

# GUJARAT EARTHQUAKE : Enormity and Impact

20<sup>th</sup> March 2012



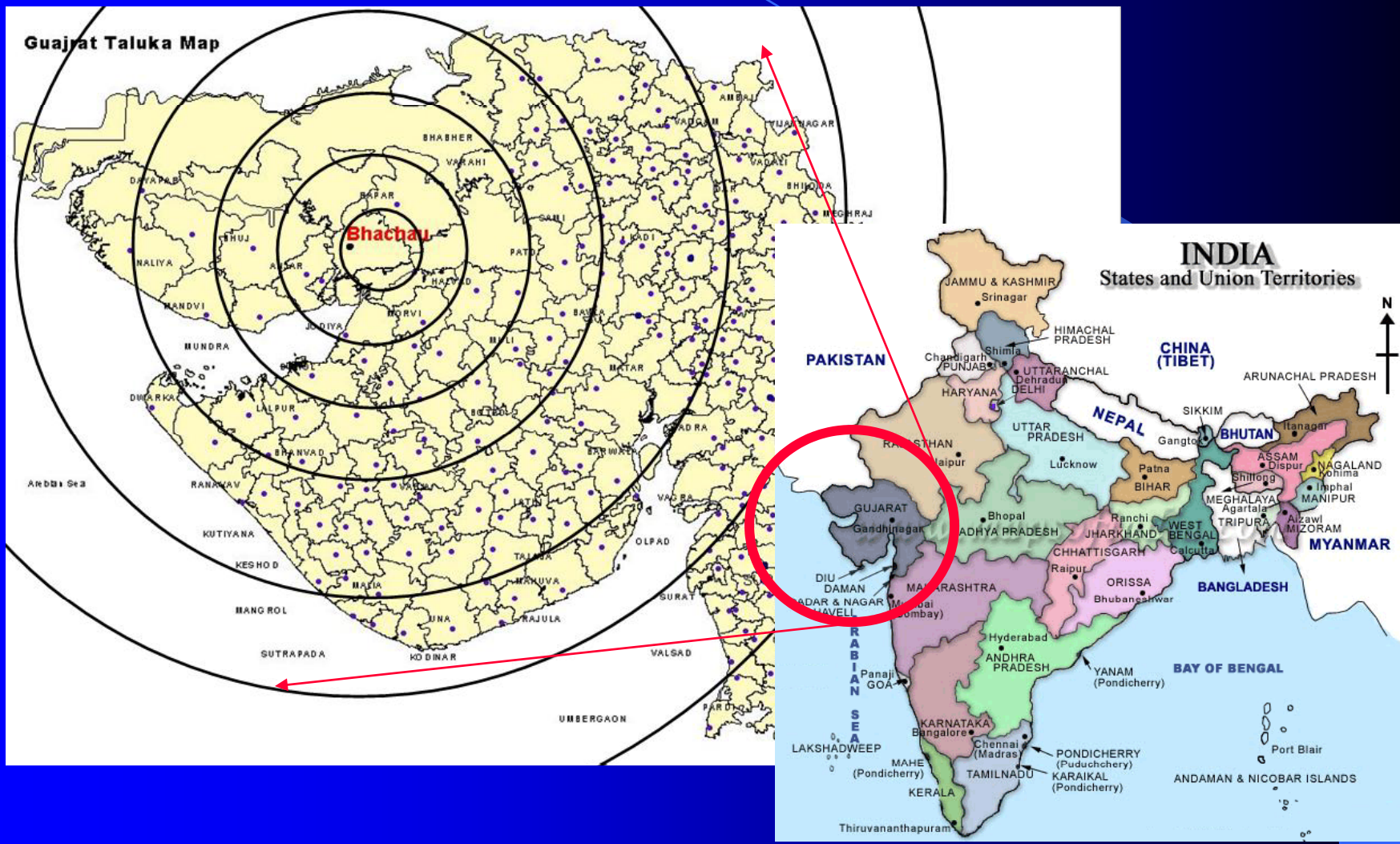
Presented by  
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# Enormity and Impact

- The nature and extent of the impact depends on the level of development
- Scale of enormity depends on only what was lost but also what you want to gain
- Impact need not be negative but can also be positive (Titanic, Plagues)
- Disasters open a window of opportunity
- Outcomes depend on various factors- Intention, capacity, financial resources available, political will etc.

# 26 January 2001: The Terrible Human Tragedy

## Earthquake of magnitude 6.9 on Richter scale; 7.7 Mw (USGS)



# GUJARAT EARTHQUAKE-26 January 2001

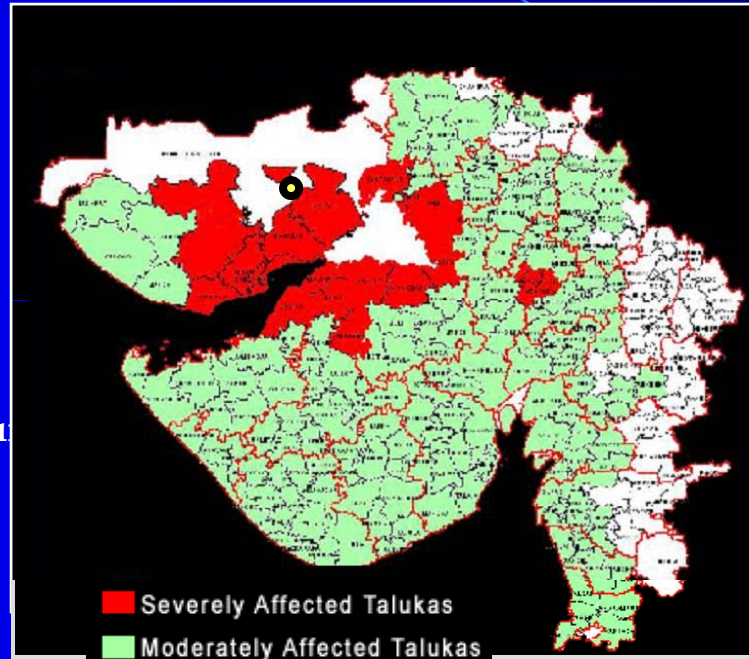
Earthquake of magnitude 6.9 on Richter scale; 7.7 Mw (USGS)

