RISK-BASED ENVIRONMENTAL AND HUMAN SECURITY MANAGEMENT IN THE MEDITERRANEAN

by

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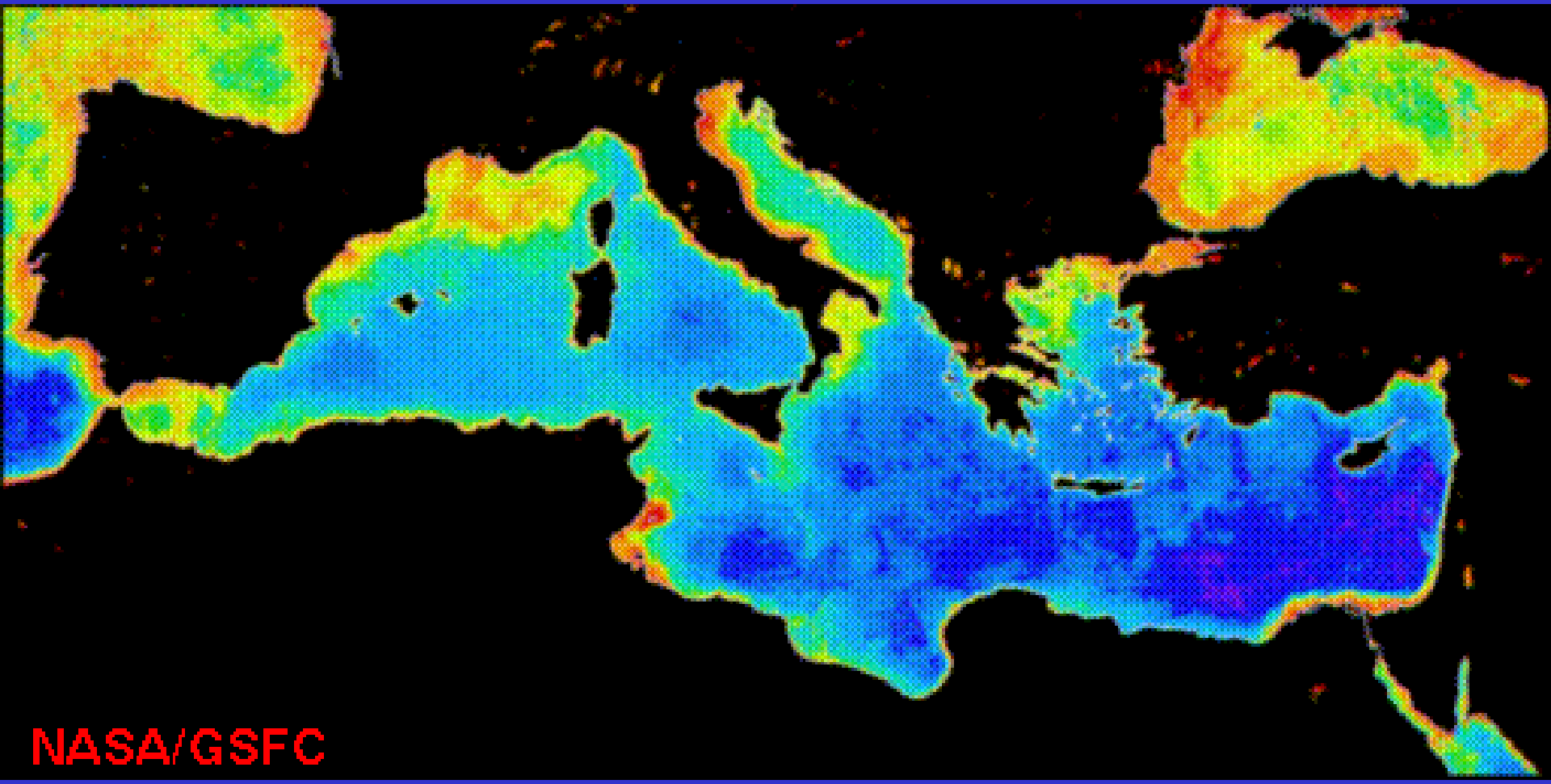
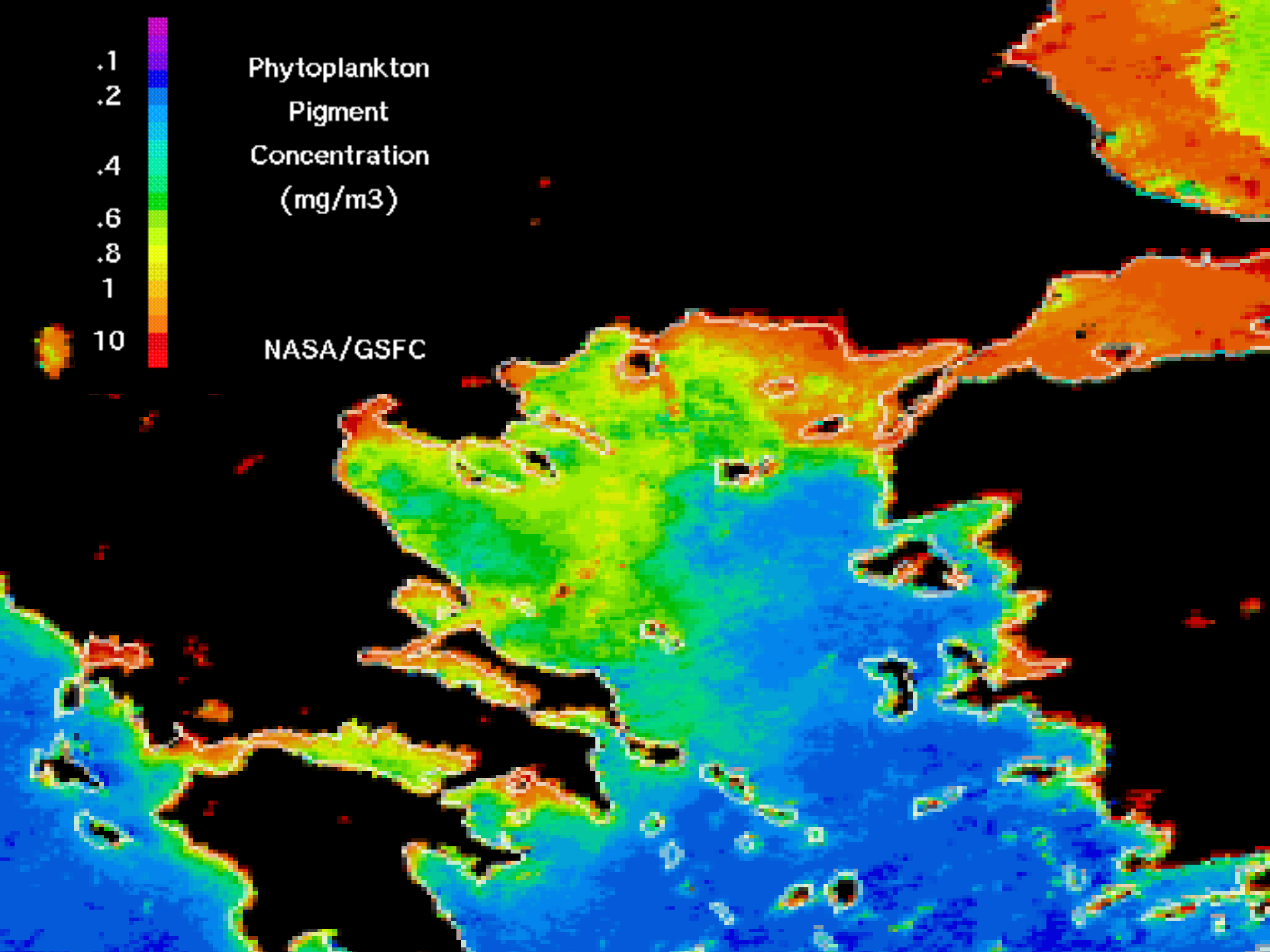
http:// www.inweb.gr



