



ΕΙΔΙΚΗ
ΓΡΑΜΜΑΤΕΙΑ
ΥΔΑΤΩΝ



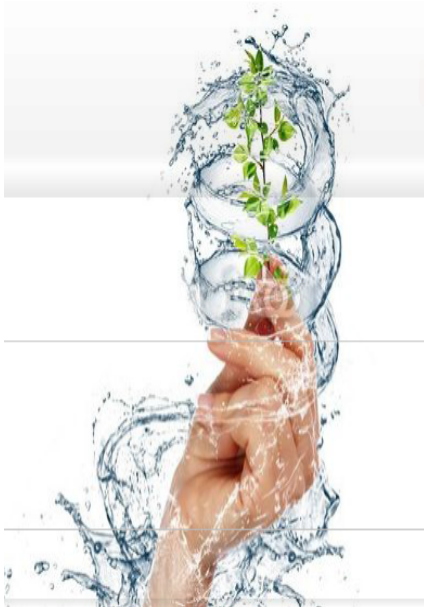
ΥΠΟΥΡΓΕΙΟ
ΠΕΡΙΒΑΛΛΟΝΤΟΣ
& ΕΝΕΡΓΕΙΑΣ



SPECIAL
SECRETARIAT
FOR WATER



MINISTRY OF
ENVIRONMENT
& ENERGY



EFFECTIVE GROUNDWATER-GOVERNANCE AND CONFLICT RESOLUTION

Prof. J. Ganoulis
Special Secretary for Water, Ministry of Environment & Energy
Athens, Greece

1st California-European Union Workshop, Irvine, California
24-25 June 2019

STRUCTURE OF THE PRESENTATION

1. From Water Problems to Hydro-Governance

2. Conditions for Hydro-Governance Change

3. The EU-WFD versus the California SGMA Policy

4. Fitness Check of the EU-WFD: Lessons Learnt

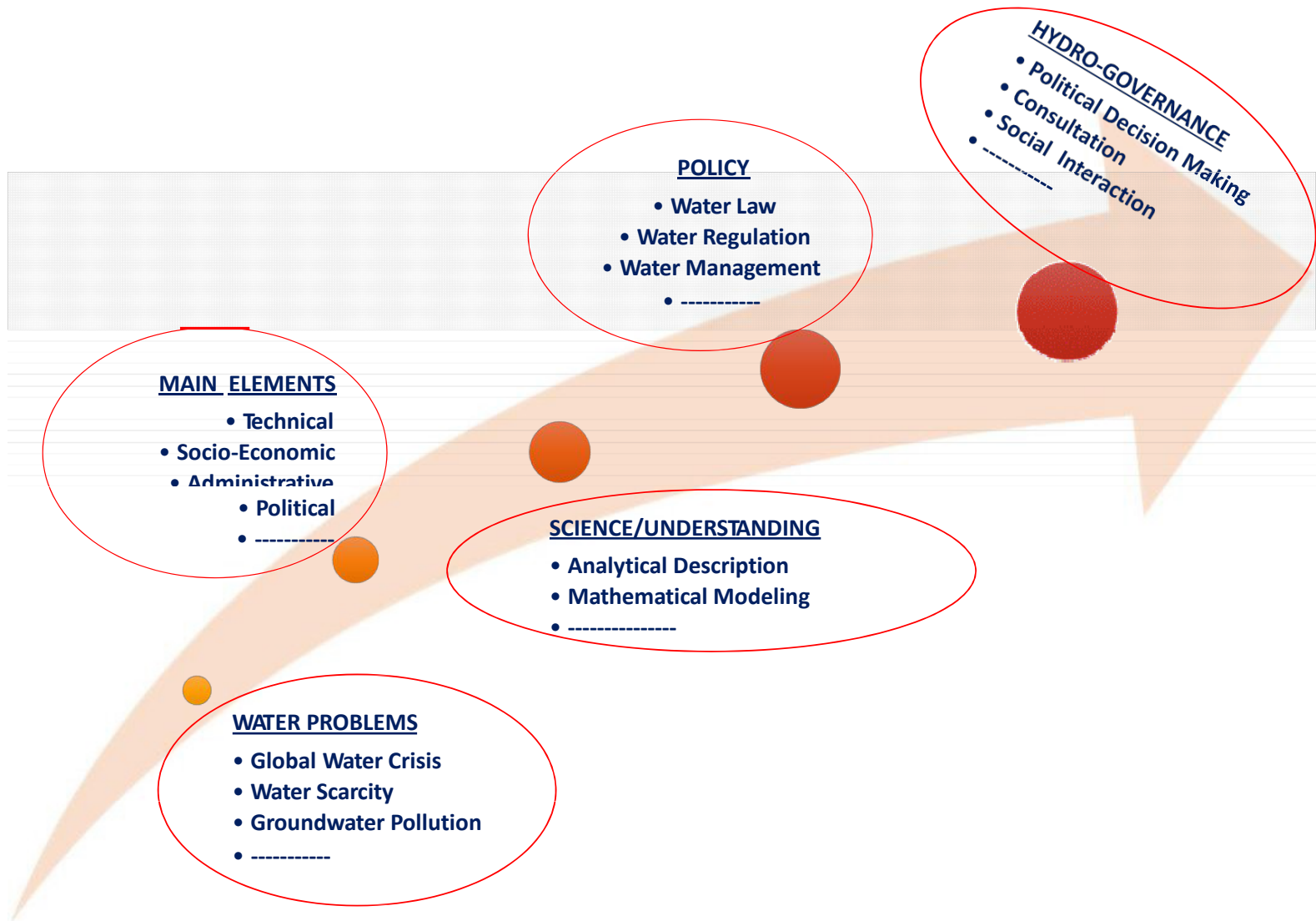
5. Conclusions

STRUCTURE OF PART 1

1. From Water Problems to Hydro-Governance

1. Policy, Management and Governance Definitions
2. "Good" Governance for Conflict Resolution
3. Models of Hydro-Governance

WATER PROBLEMS = CRISIS OF HYDRO-GOVERNANCE



GOVERNANCE, POLICY AND MANAGEMENT

- Governance:

- A multi-level, integrated political and technical process interacting with the civil sector, NGOs and professional organizations for managing complex societal problems (Ganoulis & Fried, 2018)

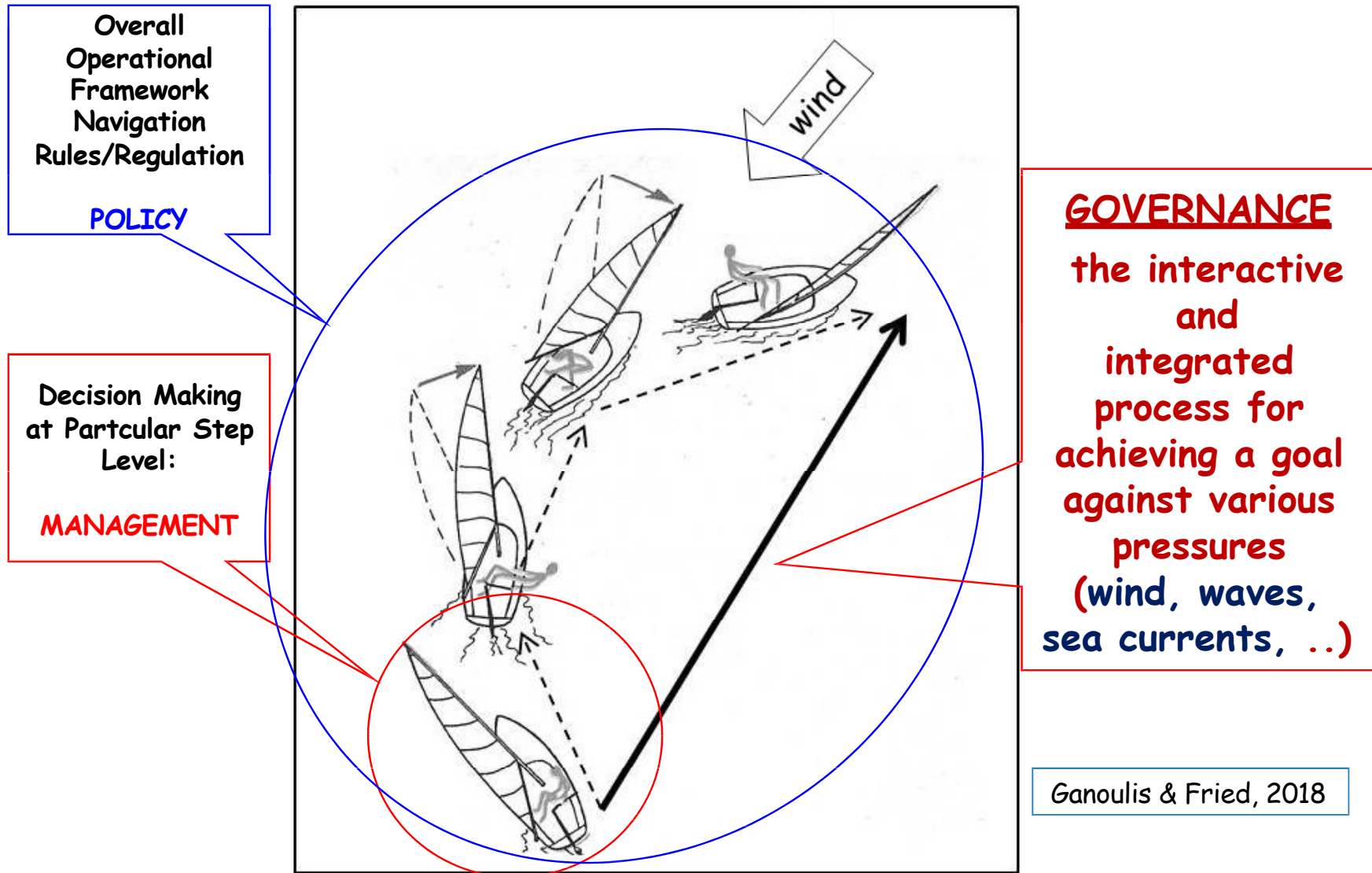
- Management:

- Activities based on assumptions, principles, data & models in order to achieve given targets

- Policy:

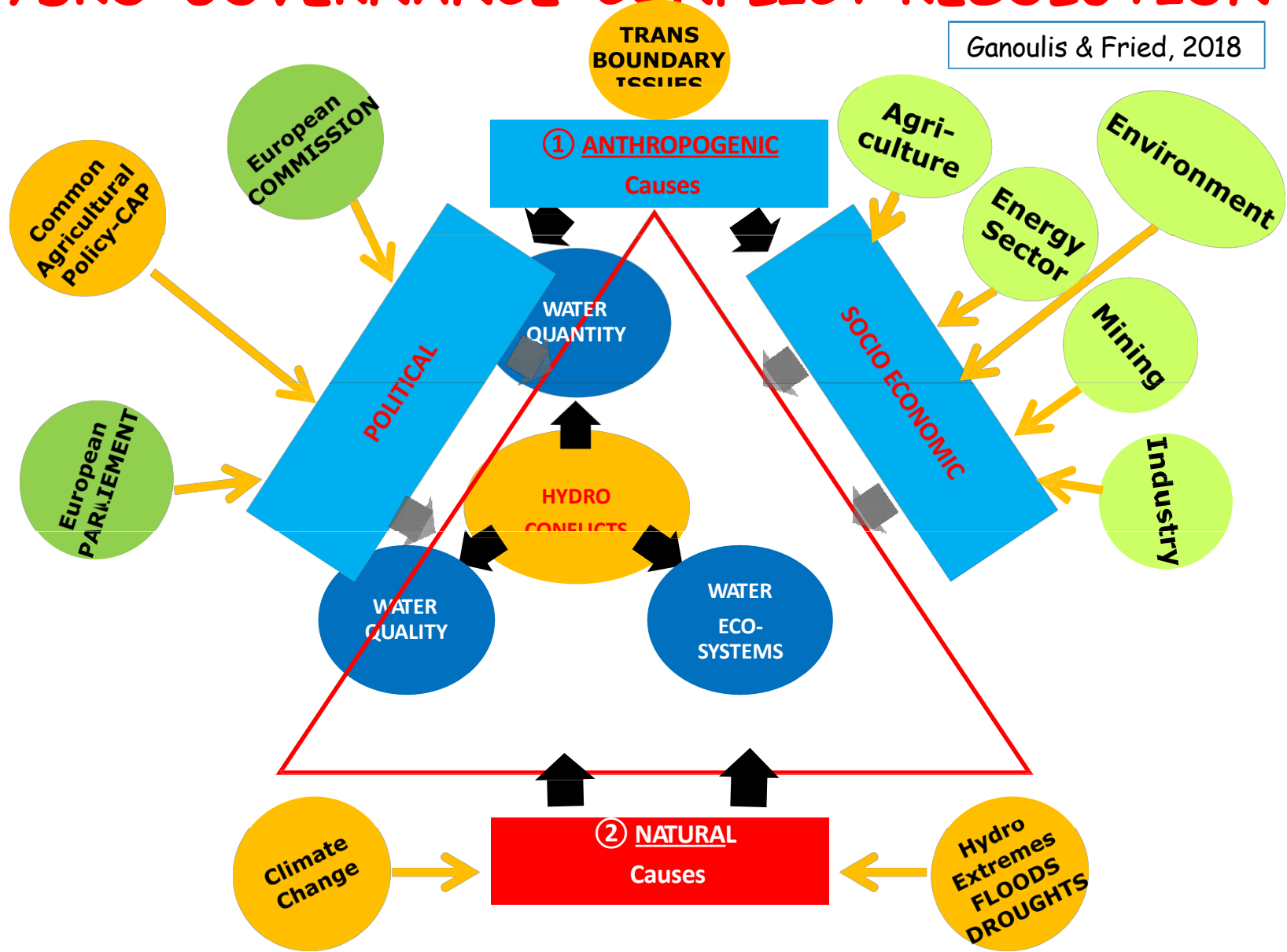
- Application of rules (mainly legal-regulatory) in order to resolve particular problems

