



# **DLRs Earth Observation Activities for Risk- and Vulnerability Assessment**

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für Luft- und Raumfahrt e.V.  
in der Helmholtz-Gemeinschaft

**Fifty-second session of the Committee on the Peaceful  
Uses of Outer Space – 09.06.2009, Vienna, Austria**















# Crisis Management

- **Increasing demand for timely information on the status of**
  - **Natural disasters**
  - **Humanitarian relief**
  - **Immanent threats to the population**
- **Establishment of a DLR center (ZKI)**

**Center for Satellite Based Crisis Information**  
– Emergency Mapping & Disaster Monitoring –

*a service of DFD*



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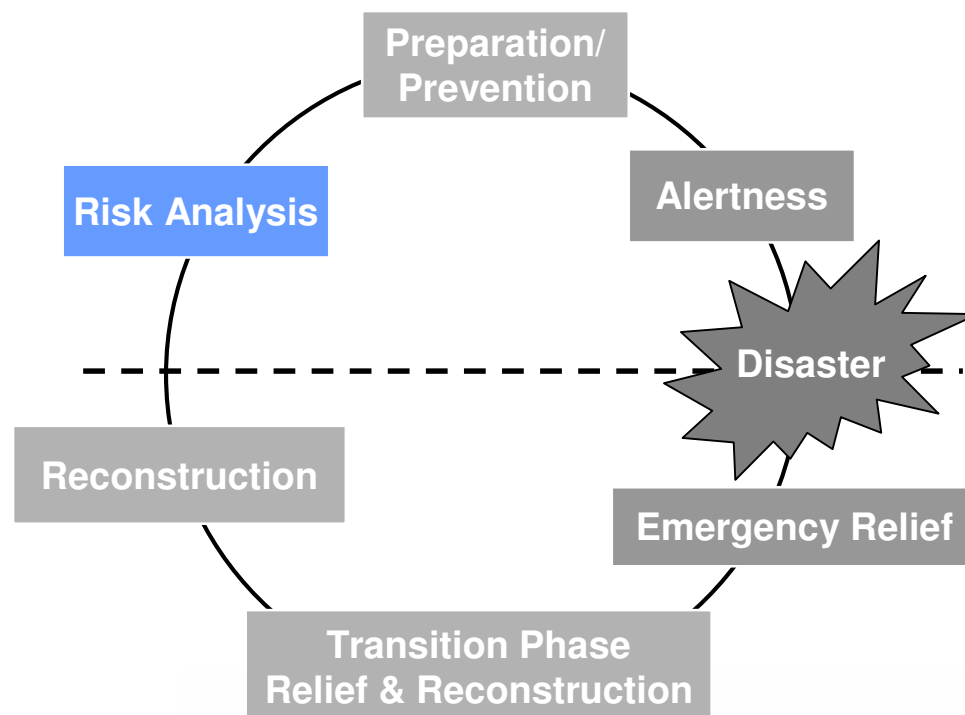




# Civil Security & Emergency Response

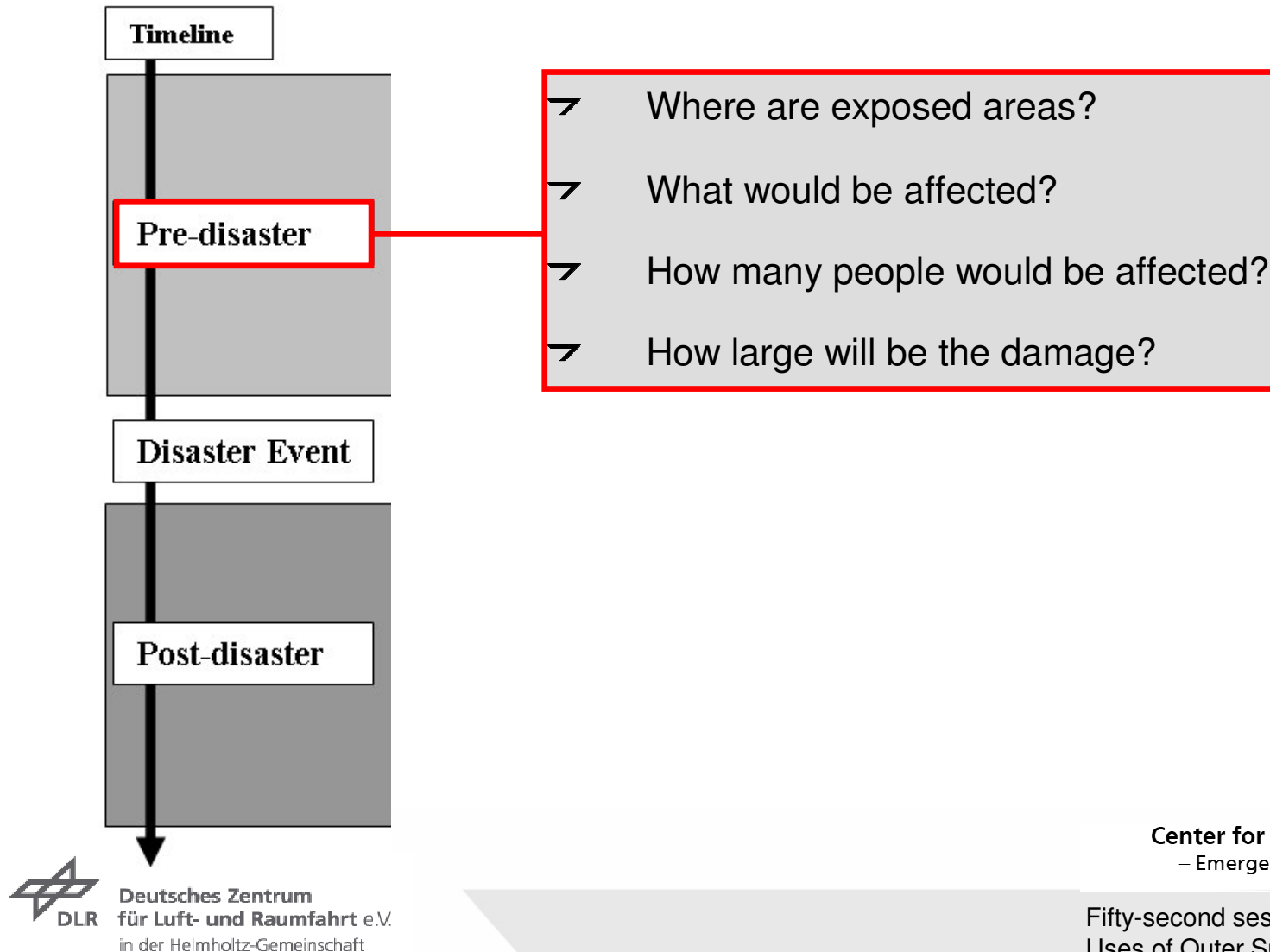
## Demand for Information on

- Natural Disasters and Humanitarian Relief Missions
- Immanent threats for the Population



