

Disaster Warning and Communication System-Hydrometeorological Disasters under climate change Scenario over Asia

D.R. Sikka
40, Mausam Vihar,
New Delhi-110051

Introduction

- The entire Asian Region characterised by Monsoons and stretching from Japan in the east to Iran in the West and Indonesia Region in near – equatorial to Tibetan & Mongolian Region in the north is impacted by a variety of Hydrometeorological Disasters like
 - Monsoon heavy rainfall – Urban and riverine floods
 - Droughts
 - Land slides
 - Avalanches
 - Tropical storm land fall and storm surges
- Asian economics and societies are strongly affected by the above hydromet disaster and suffer great losses. Whereas recovery from the losses in urban and metropolitan area in fast, rural areas take much longer time.

Application for Advances in Atmosphere – Ocean Science

Application of advances in atmospheric science, the prediction, warning and communication systems against such disasters are crucial to save life and property against the wrath of these Hydromet natural disasters. Nations in the Asian region have increasingly adopted these techniques and also enhanced regional cooperation under International and bilateral arrangement to help in disaster-proofing of the region.

Researches and Technological Solutions have shown and been adopted

- Main features of major types & flooding in all Asian countries such as (urban and riverine in Bangladesh, China, India, Indonesia, Japan, Thailand and Pakistan etc.) flash floods, coastal flooding.
- Snow and rain storms in mountainous regions and floods due to snowmelt.
- Principal causes of floods
- Estimate of economic losses and human deaths are enormous every year as climatic conditions in the region dominated by Monsoon, Warm oceans with high frequency of tropical cyclones etc.
- Evolution of flood control and management practices (reservoirs, floodwall, retarding basin, river training etc.
- Land Management & land use control measures,
- Socio-economic development-integration of flood control in to development process.

Flood Scene in Thailand



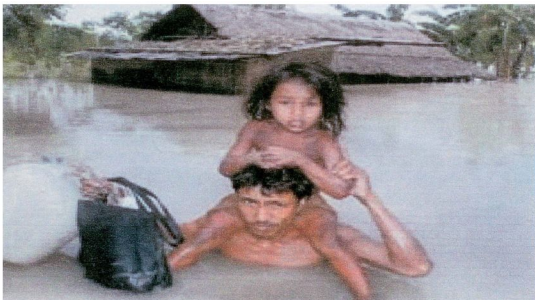
Flooding of historical sites at Ayutthaya in the lower Chao Phraya River basin

Flood Scene in Thailand



A royal park with flood-retention storage initiated by H.M. the King of Thailand in Ayutthaya Province in the lower Chao Phraya River Basin

Flood Scene in India



Priority Issues and Emerging Trends in Flood Management

- Issues of coordination of Management Practice.
- Rapid growth, economic growth and liberalization.
- Comprehensive basin management (Mekong River, Yangtze River, Indian river linking prospects).
- Storm Water Management in Metropolitan area.

Assessment of Flood Disaster Reduction

- Extension of automatic raingauges and radar surveillance – on gaining experience in the Asian region.
- Application of Meso-scale high resolution models for high impact events.
- Role of meso-network, radars, targeted observation, rapid satellite viewing etc.
- Regional Approaches Mekong River Commission, Indian River Commission.
- India-Bangladesh, India-Nepal panels on Tropical cyclone.
- Promotion of technical cooperation under bilateral arrangements.
- Contribution by International Disaster Reduction Decade-Awareness for cooperation.

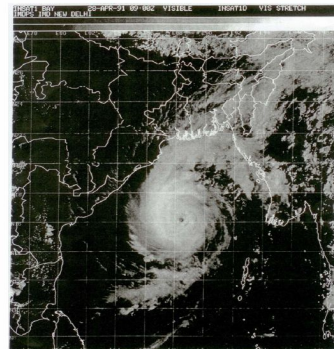
Future Requirements for 21st century

- Strategic approaches to strengthening regional cooperation framework
- Key elements of Strategic Approaches, on building participatory approach, Institutional framework, Strategy for programme development
- Goal setting
- Priority setting, common goal setting

Weather Forecasting and Warning Systems-Hydromet Disaster Prediction

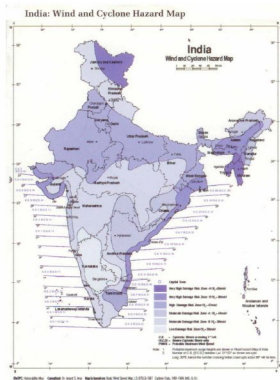
- Assessment of role played by atmosphere ocean land processes in different seasons in summer monsoon, winter monsoon, tropical cyclone season.
- Weather Observing and Forecasting Status varies in different countries.
- Stream Flow Forecasting under different agencies.
- Drought forecasting
 - Coordination of efforts within different organizations in different countries.
 - Vulnerability to droughts.
 - Case study for India

Satellite view of a Severe Tropical Cyclone in Bay of Bengal
Similar scenes in Western North Pacific

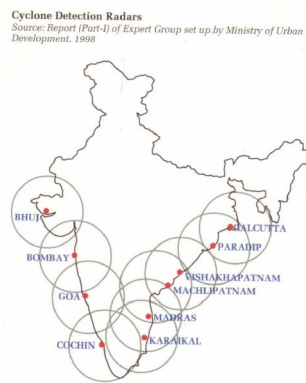


Three concentric eyewalls on 28 April 1991 (from Katsi, 1993). CI No. T 6.5. According to Dvorak double eyewalls are associated with super TCs.

