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*Let noble thoughts come to us from every side**Rig Veda*

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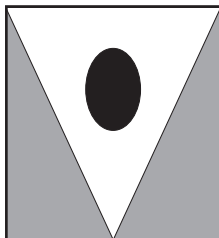
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YE-06/9/06



## About the Issue

**B**attered, wounded and scarred, India has barely had time in the last few decades, to rise from one disaster before being struck down by another. The Latur earthquake in 1993, Orissa super cyclone in 1999, followed in quick succession by the Bhuj earthquake, the tsunami, the earthquake in Kashmir, the flooding of Mumbai city, unprecedented rains and floods in parts of Gujarat and Maharashtra, and the massive deluge in Bihar when the Kosi river changed its course, not to mention the recurrent floods in the North-East and the droughts in several regions of the country. In addition, there have been man-made disasters like the Bhopal gas tragedy and the deadly terror attacks in various places across the country.

India has always been vulnerable to natural disasters like floods, droughts, cyclones, earthquakes and landslides. Its geo-climatic conditions render about sixty per cent of the landmass prone to earthquakes of various intensities, over forty million hectares susceptible to floods, about eight per cent of the total area vulnerable to cyclones and sixty-eight per cent susceptible to drought. So natural disasters are a bitter reality for us. If anything, this reality is becoming more bitter by the day, as the nature, intensity and frequency of disasters rises, aided by overpopulation, haphazard development, changing socio-economic conditions and climate changes among other factors, and we become more and more vulnerable to its effects.

It makes sense therefore, to gear up in the best possible manner to face these disasters. India has realized that it is not enough to provide merely relief and rehabilitation for disaster-hit communities, because with this we can never recover our economic and development losses. Rather, we need to focus our efforts in developing mechanisms that can minimize the effects of disasters. For example, it has widely been reported that earthquakes in Japan and USA, of higher intensity than those in Latur and Bhuj, have caused lesser damage simply because the buildings there were earthquake resistant. We also need to make our development initiatives resilient. We need to adopt an approach that focuses on prevention, mitigation and preparedness. Our development initiatives, planning, building of infrastructure etc. should take into account the disaster risks that the region faces, our communities should be aware and prepared for all eventualities that may arise in face of disasters-both natural and man-made, and proper mitigation instruments need to be put in place. The Tenth Five Year Plan reflects this paradigm shift, as does the National Disaster Management Act, 2005. Such a paradigm shift implies concerted effort at all levels- the governments at the centre, state and local levels, specialized institutions, corporates, NGOs and the community, down to each individual.

Inside, we bring you views of experts in the subject on how India proposes to prepare itself for disaster prevention, mitigation and preparedness, what is our progress report in this area, what are the challenges before us and how we plan to rise above impediments in our plan to safeguard lives, livelihoods and development gains from the vagaries of nature and the irresponsible action of mankind.



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## Building Resilience Against Disasters



In an Interview to Yojana, General N. C. Vij, PVSM, UYSM, AVSM (Retd.), Vice Chairman, National Disaster Management Authority, talks about the various aspects of Disaster Management in India and the steps that are being taken in this direction

**The approach to disaster management in India is said to have undergone a paradigm shift. In what way is the new approach different from the earlier one?**

Yes, at the national level there is proposed to be a paradigm shift from the erstwhile relief-centric response to a proactive prevention, mitigation and preparedness – driven approach. These efforts are aimed at conserving developmental gains and also minimising losses of life, livelihoods and property.

In pursuance of the above approach, the Government of India enacted the DM Act in 2005, under which the National Disaster Management Authority has been set up at the Apex level with the Prime Minister as the Chairman, a Vice Chairman and eight members. Similar organisations have also been set up at the States and Districts level with State Chief Ministers and Deputy Commissioners as their Chairpersons.

Ever since its inception, the NDMA has been working on prevention, preparedness, capacity development and public awareness to implement the Proactive Strategy.

**What are the areas/ factors that India needs to work upon to strengthen its disaster preparedness and management?**

The aspects which need added emphasis and on which the work has already commenced are:

- Promoting a culture of prevention and preparedness.

- Encouraging mitigation measures based on technology and traditional wisdom.
- Capacity building including specialist response capabilities at the National and State levels.
- Mainstreaming disaster management into the developmental process.
- Establishing institutional and techno-legal framework to create an enabling regulatory environment and a compliance regime.

**What are the critical areas of concern in disaster management?**

The arrangement for disaster management is comparatively of recent origin in our country as compared to other countries like the USA which had set up a formal arrangement in 1979 during President Carter's time. Some of the critical areas which need priority attention in our country are:

- a) Enforcement of techno-legal regime so that all our towns and cities are developed according to well laid out plans catering for disaster resilient features and good mitigation and response mechanisms.
- b) Mitigation projects at the National and State level, especially for cyclones, earthquakes, floods and landslides to develop infrastructural arrangements and capacity building for these disasters.
- c) There is also a requirement for good preparedness in the fields of Chemical, Biological, Radiological and Nuclear emergencies as also for Industrial Disasters.
- d) We also need to create a good response capability in way of 10 National Disaster Response Force Battalions at the national level and minimum one battalion equivalent response force at each state level.

- e) Revamping of Civil Defence has also to be given priority for enhancing the capability for disaster management at the community level.
- f) Community Based Disaster Management is another very important aspect.

**How would you assess India's vulnerability to disasters – both natural and man-made in the coming years?**

India is vulnerable, in varying degrees, to a large number of natural as well as man-made disasters. 58.6 per cent of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares (12 per cent of land) is prone to floods and river erosion; of the 7,516 km long coastline, close to 5,700 km is prone to cyclones and tsunamis; 68 per cent of the cultivable area is vulnerable to drought and hilly areas are at risk from landslides and avalanches. Vulnerability to Chemical, Biological, Radiological and Nuclear (CBRN) emergencies and other man-made disasters has also increased manifold in the recent past.

Disaster risks in India are further compounded by increasing vulnerabilities related to changing demographic and socio-economic conditions, unplanned urbanization, and development within high-risk zones, environmental degradation, climate change, geological hazards, epidemics and pandemics. Clearly, all these contribute to a situation where disasters seriously threaten India's economy, its population and sustainable development. However, with the measures which are now being put in place – and on their fructification – as a part of proactive strategy we shall be able to meet the challenges to a large extent.

**What are the major projects that NDMA is currently working on?**

Ever since its inception, NDMA has taken a number of initiatives to operationalize the National Vision on various fronts. Some of the important initiatives which are currently underway are:

- a) Guidelines to facilitate the Central Ministries and States: NDMA has taken the initiative for preparation of guidelines in priority areas to facilitate the process of preparation of plans. These guidelines are formulated in an inclusive and participatory process. The guidelines on Earthquakes, Cyclones, Floods, Biological Disasters, Chemical (Industrial Disasters, Nuclear and Radiological Emergencies, Medical Preparedness and Mass Casualty Management and formulation of the State plans have been released. Guidelines on Landslides, Chemical (Terrorism) Disasters, Psycho-social and Mental Health Care, Tsunami, Urban Flooding and other important subjects will be released by the end of this year.
- b) Mitigation Projects: NDMA has taken up five mitigation projects on priority basis at the national level. The Cyclone Risk Mitigation Project with the assistance of the World Bank is being launched shortly in five states in the first phase and finally in 13 states and UTs. Projects on Earthquake Risk Mitigation, National Disaster Information and Communication Network and National Mitigation Reserves are under preparation and Detailed Project Reports are being finalized. The School Safety Project is now awaiting clearance from the Government, before being launched.
- c) Awareness Campaigns: Awareness and preparedness campaigns on earthquakes, floods and cyclones have been taken up on electronic and print media. Besides, the National Disaster Response Force has also undertaken community preparedness exercises on various disasters, especially the floods. During last year 60 NDRF teams were deployed in the states to train people in anti-flood measures.
- d) Mock Exercises: NDMA in partnership with state and district authorities are conducting mock exercises in various types of man-made and natural disasters in different states. So far, we have conducted 55 exercises covering 27 states and UTs. For the coming year 100 such exercises have already been planned to be conducted. During this summer season a new initiative has been launched to conduct mock drills to the school students. This is proving to be a very useful exercise. More such exercises are being planned in the coming academic year.
- e) Disaster Management as compulsory training in Universities: A beginning has been made in this important field with Pune University. They have made one week capsule compulsory for all graduate courses. In this way there will be approximately 2.15 Lakh students trained per year at the University. The work is in progress to initiate such programmes with other universities in the country.

**Under the new disaster management approach, what role is being envisaged for Civil Defence?**

Realizing that Civil Defence can be useful in disaster management, the Government of India by an executive order has authorized utilization of civil defence for disaster management. Civil Defence Act is also being amended accordingly. Civil defence now will be a district based and not a town centric organization as earlier. The advantage of civil defence is that it is a community based organization and will prepare the community as the first responder to any disaster situation. This organization will also help in spreading awareness and preparedness activities in the community.

In the above context training Civil Defence volunteers is thus of utmost importance. A comprehensive training curriculum has already been prepared and is likely to be issued shortly. The Planning Commission has also earmarked Rs 100 Crore for this purpose. A massive training programme is being launched.

**What are the plans for the training and capacity of the National Disaster Response Force, especially the battalions who are to be trained for tackling nuclear, chemical and biological disasters?**

Presently, the National Disaster Response Force consists of eight battalions located at different parts of the country. Two more battalions have been agreed to be raised, keeping in view the vulnerability, and existing gaps. Out of these eight battalions, four battalions have been given the responsibility to deal with, chemical, biological, radiological and nuclear (CBRN) emergencies. A very comprehensive training schedule has been drawn up for training of all the eight battalions. These battalions are being trained in Collapsed Structure Search & Rescue (CSSR), Medical First Response (MFR), Heli-Borne Training and Water Rescue. For CBRN battalions various institutes within the country and abroad have been selected to train the trainers. The equipments for these battalions have been finalized and these will be fully equipped by September this year. Subsequently all the ten battalions will be trained in CBRN emergencies.

**Do we have any action plans in place to tackle cyber terrorism?**

Cyber terrorism is outside the scope of our responsibility and is being dealt by National Security Council Secretariat.

**Awareness generation and educating people about common Dos and Don'ts are important components of any disaster management plan. How do you think this can best be achieved in context of India?**

Awareness generation is one of the most important components of proactive strategy. NDMA has laid due emphasis on this aspect and some of the important programmes which are being under taken are:

- a) Focused campaign on Earthquakes, Cyclones and Floods has already been initiated on electronic and print media.
- b) Salient features of the Guidelines are being released on the National and local press.
- c) 58 table top and mock exercises each have been conducted on various types of disasters with participation at state/ district level. 100 more have been planned for 2009-10.
- d) NDRF teams are being sent to various districts for training and capacity building at the community level.
- e) Some of the other activities proposed are preparation of documentary films, TV spots, posters and leaflets.

**What are the major constraints that India faces in managing disasters effectively?**

Disaster management is comparatively a new initiative in our country. Most of the developed countries are 30 to 40 years ahead of us. Now that the path has been well defined and strategy has been worked out, there is a requirement both at the National and State level to empower the Disaster Management Authorities. There is a requirement to give a serious push at various levels to the policies and programmes of the NDMA so that the work can move with requisite speed. Speed is very essential so that we can make up for the lost time.

**What are our hopes for the future?**

A beginning has been made, NDMA has embarked on its mission in the right earnest. Planning Commission is also seized with the requirements of disaster management. The goal of disaster management in India is to protect people, prosperity and economic infrastructure by building resilience against disasters. It is a long journey but with the help of all states, we shall be soon counted amongst the well prepared countries in the world.

## Paradigm Shift in Managing Disaster

*N Vinod Chandra Menon*



***The vision  
of a disaster-  
resilient India  
can be achieved  
only by spreading  
the culture of  
preparedness  
among all  
sections of the  
society***

**N**ATURAL and man-made disasters often result in loss of lives, cause injury to people, and lead to loss of livelihoods and damage and destruction of property, assets and infrastructure. Disasters worsen the risk and exposure of vulnerable communities and lead to psycho-social stress and trauma among the disaster-prone and disaster-affected communities. In the case of recurring disasters like floods, the disaster-prone communities often become victims of a crisis of confidence as their coping strategies are often overwhelmed, survival threatened and normal life adversely affected for several months repeatedly. Children, infants, the elderly and the physically and mentally challenged people become more vulnerable to neglect and deprivation in the event of sudden outbreak of disasters, especially when the displaced communities are forced to stay in temporary relief camps.

Each year, natural disasters result in thousands of deaths, injuries and loss of property, infrastructure and assets causing substantial economic losses. In 2004 and 2005, the economic losses caused by natural disasters touched \$ 350 billion. World Bank studies estimate that 97% of the disaster-related deaths occur in the developing countries. The Asia Pacific region accounts for 63% of the world's poor, and is prone to several types of natural and man-made disasters, which worsen the vulnerability of already marginalized communities.

It is estimated by the World Bank that the annual costs of damage caused by disasters vary from 2 to 15% of the Gross Domestic Product (GDP) of the affected countries. The World Disasters Report 2003 observed that in the previous two decades alone, direct reported economic losses have multiplied five-fold in real terms to \$ 629 billion. According to a UNDP

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The author is Member, National Disaster Management Authority (NDMA) Government of India.

Report in 2004, the real annual economic losses have averaged \$ 75.5 billion in the 1960s, \$ 138.4 billion in the 1970s, \$ 213.9 billion in the 1980s and \$ 659.9 billion in the 1990s.

The economic losses caused by natural disasters are sometimes 20 times greater as a percentage of the GDP in developing countries compared to the developed countries. For instance, Hurricane Val cost 230 % of the Gross Domestic Product of Samoa in 1991. Similarly, the impact of Hurricane Ivan in 2004 cost the Caribbean island of Grenada 200% of its GDP.

### **Increasing Incidence of Disasters**

The developing countries are also becoming increasingly exposed to greater numbers of natural and man-made disasters, resulting in larger numbers of people becoming victims. It is estimated that between 1980 and 1984, about 800 disasters affected the lives of about 400 million people in the world. However, between 2000 and 2004, about 1300 disasters affected the lives of about 1.4 billion people, thereby reflecting both an increase in the number of disasters and in the number of people affected during the recent past few decades. According to the Bureau of Crisis Prevention and Recovery (BCPR) of the United Nations Development Program (UNDP), some 75% of the world's people live in areas that have been affected at least once by an earthquake, a tropical cyclone, flooding or drought between 1980 and 2000.

In 2006, it is estimated that 426 disasters in 108 countries affected

143 million people and caused \$ 34.6 billion in economic losses. In 2008, more than 300 disasters resulted in the loss of 235,000 lives, affected the lives of more than 200 million people and caused economic losses and damage worth \$ 181 billion. Most devastating among these disasters in 2008 were the earthquake which hit China in May 2008 and the cyclone Nargis which hit Myanmar in May 2008.

The high density of population in the developing countries, especially in the high risk coastal areas, results in several millions of people getting affected by natural disasters, especially in recurring disasters like floods, cyclones, storm surges, etc. Compared to New York as the only megacity with population over 10 million in 1950, there were 25 megacities in 2006 with population over 10 million, out of which 19 megacities were in developing countries. Out of these 25 megacities, 14 are on the coast and are vulnerable to storm surges, sea level rise and storms. Thus, the vulnerable communities in the developing countries are most likely to become greater victims of climate change-related disasters in the future, if appropriate strategies are developed to incorporate climate change adaptation solutions while preparing development plans in such disaster-prone areas.

### **Global Initiatives in Disaster Risk Reduction**

The United Nations declared the last decade of the 20th Century as the International Decade for Natural Disaster Reduction (IDNDR) and initiated several strategies to strengthen disaster preparedness among the disaster-

prone communities. The IDNDR was followed by the International Strategy for Disaster Reduction (ISDR) which proposed several institutional mechanisms at the global, regional and national levels to strengthen disaster risk reduction through greater preparedness, improved disaster mitigation efforts and improved emergency response capacities, especially in disaster-prone developing countries. The Hyogo Framework for Action (2005-2015) endorsed by 168 countries at the World Conference on Disaster Reduction at Kobe, Japan during 18th to 22nd January 2005 provided a new direction to disaster management by shifting the emphasis from post-disaster response to improving disaster preparedness, mitigation efforts and emergency response capacities in disaster-prone countries.

### **Disaster Management Initiatives in India**

In 1999, the Government of India set up a High Powered Committee to develop disaster management plans at the national, state and district levels. While the HPC was engaged in consultations with various stakeholder groups around the country, the super cyclone which hit Orissa in October 1999 and the Bhuj earthquake which hit Gujarat on 26th January 2001 exposed major weaknesses in our disaster preparedness and emergency response capacities. The National Committee on Disaster Management constituted by the Government of India reviewed the High Powered Committee Report and approved some of the recommendations, one of the most significant ones being the shifting of the primary responsibility

for disaster management from the Ministry of Agriculture to the Ministry of Home Affairs in Government of India.

The Indian Ocean Tsunami which devastated coastal communities in Kerala, Tamil Nadu, Andhra Pradesh, Pondicherry, and Andaman & Nicobar Islands on 26th December 2004 became the tipping point for initiating a series of steps by the Government of India for a radical transformation in the field of disaster management in India. India became one of the first countries to declare a national commitment to set up appropriate institutional mechanisms for more effective disaster management at the national, state and district levels. The Disaster Management Bill was unanimously adopted by both houses of Parliament and the Disaster Management Act 2005 demonstrated the national vision of a paradigm shift from post-disaster response to improving the pre-disaster disaster preparedness, initiating disaster mitigation projects and strengthening emergency response capacities in the country. The Disaster Management Act, 2005 stipulated the establishment of requisite institutional mechanisms for drawing up and monitoring the implementation of disaster management plans, ensuring measures by various wings of the government for prevention and mitigating the effects of disasters, and for undertaking a holistic, co-ordinated, and prompt response to any disaster situation.

