# HOW GIS WORKS

Geology

**GIS operations**

Hydrology

Thematic object selection

Point

Area

Line

Soil

-Analysis

Cartographic processing
.- Generalization
- Symbolization

stical tables
Satellite images
Aerial photographs
Field Survey

Attribute tables

Maps

**Real world**

Decision makers

# HOW GIS WORKS



Analysis

Thematic object selection

Point

Polygon

Line

Satellite images

Field Surv

Statistical tables

Aerial photographs

GPS

Real world

Private parcel

National park

Risk area

Land-use

Soil

Slopes

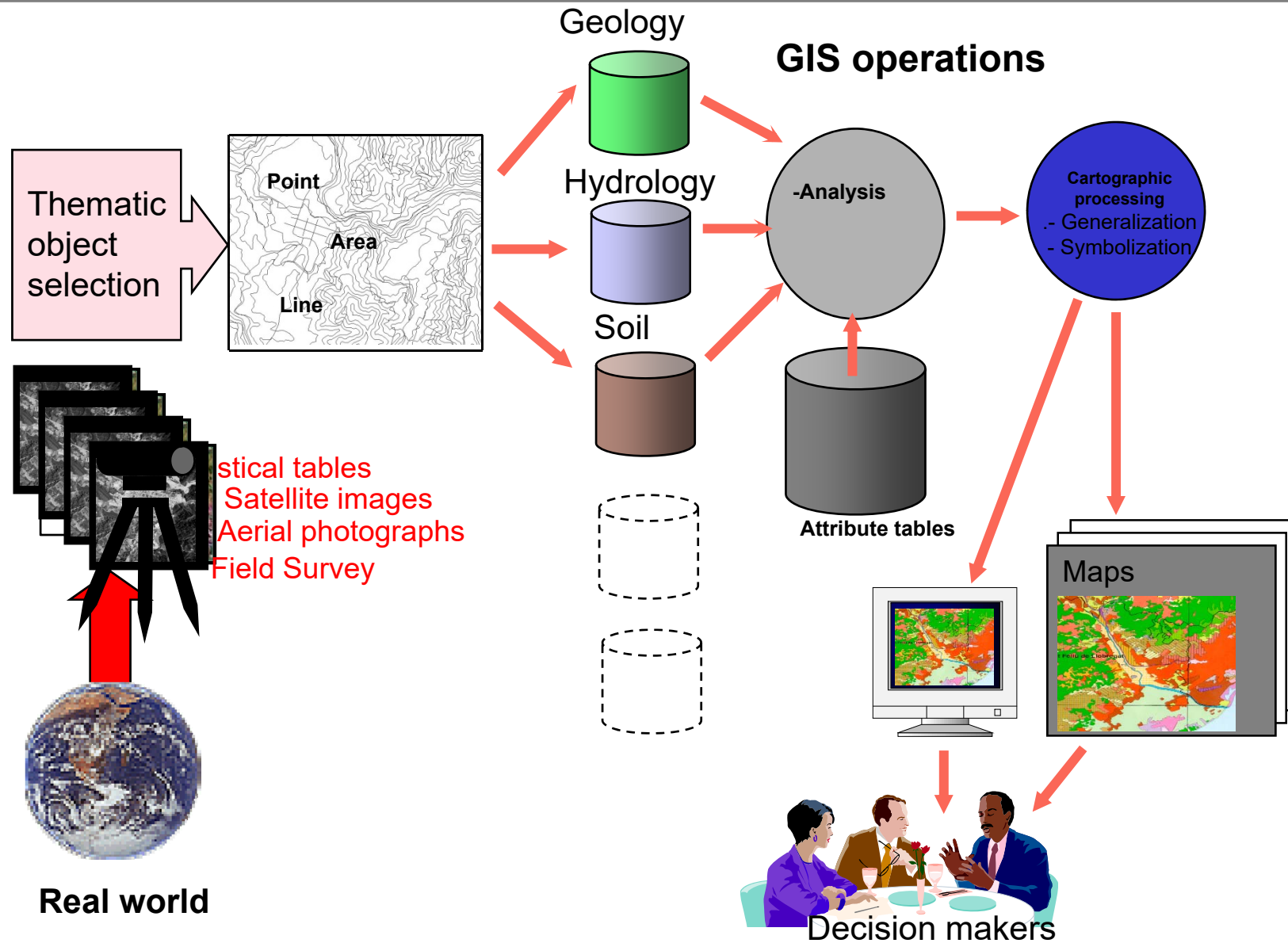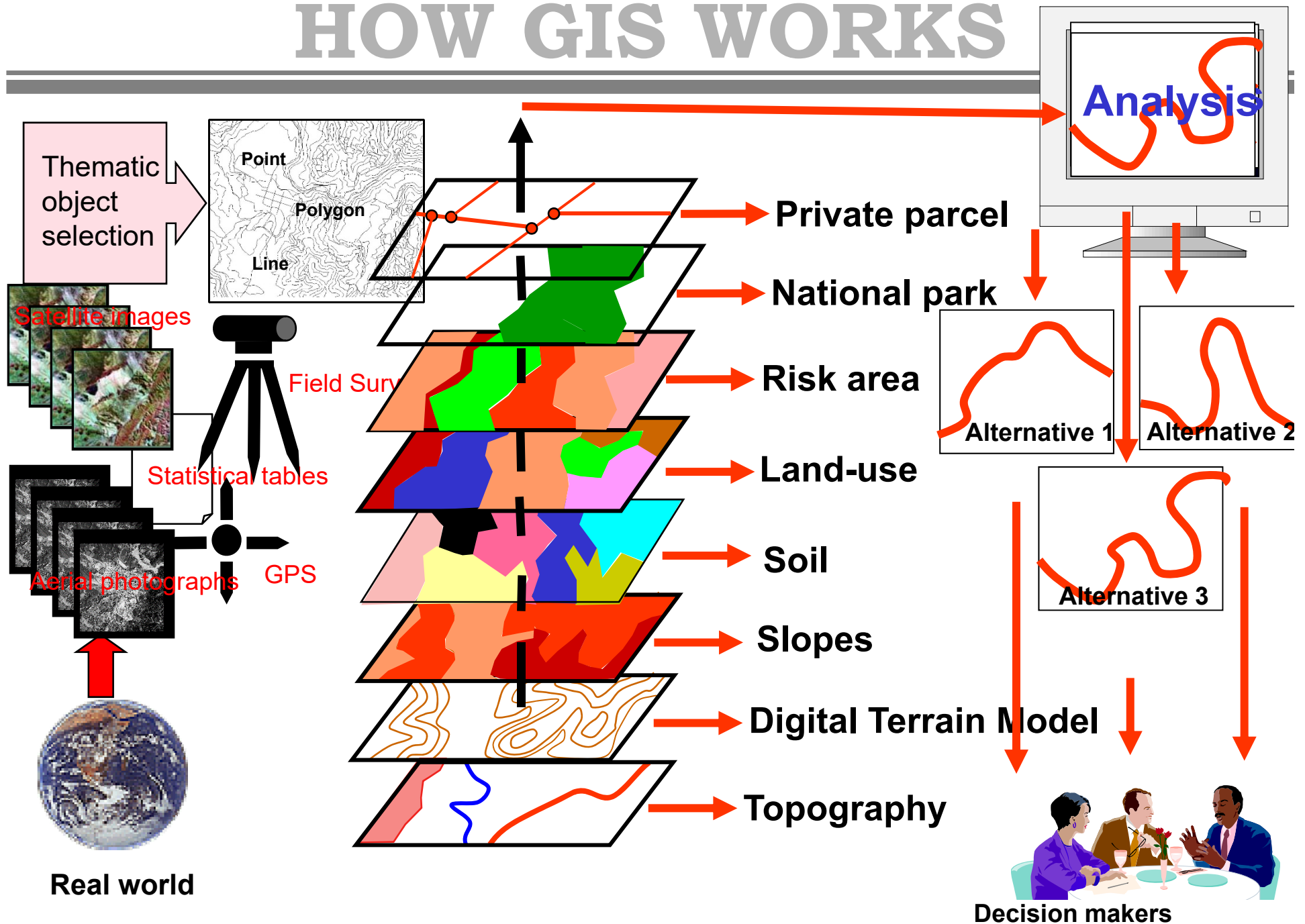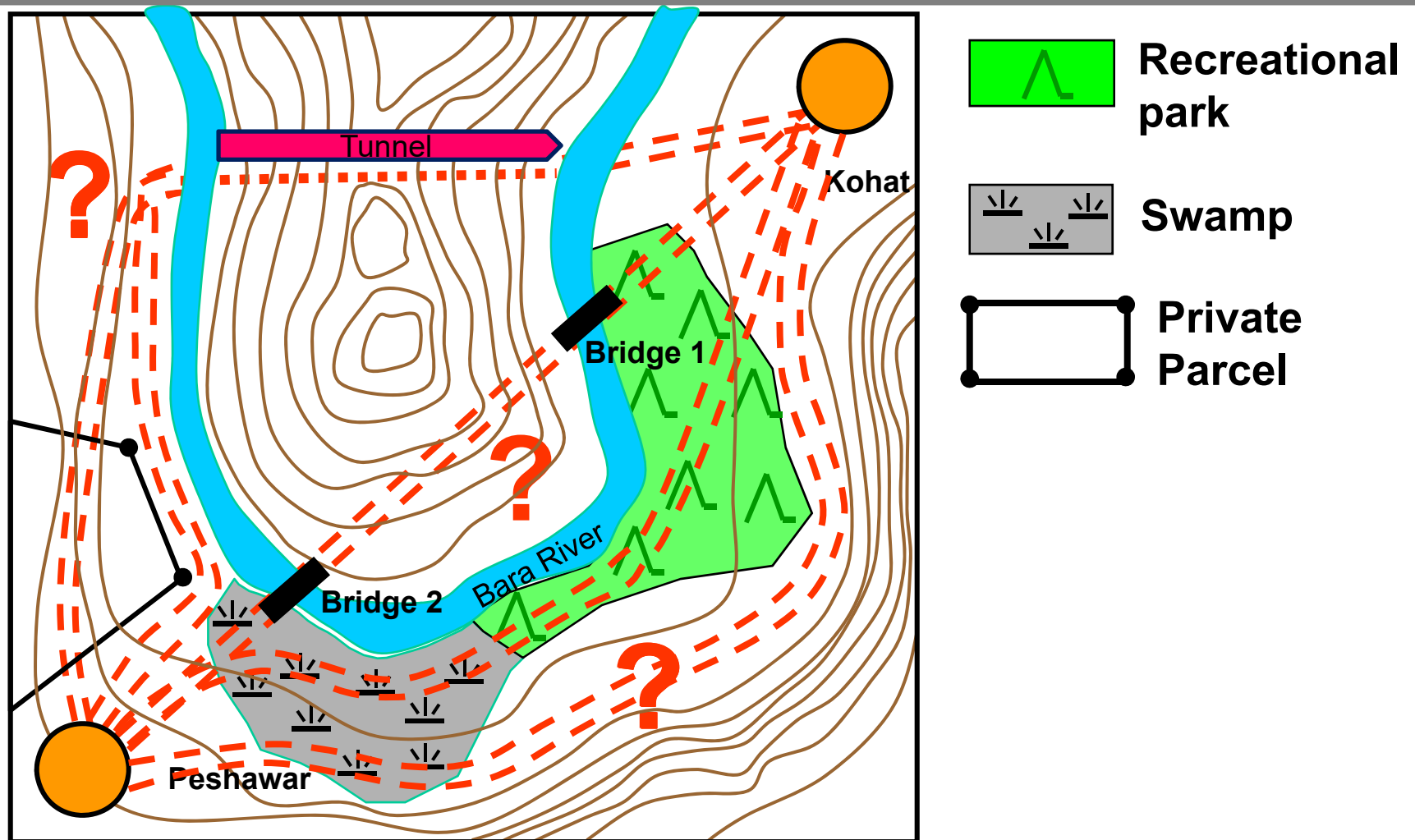Digital Terrain Model

