Financing of flood control & management

Nirmal Sengupta

Flood in India :

Average ANNUAL Losses

Area affected	**7.55 m. ha.**
Cropped area affected	**3.55 m. ha.**
Human death	**1595**
Head of cattles lost	**94772**
Houses damaged	**1.2 million**
Total damage	**Rs. 1,805 crores**

- **Most Flood-Prone Country in the World**

RECENT Floods in India :

Damages & Assistance (Rs.Crores)

year	Damage reported	Recommended **CRF**
2002-03	2575	1600
2003-04	4434	1587
2004-05	3337	1286
Annual average	1805	

- **Loss increases with increasing levels of developments**

Economic Value

Social Cost ≠ Damage

It includes also the future incomes lost

Social Cost multiplies due to --

- Repeated floods resulting in loss of incentives to invest
- Delayed reconstruction and rehabilitation

Economic Value

Social Cost multiplies due to --

- Repeated floods resulting in loss of incentives to invest

flood prone area = 45.36 mha
area affected annually (av.) = 7.55 m. ha.

on an average a flood in each 6 years over the flood prone area

Not uniformly distributed
Some areas have more frequent floods

Megadisasters - India :

Estimated Damages（ in 2005 $）

Name	year	Billion $
Orissa Cyclone	Oct 1999	**1.1**
Gujarat Earthquake	Jan 2001	**2.3**
East Coast Tsunami	Dec 2004	**2.2**
Worst ever flood	1988	**1.81**
Flood –Annual average	Every year	**0.41**

Hurricanes of US - Insured loss

year	No of Hurricanes *	Insured Losses (bill. $)	Major Hurricanes	Insured Losses (bill. $)
1996	3	2.3		
1997	1	0.07		
1998	2	4.0	Georges	3.5
1999	5	2.7		
2000	—	—		
2001	—	—		
2002	1	0.47		
2003	2	1.9		
2004	5	23.7	Charley	7.7
			Ivan	7.4
			Frances	4.8
			Jeanne	3.8
2005	6	57.3	Katrina	40.6
			Wilma	10.3
			Rita	5.0

* Includes incidences of at least $25 million loss

RECURRENT Floods of India

vs US Megadisasters

	year	Insured Losses (billion $)
USA		
Hurricane Katrina	2005	40.6
Terrorist attack (9/11)	2001	20.7
Calif. earthquake	1994	16.5
Hurricane Andrew	1992	21.6
India:		
Average Flood Loss	Every year	0.41