One of the worst earthquakes in the last 180 years

Over 10 million people affected by the calamity

Over 10,000 small and medium industrial units went out of production

50,000 artisans lost their livelihood



Around 5 million people needed to be given immediate relief all over the State

Reported lives lost  
13,805

167,000 persons suffered injury

Over 2,22,035 houses completely destroyed and 9,17,158 houses damaged

Over 300 hospitals destroyed

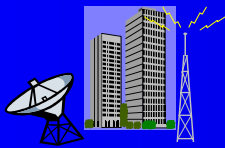
7,633 villages adversely affected, 450 villages flattened totally

*...that too in the wake of two consecutive years of drought.*

# IMPACT: LARGER PICTURE

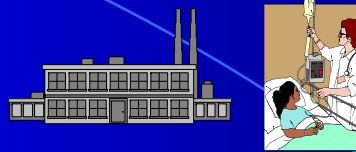
## Direct losses

- Human lives
- Livestock, other animals
- Private property
- Municipal infrastructure
- Power/ telecommunications infrastructure
- Health/ education assets



**Gujarat earthquake estimate:**

**Rs 9,900 Crore**

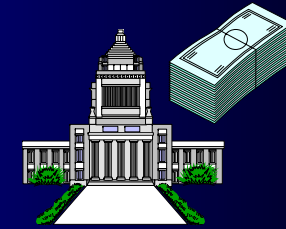


## Indirect losses

- Export/ import
- Agricultural output
- Industry/ services output
- Remittance income
- Fall in earning potential (due to disability, trauma etc.)
- Unemployment
- Health hazards

**Gujarat earthquake estimate:**

**Rs 3,000 Crore**



## Tertiary losses

- Long-term development
- Overall investment climate
- Funds reallocation
- Community migration/ relocation

**Gujarat earthquake estimate:**

**Rs 10,100 Crore**

# IMMEDIATE EMERGENCY RESPONSE

- **State Government, Revenue Department Control Room activated by 9.05 a.m**
- **Satellite Telephones made operational at 9.30 a.m**
- **Police Wireless Control Room**
- **A Team headed by the then Additional Chief Secretary, G. Subba Rao sent to Bhuj by helicopter by afternoon**
- **Team of Doctors dispatched to Bhuj by helicopter by afternoon**
- **GOI officers reach Bhuj by evening**
- **Rescue operation launched in Ahmedabad immediately**

# CIVIL ADMINISTRATION

- Office of Collector Bhuj severely damaged
- Taluka offices damaged
- Tahsildar of Anjar and personnel of many depts. killed
- Civil administration setup at Gandhidham, Anjar, Bhachau, Rapar severely affected
- Restoration
- 28 senior IAS officers deployed in the affected areas
- 107 Administrative officers supported by 1000 police staff, 12 companies of SRP and 1949 Home-guards posted in the affected areas
- Each Tehsil converted to a unit equivalent to District with senior relief Co-ordinator.
- 17 Talukas upgraded to district status appointing additional collector / Additional DDOs with equivalent powers of collector / DDOs

# EMERGENCY RESCUE OPERATIONS

Massive mobilisation of JCBs/Cranes/Bull Dozers/Dumpers/Gas cutters from various sources

| Deployment      | JCBs<br>Cranes | Bull Dozers<br>Excavators | Dumpers<br>Trucks | Gas Cutter |
|-----------------|----------------|---------------------------|-------------------|------------|
| Kutch           | 831            | 395                       | 2679              | 614        |
| Other districts | 321            | 148                       | 174               | 287        |
| Total           | 1152           | 543                       | 2853              | 901        |

Personnel Technical - 2104, Non technical - 6213, Laborers- 13355





# EMERGENCY RESCUE OPERATIONS

Contd..

- 760 S.T. Buses mobilised for the doctors, volunteers, Police Personnel, medicines, relief kits etc. to reach the victims.
- 1978 ST buses for 12115 injured and their relatives to reach various hospitals
- 319 ST buses within Kutch for free transport of earthquake affected population.



# EMERGENCY MEDICAL TEAMS MOBILISED

Contd..

|                    | Kutch | Other<br>Districts |
|--------------------|-------|--------------------|
| Medical Officers   | 250   | 1,584              |
| Specialist Doctors | 400   | 363                |
| Para Medical Staff | 1,000 | 1,500              |
| Jeeps/Ambulance    | 1,603 | 362                |

- 46 specialists with 183 medical teams operationalised in 24 hours for medical assistance in Bhuj
- Figure reached 615 specialist with 2371 medical teams with vehicles by 5.2.2001 all over the State



# EMERGENCY MEDICAL TEAMS MOBILISED

Contd..

- 167,000 injured cases treated of which over 19,000 were of serious nature. These operations had to be performed in makeshift arrangements.
- 4829 patients referred to other hospitals of other districts by road.
- 454 serious cases Air Lifted from Bhuj for special treatment to Mumbai, Pune and other centers
- Team from National Institute of Communicable diseases maintained surveillance.



