

SICILIAN WATER TASK FORCE MEETING  
POLLUTION PERMANENT MONITORING PANEL

World Federation of Scientists Pollution Task Force  
Panel Chairman: Richard Ragaini, Lawrence Livermore Laboratory, USA  
Presenter: Lorne Everett, Chancellor, Lakehead University

POLLUTION PANEL WORKSHOP PARTICIPANTS – 19 AUGUST 2005

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PURPOSE OF PROPOSAL – PROTECTING GROUNDWATER RESOURCES

Sicily is identified as a high-risk area for groundwater impact due to increases in:

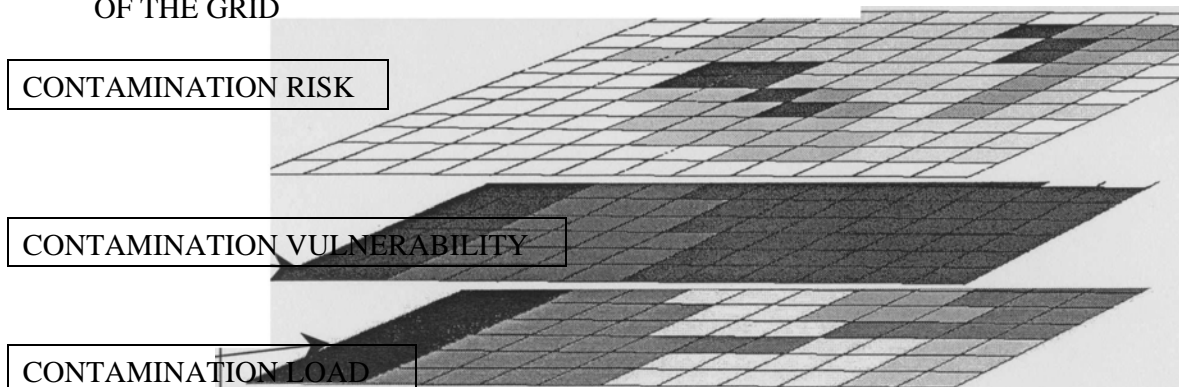
- Population growth;
- Industrial land use;
- Salt-water intrusion;
- Limited groundwater resources.

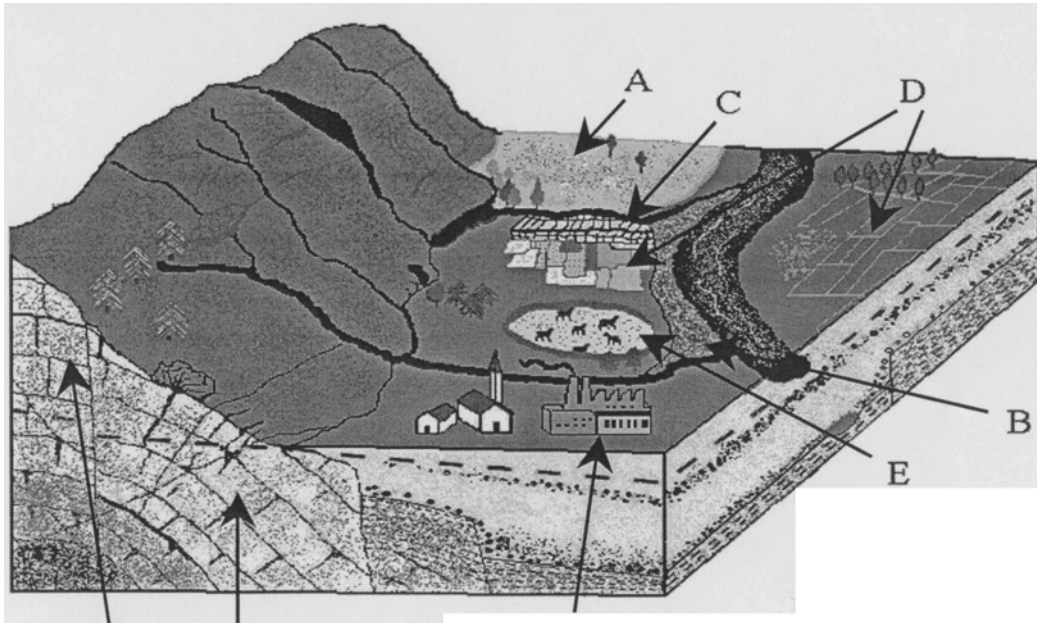
Groundwater is the main source of drinking water for Sicily and requires effective management to reduce risk of impact.

No centralized database is currently available to assess groundwater vulnerability

- Identify and delineate those areas where aquifers and drinking water resources are under threat by ongoing land use and development
- An integrated database will provide a long-term planning tool for further development and growth

EXAMPLE – CHOICE OF THE WEIGHT AND SETTING FOR EACH CELL OF THE GRID





G

F

Point source pollution

Source:  
Prof. M. Civita

- A = UNTILLED AREA
- B = FLOODING AREA
- C = AREA FOR FLOODING IRRIGATION
- D = CHEMICAL TREATED CULTIVATION
- E = BREEDING
- F = FRACTURED ROCK AQUIFER
- G = CARBONIC ROCK AQUIFER

