

An Integrated Framework for Information and Communication Technology Supported Disaster Preparedness System in India

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www.time.com AOL Keyword: TIME

SPECIAL REPORT GLOBAL WARMING

TIME

BE
WORRIED.
BE **VERY**
WORRIED.

Climate change isn't some vague future problem—it's already damaging the planet at an alarming pace. Here's how it affects you, your kids and their kids as well

EARTH AT THE **TIPPING POINT**
HOW IT THREATENS YOUR **HEALTH**
HOW **CHINA & INDIA** CAN HELP
SAVE THE WORLD—OR DESTROY IT
THE CLIMATE **CRUSADERS**



POLAR ICE CAPS ARE
MELTING FASTER THAN
EVER...

MORE AND MORE LAND
IS BEING DEVASTATED
BY DROUGHT...

RISING WATERS ARE
DROWNING LOW-LYING
COMMUNITIES...

April, 2006 Issue
TIME

Technology

- The Cause ?
- Technology can solve the very same problems it has caused.
- ICTs certainly contribute to global warming, but much more important is their role in monitoring, mitigating and adapting to climate change induced disasters.

Impact of Climate Change in India

Water resources

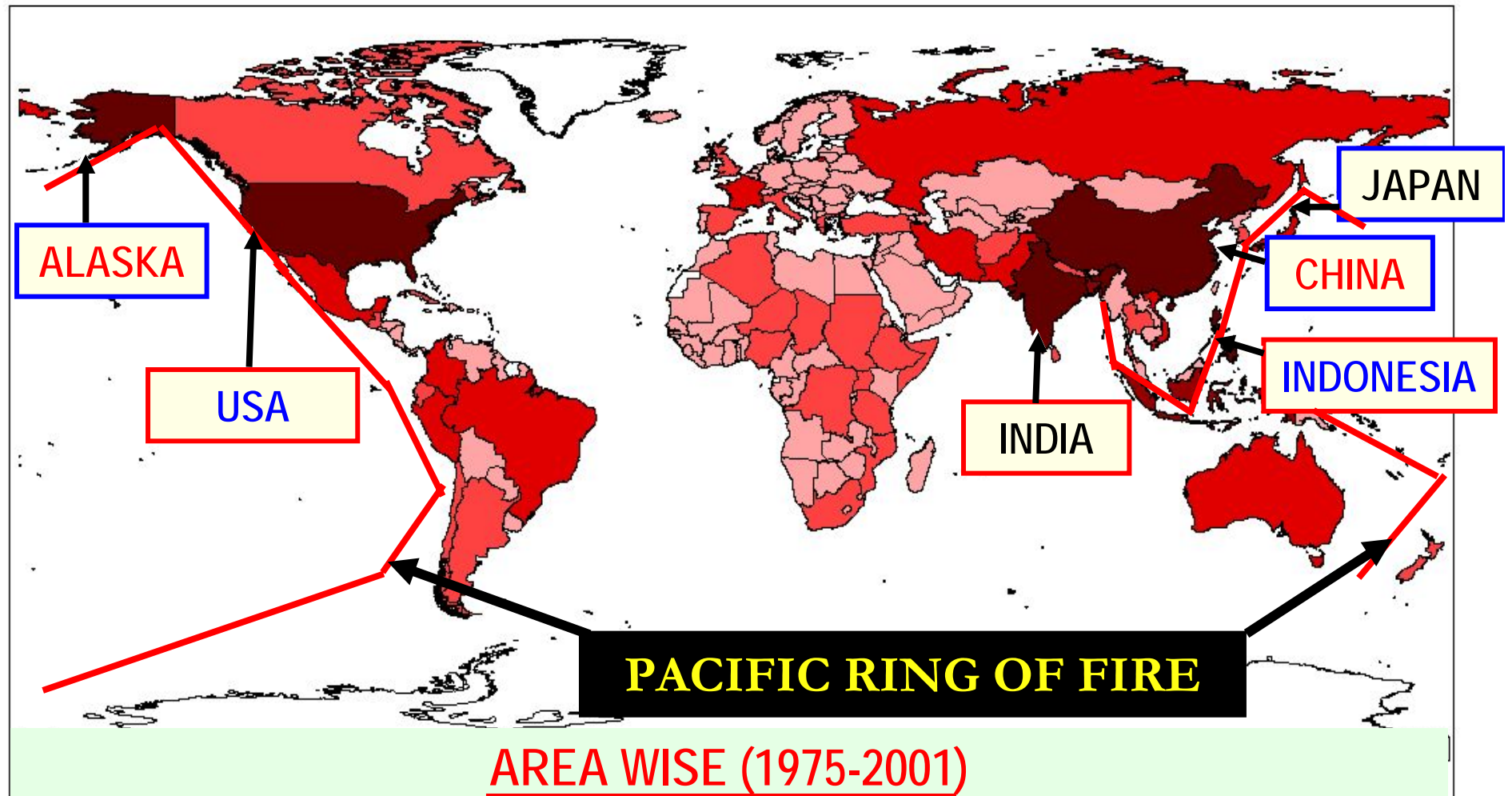
- The hydrological cycle is likely to be altered
- The severity of droughts and intensity of floods in various parts of India is likely to increase.
- Further, a general reduction in the quantity of available run-off is predicted.