### **The New Legal and Institutional Framework**

The Disaster Management Act 2005 envisaged the

establishment of the National Disaster Management Authority (NDMA), chaired by the Hon'ble Prime Minister of India, as the apex body for disaster management in the country, the State Disaster Management Authorities (SDMAs) chaired by the respective Chief Ministers at the state level and the District Disaster Management Authorities (DDMAs) chaired by the respective District Collectors and co-chaired by the elected representative of the Zilla Parishad in the respective districts. During NDMA's first meeting, the Hon'ble Prime Minister of India directed that the Union Minister for Home Affairs, Union Minister for Finance, Union Minister for Agriculture and the Deputy Chairman of the Planning Commission should be permanent invitees for the NDMA meetings henceforth to facilitate greater synergy in decision making and for more effective mainstreaming of disaster management in development planning.

A dedicated agency called the National Disaster Response Force (NDRF) has been established with personnel from the para military forces for strengthening the preparedness and emergency response in the country. Eight battalions of the NDRF have been setup and deployed in strategic locations in the country and the NDRF personnel are being trained and equipped with state-of-the-art life saving equipments, search and rescue equipments, inflatable boats, etc. The NDRF personnel from four battalions are being trained for preparing and responding to Chemical, Biological, Radiological and Nuclear (CBRN) emergencies. Since their inception, NDRF

personnel have been deployed in many natural disaster situations to assist the local administration. During the Kosi floods in Bihar in 2008, the NDRF personnel evacuated more than 100,000 people from the flood-affected villages through the sustained effort of NDRF search and rescue teams using inflatable boats, baus and local country boats.

The National Institute for Disaster Management (NIDM) has been established as the apex training institute for disaster management in India. NIDM coordinates the capacity building efforts of disaster management faculty in State Training Institutes and is also offering a few distance education programmes in disaster management in collaboration with the World Bank Institute. The NIDM also hosts the SAARC Centre for Disaster Management.

The Disaster Management Act 2005 also stipulated that Disaster Response Funds and Disaster Mitigation Funds will be set up at the National State and District levels. As the 12th Finance Commission recommendations are applicable till 2010, the rationale and the modalities for the setting up of these funds are being discussed with the 13th Finance Commission for their consideration and approval.

### **The National Vision**

The Disaster Management Act 2005 envisages a paradigm shift from the erstwhile relief-centric response to a proactive prevention, mitigation and preparedness-driven approach, so as to conserve the developmental gains and also minimize losses to lives, livelihoods and property. The National Vision

for disaster management is to build a safer and disaster-resilient India by developing a holistic, proactive, multi-hazard and technology-driven strategy. This will be achieved through a culture of prevention, mitigation and preparedness to generate a prompt and efficient response at the time of disasters. The entire process will centre-stage the community and will be provided momentum and sustenance through the collective efforts of all Government agencies and Non-Governmental Organizations (NGOs).

### **Mainstreaming Disaster Management in Development Planning**

In congruence with the dominant global thinking, for the first time, the Tenth Five Year Plan document introduced a separate chapter on “Disaster Management: The Development Perspective”. As observed by the Planning Commission, “Disasters can have devastating effects on the economy; they cause huge human and economic losses, and can significantly set back development efforts of a region or a State. Two recent disasters, the Orissa Cyclone and the Gujarat Earthquake, are cases in point. With the kind of economic losses and developmental setbacks that the country has been suffering year after year, the development process needs to be sensitive towards disaster prevention and mitigation aspects. There is thus need to look at disasters from a development perspective as well.”

The Tenth Five Year Plan document further stated, “Development programmes that

go into promoting development at the local level have been left to the general exercise of planning. Measures need also to be taken to integrate disaster mitigation efforts at the local level with the general exercise of planning, and a more supportive environment created for initiatives towards managing of disasters at all levels: national, state, district and local. The future blue-print for disaster management in India rests on the premise that in today’s society while hazards, both natural or otherwise, are inevitable, the disasters that follow need not be so and the society can be prepared to cope with them effectively whenever they occur. The need of the hour is to chalk out a multi-pronged strategy for total risk management, comprising prevention, preparedness, response and recovery on the one hand, and initiate development efforts aimed towards risk reduction and mitigation, on the other. Only then can we look forward to sustainable development.”

The Tenth Five Year Plan document categorically reinforced that “the compounded costs of disasters relating to loss of life, loss of assets, economic activities, and cost of reconstruction of not only assets but of lives can scarcely be borne by any community or nation. Therefore, all development schemes in vulnerable areas should include a disaster mitigation analysis, whereby the feasibility of a project is assessed with respect to vulnerability of the area and the mitigation measures required for sustainability... In particular, with regard to major disasters, it is also necessary for disaster mitigation components to be built

into all development projects. In order to save larger outlays on reconstruction and rehabilitation subsequently, a mechanism would need to be worked out for allowing components that specifically help projects coming up in highly disaster prone areas withstand the impact of natural disasters as part of approved project cost for projects financed under the Plan. ”

In conclusion, the Tenth Five Year Plan document stated that “The message for the Tenth Plan is that in order to move towards safer national development, development projects should be sensitive towards disaster mitigation. With the kind of economic losses and developmental setbacks that the country has been suffering year after year, it makes good economic sense to spend a little extra today in a planned way on steps and components that can help in prevention and mitigation of disasters, than be forced to spend many multiples more later on restoration and rehabilitation. The design of development projects and the process of development should take the aspect of disaster reduction and mitigation within its ambit; otherwise, the development ceases to be sustainable and eventually causes more hardship and loss to the nation.”

During the early stages of drawing up the strategies for inclusive growth, the Planning Commission set up a Working Group chaired by Dr. Mohan Kanda, Member, NDMA with representatives of several concerned Ministries and Departments of Government of India and eminent disaster management experts as members to work out the modalities of mainstreaming disaster management

in development planning. Based on the recommendations of this Working Group, the Eleventh Five Year Plan document extended the spirit of the transition initiated during the Tenth Five Year Plan. The Eleventh Five Year Plan document observed that “the Tenth Plan has set into motion the process of shift in focus from response-centric disaster management covering rescue, relief, rehabilitation, and reconstruction to laying greater emphasis on the other elements of disaster management cycle—prevention, mitigation, and preparedness—as a means to avert or soften the impact of future emergencies. The Eleventh Plan aims at consolidating the process by giving impetus to projects and programmes that develop and nurture the culture of safety and the integration of disaster prevention and mitigation into the development process. The guidance and direction to achieve this paradigm shift will need to flow from NDMA, and in the true spirit of the Disaster Management Act, to all stakeholders including State Governments and UTs, right up to the PRIs.”

In the words of the Planning Commission as spelt out in the Eleventh Five Year Plan document, “Mainstreaming disaster management into the development planning process essentially means looking critically at each activity that is being planned, not only from the perspective of reducing the disaster vulnerability of that activity, but also from the perspective of minimizing that activity’s potential contribution to the hazard. Every development plan of a ministry/department should incorporate elements of impact assessment,

risk reduction, and the ‘do no harm’ approach. Examples of this approach are urban planning and zoning, upgradation of building codes and their effective enforcement, adoption of disaster resilient housing designs and construction of school and hospitals, flood proofing, response preparedness planning, insurance, establishment of early warning systems for various types of disasters, generating community awareness, creating technical competence and promoting research among engineers, architects, health experts, and scientists.”

NDMA, in consultation with the Planning Commission and the concerned Ministries of the Government of India, has worked out the modalities for scrutinising the incorporation of disaster management concerns in the development plans of Ministries and Departments of India and State Governments and these formats have been circulated for compliance while submitting plan proposals for their approval by the Planning Commission. Thus, the Government of India has become one of the first national Governments to operationalise the mainstreaming of disaster management in development plans, as envisaged by the Hyogo Framework for Action.

### **Centre-staging Communities**

As the neighbourhood community is always the first to respond in any disaster situation, NDMA is encouraging the involvement of all stakeholders in strengthening community based disaster management through comprehensive training programmes, public awareness campaigns, mock drills, etc.

Over the past few years, disaster situations have also witnessed the changing roles of women from passive victims to social change agents, transforming the quality of life of the disaster-prone communities in their neighbourhood through large scale social mobilisation efforts.

### **Investing in Improved Preparedness**

The most important activities in strengthening disaster preparedness include the preparation of Guidelines, the improvement in risk assessment, vulnerability analysis and early warning systems, capacity building, public awareness, mock drills, etc. NDMA has already prepared and released National Disaster Management Guidelines for the Management of Earthquakes, Floods, Cyclones, Chemical Disasters, Biological Disasters, Radiological and Nuclear Emergencies, Medical Preparedness and Mass Casualty Management, etc. Guidelines have also been prepared for the National Institute for Disaster Management (NIDM) and for the preparation of State Disaster Management Plans. Several other Guidelines on the Management of Landslides, Tsunami, Psycho-Social Care and Trauma, Community Based Disaster Preparedness, Minimum Standards of Relief, Role of NGOs in Disaster Management, etc. are in the process of getting finalized.

Civil Defence is being revamped, with disaster management as one of their primary mandates. From the existing state police battalions, State Governments are being encouraged to set up State Disaster Response Force (SDRF) for preparing and

responding to natural and man-made disasters in their geographic jurisdictions.

Along with Civil Defence, Home Guards, Indian Red Cross Society volunteers, National Service Scheme volunteers, Nehru Yuvak Kendra volunteers, NCC and Scouts and Guides will also be encouraged to participate in improving community preparedness, especially in disaster-prone areas. As outlined in the Guidelines on Medical Preparedness and Mass Casualty Management, special efforts will be made during the Eleventh Five Year Plan to improve the medical preparedness through integrated ambulance network, helicopter ambulances, containerized mobile field hospitals, improved bio-safety laboratories, etc. More than 1.5 lakh people have participated in more than 58 mock drills conducted in several parts of the country in collaboration with the state governments, district administration officials, NDRF personnel, fire and emergency services personnel, civil defence personnel and local communities.

#### **Mitigation Projects**

NDMA has initiated the steps for launching national level mitigation projects for the management of earthquakes, cyclones, floods, landslides and for strengthening the disaster communication network upto the last mile connectivity and for setting up national disaster mitigation reserves. The work on risk assessment and vulnerability analysis, microzonation and hazard zonation mapping, etc. have also been initiated with the involvement of various stakeholder groups. A National School Safety Project is also being launched to strengthen the disaster preparedness, mitigation and emergency response capacities among school children, teachers and other stakeholders, especially in high risk seismic zones IV and V which are vulnerable to high intensity earthquakes.

Disaster risk reduction can be achieved only if all citizens participate in complying with the techno-legal regime, actively support the capacity building and public awareness campaigns and disseminate the need for carrying out mock drills in their neighbourhoods. The vision of a disaster-resilient India can be achieved only by spreading the culture of preparedness among all sections of the society. □

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## Earthquake Safe Buildings

*Sudhir K Jain*



*An important step to solving the “earthquake problem” is to recognize that it is really not the “earthquake problem” but the “unsafe building problem”*

**I**N RECENT years, a number of earthquakes have caused thousands of deaths and huge economic losses in India. Earthquakes of comparable size in USA typically cause less than 100 deaths, largely due to systematic effort at constructing safe buildings. Every damaging earthquake in India invites a great deal of media attention. Government agencies announce plans to reduce such disasters in future, experts are interviewed by newspapers and TV channels, conferences and workshops are held all over the country, and the public feels reassured that the problem of earthquake safety is being addressed, till the next large earthquake, when people realize that not much really got done since the last such event. Does it mean that this is a problem that India cannot solve? The answer is: we can solve this problem but need the will to do so.

The 2001 Bhuj earthquake in Gujarat caused more than 13,000 deaths, most of these casualties were in Kutch and

Saurashtra regions. However, the earthquake also killed more than 800 deaths in Ahmedabad, located about 220 km from the epicenter. Interestingly, none of the very old buildings in Ahmedabad collapsed during the earthquake. Instead, it was the collapse of 130 multistorey buildings constructed in recent years in the formal sector (involving developers, architects, and engineers) in Ahmedabad that caused these deaths. This is a very clear illustration of the earthquake problem of India: unsafe constructions not only by the public and the illiterate masons but even by many professional architects and engineers. This is at variance with the huge developmental strides India is making otherwise.

After the 1931 March earthquake in Baluchistan, several earthquake resistant railway quarters were constructed in Quetta. These were the only constructions in Quetta to survive the 1935 earthquake in which about 25,000 persons lost their lives. Even though, the country learnt seventy years ago

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that it is possible to make earthquake resistant houses, we continue to add to the unsafe building stock in our communities.

After the 2001 earthquake, many municipal authorities have started asking the structural engineer (and others such as architects and builders) to certify that the building complies with seismic codes. Unfortunately, such certificates are easy to procure, sometimes on payment of small money, and need not have any correlation with how a building is built. Until the municipal authorities start enforcing measures to ensure that the building indeed complies with codes, false certificates will continue to be issued for a variety of reasons.

### **The Problem Statement**

In engineering, often it is more important (and sometimes even more challenging) to define the problem than the solution itself because once a problem is well defined, its solutions start to emerge. Quite often, our national or professional pride comes in the way of stating the problems as they are, leading to a loss of opportunity for finding a solution. In order to solve our earthquake problem, we must start to frankly state the problem.

What is the earthquake problem? Every stakeholder tends to think that his role is the most crucial in addressing an issue. Some one would say that mass awareness campaigns are needed to create a demand for safe constructions. Another would say that more seismic instruments are critical. Many recommend seismic microzonation before any progress can be made. All of these activities are valuable but cannot help reduce the earthquake problem until we start to build safer buildings. If somehow all buildings can be made to withstand the earthquake motions, the problem

will simply go away. Clearly, unsafe building stock is THE problem and not the earthquakes as such. It is therefore obvious that the solution is to:

- (a) Ensure that all new constructions are earthquake resistant, and
- (b) All existing structures are made earthquake resistant over a period of time through sensible retrofitting.

Let us assume that average life of buildings is 50 years and that the building stock is growing at the rate of 2% per annum. If no new unsafe building is built now onwards, in 20 years about 60% of buildings will be earthquake resistant even without any retrofitting. It is therefore obvious that our priority should be to develop robust systems for ensuring safe construction of new buildings. Simultaneously, we need to develop systems, policies and methodologies for seismic retrofitting of existing structures to prepare for sensible retrofitting programmes.

### **Ensuring Safety in New Constructions:**

How can one ensure that all the new buildings are safe? Before we address this question, we need to ask: why the unsafe buildings are constructed in the first place. The reasons are several:

- *Ignorance:* In many cases, the people involved in planning, design and construction simply do not know the right way to do things. In some cases, they know that they do not know and yet proceed with the task. In other cases, they are blissfully unaware that they lack the competence to do a certain task.
- *Intentions:* Greed to save materials or manpower to cut down costs often leads to unsafe

constructions. In many cases, it is the urgency of the tasks that makes people compromise on quality.

However, these reasons are universal around the world and are as much applicable to the developed countries as to the developing countries. How is it then that in general the constructions in the developed countries tend to be safer as compared to that in the developing countries? It turns out that one could indeed put in place a system that significantly improves the likelihood of new constructions being safe. Important components for ensuring safe constructions are listed below (not in the order of importance).

*Public Awareness:* It is easy to implement safety programmes if the public is well aware of the risks and demands safer constructions. The recent earthquakes (2001 Bhuj and 2005 Kashmir earthquakes) have created tremendous awareness but there is still a lack of appreciation on what will make the constructions safer.

*Legal Framework:* After the 2001 earthquake, many state governments and municipal authorities have made the code compliance mandatory. There is now a need to develop a clearer understanding on accountability of architects, structural engineers, contractors, construction engineers, developers, and municipal authorities towards safety. The questions that need to be addressed are: who is responsible for what, who is to ensure that those responsible are doing what they are supposed to do, and what happens when someone does not do what is his/her responsibility.

*Technical Competence:* In the last decade, numerous capacity building activities have helped improve the knowledge levels of Indian

structural engineers about seismic codes. The National Programme on Earthquake Engineering Education ([www.nicee.org/npeee](http://www.nicee.org/npeee)) has trained numerous faculty members of engineering and architecture colleges, and many such colleges now include the subject in their curricula. A lot more remains to be done on this however. We need a lot more training activity, not only for engineers but for all stakeholders including developers, contractors, and masons.

*Professional Ambience:* The professions of architecture, medicine, accountancy, and law are regulated in our country. The respective councils of these professions ensure (i) competence of those licensed to practice, and (ii) ethical practices by their members. A system for regulating engineering profession is long overdue in India which can best be done with the help of a examination-based licensing system for structural engineers in the first instance, and other engineers in due course. Also, a competence-based certification system is needed for the artisans and masons.

Another concern is of low morale of some of the engineering departments in the states and the central government. In many such departments, the professionals have lost considerable amount of self-esteem and have become subservient to the bureaucrats in the ministries for even relatively minor decisions. We cannot expect to receive good services from a demoralized group of professionals.