Cyclone and Wind Hazards over India



Cyclone Detection Coastal Radars in India



Tropical cyclone Prediction & Meso scale convective storm prediction

- Status and Limitations for Intensity and Landfall. Need for Aircraft Reconnaissance
- Status for storm surge and research needs for in land inundation and research on river-surge interaction.
- Convective Severe local Storms Case Studies for India, Bangladesh, China. High density radar coverage and integration of radars
- Radar data assimilation

Rainfall Products – Mesoscale High Intensity rainfall and Land slides & Avalanches

- Land slides triggered in sub – Himalayan regions & Avalanches in Himalayas.
- Satellite / Radars applications to disasters in mountainous regions and their limitations and need for special studies.
- Under estimation of diurnal cycle of precipitations in mountainous regions.

Drought Management

- Drought a slowly evolving disaster which severely impacts on livelihood of rural agriculture – based population.
- Severe droughts take longer times for communities to face them and hence management plans have to be short – as well as long term.
- Steps needed to raise water table in good monsoon seasons.
- Indian example of rural employment guarantee scheme which shows rising water tables in districts which have emphasized water management.

Hydromet Disaster Warning Communication Systems.

- Media Warnings, Special systems in India through INSAT
- Community participation (case study of Bangladesh floods) other possible systems and community initiatives V-SAT systems,
- Thunderstorms hunters.

Technological challenges of Disaster Management

- Assessment of Scientific Inputs
- Milestones for Assessment of coordinated activities
- GIS- based Disaster Management Information System. Moving from Assessment & Implementation.

Best Practices in Disaster Mitigation

- Short – term policy
- Long- term policy
- New Arrangement in India
- Under National Disaster Management Agency, Hazard Mapping and Risk Assessment climate information in preparedness capacity building
- Mitigation Planning and Implementation and Role of local participation for Disaster Reduction
- Community Based Approaches

Awareness Generation

- **Training and Capacity Development:**
 - To suggest appropriate and practical strategies for training and capacity building of community representatives and other relevant stakeholders and to suggest the framework of mock drills at the community level.
 - Promotion of disaster management initiatives in schools through educational curricula, school safety exercise and mock drills. Etc. and through non formal interventions in education.
 - Examine the role of NDRF, Civil Defence, IRC, Home Guards, Fire services, NYK, NSS and such like organizations in bringing about community based preparedness and creating cadres of trained local volunteers.
 - Suggest appropriate strategy for awareness generation in local settings and milieus through mainstream media, traditional folk media, community radio, etc.
 - Awareness to include the demystification of technologies to communities regarding technical interventions required to equip them to cope with specific disasters like familiarity, familiarity with legal regimes etc.
 - Documentation and analysis of International and national Experience of select models/lessons learnt.

Steps being taken in India for Hydrometeorological Disaster warning and management

- Initiative by National Disaster Management Authority (NDMA) and National Institute of Disaster Management by the Home Ministry.
- Assessment of Science and technology Inputs to Disaster related events and improved warnings and preparedness by NDMA.
- New Drought Management Initiatives by the Ministry of Agriculture.
- Improvement in atmospheric and oceanic observational systems under the Ministry of Earth Sciences & Remote Sensing under Department of Space (DOS).
- Introduction of high resolution global, regional and mesoscale modeling for climate and weather prediction by Indian Met Department, National Centre for Medium Range Weather Forecasting and Indian National Centre for Ocean Information System (INCOIS) using super computers and research under different organisations of MOES, DOS, Universities and other institutes.

Other Measures

- Establishment of a central officer for co-ordinating Disaster plan and to coordinate efforts for tropical cyclone Risk Mitigation Projects in 13 coastal states and Union Territories – State Governments are actively involved in this new initiative.
- Improvement in Cryospheric disasters forecasting (Snow storm and avalanches) by Snow and Avalanches Studies Establishment (SASE) – an establishment of Defence Research Development Organisation (DRDO).

Hydrometeorological Disasters in Asia under the Climate Change Scenario

- Climate change through global warming poses a great threat to Asian Countries with a strong Monsoonal climate cycle with preponderance of drought / flood, tropical cyclones, land slides and cryospheric – related disastrous events and storm surges.
- Climate change may bring changes in monsoon intensity (flood / drought frequency) extreme events (cold and heat waves, high intensity rain events with changes in frequency of land slides) higher intensity tropical cyclones with threat to inland coastal flooding / storm surges, retreat of glaciers and glacier lakes outflow flood (GLOF) under climate changes scenarios, intensity of avalanches and changes in frequency.
- Each of such hydro – climatic disasters would impact differently for different Asian Countries. Very few studies exist to guide countries to manage altered disaster scenes under climate change.

A suggestion for planned action under climate change scenario

- Urgent need to undertake country specific studies on the impact of climate change on Hydro climatic disasters.
- Establishment of coordinated centre for study of Hydro climatic disasters under climate change for Asian Region may be of great advantage as time is slipping and we may get surprises under climate change scenarios. Social impacts of hydro climatic disasters may be more adverse. Let us plan facing them together over the Asian Monsoon region.



Thanks