Learning from the past

Understanding disaster risks based on the occurrence and impacts of natural disasters

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Regional Training on Risk Assessment, Dakar – November 25-27, 2009

Outline of the presentation

- Disaster loss database and disaster risk reduction
- Demonstration of disaster loss database from Sri Lanka
- Long-term vision – National Disaster Observatories

Disaster Information Management

Current Situation –

- No systematic method for collecting information about hazard events and their impacts
- At the most, scattered information with various agencies without any coherence and coordination
- As a result, no meaningful analysis to understand the trends, spatial and temporal impacts and hence poor understanding of potential risks and their impacts
- Finally, no integration with development programming since no evidence exists

Impacts of natural disasters

Direct Impacts: Loss of human life, injuries, damage/ destruction of buildings (houses, schools, hospitals, industries) & infrastructure (telecommunication, electricity, roads, railways), agriculture

Indirect impacts: Economic losses, long-term impacts, employment, informal sector,…

Disaster loss database captures direct losses

Development of Disaster Loss Databases
- Methodology -

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Methodology:

GLOSARY OF TERMS: EVENTS

ACCIDENT	**HAILSTORM**
FLASH FLOOD (ALLUVION)	**HEAT WAVE**
AVALANCHE	**LANDSLIDE**
BIOLOGICAL DISASTER	**LEAK**
COASTLINE EROSION	**LIQUEFACTION**
DROUGHT	**TSUNAMI**
EARTHQUAKE	**PLAGUE**
ELECTRIC STORM	**POLLUTION**
EPIDEMIC	**RAINS**
VOLCANIC ERUPTION	**SEDIMENTATION**
EXPLOSION	**SNOWSTORM**
FAILURE	**SPATE**
FIRE	**STORM**
FLOOD	**WINDSTORM**
FOREST FIRE	**STRUCTURE**
FROST	**SURGE**

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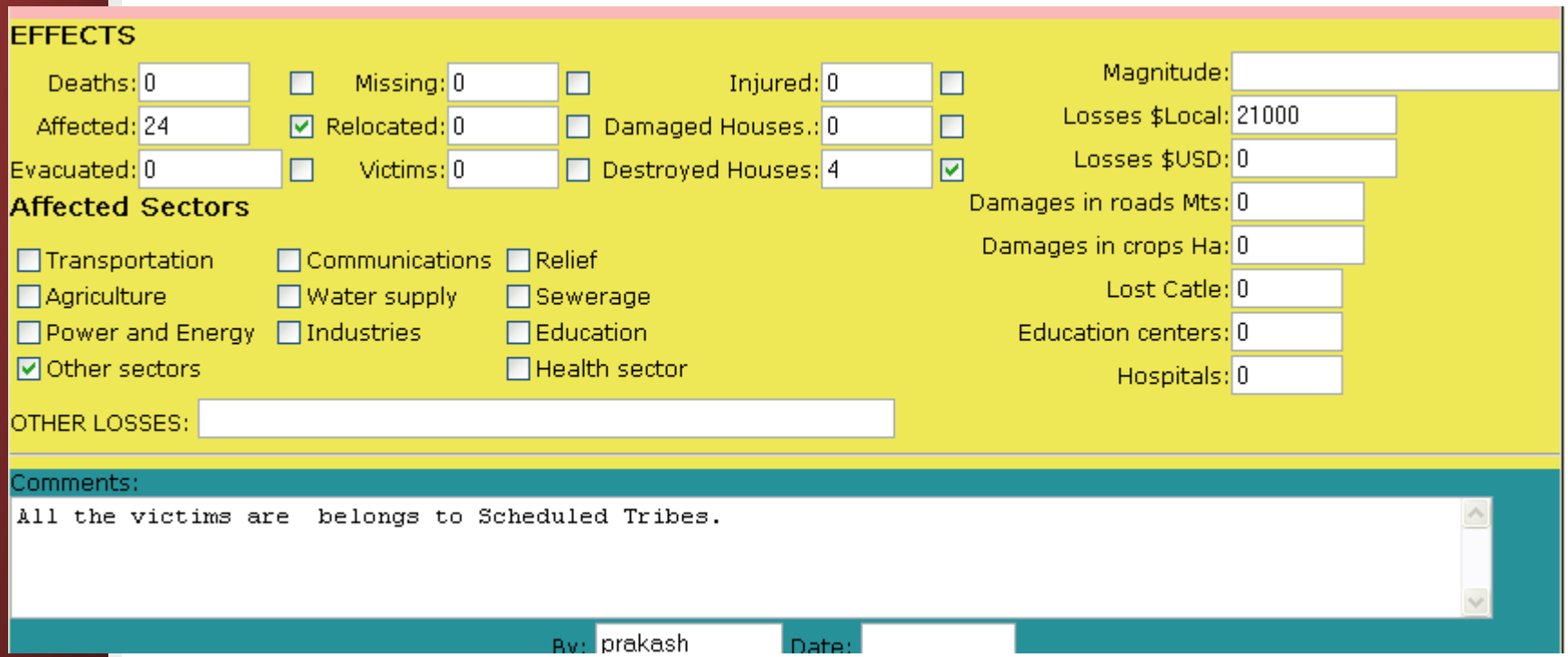
Methodology

DEFINITIONS OF EFFECTS



Methodology

- Recommendations & How to's:
  - Selection of Boundaries
  - Choosing the maximum resolution
  - Selecting Codes (and names)
  - The Period of the research
  - Selection of sources

Methodology:

- Recommendations & How to's:
  - When disaggregated data is unavailable
  - Discrepancies among sources
  - "Chained" events
  - When geographical units are split
  - Long duration events

Preliminary Analysis Methodology:

- Preliminary analysis is a set of **SIMPLE** operations that can be routinely applied to a database to produce proxy indicators of Risk and help identifying patterns and trends
- Is called “Preliminary” because it doesn’t correlate the data with other possible sources of data such as demography, topography, land use, etc. It is a “self-contained” analysis
- Deeper analysis should be done after to further prove conclusions and establish causes

Preliminary Analysis Methodology:

- Composition of disasters (type and effects)
- Temporal analysis (changes and trends)
- Spatial distribution analysis (spatial patterns)
- Cause-effect analysis
- Statistical Analysis (mean, max, deviation, variance)

Potential Uses

- Development of local vulnerability and recovery functions for Risk assessment models
- Support for plans (Preparedness, Risk Mitigation, etc)
- Monitoring mechanism
- Validation of Risk & Hazard Maps
- Support for Policies/Regulations and investments
- Damage Assessment System in major disasters
- Other applications

