conference is imposition of "Carbon Tax" on aviation and maritime transport. The International Civil Aviation Organisation (ICAO) and International Maritime Organisation (IMO) have proposed "Carbon Tax" on the line European Union enforced the scheme for flights landing or passing through European skies, starting next year 2013 (was proposed to start from January 2012 at Durban Climate Change Negotiations but could not be approved) under Emission Trading Scheme (ETS) and to extend the same to the shipping sector in 2015. This EU move was opposed and resisted by India, China, the US and Russia as they have agreed collectively to a bouquet of counter-measures, if EU does not withdraw it's scheme of charging additional levy, which in fact does not have the Concurrence of the apex decision making body Conference of Parties to UNFCCC yet. Indian Environment Minister Ms Jayanthi Natarajan took this issue with partners in BASIC group in a recent meeting at New Delhi.

It is quite alarming to notice that there is a geometric rise of global green house gas emissions, from 8.6 to 9.1 billion metric tons (more than 6 percent) during 2009 to 2010 in just one year time period. It is high time the whole world comes forward for rapid actions to combat climate change collectively to protect our planet. Although developing nations are doing a lot voluntarily as India is going through it's Eight national missions mode approach, at this hour, we need to shape it's outcome and be more visible and look aggressive to the world. ❑

Sustainability in India's Urban Areas: Need to reframe the Debate

Amita Bhide

There is an urgent need to 'free' the discourse on sustainability from ideas and knowledge that has been germinated in the Western world whose developmental contexts are entirely distinct from the developing world

IT IS twenty years since the Rio conference which debated on 'Our Common future' and the passage of the Agenda 21 which summarizes the core thinking of the global community on the question of sustainability of human settlements. India at the time was a different entity. In these past two decades, the country has transformed in several ways – from a developing largely poor country, today India is seen as an emerging economy poised to be a world giant. The urban scenario of the country has also vastly changed. Urbanization is becoming a significant phenomenon in the country in the last two decades. These developments mean new opportunities, new realities and challenges. It is thus imperative at this juncture to revisit the debate on urban sustainability, to understand the challenges in the Indian context and to explore ways of moving forward.

Urban Sustainability

The Rio conference in 1992 defined sustainability as 'the ability of current generation to develop and meet its needs without compromising the ability of future generations to grow'. In the context of human settlements, it outlined the following global plan of action –

- Sustainable land use
- Social development; eradication of poverty, creation of productive employment and social integration,
- Population and sustainable human settlements development,
- Environmentally sustainable, healthy and livable human settlements,
- Sustainable energy use

The author is Programme Coordinator & Associate Professor, Centre for Urban Planning and Governance, School of Habitat Studies, Tata Institute of Social Sciences, Mumbai.

- Sustainable transport and communication systems,
- Conservation and rehabilitation of the historical and cultural heritage,
- Improving urban economies,
- Balance development of settlements in rural regions and
- Disaster prevention, mitigation and preparedness, and post-disaster rehabilitation capabilities

The concept thus encompasses multiple and also contesting meanings of sustainability. These range from global approaches that tend towards managerialism and technocratic solutions to approaches that stress on sustainability of livelihoods and upliftment from poverty to naturalist approaches that call for transformation of lifestyles and consumption.

The years that followed saw the introduction of the United Nations Environment programme and the Sustainable Cities project, specifically in the context of urban settlements. The eco –city concept was also introduced in this period. These projects helped to operationalize ideas of what sustainability could mean in an urban context which is fundamentally (delinked from food and natural production systems, immense footprint on land, air, water etc) opposed to a notion of ecologically compatible settlement as well as outlined the immense challenges in unfolding the same in the context of developing countries whose urbanization dynamics are still not known very well. The research on climate change introduced newer dimensions in this debate such as the energy domain which at once focused the debate while also widening it to include newer aspects such as manufacturing processes, consumption patterns and a greater attention to vulnerabilities of certain settlements and risks associated with certain patterns of development. Twenty years after the Rio summit, the areas that require focus are increasingly becoming clearer. However, besides the substantive focal points, it is increasingly evident that there are conflicting approaches to issues of urban sustainability and these need to be tackled head on.

The Debate and the Issues

The prevailing discourse is dominated by biophysical and technological approaches that assume, for example, that sustainability primarily refers to ecological systems that can be sustained via engineering solutions. It focuses on identifying 'best practices' and then tries to replicate these best practices to other locations. Such a method of identifying best practices obscures the social, economic, and political arrangements underlying existing unsustainable practices, and assumes that sustainability is achievable while leaving intact those underlying relationships (Lake 1996). Similarly, practices identified usually prescribe certain forms of technology, institution building which become the 'pet' agendas for propagation. Examples abound – public transport, green building, river front development, conservation of water bodies, shifts to cleaner fuels. The developing world is full of such 'exported' agendas. Such agendas that define clean and green in extremely narrow terms have generated more havoc than welfare in cities and towns where they have been introduced. People, mainly from vulnerable categories are displaced; livelihoods destroyed in the name of environment but even the environmental agenda produces impacts that are highly inadequate in ecologic terms. There is an urgent need to 'free' the discourse on sustainability from ideas and knowledge that has been germinated in the Western world whose developmental contexts are entirely distinct from the developing world. A search for knowledge and practices that are rooted in the local contexts and thereby grounded in its realities is a necessary imperative. This is not a position against internationalism but against a globalism that assumes homogeneity of realities, institutions and knowledge.