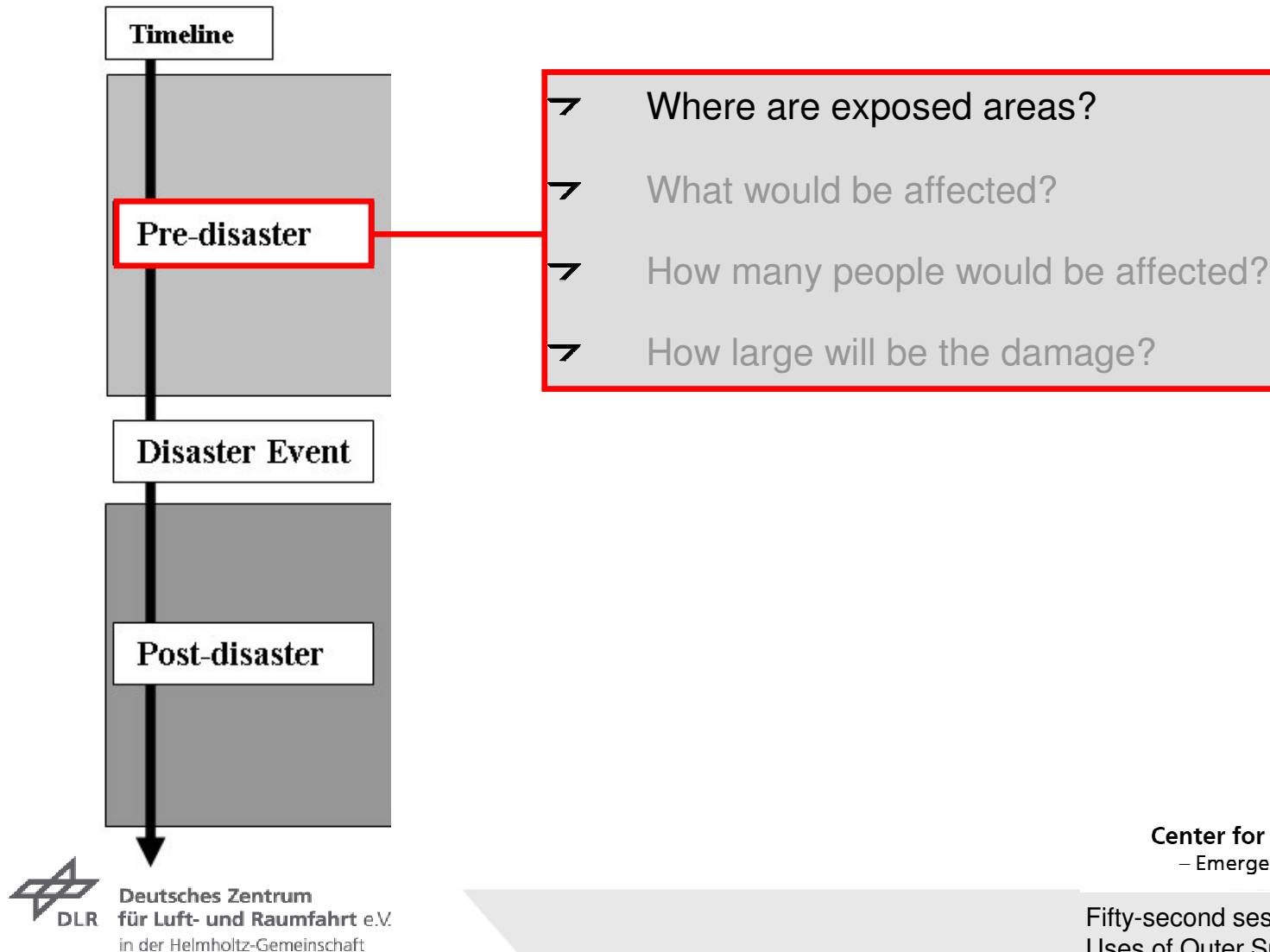



$$\text{Risk} = f(\text{Hazard}, \text{Vulnerability})$$



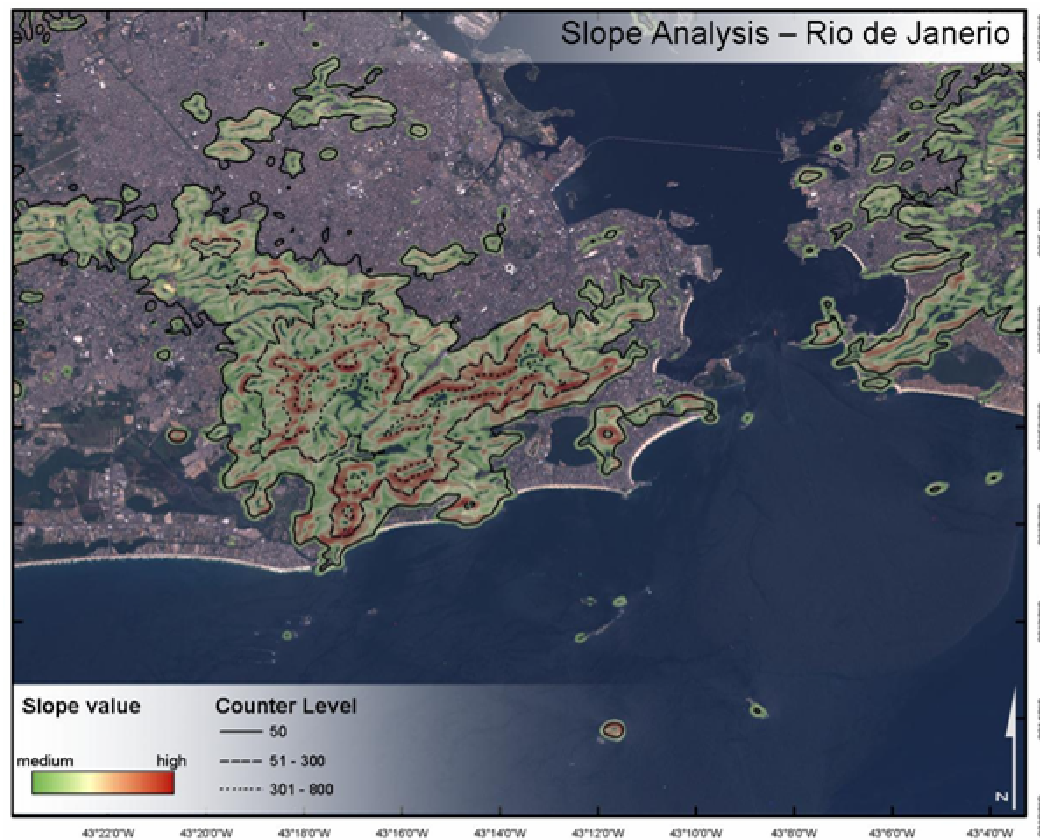



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# Hazard assessment



# Where are exposed areas?

- monitoring of mega city Cairo,  
Egypt

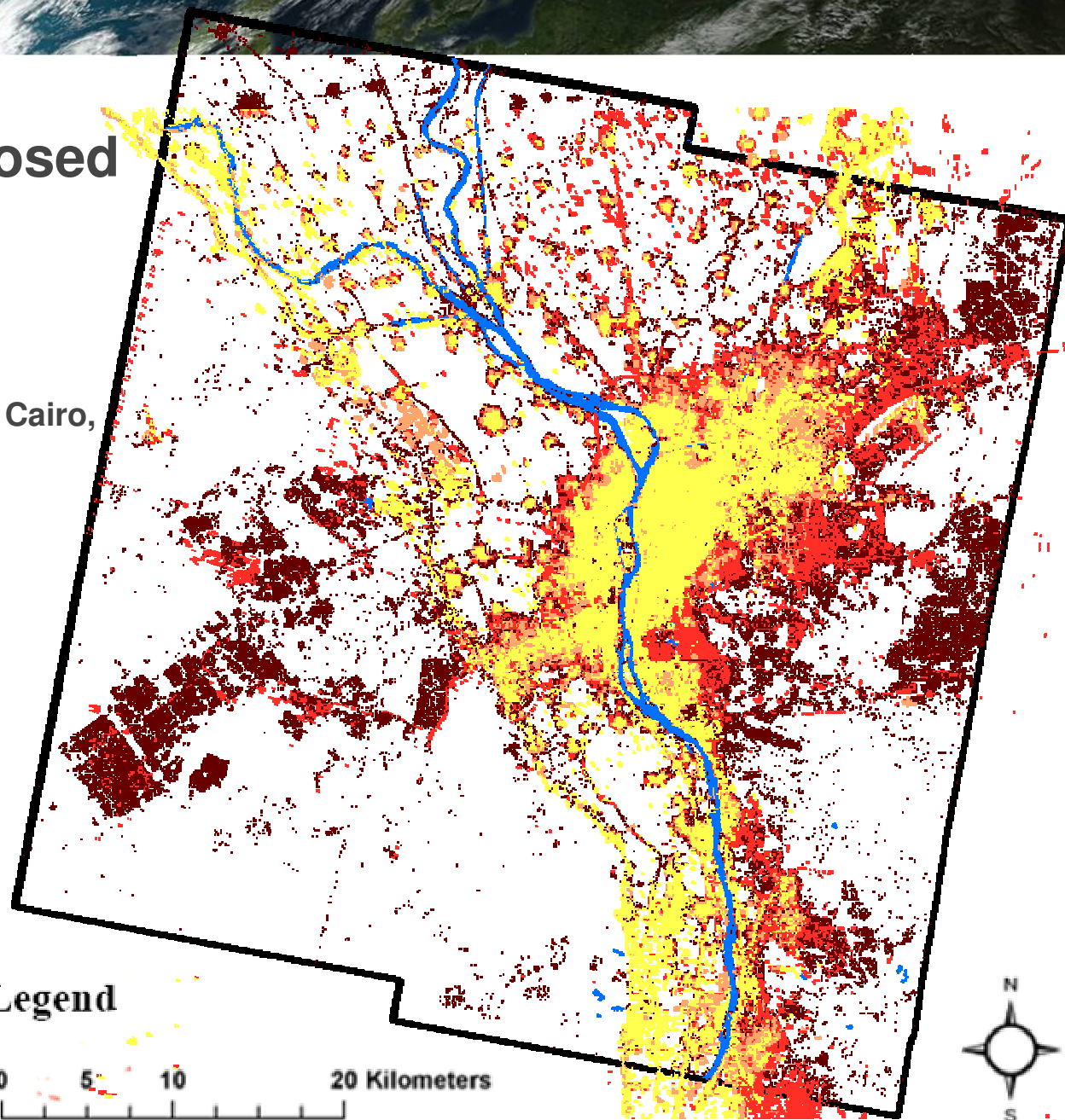
## Legend

0 5 10 20 Kilometers

Urbanized area :