Analysis of Historical Disaster Loss Data of Sri Lanka

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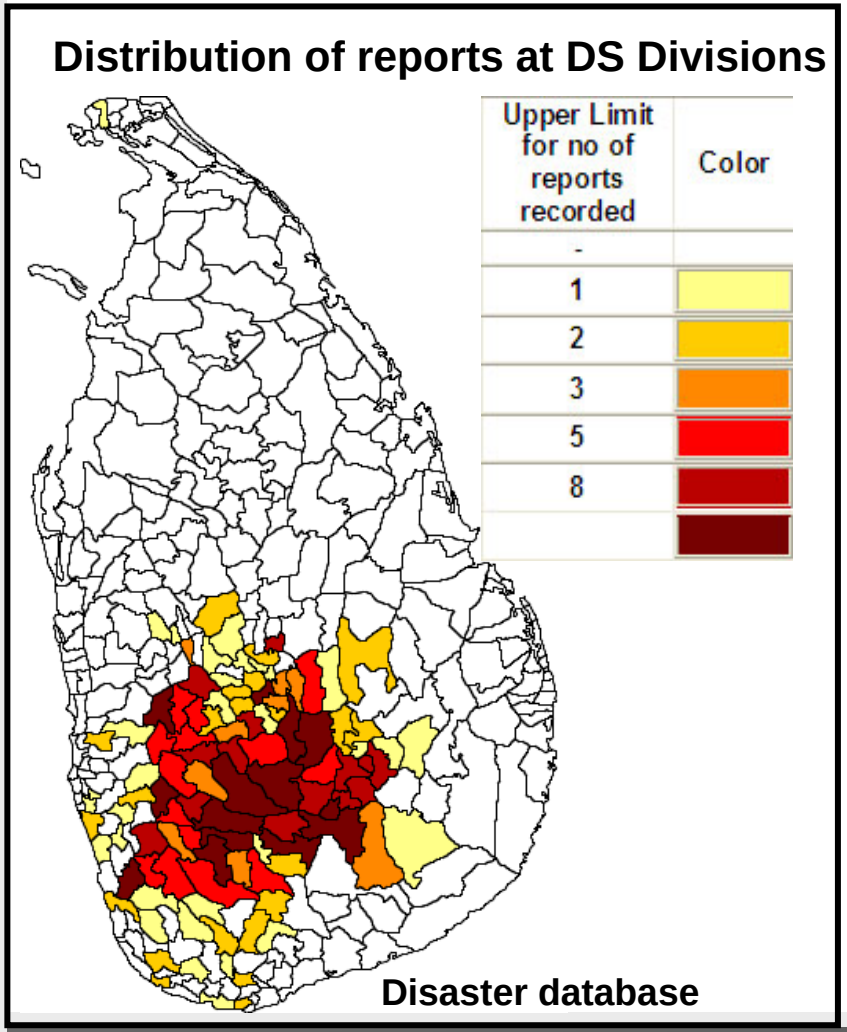
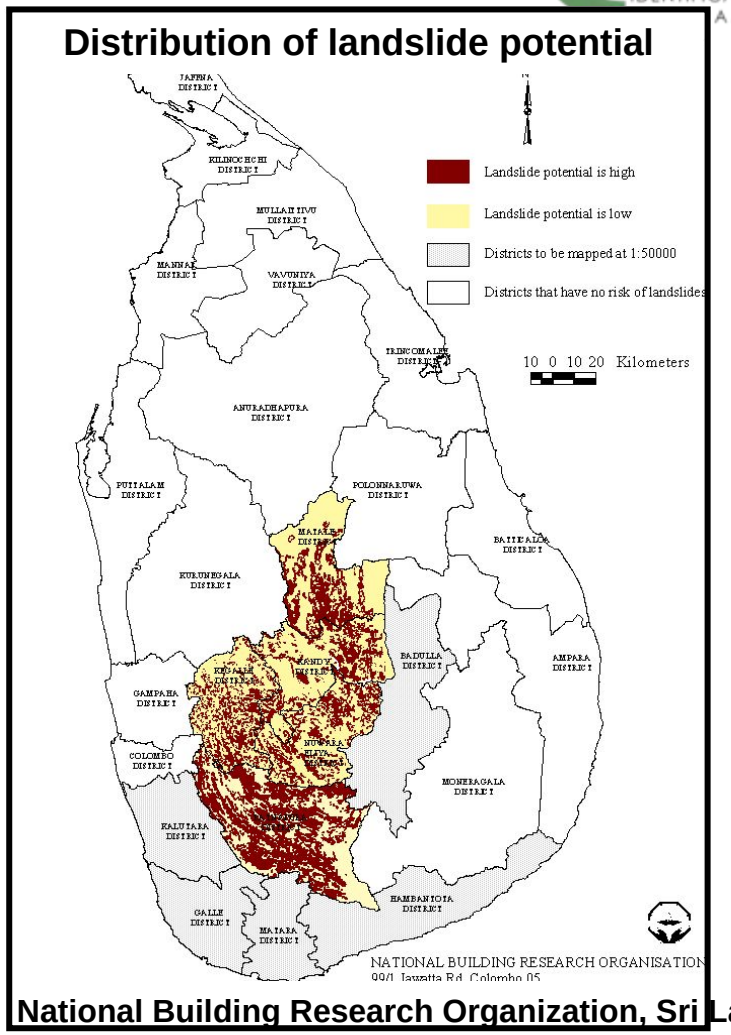
Disaster Database in Sri Lanka

- **Origins**
  - Introduced to Sri Lanka in the aftermath of the Tsunami
- **Data sources**
  - Initially collected from newspapers (Dinamina and Daily News) and later verified with various official records
- **Historical records**
  - Records date back to 1974
- **Hazards Covered**
  - Events reported for 25 different types of hazards
- **Geographic Coverage**
  - Data was collected for the Provincial, District and Divisional level
- **Data Entry**
  - The data was collected and entered into the system by a team of research assistants trained and supervised by the DMC

Landslide Prone Areas





National Building Research Organization, Sri Lanka

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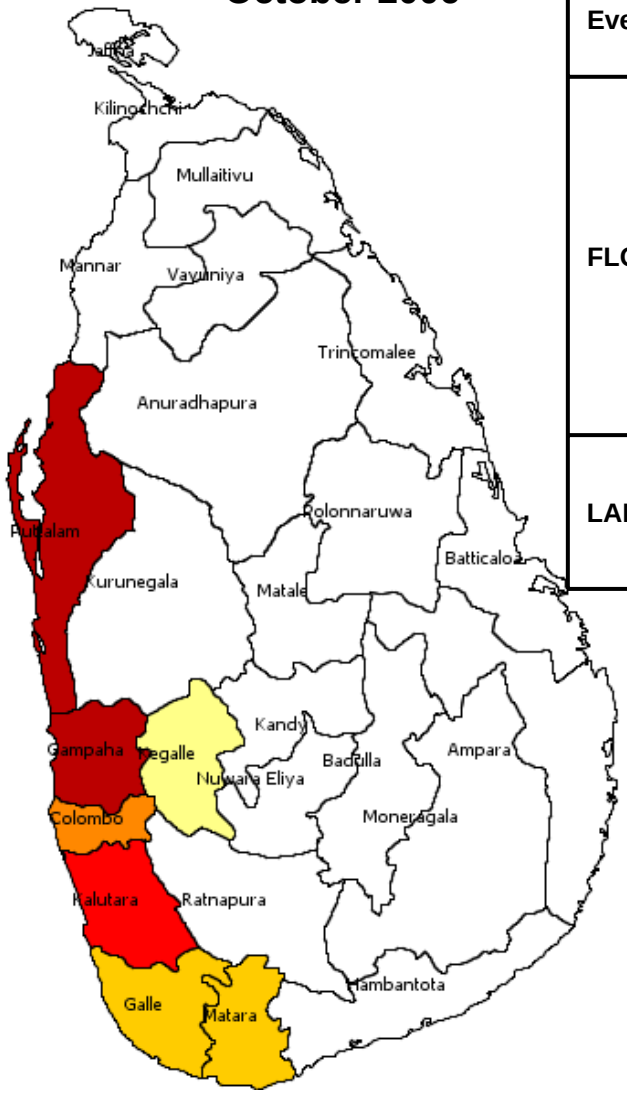
Flood and Urban Flood Disasters