Specific Challenges to Sustainability in the Indian Urban Context

A. Urban in India is highly diverse

India is even now, a predominantly rural country. Furthermore, its urban character is highly diverse with a large majority of smaller townships and an increasing sprawl focused around its major cities as witnessed by the Census 2011 figures. The nature of the urban economy too is highly diverse and ranges from agro bases to

semi feudal to capitalist-industrial bases to global-service economies. Several smaller townships are in decline and losing population while the Class I and megacities are reeling under the pressure of rising populations and inadequate infrastructure. This diversity is a critical aspect of issues of urban sustainability in India and needs due recognition. Programmes of urban reform like the Jawaharlal Nehru national urban renewal mission (JNNURM) or other programmes make a distinction only between Class I cities and small and medium towns. Such a uni-dimensional classification based on size is an inadequate basis for policy formulation and results in policy prescriptions that are uniform and likely to produce uncertain results. For example, several smaller townships in Maharashtra have launched waste to energy plants in continuation of an advocated' best practice' without commensurate amounts of waste or waste collection systems when they could easily have used other methods of segregation and disposal. Many of these plants have become non starters resulting in wastage of public expenditure and not achieved the expected positive impact on environment either.

B. Substantive urban poverty

There are substantive proportions of poor in Indian cities across the spectrum. Poverty is often seen as an obstacle or barrier to sustainable solutions. Thus one frequently encounters situations where the poor are posed as against the environment and that pro-environment moves turn out to be anti poor. Urban poverty is a critical and integral aspect of Indian urbanization and therefore enhancement of their livelihoods, creation of opportunities for growth and expansion of entitlements are important dimensions of sustainability. Further, there is a need to integrate the recognition of the poor and poverty into planning for sustainability. To cite an example, Western countries are advocating pedestrianism and cycling tracks as key elements of sustainable urban transport. Most people in most Indian cities walk or cycle as a matter of daily routine. However, it is becoming increasingly difficult to walk or cycle as there is a competition with the car, with public road transport, streets or stations do not have explicit parking spaces for cycles. Unless there is some recognition of this inherently sustainable dimension of Indian cities; poverty will continue to be a challenge to urban sustainability.

C. Urban Governance Framework suitable to Indian urbanization yet not in place

Institutions of urban governance in the country have been moulded under colonial rule with a legal, regulatory and planning framework which is highly segmental. In the post independence years, these institutions have neither been able to sustain this old framework nor been able to cut a new deal befitting a democracy with mainly poor citizens. The 74th Constitutional Amendment (CAA) has been the initial step in recognizing urban realities and creating local governance institutions befitting those. It needs to be recognized however that the 74TH CAA is only an initial step as it deals with one aspect of the urban governance framework, there are many more left untouched. Example –town planning and regional planning frameworks. Furthermore some of the functions introduced as local functions by the 74th CAA such as urban poverty alleviation, urban forestry and protection of environment have yet not been integrated into the local government machinery.

This has meant that new ideas such as dealing with urban poverty or dealing with issues of urban environment or encouraging new economic tools to strengthen local governments have been entrusted to consultants of various kinds and not really resulted in institution building. This presents an immense challenge to both recognizing issues that require action and undertaking the same.

D. Trend towards a State-Market nexus

In the immediate wake of independence, the Indian State saw itself as a regulator of the market and a promoter of public interest. In the last decade and half in particular, immense changes in the State role have emerged. There are several dimensions of this change; the one that is most relevant to the discussion here is that the State seems to act in a nexus with the market to encourage private or market led urban development and sprawl. This has been done through Special

Economic Zones (SEZs), private townships and developments within cities. Some of these developments have not incorporated the social and environmental impacts of such developments or devised mechanisms to deal with the same. Examples abound. Development of the Bangalore-Mysore corridor through private capital has also meant concessioning the lakes in the area. Some of the lakes were then used as part of road alignments or access to them closed off. Real estate developments in urban peripheries without a land use policy or thought to governance issues is another issue. Without getting into a classical State vs market debate, it is necessary here to outline the threats to sustainability underlying a thoughtless involvement of the market.

Reframing the Debate

It is evident that an approach towards urban sustainability in India needs to be formulated with an explicit and implicit recognition of the above challenges. It needs to be viewed as a process rather than a set of 'predetermined' outcomes. Following Lake (2000), urban sustainability then entails examining urbanization within the context of dynamic and complex social, economic, political, and ecological processes producing urban growth in sustainable or unsustainable ways. This demands an integrated approach that transcends consideration of sustainability issues within boundaries of the city and to understand its implications on the region, and the hinterland and a disaggregated examination of actual processes of production and consumption at multiple levels from national to provincial or state levels to local and even household levels.