Poor pigment Med-water, compared to Atlantic Pigment


.1
.2
.4
.6
.8
1
10
Phytoplankton
Pigment
Concentration
(mg/m3)
NASA/GSFC

ENVIRONMENTAL AND HUMAN SECURITY

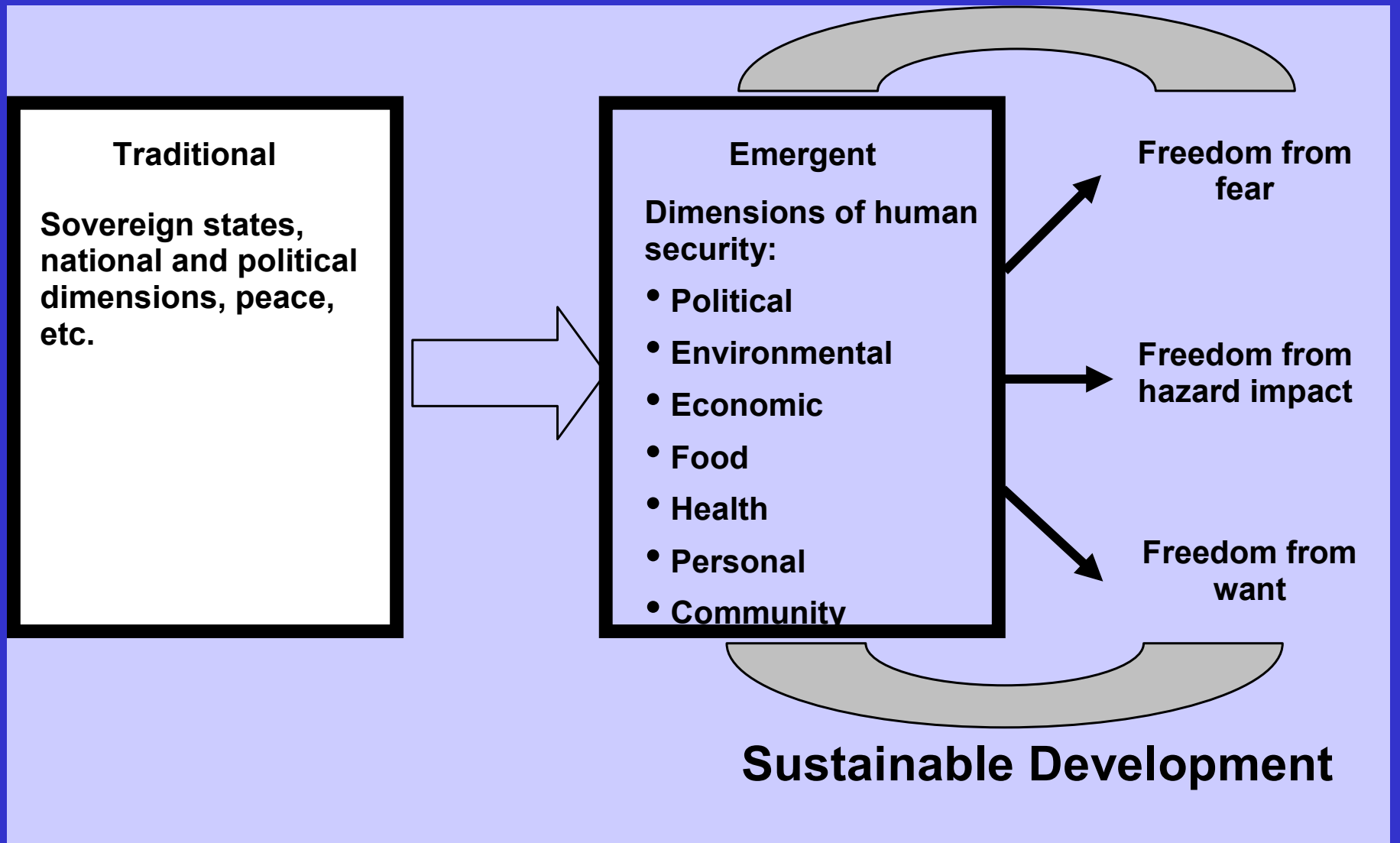
- **Main Issues**

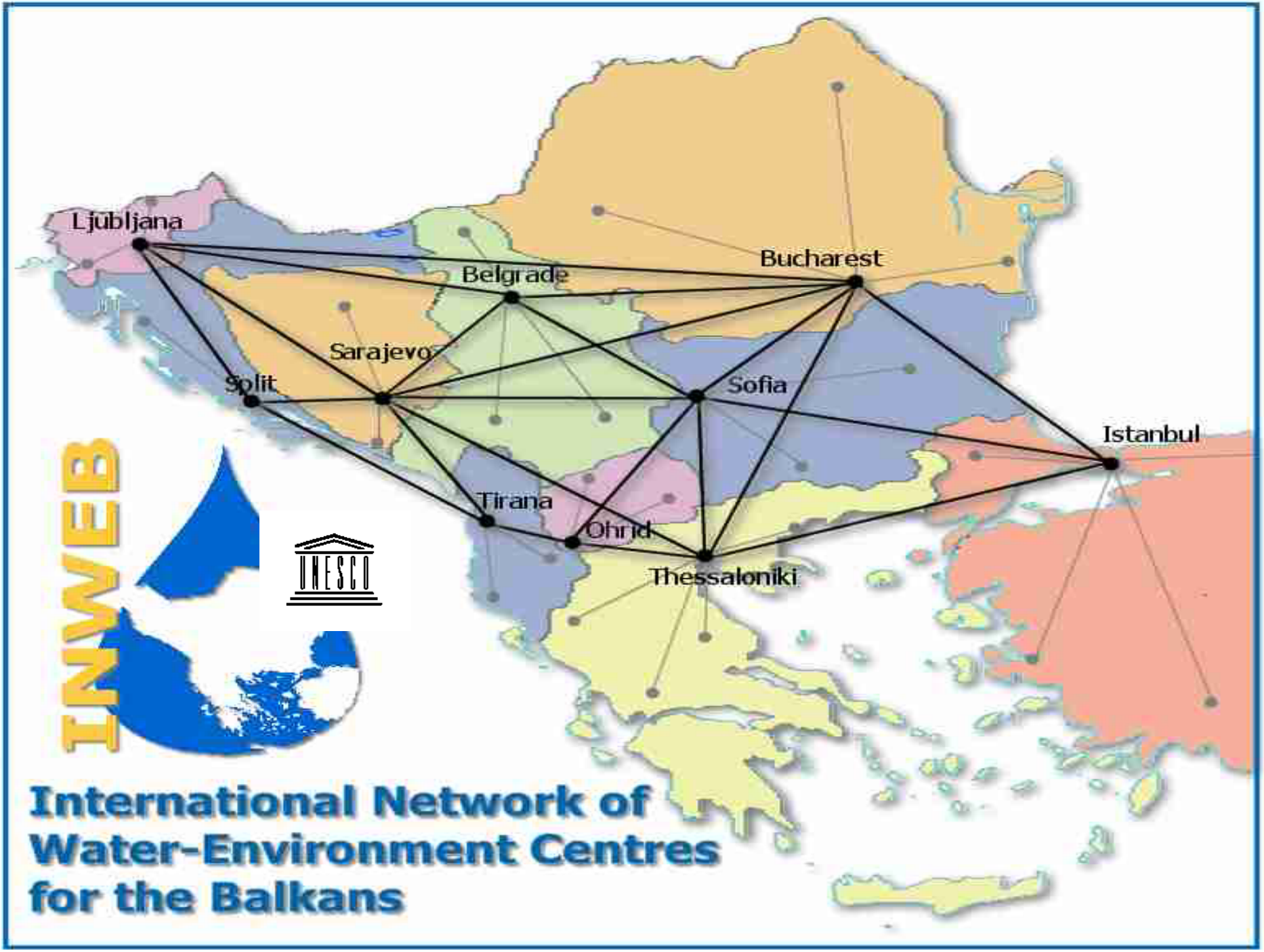
How to enhance *Environmental & Human Security* in the Mediterranean through better coordination of policies and joint efforts of multiple stakeholders towards *environmental and human risk reduction*

- **Core attention**

Vulnerability of ecosystems, individuals and local communities (damage to habitat, losses of life, health, property, moral damage, ……)

The paradigm shift for Human Security

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MAIN OBJECTIVES

- *Contribute to environmental risk reduction, sustainable development & enhanced human security*
- Improve institutional coordination & cooperation between stakeholders
- Establish an international cooperation & consensus process
- Strengthen research potential

THEMATIC AREAS

- **Natural Disasters**
- *Floods*
- *Droughts*
- Forest Fires
- **Technological Disasters**
- Associated with water quality deterioration – sewage systems, accidental discharges
- Potential accidents at waterworks

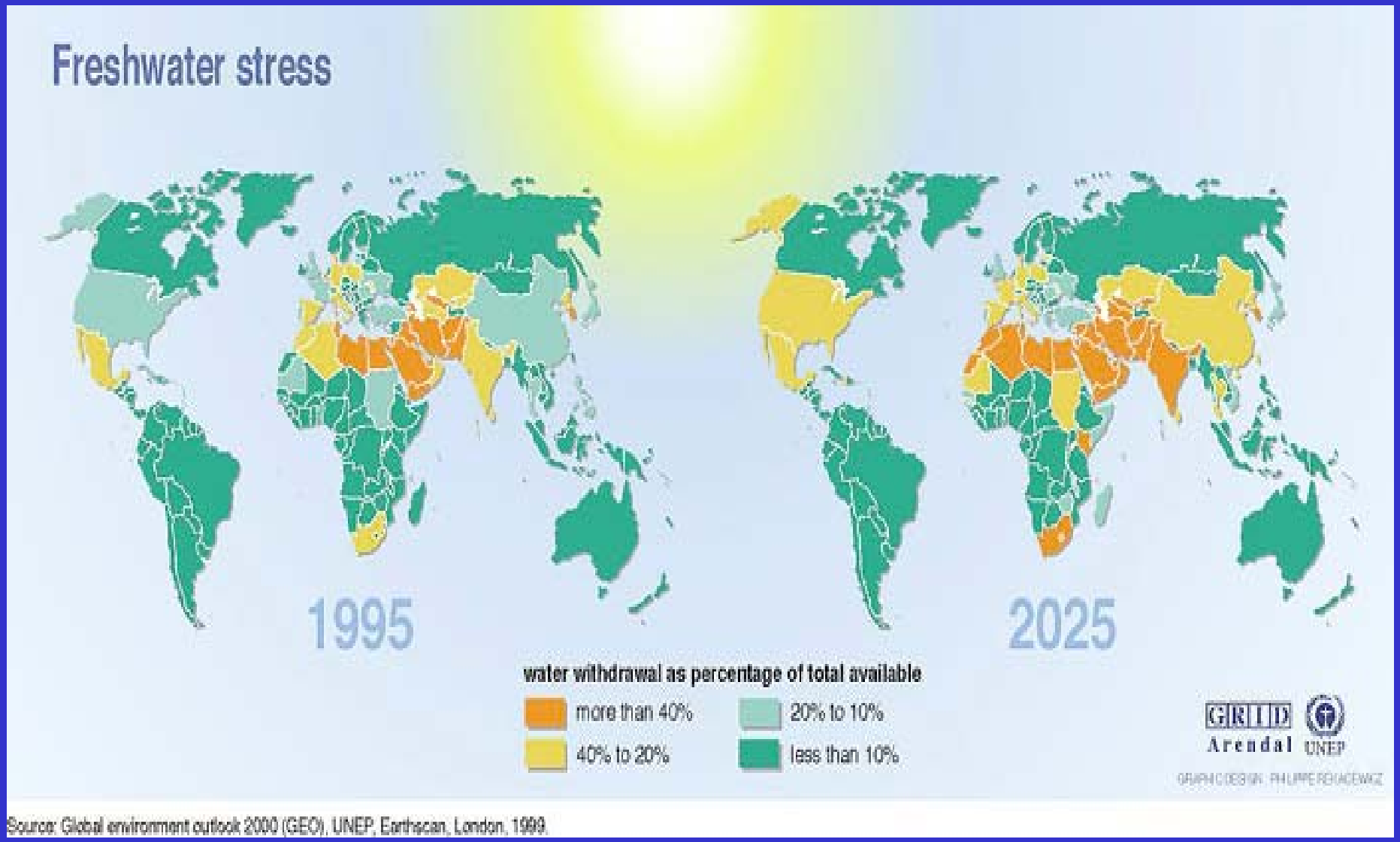
MAIN STAGES IN DISASTER RISK REDUCTION

- Prevention and mitigation
- Monitoring, forecasts, early warning, training
- Emergency response
- Rehabilitation and recovery of affected population and livelihoods

CROSS-CUTTING PROBLEMS & LOOPHOLES

- How to achieve better coordination (horizontal-vertical) between responsible organs?
- Need to incorporate disaster mitigation into river basin management?
- Integrate disaster mitigation with emergency response?
- Why many programs/strategies in disaster risk reduction are not effective?
- How to increase public participation and build partnerships between stakeholders?