*Enforcement:* It does not cost anything to wear a seat belt in an automobile. And yet, the police must enforce it before the public learns to comply. Should we then expect every property developer to voluntarily incur extra expenditures for code compliance? Currently, in most cities, the municipal authorities

require a certificate of compliance of codes, but do not carry out any verification independently. This is similar to a situation that will arise if the income tax department were to require certificates from accountants and citizens that the individual has paid taxes as per law while the Department is not allowed to look into any income tax returns nor prosecute any defaulters. Clearly, local authorities must start to carry out a cursory review of a small fraction of the structural drawings before such certificates can carry any meaning whatsoever.

*Research and Development:* Our construction practices differ from those in the developed countries, and several technical problems require indigenous research and development. There is a clear need to focus research on “engineering” of earthquakes as against the focus on “science” of earthquakes that the country has been placing in. A national initiative in research and outreach in “engineering” of earthquakes in lines with the NPEEE is urgently needed.

The above discussion has focused primarily on the urban constructions. What about the rural and informal constructions that are not regulated by the municipal authorities? Several approaches are needed in this regard:

- We need technological solutions wherein common man can construct an ordinary earthquake-resistant house with locally available resources. Examples of traditional constructions having excellent earthquake resistance include the Assam-type housing in the north-eastern states and Dhajji-Dwari constructions in Kashmir. Research is needed to develop contemporary versions of these and other types of constructions.

- We must discourage construction of reinforced concrete frame buildings without very competent engineering supervision. Instead, buildings with confined masonry or those with reinforced concrete shear walls are more appropriate when adequate engineering inputs are not available.
- As practices in the urban areas will improve, so will the same in the rural sector; the informal sector imitates the formal sector.

### **Seismic Retrofitting of Existing Constructions**

Unfortunately, the sophistication required for undertaking retrofitting has not been adequately articulated in the country. Either there is a casual attitude towards it or too much aura associated with retrofitting. Some facts about retrofitting need to be recalled:

Retrofitting can be expensive. The cost of retrofitting may range from 10% to 50% of the cost of a similar new facility (e.g., Spence 2004).

Retrofitting is a long-haul process. A time table running into decades is needed depending on inventory of unsafe constructions and the resources available. As an example, California Department of Transportation (CALTRANS) took about 35 years to retrofit its bridges at a cost of billions of dollars.

It requires considerable expertise and technology for retrofitting. Considerable technical know how may be needed for retrofitting of complex structures or when objective is to achieve better than life-safety performance. For instance, caltrans had to spend about Rs 220 crores per year for research on retrofitting technologies. In India, we are yet to develop consensus documents on

seismic assessment of existing buildings, and criteria for seismic retrofitting.

Government must undertake retrofitting of important facilities. We cannot on one hand insist that every child must go to school and then have them go to schools with unsafe buildings. The tragic scenes from Muzaffarabad, where about 400 children died in collapsed school buildings, could recur in many cities in India. A serious retrofitting policy of the public buildings is needed before we expect private buildings to be retrofitted.

A prioritization system is needed. Since not all facilities can be retrofitted at the same time, to maximize the safety with the amount spent, we must have a rational prioritization system considering seismic hazard at the site, vulnerability of the facility, consequences of damages, etc. This may in fact be a topic of research by itself.

In brief, a lot of preparation and background work is needed before a serious effort at retrofitting can be launched.

An important step to solving the “earthquake problem” is to recognize that it is really not the “earthquake problem” but the “unsafe building problem”. Hence, the focus must shift from earthquakes per se, to the buildings industry. We need to discuss and debate how the building industry can be improved in terms of what it delivers. It is also important to recognize that earthquake safety is a rather challenging engineering problem requiring decades of focused work, and cannot be solved in the short term: it is not easy to change the way people have done a task for decades!

A quote from the 1939 publication of the Geological Survey of India on the 1934 Bihar – Nepal earthquake says Leprosy is not a common disease, but the medical profession has done its utmost to eradicate it for the sake of humanity. Great earthquakes are not a daily disease of any part of the earth’s crust but it should be our duty to do all that we can to reduce its effects. Unless this matter is looked upon in a broad way, posterity may yet look back upon our short-sightedness with regret.

In the Quetta area an excellent building code has recently been drawn up, and reconstruction has been rigidly enforced in terms of that code. Such enforcement is, perhaps, easier in such a military area, but at least Quetta provides an example of the practicability of a building code and of its usefulness. It is, perhaps, not too much to hope that the rest of Northern India will some day follow Quetta’s lead.

This quote is as much valid today as it was sixty five years ago!

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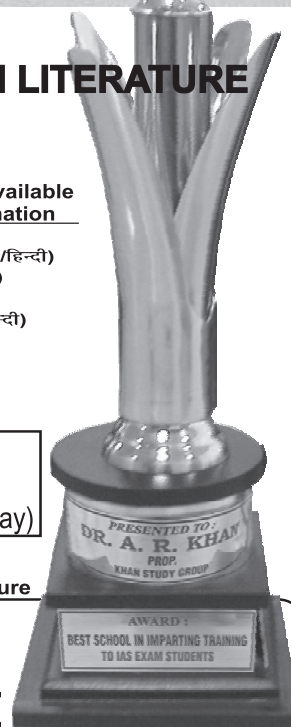
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YE-06/9/08

## Need for Reassessment

*Dinesh Kumar Mishra*



***It needs to  
be realized  
that the  
problem is  
how to  
route  
the silt and  
not how to  
route the water***

**M**ANY DEPARTMENTS working over the issue of water, irrigation and floods have changed their names in the recent past. Thus, Department of Irrigation has now become Water Resources Department (WRD), Flood Control's new incarnation is Flood Management and Relief and Rehabilitation Department has graduated into Disaster Management Department (DMD) and so on. By changing names it appears that a sea change has occurred in the working of these institutions for the better. But let someone ask what changes have actually occurred, the answer is hard to find. Most of these departments are doing the same thing even now; the flood control people are on an embankment building spree as earlier and the DMDs of the states are still busy in relief operations under a new label. If a change could be brought by just changing one's name, there was no need to do anything else, just change the name. This is true for

most of the issues affecting human life but it is truer when floods are expected to be mitigated by calling it a disaster.

Disaster is defined as a great or sudden misfortune. Various governmental and non-governmental organizations try to combat disaster by preparing to face it, mitigate it and rehabilitate the people to pre-disaster situation. All the three steps put together are called disaster management. Floods are said to be a natural disaster by many while a significant section of the society has started calling them manmade disaster because human intervention has aggravated the problem of flooding. The debate is fierce and continuing. The floods in Nagpur, Nasik, Bhopal, Hoshangabad, Barmer, Jaipur, Banda, Bangalore and Jallundhar in the recent memory are a disaster but the Bihar floods of 1998, 2002, 2004, 2007 or even the 2008 floods in the Kosi basin cannot be rated as a disaster. All these floods were

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The author is Convenor- Barh Mukti Abhiyan, Patna, Bihar.

known to be in offing and they don't qualify to be rated into the disaster category for the very definition of it. Floods in Eastern Uttar Pradesh, Assam, Orissa or West Bengal are aggravated because of human intervention in recent past and belong to manmade disaster category as massive investment on flood control have gone into these states.

### **Looking for Natural Floods -**

We all know that the civilizations grew along rivers. Floods played a definite and positive role in survival of mankind. Flooding of plains is the nature's way of land building process; it adds fertilizing silt to the agricultural land and replenishes the moisture of the soil along with revitalizing the ground water table. Non-occurrence of floods is a greater disaster than floods in the flood plains of the river. Floods in India follow a definite season and the local people living in flood plains, generally, knew the approximate dates when the floods would strike them and were prepared to face the same. However, the extent and duration of flooding has got aggravated because of human intervention, giving it a form which we now call a disaster. This intervention has come mostly in the form of embankment construction along the rivers with the hope that they would stand as solid walls between the people and the rivers. That hope has been belied beyond any shade of doubt over the years.

**Embankments** – The root cause of flooding as indicated earlier, a massive program to embank the rivers of the Ganga-Brahmaputra

basin was taken up following the independence of the country. When a heavily silt laden river is embanked, the sediment gets trapped within the embankments, pushes the bed level successively upwards necessitating the raising of the embankments also. There is a practical limit to which the embankments can be raised and maintained. The river water seeps through these embankments and causes waterlogging in the countryside. The countryside is deprived of the nutritious silt that it could have got if the river was allowed to flow freely. The embankments prevent the tributaries from entering the main river and sluice gates have to be constructed to allow this. These sluice gates cannot be opened during the rainy season because there is a possibility of the main river water entering into the tributary and flooding newer areas hitherto unknown to flooding. The tributaries, on their own, may start flowing parallel to the main river outside, again flooding new areas. It can be suggested then to embank the tributaries also and in that case the rainwater between the embankments of the main river and the tributary may get trapped. The only route for this water to escape is through evaporation or seeping into the ground. Or else, it may have to be pumped into either of the streams. Should any of the embankments breach, then the people residing between the two embankments will meet their watery grave. No embankment can be guaranteed against breaching, not even in the USA or China.

Seeking flood protection through embankments amounts to falling into a trap wherefrom it is very

difficult to come out. A section of engineers, however, believe that if water is passed through a narrow area, for example, between embankments, its velocity increases and so does its capacity to erode the banks and dredge the bottom of the river thereby increasing the waterway of the river. More waterways would mean greater capacity of the river to discharge and hence the floods would be reduced. There is however, little evidence to substantiate this claim anywhere in the country.

### **Status of Floods and Embankments -**

The Government of India, after adopting the first Flood Control Policy in 1954, proceeded to construct 33928.642 kilometers length of embankments along its rivers, 38809.857 kilometers length of drainage channels dug to drain unwanted floodwaters and protect 2458 towns against floods and raise 4716 villages above the maximum observed flood level. (Ministry of WR GOI, State wise Progress of Physical Works under Flood Management Programme till March 2006.)

Any area, which has at any time been subjected to flooding, is taken as flood prone area unless it has been effectively protected. The flood prone area of the country, as per the first Five Year Plan document, was only 25 m ha at the beginning of the plan period. It rose to 33.516 m ha. when Rashtriya Barh Ayog assessed its extent in 1980. (Ministry of WR, GOI website, 'Achievements in Flood Control', details of flood protection works updated till 2004) Of late, the Working Group on Flood Control Programme set up by the Planning Commission for the 10th Five Year Plan has estimated the

flood prone areas as 45.64 Mha., out of which an area of 16.457 m. ha. was estimated to be protected by the end of March 2004. Central Water Commission suggests that the state has protected 18.222 million hectares of land against flooding till March 2006 (Ministry of WR, *ibid*, Table 5.17 Official Website of Central Water Commission, GoI. Table 5.12, Flood Damage / Heavy Rains In India.). )which leaves a balance of 27.418 m ha yet to be provided with any kind of flood protection, implying that the flood control measures adopted so far have not yielded any result. The area yet to be protected is more than what was the total flood prone area of the country in 1950s. Obviously, the investment in the flood control sector in the country is doing more harm than good and the flood spread area is on the rise. This is often discounted by saying that the losses appear to be rising because of the rise in the population, increase in the land and property prices as also to better techniques of assessment of losses and not to the real rise in the threat of floods over the country.

As of now, on an average, 7.63 million hectares of nation's land is flooded every year affecting 32.92 million people. Crop over 3.56 million hectares valued at Rs. 705.87 Crores are lost every year due to floods that destroy 12, 35,000 houses killing 94000 cattle and 1590 persons. Average, annual damages due to floods are estimated at Rs.1782.35 Crores.

It is worth noting that the nationwide flood of 1954 that led to the adoption of the first ever flood policy in the country had spread area of only 7.490 m ha which was exceeded 22 times in the 51

years between 1954 to 2004. This happened despite an investment of Rs. 8113.11 Crores till the end of Ninth Five Year Plan (2002). Plan outlays for the tenth and eleventh plan runs into thousands of crores. Despite this investment, the states like Gujarat, Maharashtra and Rajasthan are figuring regularly on the flood map of India for the past few years and the states like Andhra Pradesh and Tamil Nadu are not lagging behind.

The disaster managers very sincerely feel that it is none of their business to go into the causes of the disaster and whether it could be avoided with judicious use of technology or the people's wisdom. Their mandate is to help people in distress, come what may. This is perfectly justified approach on humanitarian ground. The choice, however, lies in first evaluating the work done so far in the name of flood control and correcting the wrongs done over the years in managing floods as a disaster and pumping in money in the name of relief and rehabilitation year after year, which is never sufficient in relation to the losses incurred. NGOs could have furthered the debate but they too have developed vested interest in disasters and use them as an 'opportunity' to help the victims.

It should be made very clear in the beginning that floods in north Bihar are a way of life and not a disaster just as droughts are in Rajasthan. Unfortunately the floods debate has been diverted into a disaster management program so that the often asked inconvenient questions regarding flood control policies and their implementation are never raised.

The first principle of disaster management is to prevent disasters. But the present practitioners of disaster management in Bihar rarely focus on this issue. Unless attempts are made to do away with the causes that have converted the much-awaited floods into a disaster, any prescription to tame the rivers or their floods is not going to work. This would mean that the embankments, or for that matter any structure that impedes the free flow of water should not be built in the first place and if built, it should not be allowed to breach. Traditionally, floodwaters were allowed to spread over a vast area so that the sediments too spread over it and rejuvenated the fertility of the soil. This also automatically leads to flood moderation. Preventing the flooding of the plains leads to various unmanageable complications stated earlier. It needs to be realized that the problem is how to route the silt and not how to route the water.

The 2007 flood in North Bihar broke many previous records. Continuous rains between 1st July to 2nd August in Bihar plains, Terai area of Nepal and the lower Himalayas brought life to a standstill for a very long time. It rained three to four times more than the average for weeks together and districts like Samastipur, West Champaran and Khagaria was virtually cut off from rest of the world for a considerable period. Elderly people of the area suggest that they had never seen so much of rain in their life nor had they experienced such a prolonged stagnation of rainwater. Surprisingly, with so much of rains and the accompanying losses due to floods, no major river of North Bihar touched the recorded highest

flood level (HFL). There were however, 7 breaches in the Bagmati embankments, 14 in the Kamla-Balan embankments, 5 in the Burhi Gandak, 3 in the Masan embankments and one each in the Bhutahi Balan, Khirroi and the Kosi (Badla-Nagarpara) Any lay person in Bihar can tell that the embankment loses its meaning downstream of the breach point. If the maximum level of all these rivers was much below the HFL, one would expect that the damages caused by the floods would be less but that did not happen. The obvious explanation that comes to one's mind for this anomaly is that there were large number of breaches in the embankments, canals, roads and railway lines that led to moderation of flood levels in rivers and drainage congestion prevented the moderated floodwaters from escaping. The result was prolonged stagnation of water and nearly 25 million flood victims watched helplessly their dwellings and crops being washed away. The answer to the problem was to improve the drainage, but the Government announced the construction of embankments along the Bagmati and the Mahananda at an estimated cost of Rs. 792 crores and Rs. 850 crores of rupees. Obviously, it lost sight of breaches in the embankments, along with 54 breaches in National and state highways in the state. Condition of the rural road was even worse. There were 829 breaches in them and its 1353 bridges and culverts needed repairs replacement., Breach in the road means that the rain water is looking for an opening at that point to pass through, which the department intended to plug. Such damages will never diminish if the state continues to ignore the drainage aspect of floods.

The Government did well, probably, for the first time in the history of Bihar to provide grains to the flood victims and a dole of about Rs 2250/- per family but the provisions of the Calamity Relief Fund (CRF) or the National Calamity Contingency Fund (NCCF) were never met with. The GoB kept on blaming the Center for discrimination and the Center, in its turn, blamed the state for not doing its job properly.

The fact is that the WRD of the states creates disaster that is to be managed by the DMD. The cooperation between the two departments does not go beyond this. It is on rare occasions that functionaries of the two departments are seen chalking out a joint strategy. Unless that happens, floods will keep on hitting the people and doles will have to be distributed in the name of disaster management. □

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## From Risk to Resilience

*Santosh Kumar*



***Reforms in financial sector are needed for speeding up the process of prevention and mitigation thus making development more resilient to disasters***

**D**ISASTERS ARE tragic interruptions to the development process, consuming millions of unlived lives and precious infrastructure. Development infrastructure created over the years in different sectors die premature deaths, and affected countries are forced back several steps in their development journey. Precious time, effort and money otherwise allocated for development work, has to be pumped into relief, rehabilitation and reconstruction work for putting the country 'back on track' of economic and social development. Natural disasters therefore, impede social and economic growth, as they wipe out investments and divert resources from federal, state and municipal budgets and aid agencies to recovery activities. Global, national and local attempts are

being made to reduce the impact of disasters. Nearly, one hundred and sixty nine countries, have signed a global agreement called Hygo Framework of Action, in 2005 for disaster risk reduction. All the signatories to the framework are committed to make development risk resilient by attaining five goals- that include ensuring disaster risk reduction as a national and local priorities, identify, assess and monitor disaster risks and enhance early warning, use knowledge, innovation and education to build a culture of safety and resilience at all levels, reduce the underlying risk factors and strengthen disaster preparedness for effective response at all levels.