MANAGEMENT, POLICY AND GOVERNANCE

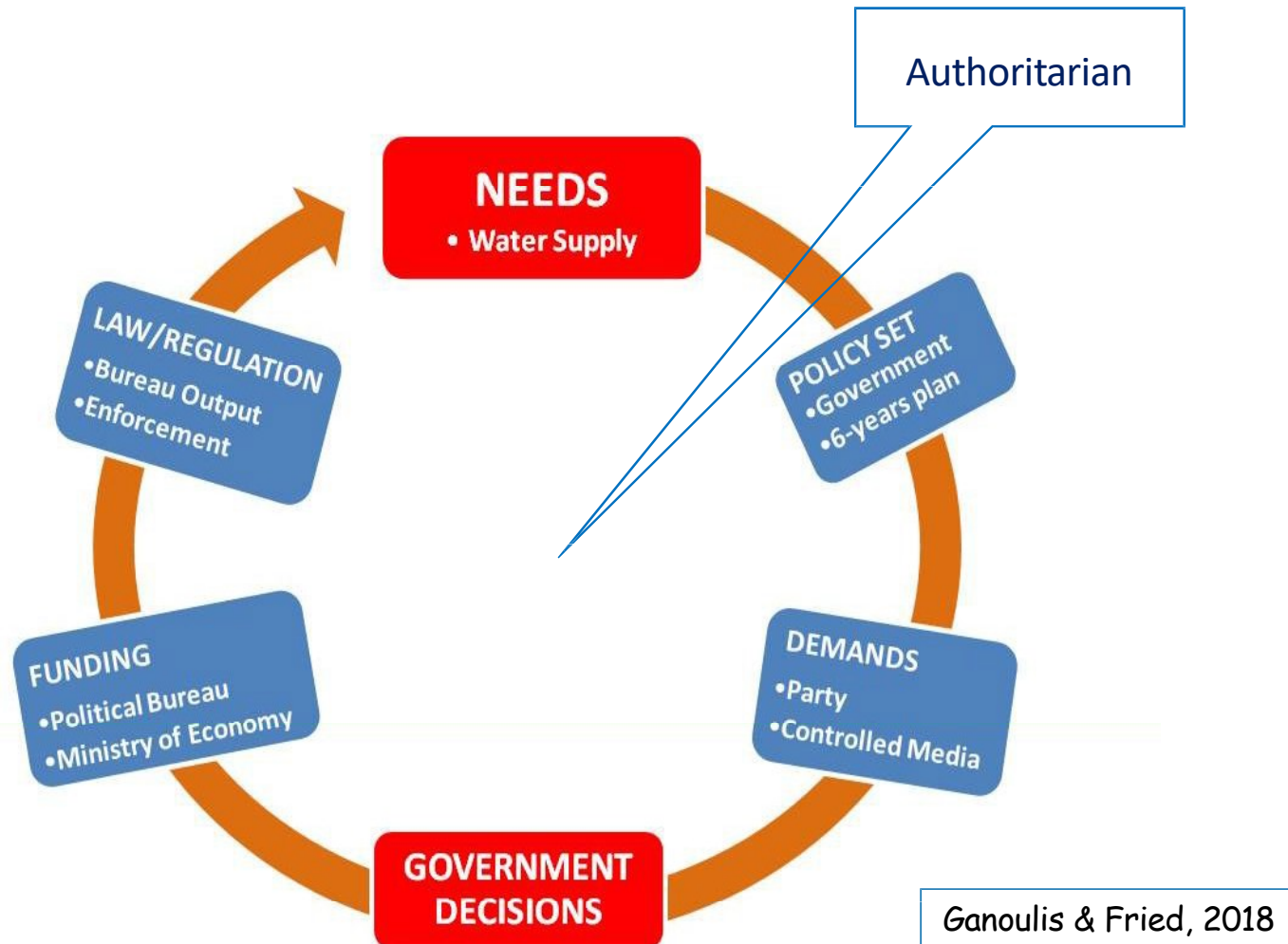


HYDRO-GOVERNANCE=CONFLICT RESOLUTION

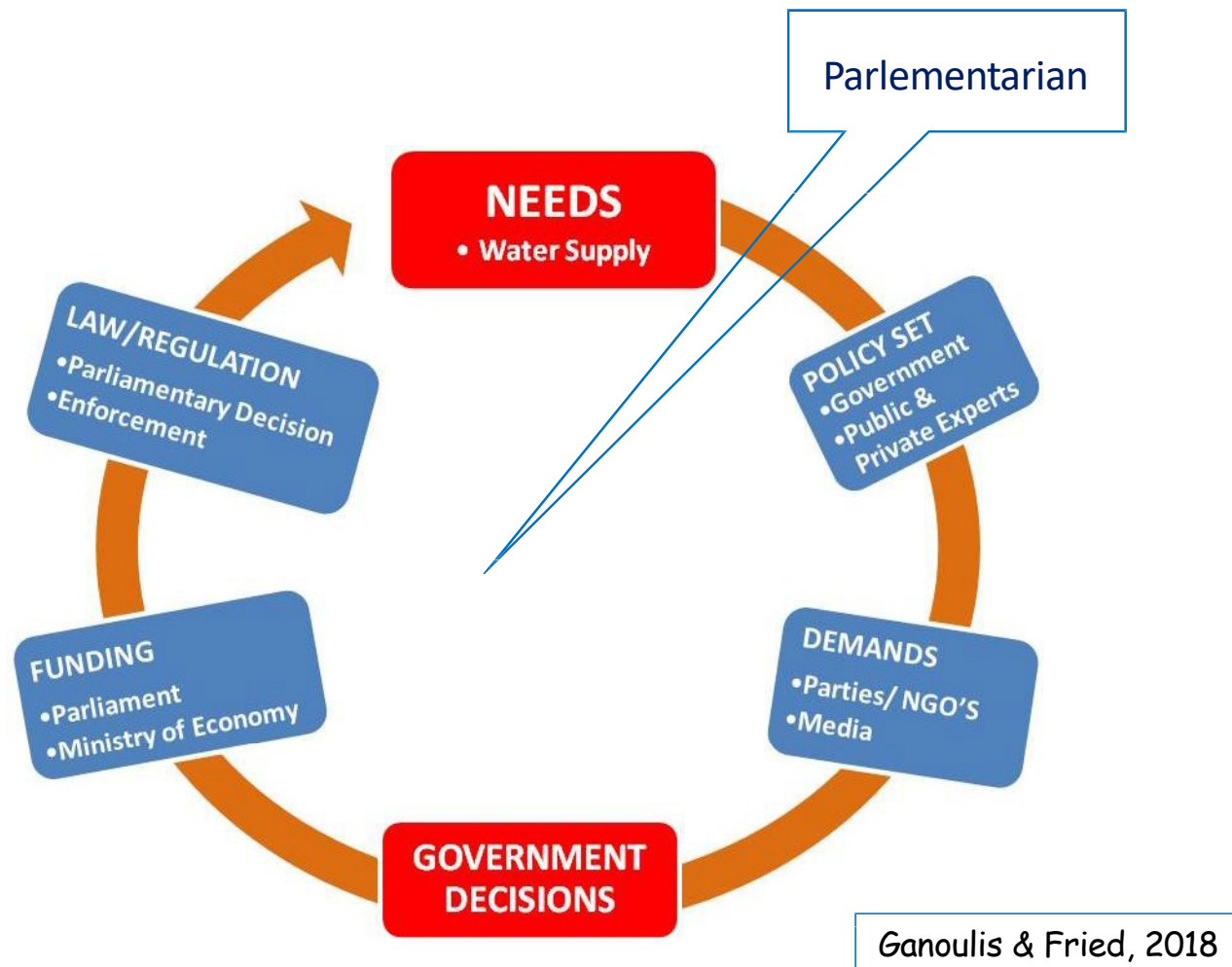
Ganoulis & Fried, 2018



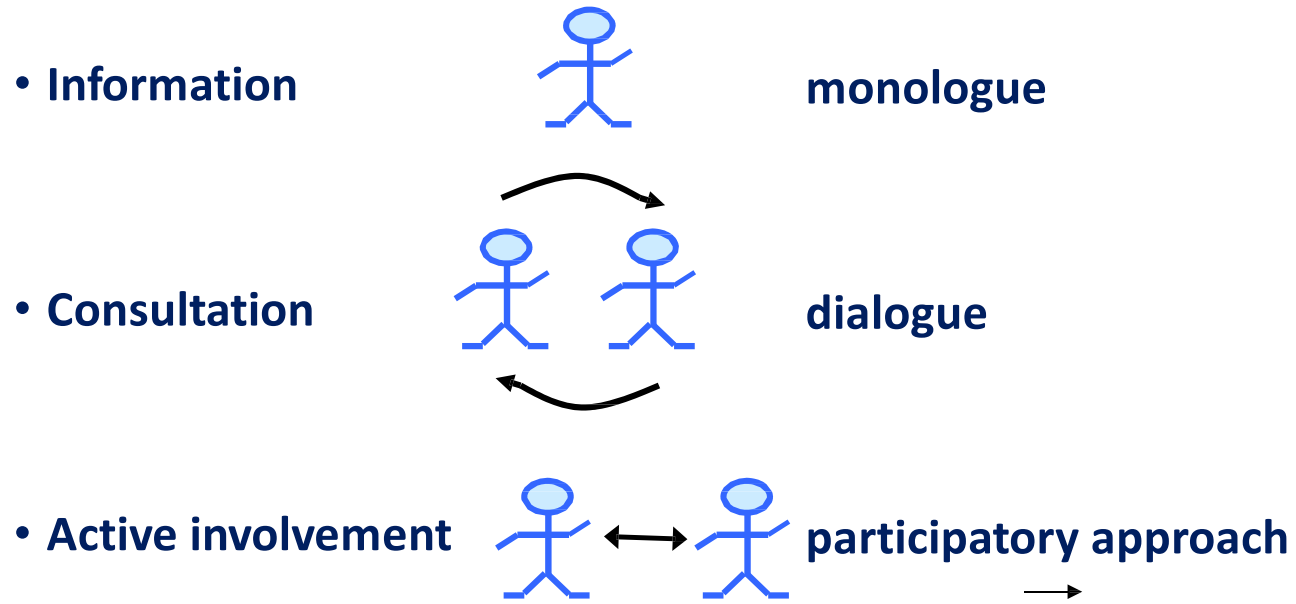
MODELS OF HYDRO-GOVERNANCE (1)



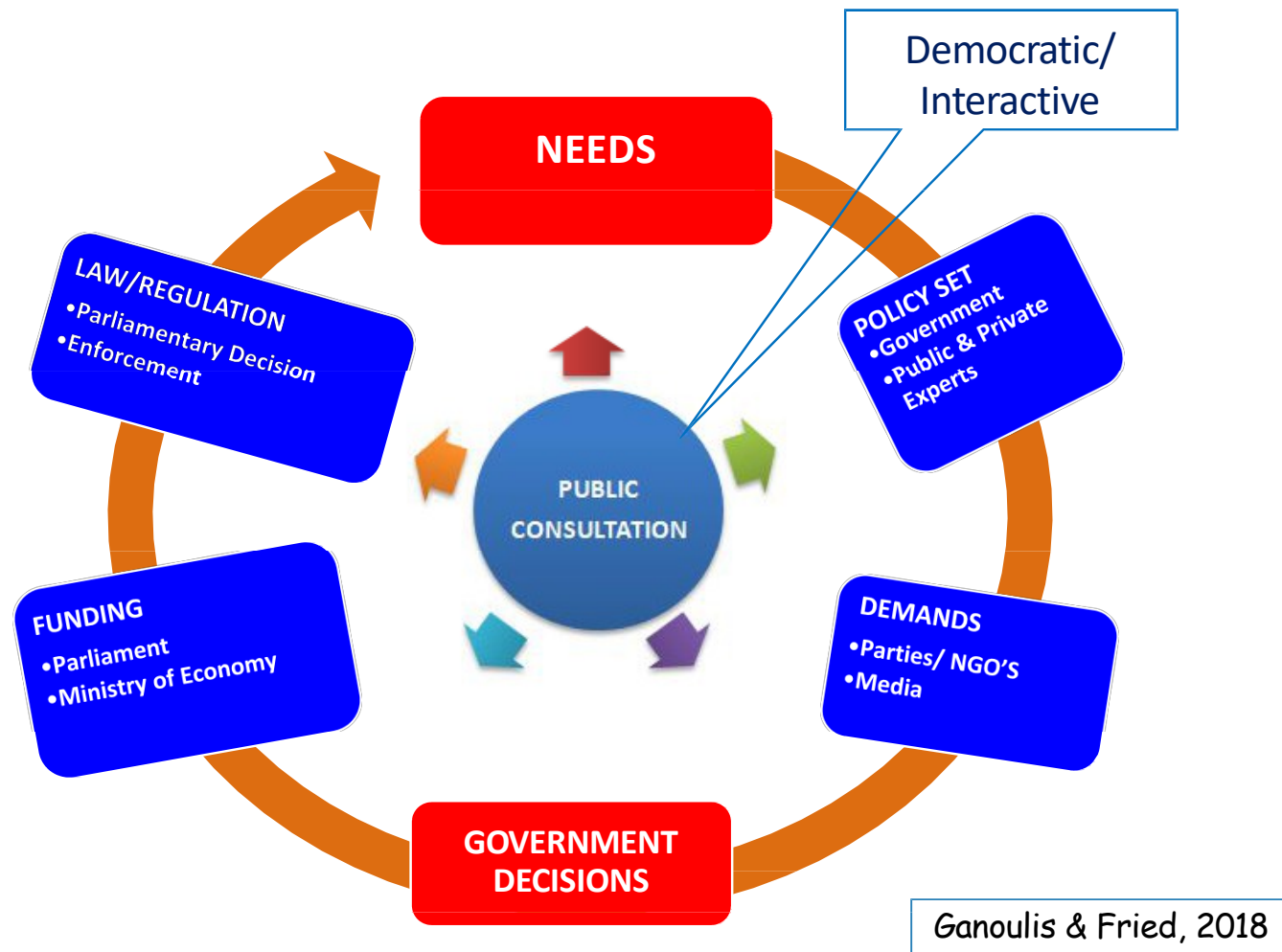
MODELS OF HYDRO-GOVERNANCE (2)



LEVELS OF PARTICIPATION



MODELS OF HYDRO-GOVERNANCE (3)

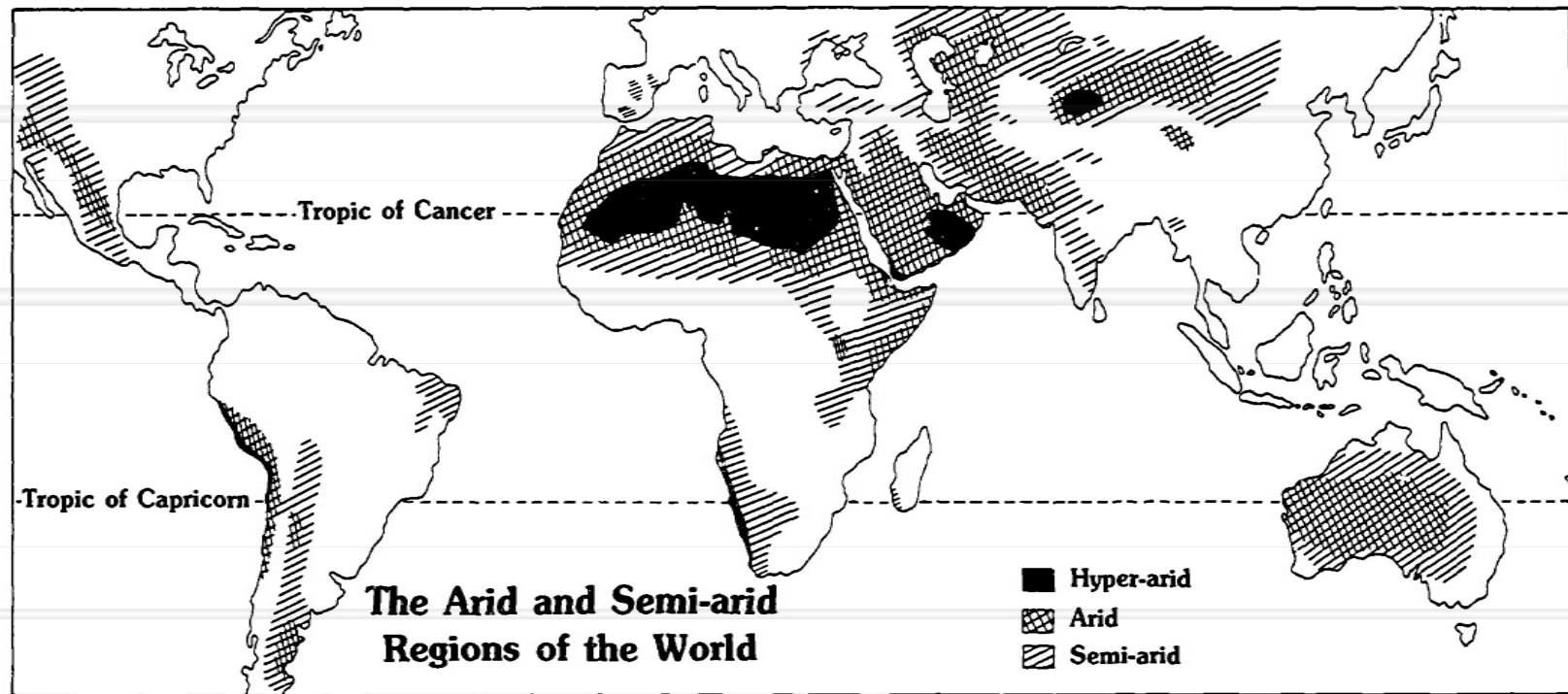


STRUCTURE OF PART 2

1. From Water Problems to Hydro-Governance
2. Conditions for Hydro-Governance Change
 1. Water Scarcity
 2. Socio-Economic Growth and Quality of Life
 3. Population Increase, Climate Change and Water Over-Use
 4. Examples from Ancient Greece and the Middle-East