Water Stress will Increase Independent of Climate Change



Source: Global environment outlook 2000 (GEO), UNEP, Earthscan, London, 1999.

WATER RESOURCES

- Effective development and management of water resources is essential for sustainable economic growth and poverty alleviation, but:
- Water scarcity is growing
  - by 2025 about half of the world's population is projected to live under conditions of water stress or water scarcity
- Water quality is declining
- Environmental and social concerns are increasing
  - large dams
- The threats posed by floods and droughts is increasing because of human-induced *climate change*

Drought/flood response...

Options

- Consider drought/flood as a random natural disaster

….*ad hoc response: emergency programs,*

or

- Recognize drought/flood as recurring phenomena …*pro-active and strategic approach*

(i) mitigation of damage to preparedness to minimize damage;

(ii) preparedness to integration of climate variability in economic and sectoral policy & management; and, therefore

(iii) shock to business as usual

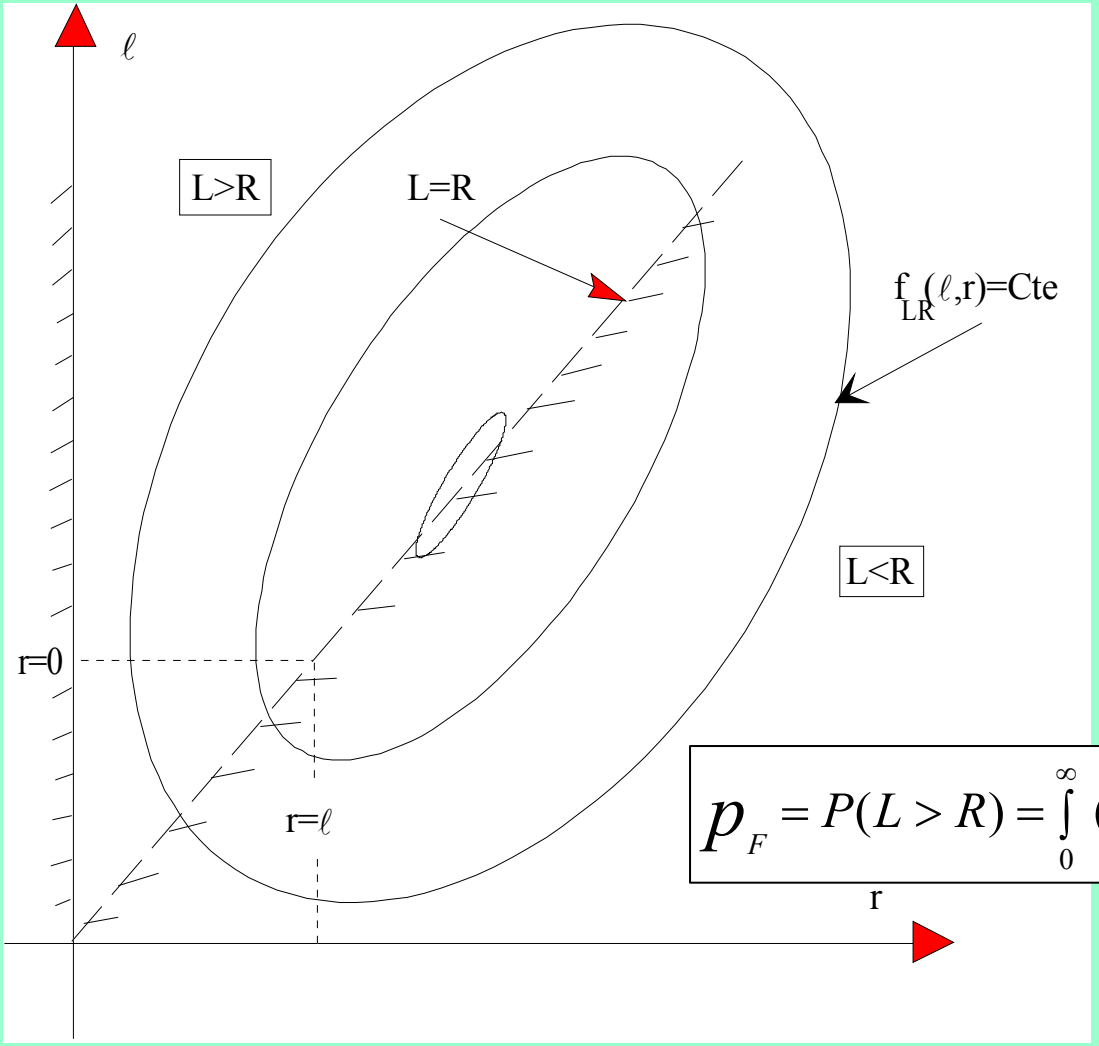
UNCERTAINTY ANALYSIS

- STEP 1 WHEN WOULD THE SYSTEM FAIL ?
- STEP 2 HOW OFTEN FAILURE IS EXPECTED ?
- STEP 3 WHAT ARE THE LIKELY CONSEQUENCES ?

PROBABILISTIC RISK

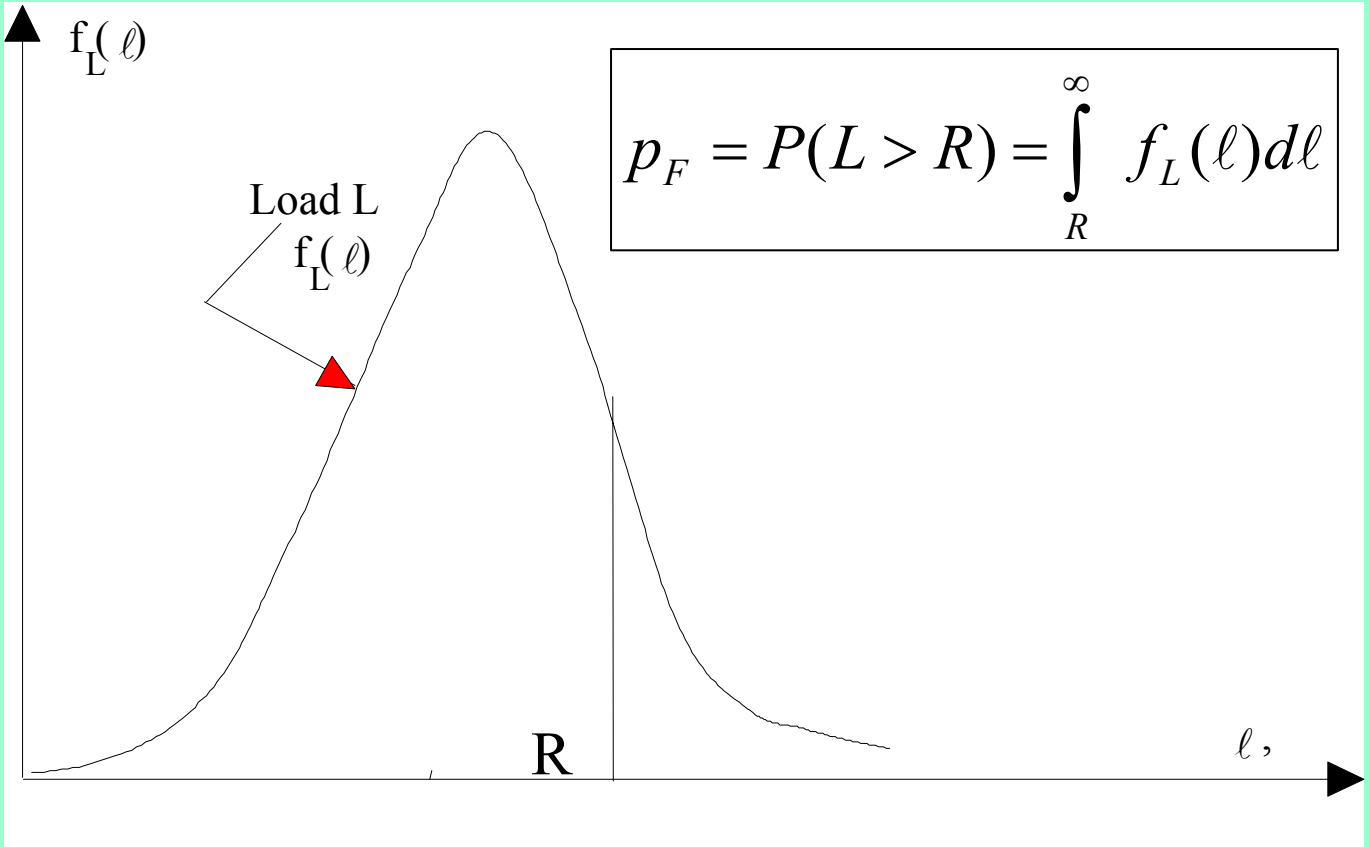
- **RISK** = probability of failure = $P(L > R)$
- **RELIABILITY**= probability of success = $P(L \leq R)$