A beginning point for such an approach is suggested through the following – a) a invoking of the urban locality as the basis for posing particular challenges and opportunities for sustainability action, b) identification of streams of sustainability in Indian cities and c) attempting to break the artificial barrier between economy and environment through thinking of sustainable livelihoods.

A. Locality as the basis for Sustainability Action

Invoking the urban locality as the basis for thinking and acting upon sustainability is suggested as a beginning point for several reasons. One, it recognizes the particularity of conditions, challenges and opportunities at the local level. Second, it recognizes sustainability as a process that has implications for local lives and livelihoods. Hence the need to shift away from a set of preconceived standards and set particular goals and flexible modes of implementation that has meaning and relevance for each urban area. Thirdly, it recognizes that there is no one 'technological fix' to issues of urban sustainability and that there are diverse knowledges vesting among various actors and that all these are legitimate. Ultimately, it also recognizes that the route to sustainability is political rather than technological and this is only possible at the local level.

In the Indian context, several cities today are emerging as the arena of environmental conflicts where different versions of environmentalisms are seen to surface. However, the modes of arbitration are highly centralized and often don't work. Thus the Supreme Court guidelines on solid waste management are in a state of variable flux from city to city in spite of financial support through the twelfth finance commission. The Coastal Regulation Zone Act faced similar challenges and has since been revised to formulate guidelines at the local level. A centralized approach may be seen to be useful from point of view of enforcement but produces alien and unintended impacts which can be pre-empted through a locally initiated process. This calls for a strengthening of the capacity of institutions of local governance to emerge as institutions with enough power, mandate, resources to act on environmental issues.

B. Streams of Sustainability in Indian Cities

Thought of sustainability in Indian cities derives from distinct streams. These streams have emerged in different historical, social, economic and political contexts. Each of these conceptualizes environment and environmental action in its own way. The listing below is not intended to be exhaustive but suggestive. Each town/ city/ region may demonstrate the presence of these streams exclusively or in varying proportions.

Historical traditions of Indian urbanism are those of highly dense,

compact, walkable cities. They use natural resources like land, water sparingly. The knowledge of these systems has been incorporated into traditions, local religious or social practices and woven into the grain of culture. Cities in Gujarat and Rajasthan thus are built around ingenious systems of water resources. Bangalore has a networked lake system. These traditions are getting lost and often destroyed in the wake of new waves of urbanization but the roots exist.

There are several other cities that were created under colonial rule and have features that have been established over two centuries. These features are based on very different values and ideas of nature and nurture. While founded in a world which had not recognized limits to growth, these principles have their own brand of environmental standards which also extended a high standard of living to its residents. Some of the contemporary 'environmentalisms' derive from these principles; some of which have also been incorporated into urban planning systems.

The third stream of sustainability in Indian cities is more contemporary. This is a stream which draws from some traditional knowledge but also moulds it to contemporary materials and resources. This is a stream that has been created by the inhabitants of so-called slums. Prodded by scarcity and neglect by the State, these settlements are a lesson in living amidst adversity. Highly compact, poorly resourced and with a high interface with the 'cleaning' aspect of the modern cities, these settlements are adept at self provisioning. Innovation prodded by scarcity is a norm here. The life style in these settlements raises extremely complex social, political, ethical and environmental issues.

The identification of streams shifts attention from 'sustainable practices' to social, economic, political and institutional conditions that foster these practices. It also enables an awareness of the strengths and limitations of these trajectories in terms of what is to be sustained, relationship to development trajectories, levels of material consumption etc with reference to the specific locality.

C. Approaching Sustainability through Sustainable Livelihoods as a frame

As discussed earlier, the current discourse on sustainability views economy and environment as inherently oppositional. The economy is viewed as a necessary evil. However, this thinking itself is narrow and is located in a short range time frame. Over a longer range, economy and issues of sustainability are integrally linked. Environmental vulnerabilities can pose serious challenges to economic growth while ecologically integrated enterprises and developments are more likely to be sustainable. Furthermore, such narrowly defined environmentalisms often displace the poor in numerous ways. Approaching sustainability through the prism of livelihoods helps to break the artificial barrier between economy and environment. It views sustainability as a practice of enhancing human quality of life in the present and future generations and rejects its anti poor stances. A river front development that is delinked from the issue of livelihoods will create spaces that are inhuman and alienated from the wider social and environmental canvas. A particular stretch of river within the city may look beautiful while the river on the periphery is crowded by squatter settlements. The effort to keep up the beauty of this stretch then is one which has a far higher environmental and social cost. On the other hand a thinking of sustainability that includes livelihoods will plan the 'cleaning' of the river as a means of enhancing the livelihoods of those linked to the river and reducing their vulnerabilities.

Conclusion

The changed realities of India in the post Rio period have created specific challenges for urban sustainability. Tackling these challenges requires an approach that needs to be significantly different from the current approach that views sustainability as a set of global, pre set outcomes, as a sequence of best practices to be commanded from the top. Such an approach needs to be based in the recognition of the diversity of urban India, and one that ties together questions of institution building, decentralization and sustainability of livelihoods as its key premises. ❑

Environmental Management by Pollution Prevention

A Navaneetha Gopalakrishnan
R Pannir Selvam

Recycling that is conducted in an environmentally sound manner shares many of the advantages of prevention – it can reduce the need for treatment or disposal and conserve energy and resources

ENVIRONMENTAL POLLUTION is defined as presence of harmful concentration of any substances or energy liable to harm to living organisms, comfort resources and ecological damage to structure, amenity or interfere with the legitimate use of environment. Environmental pollution is growing with the advancement of human civilization.