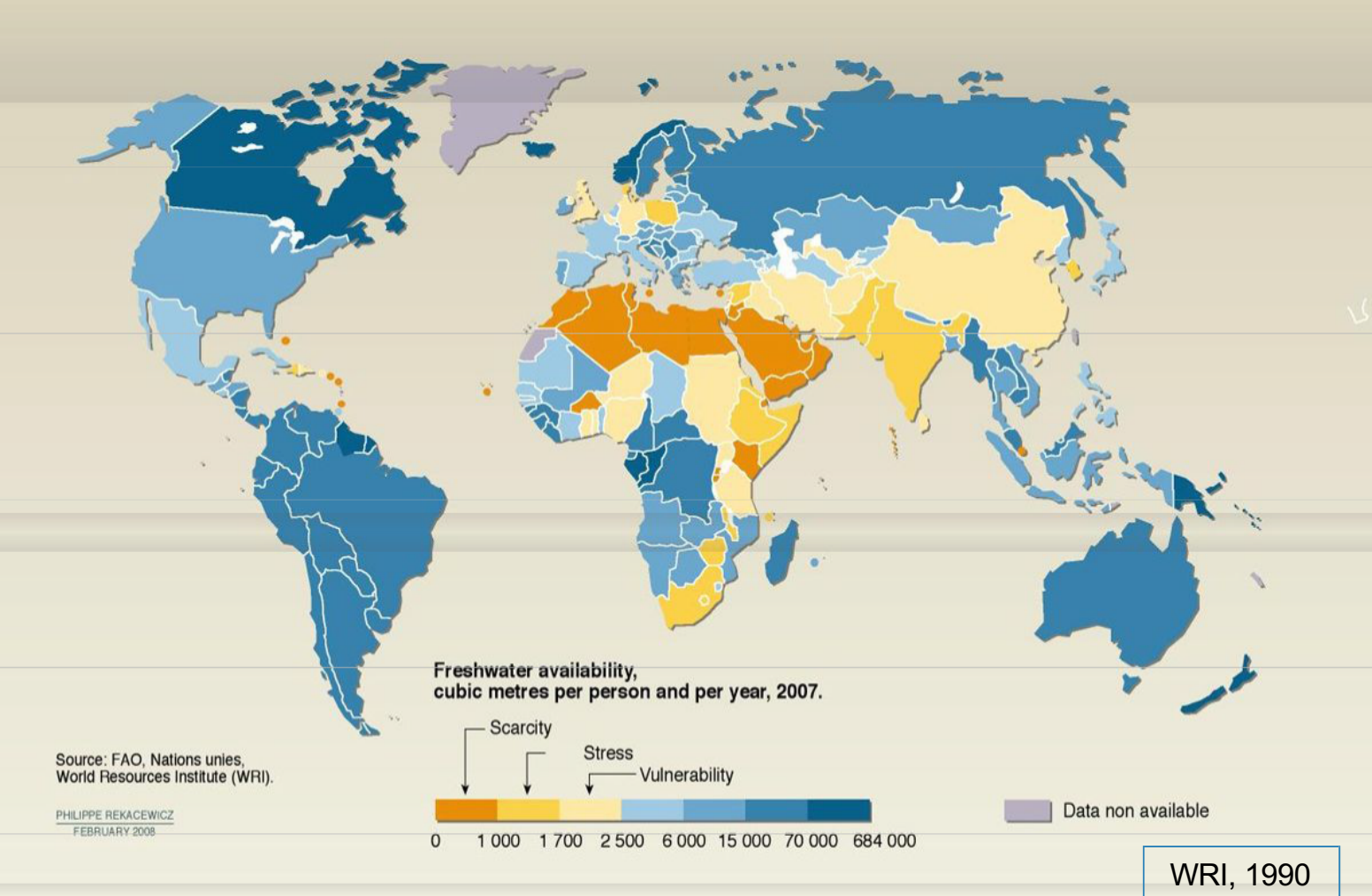
3 MAIN CHALLENGES

(1) WATER SCARCITY/CLIMATE CHANGE

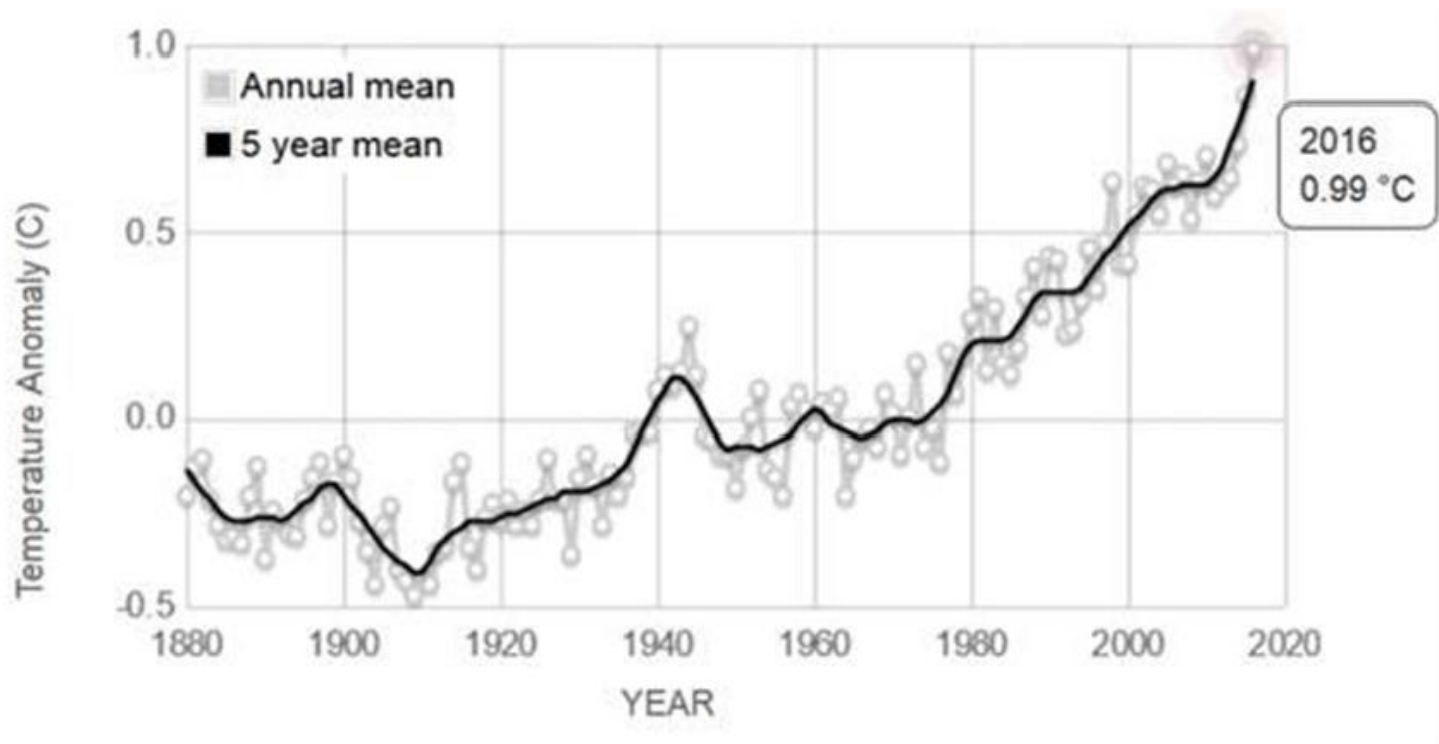


UNESCO, 1979

WATER AVAILABILITY



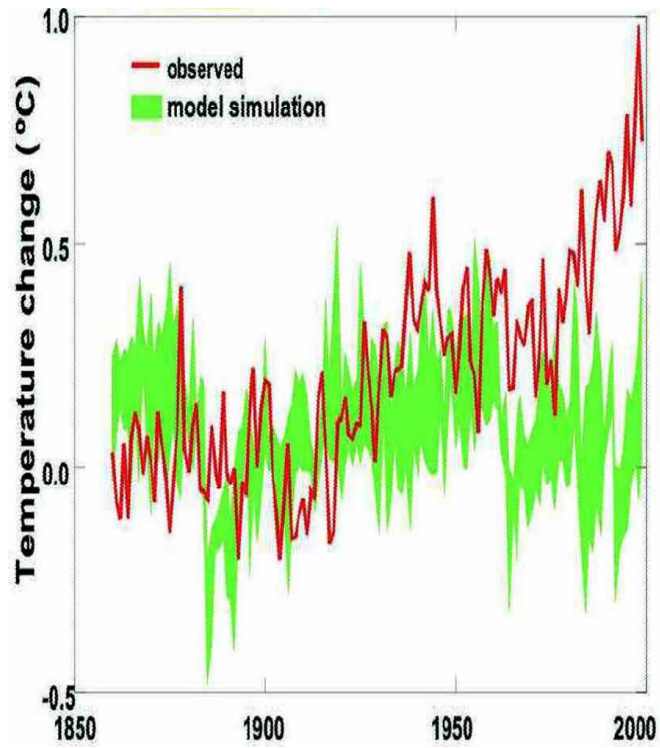
CLIMATE CHANGE



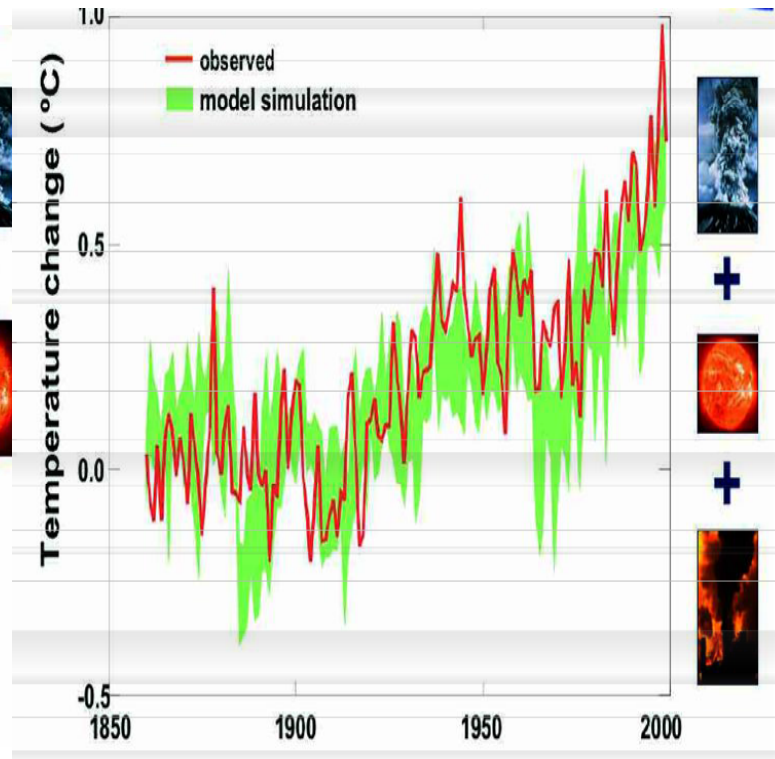
Global annual mean temperature variation.
Data from ground stations 1870-2000 (130 years)

Earth observatory NASA
<http://climate.nasa.gov/>
<http://earthobservatory.nasa.gov/>

CLIMATE CHANGE

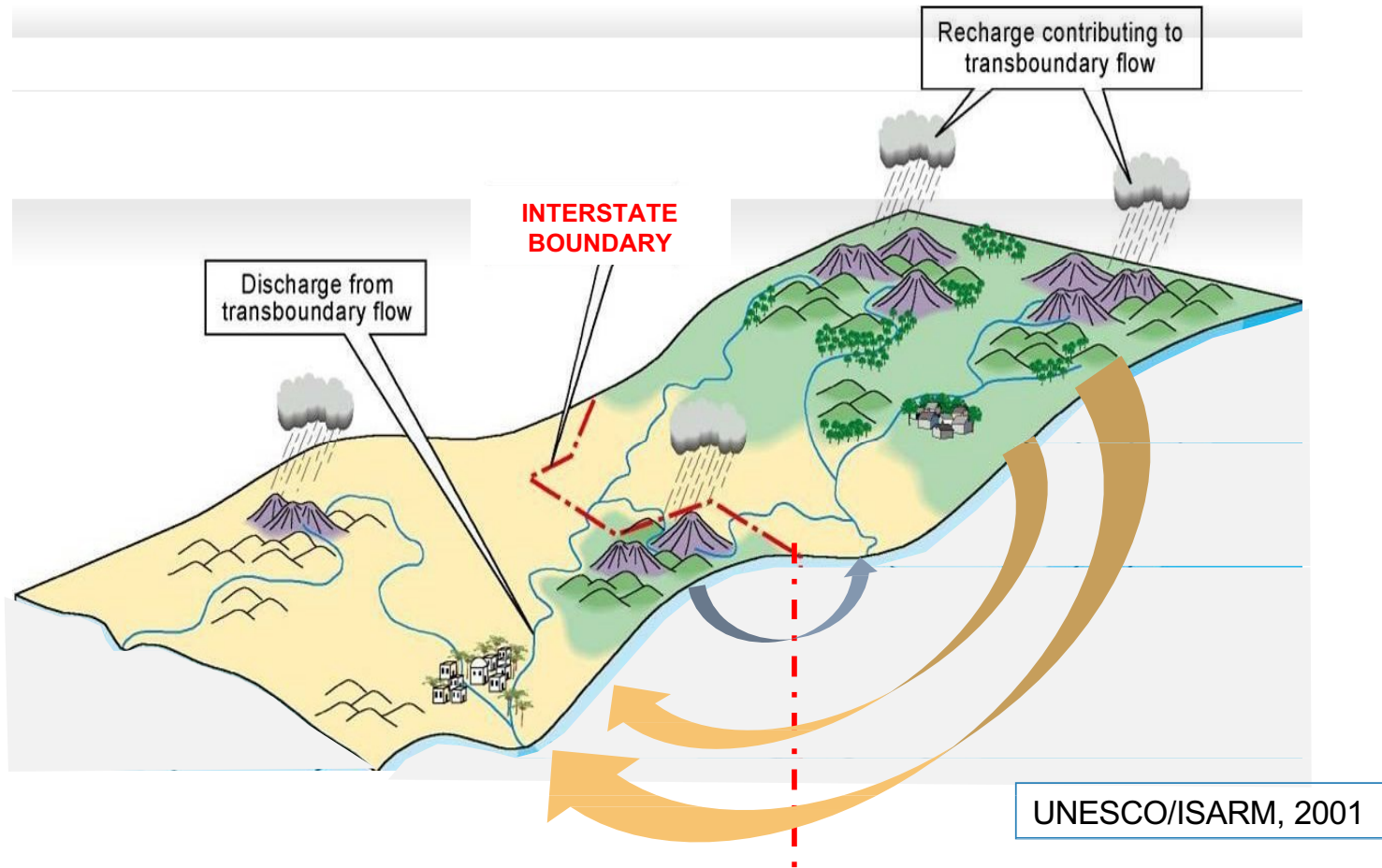


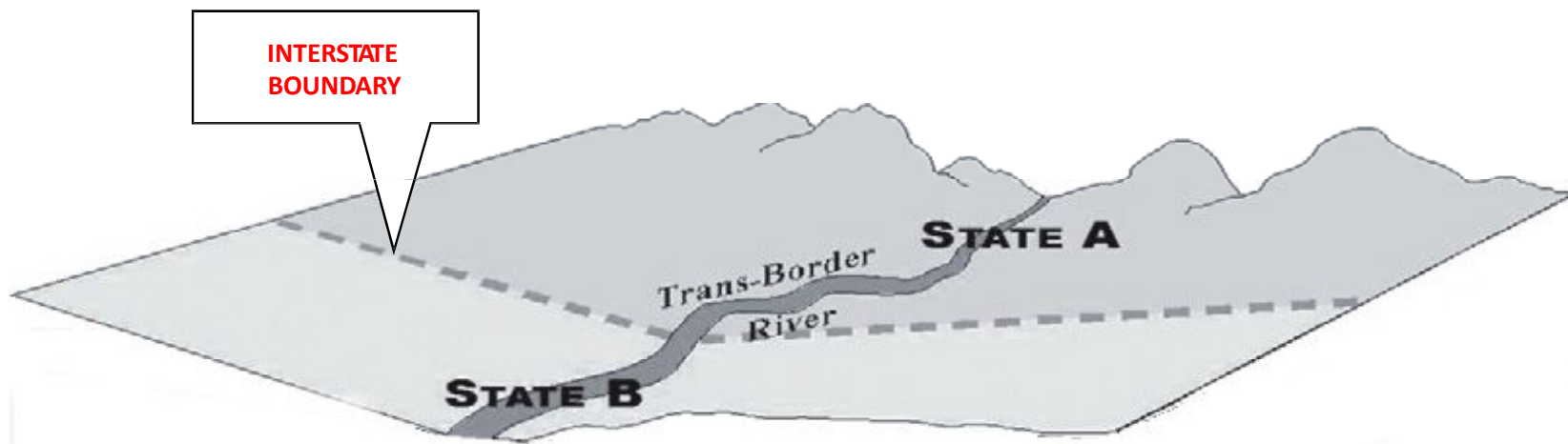
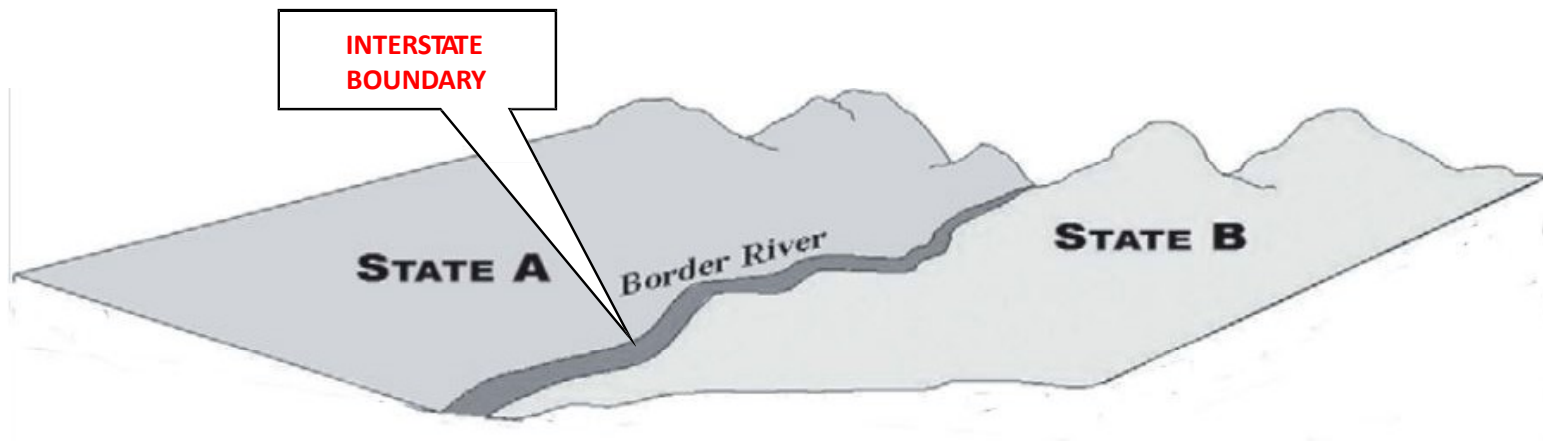
+



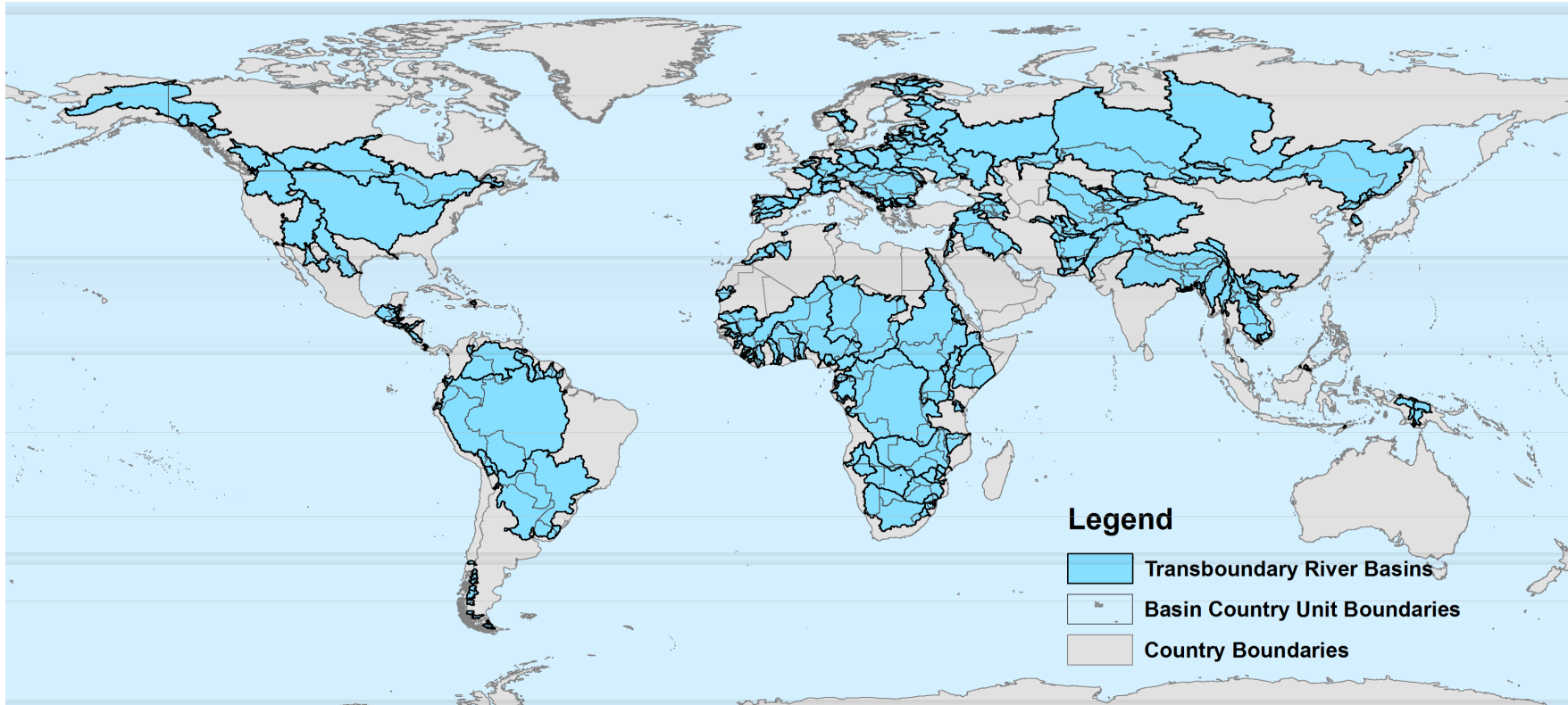
Hadley Centre, 2005

(2) TRANSBOUNDARY ISSUES



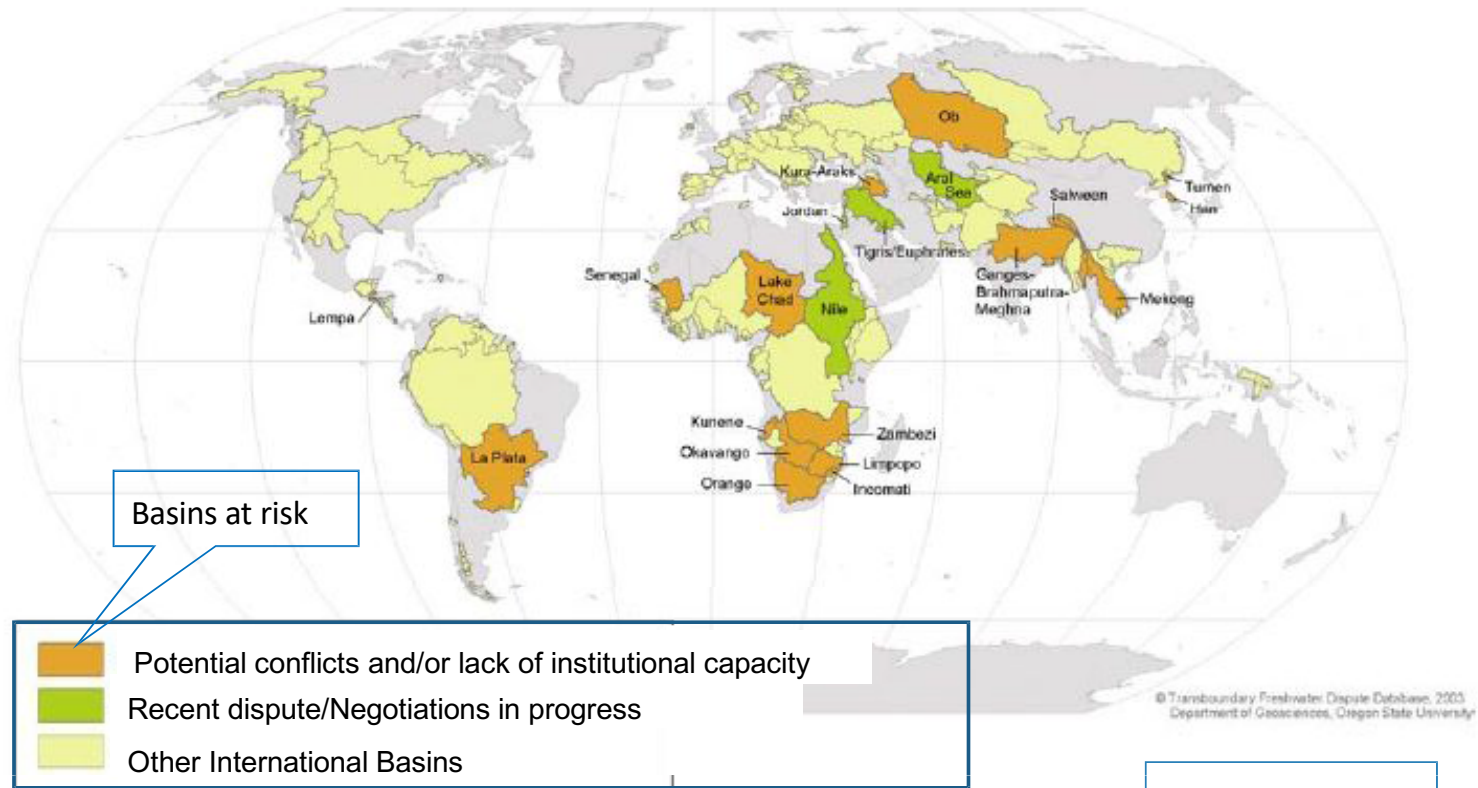


TRANSBOUNDARY RIVER BASINS (TRB)