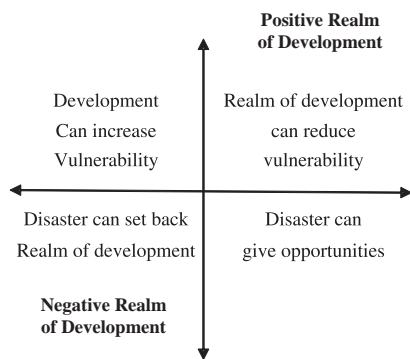
### **Development and Disaster Risks**

Natural disaster risk is intimately connected to processes of human development. Disasters put development at risk. At the

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same time, the development choices made by individuals, communities and nations can generate new disaster risks. The human development process has to be one of development in various. Over the years, it has been experienced that certain development initiatives have yielded good results without creating any disaster risk, but there are other initiatives which may have yielded desired results, but have, in the process, also created disaster risks. Development therefore, can have both a positive as well as a negative realm as shown in the figure below :



**Fig 1**

Source: UNDP,DMT training material

The analogy given above explains that development and disasters both have positive and negative realms. The positive realm of development explains that if development initiatives are designed as per the disaster vulnerability, it will help in facilitating the human development process . Much US(California) , Japan and many other countries have earthquakes

of much greater intensities than the than that of Gujarat, but the loss to lives and property have been much lower.

On the other hand, if disaster vulnerability is not taken into account while designing the development initiatives,, it can erode the development infrastructure ( Orissa Cyclone, Bihar floods 2004, 2007, 2009, Gujarat earthquake, Myanmar cyclone 2008 ). If the post disaster reconstruction, recoveries are taken well , it will help in risk reduction and facilitate development process ( Post Gujarat earthquake reconstruction is considered as one of the best practices for reconstruction).

Many development projects initiated over the years in disaster prone areas in the country seem to be ignorant about the disaster vulnerability. Most states in India are multi hazard prone, often with different parts experiencing different disasters simultaneously – for example – drought in parts of Rajasthan and Maharashtra with flash floods in Barmer and Mumbai. India as a whole experiences various kinds of disasters like earthquakes, floods, cyclones, tsunami, droughts etc. As estimated by the World Bank , India is losing @ 2 % of its GDP per annum ( as direct loss only) while many other Asian countries are losing up to 12 % of the their respective GDPs.

The main question needs to be asked is , if the disaster profile of the country is known then why is the development infrastructures failing to sustain in the disaster prone areas ? Are we ignorant of these facts or is it too expensive to invest in mitigation and building disaster resilient infrastructures ? Or is dole distribution more attractive than disaster risk reduction ? The World Disaster Report 2001 indicates that 97% of all disaster-related deaths occur in poor and developing countries, while only 2 % in the developed ones. In India, the states which are less developed are in high vulnerable zones and have low capacities to respond. States like Bihar, Assam, Rajasthan, UP, West Bengal, Orissa, North-Eastern states, Uttaranchal, Himachal Pradesh are vulnerable to frequent disasters such as floods, Cyclone, earthquake and drought. The se states are heavily dependent on relief money (Calamity Relief Fund, National Calamity Contingency Fund, PM relief Fund, Donations, Grants, Loan etc.). With these funds, we recover infrastructure and housing losses to some extent, but, financial and economic losses still remain unattended. States that had barely embarked on the path to development, are pulled back several rungs. There is thus an urgent need to develop multiple tools which can address post disaster recoveries of infrastructure and financial loss, pre disaster risk reduction and an effective response

system during disasters. DRR we needs to be mainstreamed with development.

## Mainstreaming DRR in Development Planning

Disaster risk reduction is a cross sectoral issue. The concerted efforts of integrating it into development activities require consensus and active participation of decision makers and planners at national , state and panchayat/ local bodies levels. Importance of mainstreaming is also recognized by HFA , 2005. But the challenge is how to mainstream ?

**Mainstreaming** is the process of assessing the implications of disaster risk in any planned development action from the policy to the programme implementation level-in all practice areas and at all levels. This process enables the incorporation of risk reduction

concerns and experiences as an integral dimension of the design implementation, monitoring and evaluation . When disaster risk considerations are not factored into development, including recovery efforts following major catastrophes, countries invest in constructing risks and reconstructing risks which perpetuate the conditions for unsustainable human development.

DRR-relevant projects can be – pre-disaster, post-disaster, early recoveries and also the development ones. Poor/ Developing/Developed countries/ phases all should incorporate DRR. DRR mainstreaming is essentially a form of quality improvement process for both development and disaster response projects.

DRR can be implemented on ground with the support at state and national levels . The approach

could be of bottom up and top down .Both at the national and state levels specific policies, legislations and institutions are to be framed and strengthened for DRR. DRR and mainstreaming framework should be integrated for having holistic sustainable development. The integration can be seen in the framework given below.

The DRR should be seen as an integral part of environment (Climate change also) and development. The impending risk analysis should be done in the light of disasters and possible threat of high intensity disasters due to climate change. Accordingly, mitigation and adaptation programmes should be developed. The mitigation plan should address the issue of structural and non structural interventions along with the fiscal and monetary tools ( for DRR and adaptation) for pre and post disaster planning. If this is mainstreamed, sustainable

## Framework – at a glance

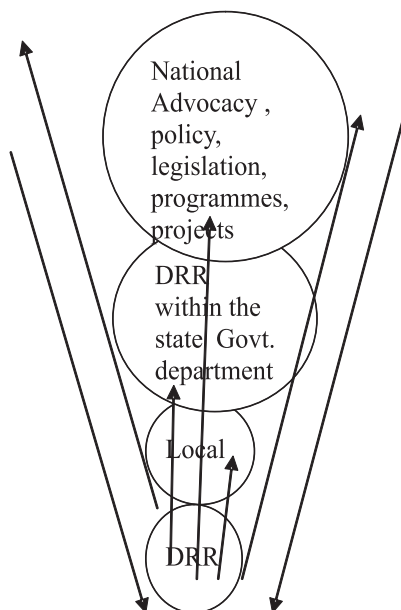


Fig.2 . Mainstreaming framework

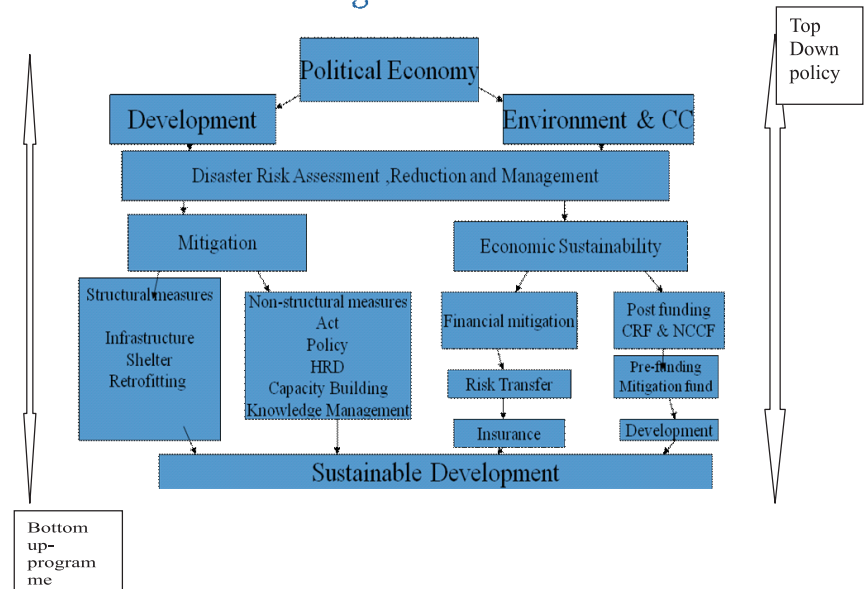


Fig 3. Integrated framework of DRR and development

development can be attained and miseries of the people could be minimized. The top down and bottom up institutional linkages for policy formulation and programme execution would be interdependent with each other.

Current initiatives taken for DRR in the context of paradigm shift are quite encouraging but not enough. At the national level institutions, the enactment of National Disaster Management Act, 2005, setting up of National Disaster Management Authority (NDMA), National Institute of Disaster Management, National Disaster Management Response Force, National Guidelines for mitigating earthquake, cyclone, floods, nuclear, chemical and biological disasters, allocation of ten percent of the budget of Calamity Contingency Fund for building emergency response mechanism are welcome steps as parts of the planned approach for DRR. This is a very good beginning, but a lot more needs to be done. The enforcement of National Act 2005, enactment of DM Act by various states, and implementation of policies (disaster management being a state subject) need to gather momentum, and capacities of communities, institutions and other stakeholders needs to be enhanced to for an effective DRR.

There is a need to look at **reversed realities**. High disaster risks exist at lower levels, capacity strengthening of state and local (community) level institutions is not adequate,

policies and programmes are not yet comprehensive. Guidelines /plans without any **budgetary allocation** could be wishful thinking. Simultaneously, even if the desired programmatic investments for DRR are made, it will still be a drop in an ocean considering the volume of disaster risks in India. Hence, for safe development strategy, there should be programmatic investments where the concept of prevention and mitigation is nurtured and developed as best practice. And for scaling it up, we should go through mainstreaming it in development process.

Regarding financial loss, recovery and encouraging investments for disaster resilient development we have to have a relook at our monetary and fiscal policies. We have to look for **new financial mechanisms and tools** (other than the Calamity relief Fund and National Calamity contingency fund) for incentivising risk reduction by states, local level institutions, corporates and individuals. Tax exemption, tax concession, mitigation grant, lower interest rate for individual seeking housing loans, risk transfer, insurance are the few examples. Not much has been done as concerted efforts in this sector in the country so far but it has great potential in not only encouraging disaster risk reduction but also speeding up the whole process.

## Conclusion

As the frequency and intensity of disasters in India intensify,

mainstreaming of disaster risk reduction (DRR) with development policies emerges as an urgent need, as well as a key challenge. The need for a strong intervention following a disaster has been recognised as build back better. The need now is to increase the focus on disaster risk reduction as a central element, may be to start with incorporating disaster risk auditing of ongoing development policies and programmes with the national as well as state governments. A more integrated approach calls for collaboration between government agencies responsible for land-use, development, agricultural and environmental planning and education as well as other stakeholders responsible for disaster management. This requires decentralised disaster risk reduction planning/ strategies with equity and inclusive approach that can empower communities and open the window for local participation. Legislation can set standards and boundaries for action but legislation on its own cannot induce people to follow these rules. There should be an inbuilt mechanism for monitoring, and enforcement needs to be strengthened with highest political commitment. Strong mechanism for incentive and disincentive can also be thought of. Reforms in financial sector are needed for speeding up the process of prevention and mitigation thus making development more resilient to disasters. □

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# Post-Disaster Housing Assistance in India

*Krishna S Vatsa*



***It would thus require provision of technical and financial services in a far more organized and professional way than what is being provided under the IAY***

**T**HE AVAILABLE data on the housing in India suggests two glaring facts: A. there is a serious shortage of housing in the country, and B. the quality of housing stock is very poor. As per the Census of India 2001, rural areas account for about 65% housing shortage in the country. Of the 71% of the rural population in India, only 41% live in pucca (or permanent) houses. A survey carried out by National Sample Survey Organization (NSSO) suggests that three-fifths of the houses in rural areas are made of mud, thatch or other low quality material. Even in urban areas, only about 57 percent houses are built of high quality material which is of a lasting nature. 19 out of every 100 structures in the rural areas and 11 in the urban areas were in bad condition and required major repair.

The poor quality of housing as well as the absence / non-enforcement of regulations regarding the land use and building permissions have increased the vulnerability of population to homelessness whenever a natural

disaster strikes. In India, a large number of people have lost their homes in the recent earthquakes in Bihar-Nepal earthquake (1988), Uttarkashi (1991), Latur (1993), Jabalpur (1997), Chamoli (1999), Bhuj (2002), tsunami in South India (2004), Jammu & Kashmir (2005). Cyclones too have caused havoc, primarily in Orissa (1999) and Andhra Pradesh (1977, 1990, and 1996). However, the floods in the Indo-Gangetic-Brahmaputra plains are an annual feature, and more than a million kutcha houses are destroyed each year.

### **Different Mechanisms of Post-disaster Housing Assistance in India**

In India, the assistance for post-disaster housing has varied across the states and disasters. The World Bank provided assistance for post-disaster housing for the first time in Maharashtra after the Latur earthquake (1993), which was followed by its assistance to Gujarat after the Bhuj earthquake (2002), and to the South Indian states after the tsunami (2004). In tsunami-affected states, the Government of India

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too announced a special package for rehabilitation, which included Rs. 40,000 for reconstruction of each house. In Jammu & Kashmir, the special package announced by the Government of India was for Rs. 1 lakh per house for owner-driven reconstruction. In Orissa, the assistance for post-disaster reconstruction was provided on the lines of Indira Awas Yojana, the regular rural housing program of the Government of India.

Though the NGOs have contributed immensely to the reconstruction programs in Latur (Maharashtra), Kutch (Gujarat), and Tamil Nadu after the tsunami, their contributions have generally followed the principle of adopting the villages and supporting new settlements. Most of the NGOs prefer to construct new RCC houses, generally on a different site. However, these NGOs intervene only in large-scale disasters where they could mobilize resources through international appeals. Such a model is difficult to apply in small but more frequent disasters, where people lose their houses on a regular basis, but in smaller numbers.

### **Assistance for Post-disaster Housing through Indira Awas Yojana and CRF / NCCF**

The existing Indira Awas Yojana (IAY) guidelines have a restrictive impact on its application for post-disaster reconstruction. First, only 5 percent of the total allocated funds under IAY would be earmarked to meet the exigencies arising out of natural calamities and other emergent situations like riot, arson, fire, rehabilitation under exceptional circumstances etc. Further, funds to be released for this purpose shall not exceed Rs. 5 million per district. These funds cannot even be pooled at the state level. So if one or two districts in the state are affected by disasters, these districts could receive only up to Rs. 5 million, which is not adequate to address these needs even on a minimal

basis. Second, IAY benefits can be provided only to the Below-Poverty-Line (BPL) families only. Third, a certain percentage of IAY funds are earmarked for the scheduled castes and scheduled tribe population of the district, which cannot be changed. In a disaster situation which affects all the communities, it has a restrictive impact.

The Calamity Relief Fund / National Contingency Calamity Fund (CRF / NCCF), which provide resources for relief, do not really provide resources for reconstruction. The resources made available through these funds are just enough for minor repairs, and are of not much help when houses need to be reconstructed.

### **Post-disaster Housing Interventions: Need for a Long-term Policy Framework**

The absence of a policy framework and program for post-disaster housing in India underscore the need for developing a long-term policy framework based on the considerations of uniformity, feasibility, home-owner's individual responsibility, and risk reduction. Such a policy needs to be made applicable to all the disasters, big and small, throughout the country. Second, the policy needs to be feasible; it must be supported by the national resources. Its implementation should not depend upon external lending or the donor support except in extraordinarily large-scale disasters. Finally, such a policy should also make demands upon home-owners to mobilize their own resources and guide them to implement the reconstruction program in a way that reduces their risks to acceptable levels.

Such a policy framework needs to rest upon a revised Indira Awas Yojana (IAY), the largest rural housing program in India. Under IAY, each beneficiary family is provided with an assistance of Rs. 30,000 for constructing its own

house on a grants basis. All the beneficiaries must be included in the Below Poverty Line (BPL) list, and should be identified and approved by the Gram Sabha. The assistance is released in two or three instalments, linked to the progress of the work. Every year around two million houses are constructed in the country under the IAY.

The main advantage of linking post-disaster housing assistance to the IAY is that the assistance would be uniform across the country, and the funds would be made available on an immediate basis through the scheme. The financial and administrative mechanisms of IAY could always be used for providing post-disaster housing assistance. No special package or external lending is required for the implementation of a post-disaster housing program.

Though the IAY began its implementation with construction through the contractors, it is now being implemented through an owner-driven construction strategy in all the states. Such a strategy offers several advantages at the level of implementation. First, it is largely in-situ construction, and does not require acquisition of new lands. Second, the entire assistance is released to the home-owners in tranches through bank transfer, and reduces the leakages in implementation. Third, it shifts the primary responsibility on the home-owner himself, which makes it easier to improve the quality of construction. Fourth, the IAY assistance always works as catalyst for the home-owners to mobilize their own resources through savings and family labour and improves the utilization of resources for housing.

The most important feature of IAY which could be applied to post-disaster housing is that it does not prescribe a type design of the houses, except that the plinth area of the houses should not be less than

20 sq. mts. The layout, size and type design of the IAY houses depend on the local climatic conditions and beneficiaries' preferences. The houses could be designed a way that provide functional space, kitchen, ventilation, sanitation, and smokeless chullha in different sizes and layouts.

### Improving and Adapting IAY for Post-disaster Housing

Yet IAY would need significant changes and improvements for accomplishing the objectives of a post-disaster housing program at the national level. It could be achieved through a setting up a special window in the scheme, which addresses just the post-disaster reconstruction. The criteria of BPL families should not apply for providing the housing assistance in this category. The States could ask for the resources from the Ministry of Rural Development through this window, with their

own contribution of 25 percent on lines of a centrally sponsored program.


The total assistance for each house should be the same as available under the IAY or a little higher. However, the damaged houses need to be surveyed properly, and only those who have suffered severe structural damages should be provided with this assistance. The damage assessment methodology needs considerable improvement, and would require extensive training to the engineering staff. Those houses which have suffered minor damages could be assisted through CRF / NCCF.

The IAY provides assistance for just housing. It does not include any provision for civic infrastructure. A post-disaster housing program must earmark a certain percentage, probably 30-35 percent of the total housing assistance for repairs, reconstruction and augmentation of

civic infrastructure. It improves the quality of habitat, and contributes substantially to the process of socio-economic recovery at the community and household levels.