Topography

Alternative 1

Alternative 2

Alternative 3

Decision makers

# EXAMPLE:
# Construction of Road between Peshawar and Kohat

# HOW GIS ANALYSE THE DATA?

**Example:** Identification of safe areas from flood hazard under the following conditions

1. The area should have at a distance of 1 km from the river.

2. The site should be located on elevation of 20 feet from water body.

3. The selected area should have an area of at least 50 hectares

4. Should have an area, which do not have an important economic or ecological value.          *(Continue…..)*

5. Site should be located on a terrain with slope less than 20 degree.

6. Should be free from active landslides.

6. Near to main road (500 m) to assure accessibility .

**Following data will be required**
- **Landuse data**
- **River map**
- **Road map**
- **Contour map indicated in degrees**
- **Slide map with landslide distribution**
- **Geological map**

# Safe areas in Peshawar Valley from flooding

Peshawar Valley

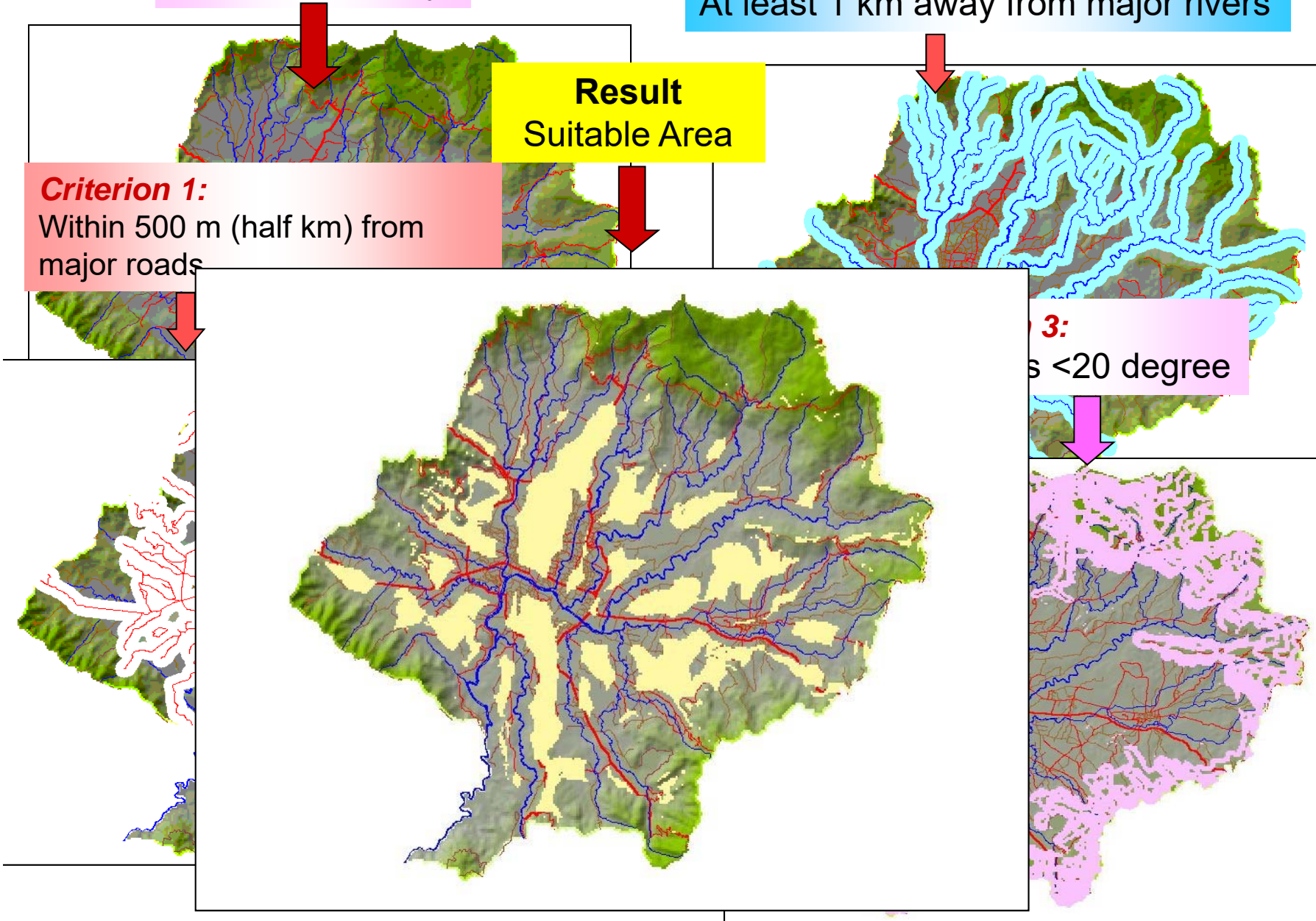**Criterion 2:**
At least 1 km away from major rivers

