GIS and Remote Sensing for vulnerability analysis in the UN World Food Programme

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Summary

- Introduction to the World Food Programme
- Disaster cycle
- GIS applications for:
  - Preparedness and Response
  - Logistics
  - Planning possible interventions (ICA)
- Automatic System for Emergency Mapping (ASEM)
The world’s largest humanitarian organization fighting hunger worldwide, operating in more than 90 countries

90 million people assisted each year, 58 million of whom are children

Established in 1963 by FAO and the United Nations General Assembly
Goals of the WFP:

- Save lives in emergency situations
- Eradicate hunger and malnutrition
- Promote autonomy of poor communities
Disaster cycle:
The disaster cycle is the framework used by the organizations of the emergency management community

- Prevention: measures which actions can be taken in disaster-prone areas in order to limit the consequences of a possible shock
- Preparedness: identifies human and material resources needed during a specific possible disaster
- Response: issues warnings and evacuations. Shelters are prepared, actions are taken, and the situation is assessed.
- Recovery: focuses on cleanup and rebuilding, concentrating on the longer-term response to the disaster.
GIS for Preparedness

- Food insecurity patterns
- Number of shocks in the past
- Areas with environ. degradation
- Population at risk
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Frequency of poor seasons in the past 5 years

Blank areas correspond to areas that never were below average in the past 5 years.

Frequency of poor growing seasons in the last 5 years:
- Yellow: 1-2
- Orange: 3-6
- Red: 7-11

Lakes

District boundaries
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GIS for Response

1. Magnitude and location of the shock
2. Forecast of the shock evolution
3. Infrastructures of the impacted area
4. Population in need of assistance
5. Possible areas of intervention

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GIS for Logistics

Settlements
Hydrology
Admin. Boundaries
Highways, roads and trails
Airports
Ports
Refugee camps
Food distribution points
Security conditions
Entry points
Check points
Humanitarian corridors

Data stored in an SDI and continuously updated

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GIS for planning: Integrated Context Analysis

Number and type of natural shocks
Food insecurity

Analysis

Aggravating factors
Population density

Population profile and priority areas of intervention

Design development programs for the next years

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GIS for planning  
Guatemala Case Study

① Seasonal food insecurity trends

② Annual average food insecurity

③ Food insecurity and malnutrition map

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GIS for planning
Guatemala Case Study

Floods
Landslides
Droughts

Categories of shocks with high recurrence

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GIS for planning

Guatemala Case Study

- A degraded environment increases a community's vulnerability to the effects of natural hazards
- Intense deforestation has direct consequences on soil degradation, relief stability and livelihoods
- Recent deforestation patterns are therefore considered the main aggravating factor

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## GIS for planning

### Guatemala Case Study

**Analysis output:**

![GIS map of Guatemala](image)

<table>
<thead>
<tr>
<th>Case</th>
<th>Tendencias (2008 - 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ÁREAS DE ENFOQUE 1</td>
<td>Municipios con tendencias de Inseguridad alimentaria, con un tipo de evento de mediana y alta frecuencia, en los últimos 5 años y propenso a por lo menos 2 regiones.</td>
</tr>
<tr>
<td>ÁREAS DE ENFOQUE 2</td>
<td>Municipios con tendencias de Inseguridad alimentaria, con un tipo de evento de mediana y alta frecuencia, en los últimos 5 años y propenso a por lo menos 2 regiones.</td>
</tr>
<tr>
<td>ÁREAS DE ENFOQUE 3</td>
<td>Municipios con tendencias de Inseguridad alimentaria, con un tipo de evento de mediana y alta frecuencia, en los últimos 5 años y propenso a por lo menos 2 regiones.</td>
</tr>
<tr>
<td>ÁREAS EN EMERGENCIA (ENFOQUE 3, NIVELES 2 REGION)</td>
<td>Municipios con tendencias de Inseguridad alimentaria, con un tipo de evento de mediana y alta frecuencia, en los últimos 5 años y propenso a por lo menos 2 regiones.</td>
</tr>
<tr>
<td>ÁREAS RESTANTES</td>
<td>Municipios con tendencias de Inseguridad alimentaria, con un tipo de evento de mediana y alta frecuencia, en los últimos 5 años y propenso a por lo menos 2 regiones.</td>
</tr>
</tbody>
</table>

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Automatic System for Emergency Mapping (ASEM)

• --- Currently in development phase ---

• Shock categories constantly monitored:

  • Exploiting databases of natural hazards data main providers

  • Server based, no need of human interaction and supervision

  • The system is 24/7 operational
Automatic System for Emergency Mapping (ASEM)

- A triggering threshold enables a series of physical, social and vulnerability analysis.
- Automatic maps are generated and disseminated, not only reporting the details of the event, but also the economic situation of the area and the activities of WFP or other agencies/NGOs.

Magnitude, affected area, population, economic profile, UN & NGOs presence, weather forecasts...

Analysis and maps ready within 30’ after the shock.

**Note:** The image is an exemplification essay.
Thank you.

WFP

Hunger
The world’s greatest solvable problem