Space Capabilities to support
Prediction and Management
of Humanitarian Consequences of Water-related Disasters

Peter Zeil

Overview

- Vulnerability & Human Security
- Prediction: the case of hurricane Katrina
- Management: the case of the Tamis River floods, Rumania/Serbia
- Management: case study Buzi, Mozambique
- Information flow and communication
- Institutional requirements
- Conclusion
The Concept of Vulnerability

- **Vulnerability** (one possible definition):
  
  "Degree to which a unit and its attendant human-environment system is harmed due to exposure to a perturbation or stress" [Turner 2003]

- **Vulnerability reduction** as a key strategy for reducing disaster impact

- Metrics, measures, and conceptual standards **NOT** yet **DEVELOPED** for coupled system and most system characteristics (e.g. sensitivity)

  ➔ Basis for risk & hazard reduction and disaster mitigation policies

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**THE DISASTER RISK MANAGEMENT CYCLE**

**3 stages of DRMC**
- PRE-DISASTER
  - Risk Assessment
  - Mitigation/Prevention
  - Preparedness
- DISASTER RESPONSE
  - Warning/Evacuation
  - Saving People
  - Providing Immediate Assistance
  - Assessing Damage
- POST-DISASTER
  - Ongoing Assistance
  - Restoration of Infrastructure Services
  - Reconstruction (Resettlement/Relocation)
  - Economic & Social Recovery
  - Ongoing Development Activities
  - Risk Assessment Mitigation/Prevention

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**DISASTER RISK MANAGEMENT CYCLE (DRMC) DIAGRAM**

Definitions:
- **Risk Assessment**: Activities which eliminate or reduce the chance of occurrence or the effects of a disaster.
- **Preparedness**: Planning on how to respond to disasters should they occur. This includes the development of plans, procedures, and resources.
New concept

Global approach

The methodology of determine a Disaster Risk Index

Risk = Frequency x Exposed Population x Vulnerability

Physical Exposure

Example for floods

Killed / Physical exposure = ~ Vulnerability
Human Security

- **Definition**: Coping capacity of individuals/societies
- **Linkage**: Stability will only be sustained if economic and social development combined with environmental protection is secured
- **Action**: Interventions based on monitoring changes in the environment are required
- **Support**: GMES (EC)

Resume 1

For reducing vulnerability and to strengthen the coping capacity we need to integrate assessments at different levels and sectors
climate change, global change scenarios, regional observations, national monitoring data
and
provide the synthesis in an appropriate format to local actors so that they can perform effectively.
Hurricanes 1

Tropical Storm Risk (TSR)

Hurricanes 2 Orphelia
Hurricanes 3 Katrina

Hurricanes 4 Katrina
Hurricanes 5 Katrina

Hurricanes 6 Katrina
“What can I say? Can’t you see that water took everything from me, even earth that I walked on? Now I wander somewhere between sky and endless water.”

Jasa Tomic Resident

Tamis River – Satellite Data
Tamis River – Satellite Data

Romanian communes (Timis Region) affected by spring 2005 flooding

- Please note: analysis results consider only areas covered by DLR satellite maps. See satellite maps for comparison.
- Results for May 2005 are derived from combined analysis (SPOT5, May 22 and Envisat/ASAR, May 12)
- Results for June 6, 2005 are derived from Envisat/ASAR analysis

<table>
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<th>commune</th>
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<td><strong>98,065</strong></td>
<td><strong>14.4</strong></td>
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</table>

Source: DLR 2005 mkl@dlr.de

Results based on satellite imagery provided by the International Cluster 'Space and Major Disasters' and commune boundaries provided by JPC

Centre for GeoInformatics Salzburg
Southern Africa, Mozambique

District of Buzi
Southern Africa, Mozambique

- Size: 7224.7 km²
- Population: 146,171
  (INE. Census 1997, calculations for 2002)
Buzi, Mozambique - Situation

Threats: Cyclone, Floods, Drought, Erosion; HIV,…

- Drought: 2005
**Information flow**

After Gall M., 2002

**SADC Vulnerability Atlas**

3. Solution - GIS and Interpretation

Ca. 2020 sqkm of arable land lost
Institutional requirements

Projects:

- **Institution building**: Z_GIS (Austria), FEWSNET (US).
- **Regional network**: AMESD, SADC RRSU, OXFAM-ROSA, UN OOSA DM
Institutional requirements

Initiatives:
International Charter, IGOS-P, EUMETSAT, ESA-TIGER

Resume 2

- Satellite systems at a high technological standard alone are not sufficient
- Network between data providers and users is needed
- Capacity to extract, deliver and receive information has to be strengthened
- Institutional structures and agreements have to exist to allow information to flow
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