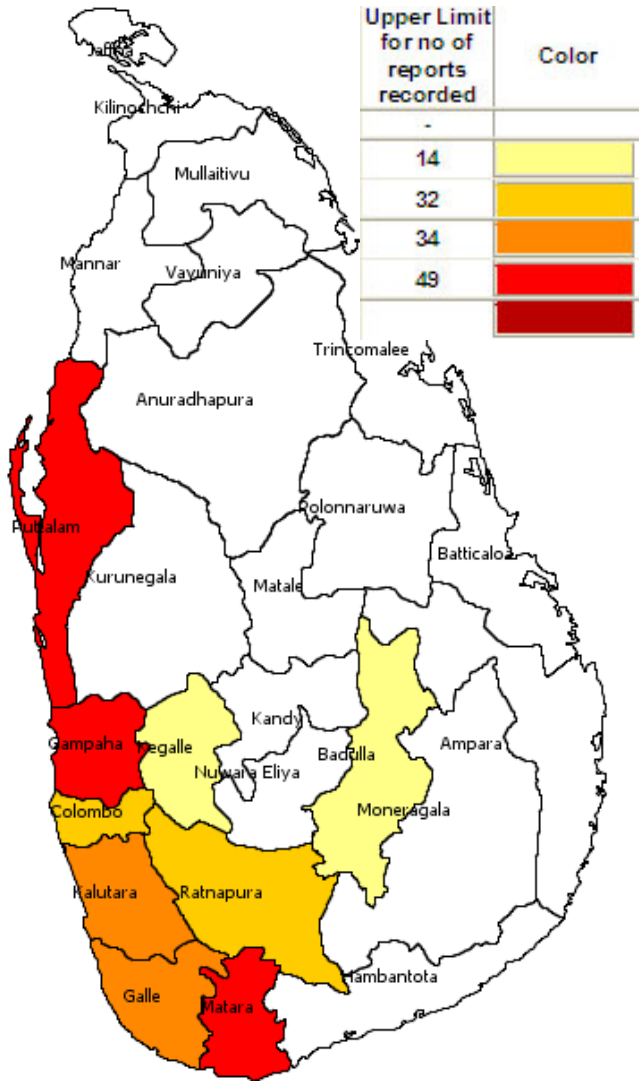
October 2006



Event	District	No of DS divisions affected
FLOOD	Colombo	8
	Galle	2
	Gampaha	12
	Kalutara	10
	Kegalle	1
	Matara	2
	Puttalam	12
LANDSLIDE	Badulla	1
	Kegalle	1
	Ratnapura	2

Upper Limit for No of DS Divisions affected	Color
-	
1	
2	
8	
10	
12	

October & November in 1974 to 2005



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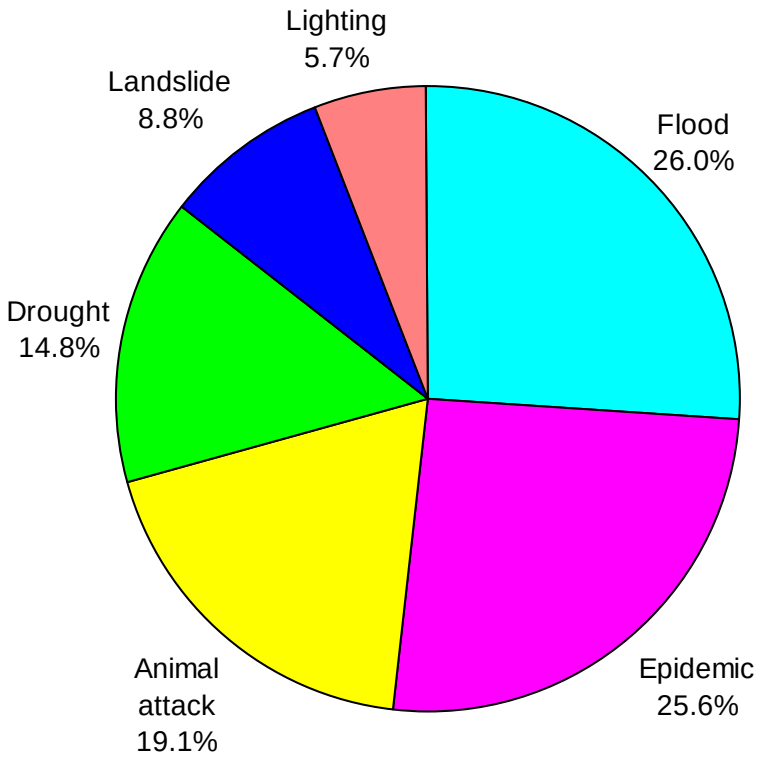
Disaster Typology



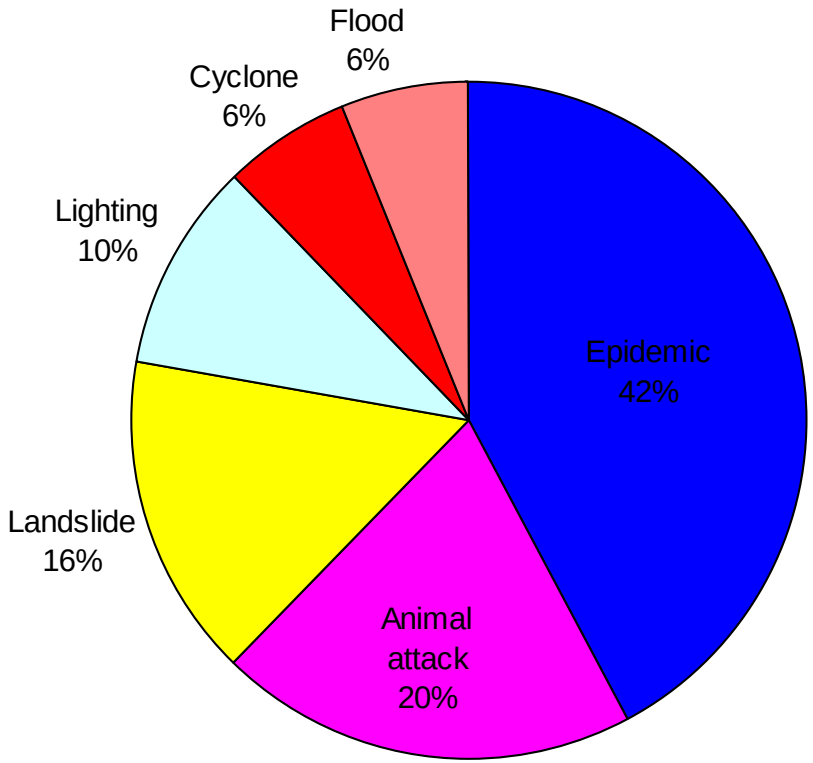
The six most frequently reported hazards represented in the pie chart above

The table describes the number of reports that have been recorded for each hazard type from 1974-2006.