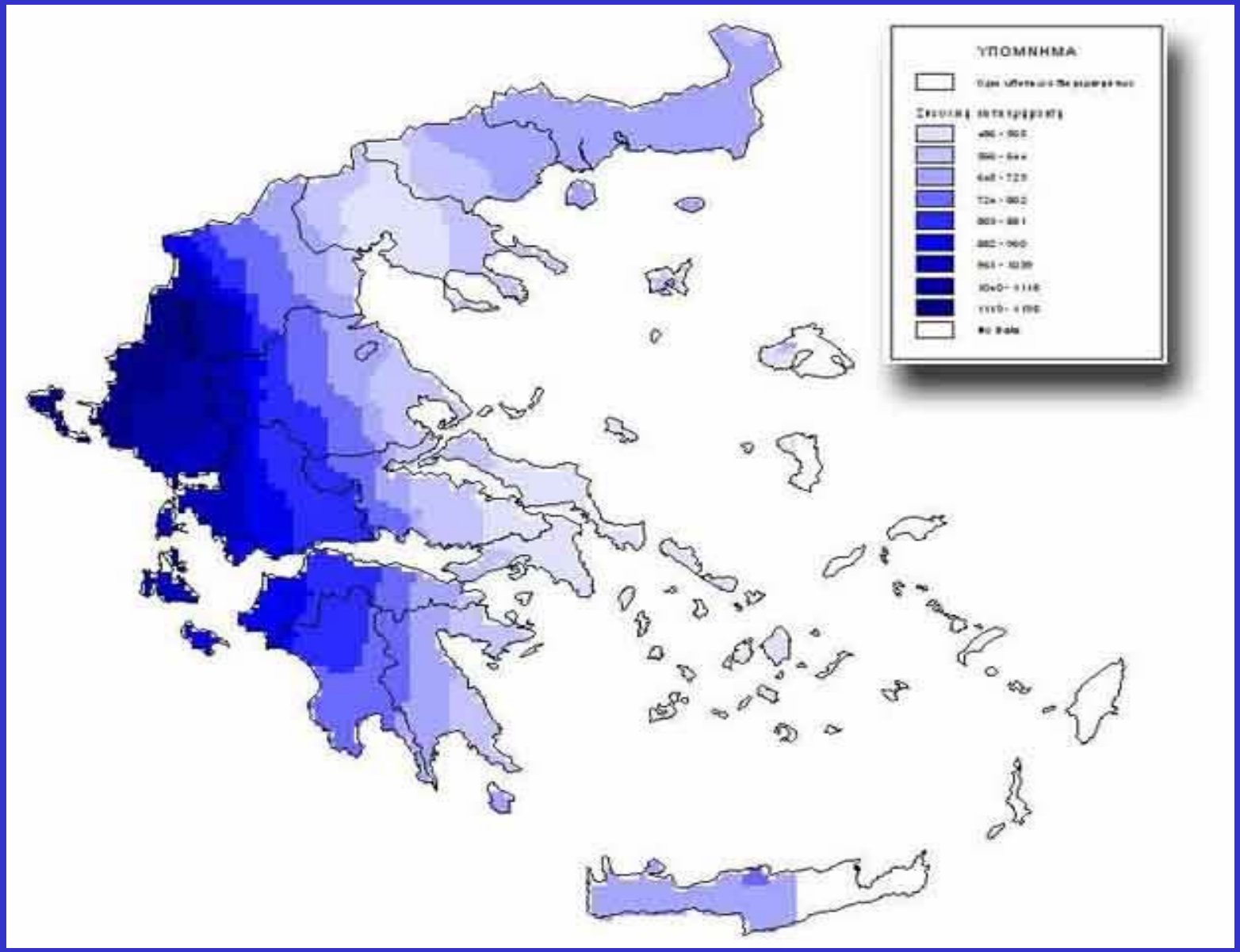
Direct Quantification using probability distribution functions



$$p_F = P(L > R) = \int_0^{\infty} \left(\int_0^{\ell} f_{LR}(\ell, r)\, dr \right) d\ell$$