Impact of Climate Change in India

Coastal zone

- Simulation models show an increase in frequencies of tropical cyclones in the Bay of Bengal; particularly intense events are projected during the post-monsoon period.
- Sea level rise is projected to displace populations in coastal zones, increase flooding in low-lying coastal areas, loss of crop yields from inundation and salinization.

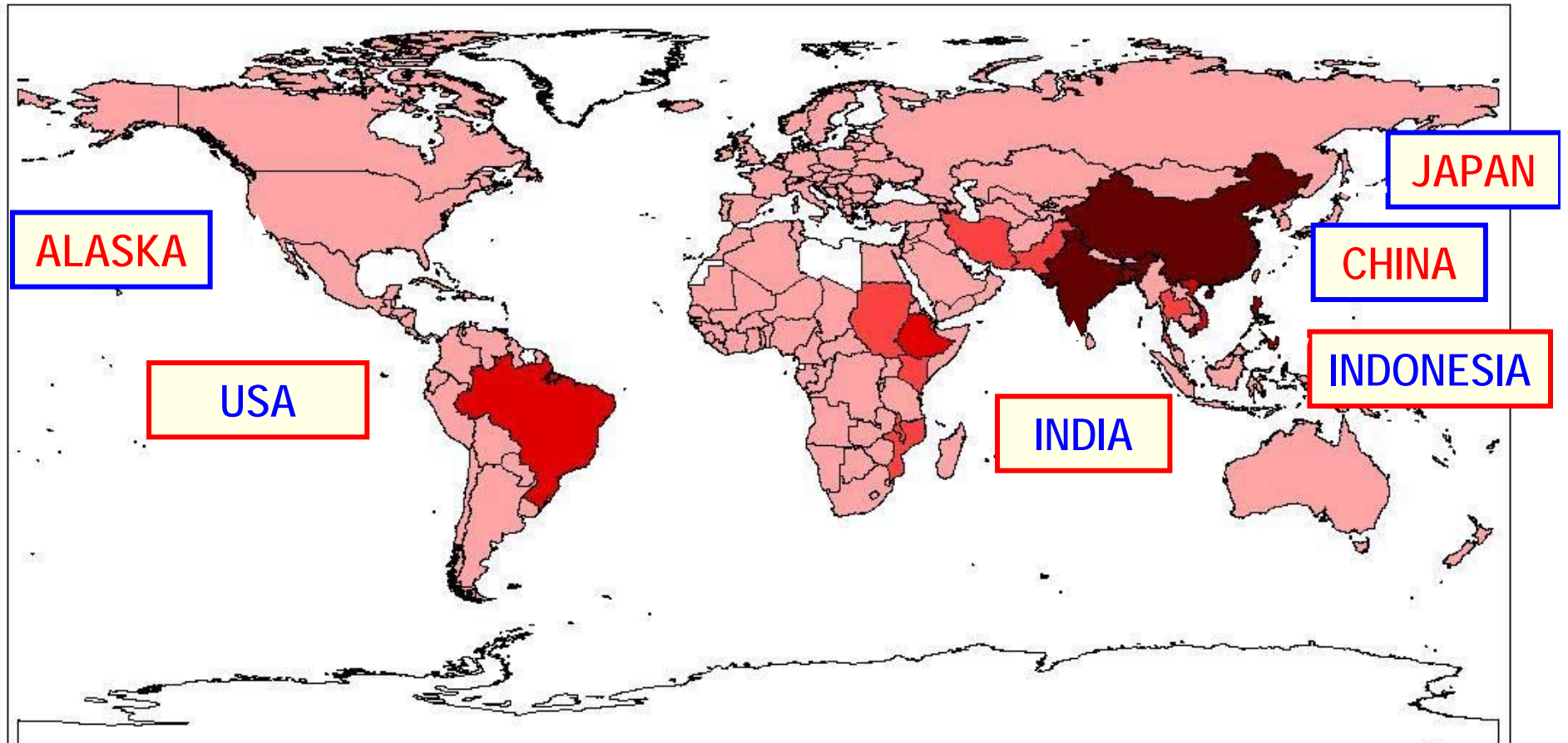
DISTRIBUTION OF NATURAL DISASTERS



LEGEND (No. of Events)



DISTRIBUTION OF PEOPLE AFFECTED



BY NATURAL DISASTERS (1975-2001)



Lessons from Disasters

- Lack of disaster preparedness at all levels.
- Lack of mitigation planning
- Lack of communication networking and dissemination of information among states
- **Delayed response due to mismanagement of relief, resources, manpower and duty delegation**
- **Lack of Interface and Coordination with State, District Administration & Community**



HUGE LOSS OF LIFE & PROPERTY

Vulnerability factors in Disaster Management

Physical

Land-use planning, engineering and architecture density levels, remoteness of a settlement, design and materials used for critical infrastructure and for housing

Social

Literacy, education, peace and security, access to basic human rights, systems of good governance, social equity, positive traditional values, knowledge structures, customs and ideological beliefs and overall collective organizational

Economic

Poverty ratio, national economic reserves, socio-economic infrastructure, communication network, utilities, supplies, transportation, water, sewage and healthcare etc.

Environmental

Extent of natural resource depletion, state of resource degradation, loss of resilience of ecological system, loss of biodiversity, exposure to toxic and hazardous pollutants.

DISASTER MANAGEMENT CONTINUUM

Proactive
Strategy

Proactive
Strategy



Better
Mitigation and
Preparedness
Measures will
Reduce 'Impact
of Disasters'

All Above Measures will Reduce 'Expenditure'

Disaster Preparedness-Priority Task

- Lay down Policies and Guidelines (Strategy).
- Coordination amongst various agencies i.e., Scientific, Engineering, Instructional and Key Responders.
- Capacity Building, Community Awareness Training and Simulation Exercises.
- Forecasting and Early Warning – Important Subject.
- Engineering of National Communication Network.
- Creation of National Disaster Mitigation Resource Centre