Any substance which causes Environmental pollution is called as environmental pollutant, environmental pollutants include any chemical or geochemical (dust, sediment, grit, etc) substance, biotic component or its product, or physical factor (heat) that is released into the environment in such a concentration that may have adverse or unpleasant effects on environment. A pollutant may also be defined as any solid, liquid or gaseous matter present in such concentration as may be or tend to be harmful to the environment.

Pollutants may be metals, organic and inorganic compounds from domestic and industrial wastes or solid waste, radio-active waste from nuclear plants, heat from thermal power plants, gaseous matter like Carbon monoxide, Oxides of Sulphur, Oxides of Nitrogen (CO,SO_x, NO_x). Many Pollutants are the residues of things we make use and throw away. Sources of pollutants are wastes such domestic, industrial and agricultural wastewater. Surface water such as the lakes and rivers are polluted by liquid wastes from chemical and other factories. Atmospheric air is polluted by gases of automobile exhausts, and emissions from industries, thermal power plants, etc.

Wastes containing pollutants produced by a variety of human activities enter the environment either as emissions to atmosphere

The authors are with the Centre for Environmental Studies, Anna University, Chennai.

or discharges to water bodies or land. These pollutants change the natural composition of the environment and adversely affect human beings, animals, plants and material objects.

Pollution Prevention

Pollution prevention may be defined as source reduction, and other practices that reduce or eliminate the creation of pollutants through:

- increased efficiency in the use of raw materials, energy, water or other resources, or
- protection of natural resources by conservation.

Source reduction means any practice which:

- reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and
- reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

Pollution prevention is the best way to protect the environment. It focuses on ways to avoid creating the pollution at its source, before it needs to be cleaned up. This can be done by using less polluting materials in manufacturing, being careful to prevent spills, maintaining equipment in top condition, and through a number of cost-effective techniques.

Traditionally, programmes have focused on treating or cleaning up pollution after it happens. Pollution prevention means reducing waste at the source by changing the process so that less pollution is created. This is a better approach because it avoids creating the pollution in the first place so that it doesn't need to be cleaned up. Pollution prevention is voluntary because it goes beyond just complying with environmental regulations.

Common pollution prevention measures include:

- using less polluting materials in manufacturing,
- being careful to prevent spills,
- maintaining equipment in good condition,
- reformulation or redesign of products,
- equipment or technology modifications,
- process or procedure modifications, and
- improvements in house keeping, maintenance, training, or inventory control.

Pollution prevention has the following benefits:

- It protects our environment by avoiding or minimizing the creation of pollution.
- Preventing pollution up front avoids costly clean-up, treatment and disposal costs. Usually, companies can save money when they prevent pollution. Sometimes there are costs to get started but these are usually made up by the avoided costs of waste treatment and disposal.
- Pollution prevention reduces non-compliance and liability risks, enhances worker's safety and improves a facility's image and credibility.
- Preventing pollution also minimizes health risks to members of the community.

Pollution Prevention Measures

Make pollution prevention a part of your everyday life! Think of ways to reduce your waste so you can avoid creating pollution. Reuse materials what you can as many times as possible (i.e., lunch bags, reusable containers, cloth napkins). Walk, car pool or ride your bike when possible when you move around. Use environmentally preferable or non-toxic products.

Many products, such as fluorescent lamps, medical equipment, thermometers and laboratory chemicals, contain mercury. It can enter the air, water or land if these products are disposed of improperly. Mercury bioaccumulates and persists in the environment. It is toxic to humans and wildlife in all of its forms (both organic and inorganic) and can move up the food chain.

Mercury in the environment can be reduced by using alternative products that don't contain mercury, cleaning up spills properly, recycling mercury-containing products and properly handling and disposing of mercury-containing equipment.

Environmental Audit may be conducted annually to determine whether its own facilities are in compliance with environmental laws and regulations.

Pollution prevention approaches can be applied to all pollution-generating activities,

including those found in the energy, agriculture, consumer as well as industrial sectors. The impairment of wetlands, ground water sources, and other critical resources constitutes pollution, and prevention practices may be essential for preserving these resources. These practices may include conservation techniques and changes in management practices to prevent harm to sensitive ecosystems. Pollution prevention does not include practices that create new risks of concern.

In the agricultural sector, pollution prevention approaches include:

- reducing the use of water and chemical inputs;
- adoption of less environmentally harmful pesticides or cultivation of crop strains with natural resistance to pests; and
- protection of sensitive areas.

In the energy sector, pollution prevention can reduce environmental damages from extraction, processing, transport and combustion of fuels. Pollution prevention approaches include:

- increasing efficiency in energy use;
- substituting environmentally benign fuel sources; and
- design changes that reduce the demand for energy.