1972  
1984

2000  
2008

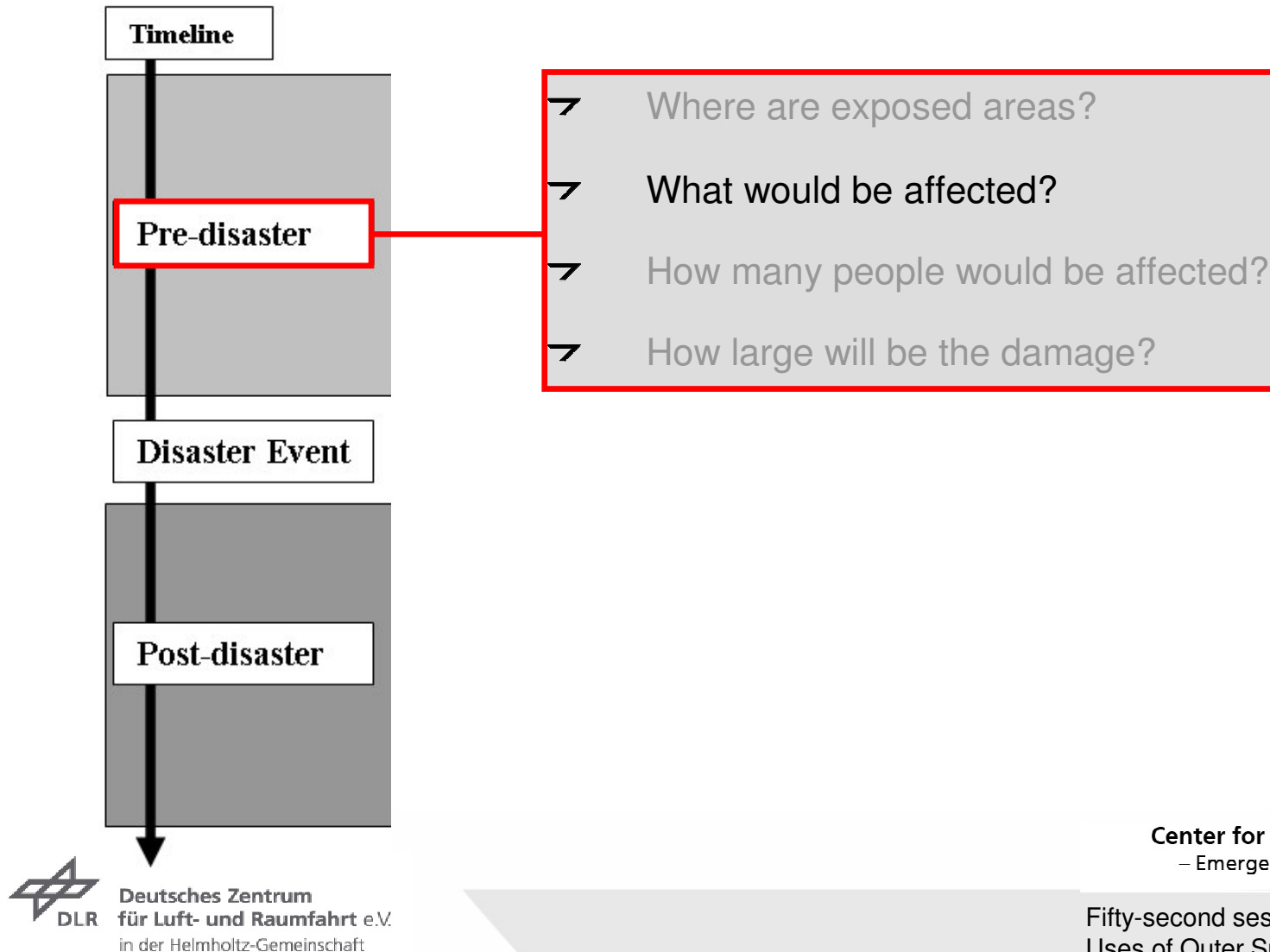


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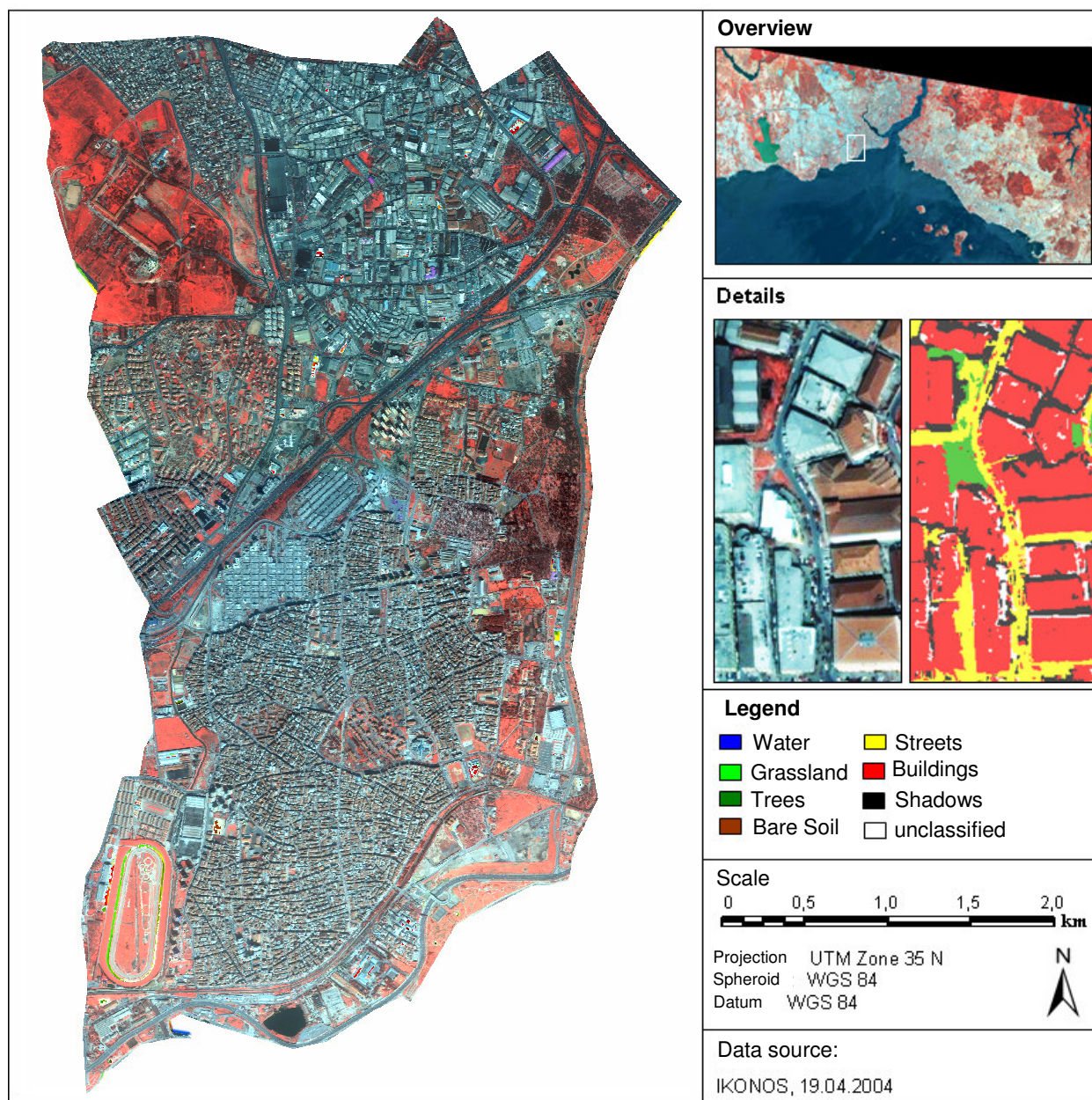



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Example:

District Zeytinburnu, Istanbul

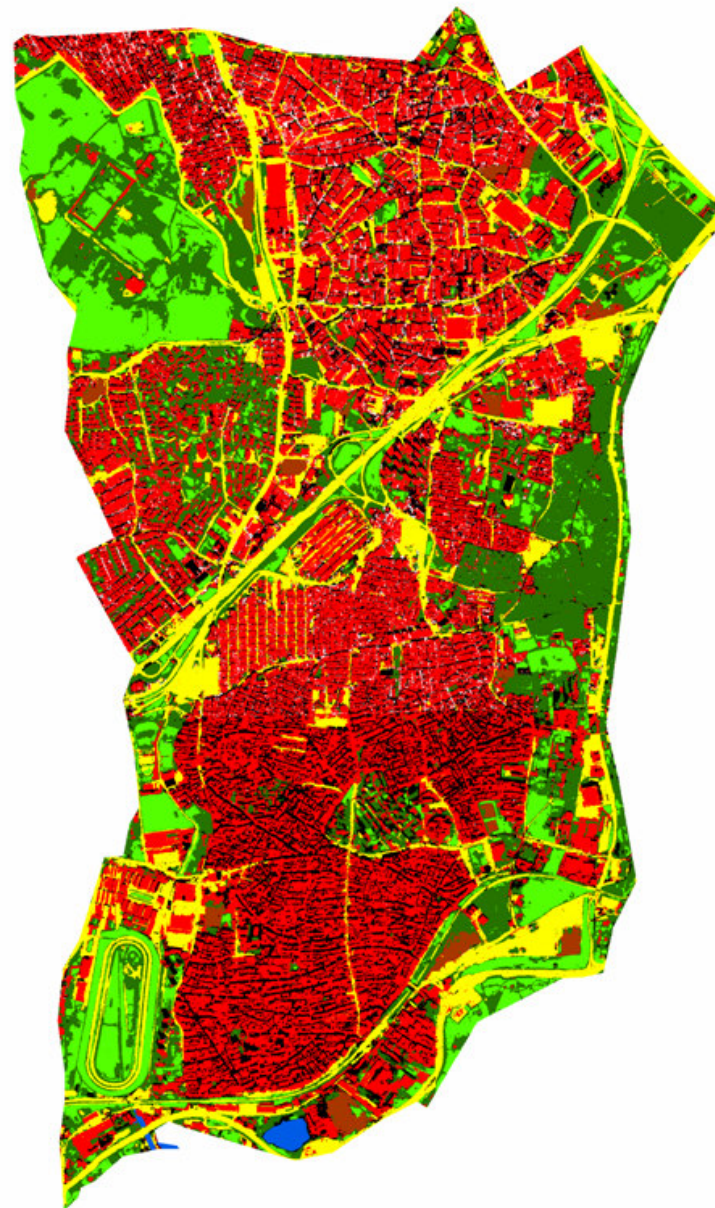


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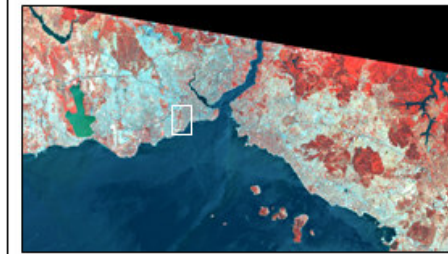
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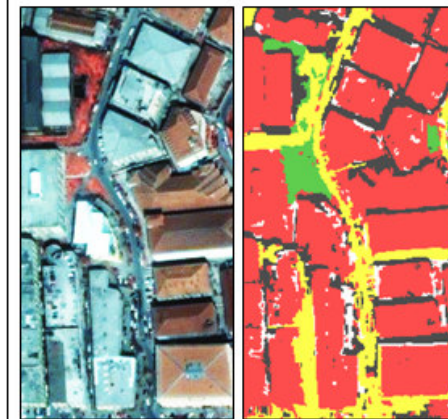
# Land cover



## Übersicht



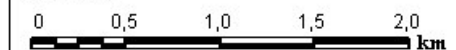
## Details



## Legende

|        |                 |
|--------|-----------------|
| Wasser | Straße          |
| Wiese  | Haus            |
| Bäume  | Schatten        |
| Boden  | unklassifiziert |