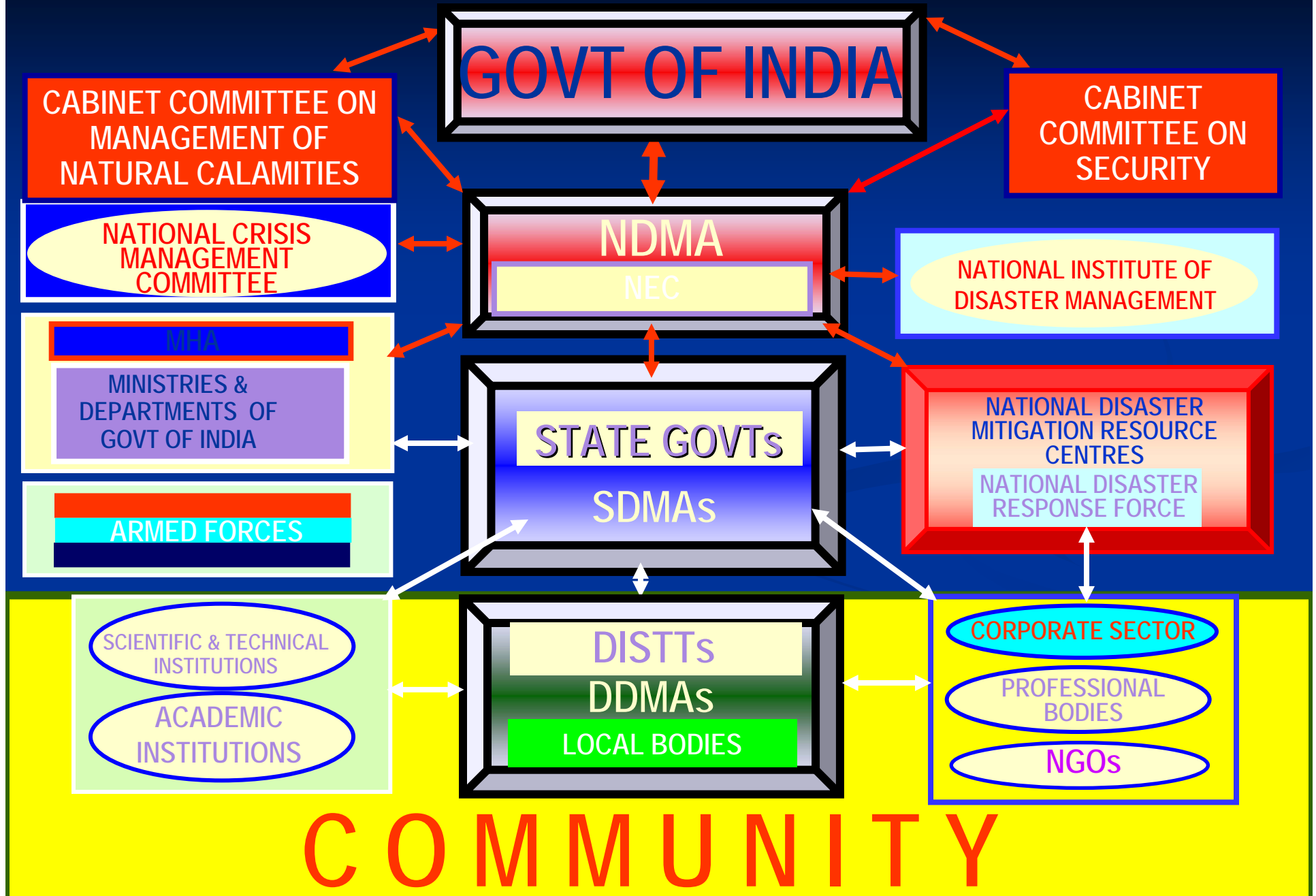
**Information and Communication
Technology Support
to
Disaster Management**

Role of Information and Communication Technology

The basic communications and IT support requirements for disaster management will correspond to the following three levels:

- Decision makers and disaster managers at all levels.
- Agencies involved in real-time dissemination of warnings and information to local authorities and threatened community.
- Last-mile connectivity at the disaster site for control and conduct of rescue and relief operations.

NATIONAL DISASTER MANAGEMENT STRUCTURE



Decision-making and Standing bodies at the Central level

- Union Cabinet, headed by the Prime Minister.
- Empowered Group of Ministers, headed by the Deputy Prime Minister
- National Crisis Management Committee (NCMC), under the chairmanship of the Cabinet Secretary.