Some practices commonly described as "in-process recycling' may qualify as pollution prevention. Recycling that is conducted in an environmentally sound manner shares many of the advantages of prevention – it can reduce the need for treatment or disposal and conserve energy and resources.

Remaining competitive in the 21st century requires any business or organization to use pollution prevention strategies that maximize production efficiency and minimize waste.

Cleaner Production Application

Cleaner production (CP) refers to the continuous application of an integrated preventive environmental and business strategy to procure resources, process and produce products or provide services at a higher efficiency, increased profitability and reduce risk to environment. CP is about minimizing the ecological impacts of our commercial and industrial activity, while maximizing the benefits gained from any raw material or resources consumed. Cleaner production aims to:

- To minimize the creation of wastes and environmental pollution.
- Reduce overall costs and add market advantage.
- Increase resource-use efficiency and utilization.
- Decrease worker's health risk,
- Improve public image of the industry

CP approach may involve:

- Modifying the product to reduce its environmental impact,
- Substituting raw material inputs with less toxic alternatives,
- Modifying production processes and technologies used,
- Good house keeping to minimize the risks of spills or leaks, and
- Resources recovery, recycle and reuse.

Action Plan for CP

Awareness of ecological problems is increasing. This is due to the fact that some problems are beginning to manifest themselves: global warming; shortage of waste disposal sites; increase in ground water contamination incidents; depletion of the ozone layer and increasing evidence of the adverse health effects of pollution. We must either change the way we view our place within the global ecosystem or risk a disastrous spiral from which we may never recover. Every generation has faced an uncertain future, however, none had to deal with the highest stakes of all-the survival of earth itself. Choices must be made and there are several actions you can take that can make a difference:

- Buy natural products like wood, cotton and wool only and purchase only containers of glass, aluminium, tin and cardboard. Avoid purchasing non recyclable plastic.
- Recycle everything you possibly can. When discarding anything, ask yourself where it might be utilized. Support local recycling efforts and legislation. Do not be concerned with whether you will make money on your recycling. Do it because it makes sense.
- Get the fullest possible use of non-renewable and minimally recyclable products. Write on both sides of the paper and

use that scrap wood. Simply because our society gives the illusion of free flowing resources, does not mean they should not be utilized to the maximum extent possible. Resources are too often taken for granted and misused.

- Be selective in purchase of wood products like paper.
- Be prudent about the products and packaging materials you purchase, as not all wastes can be recycled. Everyone must be accountable for their waste, so plan accordingly. Think about where it will go and how it will be disposed of when you purchase something. If there is no place to recycle it, do not buy it.
- Purchase products made from recycled material whenever possible.
- Plant native trees and see that they grow. Protest the cutting of any healthy tree in your community. Trees are often sacrificed in the name of development of new curb or underground pipe line. Even dead trees are needed by the wildlife.
- Minimize your use of electricity. Utilize natural light or change saving lights.
- Upgrade the insulation in your home. Insulate your hot water heater.
- Turn your thermostat down and put on a sweater.
- Keep your car in good condition.
- Take public transportation, ride your bicycle or walk instead of using your car for short distance.
- Obtain as much of your energy as possible from renewable sources like sun and wind. Solar water heaters are cost efficient over lifetime use.
- Compost household food wastes for an organic garden in your backyard.
- Join with the others in the cause of global ecology and supporting national environmental organizations. There is strength and power in numbers.

It will not be enough to talk about is, but act on it. Only by action, before it is too late, can the earth be replenished and maintained as a viable support system for all inhabitants. ❑

Measurement of Economic Progress: Does Traditional GDP Really Add Up?

Vishal S Thorat
Bitan Mondal

Environmental conditions are important not only for sustainability, but also because of their immediate impact on the quality of people's lives

GROSS DOMESTIC product (GDP) is the most widely used measure of economic activity. It is mainly a measure of market production and economic activity within a country. GDP is not a measure of economic well-being. There are several reasons why this is the case, and addressing some of them will help us to move from the standard GDP measure to measures that are closer to being indicators of how well off people are. GDP is the gross amount of goods and services produced within a country in a year (or a quarter). No account is taken of depreciation of capital goods, depletion of natural resources, or the degradation of the environment. Thus, an immediate adjustment to GDP is to account for depreciation; doing so, one obtains a measure of net domestic product (NDP). The reason that economists have relied more heavily on GDP than on NDP is, depreciation is hard to estimate.

Of even greater concern for some countries is that the standard measures of NDP have not taken into account the depletion of scarce natural resources or the degradation of the environment-natural assets, the importance of which we are increasingly recognizing. In some countries where mining is important, a large new mine will indicate big increase in GDP, but once one takes into account the degradation of the environment and the depletion of natural resources, NDP may actually be lowered. We refer to GDP or NDP where account is taken of resource depletion and environmental degradation as green GDP or green NDP.

Environmental conditions are important not only for sustainability, but also because of their immediate impact on the quality of people's lives. First, they affect human health both directly (through air and water pollution, hazardous substances and noise) and indirectly (through climate change, transformations in the carbon and

The authors are research scholars at National Dairy Research Institute (NDRI), Karnal, Haryana.

water cycles, biodiversity loss and natural disasters that affect the health of ecosystems). Secondly, people benefit from environmental services, such as access to clean water and recreation areas. Third, people value environmental amenities or disamenities, and these valuations affect their actual choices (e.g. of where to live). Lastly, environmental conditions may lead to climatic variations and natural disasters, such as drought and flooding, which damage both the properties and the lives of the affected populations.