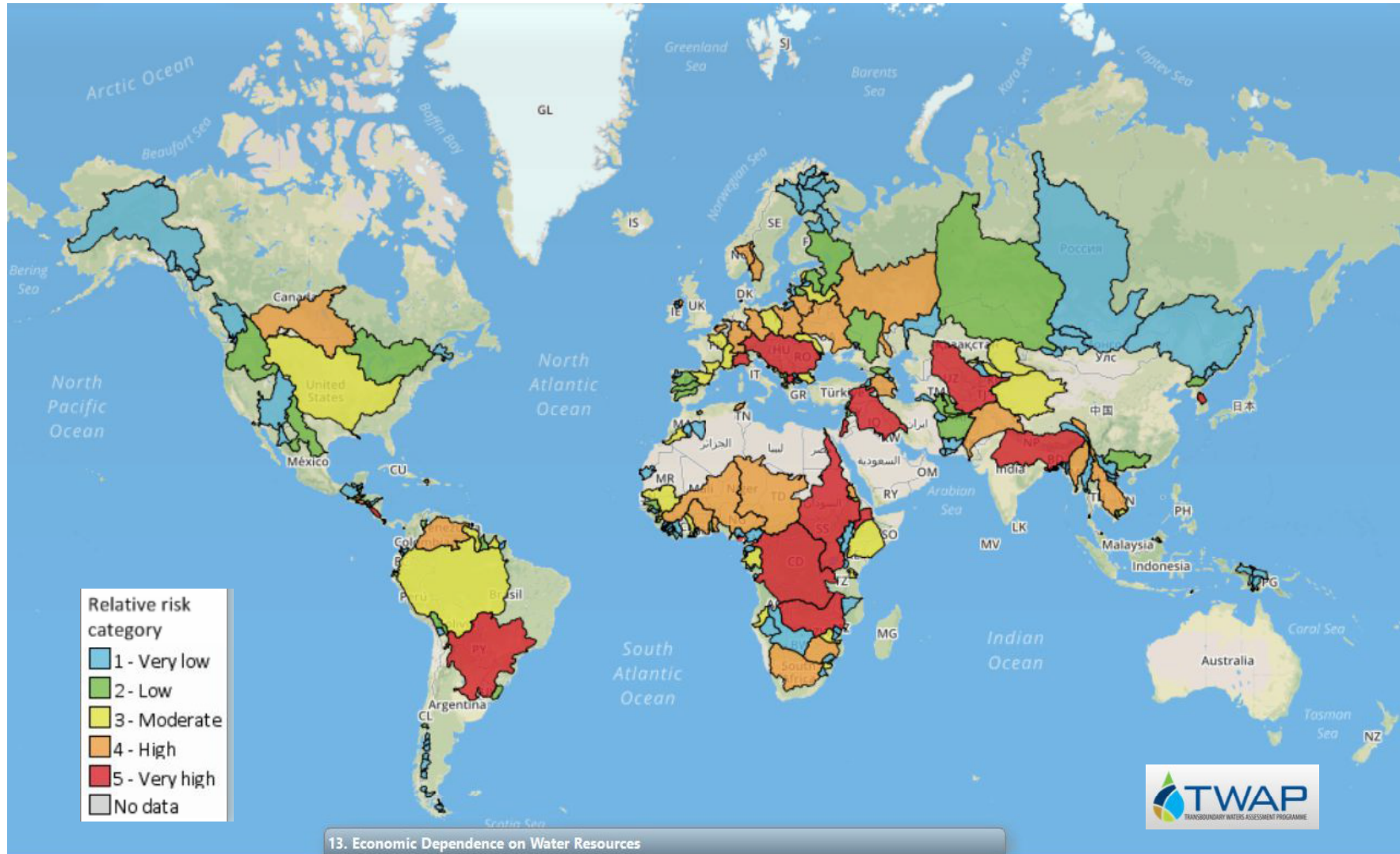
TWAP, 2006

TRB AT RISK

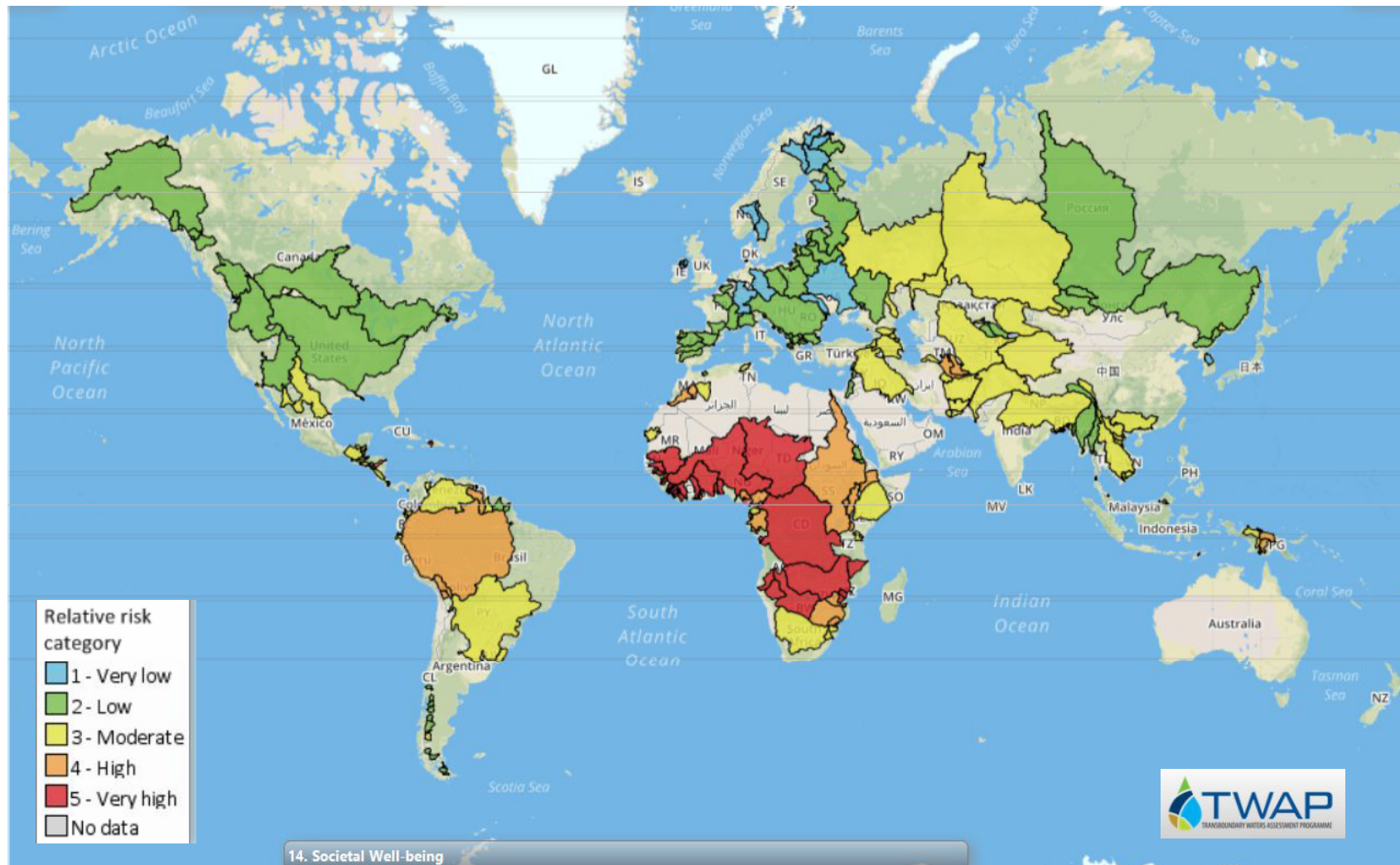


Wolf et al., 2003

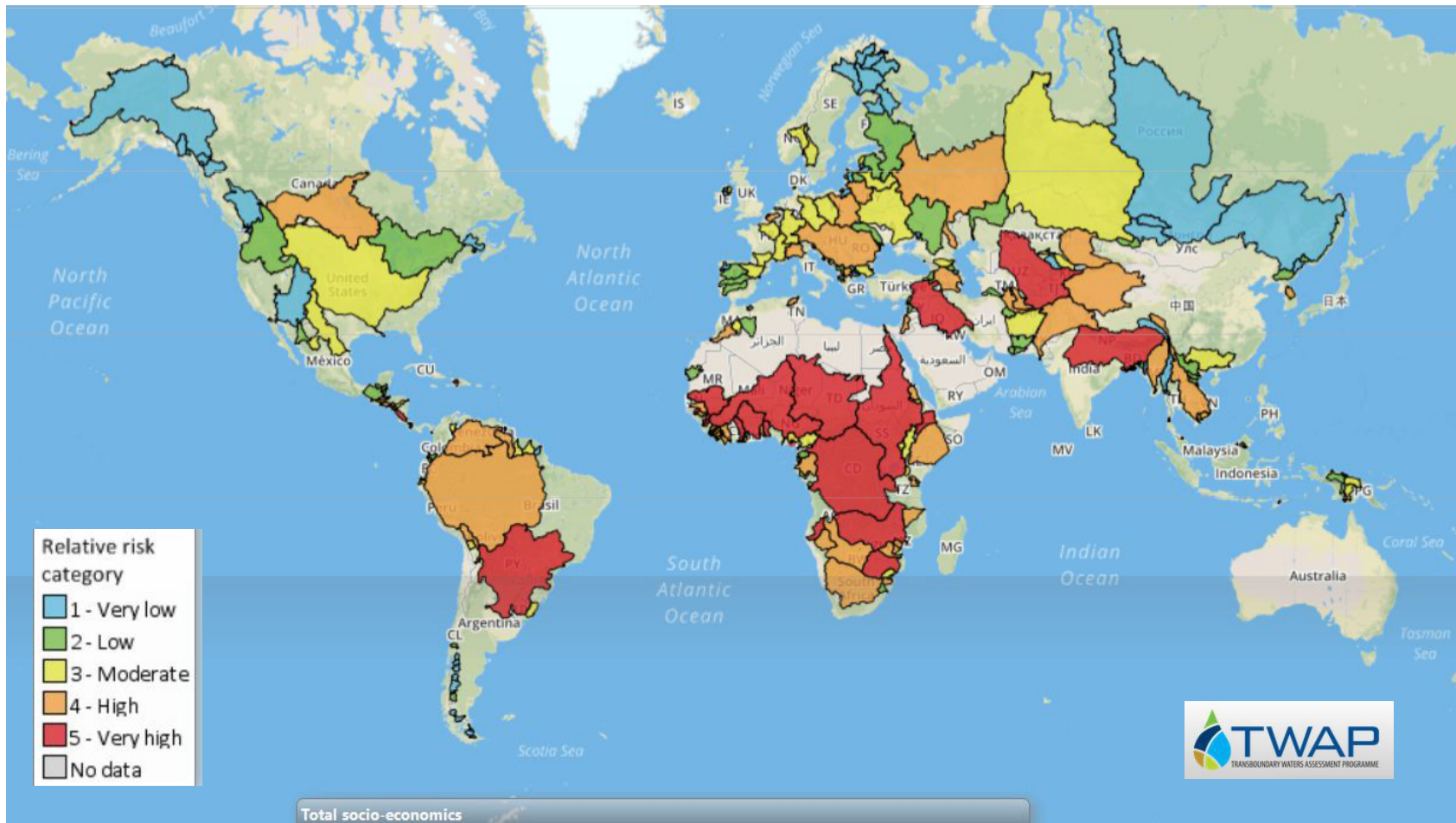
TRB AT ECONOMIC RISK



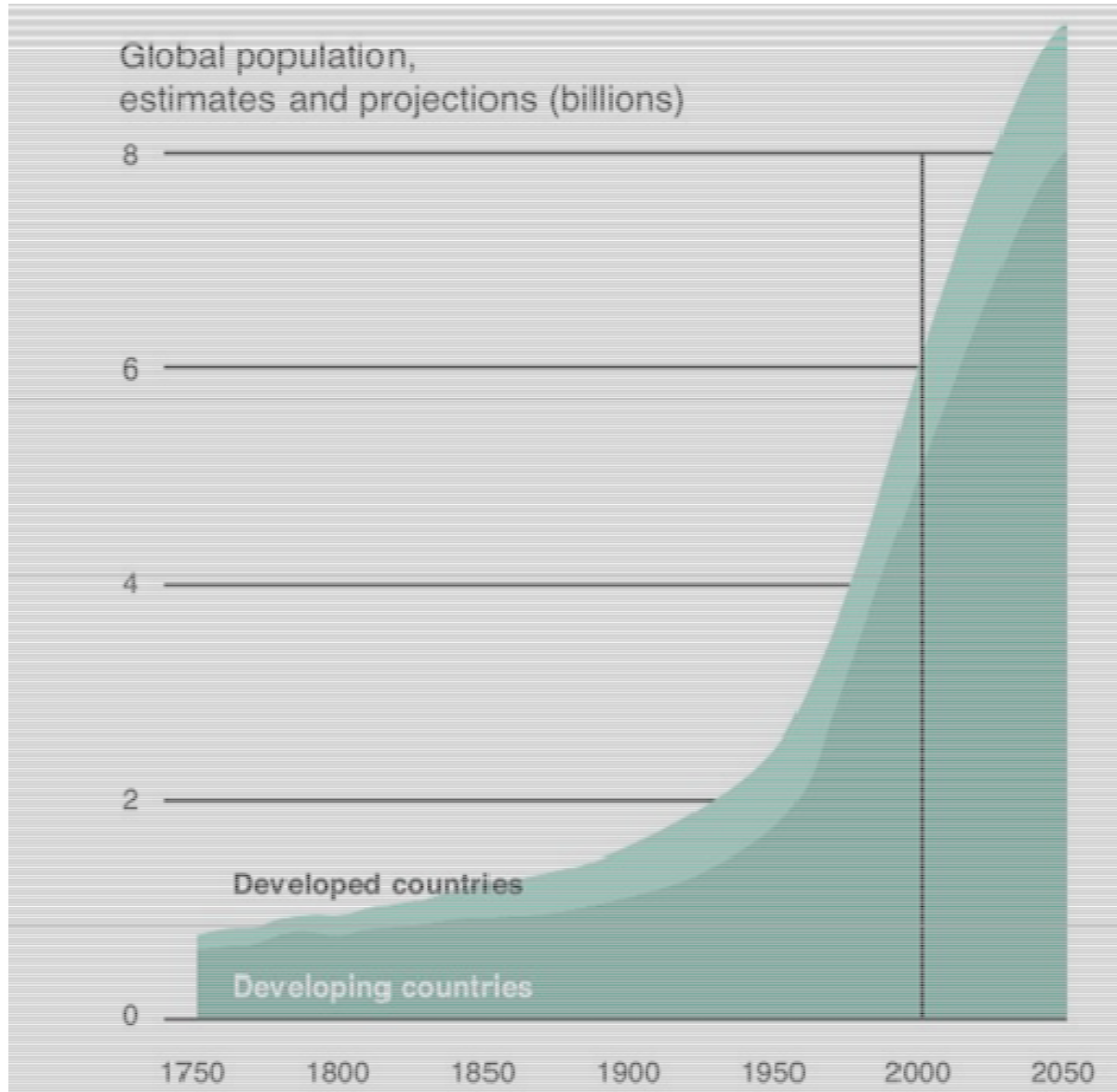
TRB AT SOCIAL RISK



TRB AT SOCIO-ECONOMIC RISK



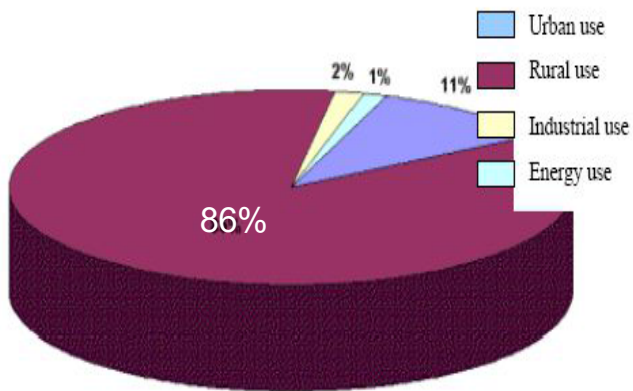
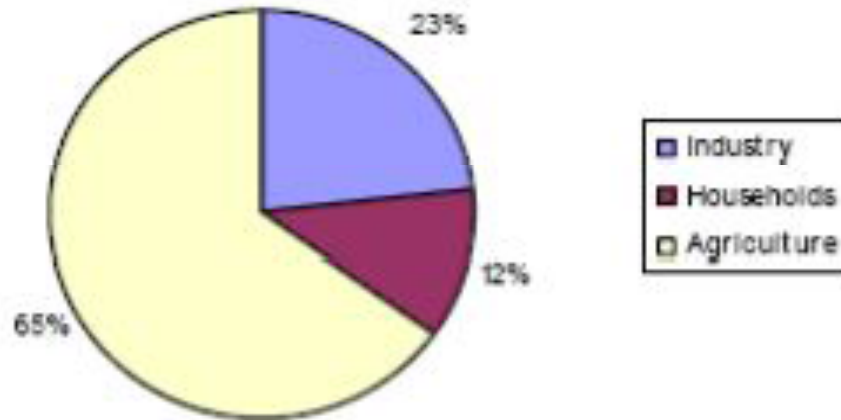
(3) POPULATION INCREASE/WATER OVER-USE