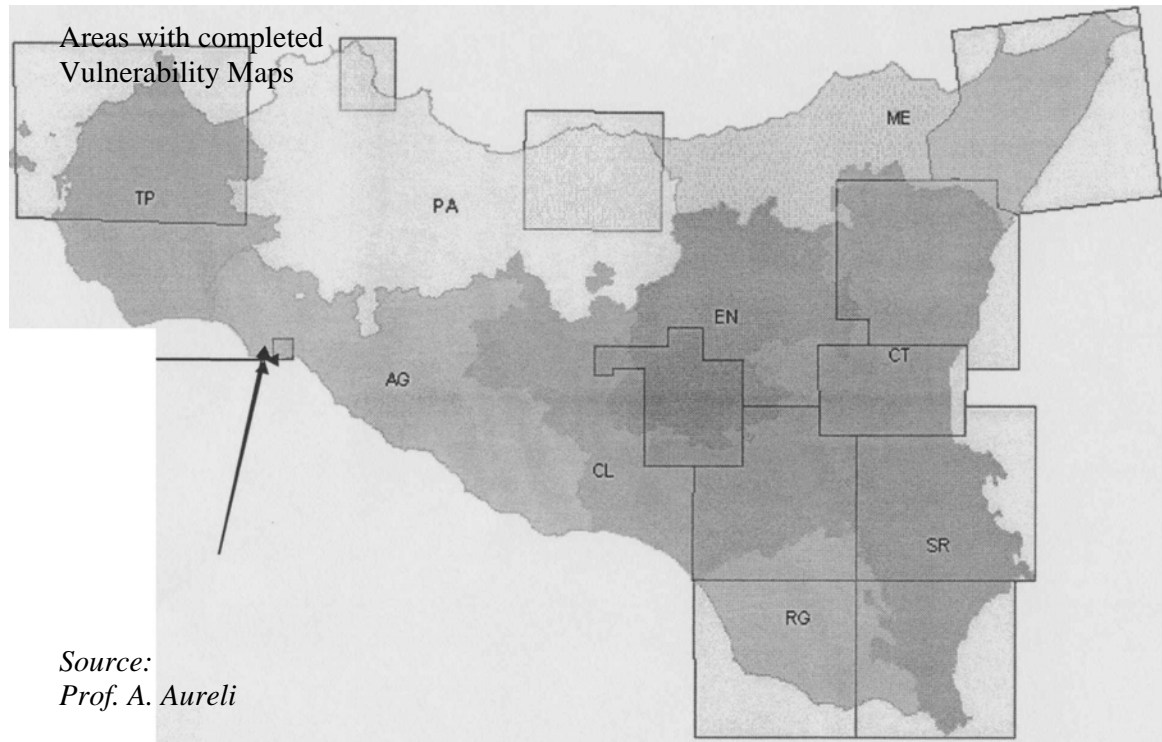
## GROUND WATER POLLUTION ISSUES IN SICILY

Releases of Contamination by Seismic/Volcanic Activity – Areas in chemical processing facilities and water storage/ distribution systems may be impacted by seismic and volcanic activity and pose a release of hazardous materials to the groundwater.

Aquifer Vulnerability Mapping/Assessment the more developed areas of Sicily:

- Palermo
- Gela
- Syracuse
- Augusta
- Catania
- Milazzo

## INDEX OF AQUIFER MAPPING COMPLETED TO DATE



## GROUNDWATER POLLUTION VULNERABILITY MAPPING PROJECT PHASES

- Create an up-to-date comprehensive database:
  - Hydrogeologic zones;
  - Site-specific pollution sources.
- Develop/update aquifer vulnerability maps of Sicily with local University collaboration.
- Deploy maps on website with Geographic Information System (GIS) tools.
- Train the potential end users (i.e., government agencies, local land use planners, developers, etc.).

## VULNERABILITY MAPPING AND ENVIRONMENTAL DATABASE MANAGEMENT FOR SICILY

### Database Development

Identify existing data sources:

- Universities of Catania, Messina and Palermo;
- Italian Civil Protection Agency;
- Additional government agencies;
- National Research Council.

Integrate data within a central database.

### Pollution Vulnerability Mapping

- Develop a GIS tool to display all available data;
- Generate pollution vulnerability maps for Sicily, including local and regional scale maps;
- Partner with Italian and Sicilian government bodies to identify significant data gaps.

### Web-Based Deployment and Training

- Create a web server to house a comprehensive database of environmental and pollution vulnerability data;
- Utilize Internet-based tools to display pollution vulnerability maps;
- Complete training for GIS and database and aquifer vulnerability maps;
- Inform interested parties of pollution prevention techniques.

## ACTION ITEMS FOR PROJECT

### Inventory of Pollution/Impact Sources

- Solid and hazardous waste disposal facilities
- Industrial facilities
- Petroleum hydrocarbon bulk storage, oil fuel power plants, and refineries
- Salt-water intrusion areas

### Map Existing Land Use

- Industrial growth areas, agricultural land use and land use patterns;
- Artificial recharge areas due to irrigation or discharge of treated water, and other activities that may have long-term effects.

### Natural Resources

- Aquifers in Sicily;
- Geology (superficial and bedrock);
- Soil types;
- High yielding aquifers, drinking water supplies, recharge areas.

## GROUNDWATER VULNERABILITY MODELING: DRASTIC

A methodology that allows the pollution potential of any hydrogeologic setting to be systematically ranked.

The system has two major parts:

- The designation of mapable units – "hydrogeologic settings"
- The superposition of a relative rating system called "DRASTIC"

The system optimizes the use of existing data to rank areas with respect to pollution potential, such as:

- Depth to groundwater
- Recharge
- Aquifer media
- Soil media
- Topography
- Impact of the vadose zone

- Hydraulic conductivity of media

#### WFS TASK FORCE

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Dr. Gina Calderone, EA Science & Technology, USA

Chancellor Lorne G. Everett, Canada/USA

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