## ARMED FORCES

- 8 Eng. Reg and 36 columns deployed in the affected areas.
- RAF / CISF /SRP deployed in large numbers.
- 536 villages visited by the Relief Teams of Army. 39 relief camps established.
- Debris & road clearing work carried on continuously in the affected towns & villages.
- Conducted 48 aircrafts, the IAF did a total no. of 957 sorties carrying a load of 4890 tonnes
- Army Hospital at Bhuj opened its door to civilians as Civil Hospital in Bhuj was destroyed.

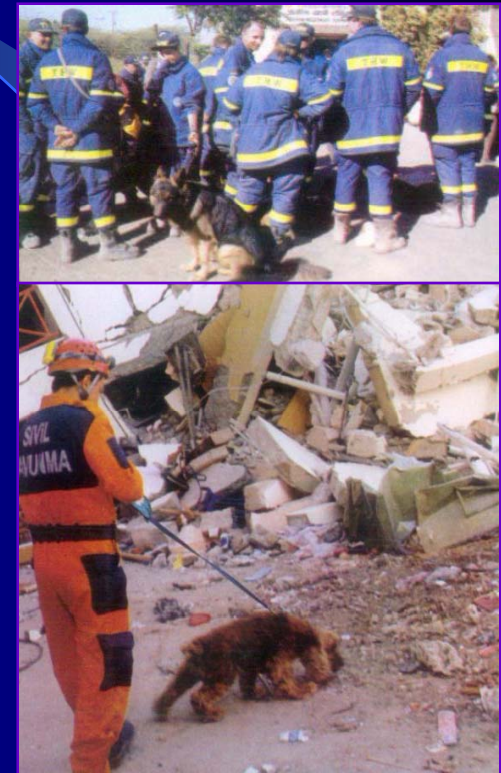


# DETAILS OF INTERNATIONAL RESCUE TEAMS

| Country        | Manpower                               |
|----------------|--|
| Netherland     | Team of Doctors with medical equipment |
| France & Japan | 58 Doctors each                        |
| Ukraine        | Team with Mobile Hospital              |
| Switzerland    | Team of 40 persons, 9 dogs             |
| Great Britain  | 69 persons and equipments              |
| Russia         | 74 persons and equipments              |
| Germany        | 46 persons and 2 dogs                  |
| Bulgaria       | 137 Persons and Trauma Kits.           |
| Israel         | 100 persons & 160 equipments           |

## People Rescued

More than 300 persons rescued in Bhuj and 135 in Ahmedabad snatched from the jaws of the death.



# ARRIVAL OF INTERNATIONAL FLIGHTS

27th January to 18th February

Ahmedabad Airport 84 Flights

Bhuj Airport 166 Flights

Total 250 Flights

- Round the clock arrangements made at Ahmedabad & Bhuj Airport for quick custom clearance and receipt and dispatch of supplies
- Senior Officer and Staff deputed to Mumbai to handle & clear incoming flight with emergency receipt.

During the peak period on 31.01.2001  
22 Flights landed at Ahmedabad  
Airport



# EMERGENCY HOSPITALS

- 310 bed hospital established by Red Cross Societies of Norway, Finland & Germany.
- 100 bed hospital by Israel
- 2 field hospital by France
- Hospital by Ukrain in Bhachau and in Gandhidham by Denmark
- 80 bed hospital by State Government and Indian Medical Association in Bhuj treated on an average 1000 persons daily.



# RESTORATION OF ESSENTIAL SERVICES

## TELECOMMUNICATIONS

On 26th January 2001

- Restoration of 2,000 lines Bhuj Exchange (C-DOT MBM)
- Restoration of 2,000 lines Gandhidham Exchange
- Putting through two 34 MBPS Microwave Systems to Rajkot-Gandhidham-Bhuj

On 27th January 2001

- Installation of Optical Fibre end-link (8mbps) at Bhuj
- 2 INMARSAT terminals rushed to site

On 28th January 2001

- Hot-lines were provided from Ahmedabad-New Delhi

On 29th January 2001

- Optical Fibre links restored
- Cellular Mobile Phones Services restored.

By 2nd February 2001

- Services restored in all 147 exchanges
- 43 Hot lines provided



# RESTORATION OF ESSENTIAL SERVICES

## WATER SUPPLY

Contd..

|                 | Towns     |           | Villages    |             |
|-----------------|-----------|-----------|-------------|-------------|
|                 | Affected  | Restored* | Affected    | Restored*   |
| ➤ Kutch         | 10        | 10        | 884         | 884         |
| ➤ Rajkot        | 2         | 2         | 125         | 125         |
| ➤ Junagadh      | 2         | 2         | 92          | 92          |
| ➤ Ahmedabad     | 1         | 1         | 0           | 0           |
| ➤ Surendranagar | 3         | 3         | 239         | 239         |
| <b>Total</b>    | <b>18</b> | <b>18</b> | <b>1340</b> | <b>1340</b> |

- Either by Tanker or pipeline supply restoration completed in stages in four days
- Within 36 hours more than 200 water tankers were rushed to Kachchh. Medical Services in Bhuj was fed by such tankers till the pipe line was restored.



# RESTORATION OF ESSENTIAL SERVICES

Contd..