Event	No of Reports
Flood	1430
Epidemic	1407
Animal attack	1048
Drought	815
Landslide	481
Lighting	315
Urban flood	174
Gale	158
Storm	154
Cyclone	121
Coastline	106
Forest fire	34

- The hazard that has been reported to occur most frequently in the country is flood, followed by epidemics, animal attacks, droughts, landslides and finally by lightening

Impact of Incidents on Human Life



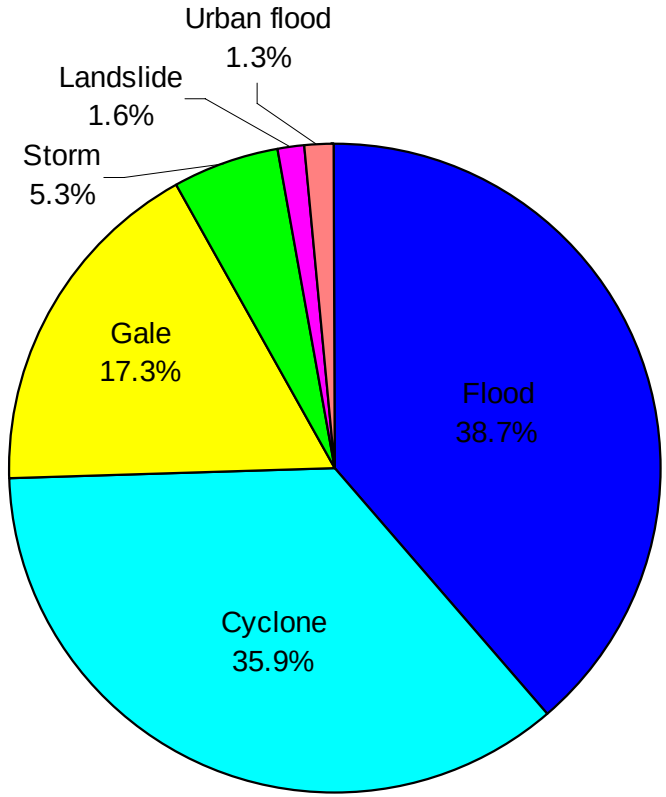
The six most frequently reported hazards represented in the pie chart above

This table depicts the total number of deaths that have resulted from the occurrence of the 12 most frequently occurring hazards from 1974-2006

Event	No. of Deaths
Epidemic	1609
Animal attack	750
Landslide	601
Lighting	375
Cyclone	233
Flood	231
Tornado	143
Storm	68
Snake bite	22
Gale	17
Structure	14
Coastline	9
Urban flood	8

- Although floods have occurred most frequently, epidemics claimed the largest number of lives followed by animal attacks, landslides, lightings, cyclones and floods

Impact on Housing (Damaged and Destroyed)



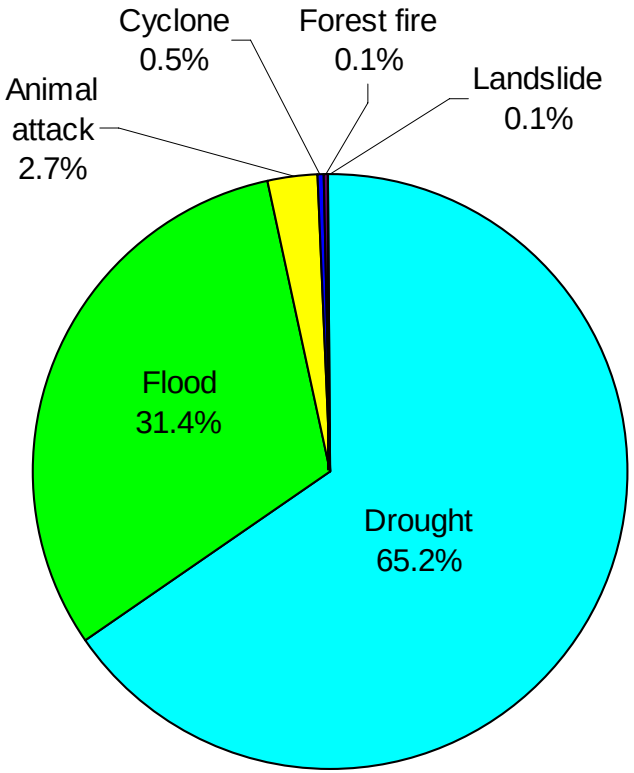
The six most frequently reported hazards represented in the pie chart above

The table in this slide depicts the damage and destruction caused to housing from the occurrence of the 12 most frequently occurring hazards from 1974-2006.

Event	No of damaged & destroyed houses
Flood	139849
Cyclone	129769
Gale	62701
Storm	19120
Landslide	5743
Urban flood	4632
Coastline	2727
Animal attack	2201
Surge	1017
Tornado	1013
Tidal wave	350
Flash flood	300

- Floods have caused the greatest damage and destruction to housing, followed by cyclones, gale force winds, storms, landslides and urban floods.

Impact on Crops



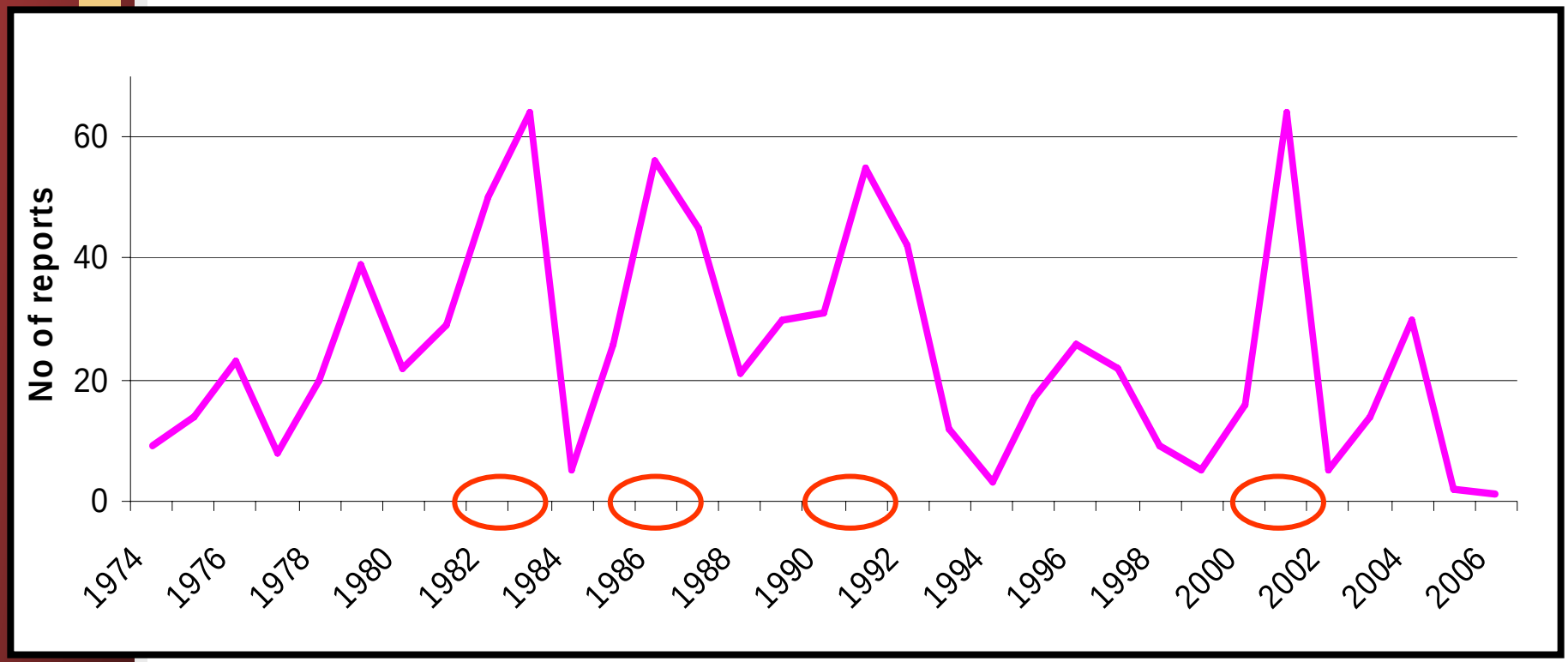
The six most frequently reported hazards represented in the pie chart above

The table in this slide depicts the damage and destruction caused to crops from the occurrence of the 12 most frequently occurring hazards from 1974-2006.