In a post-disaster housing window of the IAY, the emphasis should thus change from a program intended to address individual housing needs to a community seeking to rebuild its settlement on sound technical and environmental principles. It would thus require provision of technical and financial services in a far more organized and professional way than what is being provided under the IAY. Opening a special window in the IAY for post-disaster housing and extending technical and financial services to the disaster-affected communities through the scheme would therefore be the key challenge of a national mainstreaming effort in the area of post-disaster housing. □


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## Creating An Environment for Learning

*Sachin Jain*



*With the winds of change sweeping over Nagland's villages, what is particularly heartening is that it is all geared towards nurturing the young and channelising their talent and capabilities to create a brilliant future*

**N**AGALAND, TUCKED away in the northeastern part of India has been witness to sweeping changes in its countryside. Khonoma, a small village about 40 km from the capital Kohima is reflective of this. In spite of six schools in the village, thirty two percent of its children remained out of the school system. Absenteeism was rampant among teachers, and the attitude towards education was casual within the village community. That was before 2002.

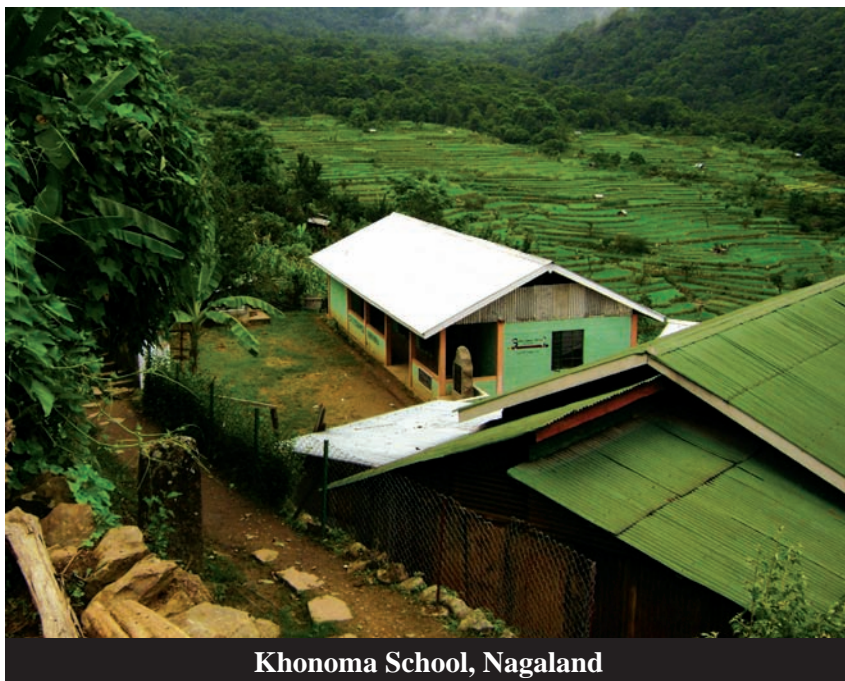
In Khonoma today there is not a single child who is not registered at school. A system of management and monitoring has evolved to ensure the child's continued presence during the entire learning years. Similar winds of change are sweeping across the entire Nagaland, completely transforming its educational scene.

The root of this change lies in the communitisation, or the handing over the ownership and management

of several government institutions in key areas like education, health, water, electricity, tourism and conservation of bio-diversity to the communities. The process of communitisation does not indicate a shifting of responsibility from the Government to the community. It is based on a wider vision to broaden the scope and potential in the field by involving those it impacts most. Kose Seche, a local who is part of the Education Committee says that involving the community so closely in the education system has knit them together. There is a sense of accountability and a growing perception on the significance of this move within the community.

Beginning in 2002, 205 primary schools in 90 villages were handed over to the tribal community. Today in all 1286 villages, 1459 schools have followed suit. 890 of these villages have the enviable record of not having a single child out of the school system.

According to Seche, the first year was devoted to largely observing



**Khonoma School, Nagaland**

and understanding the present system. The formation of Village Education Committees (VEC) which have the presence of women as one-fourth of its members, now has taken center-stage in reforming the educational system and defining its standards. Comprising teachers, parents, NGO's, churches and village community, it has begun to play a crucial role in examining the functioning of education system and taking corrective actions where necessary. For example, in order to deal with absenteeism among teachers, the VECs set up a Vigilance Committees. Teachers were made to mark their attendance daily, and errant teachers were either brought to book or removed. VECs have also implemented the bold step of "No Work No Pay". The presence of teachers is marked and performance noted before releasing their salaries. The VEC has been given control over the funds available for education and this move has had a singular impact in inculcating the sense

of ownership. Government funds under that particular head are deposited with the VEC which then has the independence to control and assign it under various heads.

The wave has caught on leading to a deepening of local initiative and a sense of commitment and ownership in areas shrugged off in other parts of our country as 'Government's responsibility'. Steps are now being taken based on the local needs of the educational institutions and the children. Concerned about the low enrolment of children, the Midland Ward Education Committee in Kohima collected funds to conduct a research on children out of the school system. They went on to build a small two-room school on land donated by a the locals, Raneli Belho. Another committee, the Ching Melen Education Committee recruited two new teachers whose salaries were paid by community contributions. They further took steps to construct a hostel for students, which was a need of the hour.

According to veteran educationist Slehu Terhuja not everything has changed because of the involvement of the community, but it is a fact that now the community has a stake in the education system.

Secretary of Education Committee Deju Khane says that this initiative has empowered the community to take corrective measures in the field of Education.

Apart from the conventional syllabi, courses in tribal culture and local development have been introduced. The child-teacher ratio in Nagaland is highly favorable at 1 teacher per 21 students as compared to the all India average ratio of 1 teacher per 42 student .There has been a marked drop in percentages of school drop out, teacher absenteeism , and improvement in judicious utilization of fund for infrastructure in development and monitoring of mid-day meal schemes.

In an age where debates about government control versus privatization dogs several areas of public life and service, Nagaland has hit upon a middle path. A path of innovation, of enterprise and a convergence between different players. . This has been recognized by the United Nations Service Awards for Communitisation in July 2008 . With the winds of change sweeping over Nagland's villages, what is particularly heartening is that it is all geared towards nurturing the young and channelising their talent and capabilities to create a brilliant future.

*(Charkha Features)*

# Community Based Disaster Management

*Manu Gupta  
Shivangi Chavda*



***CBDM  
processes build  
local resilience,  
strengthening  
existing coping  
strategies and  
enhance security  
of lives and  
livelihoods***

**T**HE ASIAN sub continent has been affected by all kinds of disasters during recent years. Various studies, research and statistics reveal that Asia has been affected severely by disasters over last 15 years. The average number of people reported affected, per million inhabitants between year 1991 – 2005 was 57342 . The disasters which have impacted the most are hydro meteorological, geological, and biological. The disasters have left behind economic loss to the tune of 577.44 US\$ billion. Countries that are impacted the most are the developing or under developed ones. The vulnerabilities and risks in such countries are higher. The basic needs such as food, shelter and clothing are hardly met in some of these countries. The vulnerabilities are accentuated also by geo political risks that these countries face.

Most of the countries like India, Bangladesh, Afghanistan,

Maldives, Sri Lanka and others have laid down the framework for Disaster Management. However challenge still remains how we make each individual living in a high risk area, more resilient to disasters. The efforts therefore, in many countries have been shifted from top-down command and control, to more decentralized and community based. The central idea is to recognize communities as first responders in a disaster situation.

Community Based Disaster Management (CBDM) is now an accepted and widely practiced strategy in disaster vulnerable regions. Essentially, it puts community at the lead of local disaster management effort. External agencies then become the facilitators to the process. Through CBDM, the people's capacity to respond to emergencies is increased by providing them with more access and control over resources and basic social services. Using

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a community-based approach to managing disasters certainly has its advantages.

The CBDM approach provides opportunities for the local community to evaluate their own situation based on their own experiences. Under this approach, the local community not only becomes part of creating plans and decisions, but also becomes a major player in its implementation. Although the community is given greater roles in the decision-making and implementation processes, CBDM does not ignore the importance of scientific and objective risk assessment and planning.

The importance of community-based approaches has been recognized since long in promoting a culture of safety through reducing local vulnerabilities and building capacities. These approaches have been practiced by various community groups, national and international organizations and government departments, in some cases, for over two decades now.

### **Knowing Risks**

As a starting point for any CBDM exercise, it is important to know where the risks and vulnerabilities are. The risks can be environmental, social, physical or economic. It is important to highlight that while, hazards are inevitable and cannot be prevented; vulnerabilities can be reduced and capacities increased to reduce overall risk. Vulnerabilities are inherent weaknesses in the functional environment of the society. For eg: Education cannot be provided to the students – because there are no schools, or no stronger

schools; Health condition of the society is poor because there are no doctors available or medicines available. Such vulnerabilities are existent in normal conditions and when there is disaster, these vulnerabilities further aggravate the situation. Also, Community cannot be displaced to other region which is not a risk prone zone. Displacing the communities has a social and psychological bearing and hence the only element which one can address to is to reduce vulnerability.

Although, there are techniques and systems available to measure the vulnerability and also provide mitigating solutions to reduce risks, it is more important that communities are made aware of their own risks. The pertinent question is, since risks can be assessed by outside agencies and the risks can be mitigated through proper mechanisms, why involvement of community is required? The response to such school of thought is that any strategies worked on the theory of the theory of imposition always fails, as the community fails to acknowledge the facts leading to a unsustainable knowledge.

SEEDS, in implementing its Community Based Disaster Management programmes, involves local communities at risk to do initial risk assessment. The tools and methodologies include participatory risk assessments through focus group discussions, interviews with multiple groups and stake holders, community workshops, Hazard hunt through town watching. Such process has helped the communities themselves

to understand and know their risks. Initial Risk assessment by the community also facilitates them to think about the required solutions which can be help mitigate these risks through community efforts. For example, during one of the SEEDS recent intervention in Mashobra in the mountainous terrain of Himachal Pradesh , the community staying in scattered hamlets , had problems in crossing a local stream to evacuate safely, during the time of landslides or heavy rains. The risk identified, was the problem of accessibility.

Subsequently, based on the risk identified by the community, bridge was constructed with the local Gram Panchayat taking the lead. The entire exercise of knowing risks through community led processes actually helped in better assessments and therefore realistic solutions.

### **Schools as entry point for CBDM**

Schools are the symbol of faith for the community. Moreover, during disasters, schools are often converted into relief centers providing shelter, health facilities and food to the most affected communities. Schools are therefore rightly called “Safe Havens”. The community around these safe havens, shares strong linkages with the institutions. The schools provide a formal environment for risk education as also others. The students, as future citizens, are the best medium of spreading knowledge in the communities. They become a catalyst in transferring knowledge to practice. The education on disaster prevention ultimately reaches parents and further to the entire society.

The concept of “Safe School Safe Community” is actively promoted by SEEDS in its CBDM programmes. This has been recently implemented in Himachal Pradesh, with the support of international agencies – Christian Aid and European Commission and in partnership with the State Government. The aim is to educate the school children, teachers and other occupants of the school on disaster risk reduction as well as the communities surrounding such schools. The disaster management committee of the village has parents of children studying in the local school, the local school authorities, village leaders and local government officers. It so works that while the schools students and teachers are trained to respond during the disaster, the communities outside the schools are also prepared for the disaster. The school children if needed may be evacuated to a identified safe location outside the school premises, the community task forces facilitates the process. On the other hand, if schools are designated as safe locations for evacuees, the schools are prepared to provide the rescue and relief facilities. Schools and local communities around them mutually reinforce their strength for coping against natural disasters.

### **Institutionalization for Sustainable Development**

Community Based Disaster Management is sustainable only if it is institutionalized. The development efforts should acknowledge and treat the risks to which communities are exposed. Integrating risk reduction methods with regular development programmes

would significantly contribute to sustainable development. It is in this context that disaster management practitioners, academicians and researchers have strongly advocated for a disaster-free development. Paradoxically, it was also observed that sometimes development has led to disaster. For example: In State of Orissa, in order to improve inter state transportation, a highway was constructed above the ground level. The result was that the villages on either side became a low lying area. Now during heavy rains, the water slopes down from highways to these villages, thereby flooding these villages. The development here has led to disasters. This situation is the outcome of the fact that development and disasters are treated in isolation. Institutionalization therefore looks at consolidating the isolated efforts as well as channelizing the resources appropriately to reduce risks.

In India, Community Based Disaster Management has been recognized though not yet institutionalized. The Disaster Management Act, 2005 does recognize in spirit the need for disaster management planning at national, state and local levels, however the process of implementing a framework whereby community efforts are recognized and incorporated in development and disaster management planning is yet to be put in place.

SEEDS has proposed a model for institutionalization in its recent efforts in Himachal Pradesh, whereby horizontal and vertical linkages have been created with CBDM approaches. (Figure1)

Wide scale replication of CBDM approaches in India

would require expansion in the roles and functions of the PRI institutions. Equipping them with resources and training would be needed. The models of Village Knowledge Centers, now popular in several parts of India can be strong vehicles for communicating and educating local communities on local risks and challenges of natural disasters.

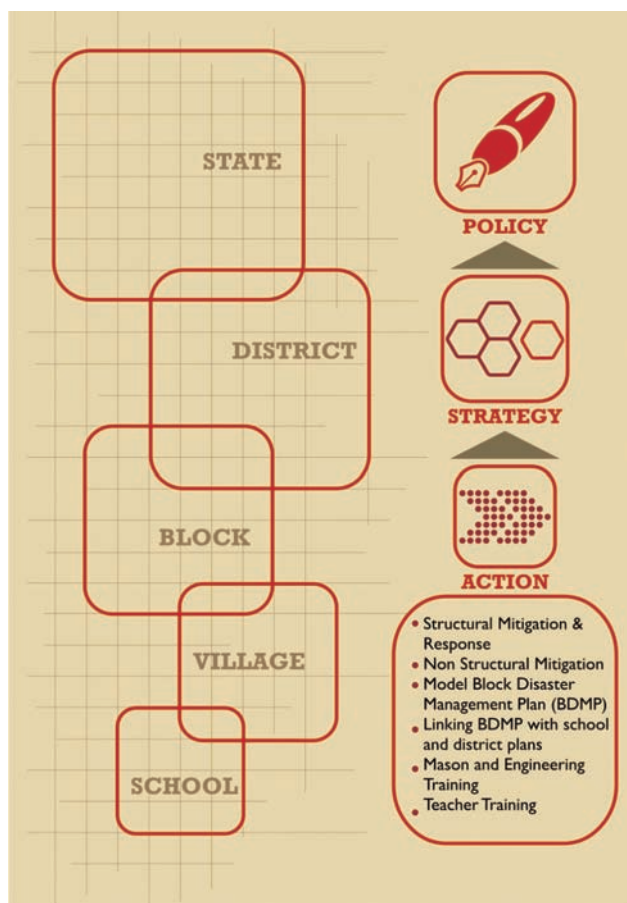
### **Community Disaster Resilience Funds**

Along with institutionalization, funding is another important requirement for CBDM. The National Alliance for Disaster Risk Reduction (NADRR) in India has been promoting the idea for putting funds at the disposal of local communities to carry out CBDM activities. “Community Disaster Resilience Fund” is co-financed by communities by way of households contributing a small fixed amount from their livelihood earnings to be used for their protection. These funds can be potentially utilized for disaster mitigation or relief activities. The village development committee are responsible for managing such funds for the communities.

The core funds can be used to leverage funds from Government sponsored rural development scheme, cash for work programmes and others. In the longer run, creating Disaster Resilience Funds at community level would be a critical element to sustain CBDM efforts.

### **Emerging Challenges**

The environmental changes due to global warming have posed a fresh threat to the communities.



**Figure 1 : Developing vertical linkages for CBDM (Himachal Pradesh)**

The change in weather patterns has caused major impacts on living and livelihoods of the people. Climate Change has induced disasters such as flash floods in the regions which have traditionally been drought prone. While certain areas, where there was no dearth of water due to heavy rains are now facing drought. A community based approach for disaster reduction such as CBDM will help address these challenges much more effectively.

The change of status from 'Rural Vulnerable' to 'Climate Change Victims' - has compelled disaster managers to approach disaster risk reduction differently.

Similarly, changes can also be seen with the communities depending on coastal eco systems. The sea erosion and ingress of sea has led to displacement of communities. At the same time, the mangroves which protected the communities from high tidal waves and disasters such as tsunamis have dried up. As a result of such environmental degradation, coastal communities residing on coastal belt of Tamil Nadu were worst impacted during Tsunamis. The communities are being trained now to revive the mangroves, which can protect them to shield against high waves.

Thus approach towards community based disaster

management requires to be integrated with the environmental changes perpetrated by Climate Change.

### **A tool for poverty alleviation**

Disaster reduction is often looked as a stand alone process. However, CBDM can potentially become the means to achieve the final goal of "Poverty Alleviation". The poor communities are worst hit during disasters. Poor in India, is deprived of basic necessities such as water, food, clothing, education and health. Disasters wipe out their hard earned assets in one go, pushing them once again in the vicious cycle of poverty.

CBDM processes build local resilience, strengthening existing coping strategies and enhance security of lives and livelihoods. Building such capacities can help local communities shielded from shocks and stresses that disasters bring with them.