## POWER

- 45 sub-stations damaged/destroyed in Kutch and 7 in Jamnagar, Rajkot and Surendranagar
- 255 feeders snapped
- 9 towns of Kutch in darkness
- 925 out of 949 villages in Kutch affected

## Restoration

- 9 towns (Partial power restored to Bhuj town on 28th Jan., 8 additional town by 30th Jan.)
- 925 villages power restored in stages by 2nd February



# RESTORATION OF ESSENTIAL SERVICES

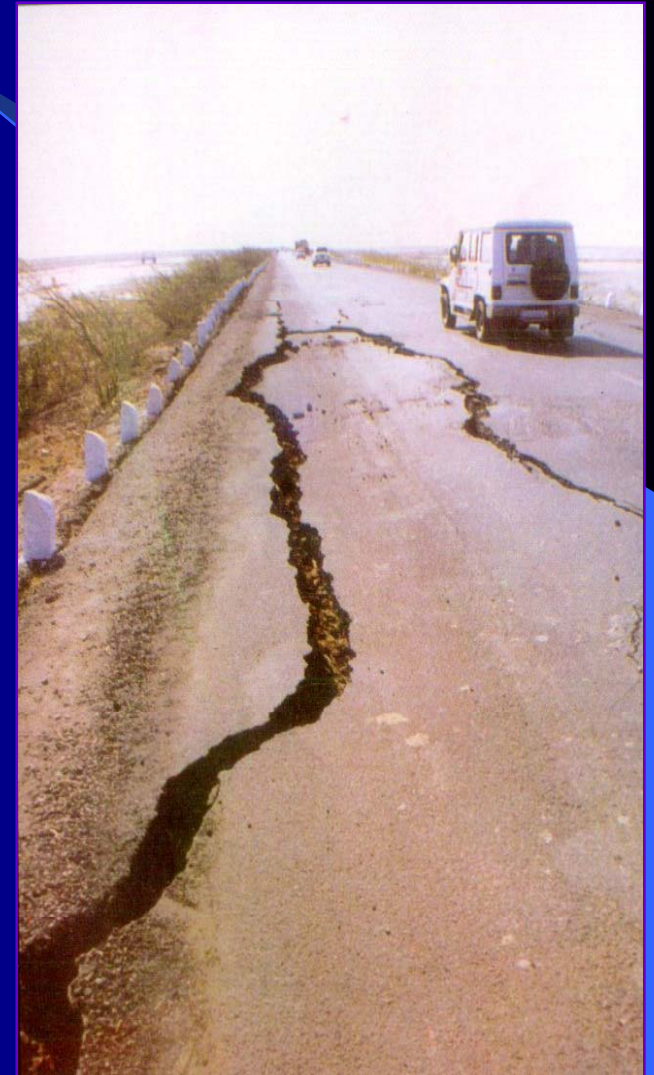
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## ROADS

- Suraj Bari Bridge initially closed.  
Reopened for relief material in six days

## RAILWAYS

- Rajkot - Okha BG track restored on 26th January 2001
- On Viramgam-Gandhidham broad gauge route, railway track certified upto Gandhidham on 29th January 2001
- On Palanpur-Bhuj meter gauge route upto Kukma, 10 kms short of Bhuj on 29th January 2001
- Railway traffic fully restored to Bhuj.



# RESTORATION OF ESSENTIAL SERVICES

## FOOD & CIVIL SUPPLIES

- Essential supplies of wheat, groundnut oil & sugar rushed to Kutch district for free distribution.
- Food packets biscuits, water pouches, battery cells, milk powder, match boxes distributed.
- 20 distribution centers opened in Kutch district and distributed 28 thousand MT of food grains in affected areas in initial two week period.
- All 562 FPS were functioning. Mobile vans deployed.
- 112 thousand KL diesel, 44 thousand KL Petrol and 69 thousand KL kerosene supplied in quake affected districts.
- 5 Lts. Kerosene per family provided in 20 severely affected talukas free of cost and in other 6 districts at subsidized rates for two months.

## RESTORATION OF ESSENTIAL SERVICES

- 2,43,000 Family kits consisting of essential items distributed free of charge to the affected families

### FREE COMMUNITY KITCHEN SERVICES

65 MT wheat, 30 MT rice, 71 MT Sugar and 53,155 Lts. edible oil for community kitchens run by various voluntary agencies benefiting 65,000 families



# FLOW OF RELIEF MATERIALS FROM OTHER DISTRICTS OF THE STATE

|                  |                                 |                      |             |
|------------------|---------------------------------|----------------------|-------------|
| Blankets         | 4,86,816                        | Tarpaulin            | 51283       |
| Wood             | 637 Trucks                      | Tents                | 41884       |
| Bamboo           | 107 Trucks                      | Utensils             | 80230       |
| Foodgrain        | 8400 MT & 59 Trucks             | Massala              | 145.3 MT    |
| Dal              | 1129.6 MT & 4 Trucks            | Vegetables           | 946.4 MT    |
| Sukhdi           | 1581.2 MT                       | Matchboxes           | 38,166      |
| Milk Powder      | 1420 MT                         | Pesticides           | 107.7 MT    |
| Biscuits- Breads | 1081426 Packets                 | Shrouds              | 58260 Mtrs. |
| Food Packets     | 4596390                         | Masks                | 5756        |
| Water Pouches    | 10158930                        | Safety shoes/ Gloves | 6833        |
| Edible Oil       | 17294 Tins                      | Lanterns             | 30578       |
| Sugar, Gur, Tea  | 707.6 MT                        | Stoves               | 3898        |
| Candles          | 66393 Packets                   | Shoes                | 4310        |
| Flour            | 1740.2 MT                       | Household Kits       | 10068       |
| Blood            | 1108 Bottles                    | Milk Pouches         | 651486      |
| Woolen Clothes   | 415259/33cart.<br>1 truck/4 box | Salt                 | 2200 Kg.    |

# DISTRIBUTION OF EMERGENCY ASSISTANCE

|                    |                   | Amount<br>(US\$ Mn) |
|--------------------|-------------------|---------------------|
| Cashdoles          | 9,11,096 Families | 15.8                |
| Household kits     | 3,72,027 Families | 8.9                 |
| Death Compensation | 13,378 Cases      | 26.4                |
| Injury Assistance  | 19,648 Cases      | 3.7                 |