Measuring the effects of environmental conditions on people's lives is, however, complex. Much progress has been achieved in the last two decades in terms of measuring environmental conditions, understanding their impacts and establishing a right of access to environmental information. However, existing indicators remain limited in important respects. For example, emissions indicators refer mainly to the aggregate quantities of various pollutants, rather than to the share of people exposed to dangerous doses. Existing indicators should hence be supplemented in a number of ways, including the assessment of vulnerability of society to idiosyncratic (household level) as well as covariate (community level) shocks and thereby vulnerability to poverty in future through regular monitoring of the number of premature deaths from exposure to air pollution; the number of people who lack access to water services and nature, or who are exposed to dangerous levels of noise and pollution; and the damage inflicted by environmental disasters.

Alternatives to GDP

By taking into consideration the limitations of traditional GDP, several new metrics have emerged such as Green GDP, Gross National Happiness (GNH), Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), Genuine Savings (GS), Happy Planet Index (HPI) etc.

Green GDP

The concept of "green GDP" arose in the early 1990s in reaction to the deficiencies of the traditional gross domestic product (GDP) to account for the economic costs of depleted natural resources and incurred pollution, which in turn affect human welfare.

The notion of "greening" GDP has gained some momentum in both academia and public policy since the early 1990s. One of the most noteworthy attempts to implement the concept was carried out by the People's Republic of China. In 2006, the Chinese government released its environmentally adjusted GDP—its green GDP, prepared jointly by the State Environmental Protection Agency and the National Bureau of Statistics. Included in the calculation were assessments of air, water, and solid-waste pollution as well as the costs of depleting various natural resources. The report concluded that the economic loss of environmental damages amounted to 3 percent of the country's GDP in 2004.

In his speech at India Today Conclave 2011, the then Minister of state (independent charge) of Environment and Forest, Mr. Jairam Ramesh unveiled some truths having concern of Green GDP with India. For the year 2008, the conventionally measured savings rate for India was 38 percent of our GDP and according to the world bank's estimates; the adjusted net savings rate (the macro economic saving rate adjusted for environmental pollution, resource depletion and a whole host of environment related factors) is 24 percent of GDP. If India is reporting a normal, real GDP growth of 9 percent per year, according to the adjusted net servings it is actually 6 percent a year, if we take into account all environment related factors.

Thus, the point here is that there is a very substantial gap between the economic growth of India, as measured by GDP, and the real well-being of the country as measured by economic performance after being adjusted for environmental factors.

Gross National Happiness (GNH)

Gross National Happiness is a term coined by the Fourth King of Bhutan, Jigme Singye Wangchuck in the 1970s. The four pillars of GNH are the promotion of sustainable development, preservation and promotion of cultural values, conservation of the natural environment, and establishment of good governance.

Other Metrics

Index of Sustainable Economic Welfare (ISEW) was developed in the late 1980s to address the flaws in GDP. ISEW accounts for both conventional economic transactions and nonmarket natural and social

benefits, and the balance between positive transactions that benefit human well-being and negative economic activities that diminish it determines its value.

Genuine Progress Indicator (GPI), developed later in 1994 by Redefining Progress (a nongovernmental organization focused on public policy), includes essentially the same measures as ISEW. ISEW and GPI have widely been used by international organizations, governmental agencies, and academic researchers.

Another common development metric is **Genuine Savings (GS)**, proposed by the World Bank in 1999. Taking into account both natural and human capital, GS estimates the domestic savings less the value of resource depletion and environmental degradation.

A relatively new metric, **Happy Planet Index (HPI),** was introduced by the New Economics Foundation (NEF) in 2006. HPI bypasses traditional monetary approaches and focuses on the efficiency with which countries translate natural resource use into human and societal well-being. Specifically, HPI is the ratio of happy life years (the product of life satisfaction and life expectancy) to environmental impact (measured by ecological footprint).

Conclusion

Measurement of Economic Progress based on conventional GDP is incomplete and a unjust act. It is evident that mere GDP can not be the sole indicator of wellbeing. *One of the reasons that most people may perceive themselves as being worse off even though average GDP is increasing is because they are indeed worse off*. Thus, time has come to switch over to the most comprehensive measure of economic development, which will take sustainability of natural resources and all the excluded parameters of conventional GDP into consideration. ❑

Indo-French Project to Study Effects of Climate Change on Farming

The Indo-French Centre for the Promotion of Advanced Research (CEFIPRA) recently launched a multi-disciplinary Indo-French research project titled 'Adaptation of Irrigated Agriculture to Climate Change (AICHA).' The study aims at developing an integrated model for analysing the impact of climate change on ground water-irrigated agriculture in south India.

Berambadi village and surrounding areas in Hangla hobli of Gundlupet taluk in Chamarajanagar district have been selected for a field study under the project.