* GDP of US is 12 times that of India

Major Disasters in India - Frequencies

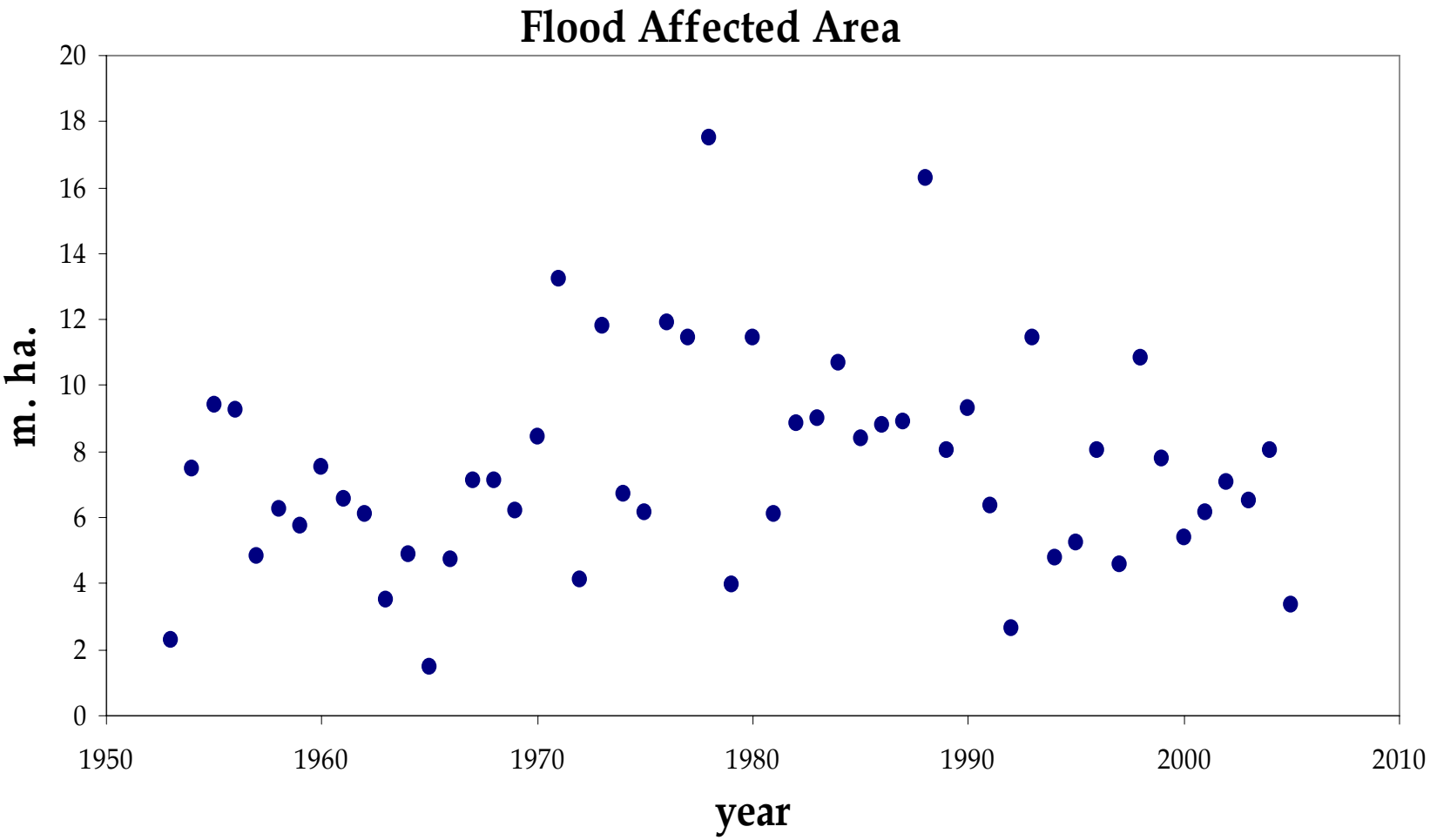
Between 1990 - 2005

Type of Disaster	**No. of Disasters**
Cyclones (category IV-V)	**4**
Earthquakes (R. 6+)	**5**
Tsunamis	**1**
Floods	Every year
Droughts	Each 2-3 yrs.