# EMERGENCY SHELTER

## Assistance from International agencies /Other States

Families covered 143,864

## State Government

Families covered 105,083

Total Families covered 248,947





# THE TASK AHEAD

## Housing

- Reconstruction of 2,22,070 houses
- Repair of 9,17,163 houses

## Public Infrastructure

### Power

- Strengthening of 9,034 km of transmission and distribution lines

### Roads & Bridges

- Repair/Reconstruction of 4,973 km of state highways and rural roads
- Restoration of 179 bridges

### Rural Water Supply

- Laying of 3975km of water supply pipelines

### Dam safety & Irrigation

- Strengthening of 222 dams

## Social Infrastructure

### Education

- Repair of 42,678 school rooms
- Reconstruction of 12,750 school rooms

### Health

- Repair/Reconstruction of 1,548 health structures (CHCs, PHCs, SCs, anganwadis, dispensaries, staff quarters)

## Public Buildings

- Reconstruction of 3,377 public buildings
- Repair of 9,001 public buildings
- Retrofitting of 4,572 undamaged buildings
- Retrofitting of 232 damaged buildings

## Urban Infrastructure

- 348 Km of roads to be completed
- 362 Km of sewerage pipelines to be laid
- 703 Km of water supply pipelines to be laid
- 177 municipal buildings to be reconstructed

## Livelihood

- Livelihood restoration of 200,000 families and much more

## Social Rehabilitation

# THE NEED OF THE HOUR

- **A Comprehensive Program**
  - **To undertake Rapid Repair and Reconstruction**
  - **To cover all the aspects of human need, not merely reconstruction of damaged structures but also livelihood restoration, social rehabilitation etc**
  - **To Promote Sustainable Recovery in the affected areas including promoting construction of Multi - Hazard Resistant Structures and Retrofitting of undamaged buildings**
  - **To lay the Foundation for Sustainable Disaster Management Capacity Building in Gujarat**

# THE NEED OF THE HOUR

- **An agency to carry out**
  - **The implementation of the massive reconstruction and rehabilitation programme**
  - **Coordination with Government of Gujarat, Government of India, World Bank, Asian Development Bank, donors, UN agencies and international community**
  - **Quick policy making**
  - **Resource mobilisation & financial management**
  - **Monitoring and quality inspection**
  - **Capacity building for long term disaster management in Gujarat**

# ANSWER

## THE PROGRAM

**GEERP**

*GUJARAT EARTHQUAKE EMERGENCY  
RECONSTRUCTION PROGRAM*

## THE AGENCY

**GSDMA**

*GUJARAT STATE DISASTER MANAGEMENT  
AUTHORITY*

# GSDMA

To co-ordinate the massive effort, a nodal agency was created –  
**Gujarat State Disaster Management Authority**



*... which effectively co-ordinates with all the entities associated with disaster management in Gujarat and outside*