AICHA includes researchers from the Indo-French Cell on Water Science, Ashoka Trust for Research in Ecology and the Environment (ATREE) and the French National Institute for Agricultural Research (INRA). Sekhar Muddu, IISc Associate Professor (Department of Civil Engineering) involved in the project, said the study would extend up to three years and involve regular interaction with farmers in the region.The Indian and French governments are jointly funding the ₹2.25-crore project.

Muddu said that with ground water being a limited resource, agriculture would be a challenge for farmers in the coming days. He said the study would try to learn and explore sustainable water management with available ground resources, changes in the cropping pattern if needed, and the economy involved. Muddu also said that the research is special in the sense that it looks into all three fields pertaining to farming, namely, agronomy, hydrology and economics.

When questioned about how a study limited to a hobli block in Karnataka be generalised for the entire southern India, Laurent Ruiz from INRA said the aim was only to develop a model to address the climate change issues pertaining to agriculture in future and the model can be adopted with suitable alterations in a given region.

The project would explore adaptation strategies based on innovative cropping systems and water resource management policies, by considering a range of scenarios for agricultural systems and policies, to be tested at the farm and the watershed scale. The methodology will combine remote sensing, field surveys and advanced numerical analysis with hydrological, agronomical and economic modelling, and will pay particular attention to sustainability and acceptability issues.

The Seed Broadcaster

Premjibhai has spent 3.5 million rupees of his own money on tree planting and promoting well-recharging as a means of rain harvesting

PLANTING MILLIONS of trees, developing new models of financing and designing check dams and evolving new techniques of irrigating freshly planted tree saplings in dry regions, are feats of an extraordinary maverick. Premjibhai, after having had a busy life in a city as a trader, decided to go back to his roots. When he noticed these roots drying up and literally, he decided to develop new devices for scattering seeds on road sides- about 45 billion seeds. If even one percent survives it would mean millions of trees. He started this work from his homeland Saurashtra and moved on to other regions in the states of Gujarat, Maharashtra, Madhya Pradesh and Rajasthan. At seventy years, his spirit is still young- he continues to experiment, innovate and explore newer ways of revitalizing the resource management system in dry regions.

Genesis

Premjibhai was born in Bhayavadar village in Upleta Taluka, Rajkot district. Although he belonged to a farming community, he took to trading as a profession. Till 1975, he conducted his business in Upleta and later moved to Mumbai. Frustrated by the lifestyle in Mumbai, he yearned to retire and do something that would make a difference to the world.

The Innovation

Premjibhai relates the genesis of this innovation. A young man used to visit him regularly to collect seeds. Premjibhai knew that he was indeed a committed person. So Premjibhai requested him to bring 10 to 12 other friends along with him. Premjibhai took a sack of seeds and all of them set out in a four-wheeler. He gave a bagful of seeds to each and dropped two persons at every milestone. He asked them to broadcast seeds on both sides of the road while walking down to the next milestone. This way they covered a stretch of 150 km.

Later, when Premjibhai chanced to see the growth of trees on this road, he found that the trees had grown in a very haphazard pattern

as the volunteers had broadcast them with their hands. This made him think of developing a tool which could broadcast seeds uniformly from a moving vehicle. He felt that if the seeds were blown with air they would spread evenly and they might grow better. He also thought about the fan stove used in making tea. He kept on thinking of this design and discussed this idea with his son-in-law and daughter who run a steel business in Rajkot. They encouraged him. Then he bought a motor, a fan and pipe from the scrap market and started to work. In the first version the pipe was lower in height so the seeds fell near the blower pipe. In the next improved model he fitted a longer pipe so that the seeds could be blown to a longer distance. The result was a petrol-driven mechanical blower which could be mounted on the back of a jeep. The blower, fabricated in Rajkot at a cost of around Rs 12,000, could blow seeds to a distance of 15 m. Premjibhai soon adapted it for use on railway tracks as well, to broadcast seeds on the sides of the tracks. He has two machines of this kind.

The following factors have to be considered while using the seed blower. Direction and speed of the wind are important factors for evenly spreading the seeds. If there are strong winds, it is advisable to keep the vehicle's speed slow. On the other hand, if the wind speed is too low, the seeds could fall on the track. In this case the speed of the vehicle should be faster. It is also important to feed the seeds evenly so that they get blown and sprout at fairly regular distance.

In one year using these machines he broadcast ten tonnes of tamarind seeds in the villages around Ahmedabad. He says that this blower has been given to various organizations for seed broadcasting. He has no plans to replicate the innovation and sell it and so far has not received any orders for the same.

Choice of species and technology

Mesquite, locally known as *'ganda bawal' (Prosopis juliflora)* was Premjibhai's first choice among tree species. It is one of the hardiest species capable of surviving in arid and semi-arid regions. It is also salt tolerant. Its thorns provide it a natural defence against cattle and other grazing animals. He was well aware that this was not a very popular choice to make, but he convinced people with the following argument: "The trees of *Prosopis juliflora* are like soldiers who get killed on the battle-front while the other trees in the background remain unscathed." However, after a while, he added more trees and grasses to his list of species to be used for afforestation. These included Flame of the Forest (*Butea monosperma*) known locally as *palash* or *khakharo*, *awali* (*Argyreia speciosa*), *neem* (margosa - *Azadirachta indica)* and *desi baval* (babul - *Acacia nilotica*) trees and *dhaman* (*Grewia titiefolia*) grass.