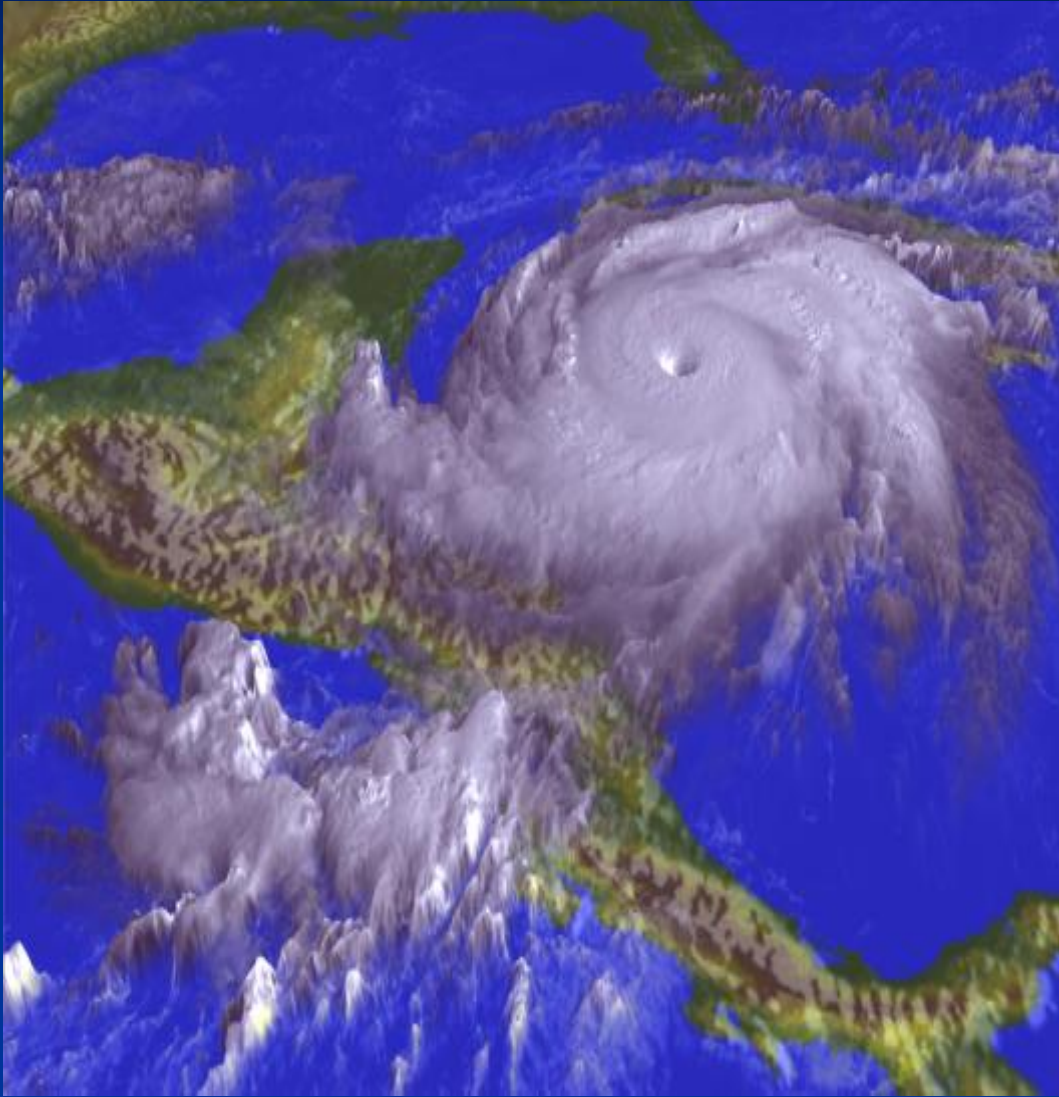
- Crisis Management Group (CMG): under the chairmanship of the Central Relief Commissioner comprising senior officers from the various Ministries and other concerned Departments which reviews contingency plans, measures required for dealing with a natural disaster, and co-ordinates the activities of the Central Ministries and the State Governments in relation to disaster preparedness response and relief.

- Technical Organizations, such as the Indian Meteorological Department (cyclone/earthquake), Central Water Commission (floods), Building and Material Promotion Council (construction laws), Bureau of Indian Standards (norms), Defence Research & Development Organization (nuclear/biological), Directorate General Civil Defence provide specific technical support to coordination of disaster response and management functions.

Updating and Digitization of Flood Plain Zoning Maps

- The Central Water Commission now intends to carry out the updating and digitization of existing flood plain zoning maps covering the area of 54,740 sq. km. of the states of U.P., Bihar, West Bengal, Punjab, Haryana, Delhi, Assam and J&K by SOI
- Maps to be in five layers viz. contour, water bodies (rivers/ponds), communication, vegetation and existing flood control works i.e. embankments, anti-erosion works etc.
- Digitized maps should be GIS ready.

OCEANOGENIC DISASTERS



- 13% of World's Cyclones in the Seas around India.
- Annual; Frequent Phenomenon.
- Inundation of Coastal Areas.
- Tsunami in Indian Ocean.
- Highly Devastative.