## Maßstab:



Projektion: UTM Zone 35 N  
Spheroid: WGS 84  
Datum: WGS 84



## Datenquelle

IKONOS, 19.04.2004



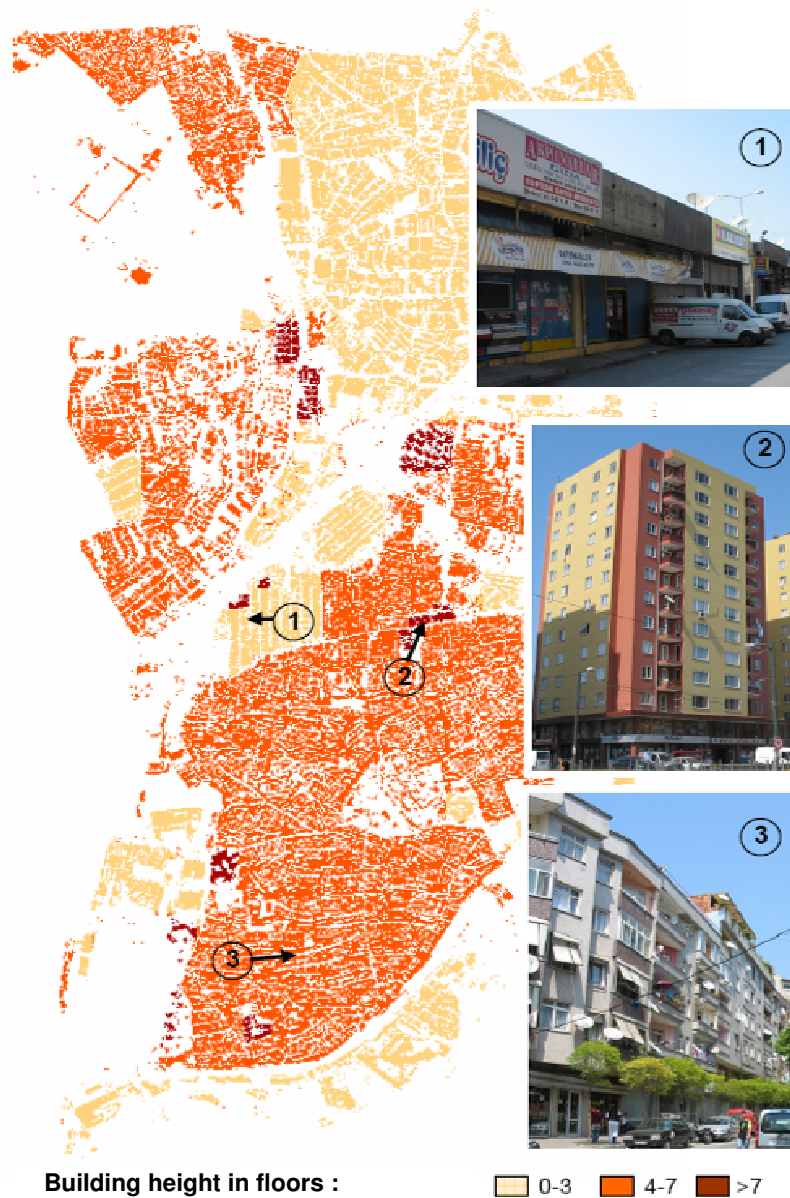
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# Urban Morphology

## ➤ Building types

- Height, Size, Age, Rooft type, Structure, etc.

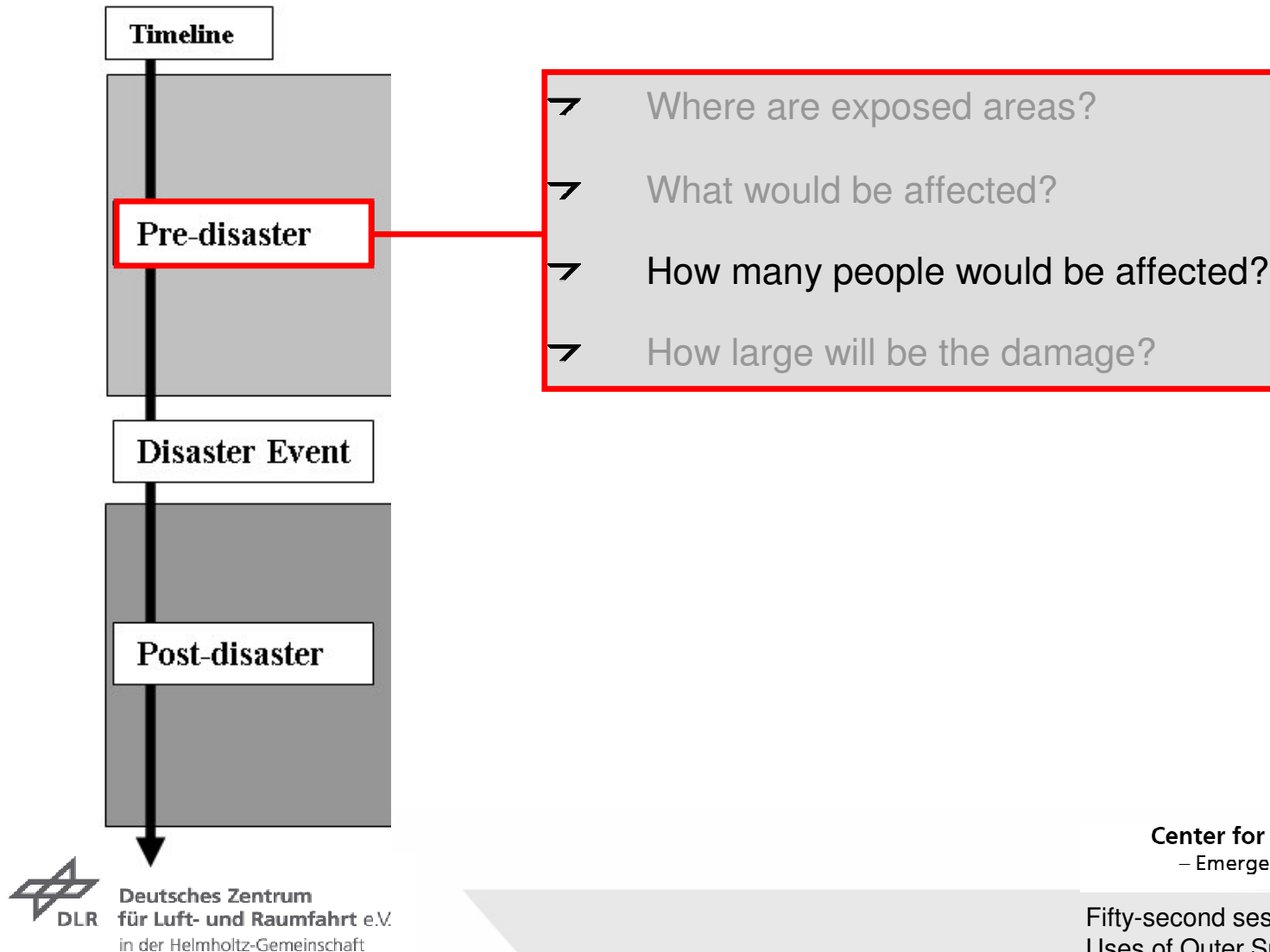


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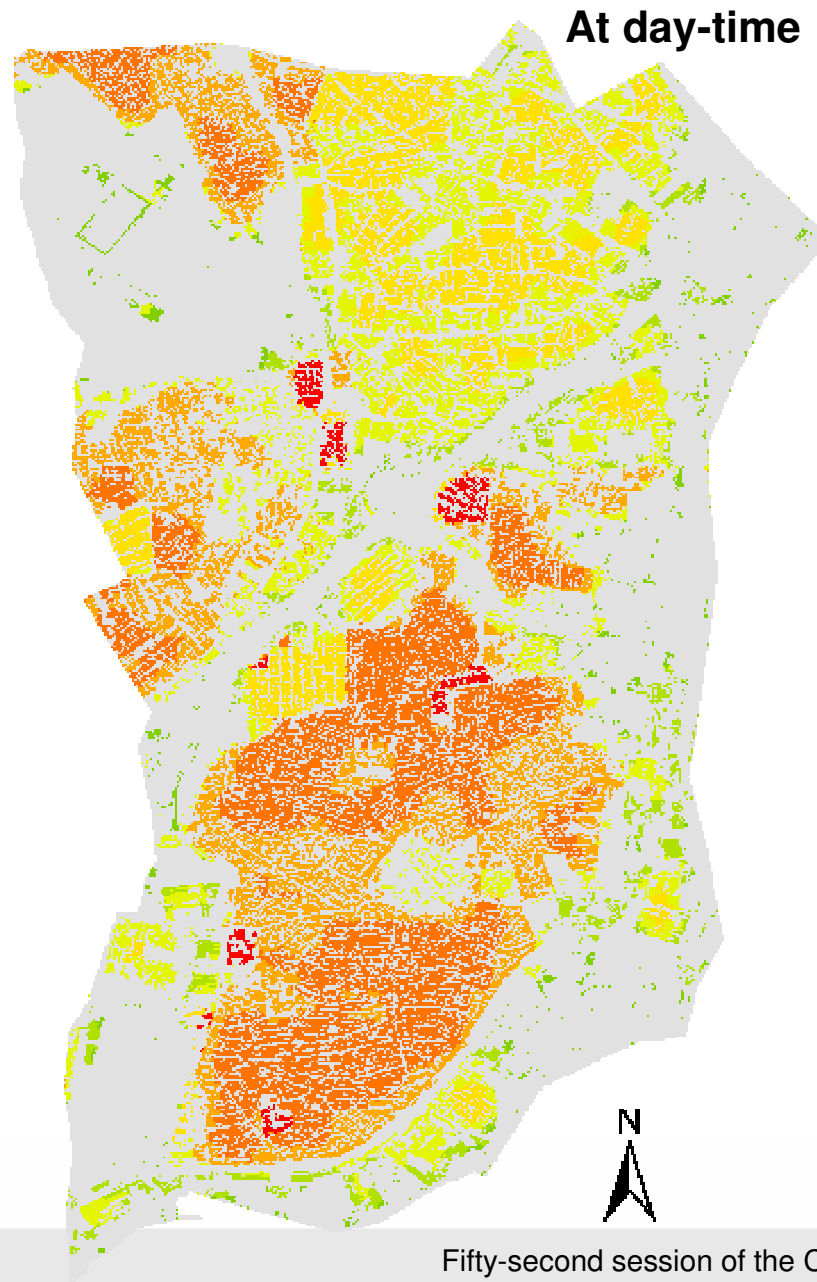
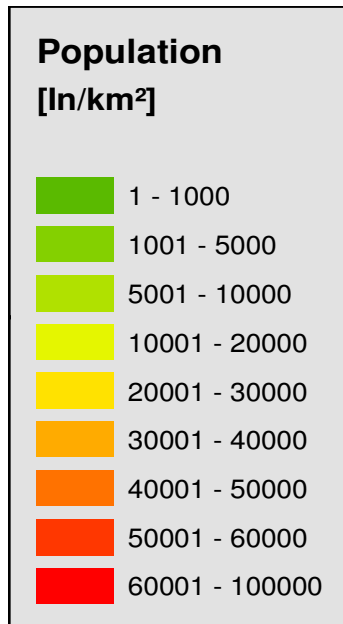
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$$\text{Risk} = f(\text{Hazard}, \text{Vulnerability})$$