**Result**
Suitable Area

**Criterion 1:**
Within 500 m (half km) from
major roads

*3:*
s <20 degree

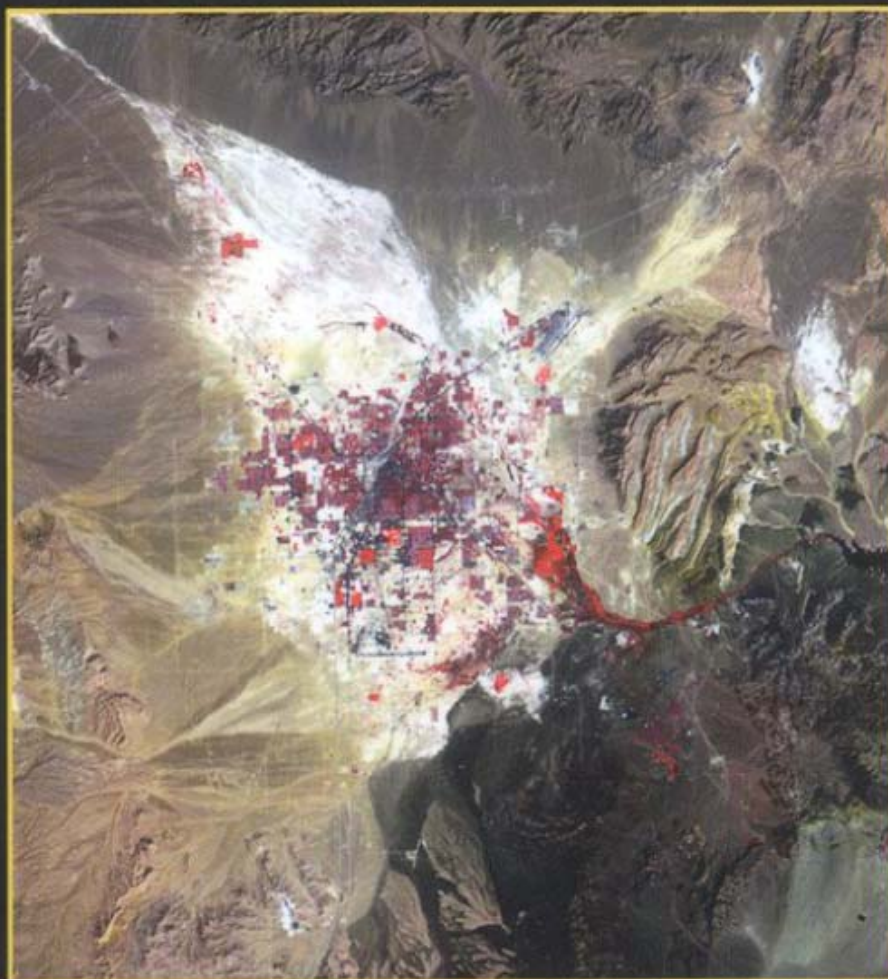# Ikonos - Banda Aceh



January 10, 2003

Aceh, Sumatra, Indonesia

December 29, 2004

Landsat MSS 13 August 1972          Landsat TM 7 August 2000

Urban Expansion

# CREATION OF HAZARD MAP:

The degree of hazard in a certain area is determined by a combination of factors. The factors are provided in the form of maps. The input data maps describe a potentially damaging phenomenon like:

- **Landslides**
- **Seismic hazard**
- **Tsunamic hazard: earthquake induced flood waves**
- **Volcanic hazard**
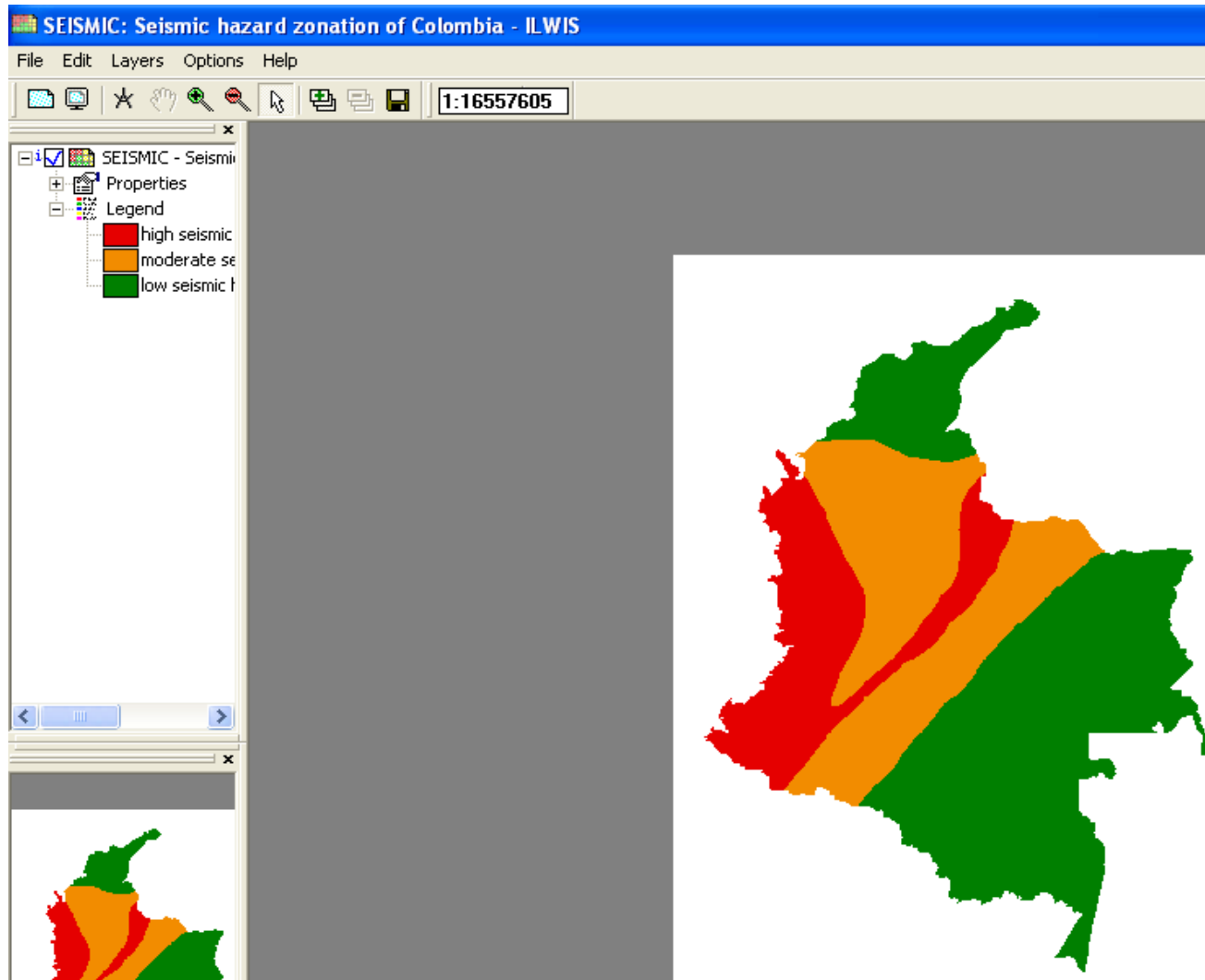- **Flood hazard**
- **Topographic regions**
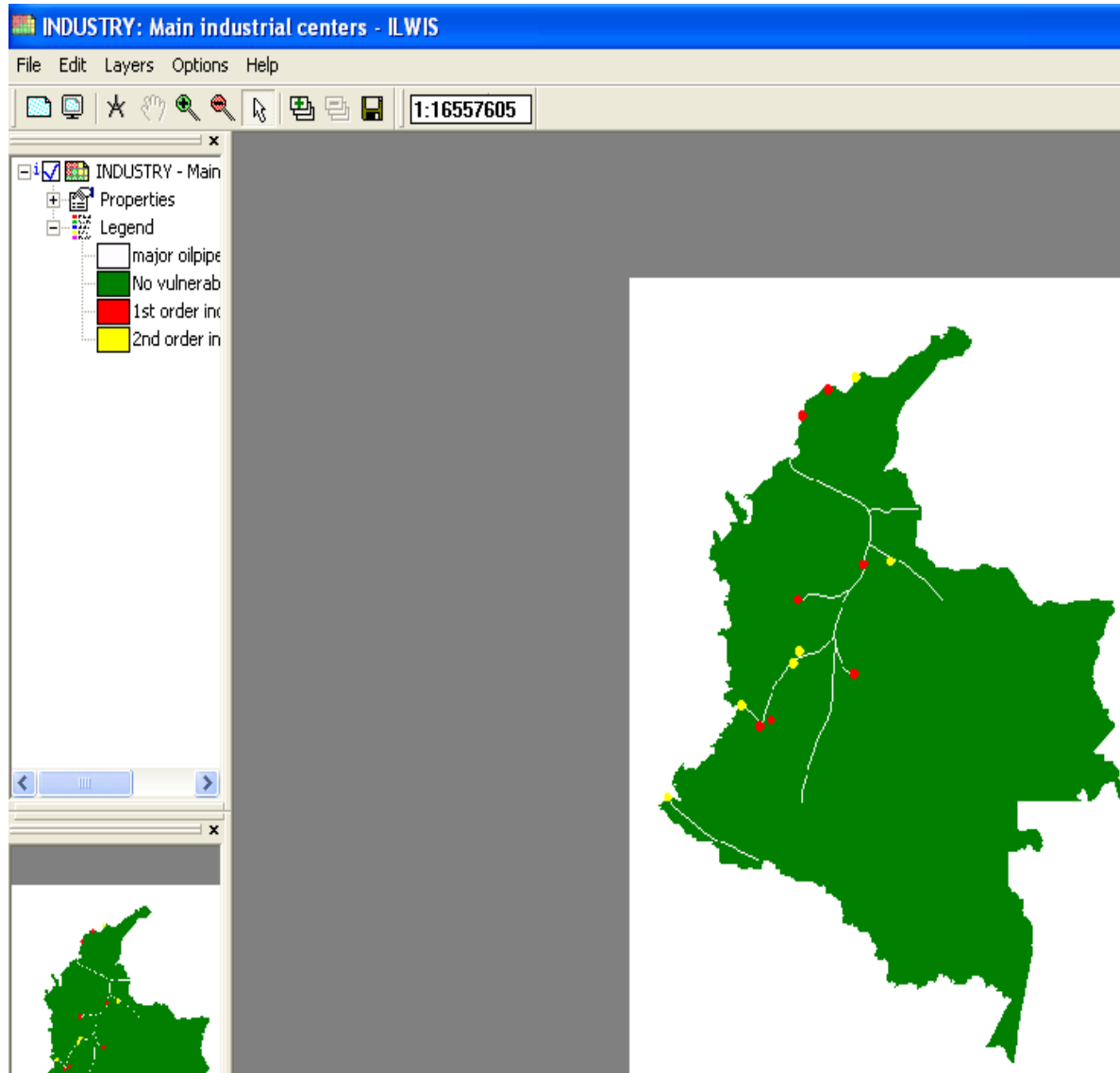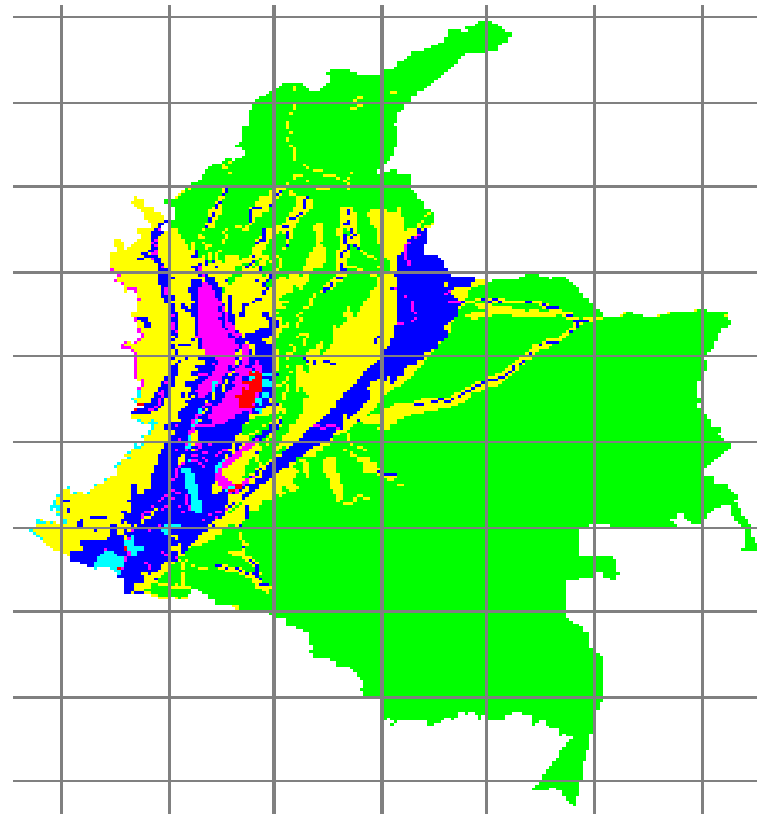
# RIVERS MAP
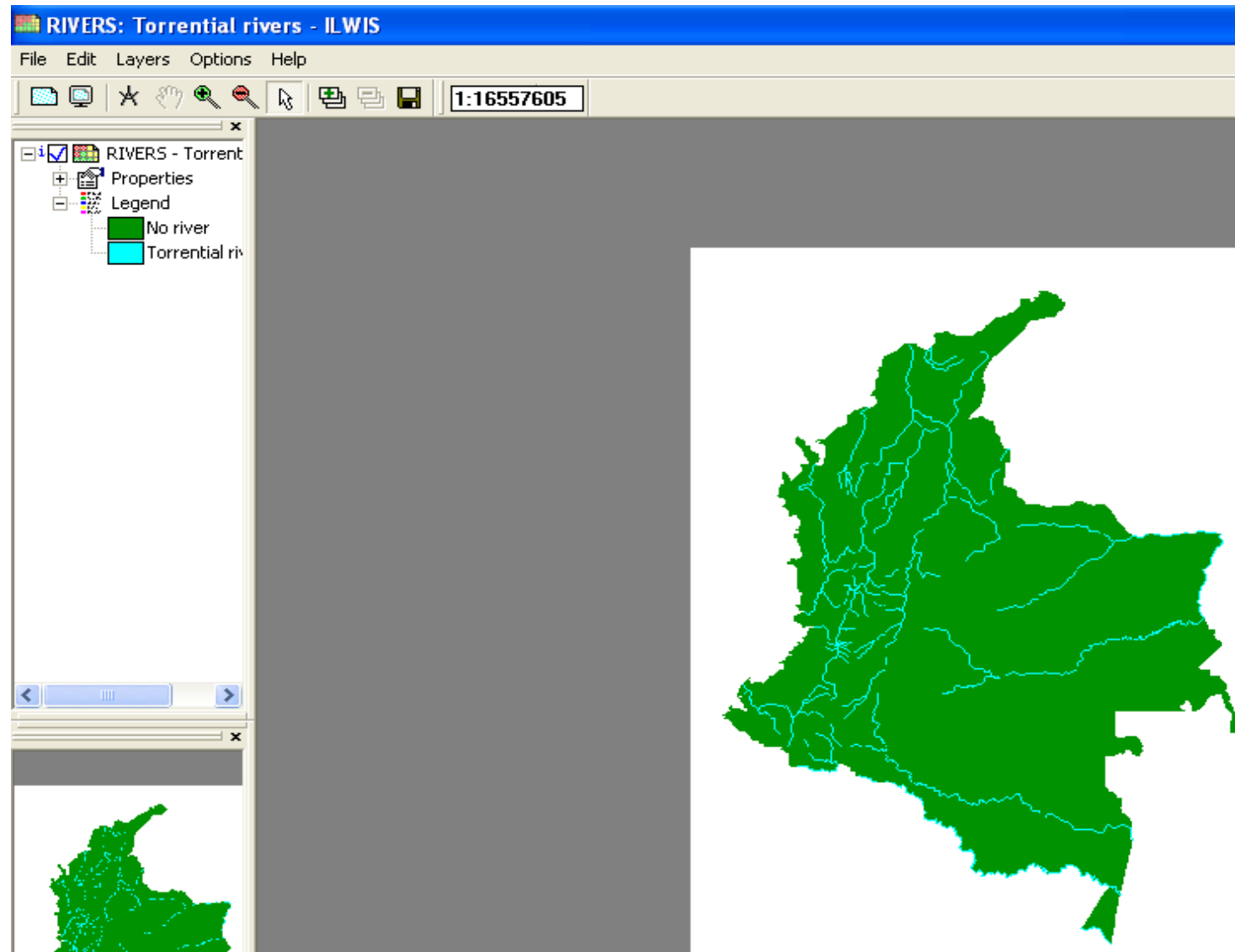
# LANDSLID MAP
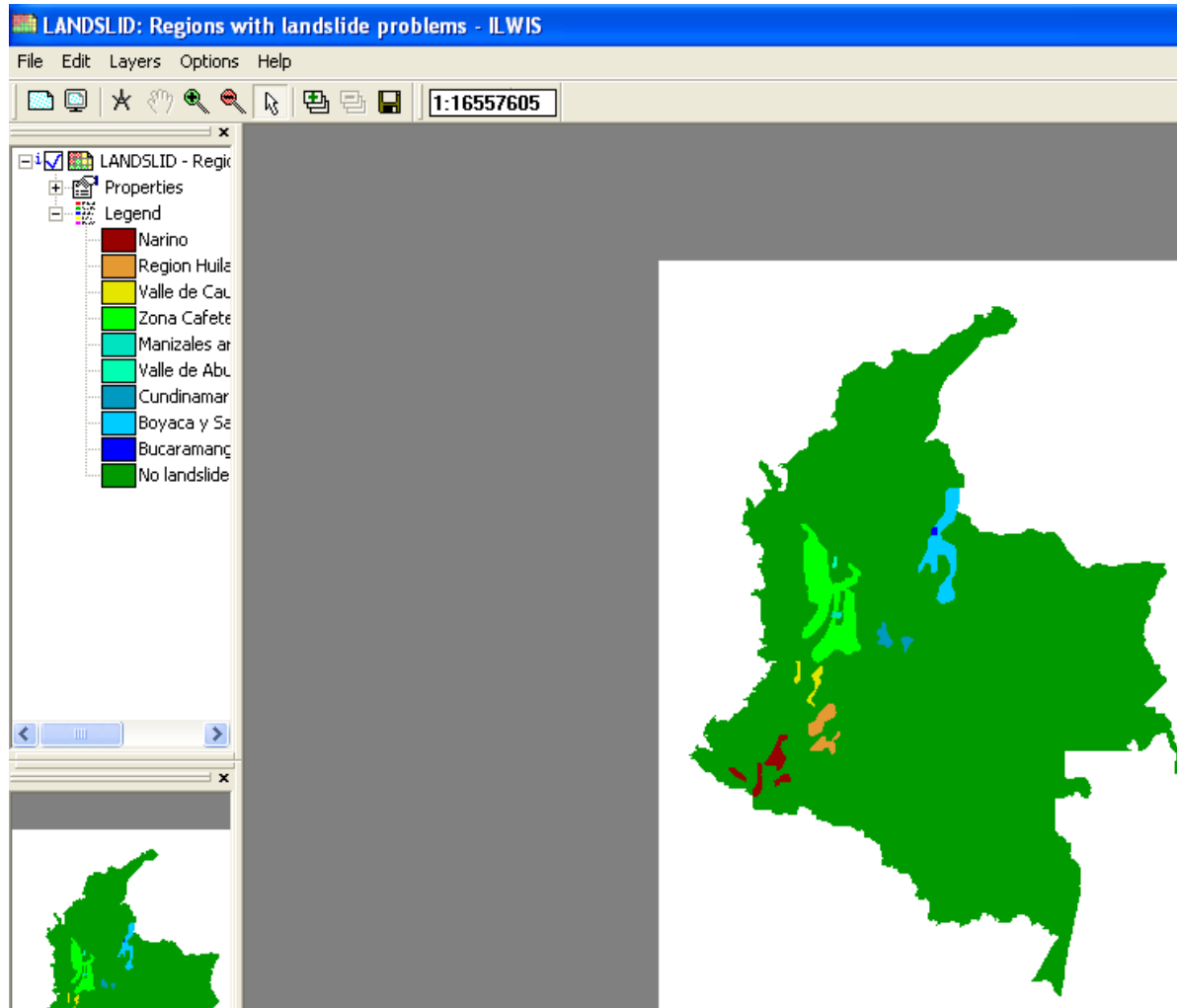