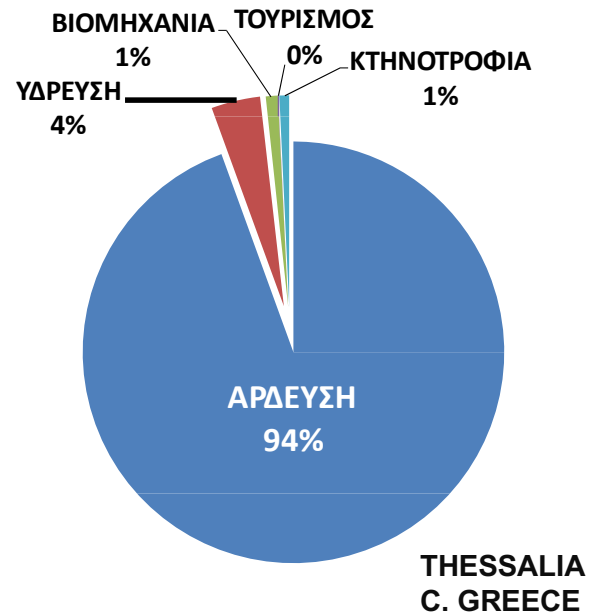
UNEP/GRID, 2017

SECTORIAL WATER CONSUMPTION

FAO:
MEDITERRANEAN

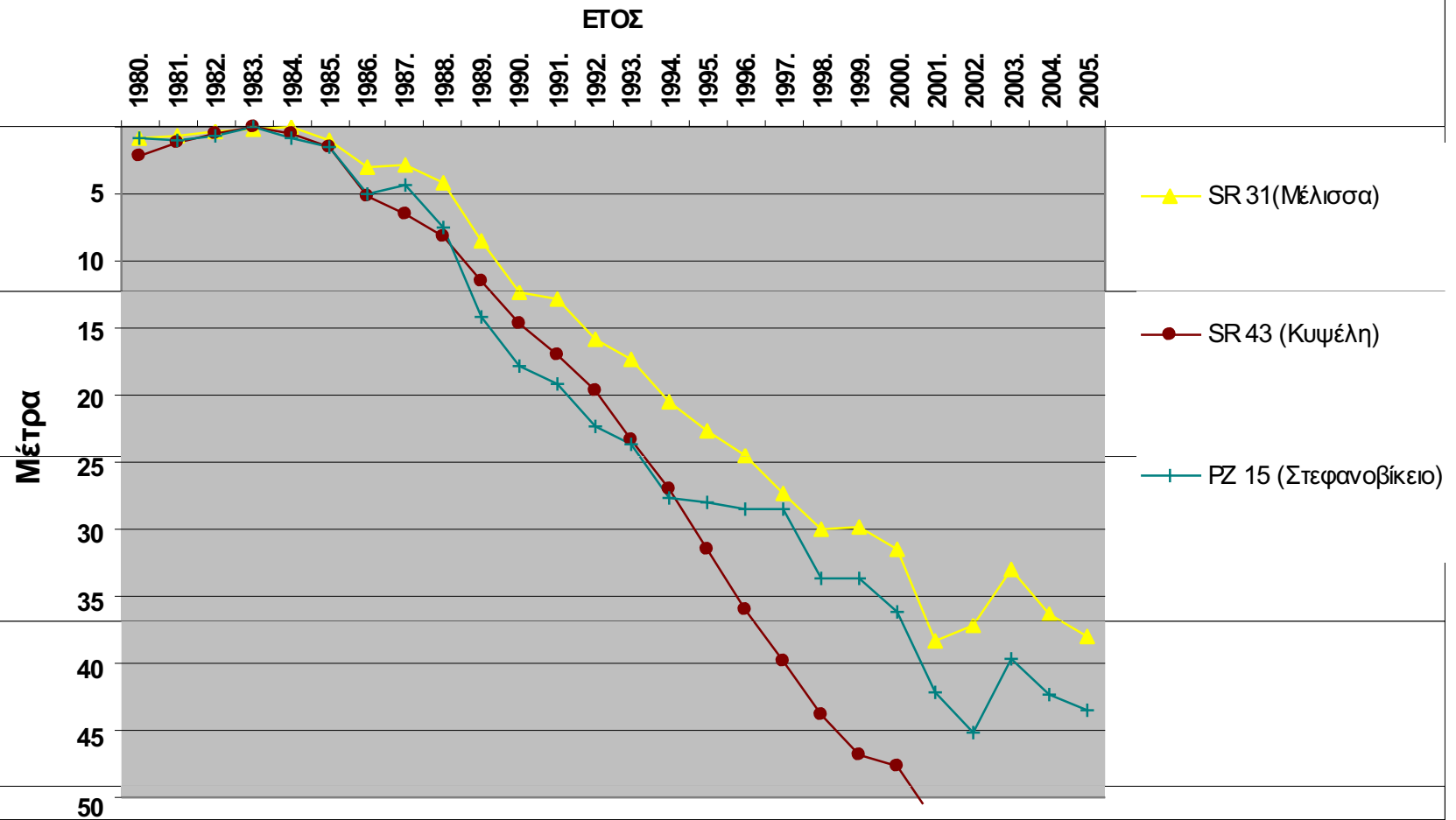


SSW: GREECE



THESSALIA
C. GREECE

GROUNDWATER DRAWDOWN IN THESSALIA

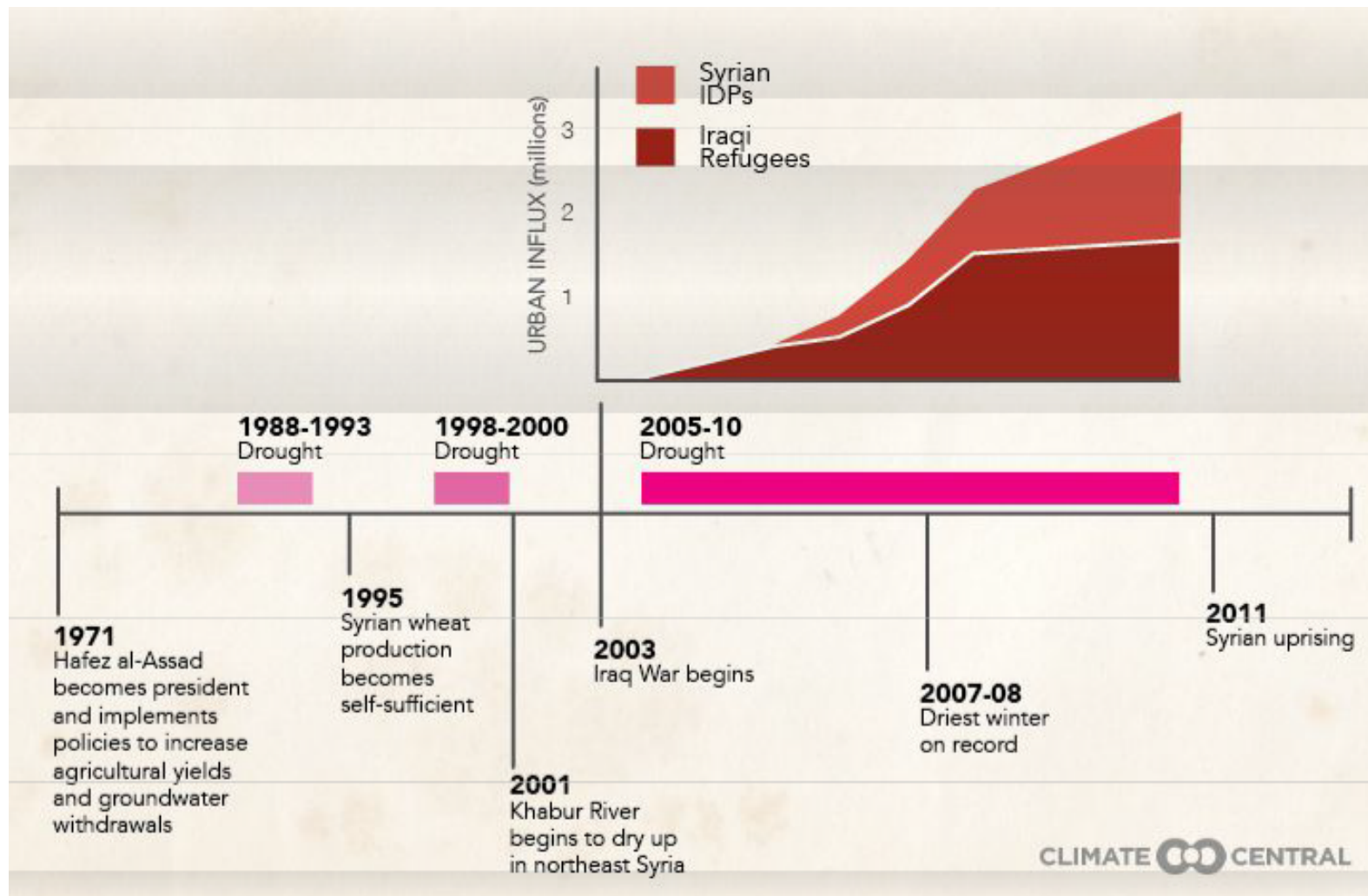


WATER SCARCITY AS

RISK

OR

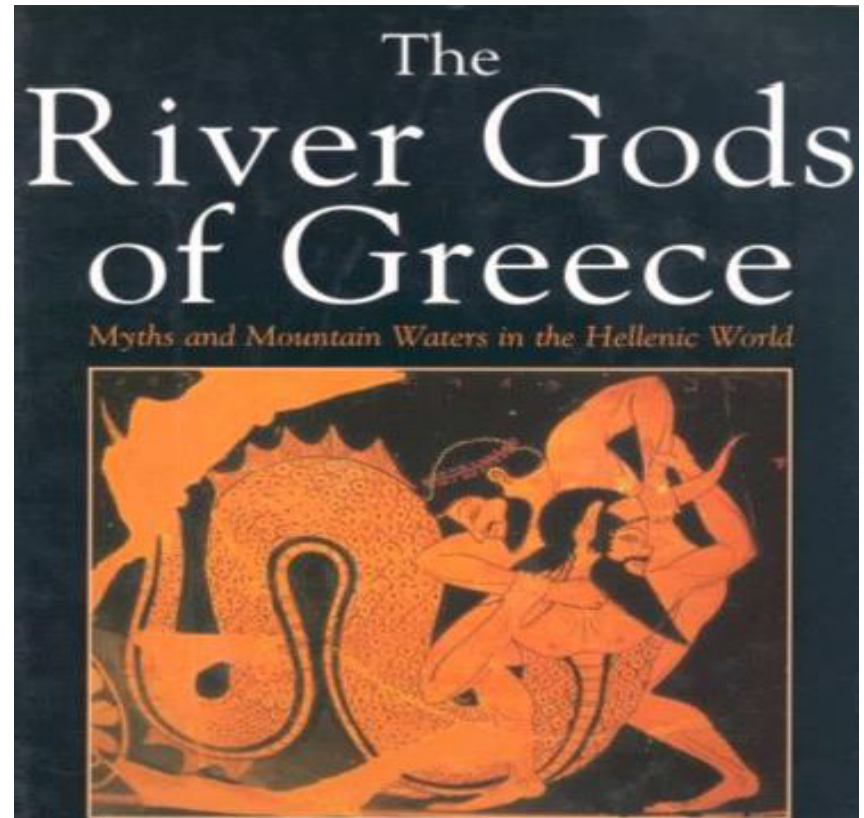
AS AN OPPORTUNITY



Droughts, water scarcity and policy as risk factors in the Syrian conflict and war (Climate Central, 2015 from Kelly and al., 2015)



**Raphael's
School of Athens**



Water is best
"ἄριστον μὲν ὕδωρ"

Pindar, c. 450 B.C.

Raphael's School of Athens





Explanation of the References.

- 1 Cenotaph of Euripides
- 2 Equestrian Statue
- 3 Tombeion
- 4 Temple of Ceres
- 5 Different Porticos
- 6 Temple of Minerva
- 7 Portico of Jupiter Bloutherus
- 8 Temple of Apollo Patrons
- 9 Portico of the Hermæ
- 10 Pavile
- 11 Enclosure containing the Palace of the Senate and an Edifice dedicated to the Mother of the Gods
- 12 Tholus
- 13 Statues of the Epionymi
- 14 Temple of Mars
- 15 Different Temples and Sites of Edifices
- 16 Chapel of Bacus
- 17 Leocortium
- 18 Temple of Castor and Pollux
- 19 Chapel of Agræus
- 20 Prytæneum
- 21 Temple of Diana Aristoboule built by Themistocles
- 22 Ancient Temple of Bacchus of the Marshes
- 23 Ancient Temple of the Olympian Jupiter
- 24 Temple of the Pythian Apollo
- 25 Eleusinium
- 26 Temple of Eueha
- 27 Temple of the Earth
- 28 Stair-case leading to the Citadel
- 29 Groto of Pan
- 30 Propylæa
- 31 Temples of Erechtheus and Minerva Pelas

MOUNT ANCHESMUS

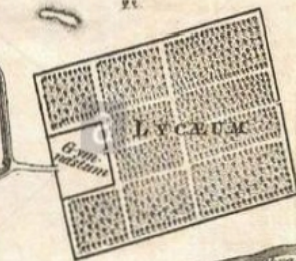
MELITE

LIMNÆ or the Marshes

DROMOS

AGRE

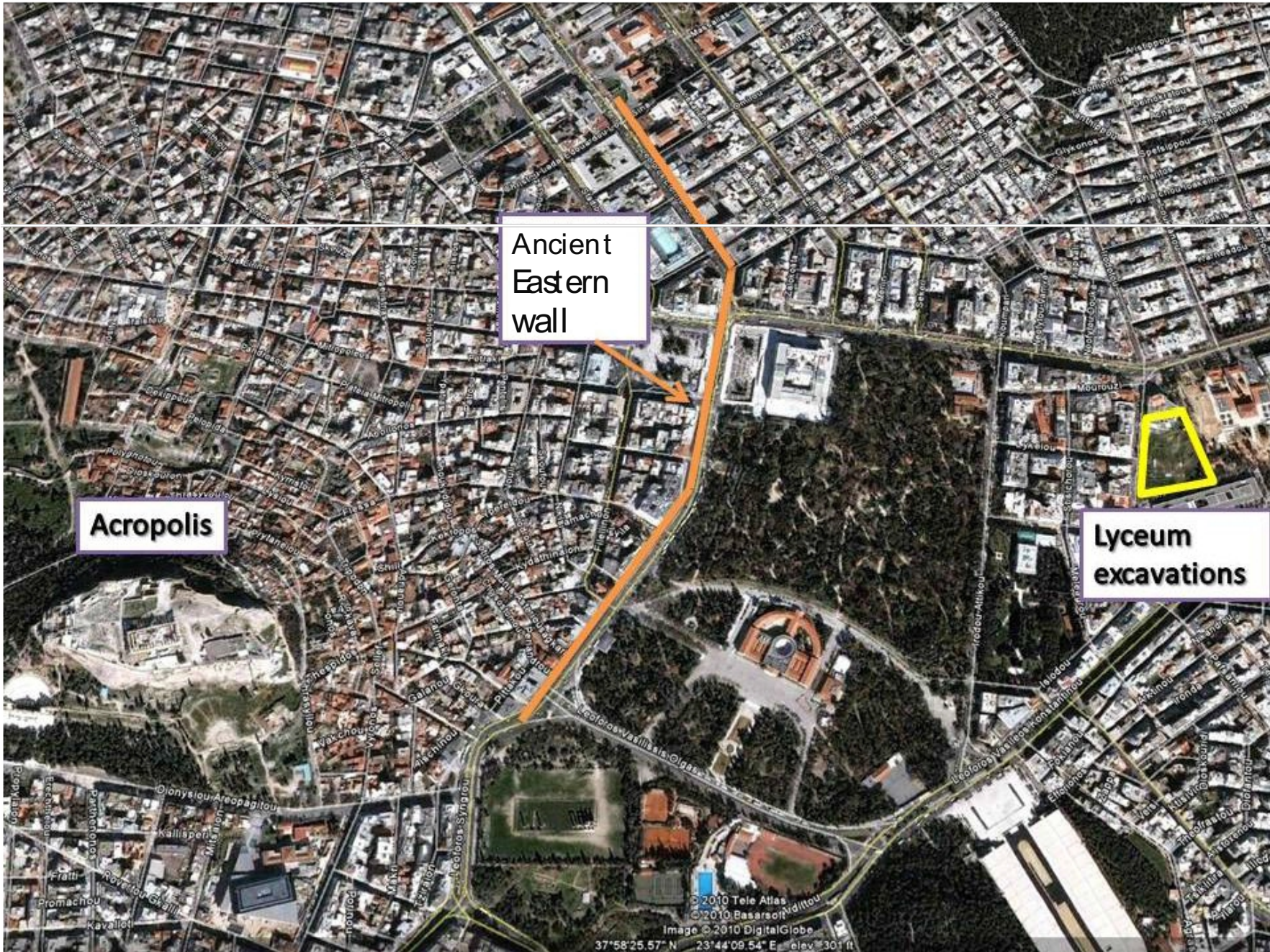
MOUNT HYMETTUS



GG

JL; i.v 01. A!n Dik: for dlch hych of \n: l d m ni.





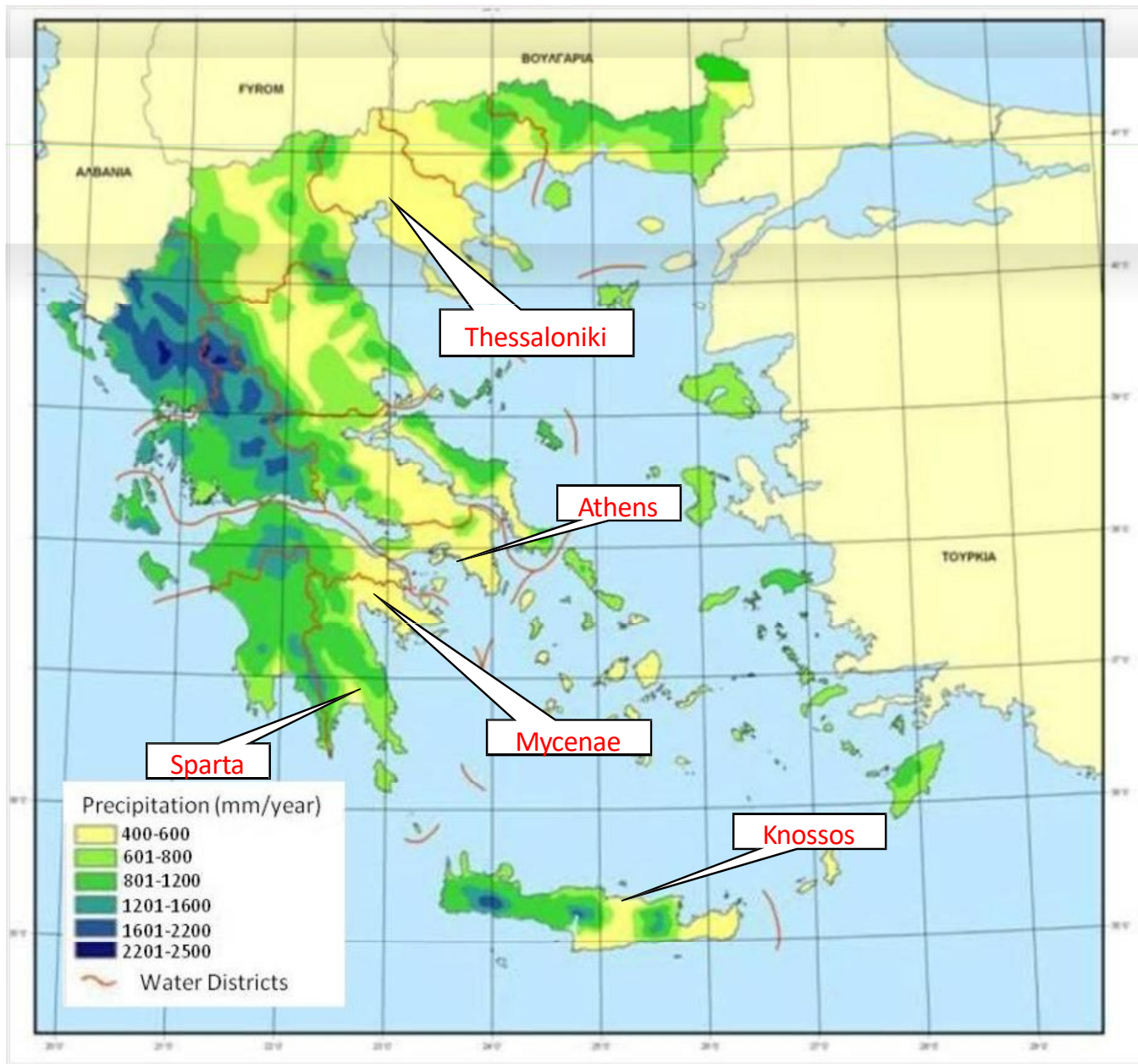
Ancient Eastern wall

Acropolis

Lyceum excavations

© 2010 Tele Atlas
© 2010 Basarsoft
Image © 2010 DigitalGlobe
37°58'25.57" N 23°44'09.54" E elev 301 ft