# Population assessment

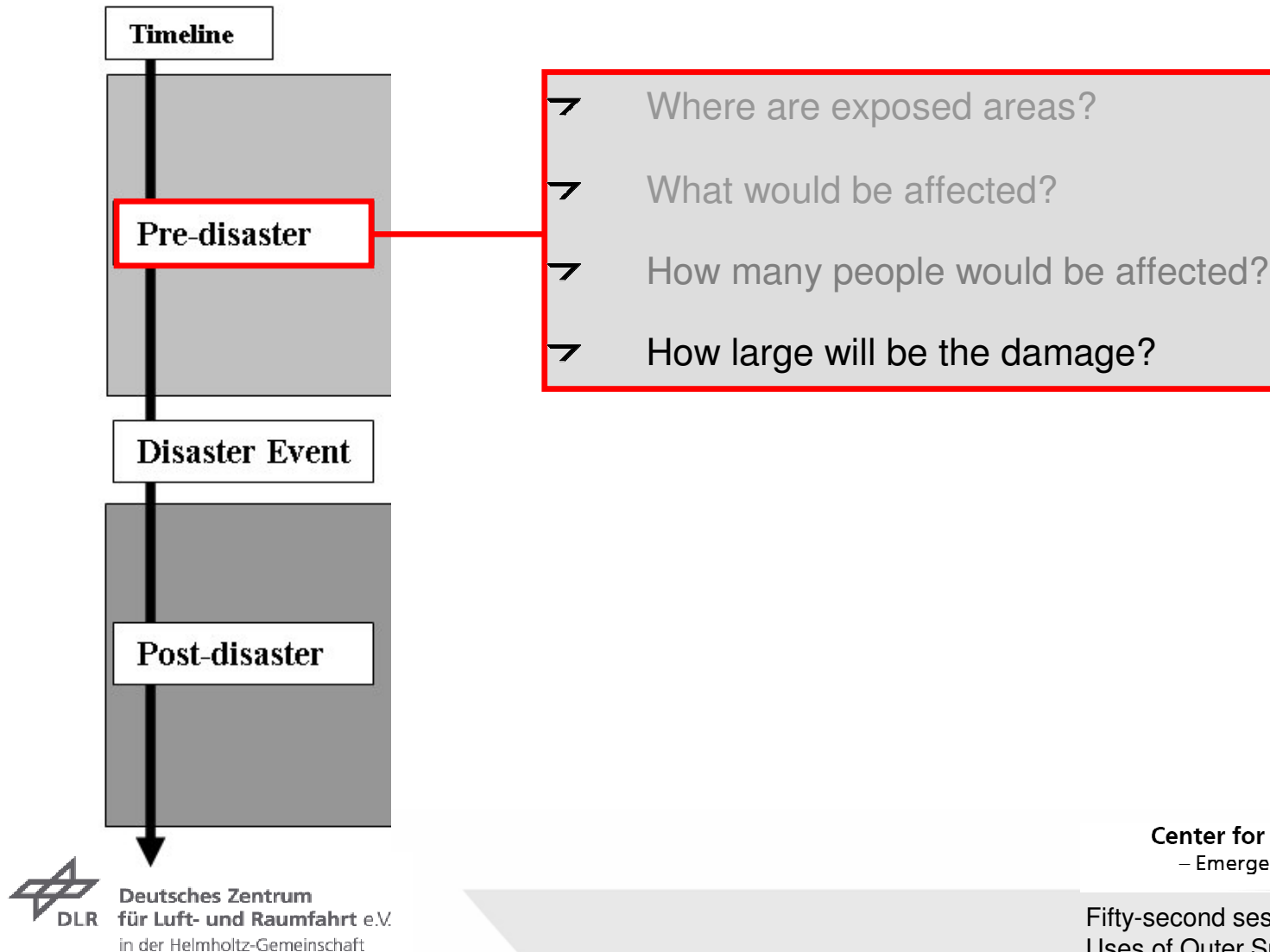


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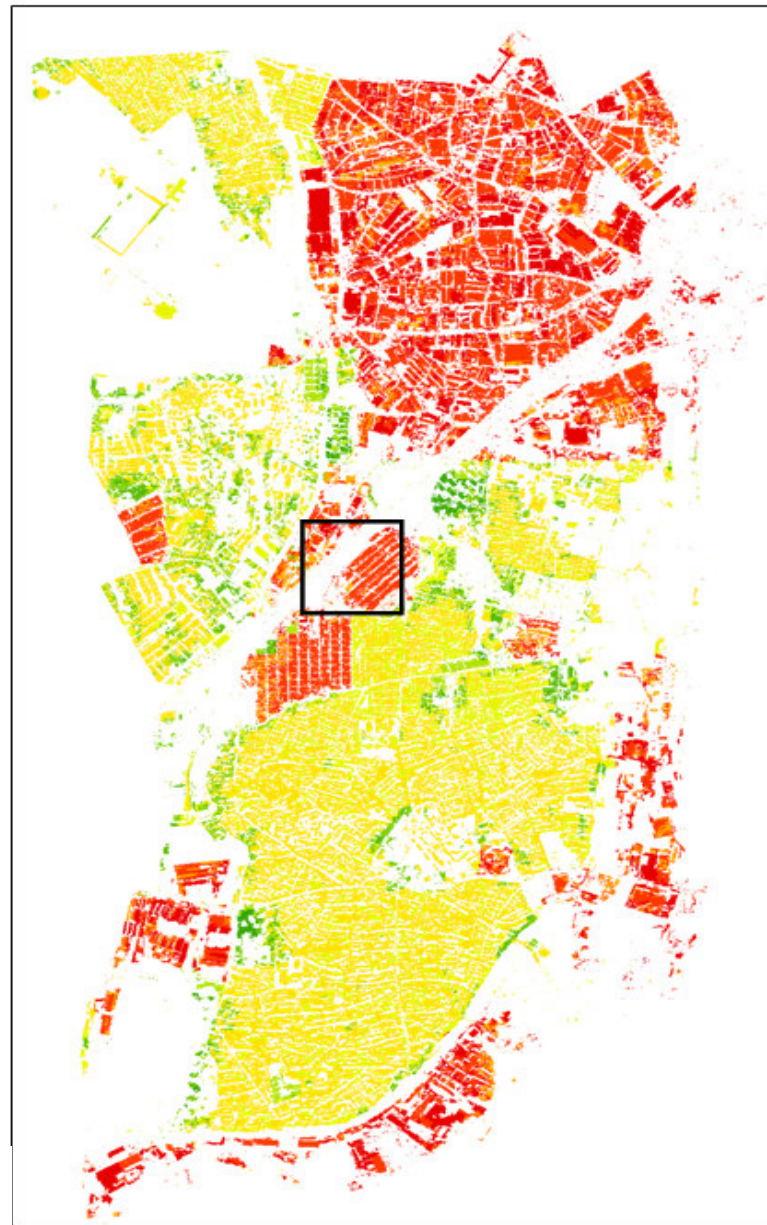



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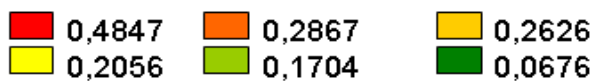


# Result

- Assessment of damage grades
- Earthquake scenario



Probable damage grades [%]



