

GROUNDWATER MONITORING AND DATA MANAGEMENT IN THE MEDITERRANEAN REGION

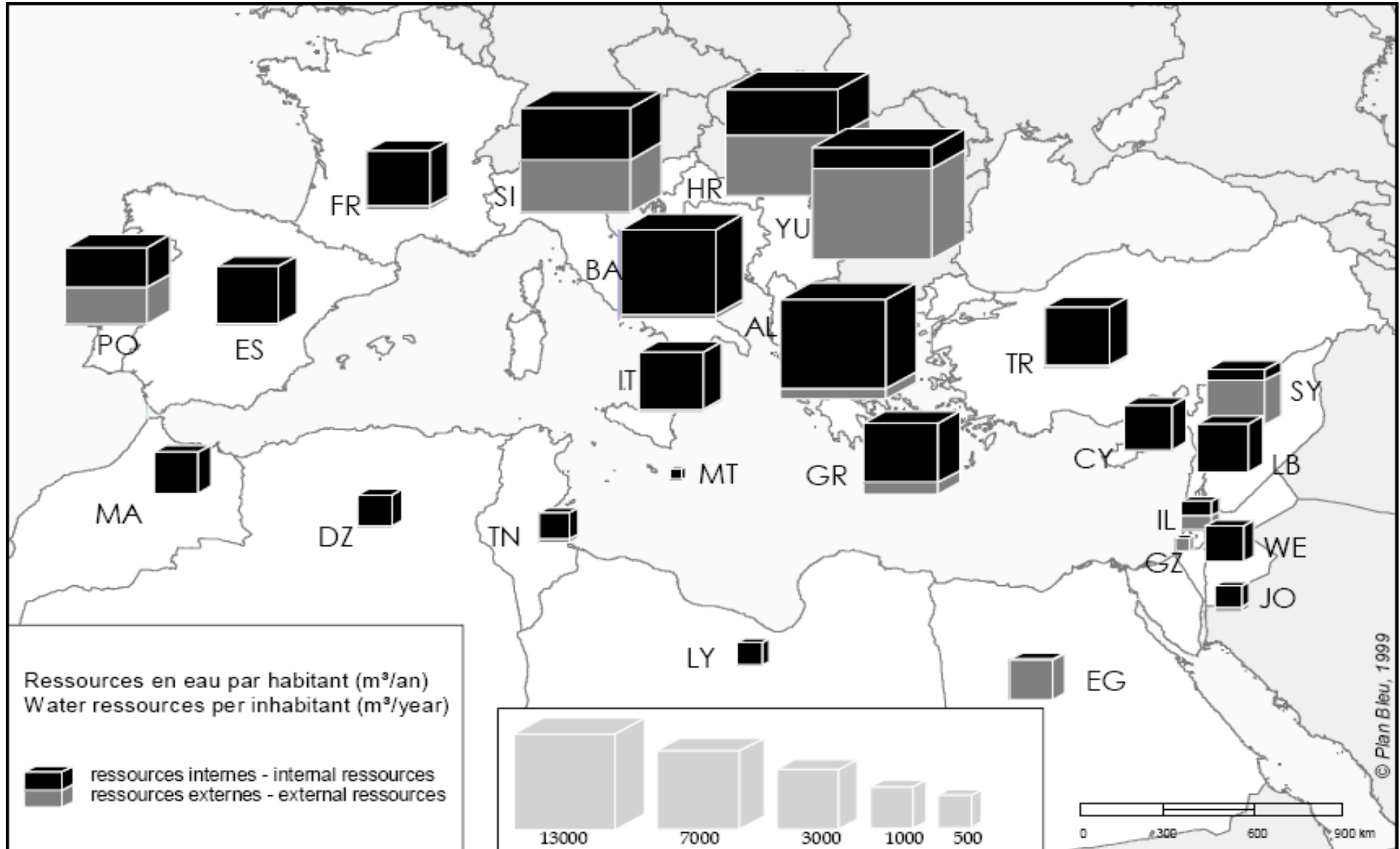


Marrakech, May 2005

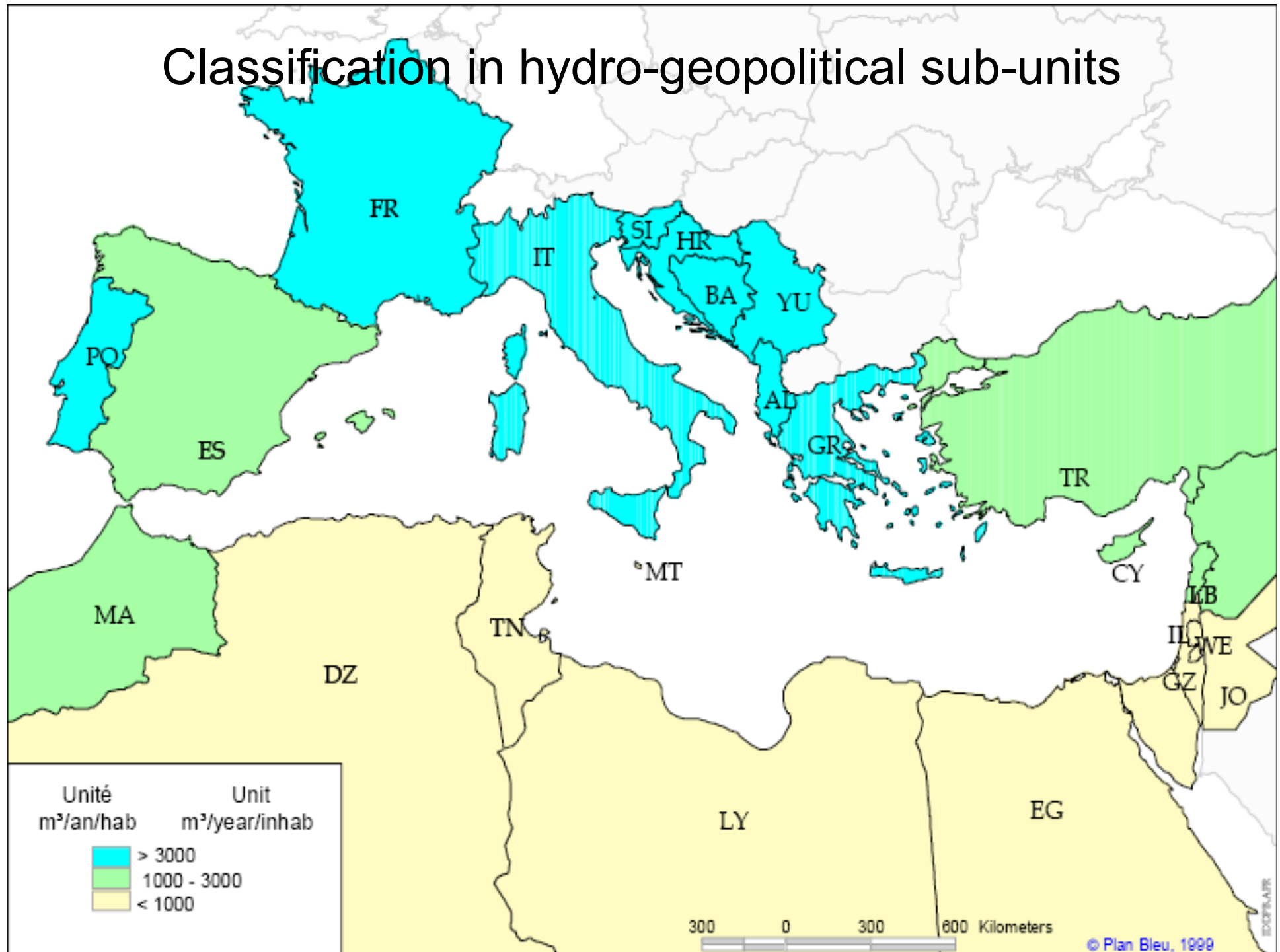
WATER RESOURCES IN THE MEDITERRANEAN REGION

- **Water resources are limited, fragile and threatened**
- **Different conditions for water resources availability between countries and populations**
- **Increasing water demand**
- **High level of exploitation and increasing pressures over water resources**
- **Water use is not efficient**