In conclusion, while it is universally acknowledged that natural disasters can significantly offset decades of development gains, CBDM on the other hand can mitigate damaging impacts and contribute to sustainable development. As a signatory to the Hyogo Framework of Action (2005-2015), the presence of the Disaster Management Act, and necessary institutional framework, it is time that Community Based Disaster Management is taken up at a wide scale targeting those at highest risk to disasters. □

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YE-06/9/09

## For the Sake of Mother's Pain



MALLESHAM

***His mother  
does not  
complain of  
pain in her  
arms any more  
and his  
happiness is  
beyond measure***

**M**RS LAXMI Malleshham is perhaps the happiest mother in Sharjipet, the small village of handloom weavers. She has got freedom from the hours of physical pain and stress, thanks to her thirty-six year old son Chintakindi Malleshham's innovation, the automatic Asu machine. Asu is the process of yarn winding, and is the first step in creating the gorgeous, colourful designs of a pochampally sari. It is a very tedious process, involving intricate hand movements. For each sari, the hands move up and down over a space of one metre, roughly 9000 times, winding yarn around multiple pegs. This causes intense pain around the shoulders and elbow joints, and one wrong move can spoil an entire design.

Malleshham's family has been into the traditional weaving of Pochampally silk saris, involving the process of Asu. He himself had learnt to work on the loom at an early age, and had given up studies after passing class ten to work full time in the family trade. He was however, moved by his mother's pain and drudgery, and by the fact that so

much of effort yielded Asu work for just two saris at the end of the day, which was not financially sufficient for the family. So he resolved to devise an instrument which could ease the process of Asu.

### **Perseverance**

The young innovator started working on his dream project in 1992. It was long – drawn process where he would save some money, work on the machine, save more, work again and so on. Part by part, he developed and fitted mechanical devices to a wooden frame. Since he did not have the right technical knowledge he would end up wasting money in buying incorrect parts. That money used to be the savings of days of his hard work. He then used to wait for some time to pool in his savings and buy more parts. He also used his wife's earnings for the purpose. By 1997, he had completed three parts of the machine, when he ran out of resources and started looking for loans. Loan was difficult to come by, and even more difficult to repay, especially since he had stopped weaving and had started making frequent trips to Hyderabad



**Asu Machine**

in search of technical advice, money and machine parts. His family was also fed up by the constant proddings of those who had lent him money. Exasperated, Mallesham left home and went to Hyderabad in mid 1997 and started working as an electrical contractor on daily wages, and also picked up some part time jobs. The machine progressed, till he reached the last stage that required the thread to go round the stem or peg and slide down to the last thread perfectly. This action was taking a long time in getting functional in the machine.

### **The Breakthrough**

In Feb 1999, he went to work in a machine shop in Balanagar area in Secunderabad. A number of machines caught his attention. He started observing each one of them. The owner shouted that he had come for work and not for watching the machines. This incited him to watch the various machines seriously. In one machine he noticed a movement similar to what he required in his machine. Immediately he told the shop owner

that he was off for the day and was prepared to forego the wages of a day. He rushed to a workshop, and got a part manufactured to suit the requirement. With excitement in his heart, he reached his rented room and fitted the component to the machine, and operated it. Hurray it worked!! He disassembled the machine next day and went to a friend's house in Aler. The machine was reassembled and Mallesham demonstrated the processing of Asu for one sari. His friend used that Asu for weaving a sari. The quality that came out was better than the one obtained through hand operated Asu process. The news spread like wild fire and there was a beeline at his friend's house to see the Asu machine.

### **A Social and Financial Revolution**

History was made that day. It was for the first time that a machine was used for Asu process. Weavers from neighboring villages rushed to see the machine and wanted him to supply one such machine immediately. Overwhelmed by the response he

decided to pass on the comfort to all. No mother will undergo the suffering like his mother had. With the help of his brother and few family members he started a workshop in 2000 to produce the Asu machines for supplying to the weavers. His machine has helped a wide cross section of weaver community involved in silk sari tradition of Pochampally variety. Employment, productivity and marketability have visibly increased. Ladies who were hitherto engaged in manual Asu process have now learnt to weave on looms like men. It has enhanced the income of the family. Separate work centers for only Asu have come up especially by those who could not afford a loom. These 'Asu Machine Centers' started supply Asu to weavers with looms. This is a new opportunity, only possible with Mallesham's machine.

### **Recognition**

On 17 October 2008, while felicitating Mallesham in a Workshop conducted by Honey Bee Andhra Pradesh, Hyderabad, the editor of the Honey Bee magazine named this machine "Laxmi Asu Machine" and dedicated it to Smt Laxmi, mother of the Innovator who was the inspiration for such an excellent innovation. The Laxmi Asu Machine is in the process of being patented. When invited to the Inventors of India workshop held on November 28, 2008 at IIM Ahmedabad, Mallesham proudly talked about his machine. In the same workshop his machine was observed by the Weavers' Association of Gujarat, and was found to be useful for Patola weaving also, with slight modifications to suit their type of work. The possibilities of introducing his machine for different weaving styles in other parts of India are also being explored. Till date he has sold 500 machines. □

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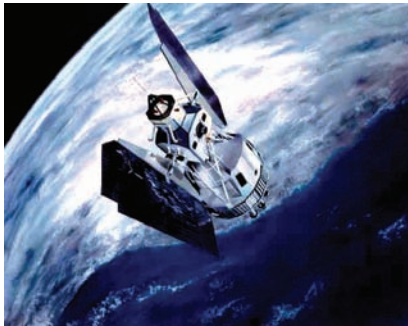
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YE-06/9/12

## Application of Science and Technology

*Sanjay Srivastava*



*The advances  
in science and  
technology lend  
themselves to  
greater  
possibilities  
for more  
efficient disaster  
management  
worldwide*

**T**HE ROLE of science and technology is quite complex as disaster management enable convergence of multiple disciplines ranging from earth sciences to atmospheric, environmental, engineering, agricultural, medical, social, behavioral and management sciences, remote sensing, GIS, modeling, information and communication technologies etc. There are continuing advances in these core disciplines increasingly leading to more effective applications of science and technology in disaster management. Operationally, there are two areas where science and technology have made considerable impacts and formed an integral part of the disaster management practices worldwide. They are:

- Risk Mapping, Risk Assessment and Risk Monitoring under the diverse geographical, socio-economic and cultural settings;

- Disaster Warning and Communication System for all kinds of Hydro-meteorological and Geological disasters.

### **Risk Mapping, Risk Assessment and Risk Monitoring**

Disaster risk is commonly regarded as a product of hazard, vulnerability and exposure. While hazard is often a result of forces of nature, vulnerability is the degree to which a society is threatened by the impact of natural disasters. There are different aspects of vulnerability such as physical, social, economic, cultural and attitudinal. Exposure relates to types of values at risk such as, extent of population at risk, economic infrastructure at risk. An overlay of hazard maps and vulnerable elements (population, infrastructure) forms the basis for risk assessment. This leads to a process of risk evaluation to determine what to do about the risk, including the feasibility of vulnerability reduction interventions.

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Mapping, assessment and monitoring of multi-hazard risks are the basis for policy, mitigation planning and implementation. If there are weaknesses in disaster management policies, the entire apparatus (laws, regulations, institutional arrangements etc) for dealing with risk will be prone to failure. Existing national capabilities for mapping and risk assessment often have severe limitations. In most of the countries, risk assessment is limited to hazard mapping, showing areas where different levels of hazard can be expected. Another dimension of the problem is that available risk information is usually at too coarse in spatial and temporal resolution to provide useful information on increasingly complex and dynamic risk patterns. Risk assessment needs to be able to deal with the increasing complexity of risk in order to be relevant to risk reduction objectives. This, in turn, implies improving risk analysis capabilities of national disaster management agencies in most of the countries in the region.

While there have been major advances in the development of risk assessment applications based on Remote Sensing & GIS in recent years, there are still unresolved methodological problems in designing and implementing applications at larger scale, especially in developing countries. The larger the scale, the greater the complexity of the models required representing risk accurately. The development of risk assessment is further hampered by a lack of adequate data in developing countries. Both cartographic and attribute data may have incomplete geographical coverage or be

presented in unsuitable scales, be dated or of dubious quality, or difficult to obtain. The development of advanced models using remote sensing and GIS tools under the different terrain, climatic and socio-economic vulnerability contexts continues to be challenging, with the result that there are not much standardized and uniform operational procedures available for building social vulnerability aspects into risk information systems. This is the main reason why risk analysis tools have primarily been empirical, region/country specific and their scalability is limited.

Disaster risk emanates primarily from many kinds of hydro-meteorological (floods, cyclones/hurricanes, drought etc) and geological hazards (earthquakes, landslides, tsunami, volcanic activities etc). High concentrations of population and economic infrastructure in areas vulnerable to hydro-meteorological and geological hazards accounts for high levels of disaster risk and the extent and nature of this risk is highly variable across the country. Capturing such variability in terms of a systematic risk mapping, assessment and monitoring system has been the constraining factor with some of the major issues, listed below, yet to get resolved:

- Methodological aspects for risk assessment, mapping and monitoring for all kinds of hydro-meteorological and geological disasters – including micro-zonation and risk modeling strategies;
- Building the operational capability on the existing infrastructure including databases and modeling

framework to realize a system for periodic risk analysis especially in high risk and low capacity developing countries?

- Strategies on making the transitions from risk analysis to disaster risk reduction framework;
- Integrating local knowledge into scientific paradigms for risk assessment;
- Sharing of experiences, know how and operational strategies from the lessons and best practices.

### **Disaster Warning and Communication Systems**

Disaster warning represents a cornerstone of disaster management. The forecasting challenge presented in providing early warnings spans a continuum from less than one hour for tornadoes and flash floods to seasonal and inter-annual time scales for drought. In the recent years, considerable progress has been made in developing the knowledge and technical tools required to generate and communicate predictions and warnings and especially there have been marked improvements in the quality, timeliness and lead-time of hazard warnings. Improvements in the accuracy and reliability of monitoring instrumentation in integrated observation networks have strengthened the capabilities of risk communication or warning messages. Supported by continuing research on hazard science, modeling and forecasting methods, the monitoring and warning services along with supporting data exchange, translating scientific or technical information to comprehensible messages and the dissemination of understandable warnings to those at risk are improving rapidly.

However, capacities in monitoring and prediction of hazards vary considerably by hazard and by country and even within countries and warnings of disasters can only be provided to the extent that the existing networks of hydro-meteorological and geological monitoring infrastructure permits.

### **Early Warning of Geological hazards**

Considerable efforts have been made through advances in satellite-based observing systems, modeling capabilities and fundamental scientific innovations to understand the physics of hazards and promote integrated observation of the Earth's oceans, landmass, atmosphere, ice shield, glaciers and of the upper mantle of the Earth's interior. While capabilities exist at the global level to identify areas of occurrence of geological hazards, there is much less certainty in predicting when hazardous events are likely to occur.

A tsunami, a series of ocean surface waves that are generated by submarine earthquakes, submarine volcanic eruptions and submarine or coastal landslides, does provide a lead-time for warning. For example, following an offshore earthquake, a rough estimate of the probability of a tsunami could be made within 15 minutes based on the estimation of the earthquake hypocentre using global and regional seismic observations. Once a tsunami is observed, through ocean observing systems, its size, movement and likely arrival time can be calculated accurately enough for warning purposes.

### **Early Warning of Hydrometeorological hazards**

Disasters of hydrometeorological origin cover a wide range of

atmospheric, hydrological and oceanographic phenomena. Advances in dedicated weather and ocean satellites have been helpful in understanding the scientific uncertainty with regards to land, atmosphere and ocean coupling. Based on multi-sensor multi-platform satellite data, which are assimilated into the dynamic climate and weather models providing better warning and forecasting of extreme events, there are several science initiatives focused not only on the improvements in weather predictions but also in the early warning of hydro-meteorological hazards..

While most of the flood warning systems are stand-alone national operations, global scale warning systems have also been developed covering several international rivers, such as for the Rhine, Danube, Elbe and Mosel in Europe, the Mekong, Indus and Ganges-Brahmaputra-Meghna basins in Asia and the Zambezi in Southern Africa. Globally, the Dartmouth Flood Observatory in the United States detects, maps, measures and analyses extreme flood events worldwide. At global scale, flood forecasts from specialised warning systems do provide timely warnings to the extent of 2-3 days and there are several initiatives underway to extend the warning range.

### **Cyclone 'Sidr' in Bangladesh, 2007**

Cyclone 'Sidr' with winds of 240-km/h speed hit populous Bangladesh coast on Nov. 15, 2007. It was tracked more than 48 hrs before. With the state-of-the-art orbiting satellites over the Bay of Bengal, all meteorological and oceanographic agencies at International, Regional and National levels were tracking

and monitoring the cyclone and providing the early warning forecasts regularly. The Bangladesh national capacity, over the years, was enhanced to the extent that the country could predict precisely the landfall and storm surges using local weather and topographic data. The value addition locally could turn the information 'actionable' down the line. Accordingly more than 320,000 people were evacuated to the safer places, which resulted in reduced casualties unlike the similar cyclonic events in the past. It is important to highlight the synergy among the agencies at global/regional (WMO, NOAA, GMA..) and Bangladesh national levels in terms of sharing the information with regards to the complete life-cycle of 'Sidr' and ultimately empowering the local capacity to act/respond on the information. The experience brings in role of Early Warning System to capture an event having trans-boundary origin, process, and share the information to the local agencies to act upon.

Early Warning Systems (EWS), which play a vital role in saving lives and protecting livelihoods, integrates the advances in hazard monitoring and telecommunications capabilities. December 2004 Indian Ocean tsunami reminded the absence of having a tsunami warning system in the region and there are concerted efforts now at various levels to put in place a network of viable tsunami warning systems. The EWS however in itself does not reduce risks, unless the vulnerable communities have access to relevant, timely and 'actionable' warning information at the local level. The following components of disaster warning

process are important for a disaster warning to work on the ground:

- Risk Assessment of the potentially vulnerable people;
- Detection, interpretation and forecasting of hazards/disasters;
- Formulation and dissemination of warning messages to specific targeted and riskiest recipients;
- The perception of and response to warnings by the intended recipients.

Successful disaster warning requires unrestricted access to data that is freely available for exchange. It is important to support the development of

early warning capabilities at the community level, based on local vulnerability and risk assessments.

The advances in science and technology lend themselves to greater possibilities for more efficient disaster management worldwide. The interoperability of various communication systems including Internet, mobile phones, fax, e-mail, radio, TV, siren and Public Address System is creating newer grounds. There are both social and technical aspects to the application of science and technology in disaster management. The effective application depends greatly upon their appropriateness for the

social and economic context in which they are applied. The information technology revolution has to trigger local innovations in harnessing the communications infrastructure to address 'the last mile' problem. The disaster management community will have to capitalize on these innovations in order to build a disaster resilient community from the bottom. In the coming years, the new communications and information technologies can potentially redefine the conventional disaster management systems. There is a movement underway, away from strict "command and control" model to a more devolved system of disaster management. □

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YE-06/9/07

## Tulip garden in Srinagar attracts tourists

**A**n explosion of colour in Asia's largest recreational tulip garden has emerged after 60 varieties were imported from Netherlands and planted in the Siraj Bagh Tulip Garden. The garden is attracting around 1400 tourists on regular basis.

About 80,000 tourists visited this garden during the year 2008-09. Of these, about 95 percent are tourists from country and abroad. Set in the foothills of the Zabarwan Mountains on the banks of the Dal Lake, this garden is fast becoming another tourist attraction.



The colours of garden have got a major boost with 7-day Tulip festival which took off amid great fanfare recently. Speaking after inaugurating the festival, Secretary Tourism Tanveer Jahan said that "Tulip festival has pre-poned the tourism season in the valley and exuded hopes that a large number of tourists will be fascinated by this Tulip garden. Infrastructure is also being developed at the tourist destination to attract tourists and this would help boost the economy of the people associated directly or indirectly with this industry.

*(Courtesy : The Kashmir Times)*

## Conservation plan for endangered Markhor

**M**arkhor, an endangered species which is facing the danger of extinction in the near future is now going to be preserved by Jammu and Kashmir Wildlife Protection Department under Markhor Recovery Plan.

The project is being launched at a cost of Rs. 10.72 crore which the wildlife department has received from the Public Works department.

The Department has claimed that launching of the Project will go a long way in conserving this rare species and preserving its habitat spread over the Pir Panjal Range of the Valley. Ministry of Environment and Forests while supporting the state's demand for utilisation of funds deposited under Compensatory Afforestation Fund Management and Planning Authority (CAMPA) has given approval to the Markhor Recovery Plan.

Funds available with the Wildlife Department will be utilized for activities like fencing, habitat improvement, afforestation, soil and water conservation, development of infrastructure like guard huts, staff quarters, check posts, measures for mobility and communications, fire protection, anti-grazing/anti-poaching activities, construction of nature trails and inspection paths, publicity and awareness, eco-development activities and eco-tourism etc., besides regular census and survey of Markhor and other important wildlife species found in the Markhor habitats.



*(Courtesy : The Kashmir Times)*

# Climate Change and Disaster Management

*Dileep Kumar*



***The awareness of all stakeholders to climate issues is the key to enhancing preparedness and disaster proofing against the menace of global warming and climate change***

**I**N THE recent years, we witnessed unprecedented floods in Mumbai and Rajasthan. New diseases like chickengunya, dengue, bird flu and now swine-flu etc are affecting both humans and livestock with alarming frequency. The question that arises in anybody's mind is why is it all happening?

One major reason attributed to this is the phenomenon of climate change which is occurring globally and, the world over, scientific community is concerned about it. The climate of a place is the average weather that it experiences over a period of time. The factors that determine the climate at a location are the rainfall, sunshine, wind, humidity, and temperature. Climate change refers to any long-term significant change in the expected patterns of average weather of a specific region or area or zone over an appropriately significant period of time. Such a change may be brought about by natural processes such as changes in the earth's orbit around the sun, the earth's tilt, change in

ocean circulation, El Nino, La Nina etc., or due to human activities like burning fossil fuels, emission of greenhouse gases, deforestation, unscientific waste disposal etc.