These species do not need much care or protection from grazing animals and cattle. Some species of plants such as neem are vulnerable to destruction by cattle at an early stage of growth. Premjibhai has ways to overcome this. He plants such trees within clusters of thorny bushes that offer natural protection from grazing animals, when they are young and vulnerable. For reaching such hard-to-reach locations, he uses a hollow crowbar approximately five feet (1.5 m) long to convey the seeds to the selected location. One end of the pipe-like steel shaft is pointed and the other end slightly flared. The hollow crowbar is used to dig a small pit even while one stands safely away from the thorny shrubs. The seeds are fed in from the flared end once the pit is dug.

Plantation in drought prone areas

Premjibhai has also developed a technique for the plantation of trees in places where there is a scarcity of water and which are drought prone such as Kutchh, Bhuj and Saurashtra.

For this he made plastic pipes of seven inches diameter with a height of approx 1-1.5 feet. Each pipe has two holes on opposite sides at the top. First a pit of around half a foot is made and the pipe is put in it. The seedling is planted beside the pipe and the pit is covered with soil. Then the pipe is filled with a mixture of sand, soil and gravel. A small stick or branch is put through the two holes and the pipe is taken out. Now when water is poured on the sand, it will directly reach the roots of the plant. By using this technique of plantation, there is no loss of water at all. The rate of successful plantation can also be increased using this method.

Premjibhai is also a fast learner. While the government has been deliberating upon the merits of the semi-circular check dam design developed by Bhanjibhai of Visavadar, Junagadh, Premjibhai tested it and also replicated it with some location specific improvements. Innovations in check dam designs have become almost a rule with him, rather than an exception. Till date he has built 1,500 check dams for which he has given the complete financial support and 400 other dams for which he has provided the cement. He has also been instrumental in laying out 50,000 feet of pipelines for recharging underground wells. Even at 80, he does this work with fantastic levels of enthusiasm and zeal. ❑

NORTH EAST DIARY

GROWTH IN BAMBOO-BASED PRODUCTS IN TRIPURA

Production of bamboo-based products like handicrafts, furniture and sticks for Agarbatti-making in Tripura has grown three-fold to ₹93.05 crore since 2006-07. Expressing satisfaction at the growth rate, state's Forest Minister Jitendra Chowdhury, has said that there has been a commensurate increase in the revenue also. While in 2006-07 the turnover was ₹28 crore, it grew more than three-fold at ₹ 93.05 crore this year which represents a 240 percent absolute growth rate.

Buoyed by the development, the state government has set an ambitious target of ₹200 crore per annum by 2016. The state earned 80 percent of its profit in bamboo products by making sticks for Agarbatti, which met 60 percent of the country's total demand for the product. The state has set a target of ₹54 crore as revenue next year from bamboo and handicrafts alone. According to the state government, there are 21 known species of Bamboo. Bamboo is used by 2.5 billion people worldwide, of which one billion people use it for housing.

The state government in collaboration with the Tripura Tribal Areas Autonomous District Council (TTAADC), home to tribals constituting one third of the state population, has launched a massive drive for bamboo cultivation in the state. Tripura cane and bamboo handicrafts are considered to be the best in the country for their exquisite designs, wide variety and artistic appeal. The state government had launched the Tripura Bamboo Mission in the year 2007 under a PPP framework, for integrated development of the sector.

Bamboo is one of the most important non-wood forest resources in Tripura. In fact, Tripura is one of the highest CVP (Climate, Vegetation, Precipitation) index zones (a measure of potential productivity) in the country. Bamboo has been identified as a major thrust area by the state government for development. The state has formulated a state bamboo policy and also signed an MoU with the International Network for Bamboo and Rattan (INBAR) for effective implementation of the Bamboo policy. ❑

RISE IN RHINO POPULATION IN ASSAM

Poachers may have been on the prowl and killing a number of rhinos, especially at Kaziranga National Park in Upper Assam. However, the population of the one-horned rhinoceros has shot up in the state very encouragingly, with the just-concluded census putting it at 2,505, over 300 more than what it was three years ago.

In Kaziranga, which has the highest concentration of the one-horned rhinoceros, the figure has gone up from 2,048 in 2009 to 2,290 now, despite the death of roughly 120 rhinos between 2009 and 2011. The highest number of 14 rhinos were killed by poachers in Kaziranga National Park during 2009 while 2010 was the worst year in the park as far as natural deaths were concerned — 68 rhinos had died. Officials, while describing the increase in number of rhinos as a positive development, said going by the trend, the target of having 3,000 rhinos in the country by 2020 under the Indian Rhino Vision would be achieved much ahead of schedule. The rhino census, also registered 100 rhinos in Orang National Park and 93 in Pobitora wildlife sanctuary, besides 22 that have been translocated to Manas National Park over the past four years. In 2009, Orang had only 64 rhinos while the figure was 81 in Pobitora. ❑