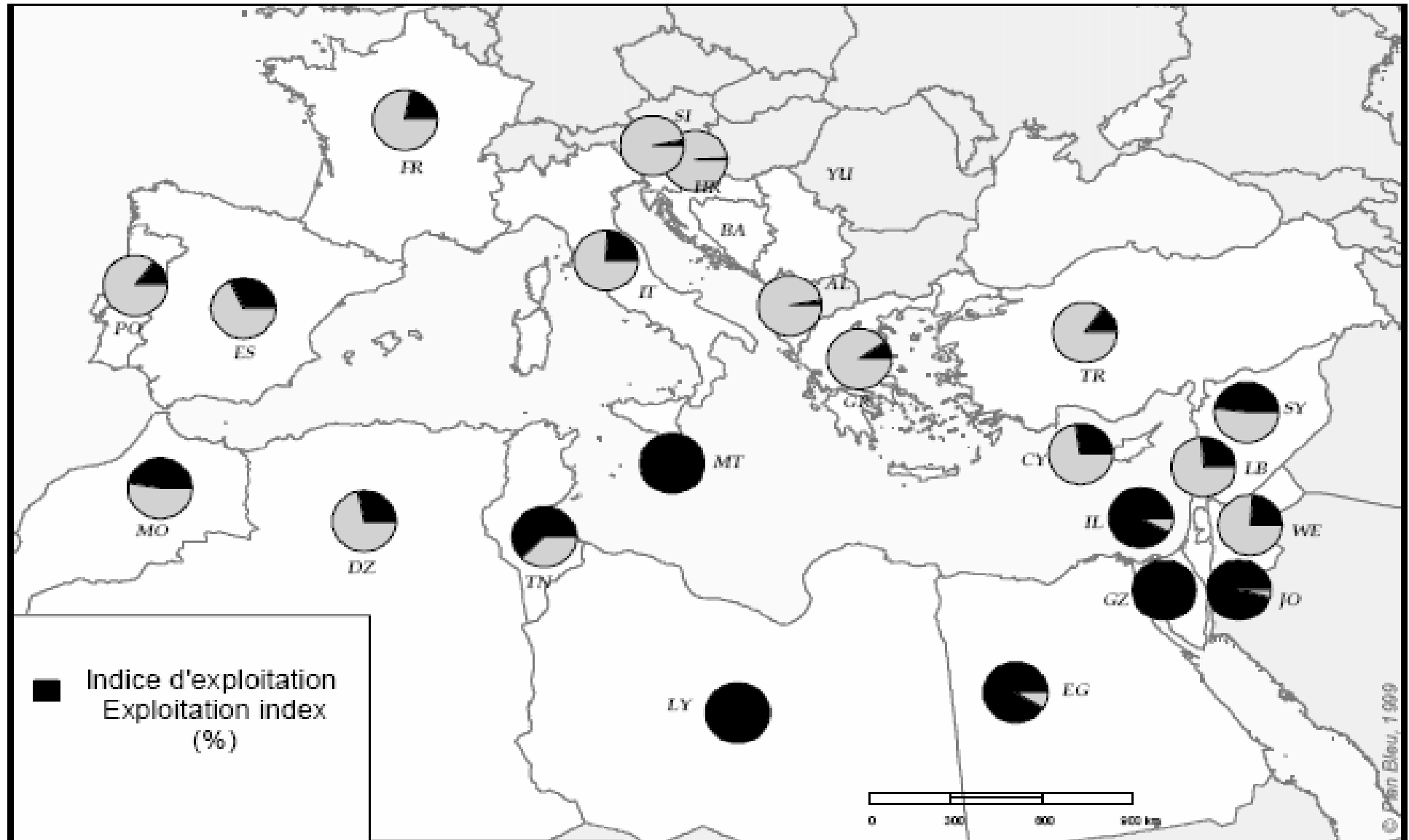
LIMITED WATER RESOURCES



Classification in hydro-geopolitical sub-units



Exploitation indexes for renewable natural water resources



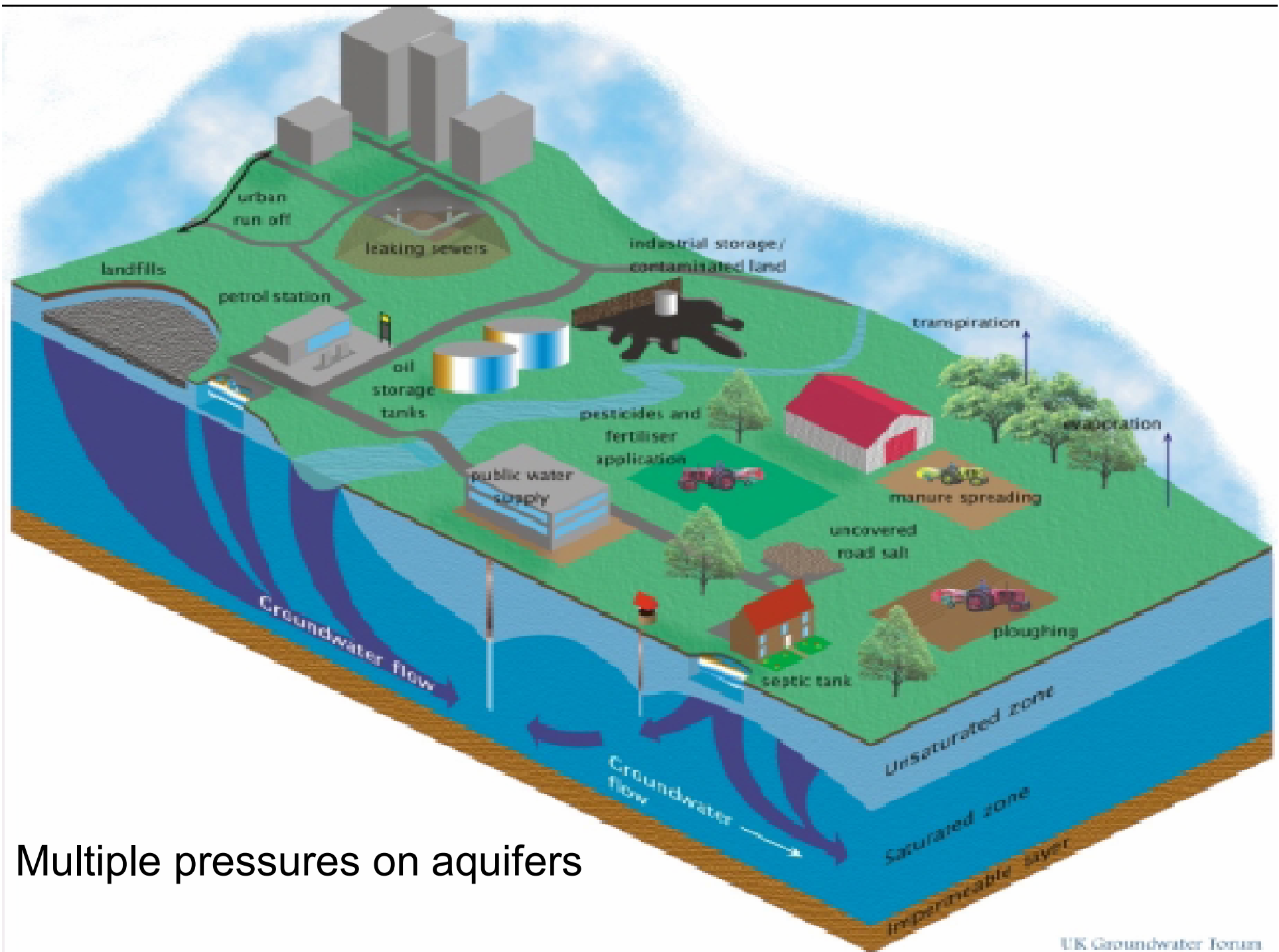
WATER RESOURCES IN THE MEDITERRANEAN REGION

- **More than 160 million of the about 420 million Mediterranean people (United Nations estimate) live in countries with less than 1.000 m³/year per inhabitant (annual average)**
- **the exploitation index, is higher than 50% in some countries: Jordan, Malta, Tunisia, and also in the Mediterranean part of Spain. The index is higher than 90% for Egypt, Israel and Libya.**
- **Of the water utilized, about 10% is used for domestic needs, 18% for industrial and 72% for irrigation.**