Event	Damages in crops (ha)
Drought	**586296.5**
Flood	**282933.4**
Animal attack	**24590**
Storm	**11000**
Cyclone	**4409.2**
Forest fire	**1128**
Landslide	**530.92**
Gale	**440**
Urban flood	**20**

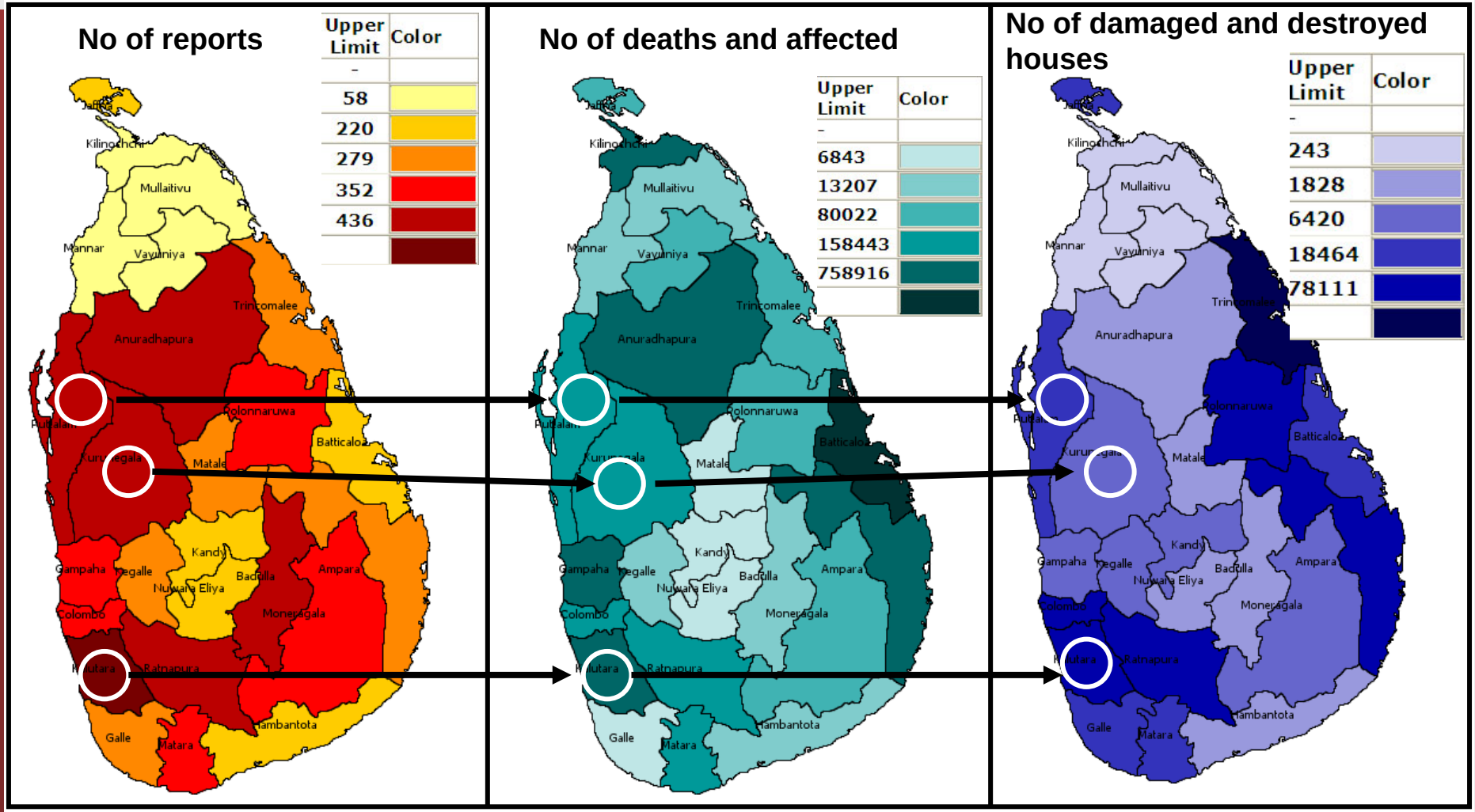
- Droughts accounts for the largest proportion of crop losses followed by floods, animal attacks, storms, cyclones and finally forest fires.

Disaster losses trends: Drought



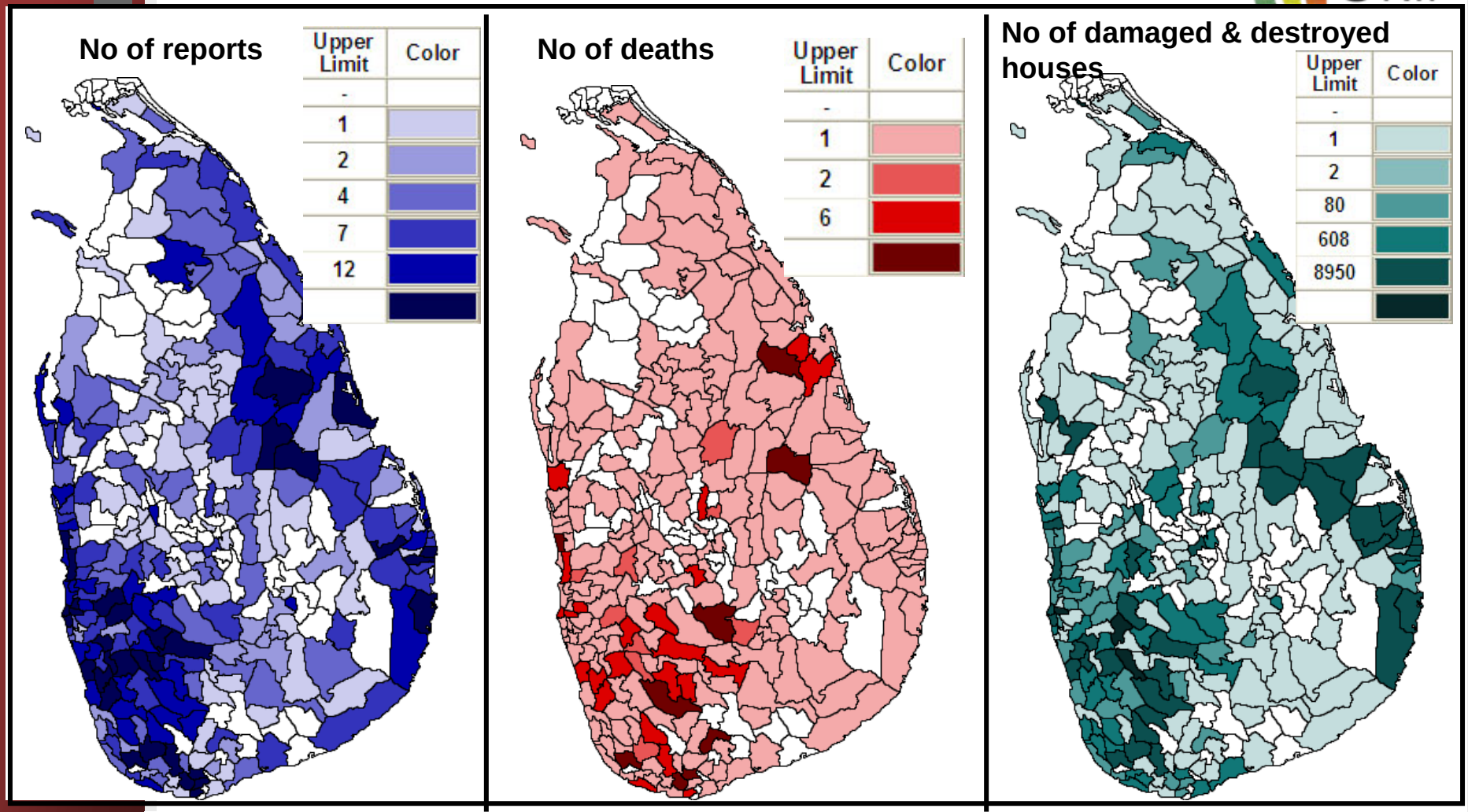
- Drought demonstrates a cyclical trend peaking in three to four year cycles with the highest number of recorded events taking place in 1982-83, 1986, 1991 and 2001