**APPROACH TO RECONSTRUCTION AND  
REHABILITATION.....**

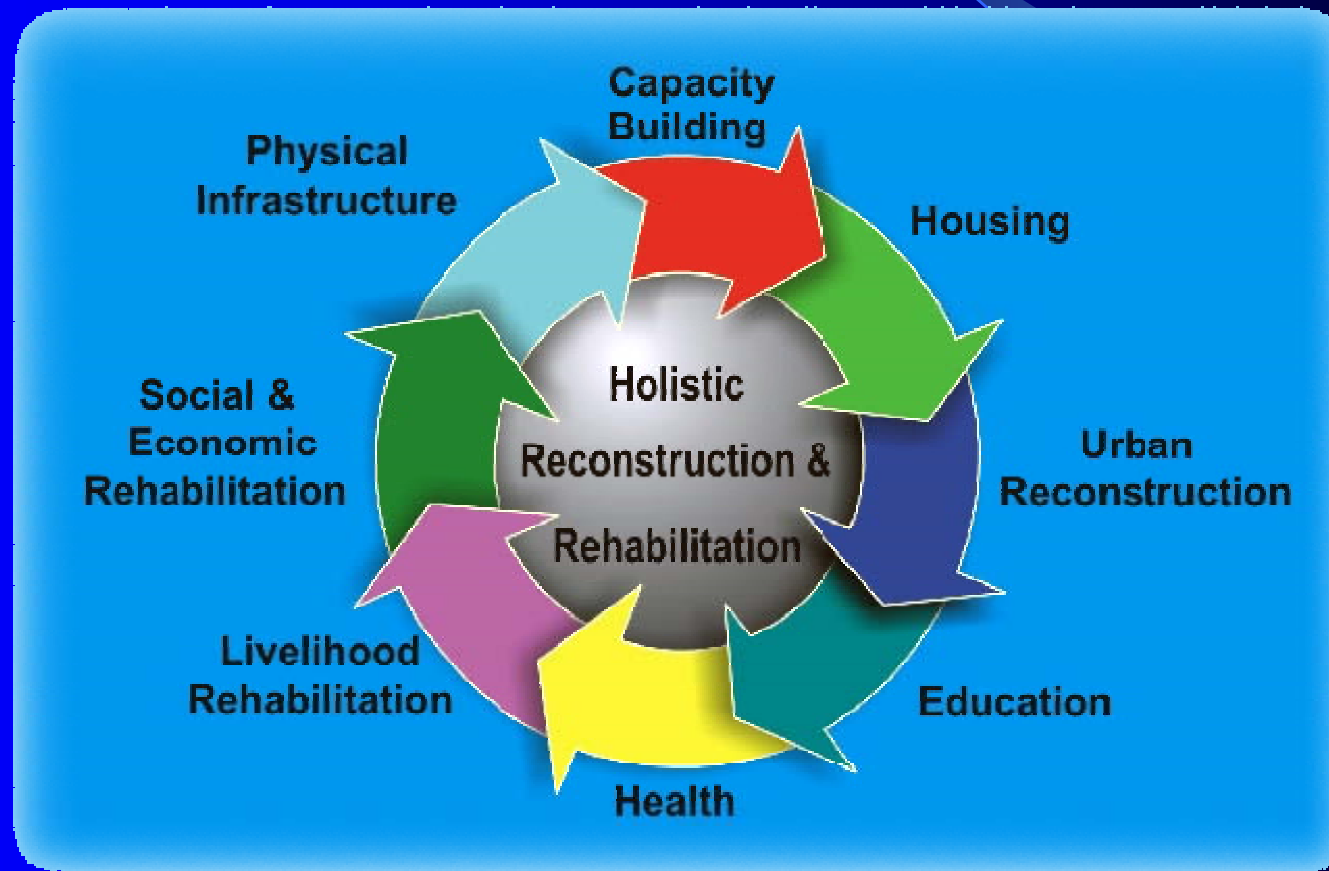
# VISION

*“To go beyond reconstruction and make Gujarat economically vibrant, agriculturally and industrially competitive with improved standards of living and with a capacity to mitigate and manage future disasters”.*



# RECONSTRUCTION & REHABILITATION

*The reconstruction program has been designed to address the needs of beneficiaries comprehensively...*





# REHABILITATION POLICY

## Short and Medium term Rehabilitation Policy...

**28**  
**Reconstruction**  
**and**  
**Rehabilitation**  
**packages**

Housing)

Rehabilitation  
of orphans  
and women

Packages for  
rural artisans

Packages for  
capacity  
building

Packages for  
industry, trade  
and services

Packages for  
handicraft  
artisans

Packages for  
agriculture

Package for  
tourism

Supported by

Revival of  
Livelihood and  
Economy

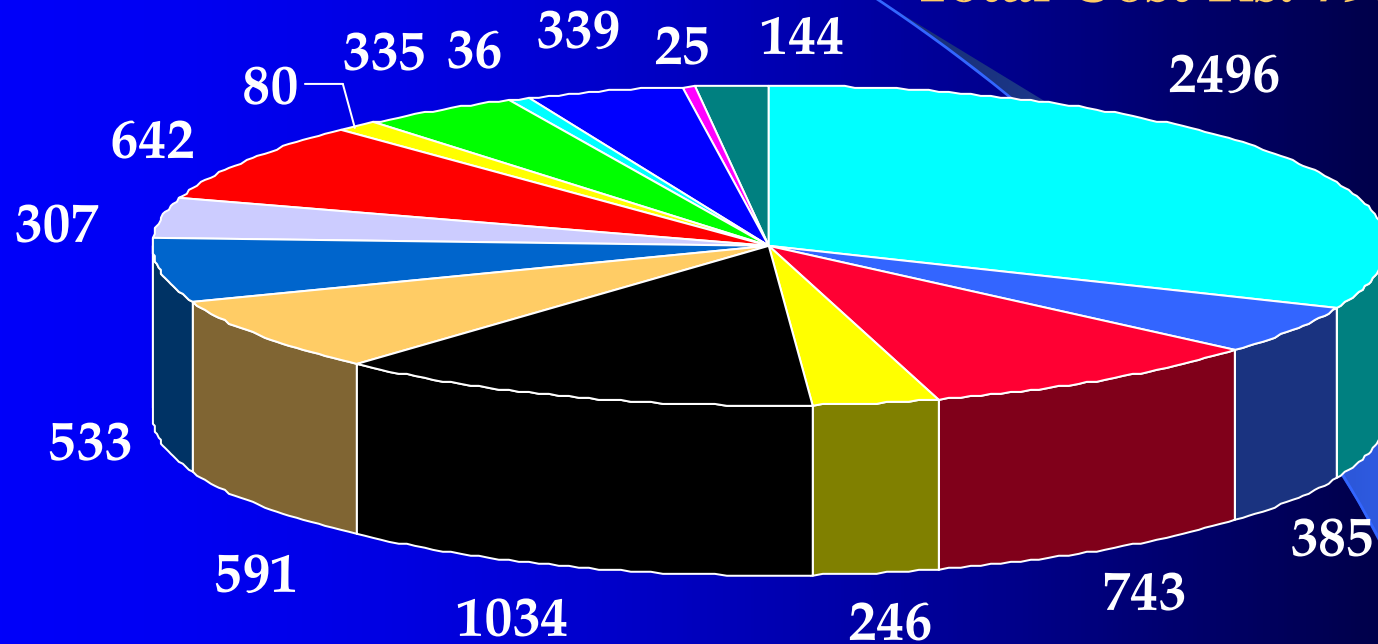
Trade and  
Enterprise  
Resurgence

Renewal of  
Social Capital

Reinforcement of  
Critical  
Infrastructure

# TOTAL ESTIMATED RECONSTRUCTION COST

Total Cost Rs. 7936 Cr.