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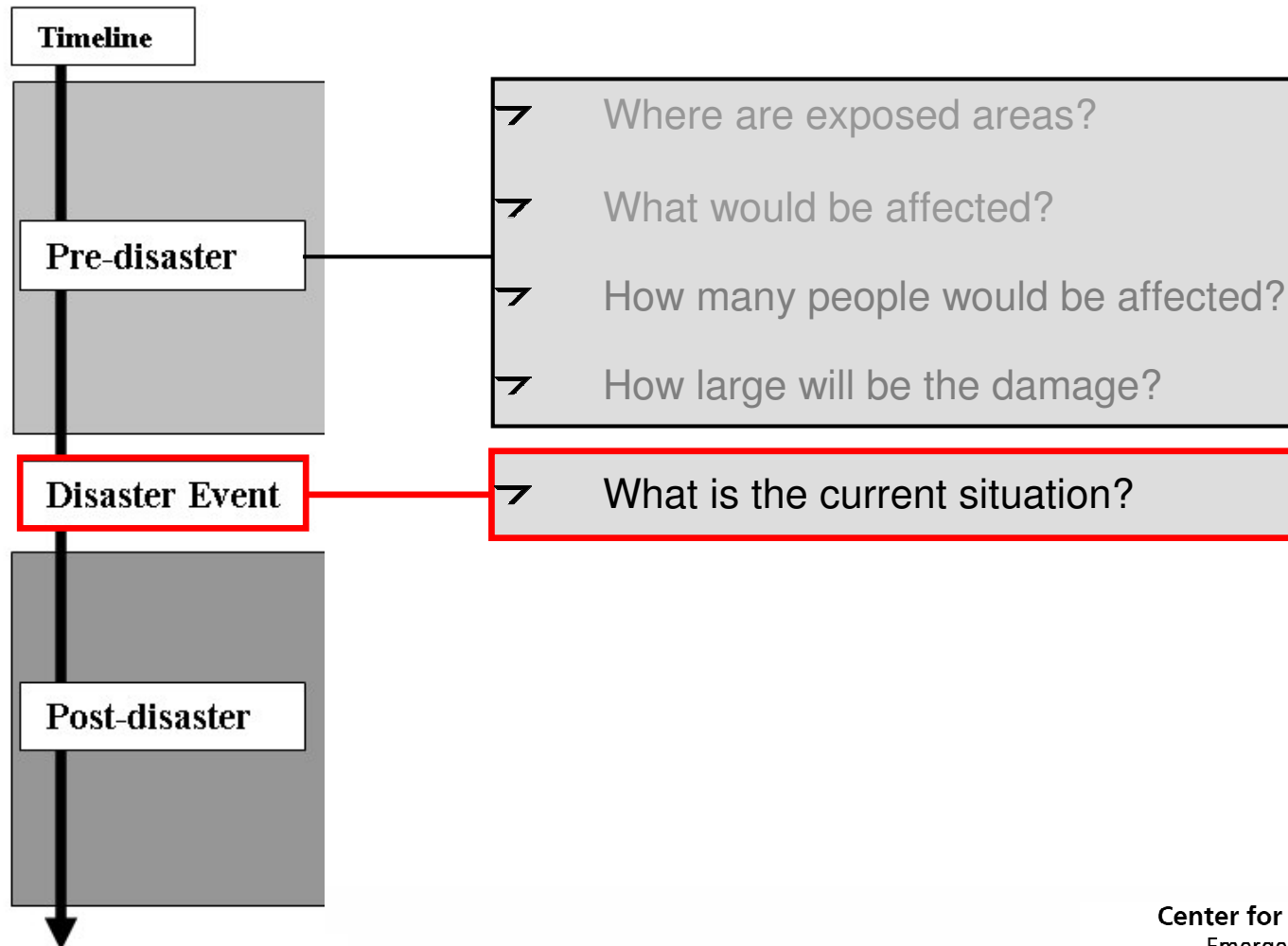
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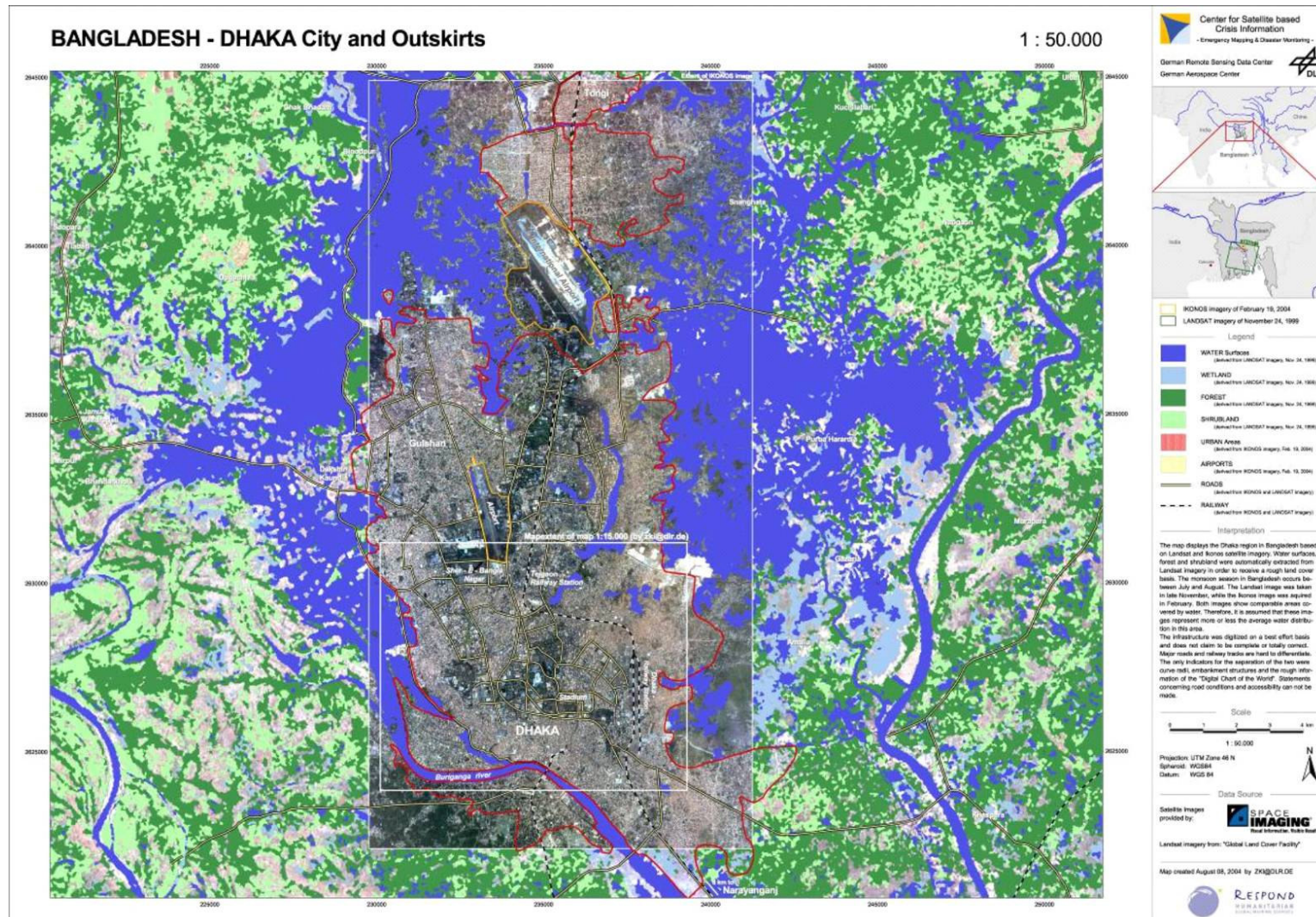

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# DLR-ZKI – sample products during Charter calls