The earth has always witnessed changes in its climate, with well-marked cold and hot periods, to which most life forms adapted naturally. Over the last 150-200 years this change in climate has speeded up due to human interference, leading to a disruption of natural balance. This rapid change in global climate is evident in rising global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea levels.

The reason for this widespread change is human activities which tend to upset the environmental and ecological balance. For example, our thermal power plants and ever increasing fleet of petrol and diesel powered vehicles emit huge amounts of greenhouse gases and other pollutants. The non-biodegradable plastic waste that we generate, causes further damage to

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The author is Assistant Professor (Disaster Management), Shri Krishna Institute of Public Administration, Government of Jharkhand.

the environment. We complicate matters even more by cutting down trees to meet our demand for paper, construction and other timber based products. Further, our growing numbers means we need more food, hence the need to use fertilizers that not only emit nitrous oxide, but also pollute soil and groundwater. The

Fig -1

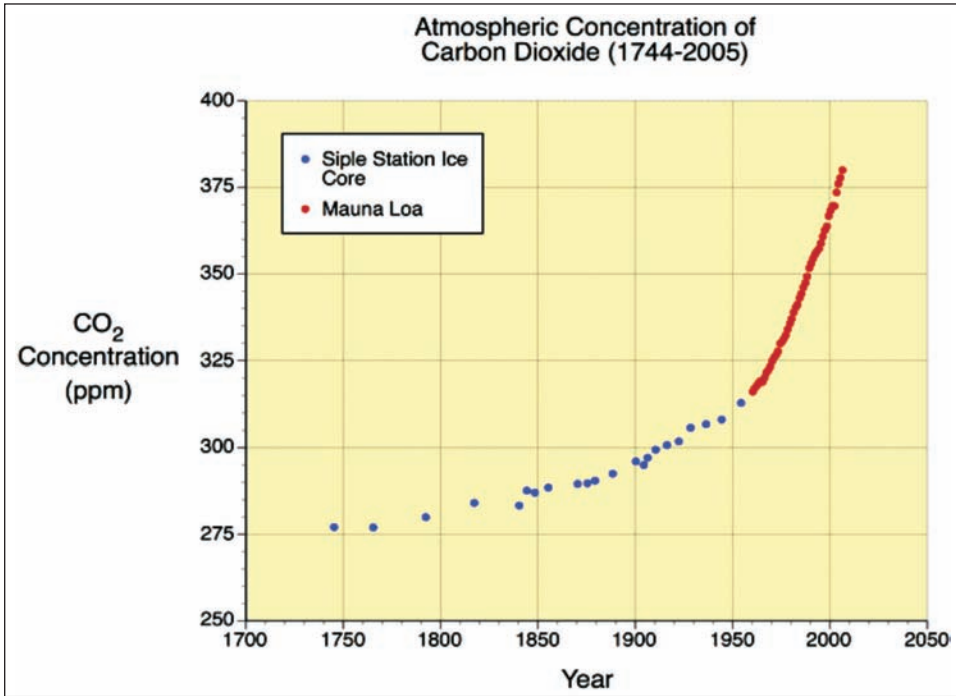
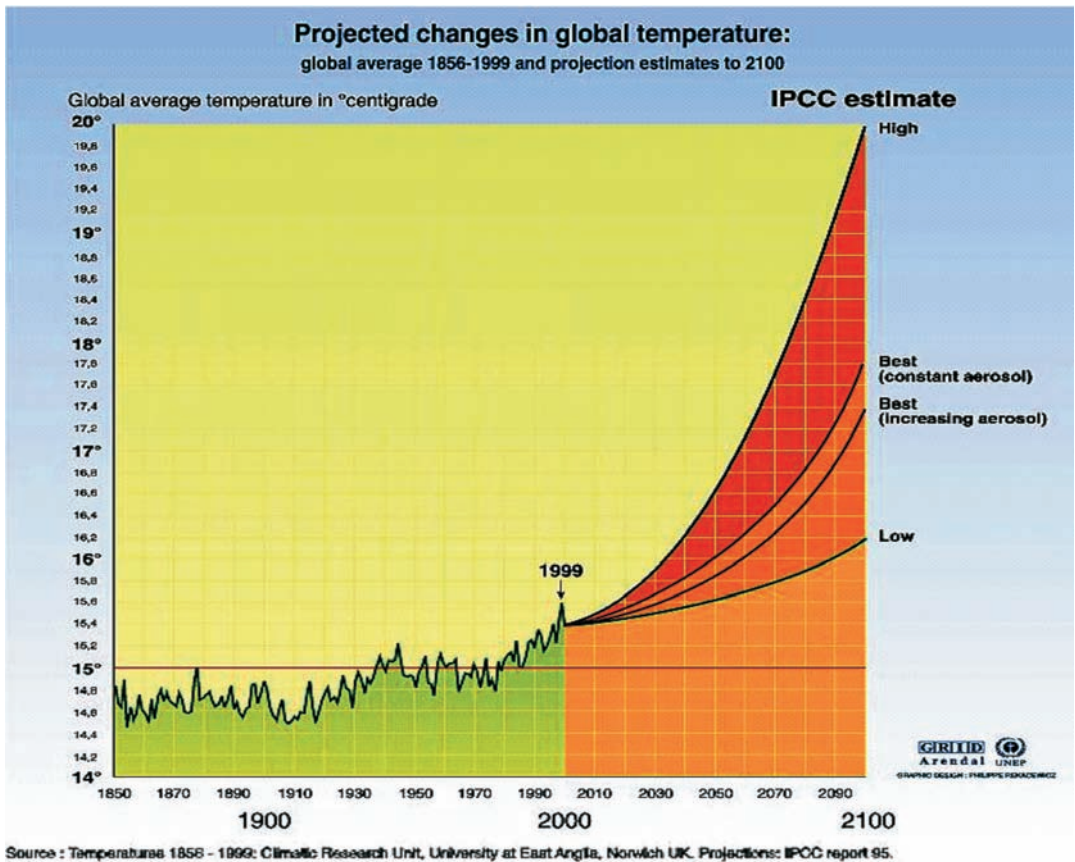


Fig-2



use of refrigerator, air-conditioner, electric appliances etc are all adding to global warming and the depletion of the ozone layer.

### **Greenhouse effect and Global warming**

Greenhouse effect refers to the trapping of heat by a blanket of gases around the earth. This effect keeps the earth warm. Activities that generate greenhouse gases are called 'sources' and those that remove them are known as 'sinks'. A balance between 'sources' and 'sinks' maintains the levels of these greenhouse gases. When the concentration of greenhouse gases rises too much, it leads to global rise in temperatures, as we are witnessing today.

Global warming is an average increase in the temperature of the atmosphere near the earth's surface and in the troposphere and it can occur from a variety of causes, both natural and human induced. In common language, "global warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities. It has been observed that there is a rise in CO<sub>2</sub> concentration in earth's atmosphere from 280ppm in the year 1850 to 379 ppm in the year 2005, as evident from figure 1. The rise in CO<sub>2</sub> is having analogous increase in temperature profile. (figure-2).

According to the IPCC (Intergovernmental Panel on Climate Change), an increase in carbon dioxide and other Green House Gases (GHGs), like methane, ozone, nitrous oxide, and chlorofluorocarbons, in the atmosphere is expected to increase the average global temperature between 1.5 °C to 4.5 °C by 2050. This in turn will lead to changes in

rainfall and snowfall, more intense or frequent droughts, floods, and storms, as well as a rise in sea level. These climatic changes will have wide-ranging harmful effects including increase in heat-related mortality, dehydration, spread of infectious diseases, malnutrition, and damage to public health

### **Disastrous impacts of climate change**

Climate change is a threat to both mankind and any life form existing on planet earth. Since the end of the 19th century, the earth's average surface temperature has increased by 0.3-0.6 °C. Over the last 40 years, the rise has been 0.2-0.3 °C. Recent years have been the warmest since 1860, the year when regular instrumental records became available.

#### **Direct impacts**

It is anticipated that there will be an increase in the number of deaths due to greater frequency and severity of heat waves and other extreme weather events. An extreme rise in the temperature will affect people living in the urban areas more than those in the rural areas. This is due to the 'heat islands' that develop here owing to the presence of concrete constructions, paved and tarred roads. In the sea it would create dead zones with no fish.

#### **Indirect impacts**

Indirectly, changes in weather pattern, can lead to ecological imbalance, changes in food production levels, increase in the distribution vector-borne diseases. Higher temperature will cause the sea levels to rise that could lead to erosion and damage to important ecosystems such as wetlands and coral reefs. Temperature rise would indirectly result in geo-hydrological

changes along the coastline such as saltwater intrusion into the groundwater and the wetlands, coral reef destruction, and damage to the drainage in the low-lying areas. Climate change would also increase air pollution levels.

### **Agriculture**

Climate change will affect agricultural yield directly because of alterations in temperature and rainfall, and indirectly through changes in soil quality, pests, and diseases. In particular, the yield of cereals is expected to decline in India, Africa, and the Middle East. Extreme weather conditions such as high temperature, heavy rainfall, floods, droughts, etc. will also affect crop production.

### **Weather**

A warmer climate will change rainfall and snowfall patterns, would lead to increased droughts and floods, melting of glaciers and polar ice sheets, and result in accelerated sea-level rise. An increase in the number of cyclones and hurricanes over the last few years has been attributed to changes in global temperature profile.

### **Sea level rise**

Coastal areas and small islands are the most threatened areas because of rises in sea level due to global warming. The heating of oceans, and melting of glaciers and polar ice sheets, is predicted to raise the average sea level by about half a metre over the next century. Sea-level rise could have a number of physical impacts on coastal areas, including loss of land due to inundation and erosion, increased flooding, and salt-water intrusion. These will adversely affect coastal agriculture, tourism, freshwater resources, fisheries and aquaculture, human

settlements, and health. Rising sea levels threaten the survival of many low-lying island nations, such as the Maldives, Marshall Islands and low-lying coastal areas.

### **Health**

Global warming will directly affect human health by increasing cases of heat stress. It would cause new diseases both in humans and cattle and outbreaks of epidemics will increase.

### **Forests and Wildlife**

Ecosystems sustain the earth's entire storehouse of species and genetic diversity. The ecosystems that are most likely to be affected by this change are the ones in the higher latitudes, the tundra forests. Polar regions will feel the impact of warming more than other regions and interiors of continents will experience more warming than the coastal regions. Climate change may establish entirely new set of forest species wiping out the existing ones. The recent report of WWF (The World Wide Fund for Nature) states that this invisible killer has entered the most cherished natural habitats of the world. The giant pandas of Wolong in China, the grizzly bears of America's Yellowstone National Park, and the Tigers in Kanha National Park in India are some of the animals at risk from global warming. If the rate of climate change continues at the same pace or accelerate, the extinction of some mountain plants and animals is a certainty.

### **Marine life**

Due to climate change and increasing temperature the tropical forests of the oceans- the corals and coral reefs would sustain more damage. In Australia, large stretches of the Great Barrier Reef have been damaged by bleaching.

Zooplanktons, small organisms that float on the sea surface are declining in numbers, thereby reducing the number of fish and sea birds that feed on these organisms disturbing the food web of aquatic ecosystem.

### **Global warming affecting India**

A recent report by scientists has revealed that India has almost consistently experienced more than normal annual mean temperatures for the past 14 years. The data contained in the "Annual Climate Summary 2006", a report produced by the National Climate Centre Office of the Additional Director General of Meteorology (Research) Meteorological Department, Pune revealed warming at the rate of 0.48 degrees Celsius over 100 years. The year 2006 was the warmest year on record since 1901, according to the report and it was determined by annual mean temperature over the country as a whole being 0.59 degrees Celsius above the average calculated during 1961-1990.

The 10 warmest years ever since the Meteorology Department started keeping a record of temperatures since 1901 are 2006 (0.595), 2002 (0.59), 1998 (0.50), 2004&2001 (0.47), 2003 (0.45), 1958 (0.43), 1941 (0.41), 2005(0.40), 1999 (0.39), 1953 & 2000 (0.36) and 1980 (0.34).

The Himalyan glacier is melting at the rate of 10-15mts/year and Ganges would lose 2/3rd of July-September flow affecting 1/3 rd of India's irrigated land and causing water shortage for 500million people in South Asia. Possibilities of frequent droughts in Rajasthan, Karnatka, Tamilnadu, Orissa, Chattishgarh. Floods in Assam, West Bengal,

Bihar, Orissa, UP. Cyclone and storms in AP, Tamilnadu & Orissa, submergence of low lying coastal regions. Traditionally dry areas like Saurashtra and Kutch and West Rajasthan, besides Gujarat, Madhya Maharashtra and Orissa, are receiving excess rainfall, whereas Himachal Pradesh, East and West U.P, Bihar, Jharkhand and Assam and Meghalaya are becoming rain deficient. Northern hilly regions, Uttrakhand, Himachal and parts of Jammu and Kashmir are becoming warmer and receiving less snowfall.

### **Disaster Preparedness Measures**

Lesser use of fossil fuels and increased use of renewable sources of energy will undoubtedly decrease the emission of GHGs substantially and switching to cleaner fuels and energy-efficient technologies will reduce pollutants level in the environment.

### **Carbon Sequestration**

The uptake and storage of carbon is called carbon sequestration. Carbon sequestration is the process through which agricultural and forestry practices remove carbon dioxide (CO<sub>2</sub>) from the atmosphere. The term "sinks" is also used to describe agricultural and forestry lands that absorb dangerous CO<sub>2</sub>. Measures that sequester carbon and/ reduce emissions of GHGs are Afforestation, Grazing land management, conservation tillage on croplands, conservation or riparian buffers- Grasses or trees planted along streams and croplands etc.

### **Kyoto Protocol**

India accepted Kyoto Protocol in August 2002 with the objective to fulfill requirements of Clean Development Mechanisms (CDMs) It commits the developed

countries, including economies in transition to reduce emissions of GHGs by an average of 5.2% below 1990 levels during 2008-2012. Under this initiative a National Clean Development Mechanism has been created in 2003 by the Cabinet. Till March 2006, CDM Authority has cleared 252 projects mainly in the field of Renewable energy, solid-waste, Hydro-fluorocarbons, Energy efficiency etc.

### **Ozone Cell under Montreal Protocol**

The Ministry of Environment and Forest (MoEF) is the nodal agency entrusted with the task of UN Framework Convention on Climate Change (UNFCCC) and environment related multilateral conventions and protocols. It

has established an ozone cell to render necessary service to implement Montreal Protocol and its Ozone Depleting Substances (ODSs) phase out programme in India. India is also a signatory to UN Framework on Climate Change (UNFCCC) whose primary objective is to reduce the emission of Green House Gases (GHGs)

Scientists feel that the world must restrict its carbon emission to 190 Giga Tons by 2050 if it is to have the chance of escaping the consequences of global warming. It is possible to reduce emission adopting disaster risk reduction approach. On the basis of deliberations at the World Conference on Disaster Reduction in Kobe,

Japan, 168 countries adopted the Hyogo Framework for Action (HFA) which seeks to achieve a substantial reduction of disaster losses in lives and in the social, economic and environmental assets under their five priorities of action between year 2005-15. What is required now is a holistic approach to mitigate climate change effects by all agencies and stakeholders through initiatives of awareness, training, capacity building and adopting more scientific approach towards development. The awareness of all stakeholders to climate issues is the key to enhancing preparedness and disaster proofing against the menace of global warming and climate change. □

(Email : dileepk24@gmail.com)

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# DO YOU KNOW?

## RESPONDING TO DISASTERS – SOME DOs AND DON'Ts

**W**hen disaster strikes, it pays to maintain your calm, gather your wits and respond positively and proactively. Here are some tips on what to do and what not to do in face of certain kinds of emergencies:

### General Dos and Don'ts

- Do not panic, remain calm, follow instructions coming from official/ authorized sources, do not listen to rumour. Always keep an emergency plan ready for the family and ensure that each family member is aware of it. Plan two exit routes from the house, fix up where the family members should meet if they get separated, decide on a common contact person/ family, ensure that each family member is aware of emergency contact numbers like the police, hospital/ ambulance, fire service, anti-terror squad, and knows how to call for help.
- Always keep an emergency kit ready. This would include first aid kit, dry food that does not perish easily, water, water purifying tablets, sheets, necessities for children and old people, a handy tool kit with knife, screwdriver, batteries, torch, rope, adhesive tape and a battery run radio.
- Keep all important documents like identification papers, financial documents, birth certificates, passports etc handy, in one place. It is also advisable to keep attested photocopies of important documents in an

alternate location with trusted friends/ relatives.

- It is useful to get adult family members trained in basic first aid techniques and cardio-pulmonary resuscitation.
- Be alert and help other victims around you in every possible way. Do not do anything that would hinder rescue and relief operations.

### Earthquake

- Get your building checked by structural engineers and if possible, strengthen weak zones.
- Do not leave heavy objects like geysers, heavy photo frames, mirrors etc in high places from where they can fall and hurt people
- During an earthquake, the best response is to **DUCK, COVER and HOLD ON**. Drop to the ground, take cover under a study table, bed etc, crouch on the floor, with your head on your knees, cover the sides of your head with your elbows and clasp your hands behind your neck. You can cover your head with a pillow etc if available. If there are no tables/ beds to duck under, you can stand in doorways and wait for the shaking to stop. Stay away from windows, heavy overhanging objects or anything that could fall. Come out of the building only when the tremor has stopped.
- If outside, stay away from electric wires, exterior walls of buildings, streetlights trees etc. Do not stay directly outside a building as it may collapse. If in a moving vehicle, stop at a safe

distance from buildings, wires trees etc.