- Housing
- Education
- Rural Water Supply
- Urban Infrastructure
- Transportation
- Disaster Management
- Rural & Cottage Industry
- Others
- Health
- Dams & Irrigation
- Public Buildings
- Power
- Agriculture
- Community Participation
- Project Management

# MAJOR FUNDING AGENCIES FOR RECONSTRUCTION

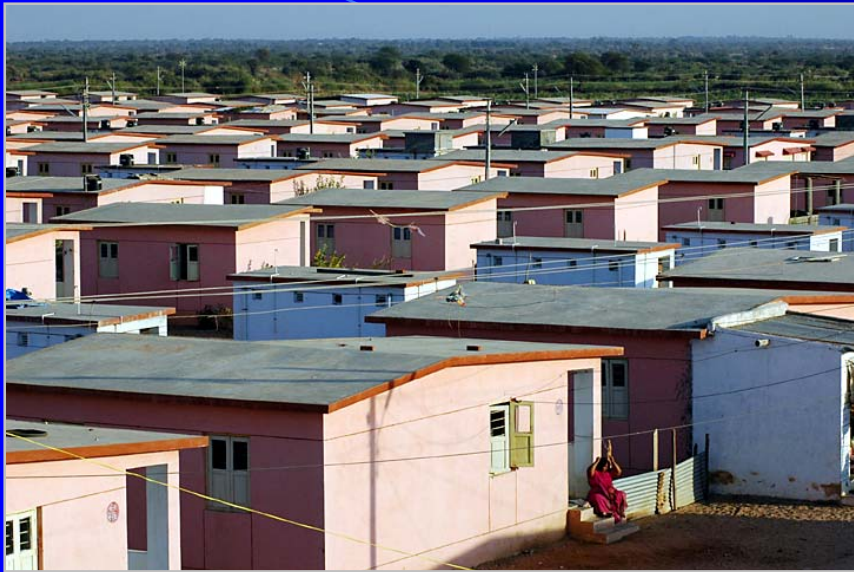
Amount in Rs. Crores

|                           |              |
|---------------------------|--------------|
| World Bank (Phase I + II) | 3,181        |
| ADB                       | 1,572        |
| EC                        | 170          |
| The Netherlands           | 332          |
| GoG                       | 1,363        |
| GOI                       | 724          |
| Others                    | 594          |
| <b>TOTAL</b>              | <b>7,936</b> |

## TASK ACCOMPLISHED-TILL DATE

- 1,99,739 ( 90%)Houses reconstructed & 9,08,741 (99%) Houses repaired
- 12,442 Schoolrooms reconstructed & 42,678 schoolrooms repaired (100%)
- 3,391 public building repaired & 1,245 public buildings reconstructed and work in 562 buildings in progress
- 8,492 km of transmission and distribution lines strengthened
- Repair/reconstruction of 3,915 km(98%) of roads have been completed and rest are in progress
- All 179 bridges have been restored
- 2,430 km(91%) of water supply pipelines laid including drilling of 222 deep tube wells
- 166 Dams out of 222 Dams restored
- Restored livelihood of 2,00,000 families

# HOUSING



# HOUSING : RECOVERY APPROACH

## HOUSING APPROACH

### **Owner Driven Reconstruction**

- Owner the prime mover of the reconstruction process and reconstruction as per the need, pace and will of the owner
- Government providing material, technical and financial assistance
- A sense of acceptance and ownership leading to higher occupancy
- Flexibility of expansion based on needs
- Knowledge transfer resulting in long term disaster management capacity building

### **Public Private Partnership Program**

- Partnership with 80 NGOs on a 50% cost sharing basis with government
- Community through Gram Sabha to approve NGO involvement

# HIGHLIGHTS

- Third party quality audit, NCCBM inspected 2,79,109 houses
- Payment of installments after engineers' certification
- Joint ownership of house by husband and wife
- Grievance redressal at village and district levels
- Insurance to 14 types of hazards
- District judge as ombudsman
- Payment made directly in bank accounts- 6,60,000 bank accounts opened
- Excise duty exemption for building materials procured in Kutch
- Minimal relocation and no secondary displacement
- Choice of relocation decided by village community
- Multi-hazard resistant reconstruction
- 1082 material banks have distributed over 219 lakh cement bags

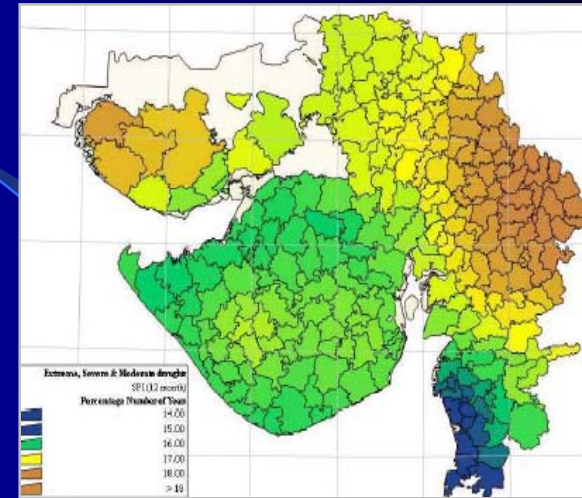
# HOUSING INSURANCE

- First in the country to insure houses reconstructed
- Who will insure?
- What will be the premium?
- How to educate people?
- How many years?
- How many perils?

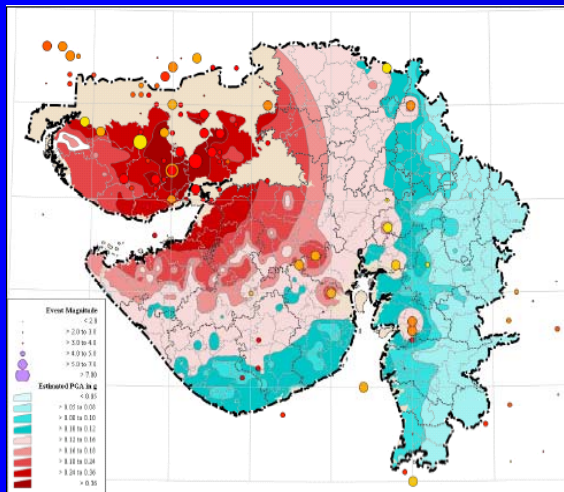


# GUJARAT-HAZARD PROFILE

- Gujarat is prone to Earthquake, Flood, Drought, Cyclone, Chemical hazard and Tsunami
- Series of disasters that hit Gujarat since 1998
  - Cyclone: 1998 & 1999
  - Drought: 1998, 1999, 2001, 2002 & 2003
  - Earthquake: 2001
  - Flood: 1998, 2003, 2004 & 2005



Drought Hazard Map



# OBJECTIVES

- To focus on vulnerability reduction.
- To ensure speed of response through better preparedness.
- To integrate Disaster Management into development planning efforts.
- To create awareness and stakeholder participation based on a multi-disciplinary approach.
- To institutionalise mechanisms for learning from other experiences.
- To capitalise on existing resources, networks and experience.