GROUNDWATER RESOURCES IN THE MEDITERRANEAN REGION

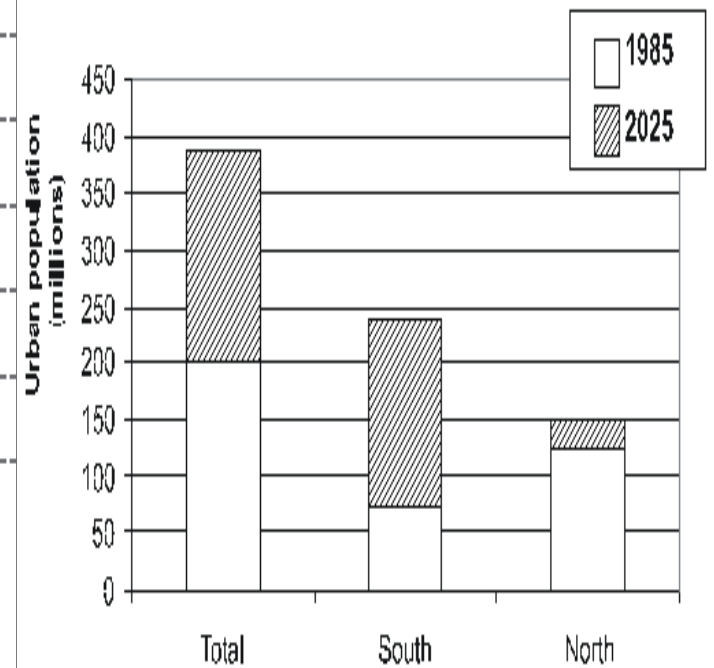
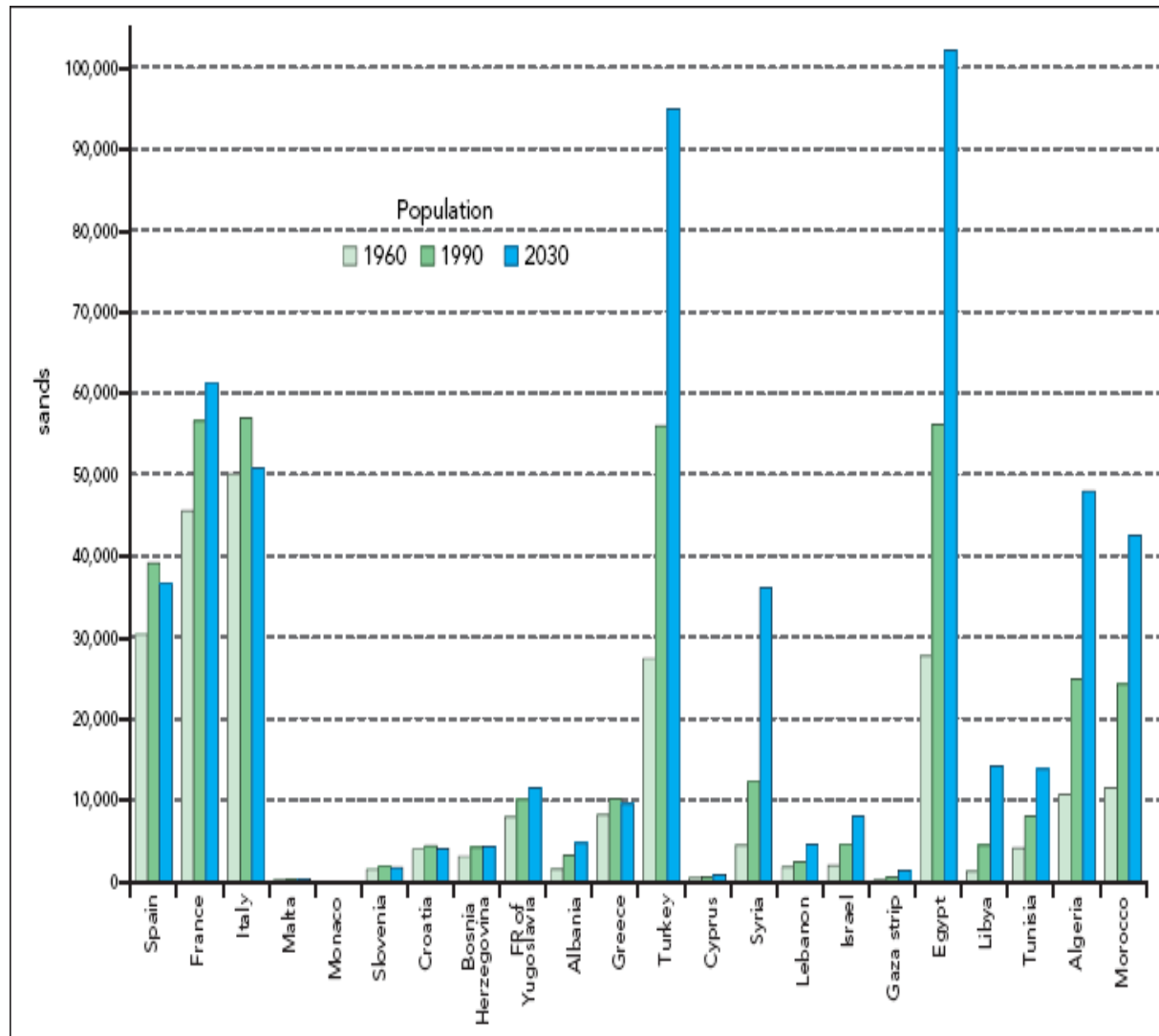
The groundwater resources of the Mediterranean region are either the main sources of freshwater or are vitally needed to supplement surface-water sources.