Most Disaster Prone Districts



- The districts of Kalutara, Ratnapura, Puttalam, Kurunegala, and Anuradhapura have been the districts most prone to disasters

Most Flood Prone Divisions



- The most flood prone Districts are Kalutara Rathnapura,Ampara, Matara and Galle

Summary of Preliminary Analysis

- Sri Lanka is a country that suffers from recurrent small and medium scale hazard occurrences
- The six most frequently occurring disasters in Sri Lanka include: floods, epidemics, animal attacks, droughts, landslides and lightening
- While floods have occurred most frequently, it is epidemics that claimed the largest number of lives, followed by animal attacks, landslides, lightings, cyclones and floods. Droughts have had the greatest impact on crop loses and floods on damage and destruction to housing
- The District's of Kalutara, Ratnapura, Kurnegala, Anuradhapura and Badulla have been the District's most prone to multiple hazards, followed by Puttlam, Moneragala, Polonnaruwa, Colombo

Overview

Disaster Loss Data – Long-term vision

Databases are just the first step – the Challenges

Disaster Observatories

What is being done

The Disaster Analyst

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Databases are just the first step

- Challenges
  - Sustainability
  - Analytical capabilities
  - Institutional frameworks
  - Identification of potential users and their needs
  - Generation and dissemination of knowledge

Disaster Observatories

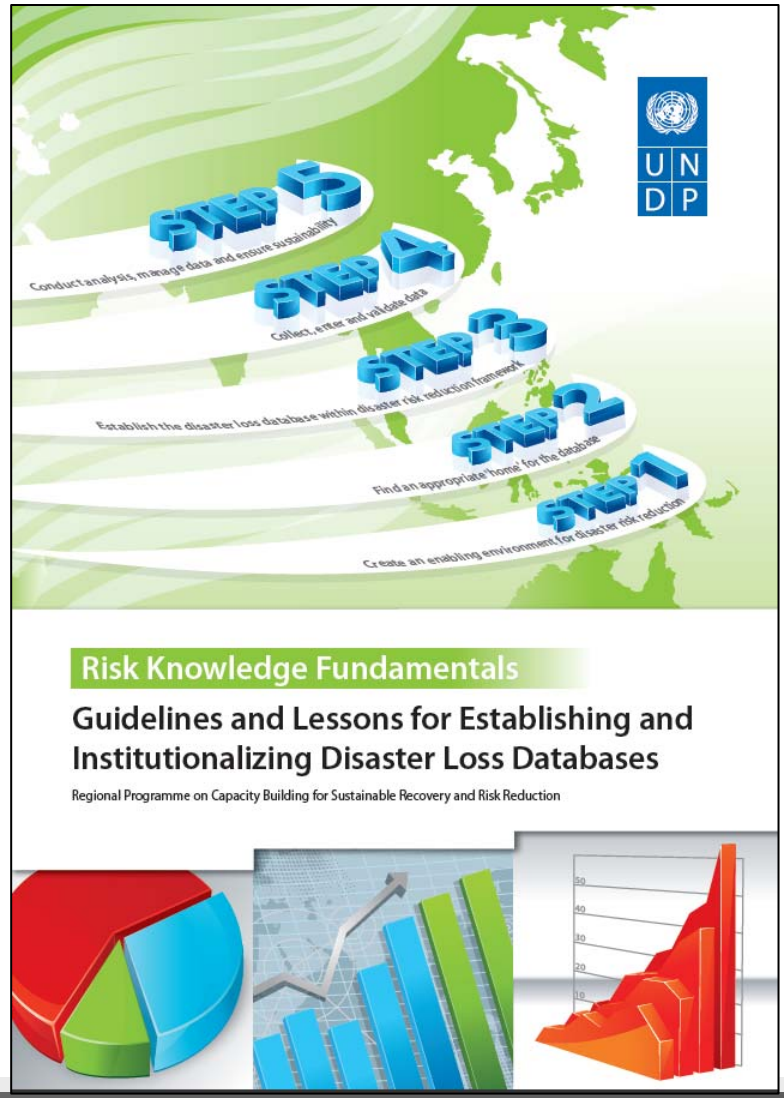
What is a Disaster Observatory?

A Disaster Observatory is a sustainable institution for the systematic collection, documentation and analysis of data about losses caused by natural hazards.

An observatory comprises:

- The arrangement itself within the institution (usually governmental)
- Human resources
- A computational infrastructure (software, database, national network, …)