Communications

At the National Level

- Dedicated Communication System for disaster management with built-in redundancies.
- Multi Channel Communication System Links include DOT, POLNET, NICNET, ISDN and SPACENET.
- Satellite Communication based on mobile voice/data/video communication between national EOC and State EOC/ District EOC/Mobile EOC and Disaster/Emergency Site.
- GIS based National Database for Disaster Management.

National Emergency Operation Centre

- Control Room at MHA upgraded to National Emergency Operation Centre which is equipped with SATPHONES, GPS, GIS info system etc- Control room personnel trained in use of equipments
- States being assisted to set up Control Rooms at the State level GOI-UNDP project.
- 602 Emergency Operation Centers in each district in the country being set up under GOI-UNDP project.

The National Emergency Communication Network

- With almost a hundred per cent reliability, this network will ensure real-time dissemination of warnings and information direct to the affected community and local authorities.

Cyclone Monitoring & Mitigation

Cyclone Monitoring & Mitigation

- With geostationary satellites like GOES, Meteosat and GMS, and since 1982 with INSAT, tropical cyclones came under a global round-the-clock surveillance right from their genesis up to landfall
- Because of the wealth of data that the new generation of satellites are making available, the ability of meteorologists to make predictions of cyclone tracks has been consistently improving

Track prediction

- The accuracy of cyclone track prediction by operational numerical weather prediction centres has steadily improved over the past ten years
- However, even now, track predictions made 5 days in advance can be wrong by as much as 600 km and the 3-day predictions by more than 300 km
- Even the 24-hour predictions could be in error by up to 150 km

Minimization of impacts

- Primarily by an application of the increasing scientific knowledge of the behaviour of cyclones
- By a fuller utilization of the new technological tools like satellites and Doppler weather radars

Doppler Weather Radars



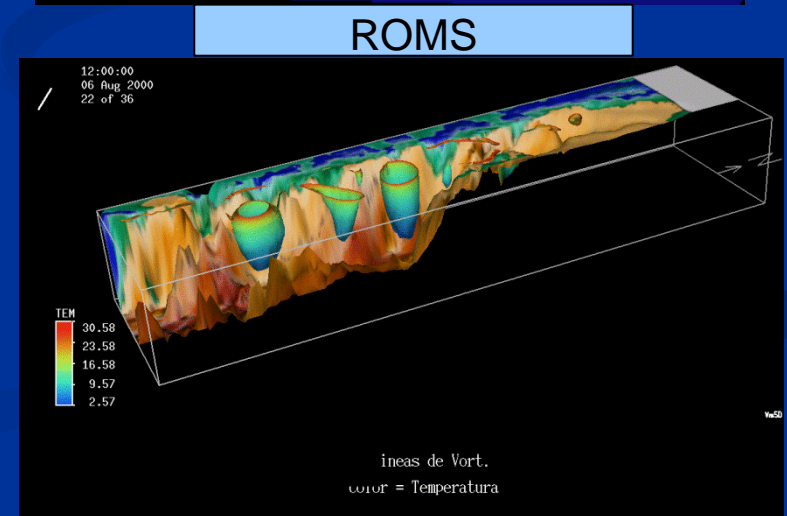
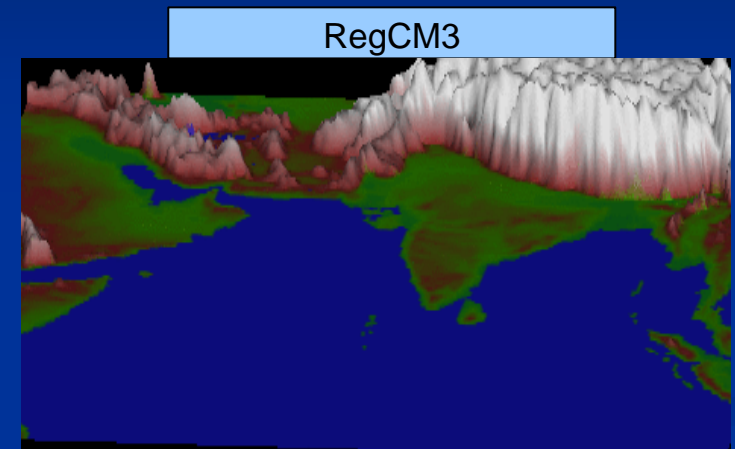
- India has DWRs at
 - Sriharikota
 - Chennai
 - Machilipatnam
 - Kolkata
 - Visakhapatnam