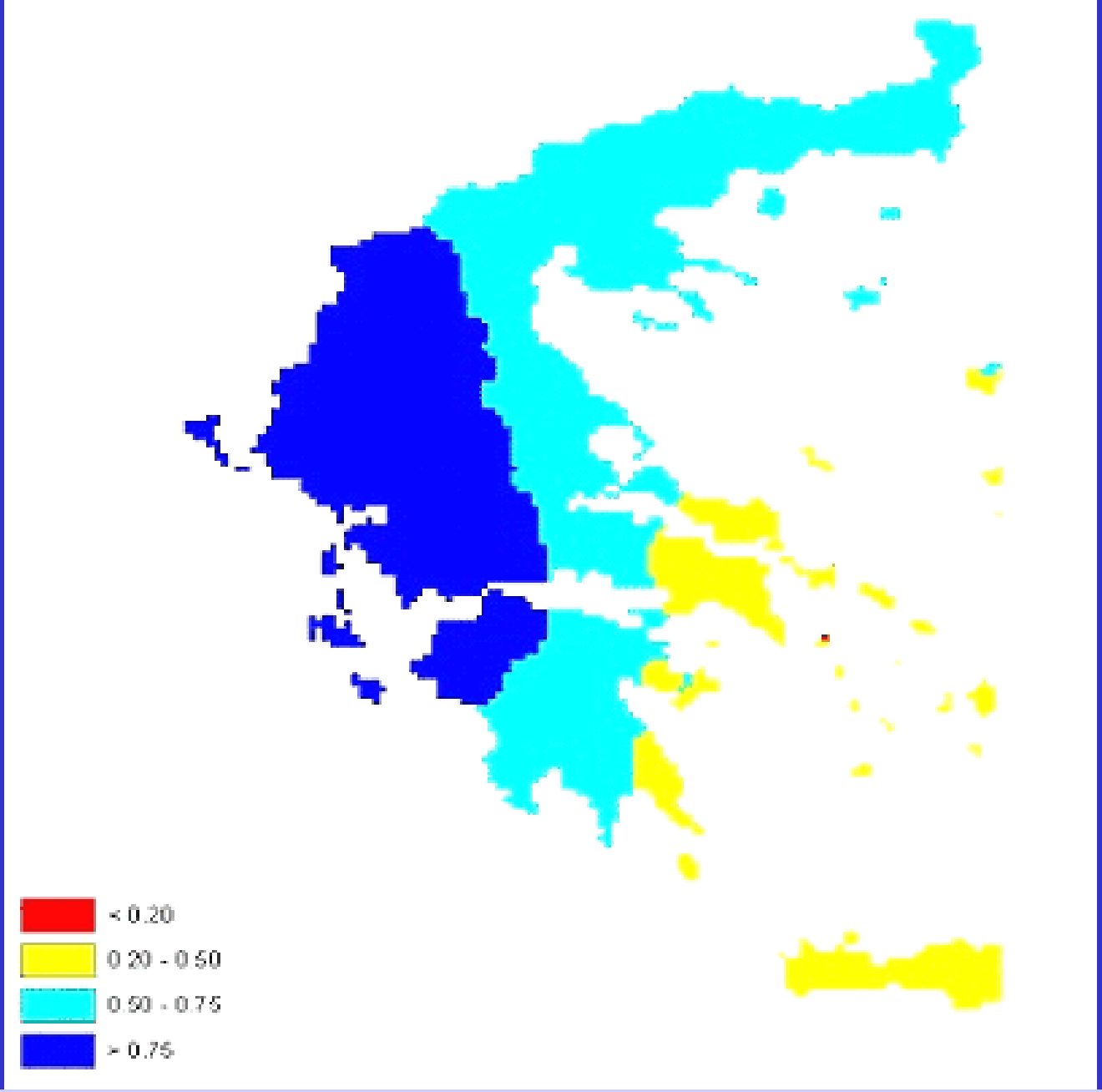
CONSTANT RESISTANCE



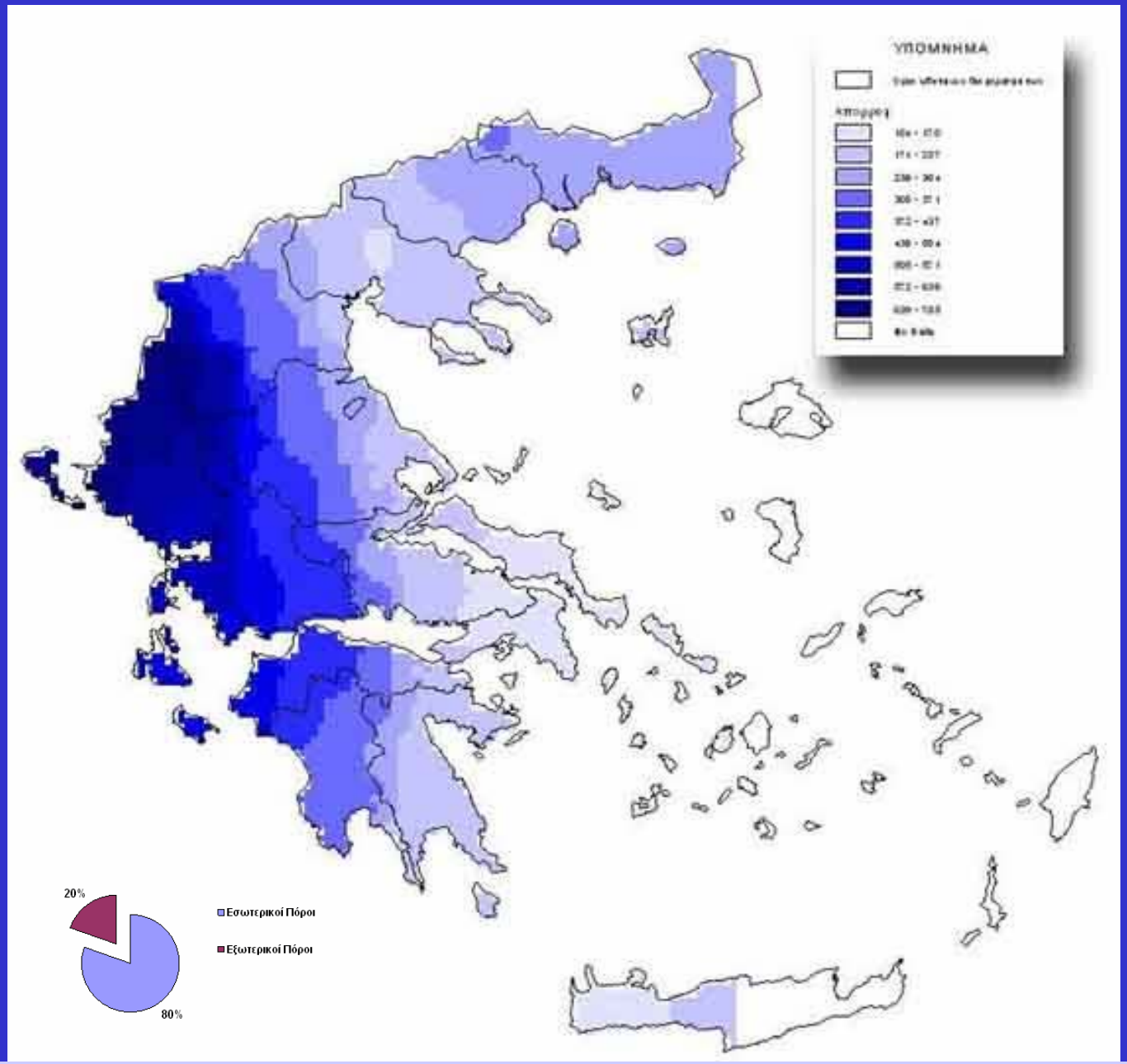


Total Precipitation Distribution in Greece

DI=Precipitation/Potential Evapotranspiration

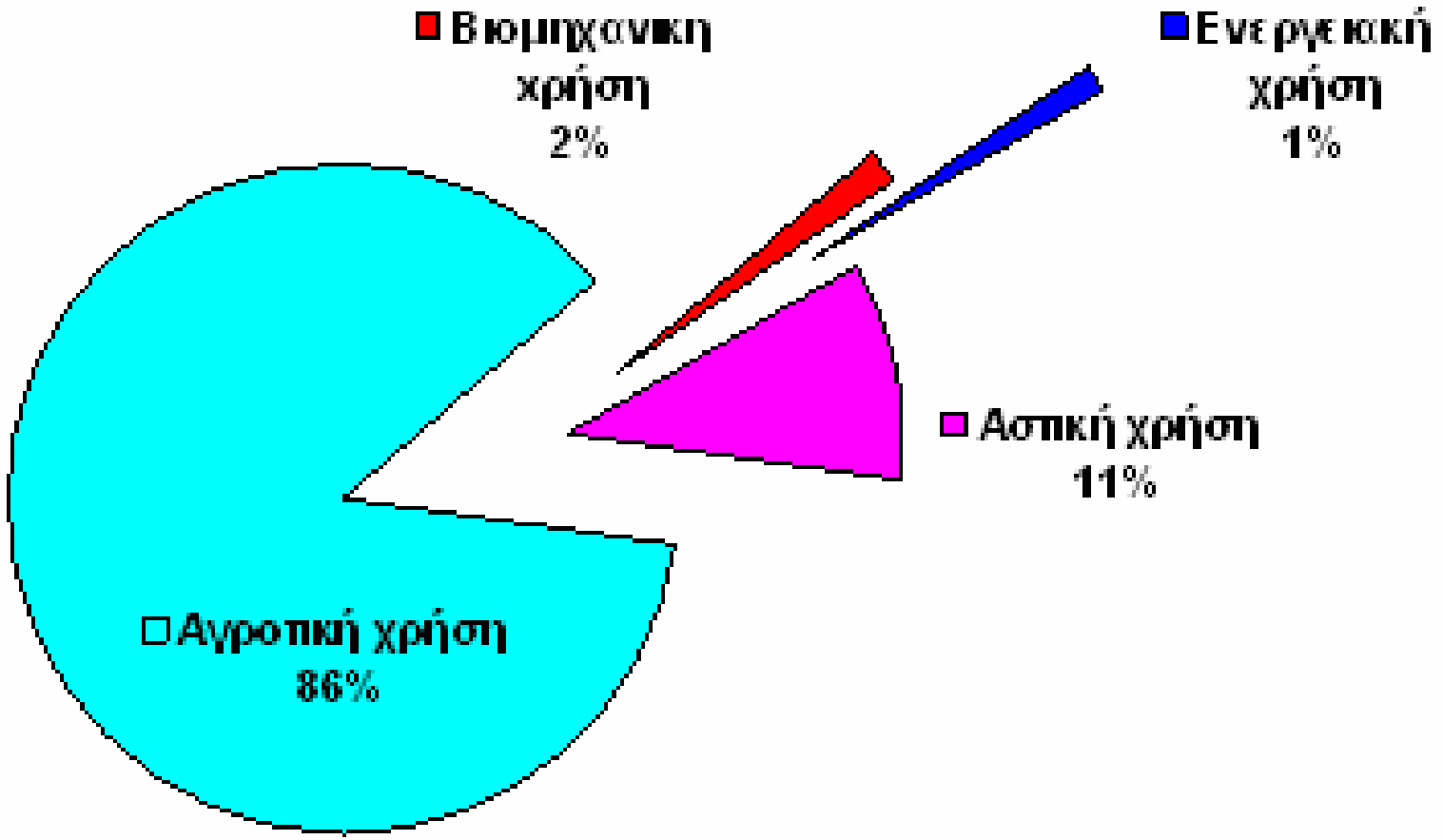


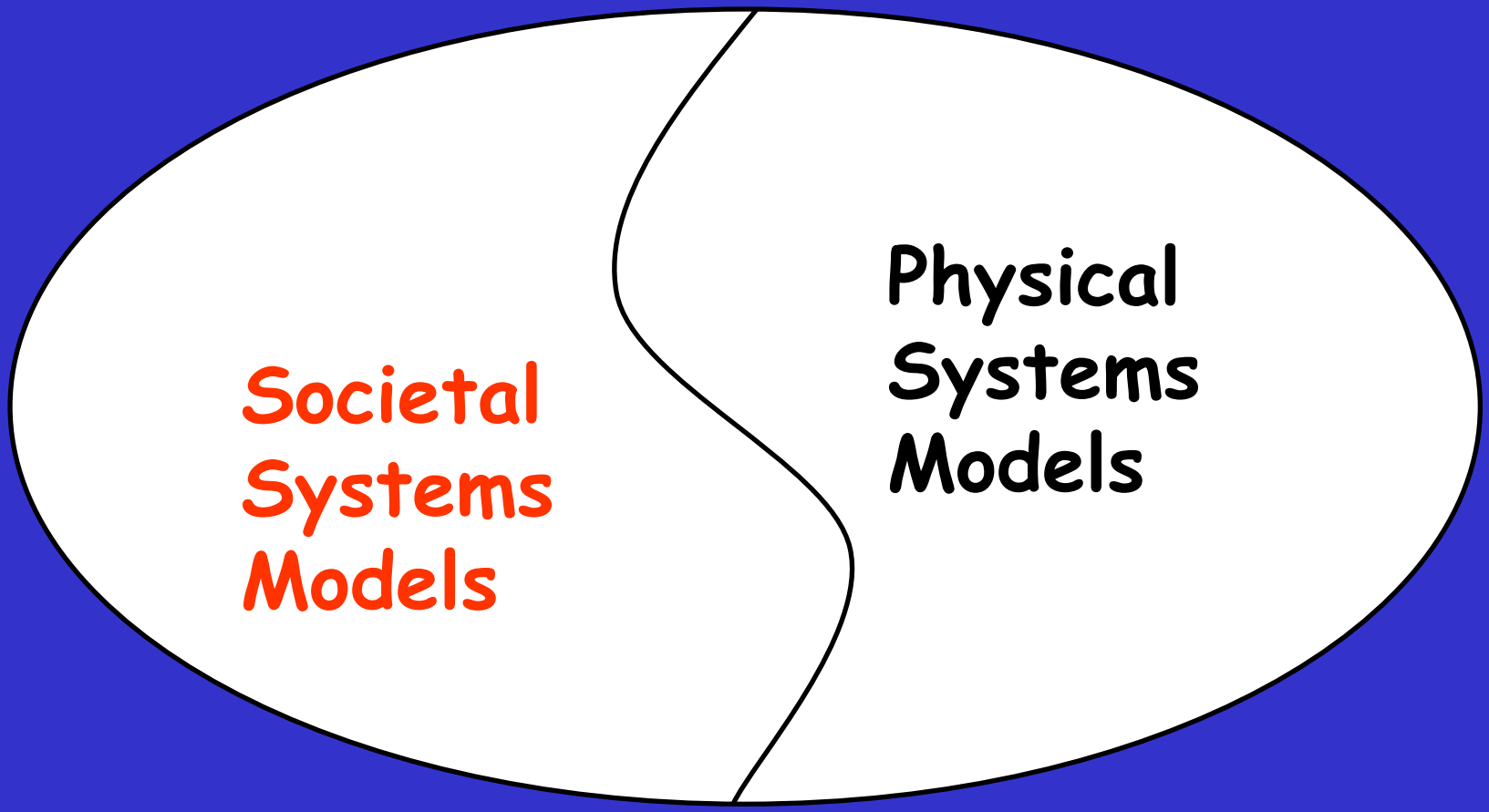
Drought Index (DI) Distribution in Greece