Assessment of current situation



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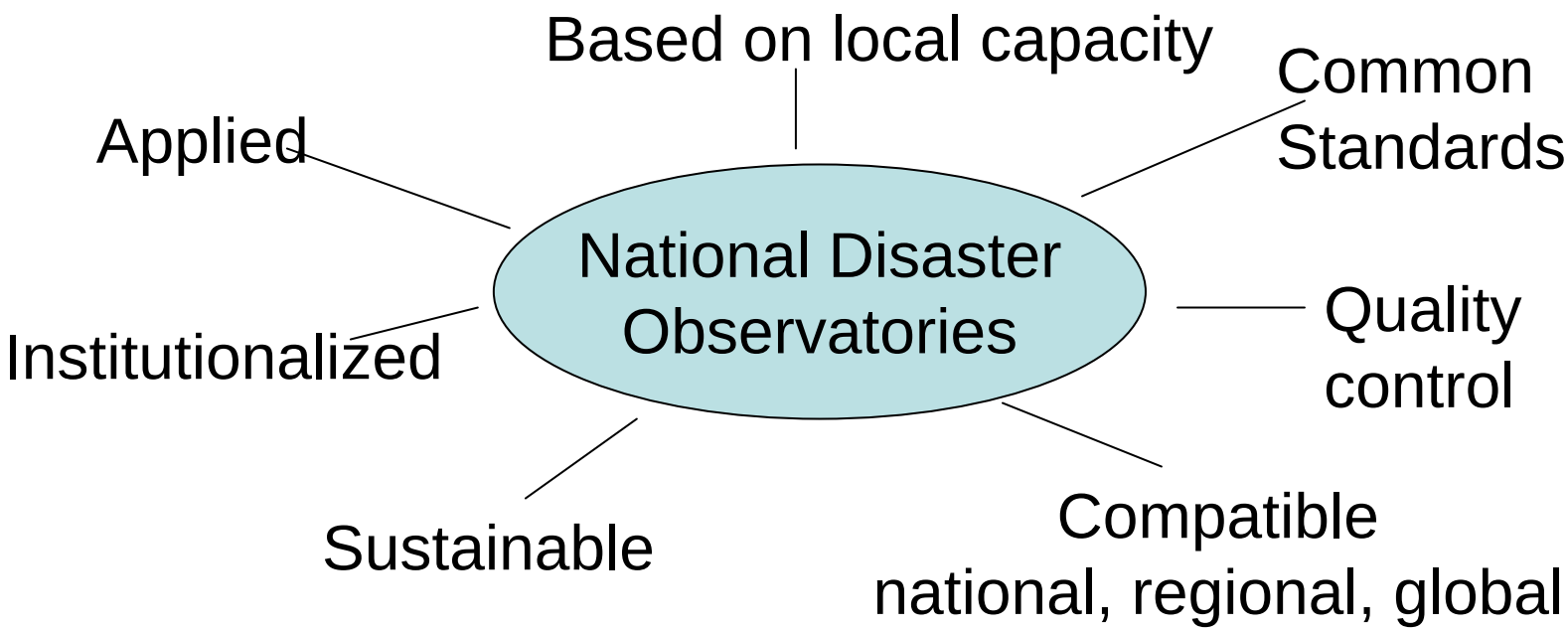
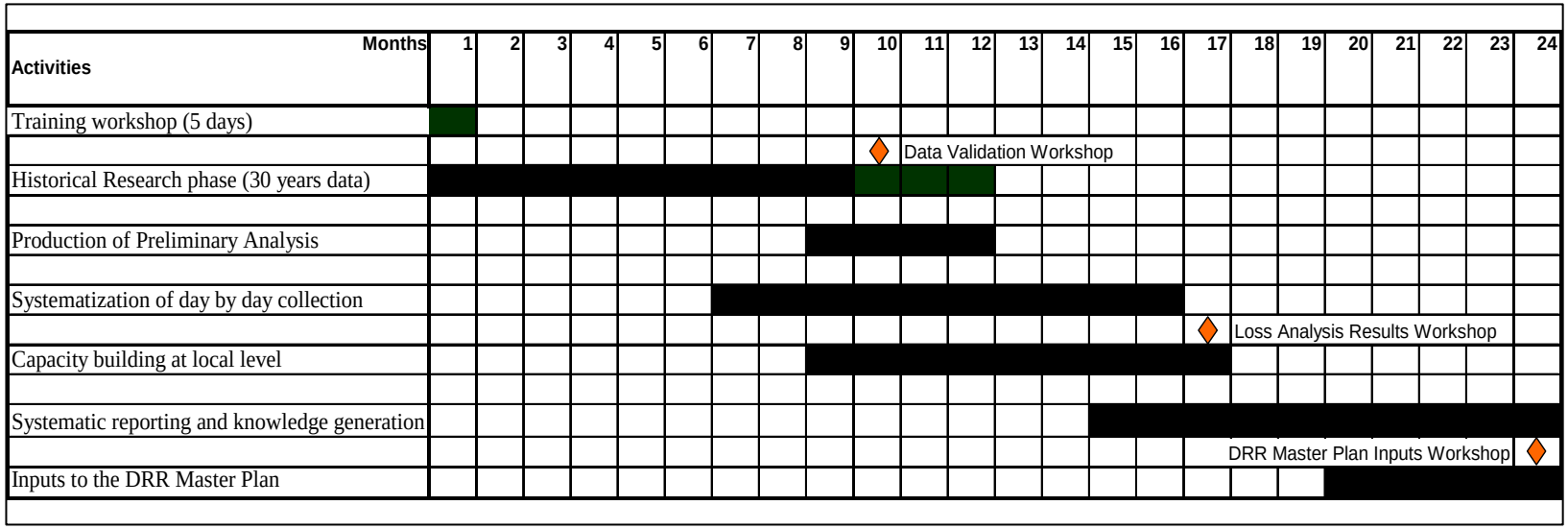
Characteristics of Disaster Observatories



IMPLEMENTATION ACTIVITIES

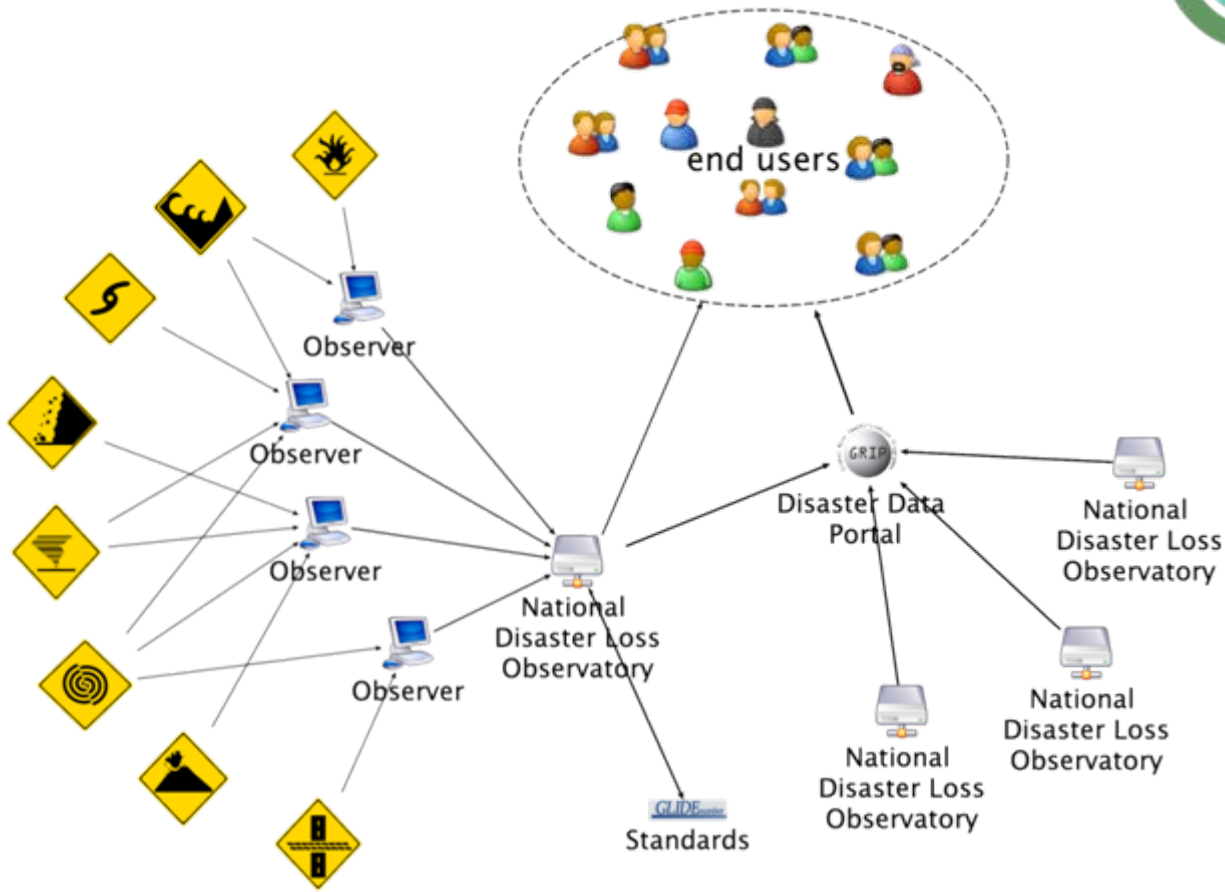
- Identification of partners/Host organization
- Training workshop (5 days)
- Historical Research phase (30 years data)
- Start of day by day collection
- Production of Preliminary Analysis
- Continuous improvement and quality control
- Mainstreaming Analysis into national DRR