# WHAT GSDMA HAS DONE

- **Formulation of Policies**
- **Installing a statutory framework**
- **Preparation of DM Plans**
- **Preparedness Initiatives**
- **Capacity Building**
- **Mitigation Measures**
- **Community Preparedness**

# DISASTER MANAGEMENT

## -A PARADIGM SHIFT

- The Gujarat earthquake resulted in a **paradigm shift** in the policy from “**relief and humanitarian assistance**” oriented post-disaster intervention to a “**pro-active prevention, mitigation and pre-disaster preparedness**”
- The Gujarat State Disaster Management Authority(GSDMA) was created on 8<sup>th</sup> February 2001 to act as a nodal agency for earthquake reconstruction after Gujarat Earthquake, 2001
- Comprehensive Gujarat State Disaster Management Policy (GSDMP) was declared in November, 2002
- Gujarat State Disaster Management Act was enacted in March, 2003 to provide statutory authority

# DM INITIATIVES

- Purchase of equipments, training of fire service and volunteers, distribution of boats and basic rescue equipments to villages
- Preparation of disaster management plans: village, taluka, district and state level plans
- Creation of regional response centers and construction of district and state EOC
- Information education campaigns to create awareness among people
- Community based disaster risk reduction program
- Revision of rules and introduction of regulations- revision of GDCR
- GIDM and ISR formed to mainstream training and research

## DM INITIATIVES

- Syllabus revision in engineering colleges and polytechnics to include seismic engineering
- School safety programs launched
- In addition to IDRN a state level system SDRN created to capture the data of inventories and equipments available with public and private sector
- Teachers, PRI members, volunteers from village level rescue forces trained in large numbers
- Studies undertaken for long term risk reduction- preparation of Atlas, revision of building codes, seismic microzonation, early warning and communication etc

# INTERNATIONAL REGOGNITIONS

- GSDMA awarded **Commonwealth Association for Public Administration & Management (CAPAM) GOLD Award** for Innovations in Governance-year 2004
- GSDMA was awarded the **U.N Sasakawa Award for Disaster Reduction** for the year 2003
- GEERP awarded **Green Award by World Bank** for successfully integrating environmental concerns in the emergency reconstruction program-year 2001

# LIMITATIONS

- Additional expenditure for interim shelters to delay the reconstruction of houses in 4 towns
- Pre-impact social and cultural factors
- Urgency of people wanting to go back to normalcy or what is known
- Backwardness and illiteracy in the affected areas



# LIMITATIONS

- Terms and conditions of the lending institutions
- Target oriented approach of the donors, contractor driven NGO reconstruction
- Limitations due to legal and legislative procedures in land acquisition and town planning
- Media pressure and camcorder policies

# Lessons Learnt

- Owner driven reconstruction demands more from government than contractor/donor driven reconstruction
- Not all owners have the capacity to undertake reconstruction on their own like single mothers or widows etc
- Control of construction material cost critical-address inflation
- Information, education campaign critical
- Technical guidance and quality audit critical for owner driven reconstruction
- Without enabling mechanisms owner driven reconstruction will reinforce pre-disaster patterns of vulnerability

# Lessons learnt

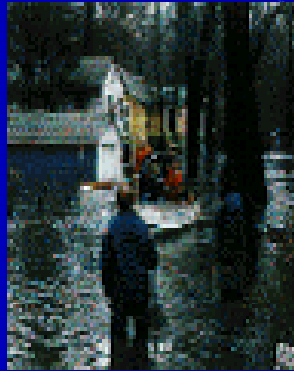
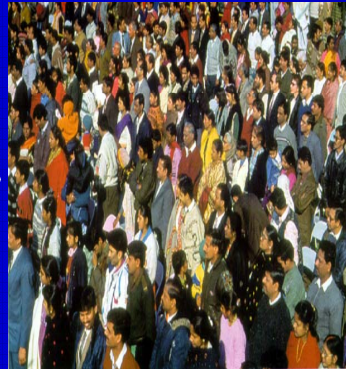
- Livelihood rehabilitation should not be asset centric
- Setting up an Extra-ordinary mechanism is necessary, but it should have a clear mandate
- Non involvement of beneficiaries in reconstruction by NGOs, non adherence to quality and lack of accountability
- Careful selection of NGOs needed, and they should have an exit policy
- WB funding may involve cost and time over runs and also in cost escalation

# Issues

- How to ensure compliance?- In Gujarat we had no option but to withhold the third installment and force retrofitting
- How to ensure real participation? What is the lowest level of identifiable last unit?
- How to ensure accountability of external agencies to take part in reconstruction?
- How to Institutionalize the initiatives?
- Mechanisms for enforcement.

# VISION

Imagine a Gujarat where.....



Disaster strikes;

Communities react with sense of urgency but in a planned way

Only a few structures are damaged

... with a limited death toll

... and a limited impact on the state exchequer

- Risk assessment
- Information monitoring

- Awareness
- Training
- Drills
- Contingency plans

- Planned development
- Policies, guidelines

- Contingency plans
- Rapid response mechanisms

- Risk transfer mechanisms
- Effective program management