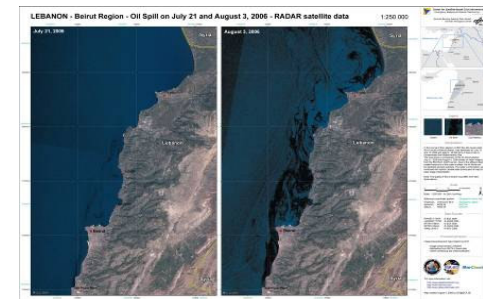
tropical cyclone, Myanmar, 2008



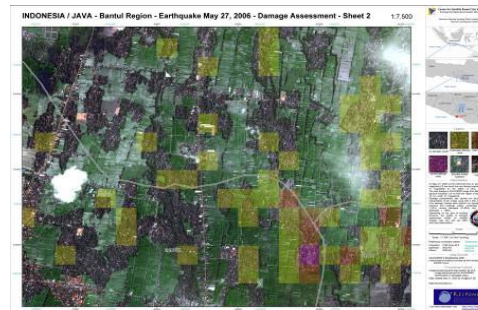
forest fires, Greece, 2006



marine oil spill, Lebanon, 2006



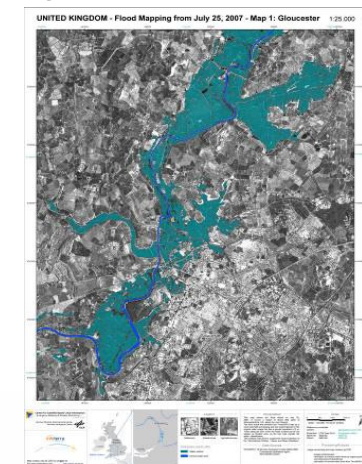
earthquake, Yogyakarta, 2006



land slide, Philippines, 2006



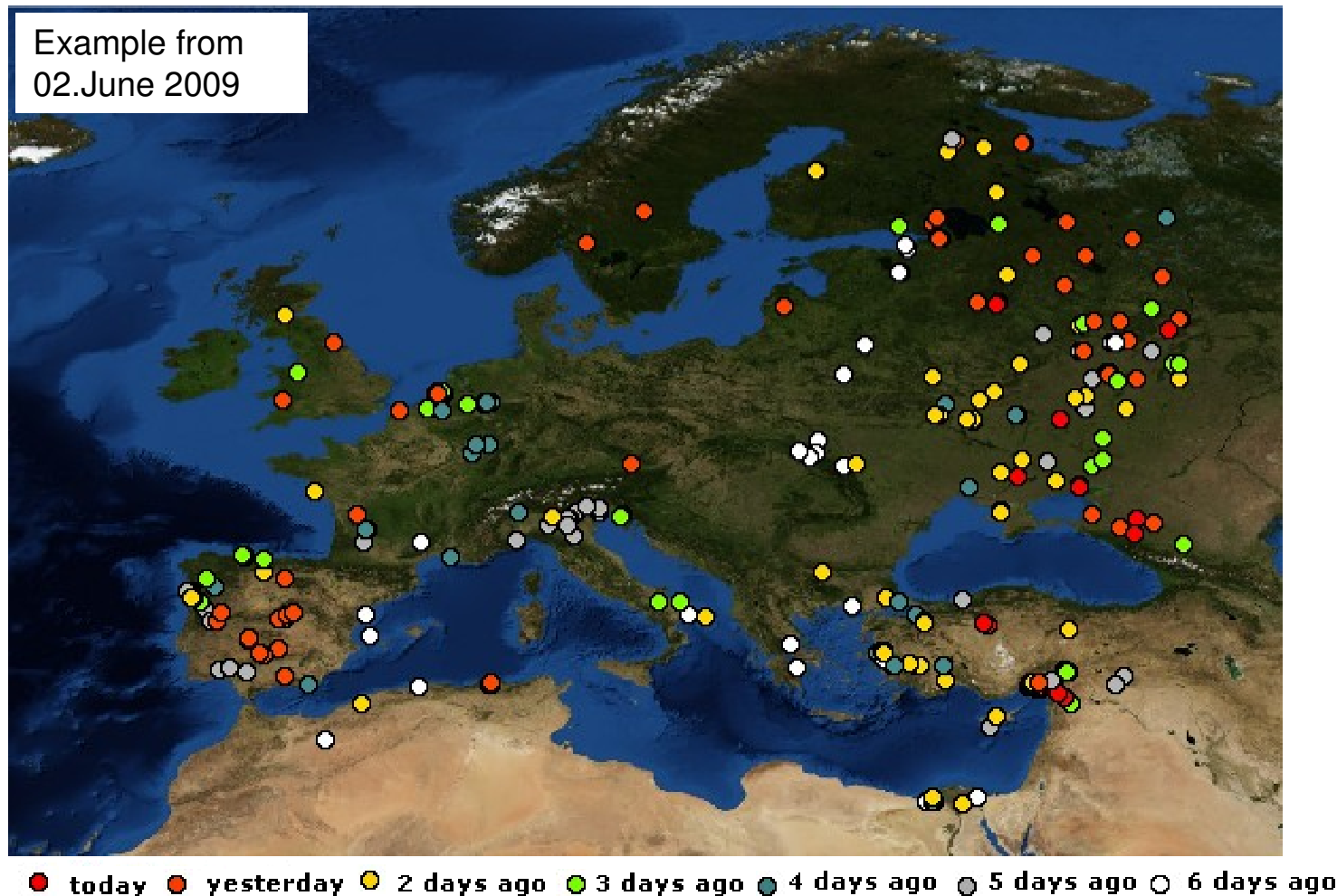
floodings, UK, 2007



tropical cyclone, Bangladesh, 2008

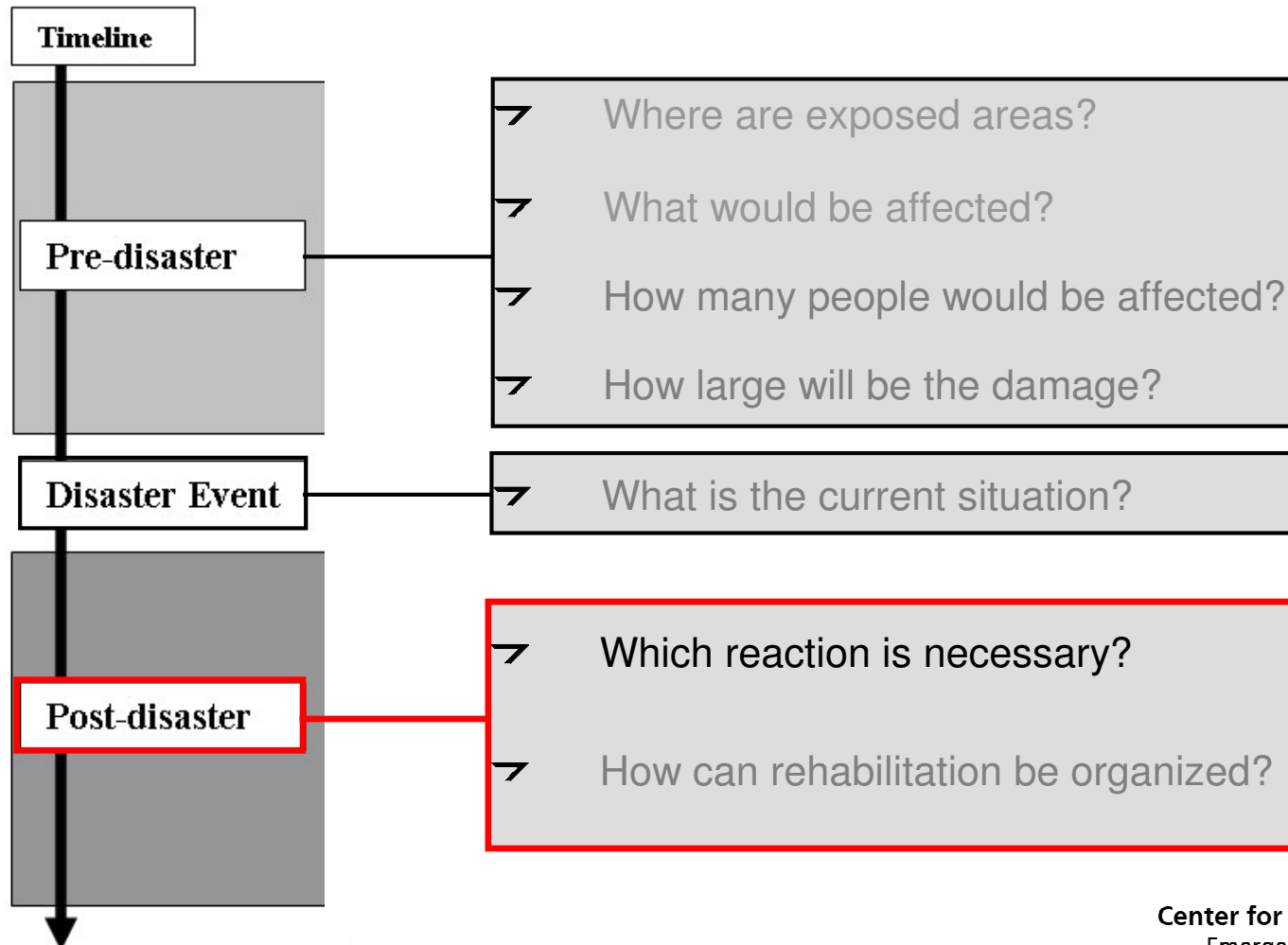


# Operational Service of DLR - Fire Monitoring Europe



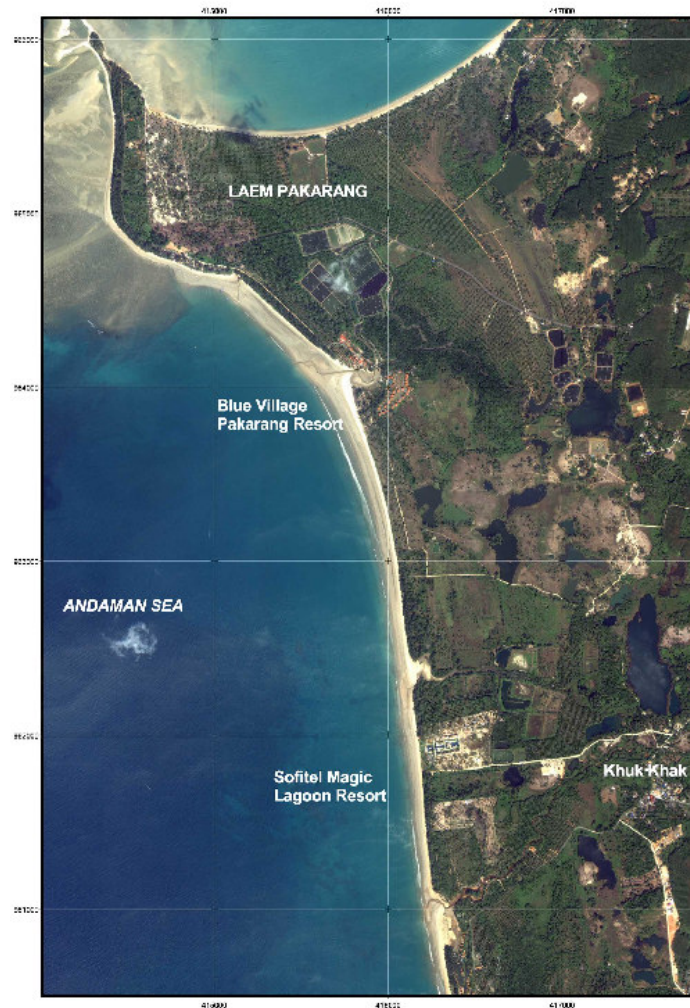



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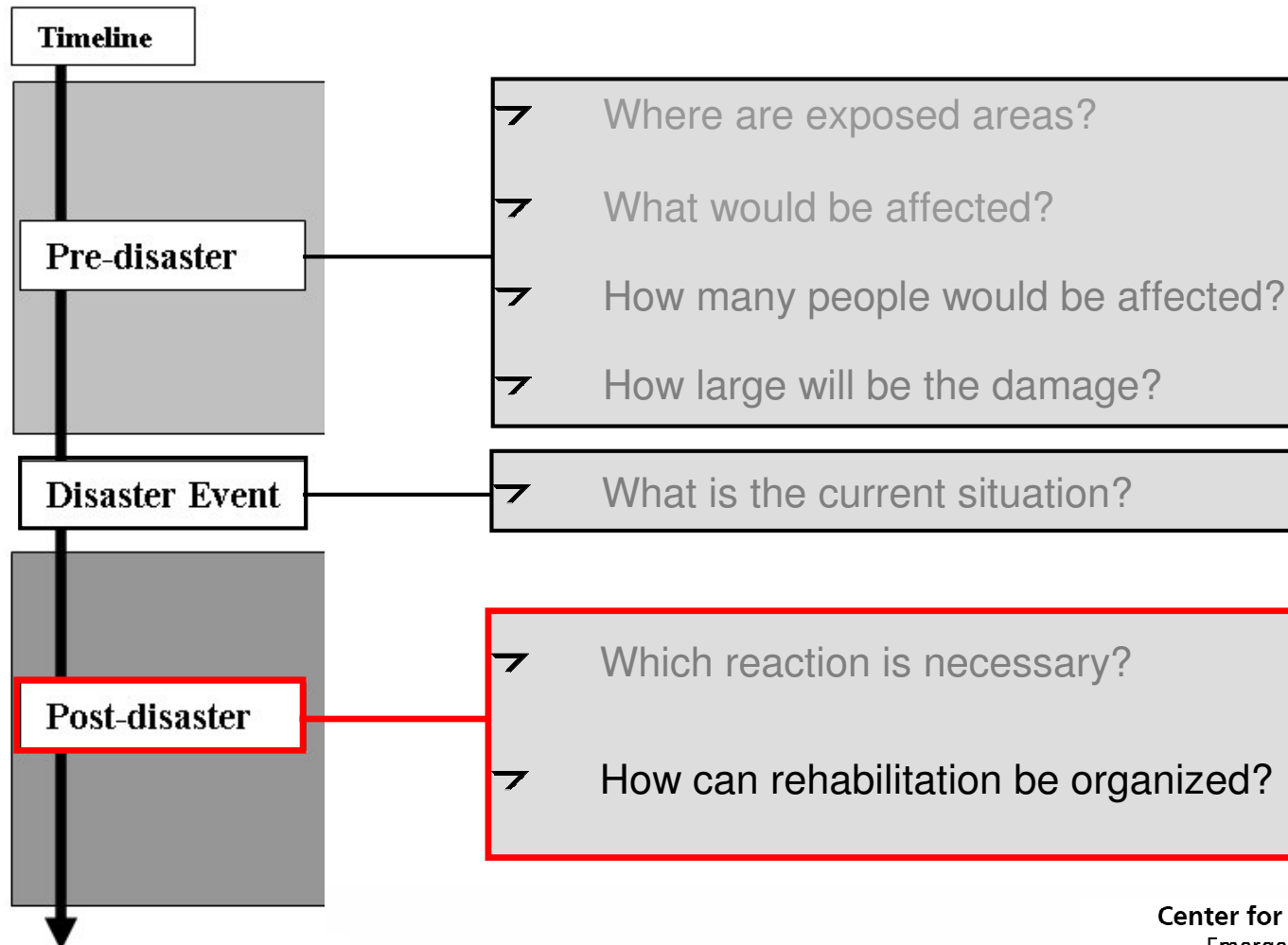
**IKONOS - January 30, 2003 - PRE-DISASTER IMAGE**