COMPETITION
ATHENA AND POSEIDON
(from Greek Mythology)

CHOISE between

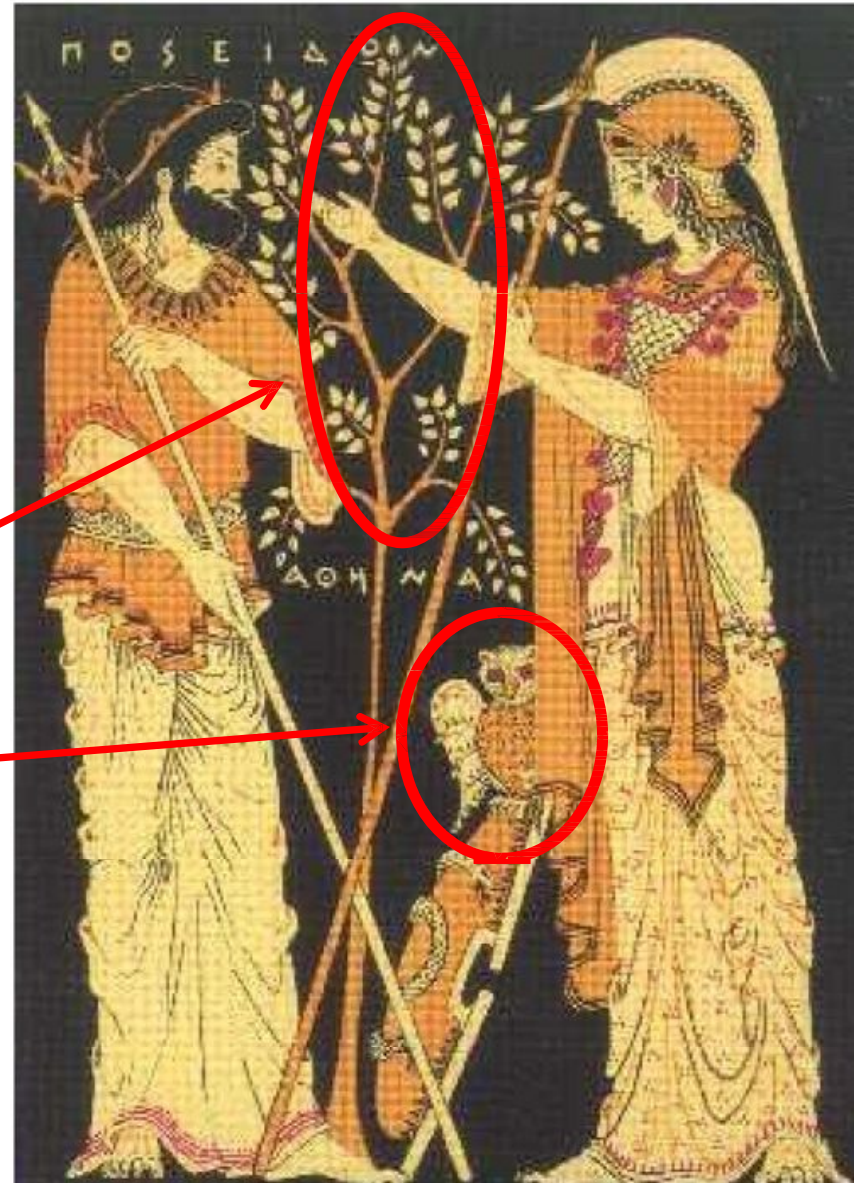
POSEIDON (god of water) and
ATHENA (goddess of wisdom)

WATER ABUNDANCE
or
WISDOM

Athena offered
the olive tree and wisdom

She explained why water
scarcity with wisdom is more
powerful than abundance

Athenians opted for wisdom



THE GLORY OF ATHENS DURING PERICLE'S GOLDEN AGE (480-400 BC)



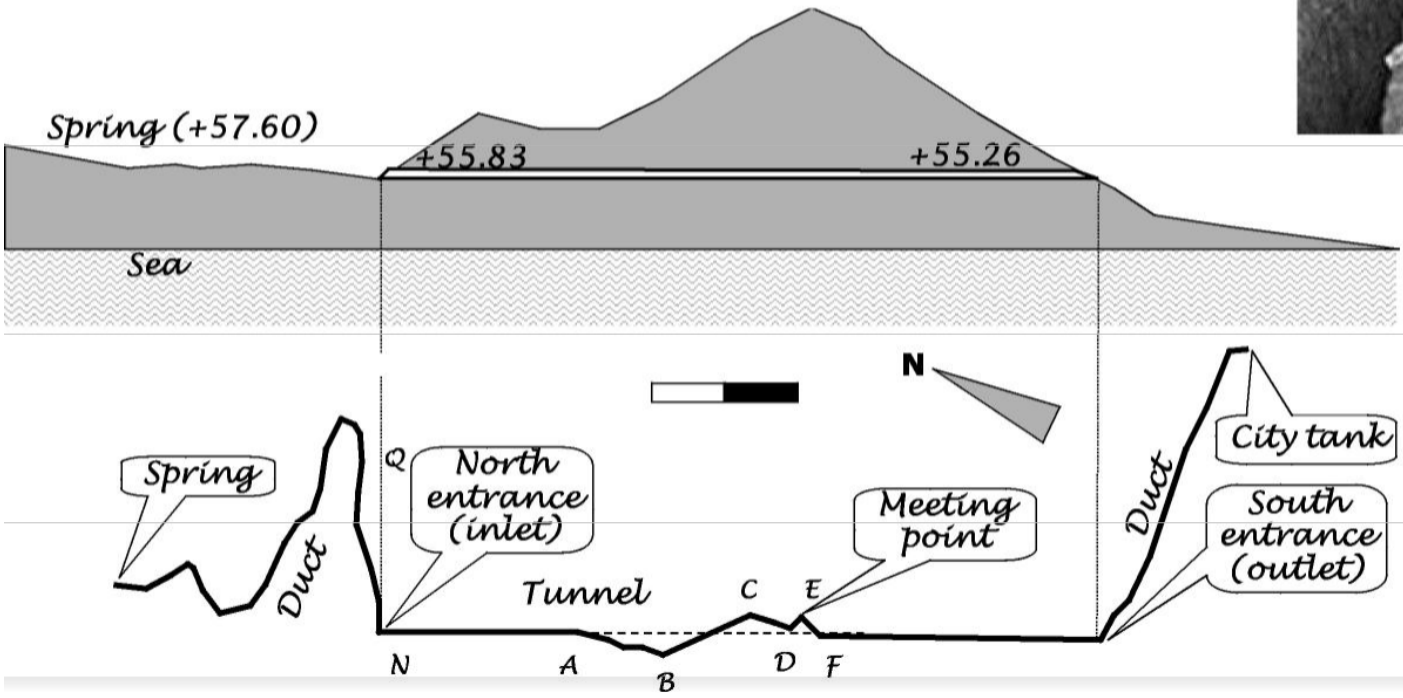
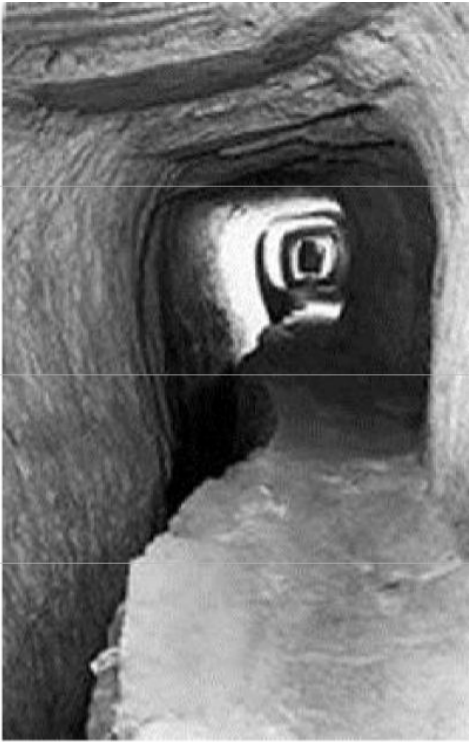
WATER LAW IN ANCIENT ATHENS

ἐπεὶ δὲ πρὸς ὕδωρ οὔτε ποταμοῖς ἐστὶν
ἀενάοις οὔτε λίμναις τισὶν οὔτ' ἀφθόνοις
πηγαῖς ἢ χώρα διαρκῆς, ἀλλ' οἱ πλεῖστοι
φρέασι ποιητοῖς ἐχρῶντο, νόμον ἔγραψεν,....

Since the area is not sufficiently supplied with water, either from continuous flow rivers, or lakes or rich springs, but most people used artificial wells, Solon made a law

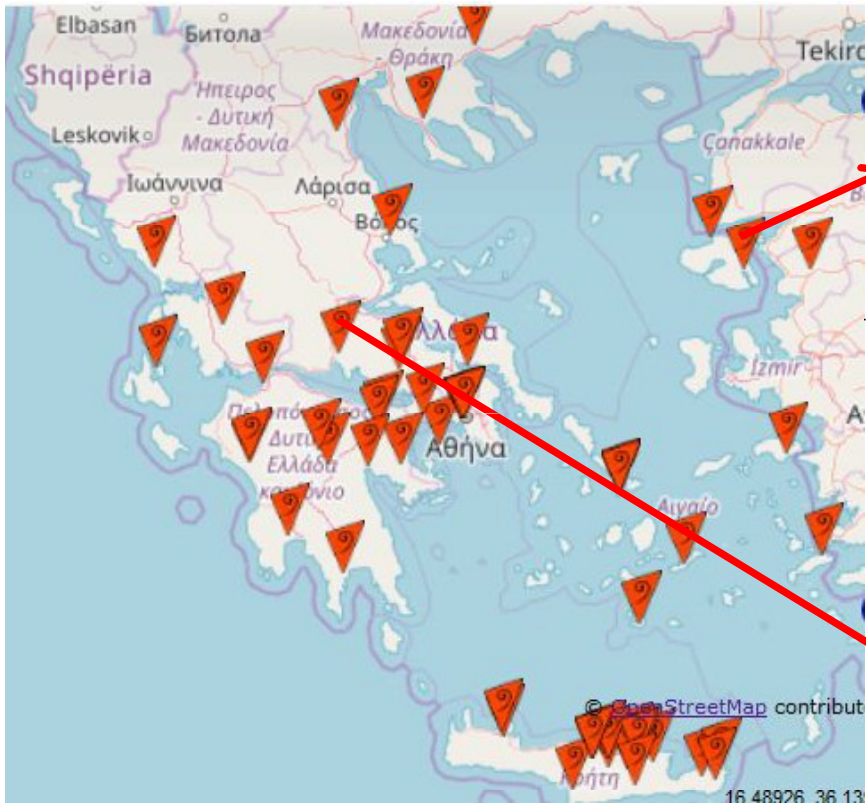


The “Imittos” aqueduct in Athens (405 cent. BC)
National Garden’s irrigation water today

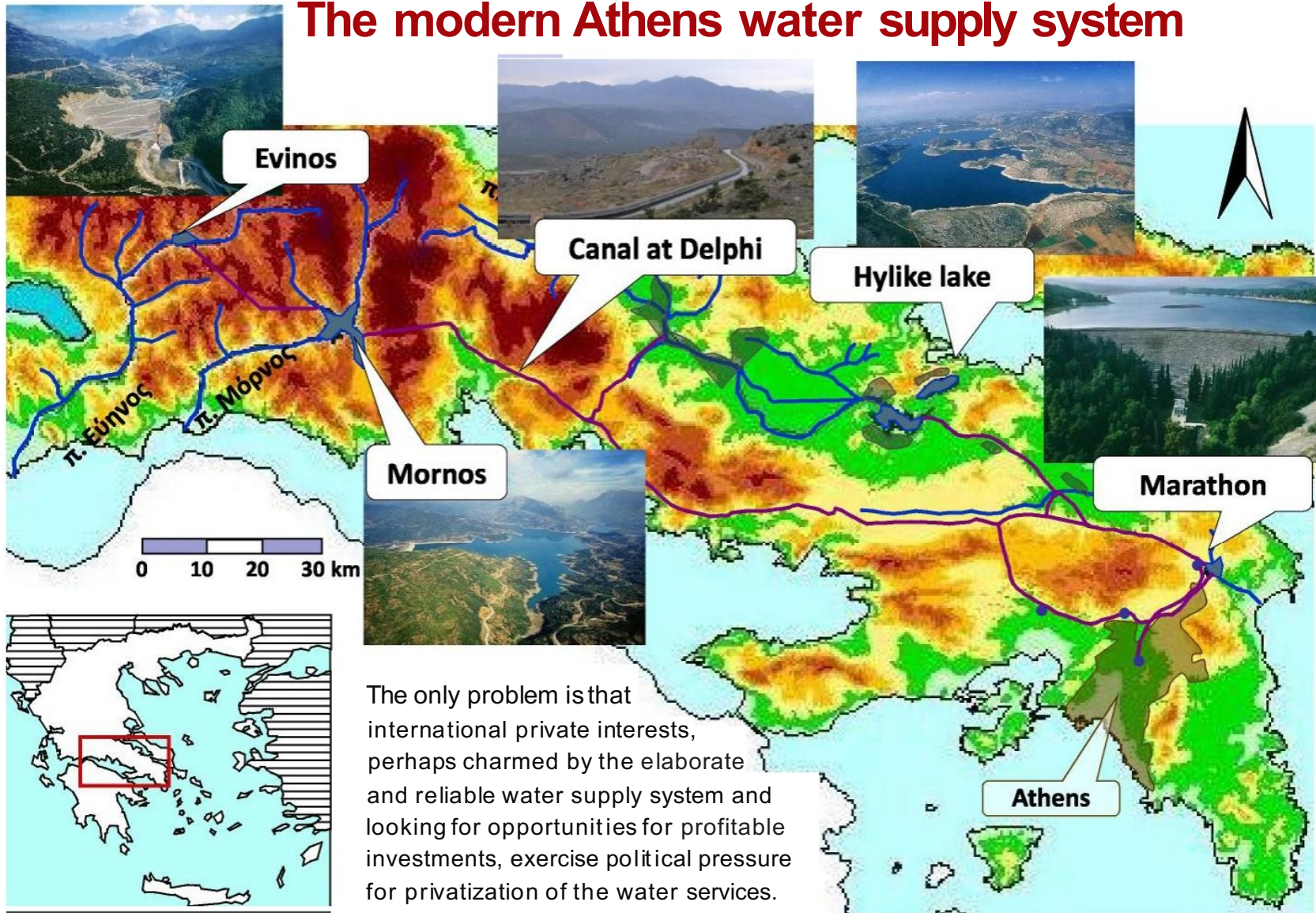


Ancient Greek Hydraulic Works

<http://www.iti.ntua.gr/hydworkel>



The modern Athens water supply system



The only problem is that international private interests, perhaps charmed by the elaborate and reliable water supply system and looking for opportunities for profitable investments, exercise political pressure for privatization of the water services.

STRUCTURE OF PART 3

1. From Water Problems to Hydro-Governance
2. Conditions for Hydro-Governance Change
3. The EU-WFD versus the California SGMA Policy

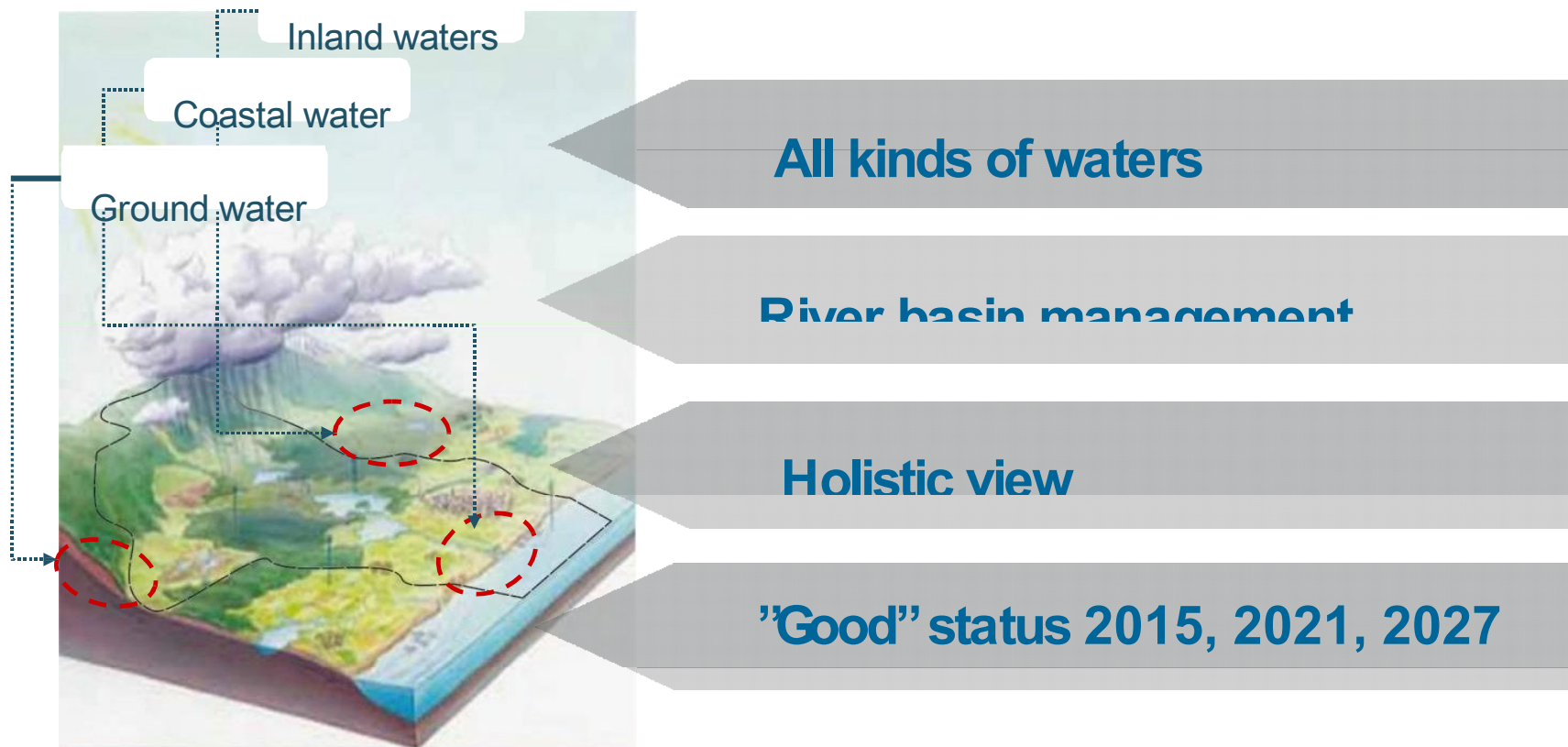
1. The 2000/60/EC Water Framework Directive