Surface Runoff Distribution in Greece

WATER USE IN GREECE

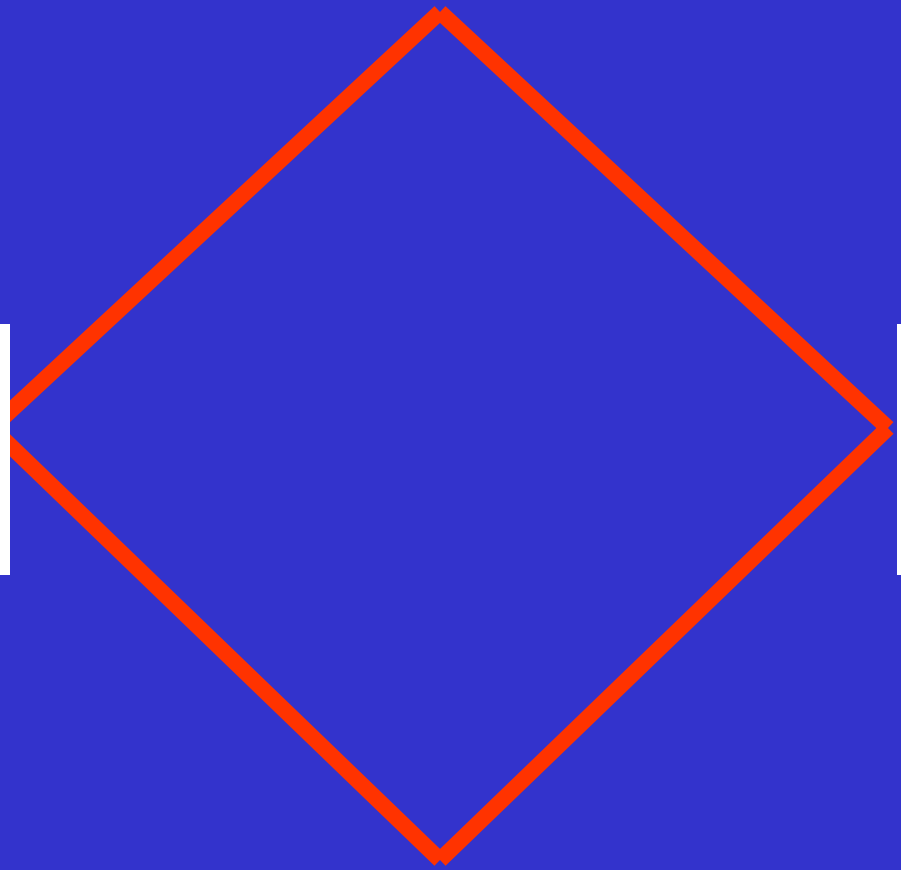




The duality of systems modeling

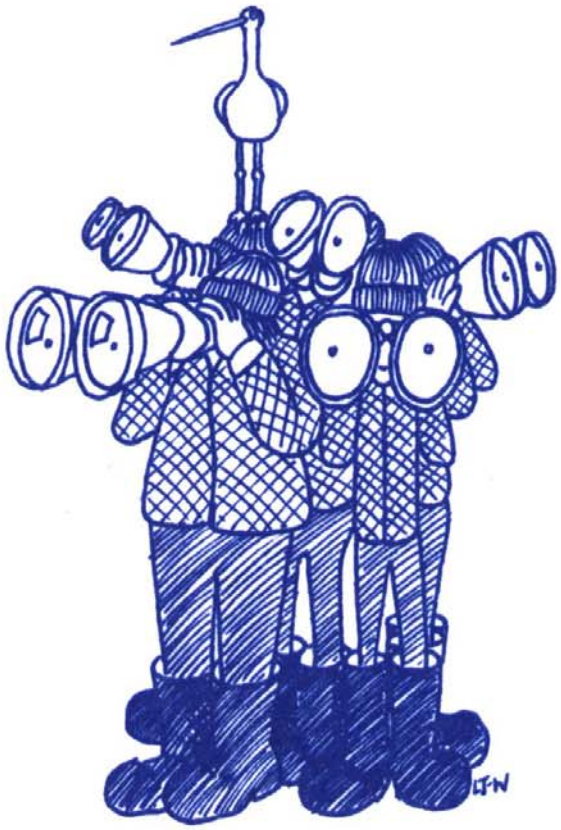
DECISION MAKERS
[elected representatives
policy generators]

SCIENTISTS
[knowledge generators
researchers
data & modelling]



CUNSULTANTS
PRACTITIONERS
[implementors
administrators]

PUBLIC /
MEDIA
[recipients]