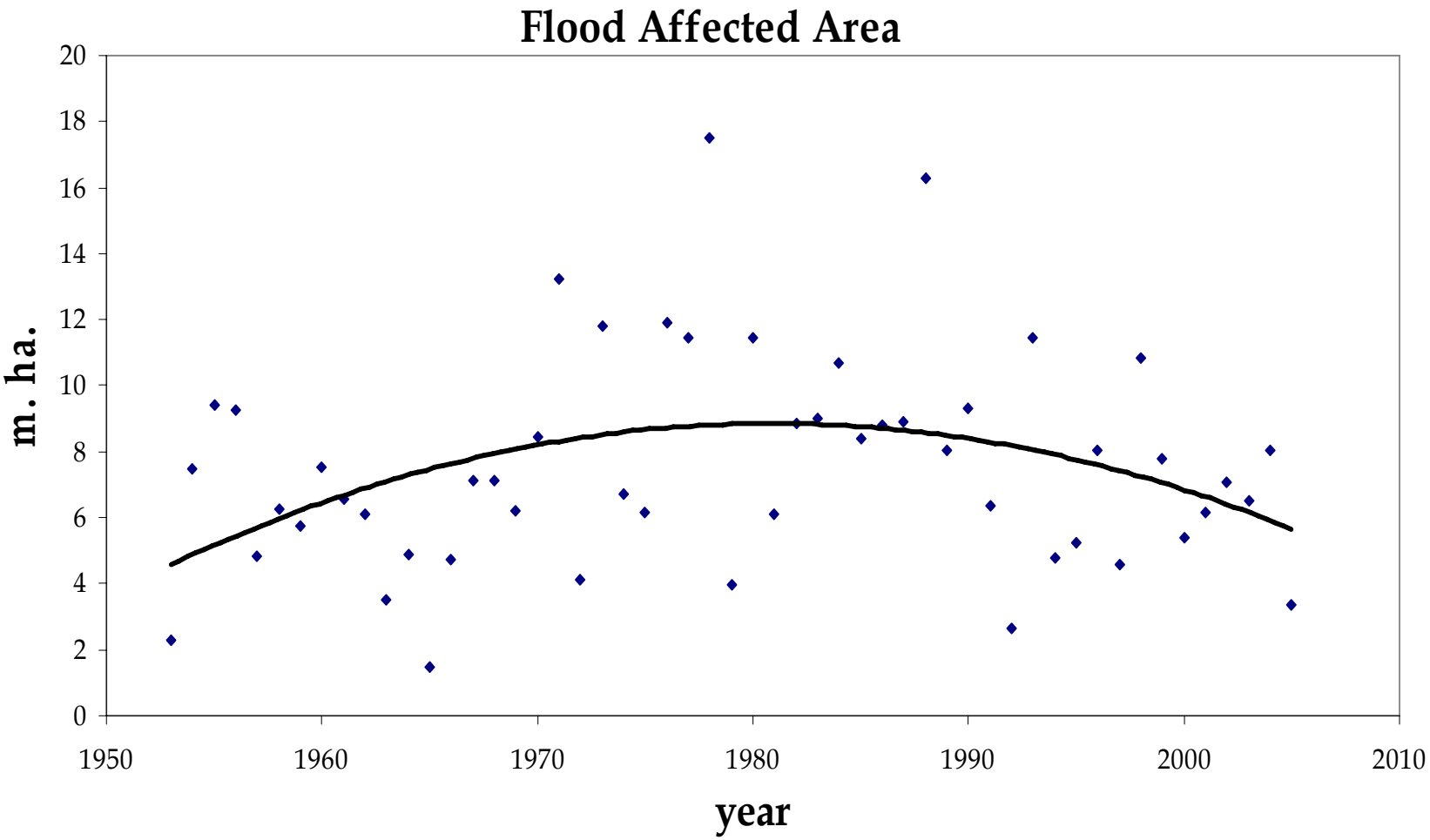
India - Evolution of Flood policy

- Major theme before independence
  - 1850 – Damodar Embankment
  - Intense Technological Discussion – no investment
  - Nationalist party - Important Agenda
  - D.V.C. – work began in1944. Other projects ready
  - D.V.C. , Hirakud, Ukai dams built immediately after independence
- Silent shift after independence
  - No other dam primarily for flood control
  - Embankment primary. Also, flood cushioning etc.
  - National Flood Commission (1976) – non-structural measures
- Disaster Management Phase
  - UN Decade for Natural Disaster Reduction (1990-2000)
  - National Disaster Management Program –
  - Flood Management included

India Flood policy- Assessment



India Flood policy- Assessment



Evolution of Indian Flood Policy

Financial Motives

- ***Colonial Era*** – no incentive
- ***Large Dam Era*** – cost recovery problem. Hence multipurpose projects. Other 'purposes' overshadowed flood control
- ***Embankments*** – rejected earlier. But silently returned once dams ceased to be made
- ***Disaster Management*** – primary objective is damage reduction

Evolution of Flood Policy

US & Global

- ***Large Dam Era*** – enthusiasm of earlier years. Quick realisation that dams would not eliminate flood. New policy 'Keep the people away from flood'.
- ***Insurance*** – quick recovery reduces social cost. But frequent disasters resulted in bad business . Private insurers became unwilling.
- ***Federal Insurance Era*** – availability conditional. Implicit 'keep the people away from investing'.
- ***Crisis of Insurance*** – due to mega-disasters. Agencies became bankrupt. Different derivatives are being explored.

Should India introduce flood insurance ?

Social cost of disasters
can be greatly reduced

by fast rehabilitation

Rehabilitation works range

from psychological healings to restoration of property

Available Financial Instruments -

- **Grants and Subsidies**
- **Loans**
- **Insurance**

Financial instruments for rehabilitation

Grants

- Inadequate, Uncertain –

  Investment decisions by flood victims are instantaneous and short-sighted

- Delivery problem
- Corruption and wastage
- Non-recoverable – increases fiscal burden

Financial instruments for rehabilitation

Loans

- Difficult to design
  - -- Amortisation problem
- High risk of default
  - -- Private agencies would not be willing.

Financial instruments for rehabilitation

insurance

Insurance agencies are reluctant to extend flood insurance because of several problems :

- Risk estimation is very difficult
- Low coverage needs high premium. That in turn reduces acceptance
- Moral hazard & Adverse selection
- Catastrophic & Simultaneous disasters – bankruptcy of insurers

Financial instruments for rehabilitation

insurance

Insurer risk Issues -- solutions tried

- ✓ Government steps in – as Insurer or as Guarantor (UK)
- ✓ Mandatory Insurance (France) against low coverage
- ✓ Instruments to check Insurer bankruptcy –
  - **Reinsurance**
  - **Catastrophe Futures (CBOT, 1992)**
  - **Act of God Bond**
  - **Catastrophe (CAT) Bond**

Insurance

Indian scene - implementation problems

- Hazard Database necessary
- Investment guidelines necessary
- Extend Weather Index Insurance
  - introduced in 2003 for drought
- Insured Party ?
  - Farmers or State & Local Govts.

For
All Aspects of
Disaster Management

Disaster Management :

Disaster

= Hazard X Vulnerability

Strategy : **Target either or both the components**

Possibilities for Flood Disaster Management -

- Hazard reduction (e.g. flood control structures)
- Vulnerability reduction (e.g. early warning)

Note:

Earthquake or Tsunami hazards cannot be reduced

Flood – Hazard Reduction
Available Structural Options

Storages	**Best but not made or operated so** **cannot eliminate flood. Moderates**
Embankments	**Once Condemned. But technology improved.** **Need assessment and selection**
Wilcocksian	**Developed for India** **Not implemented as yet**

Flood – Vulnerability Reduction
Neglected Tasks

After Latur Earthquake

- Earthquake resistant construction technology developed

After Gujarat Earthquake

- New building standards in seismic zones adopted

After Orissa Supercyclone

- Network of cyclone shelters constructed
- Emergency evacuation plans for communities in coastal areas introduced
- Livelihood restoration integrated in poverty alleviation program

After East coast Tsunami

- Tsunami Early Warning system

But no parallel initiative taken after any flood