1. Conditions for Change, Conflicts and Main Characteristics
2. The Groundwater Daughter Directive

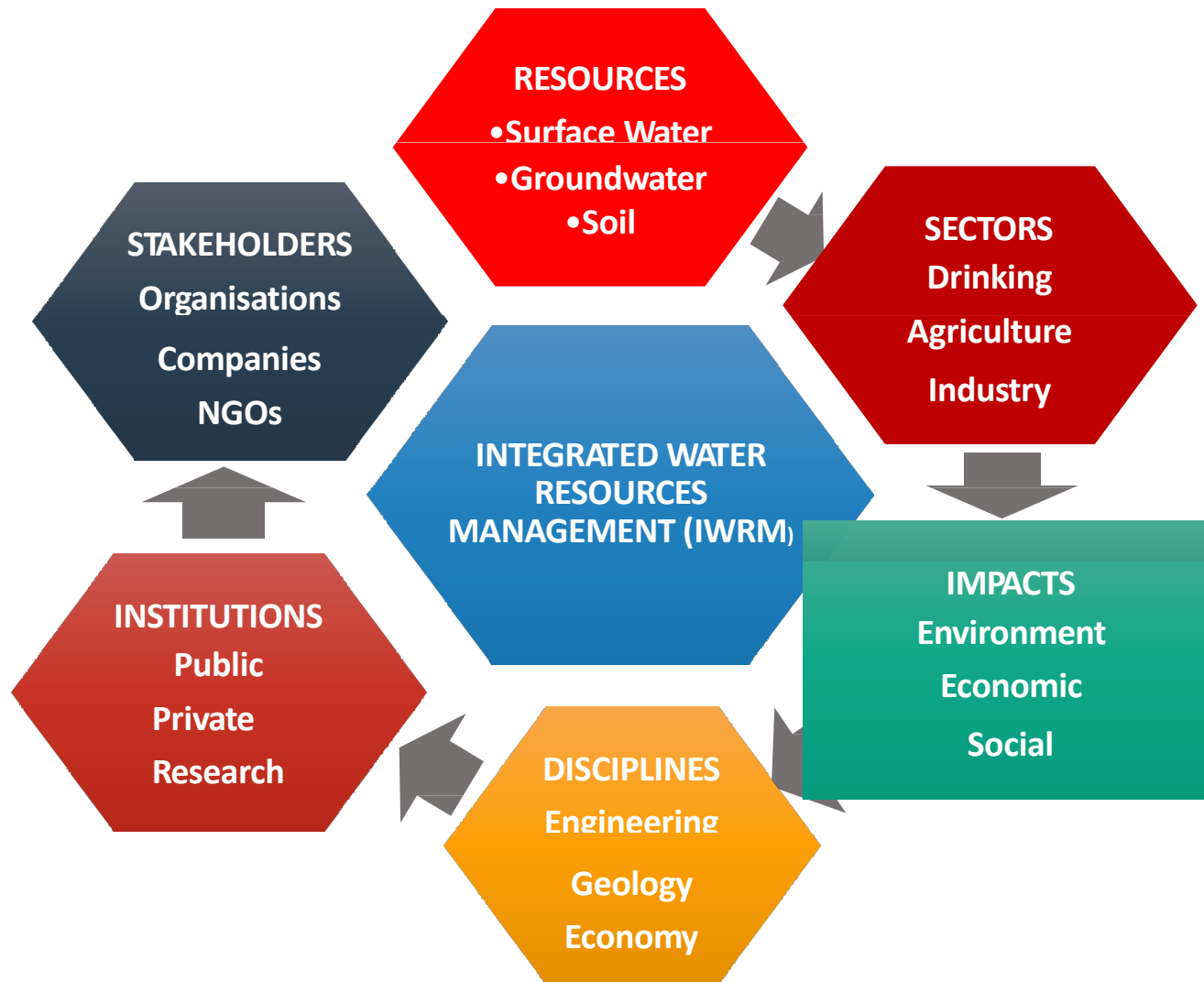
2. The California 2014 SGMA Policy for Groundwater