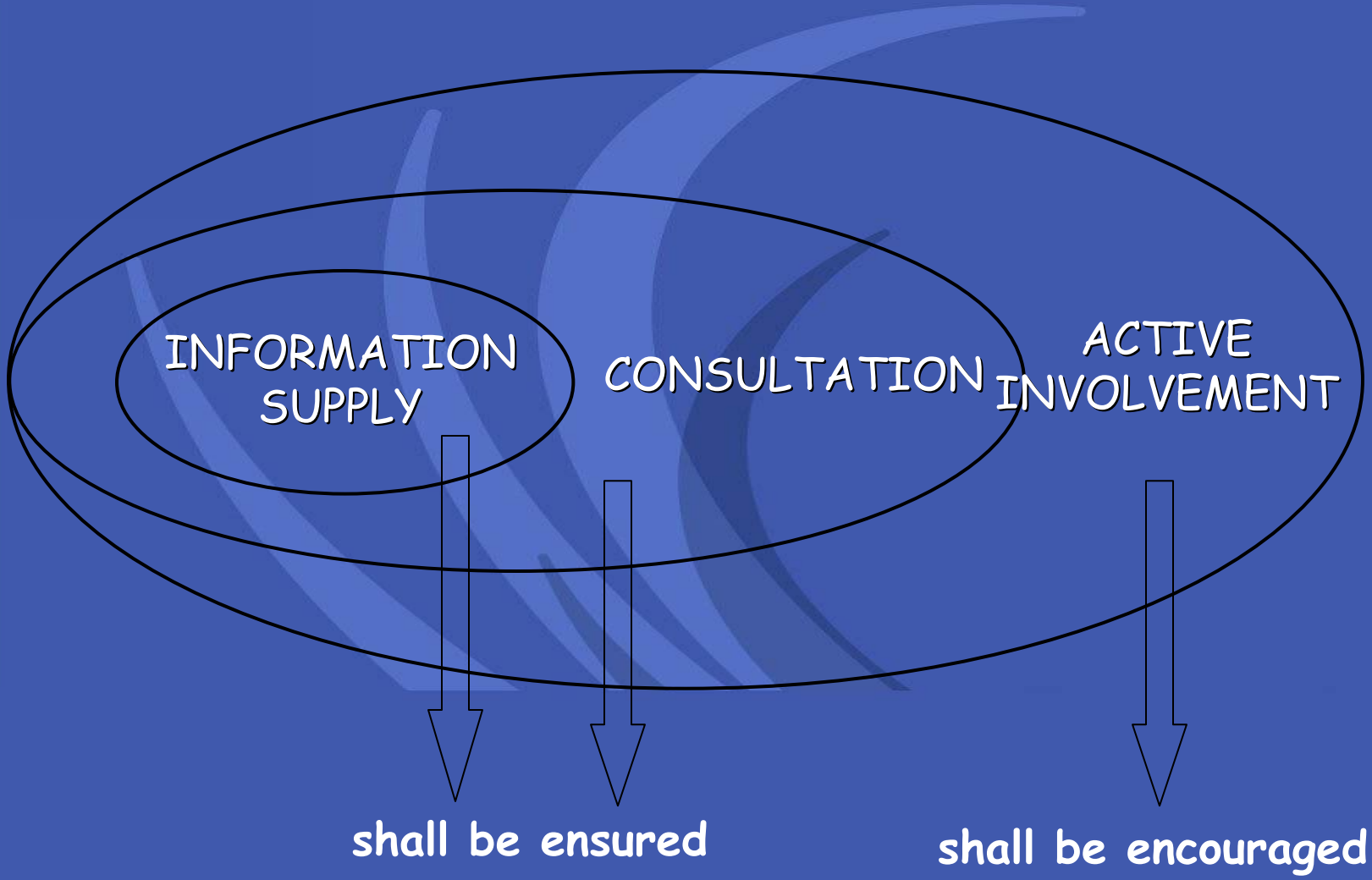
Us

Them

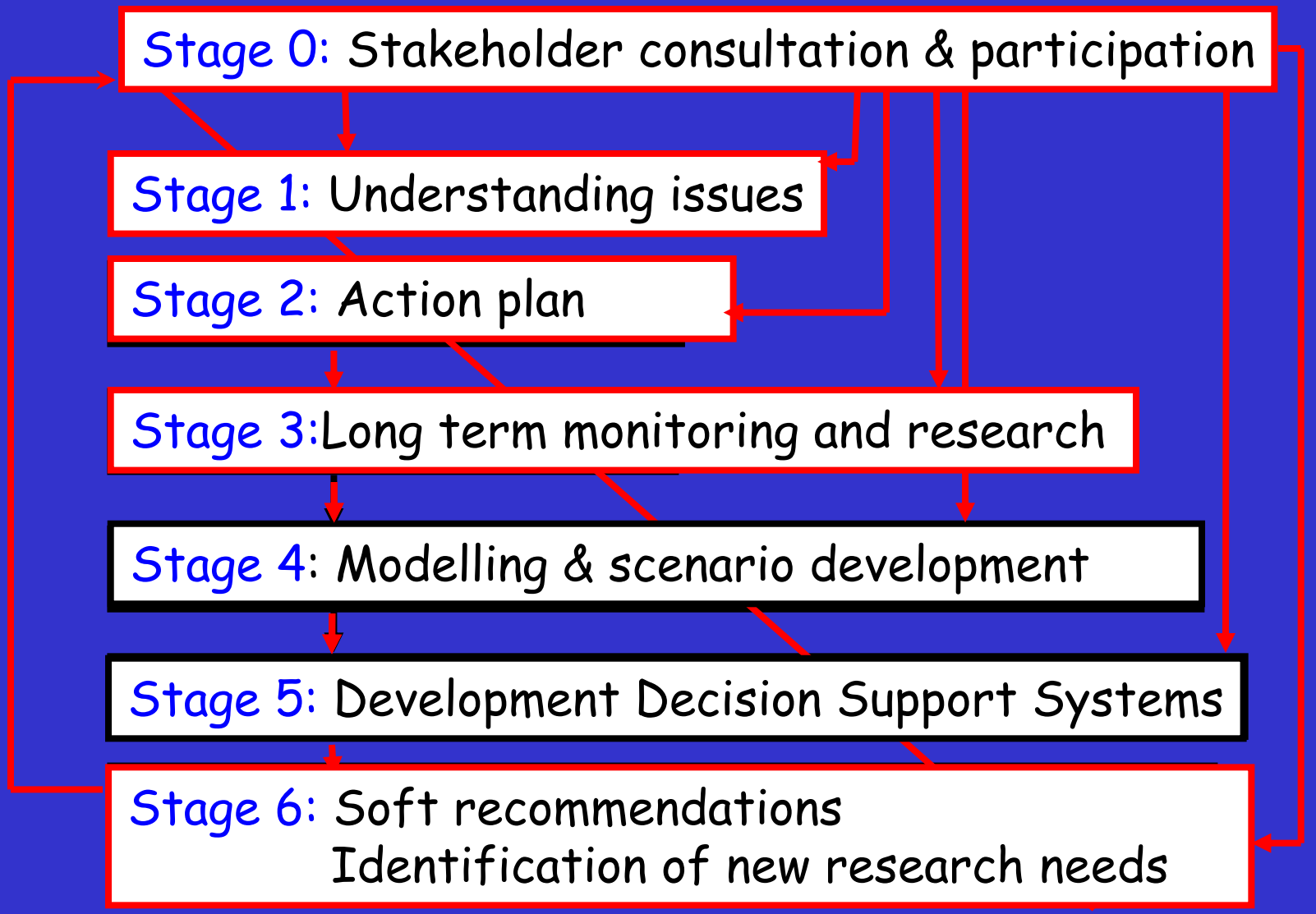
Us

Them

Language problems

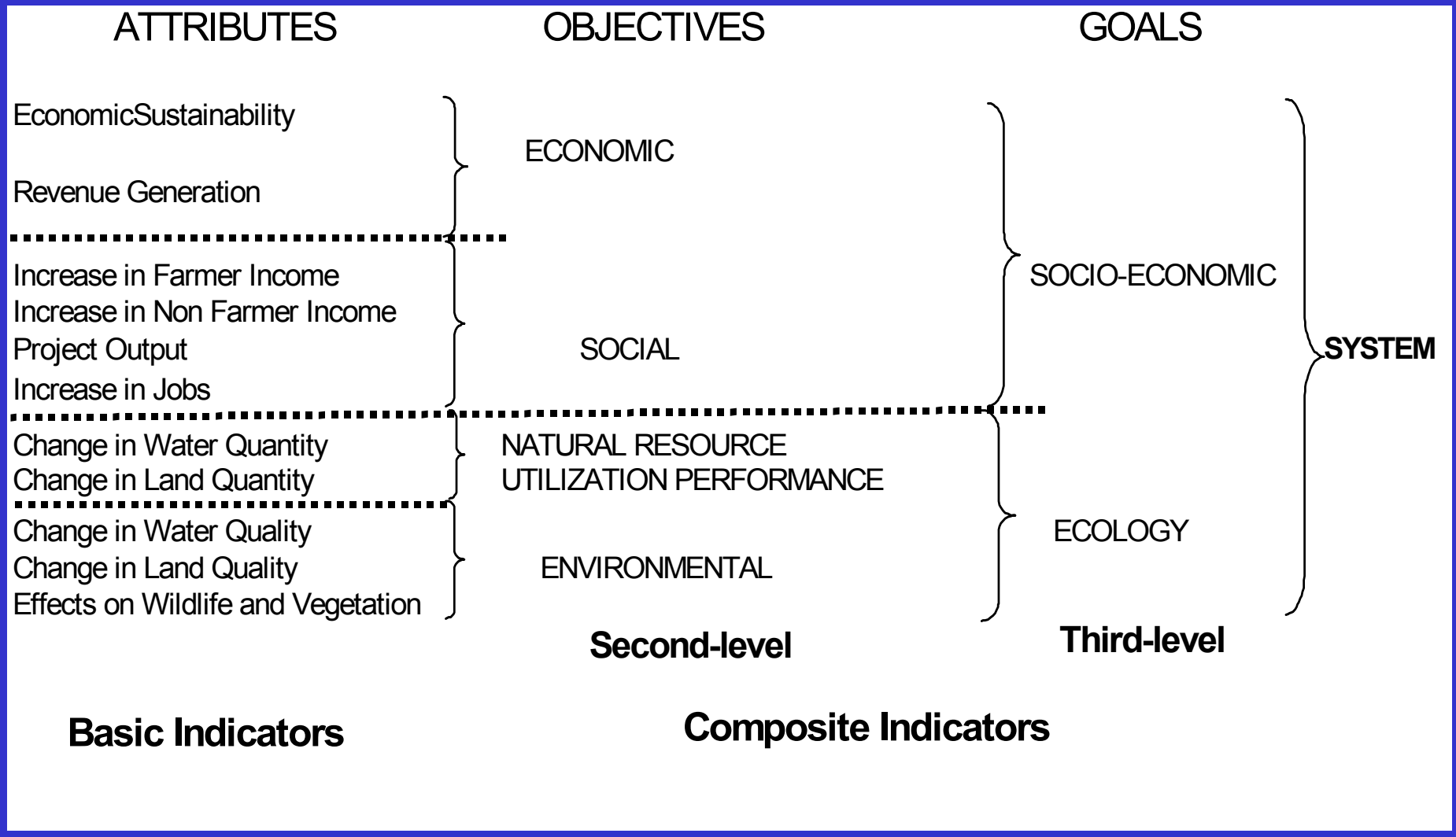

INFORMATION SUPPLY
CONSULTATION
ACTIVE INVOLVEMENT
shall be ensured
shall be encouraged

Breaking the vicious cycle in integrated project management



Multi-Criterion Decision Analysis (MCDA)

- Definitions
- Decision Variables
- Feasible solutions
- Non-dominated alternatives
- Typology of MCDA solutions
- Example : Conflict Resolution



Criteria : either an attribute or an objective

MODELLING CONFLICTS

Conflict situations in transboundary water resources management occur on at least ***two levels***:

- conflict among ***criteria: objectives or attributes***, in particular economic, environmental and social criteria and

- conflicts of ***goals*** dr ***general interests between countries*** and among groups of actors involved.

AGGREGATE THE RISKS

$$R_{in} = \left(\sum_{i=1}^{n} w_i \left(R_i^2 \right) \right)^{1/2}$$

where

R_i are the different ***risks*** (*normalised index values*)

w_i the *weights* assigned to each criterion, and

R_{in} the *aggregated risks* of every group of criteria

R_{ET}: Eco-Technical risk R_{SE}: Socio-Economic risk

MANAGEMENT OF FLOODING RISKS

- DEFINE ALTERNATIVE SOLUTIONS

  (STRUCTURAL / NON-STRUCTURAL)

- EVALUATE THE OUTCOMES (IMPACT MATRIX)

  (MODELING / EXPERTS OPINION / DATA / EXPERIENCE)