The future

- It is only with a tropical cyclone that nature gives us a few days notice
- We have to make the best use of this grace period

Using Grid (EU-India Grid Project) for Earth & Atmospheric Sciences Studies

- Physic of Weather and Climate group at ICTP and Computational Atmospheric Science group of C-DAC/Pune Focus on developing a Regional coupled atmosphere-ocean model system for the **prediction of the Indian summer monsoon**
- Regional Climate Model (RegCM3)
- Regional Ocean Modeling System (ROMS)
- Results achieved (some presented at EGEE User Forum in May 2007):
 - RegCM3 and ROMS ported to both GARUDA and gLite
 - Proof of concept with limited problem size (few MBs, one CE only)
 - Coupled system tested on gLite
- Next steps: implementing adequate data management, increasing problem size to enable realistic simulations



Mitigation Measures

- Most of the mitigation measures are built into the national, state and district disaster management plans which already exist and in the event of a cyclone threat, they can be enforced by the concerned authorities.
- In practice, this is easier said than done !

Socio-Economic Aspects

- Fishermen may be advised not to venture into the sea, but they may not listen to this advice
- If the storm is brewing far out at sea, there may not be enough evidence on the coast for the fishermen to take the meteorologists' predictions seriously.
- Much of the coastal population consists of farmers and fishermen living below the poverty line, who earn for the day and feel compelled to take the risk of going to work rather than let the family starve.
- Decisions about leaving one's homes in the wake of a cyclone warning are many times taken by the village chief on the basis of his past experience with cyclone warnings.

WHAT IS THE SOLUTION ?

Mobile Technology at the Grass Root Level

Global System for Mobile Communications (GSM) wireless network Technology

- For the purpose of disaster management works, it is important to identify geographic location of the disaster prone area. Location of the mobile user can be identified by two basic approaches
 - One is through the **MOBILE NETWORK SIGNAL SYSTEM** where signals is send by the mobile phone system to its base
 - Another is through using **INTEGRATED GLOBAL POSITIONING SYSTEM (GPS)** with the mobile phone receiver, an additional hardware that takes care of location functions.. Although accuracy of location based on signal system over integrated GPS is still an issue of debate but in the context of less developed country like India adding hardware at the user's end will involves additional cost at user's end which is not possible to effort for a lot of user.

Mobile Penetration in India

- On a brighter note, In India the growth rate for mobile phone market has been 200 percent over the last two years. The total number of telephone connections stood at 281.62 million at the end of January 2008.
- Almost every single village in India has been brought under the coverage of mobile network system.
- Due to the wide prevalence of low cost pre-paid cards, there are now many who can afford to keep a mobile phone since the minimum bill payable per month is about US\$ 5.

Mobile Telecommunication

The central NDMA coordinators will collect weather information from the weather information department.

After receiving location based weather report, the central coordinator will write a Short Message Service (SMS) describing the weather report and necessary steps to be taken and then send it to the mobile phone operators. Mobile operators then disseminate this short message to all mobile phones in a specific geographical area.

Using mobile technology concurrent information can be gathered from the field which in turn ensures proper distribution and minimizes losses.