Groundwater represents more than 50% of the available water resources in Mediterranean islands and it is practically the only water resource in the Sahara region extending from Egypt to Morocco.



Multiple pressures on aquifers

Population increase and urbanisation growth in the Mediterranean

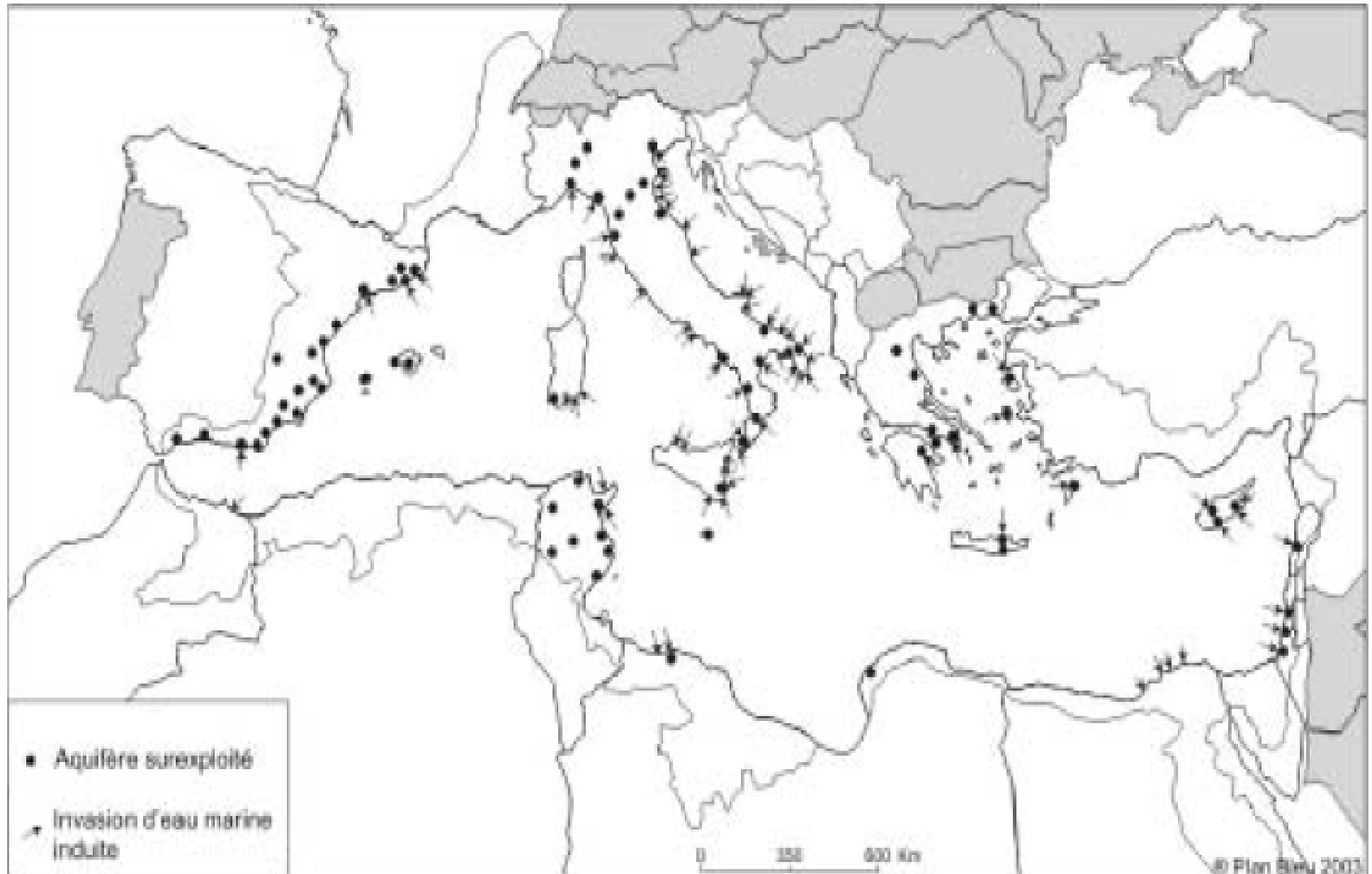


Agriculture	Nutrient loads from agriculture Pesticide application Modified water use by vegetation Soil erosion	Groundwater quality deterioration Transportation of dissolved elements in groundwater Altered aquifer recharge
Abstraction for irrigation, public & private supply (including Tourism)	Reduction in groundwater volume	Seawater intrusion Aquifer compaction Modified flow Reduced dilution of chemical fluxes (increased concentrations)
Urban activity	Effluent disposal to groundwaters	Groundwater quality deterioration
Industry	Effluent disposal to groundwaters	Groundwater quality deterioration

GROUNDWATER RESOURCES IN THE MEDITERRANEAN REGION

- **The groundwater resources in the Mediterranean region are threatened by various development activities, and mismanagement. Groundwater has been over-exploited through excessive, uncontrolled pumping in many groundwater basins, and groundwater quality is deteriorating as a result of seawater intrusion into coastal aquifers.**
- **The exploitation of non-renewable resources is very intensive in in many parts of the Saharan aquifers**
- **In addition to their over-exploitation and seawater intrusion, groundwater resources are being threatened and polluted by numerous point and non-point sources of pollution generated from anthropogenic sources (agricultural, industrial, and urbanisation activities).**

Areas where overexploitation of groundwater was registered in the Mediterranean region



GROUNDWATER MONITORING AND DATA MANAGEMENT

- **With groundwater quantity and quality problems growing, the awareness of the need for sustainable management of the groundwater resources has also increased.**
- **Monitoring of water quality, water levels, and water extraction in an aquifer is of fundamental importance as a basis for groundwater resources management.**