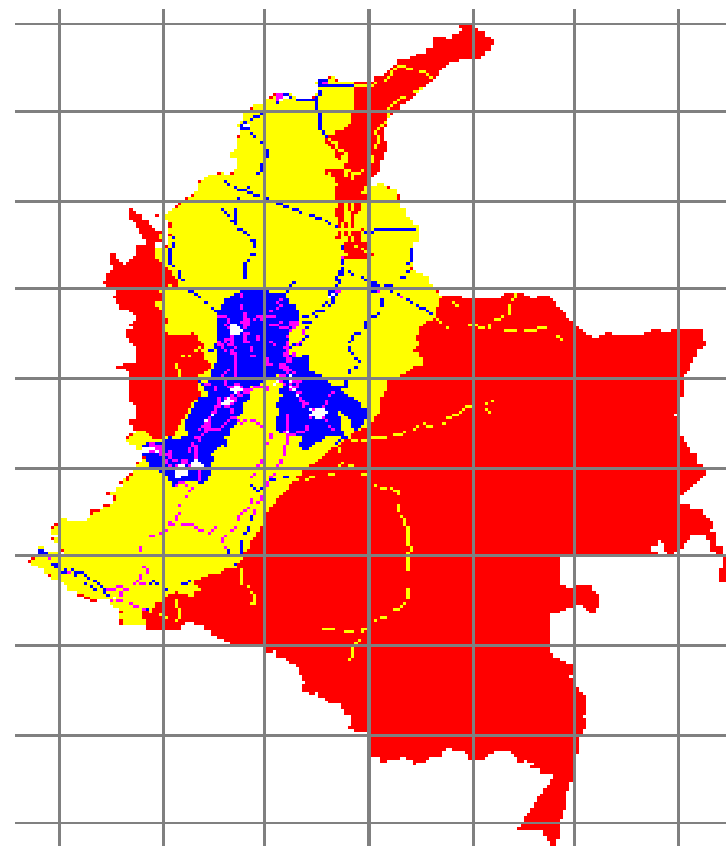# SEISMIC MAP

# INDUSTRY MAP

# Hazard Map

RF  1 : 10557605

0                    500000

Legend
- very low hazard
- low hazard
- moderately low hazard
- moderate hazard
- high hazard
- very high hazard

VULNERABILITY MAP

RF 1 : 10667606

0                    600000

LEGEND
very low vulnerability
low vulnerability
moderate vulnerability
high vulnerability

# Principal Components and Functions of an Ideal GIS

| | | |
|---|---|---|
| **Data from Maps** | | |
| **Tabular Data** | | |
| **Field Data** | | |
| **Data from Other Digital Database** | | |
| **Remote Sensing** | | |
| **Global Positioning System** | | |

**Other Geographic Information Systems**

## Geographic Information System

### Database Management

| Collection Input and Correction | Storage and Retrieval | Manipulation and Analysis | Output and Reporting |
|---|---|---|---|

**Other Geographic Information Systems**

**External Statistical Packages**

| |
|---|
| Reports |
| Maps |
| Photographic Products |
| Statistics |
| Data to Other Digital Database |
| Data Input to Models |