- Avoid entering damaged buildings. Be ready for aftershocks.

### Floods

- Identify elevated areas where you can take refuge during floods.
- Do not walk in flood water unless absolutely necessary. Check the depth of water and firmness of ground with a stick. Avoid areas with downed power lines .
- Turn off your gas and electrical supplies. Disconnect electrical equipments.
- Flood usually brings in its wake water borne diseases. Take necessary steps to protect against the same.

### Fire

- Make your house/ neighbourhood as fire proof as possible. Ensure that the fire extinguisher is in proper working condition. Let there be no leaking gas lines or frayed electrical wires. Do not overdraw electricity above the permitted load. Store inflammable material at a safe distance from heat generating appliances. Install smoke detectors if possible. Keep combustible material out of reach of children.
- Plan out a fire escape route from home / building.
- Conduct fire drills in your locality.
- During a fire, cover your nose and mouth with a wet towel or

thick cotton material so that the air gets filtered. Crawl while trying to escape, as smoke and poisonous gases gather at the top.

- If your clothes catch fire – do not run. Roll on the ground to extinguish the fire.
- Do not re-enter the building unless authorities declare it safe.
- Try to cool burns and get emergency medical aid.

#### **Terrorism**

- Be alert to any suspicious activity or object and report it to the Anti terror Squad.
- When renting an apartment, be sure to get a reference and do a background check.
- Get to know your neighbours.
- In case of an explosion take shelter to protect yourself from falling debris.
- Move away from the affected area immediately. Do not crowd around on streets, making movement difficult for emergency personnel.

#### **Cyclones**

- Before onset of the cyclone season, repair all doors,

windows, roof of your house, remove dead trees, demolish old, unsafe structures.

- Keep emergency kit with water, food, torch, radio, batteries, emergency medicines and tool kits handy.
- When cyclone hits, remain indoors – either in your homes or in special shelters.
- Close all doors and windows. Do not keep sharp objects like tins and implements lying around. Do not venture out unless authorities give a clearance.

#### **Chemical Disasters**

- Keep yourself informed about the warning system in your area – sirens etc. Listen to radio/TV for information and instructions.
- If instructed, evacuate your home immediately. If caught outside move as far away from the incident area as possible . Try to move to a high place.
- If inside, close all doors windows, try to seal all openings and cracks with tape and plastic sheets. Take refuge in a room with minimum number of openings. Close all air conditioning and other vents. Keep your bodies fully covered.

- After the disaster, follow decontamination instructions in case of exposure. All items exposed to the chemical would have to be decontaminated before use.

#### **Nuclear Disaster**

- It is absolutely necessary to take shelter during a nuclear attack. Shelter can be taken in any protected space provided it is thick and dense enough to absorb the radiation. The three factors that are important for a shelter are shielding, distance and time. Thicker the walls of the shelter, and further it is from the site of the incidence, the better protection it would provide. Thus the basement of a building is better than an upper floor. Top floor is best avoided. However, any shelter is better than no shelter.
- Radiation can travel wide distances so take shelter even if you are far from ground zero.
- Do not leave your shelter unless authorities say it is safe. □

# YOJANA

July '09

## Next Issue on Infrastructure

If the country is to grow economically, and if the fruits of this growth are to reach every corner, we simply cannot do without proper infrastructure. Roads, railways, waterways, drinking water, sanitation and waste management – there are many facets to our infrastructure requirements. Where do we stand in terms of what we have and what is being planned ? What are the constraints we are faced with ? Experts from the sector offer an insight in the July issue of Yojana.

## Liquidating Unspent Balances

*Dhruva Kumar Singh*



***However,  
keeping in  
mind the fiscal  
crisis due to  
accumulating  
unspent balances,  
the system would  
be worth a try***

**T**HE PAST five years have seen a dramatic increase in the plan outlay for centrally sponsored schemes across ministries. This has called for increased attention on the issue of proper utilization of funds. An amount spent well is fine, but if the fund meant for expenditure lies idle with institutions as unspent balance, the fiscal situation in the country is adversely impacted.

An examination of the current system of programme implementation shows that there are certain inbuilt constraints in the system. The performance of an officer is often viewed from the angle of his/her ability to exhaust the budget by the close of the financial year, rather than from the angle of a genuine cost-benefit analysis. As a result there is unilateral focus on the issue of availability of funds, rather than its efficient and effective utilization. Consequently, the prevailing ground realities rarely ever come to the fore and are usually not the dominating factors in decision making.

Secondly, there are certain accounting anomalies which further hinder the system from ensuring greater accountability. The release of grants in aids is a conditional release for proposed activities, the mandatory condition being that it is to be settled against final submission of utilization certificate and audited statement of account. Thus, release of grants in aids is nothing but a kind of advance payment. This is the amount meant for expenditure and not the final expenditure. But in the book of account this is booked as expenditure. This anomaly has been also observed by the C&AG of India.

Thirdly, there are certain anomalies also between rules of financial administration and those of programme administration. As per the General Financial Rules (GFR), the utilization certificate (UCs) has to be rendered as a proof of the utilization of funds. The utilization of funds ostensibly means complete utilization and not partial and fractional utilization. However, in the various programme guidelines, there are provisions for

submission of UCs which report 60-70% of utilization, for further release of funds. This way the emphasis of GFR on utilization of funds stands diluted and is one of the main reasons for the increasing problem of unspent balances.

A close examination of the system in this regard presents a complicated picture. Grants in aid are released to various recipient agencies in installments. The release of first installment is unconditional while the second installment is released on furnishing UC which generally reports 60-70% of the utilization of funds. Next year, release of the first installment will be automatic and UC will be required only for the second installment. As a result the unspent balances lying with the recipient agencies will go on increasing. This is illustrated in Table-1 wherein both first and second installment consist of Rs.100cr. each. In one case, requirement of UC is 60% of the utilization of the funds and in the second case, the requirement is 70% of utilization of funds. It is thus evident that unspent balance is an ever increasing spiral.

According to the above trend, an equation can be derived for calculating unspent balances (UB) for any scheme after the end of N no. of years

$$UB = F + 2 \times C \times F + 2 \times C^2 \times F + 2 \times C^3 \times F + \dots + 2 \times C^N \times F + C^N \times F$$

(Here, F=1st installment amount;  
C= F-% of UC; N= No. of Years)  
100

#### Unspent balance in Rs cr.

Table -1		
Year end	Unspent Balances(UC 60%)	Unspent Balances(UC 70%)
First	140	130
Second	196	169
Third	218.4	180.7
Fourth	227.3	184.21
Fifth	230.9	185.26

#### The way forward

Possibly, a change in the existing system of fund disbursement on the lines suggested below could hold the key. Generally, grants-in-aids are remitted by the Government of India to various recipient agencies by electronic means (e-Payment). The present system of e-Payment involves several agencies in the process such as

- The Account Wing of the Union Ministry which performs the treasury function of the Government of India.
- The Accredited banker of the Union Ministry which acts as agents of fund transfer.
- Reserve Bank of India which maintains the account of the Union Government.
- District level bank wherein master account of district level implementing agency is maintained.

In the process, five kinds of MIS are generated, which are taken into account for compilation of the Union Govt's monthly and annual account. However, no MIS from the recipient agencies are taken into account for this compilation. Thus the problem lies in the fact that there is no linkage of expenditure with the utilization of fund.

To solve this problem, instead of transfer of instruction of payment there should be transfer of information regarding authorization

to spend. In other words, a letter of credit should be issued against each recipient agency declaring a limit up to which the recipient agency could incur expenditure. The following suggestions for a proposed scheme of disbursement of fund and collection of MIS may call for involvement of one more agency, National Securities Depositories Limited (NSDL) apart from agencies already involved in the existing scheme of fund disbursement. This can be elucidated in the following explanation bearing title Part I, Part II & Part III

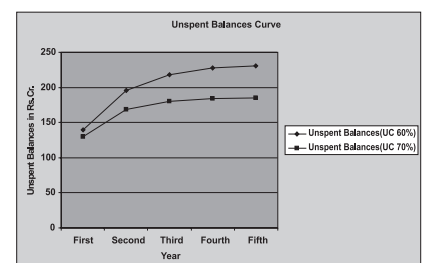
#### Part I

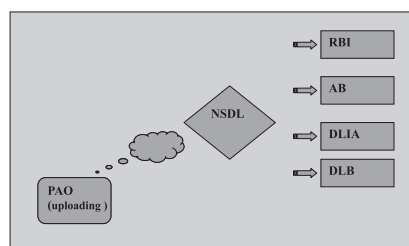
In the first part the accounts wing of the Union Ministries uploads on a web based portal of NSDL letter of authorization to spend up to a ceiling amount or letter of credit (LOC). The NSDL simultaneously mails this information to RBI, Accredited Banker, District Level Bank (DLB) and District Level Implementing Agencies (DLIA). For DLIA and DLB, the letter of authorization or letter of credit also acts as a budgeted amount, and it would be their responsibility to remain within that budgeted amount and to prevent any overdraft. Diagrammatically, the scheme can be shown in Fig 1

NSDL=National Securities Depositories Limited, DLIA= District Level Implementing Agency, DLB= District Level Bank.

#### Part II

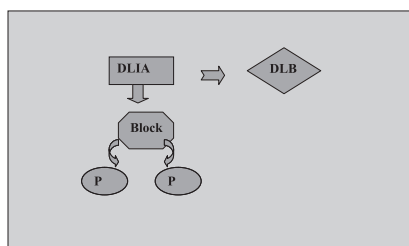
The next part is system of payment at the district and sub-



**Fig-1**

NSDL=National Securities Depositories Limited, DLIA= District Level Implementing Agency, DLB= District Level Bank.

### Section –A (fund flow- district and sub district level system )

**Fig-2**

P=Panchayat.

district level ,and reimbursement against the payment made from the Reserve Bank of India through Accredited Banker of the Union Ministries. Section A of the process, as shown in Fig-2, starts at district level on the principle of bottom up approach and time bound clearance. In a scheme like NREGA where there is urgency in payments , the panchayat stakes weekly claim with the block which forwards payment request online to the district administration. For other centrally sponsored schemes , duration of time bound clearance depends upon the urgency of payment. The district administration makes online approval which is downloaded by DLB as an instrument of payment. The DLB makes payment against that instrument of payment and stakes claim with the accredited banker of the Union Ministry.

Section B shown in Fig-3 represents working of the system of payment between district level bank , accredited

banker of the Union Ministries and the Reserve Bank of India. The accredited banker of the Union Ministry controls payment for each district against the ceiling of expenditure as per letter of authorization. In turn, the accredited banker of the Union Ministry raises claim for the same from RBI for reimbursement of the disbursed amount.

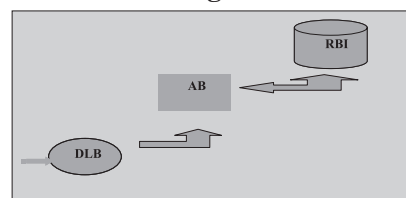
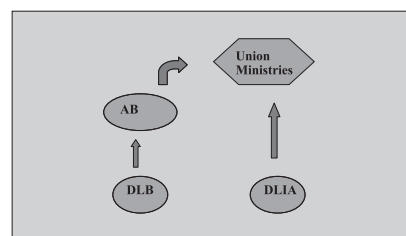
### Part III

This part deals with flow of real time expenditure based MIS which is the most important aspect of the whole scheme. The DLB and DLIA provide the Union Ministry an account of the statement of expenditure from time to time. The DLB forwards the real time expenditure to the accredited banker on monthly basis. The accredited banker suo motu also prepares a district wise statement of expenditure. Both the above information are to be reconciled against each other. The accredited bank forwards both of the above information for the purpose of compilation and reconciliation to the accounts wing of Union Ministries. The DLIA forwards a certified account of statement of expenditure to the Union Ministry before claiming any installment. Thus, the above system enables periodical compilation of expenditure based account for any scheme. This can be helpful in providing real time actual expenditure figure not only of any recipient agency but of the country as a whole. The schematic representation of preparation of expenditure based MIS is shown in Fig-4

a) On an analysis, the proposed scheme appears to be quite viable and desirable . It not only provides real time information on expenditure figures but also helps in the liquidation of unspent balances . It will control the urge to overspend since demand for additional fund has to be substantiated with requirement of funds on the basis of actual utilization Further, since in the initial stage there is likelihood of only a small portion of available fund getting utilized, hence to push

expenditure northwards attention will naturally shift towards task improving the efficiency of grass root institution. This will further eliminate the need for dovetailing schemes as was done in the paste. In addition to this, it will put an end to the instances of manufactured UCs. However, the importance of UC may continue in a new form

### Section B (fund flow above district level system)

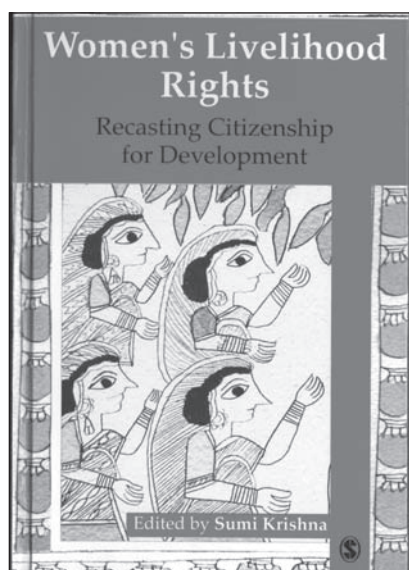
**Fig-3****Fig-4**

wherein UC is called upon to report outcome(in verifiable terms) and output(in measurable term) viz a viz actual utilization of fund.

There would, no doubt, be problems associated with the implementation of such a system. It would require necessary approval of Controller General of Accounts and C&AG of India. The payment system may get delayed at the grass root level. The work at the level DLIA and DLB, as also the accounts wings in the Union Ministries may increase dramatically. Further, it would require extensive training of bankers, district & sub district level officers and panchayat functionaries. However, keeping in mind the fiscal crisis due to accumulating unspent balances, the system would be worth a try. □

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## Gender Justice and Development



**T**HE VOLUME *Women's Livelihood Rights: Recasting Citizenship for Development* is an important area very few could dare to enter with a proper perspective. This edited interdisciplinary volume looks at women's natural resource-based livelihoods in the wider context of development viewed through the lens of citizenship rights. Unraveling the patriarchal social fabric and policy structures in India, it argues that the concept citizenship needs to be understood and extended to include recognition of ways of life and livelihood, so that women, the other half of human society, could take their legitimate space and position as productive human beings, entitled to dignity as a political right, and not merely to protection and welfare as we have been made to believe in.

The volume reflects one thing clearly, that is, an ongoing effort was made towards a continuous dialogue across different disciplines and varied development interventions. A common thread that runs through the contributions is their belief that a clear and enhanced understanding through research can only help improve action on the ground

and this understanding with poor people, including women, and through learning from their struggles must act as precursor. Most of the contributors though belong to different disciplinary and institutional affiliations who have been interacting fairly regularly since late 1999 through a common platform called Jivika, an e-discussion group is quite commendable. It is said, the aim of this group is to continue to share their interests, information, knowledge, experience and concerns regarding gender equity in natural resource-based livelihoods and anti-poverty initiatives in South Asia and beyond. It is a virtual 'community of practice.' However, this group is growing with membership ranging from fieldworkers, activists, action-researchers, teachers, scholars, resource managers and development practitioners to bring to fore the vital and neglected field of women's livelihood rights.

The editor weaves together a historical perspective on varied dimensions of livelihood, development and citizenship. Drawing upon rich field-based researches in 13 different states across India the contributors could deal with several complex and

**TITLE :** WOMEN'S  
LIVELIHOOD RIGHTS:  
RECASTING CITIZENSHIP  
FOR DEVELOPMENT

**Author :** Sumi Krishna  
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inter-related themes. Reflecting upon and critically analyzing context-specific issues in several less-studied far-flung locations, the book shows that there is much to be learnt from emphatic interaction with the collective struggles of poor women in different parts of our great nation, as well as from collective action strategies and dialogue on the ground. In other words, it suggests that feminist politics has to network strategically with other struggles to counter the resistance of traditional and contemporary patriarchal structures, and to work towards recasting citizenship for a gender-just development that ensures women's livelihood rights and thereby position them properly in the society.

This volume consisted of six chapters having 17 articles written by 23 contributors do provide us fresh perspective and insights into several themes as mentioned. Further, the contributors have brought together in this volume a critical, gendered perspective to bear on a set of overlapping issues and concerns related to women's livelihood rights to recast citizenship for development. Most of the chapters deal with detailed empirical case studies and as said, a few have had a broader canvas across different states of India. The threads that run through the chapters do reflect the interrelatedness of the complex themes related to an important dimension of much-neglected vital issues of human society, that is, women's livelihood rights. The chapters are: recognition and resource rights; work and employment strategies; the challenges of democratic governance; restructuring institutional systems; women's collective agency, development and citizenship; and dignity in struggle: lessons from the past. Of course, the collection of articles penned down by a deeply inspired and engaged group were peer-reviewed before these are incorporated into this single volume. Normally, we rarely come across this type of volume with insight and understanding of the different dimensions of women's livelihood, citizenship and development in one volume. It is in this context this volume serves us commendably well in bringing the centrality of women's livelihood rights in perspective enriching the gender studies in the process. This significant volume would be invaluable to concerned individual practitioners and students, policy makers, research institutions, NGOs, and donor agencies working in the fields of gender justice and development, natural resources management and livelihood policy, planning and innovative interventions. □

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