Example of Timeline for implementation



Estimated budget: USD 75,000 – 100,000

National Disaster Observatories



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Outcomes & Applications

- **Inputs to the National Disaster Risk Reduction Strategy**
  - Better definition of goals, priorities and structure of risk reduction measures
- **Calibration and validation of Risk Assessments**
  - Confronting estimated vs. realized losses
- **Assessment of vulnerability and recovery capacity**
  - Physical, social, financial, political vulnerabilities
- **Monitoring effectiveness of risk reduction strategies and measures**
  - HFA's goal is reduction of losses

National Disaster Observatories

- Existing (run by Governments, GRIP or Partners)

  Asia

  Sri Lanka, Tamil Nadu, Orissa, Indonesia, Iran, Maldives, Thailand, Nepal

  LAC

  Mexico, Costa Rica, El Salvador, Colombia, Ecuador, Peru, Bolivia, Venezuela, Argentina, Chile, Paraguay, Panama

- Proposed or underway (countries implementing, interested or having Disaster Database)

  Asia

  Armenia, Afghanistan, Bhutan, Cambodia, Laos, PNG*, Vietnam*

  Africa

  Mozambique, Malawi, Madagascar

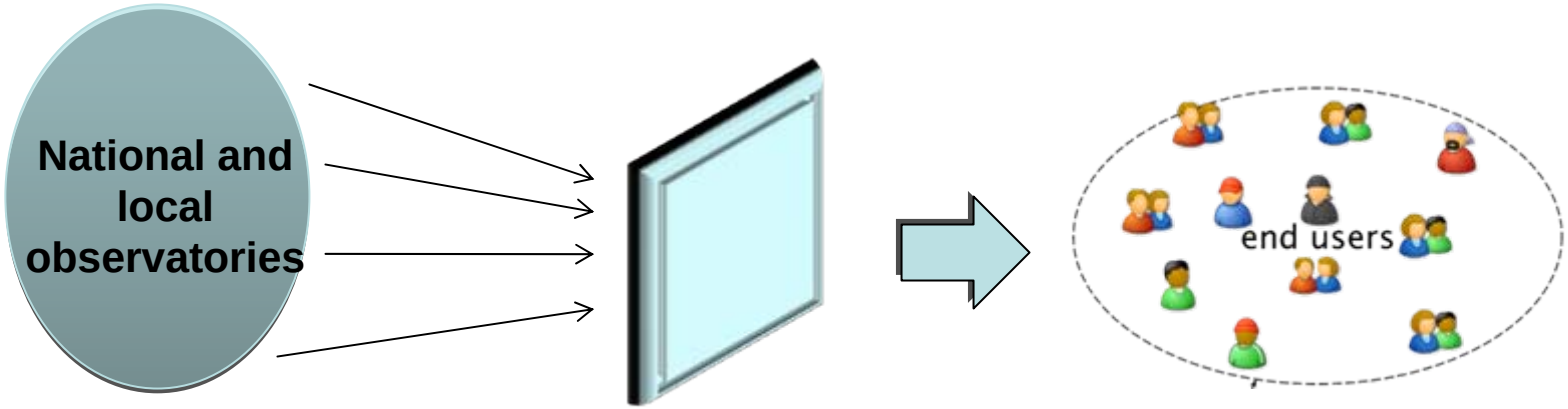
  LAC

  Nicaragua*, Guatemala*, Honduras*, Jamaica*, Cuba, Trinidad and Tobago*, Guyana*, Antigua & Barbuda, Uruguay, Organization of Eastern Caribbean States

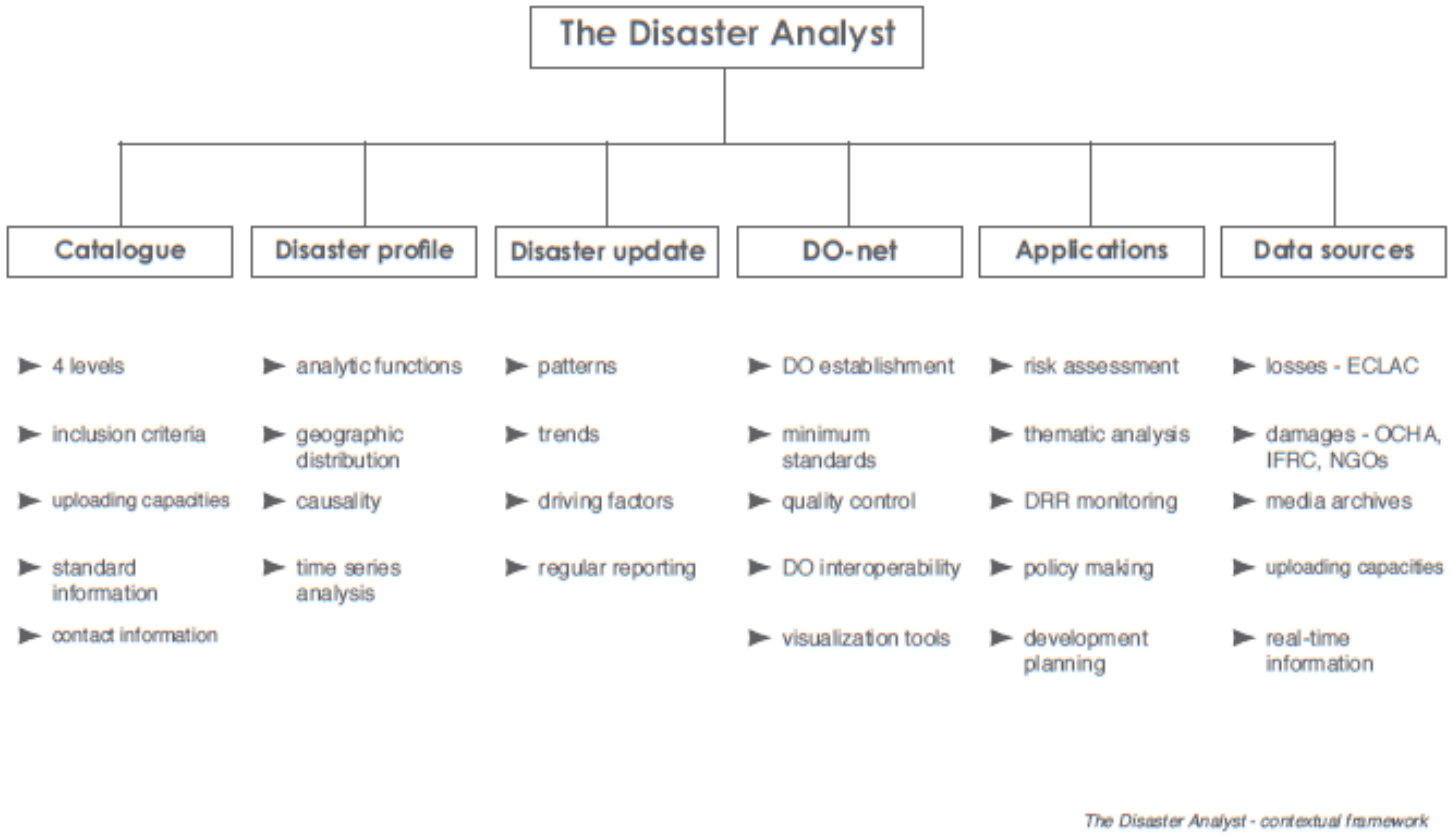
  * Have national disaster databases

Services to DRR Community

– **GRIP Portal**: Comprehensive service provider for Risk Assessment at every level



- The Disaster Analyst – Analysis of past disasters
- The Risk Informer – Estimation of potential losses
- The Capacity Developer – Capacity development



The Disaster Analyst - contextual framework

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