  - CRITERIA : TECHNICAL / ECONOMIC
    ENVIRONMENTAL / SOCIAL

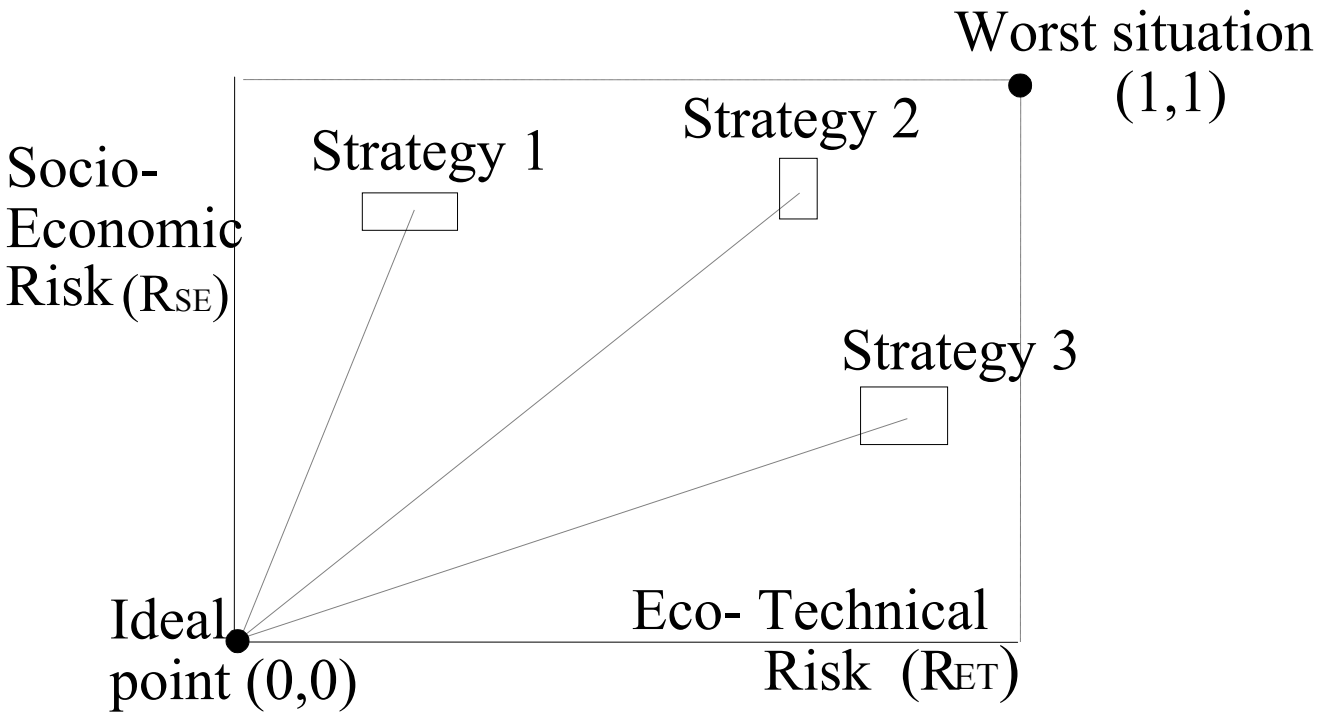
- DEFINE THE IDEAL (0 RISK) AND WORST (1 RISK) SITUATIONS

- RANK THE ALTERNATIVES

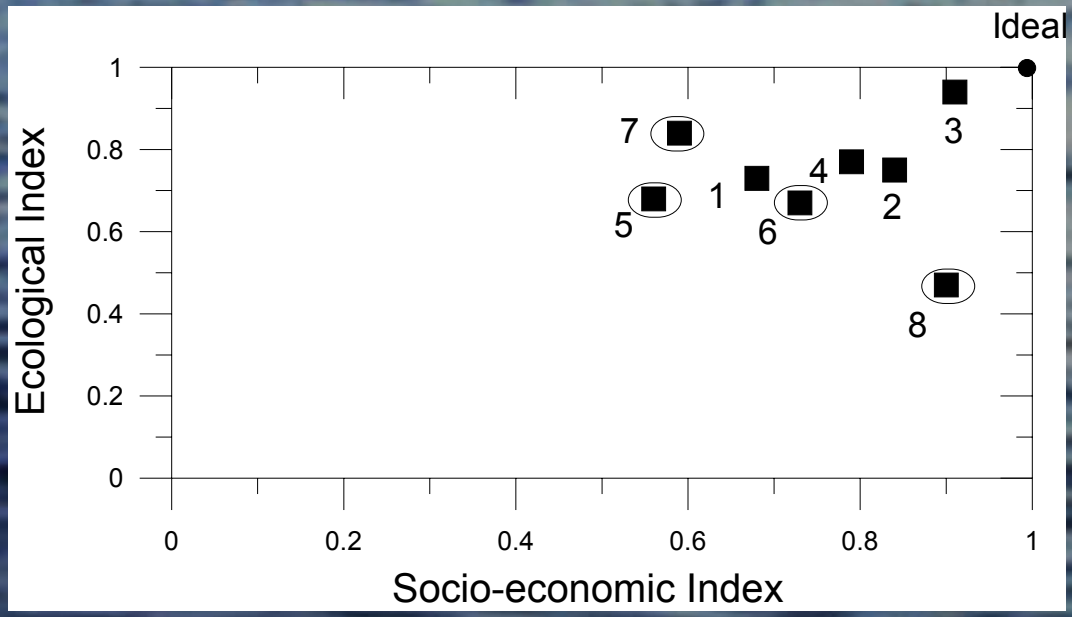
ALTERNATIVE SOLUTIONS

- Regulation of the downstream bief of the stream (R)
- (R) + Construction of a large capacity reservoir (LR)
- (R) + Construction of a small capacity reservoir (SR)
- (R) + Detention Basin Network of T=30-yr floods (DB30)
- (R) + (DB50)
- (R) + (DB100)

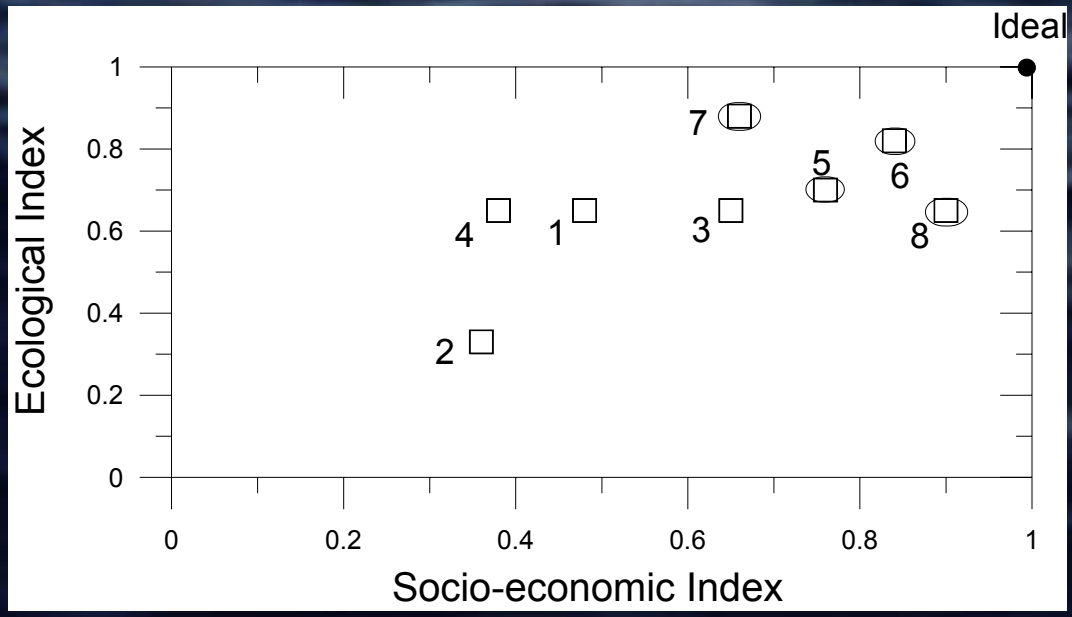
RANKING ALTERNATIVES



RANKING THE OUTCOMES GR-BG

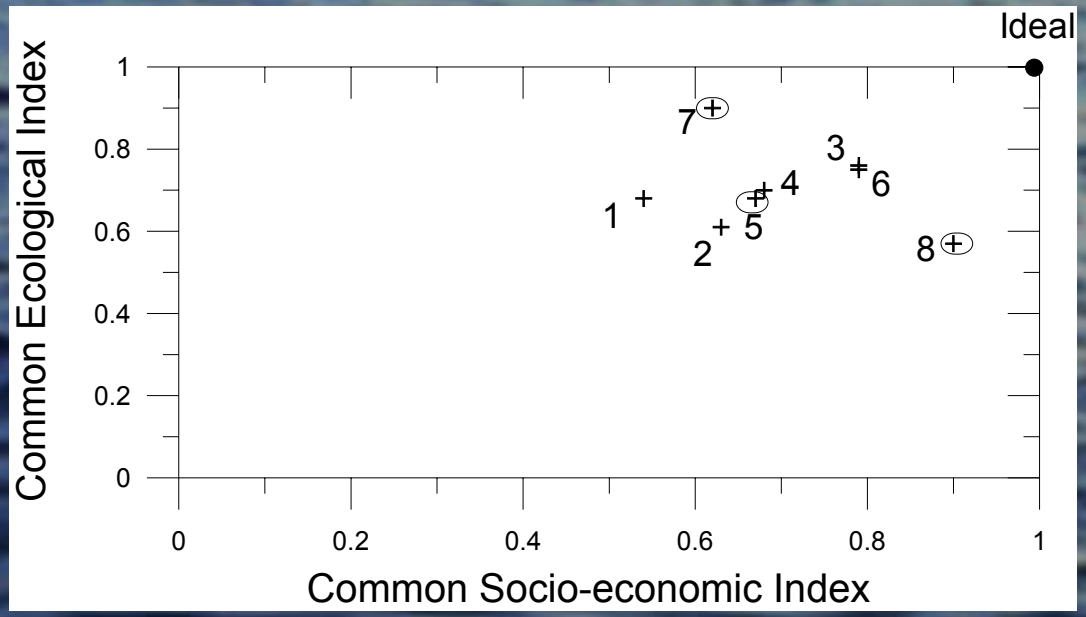


1,2,3,4:
GR

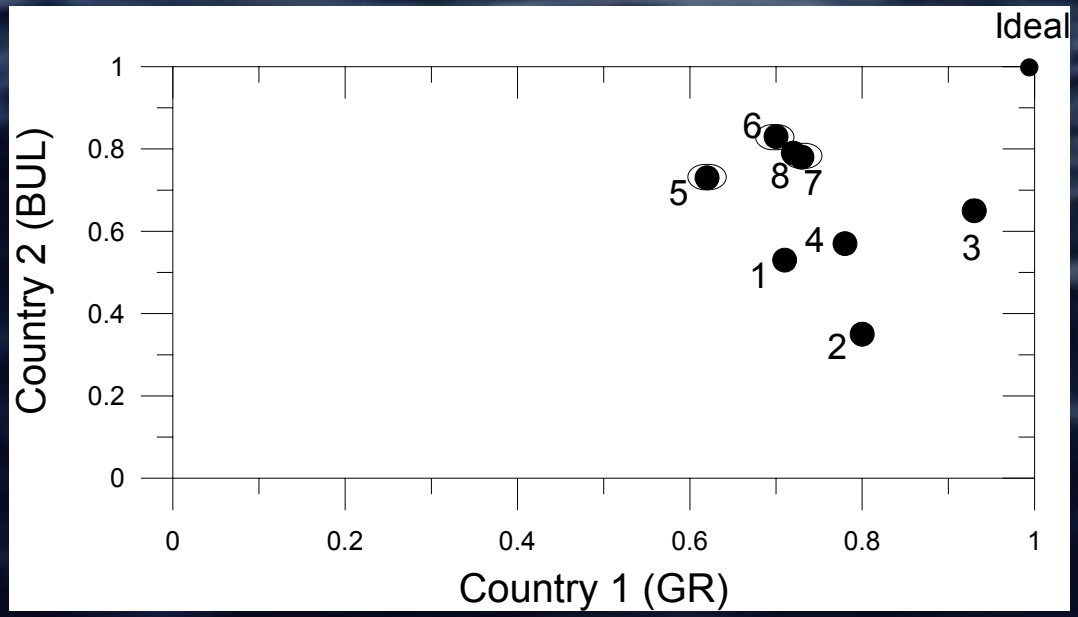


5,6,7,8:
BG

RANKING THE OUTCOMES GR+BG



3,6,7,8:
GR-BG



3,6,7,8:
GR-BG


Thank you !