- **An integrated approach to monitoring design together with a unified and consistent data base on basic hydrological processes is a prerequisite for the sustainable management of transboundary aquifers.**

GROUNDWATER MONITORING AND DATA MANAGEMENT

Integrated approach:

- **integration of data gathering and storage**
- **groundwater - surface water interaction**
- **quantity - quality**

GROUNDWATER MONITORING AND DATA MANAGEMENT

Types of monitoring networks:

- **Basic**
- **Specific**
- **Temporary**

GROUNDWATER MONITORING AND DATA MANAGEMENT

Primary aspects in network design:

- **the parameters to be measured,**
- **the locations and depths for which the parameters should be representative,**
- **the period of time for which monitoring is required and**
- **the frequency of the measurements within this period of time.**

GROUNDWATER MONITORING IN THE MEDITERRANEAN

Current situation:

- **Groundwater monitoring has become a standard practice only in certain parts of the region.**
- **In many parts of the region, no significant and systematic groundwater monitoring going on or only project-wise or problem-driven.**
- **Until recently many monitoring networks in the region were developed for the assessment only of the groundwater quantitative status (water level). Groundwater quality management became an issue only recently.**
- **There is a lack of standard groundwater monitoring procedures and thus datasets from different part of the region, in many cases, can not be compared.**

GROUNDWATER MONITORING IN THE MEDITERRANEAN

Current situation:

The situation is rather different in the north Mediterranean countries (EU Member States), where groundwater management comes under the EU Water Framework Directive (WFD), which requires the formal implementation of long-term monitoring activities. Groundwater monitoring strategies are under revision or amendment, in order to be in line with the requirements of the WFD.

GROUNDWATER MONITORING IN THE MEDITERRANEAN

Existing data are not sufficient or reliable enough to plan regional actions for the sustainable use of groundwater. The lack of sufficient and reliable data causes a considerable risk of deterioration of the groundwater status, both quantity and quality, without sufficient warning.