INDIA DISASTER RESOURCE NETWORK



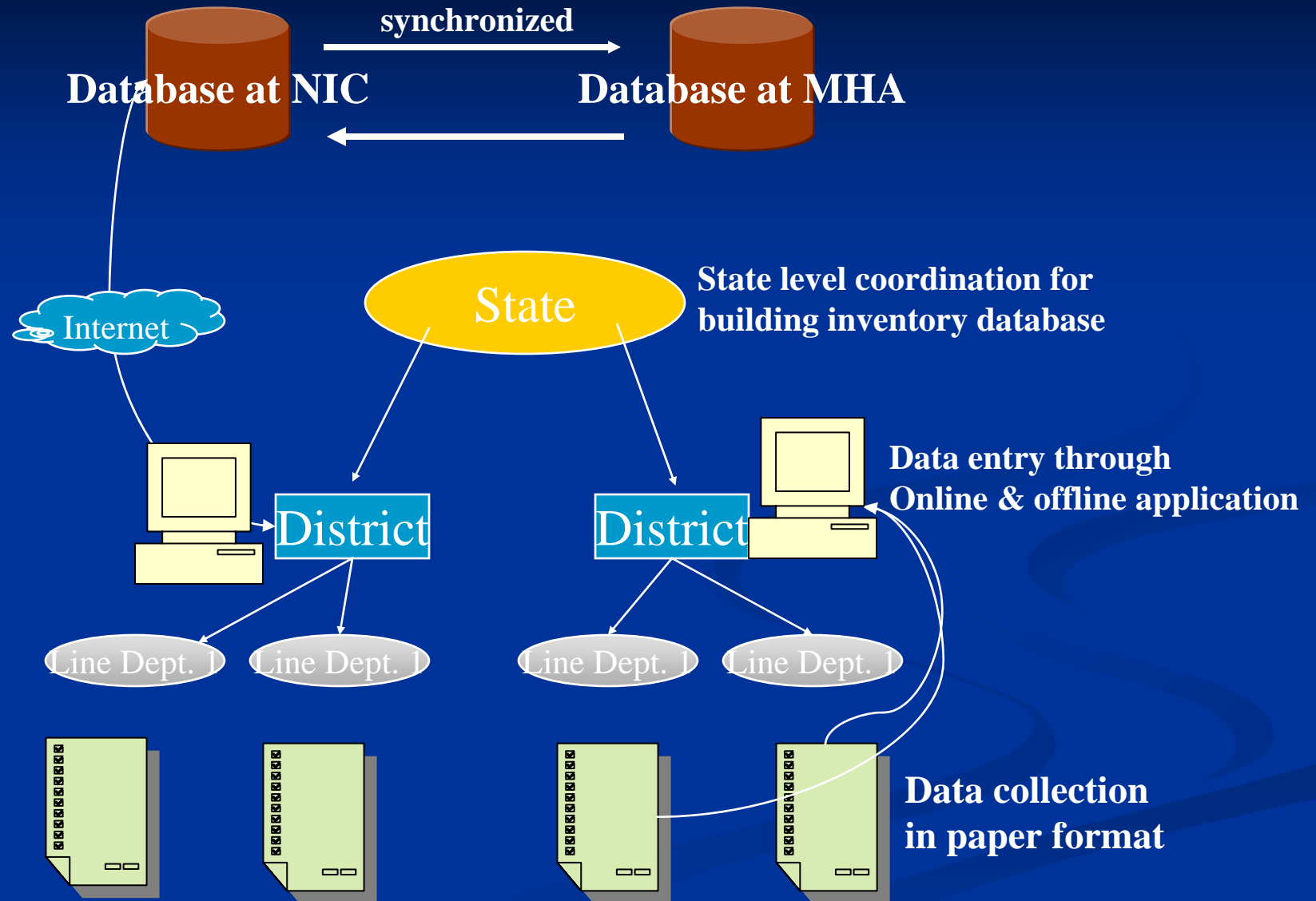
INDIA DISASTER RESOURCE NETWORK

WWW.IDR.N.GOV.IN

What is IDRN?

- It's a web-enabled GIS based All-India Resource Inventory i.e. on-line centralized database.
- This Resource inventory titled IDRN (Indian Disaster Resource Network) will be available on the website with the Url www.idrn.gov.in to all the disaster managers in the state & at the centre
- The IDRN is a live system providing for updating of inventory every year. Entries into the inventory are made at two levels – district and State level. It has 226 items.
- IDRN inaugurated on 1st September 2003
- 69,329 records in 545 districts uploaded.

Work Process



CONCLUSION

- There is a need to integrate the fragmented, decoupled institutional setup for preparedness and quick response and further strengthen it through Public-Private Partnership (PPP).
- The right mix of policy, institutional arrangements and use of Information and Communication technology provides the framework for a country's approach to disaster mitigation. Worldwide, there has been a shift away from a strictly 'top-down' approach relying on government alone, to a combination of 'top-down' and 'bottom-up' approaches.
- The aim is to enhance the indigenous coping mechanisms of vulnerable communities; draw on their cooperative spirit and energy; and empower them through appropriate information communication technology to mitigate disasters.

Thank You.