**IKONOS - December 29, 2004 - POST-DISASTER IMAGE**



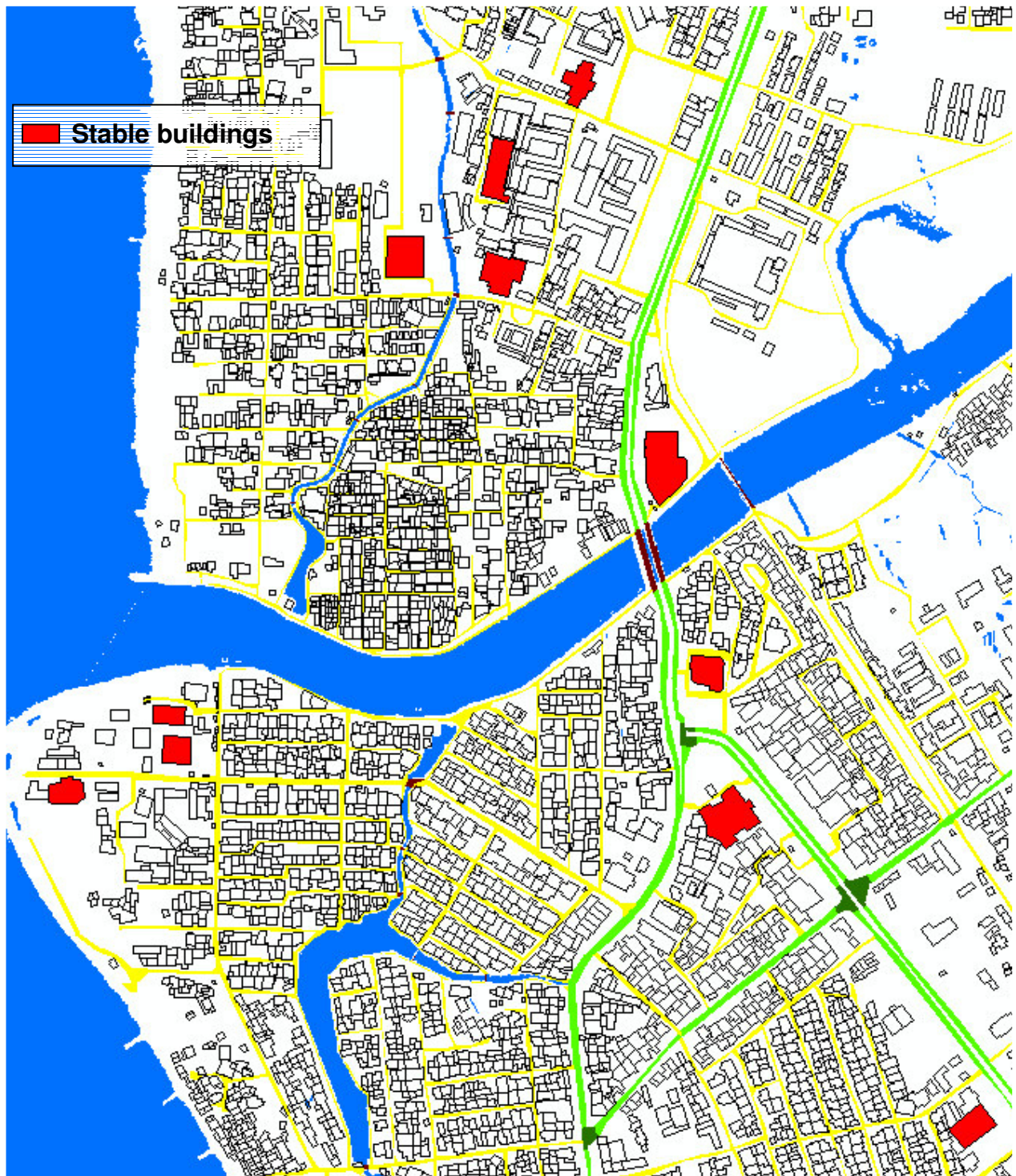
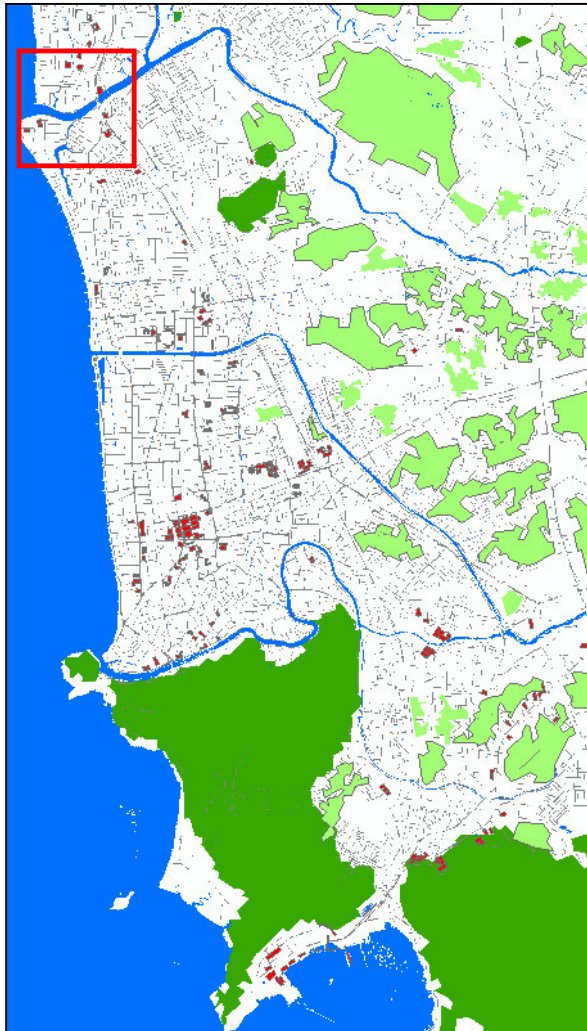



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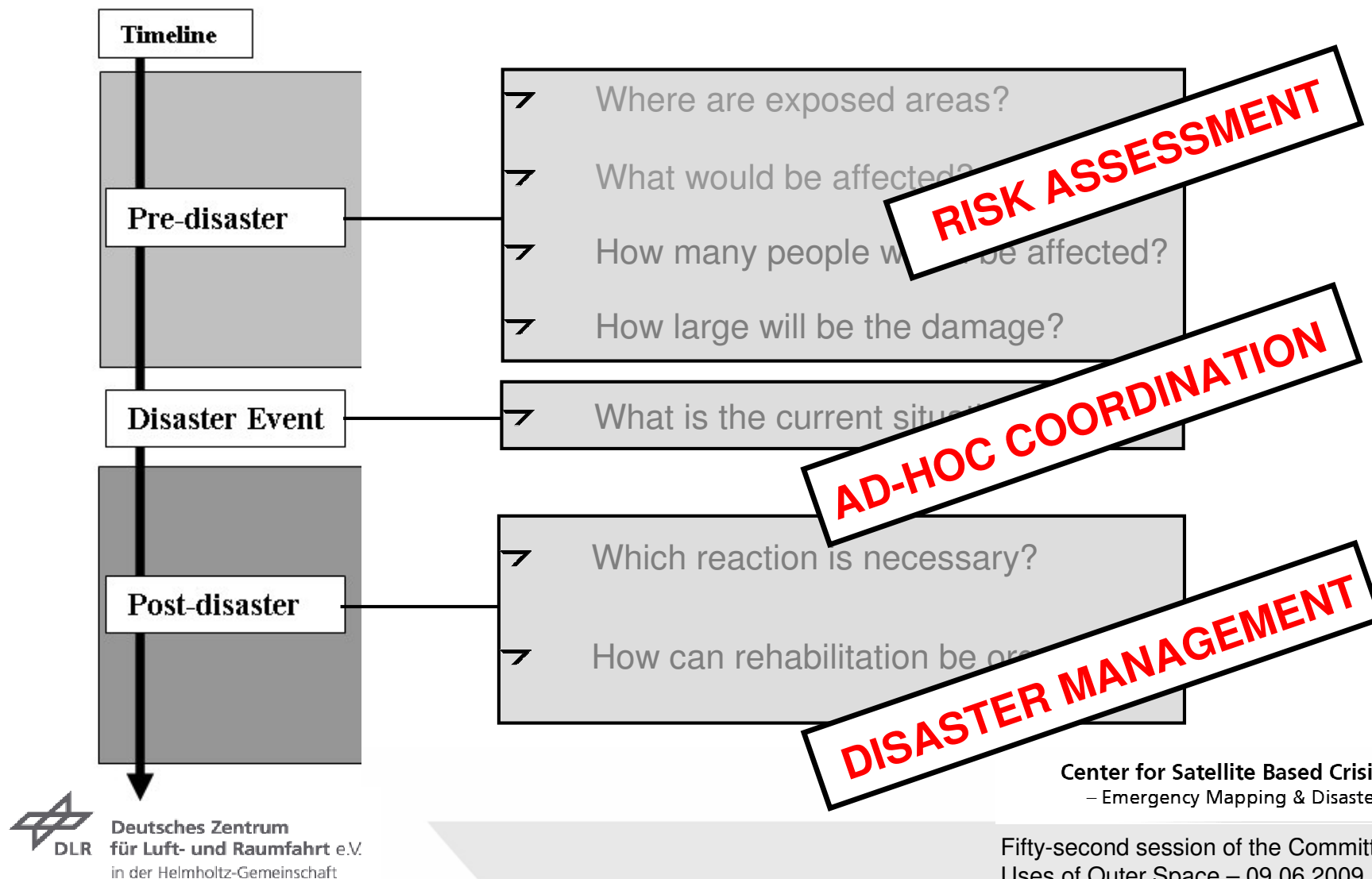
# Reaction and rehabili



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# Summary – DLRs Earth Observation Activities for Risk- and Vulnerability Assessment



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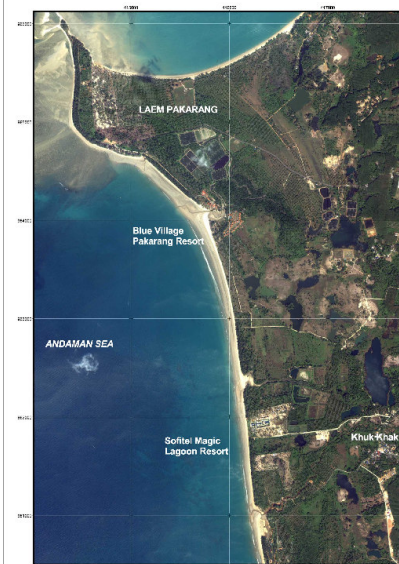


THAILAND / Northern Khao Lak Bay

IKONOS - January 30, 2003 - PRE-DISASTER IMAGE

1 : 12,500

IKONOS - December 29, 2004 - POST-DISASTER IMAGE



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Thank you very much for your  
attention!