GROUNDWATER MONITORING IN THE MEDITERRANEAN

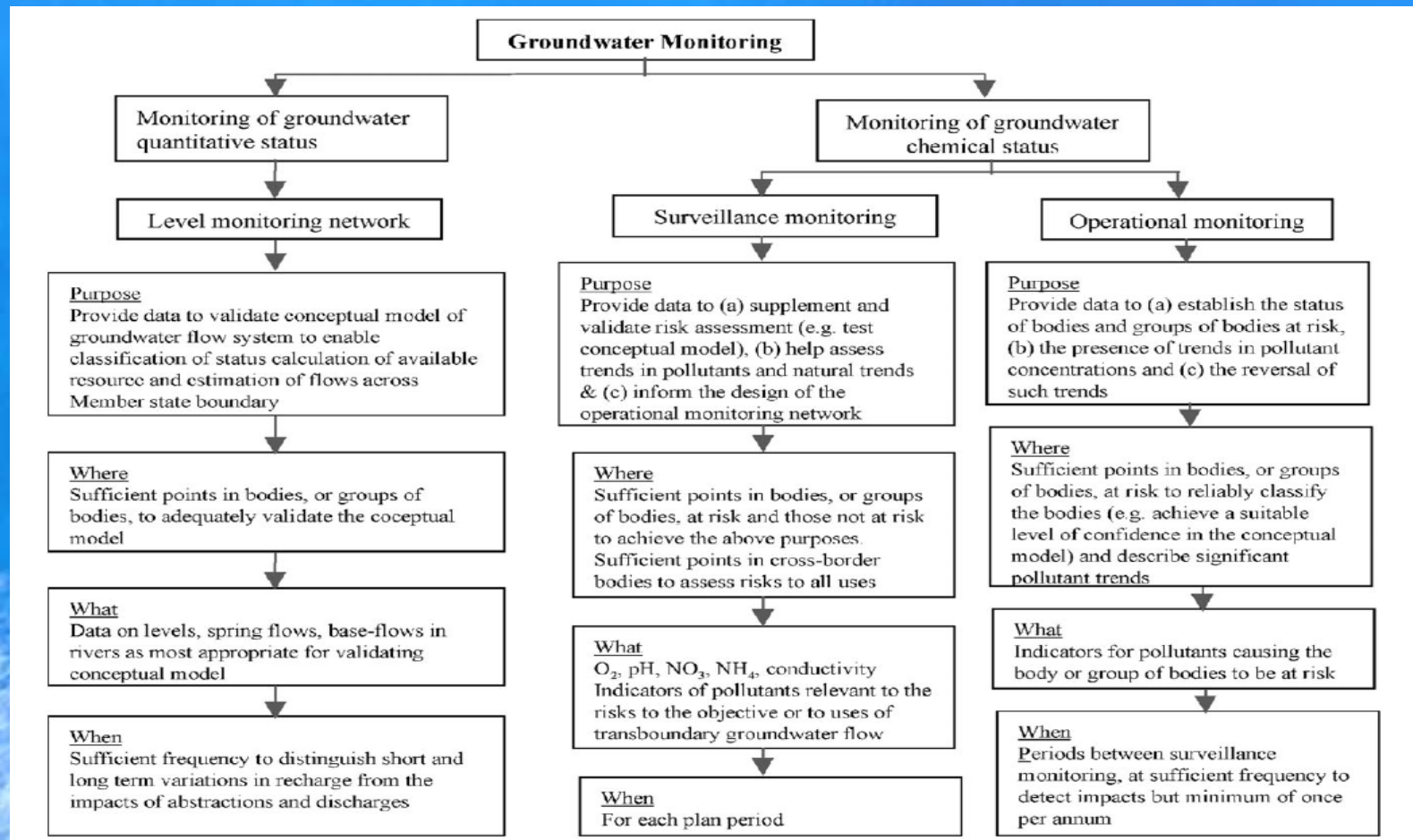
Transboundary aquifers:

- Although there are some good examples of ongoing programmes on transboundary water cooperation in the region, such activities are scarce and lack coordination.
- Harmonisation of network design, measurement frequency, standards, quality control and data storage and processing will be needed for setting up efficient transboundary groundwater monitoring.

GROUNDWATER MONITORING: WFD APPROACH

- **WFD requires the formal implementation of long-term monitoring activities**
- **Monitoring is required to provide a reliable assessment of quantitative status of all groundwater bodies or groups of bodies including assessment of the available groundwater resource**
- **Monitoring is required to provide a coherent and comprehensive overview of groundwater chemical status within each river basin and to detect the presence of long term anthropogenically induced upward trends in pollutants**
- **Monitoring programmes have to be operational before the end of 2006**

GROUNDWATER MONITORING: WFD APPROACH



A satellite-style map of the Mediterranean region, showing the Mediterranean Sea, the Iberian Peninsula, the Balkans, and the Middle East. The text "THANK YOU FOR YOUR ATTENTION" is overlaid in large, bold, yellow letters with a black outline, centered over the sea.

**THANK YOU FOR YOUR
ATTENTION**