1. Safe Yield and Sustainable Groundwater Management

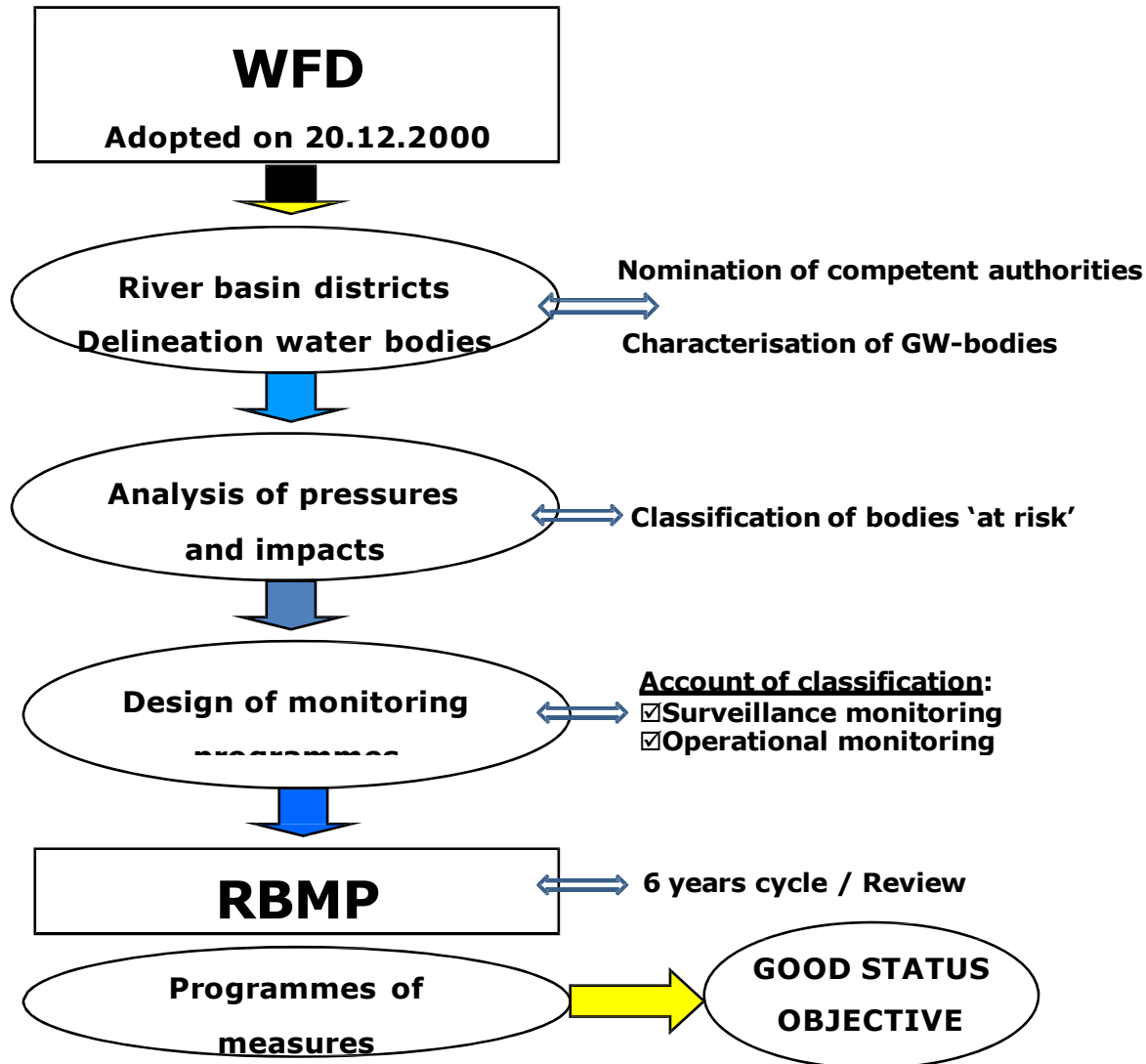
THE EUROPEAN WATER POLICY= THE IWRM HYDRO- GOVERNANCE



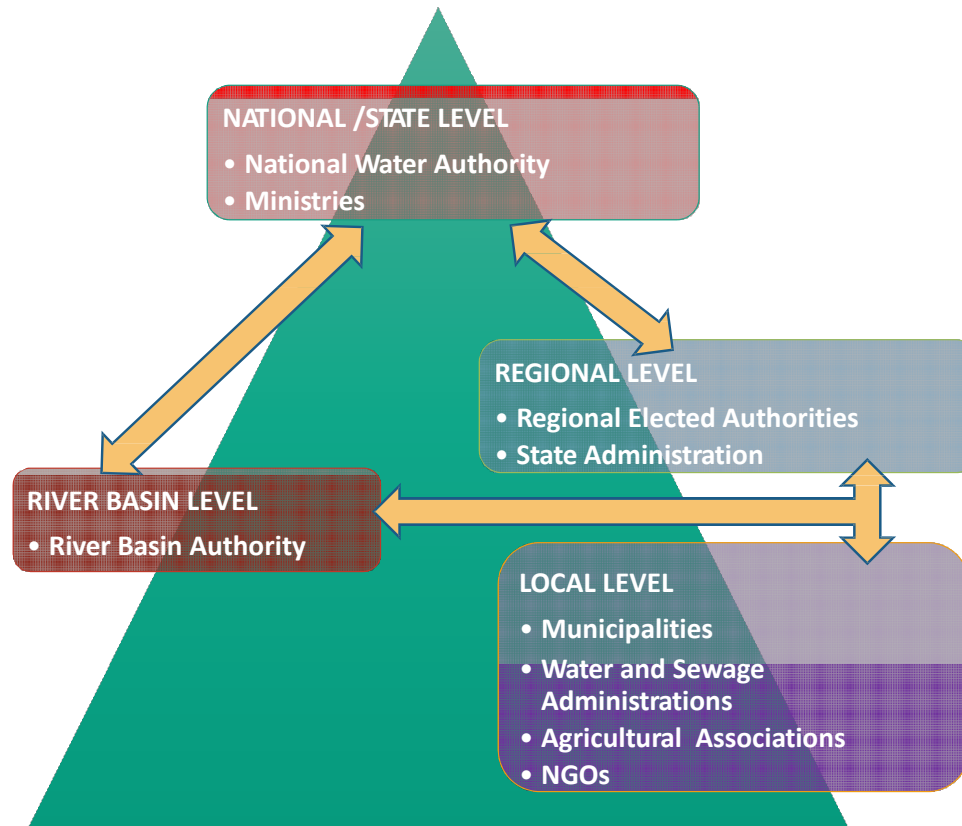
THE IWRM METHODOLOGY



THE EU WATER FRAMEWORK DIRECTIVE



HYDRO-GOVERNANCE SCALING

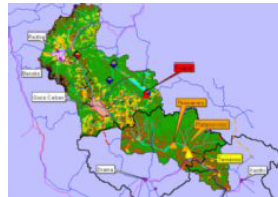


European level



National level

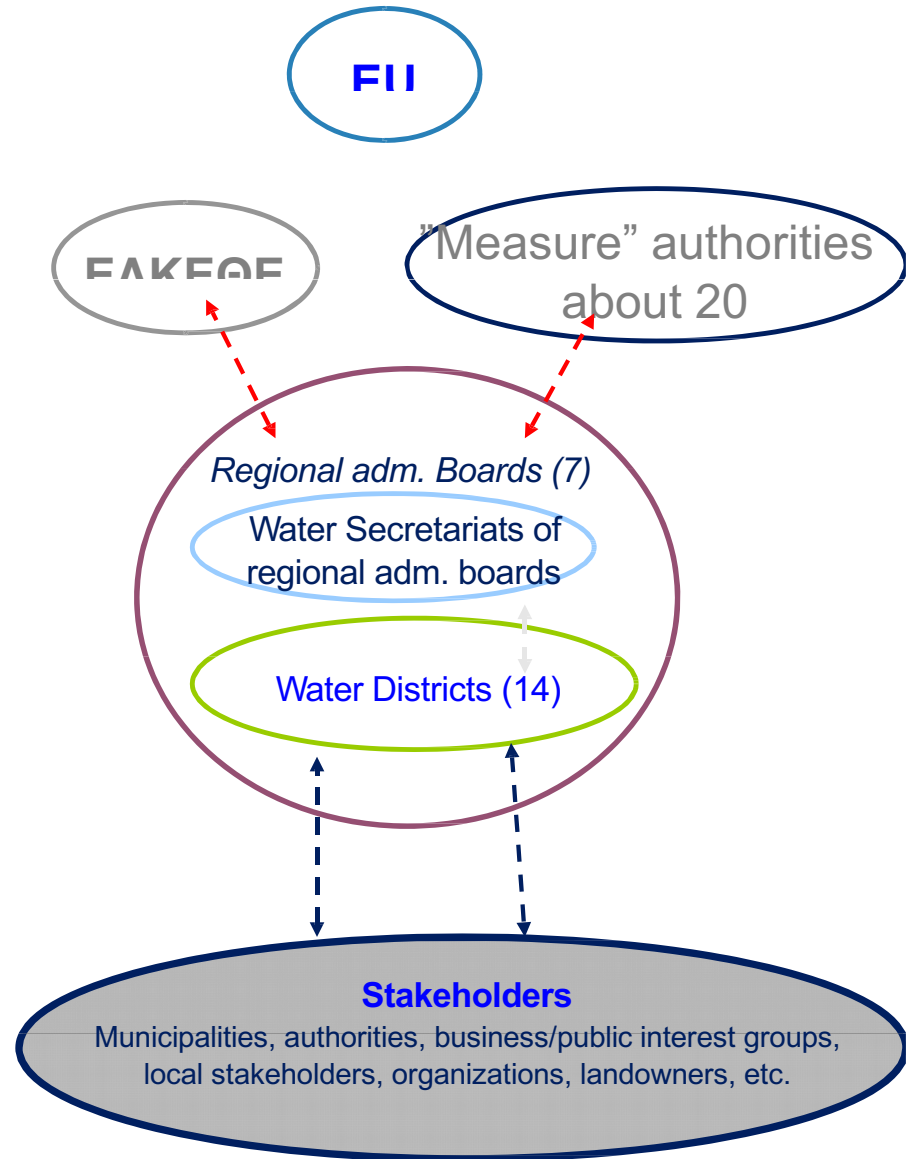
Local level /
River Basin level



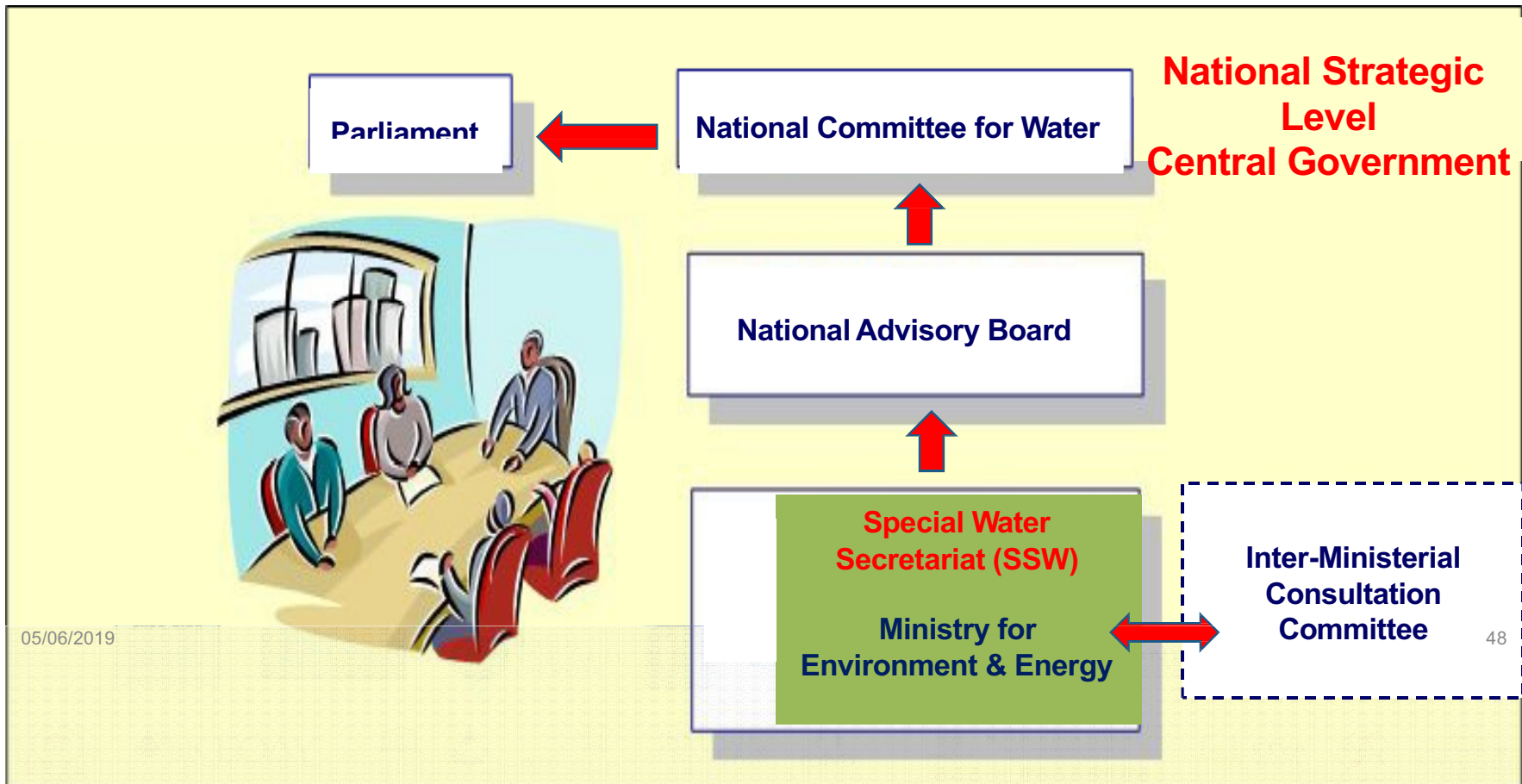
Water district level



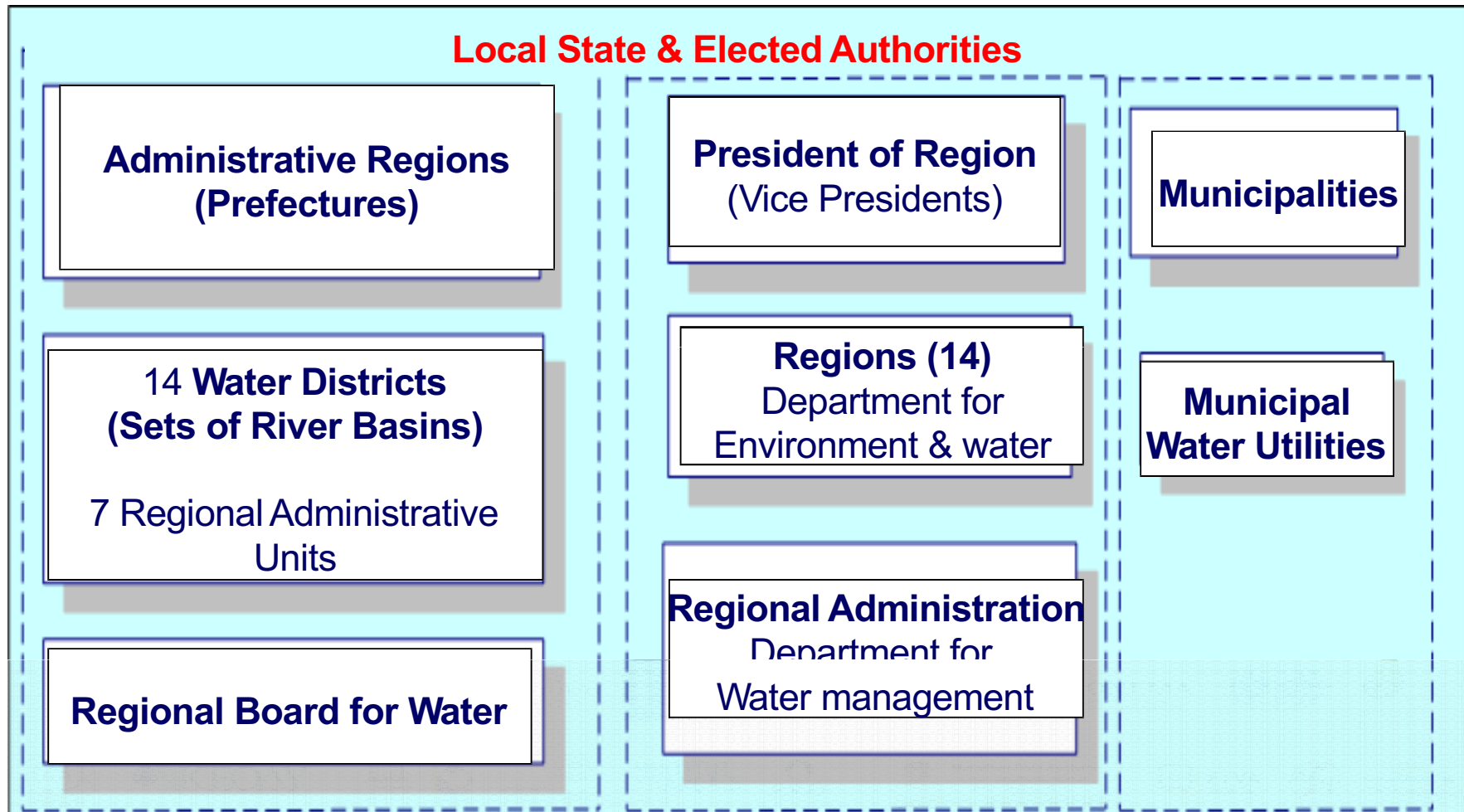
Regional level



Hydro-Governance in Greece



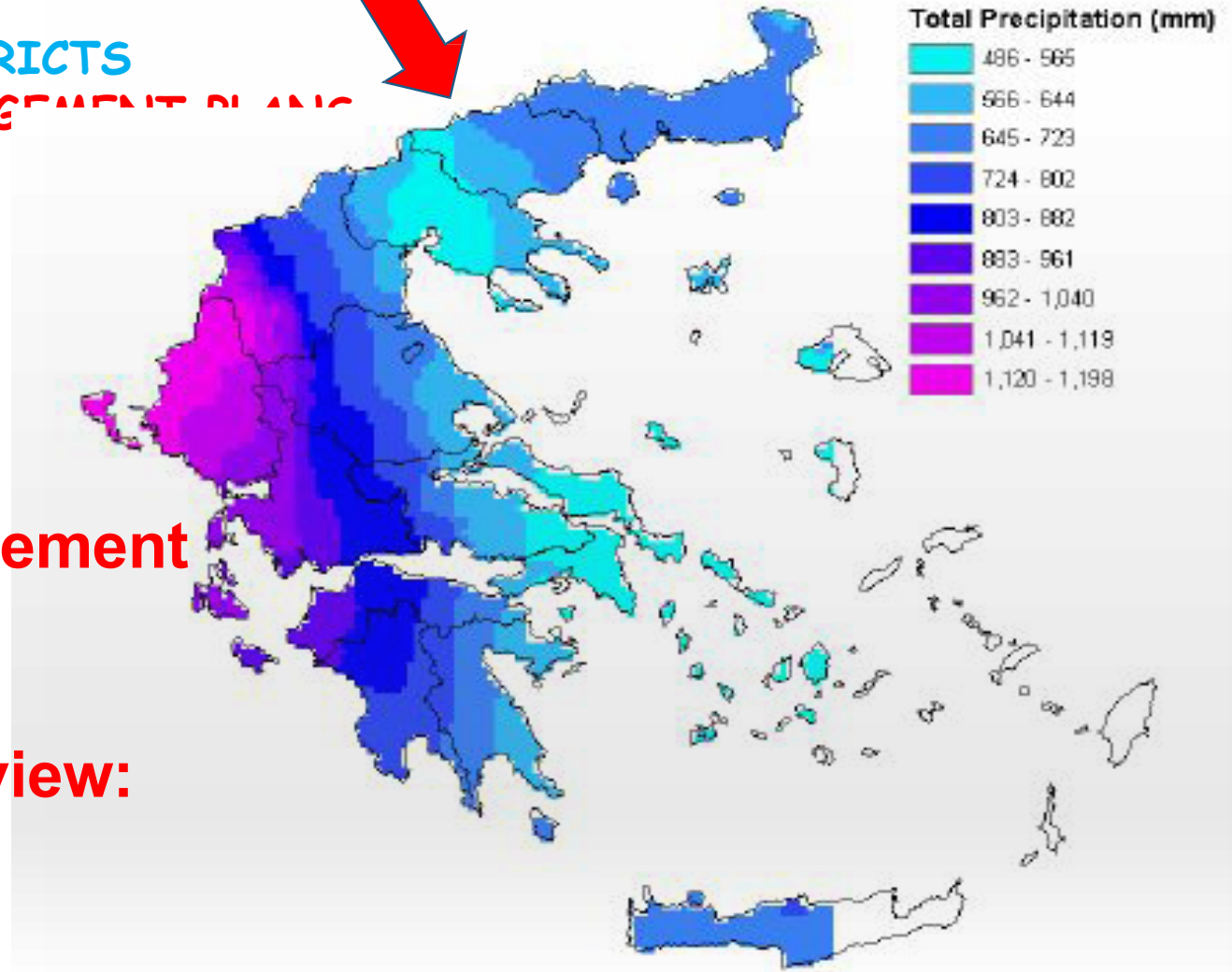
Institutions & management bodies



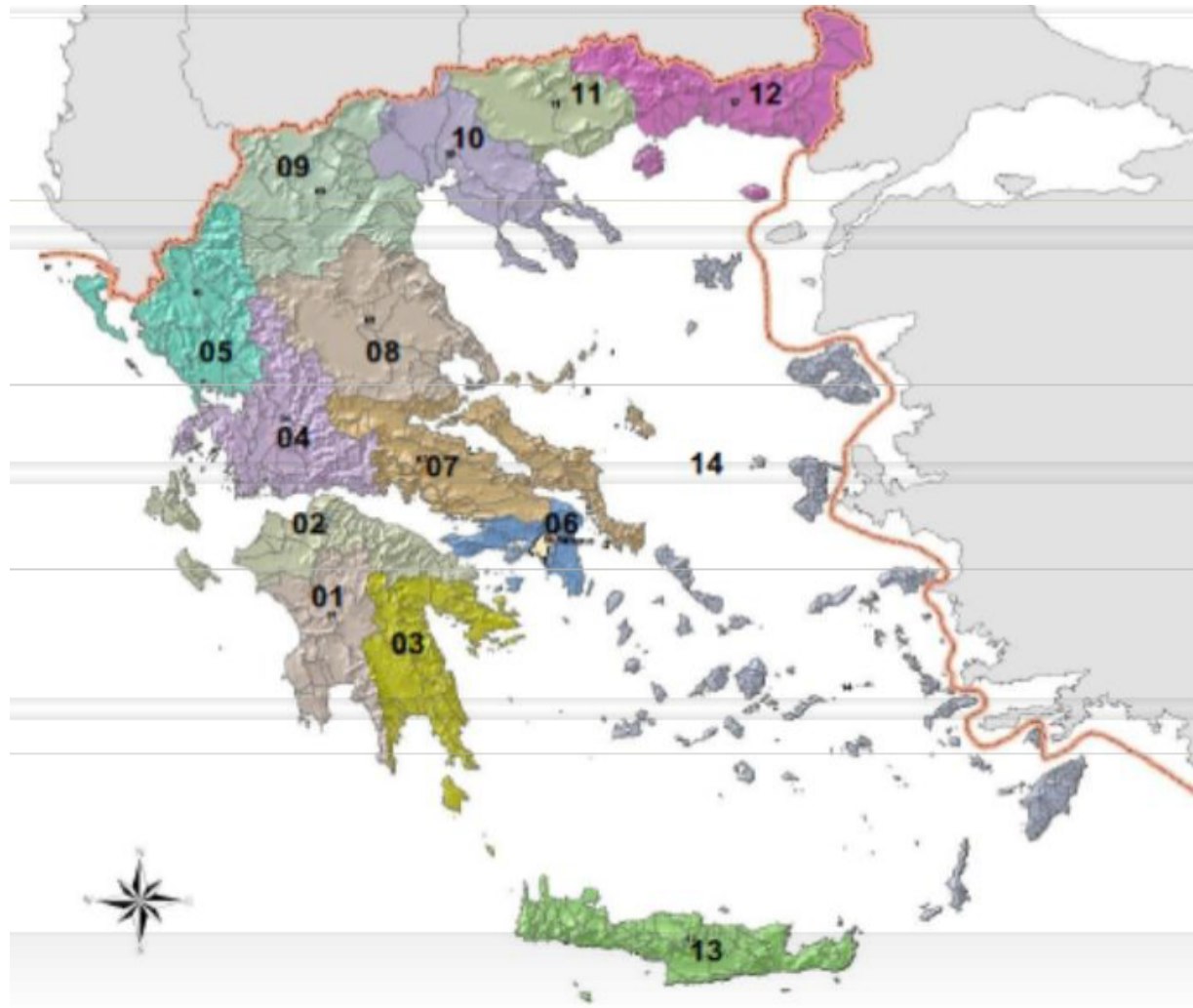
**HIGH HYDROLOGICAL AND
HYDRO-GEOLOGICAL
VULNERABILITY**

**14 WATER DISTRICTS
14 WATER MANAGEMENT PLANS**

**Water Management
plans:
2003-2015
Under 2nd review:
2015-2021**



14 HYDROLOGICAL DISTRICTS (WATER MANAGEMENT PLANS)





ANATOLIKI
MAKEDONIA



THE EU GROUNDWATER DIRECTIVE

AIM: ACHIEVING THE GOOD QUANTITATIVE & CHEMICAL STATUS

- Define groundwater bodies within river basin districts and analyse pressures and impacts of human activity
- Establish registers of groundwater protected areas
- Establish groundwater monitoring networks
- Include groundwater pressures to the river basin management plan (RBMP)
- Take into account by 2010 the principle of recovery of costs for water services
- Establish by the end of 2009 a program of measures for achieving WFD environmental objectives

CONFLICTS AND CHALLENGES

NEW CONDITIONS IN THE 2000s: RESPONDING TO SOCIAL AND ENVIRONMENTAL SUSTAINABILITY NEEDS IN EUROPE (FROM CLASSICAL TECHNICO-ECONOMIC APPROACHES)

- Internationalization of water markets have introduced the private sector
- Multiplication of power centers and decision-making scales in the water sector
- Increasing concern for the environment
- Substitute political action with stakeholders participation. Create Social Capital
- 3 main conflictual issues: 1) full cost recovery, 2) hazardous substances and 3) the implementation timeline
- Actors: NGOs, Local Authorities, Consumers, Industry, Agriculture
- Governance Conflicts: Local Authorities-River Basin Authorities, zero emission of priority hazardous substances

THE 2014 CALIFORNIA'S SGMA

AIM: to achieve groundwater sustainability within 20 years of implementation

- Establishing local Groundwater Sustainability Agencies (GSAs) for developing Groundwater Sustainability Plans (GSPs)
- Moving from “safe yield” to “sustainable yield”
- Understanding of the groundwater basin, basin boundaries and flows across
- Including comprehensive groundwater monitoring networks
- Modeling groundwater including changing land use, climate and hydrologic conditions
- Creating a Collaborative Planning Process facilitating local disputes and conflicts

CONFLICTS AND CHALLENGES

DROUGHT CONDITIONS IN THE 2000s: FOUR YEARS OF SEVERE DROUGHT IN CALIFORNIA CREATED CHRONIC DECLINE IN GROUNDWATER LEVELS LEADING TO THE 2014 SGMA GOVERNANCE

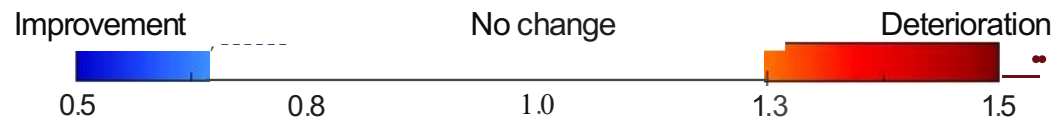
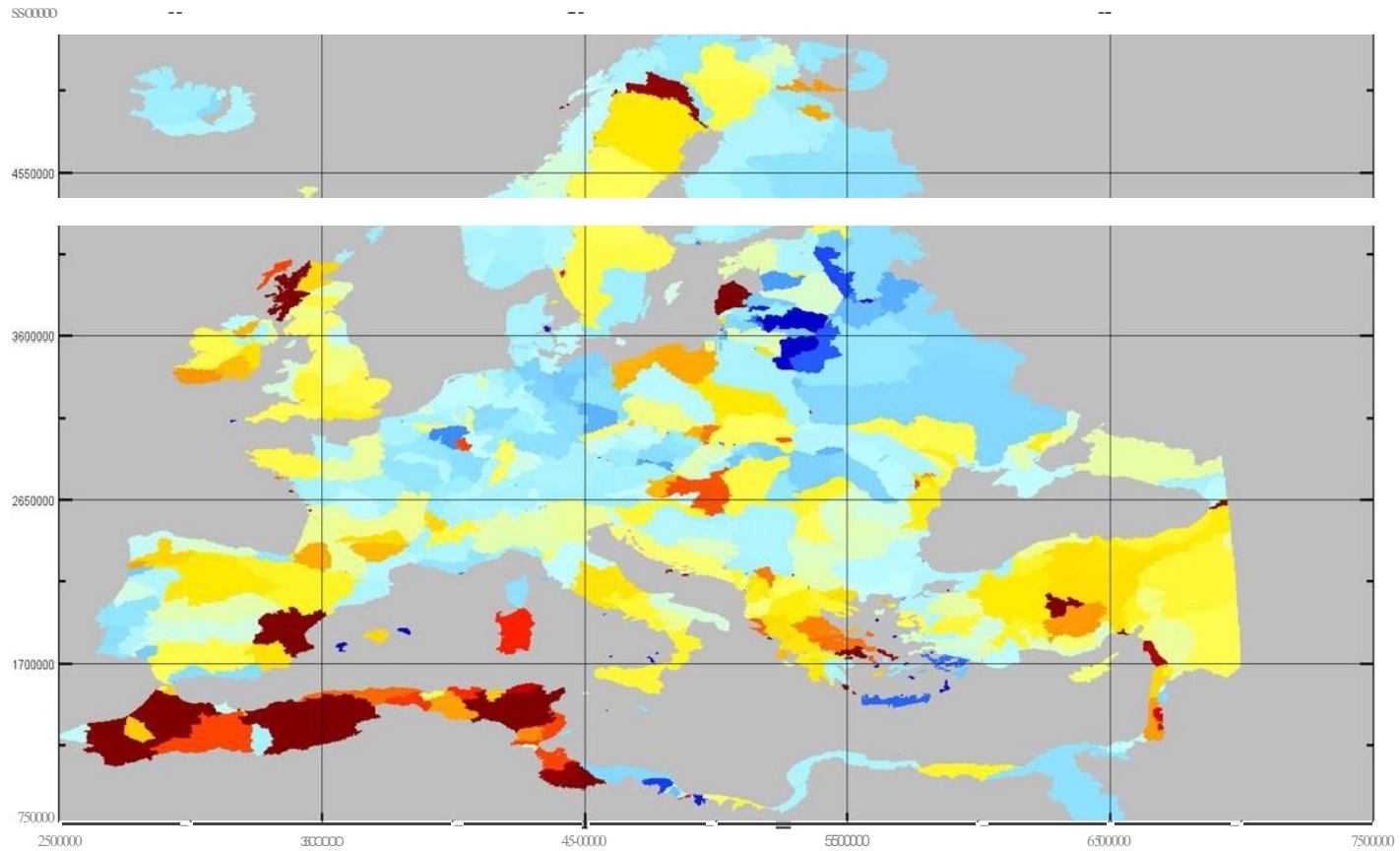
- long-term reduction of groundwater levels in many parts of the state
- Increasing energy cost due to excessive groundwater overdraft
- Increasing concern for the environment: water quality deterioration
- Drastic reduction of base flow to streams and rivers and loss of groundwater-dependent ecosystems
- Main conflictual issues: 1) trans-state aquifer disputes, 2) private wells and fragmented groundwater management, 3) property rights and 4) legal uncertainty
- Actors: NGOs, State Authorities, Consumers, Industry, Agriculture
- Governance Conflicts: data & information dissemination, models, funding and support

THE 2019 EU/WFD FITNESS CHECK

Aim	<p>The Fitness Check of the EU Water Legislation is a policy evaluation of its effectiveness, coherence, efficiency, relevance and EU added value.</p> <p>The target is to improve the EU Water legislation, mainly the WFD by making it more responsive to current and future challenges</p>
Effectiveness	<p>The WF and the UWWT Directives have not fully achieved their objectives, i.e. getting the "good" environmental status of water bodies at the River Basin Scale. Substantial progress has been made but their implementation is not fully satisfactory yet.</p> <p>Both Directives very water centric (which is logical) but this fails to address in a coordinated way users of different water sectors and the effective wastewater re-use in a circular economy.</p>
Coherence	<p>There is no conflict between the pieces of legislation themselves but <i>there are gaps</i>, and more is needed to bridge these gaps and having a common approach by all MS. The <i>Water - Energy - Food Nexus</i> – is a useful approach for integrated policy, but it is not clear how to get a win-win result.</p>

<p>Efficiency for Implementing the EU Water Legislation</p>	<p>There are many ways for assessing costs and benefits in both Directives if externalities are to be taken into consideration. For the <i>benefits it is not only about marketing</i>, as the role of ecosystems and their intrinsic value may be very high.</p>
	<p>The WFD focuses on technical aspects. There are many actors that are involved without technical knowledge and understanding. <i>If these people are not effectively involved, this fails to capture</i> some important aspects of the WFD implementation</p>
<p>Challenges in Transboundary cooperation</p>	<p>More efforts are necessary for a better collaboration between Member States sharing transboundary waters. There is a high heterogeneity of situations throughout Europe but not enough sharing of good practices and lessons learnt.</p> <p>There is limited success from transboundary cooperation. Alternatively, there is not a 'model' of European water governance, and there is no mechanisms to compare approaches to governance from different Member States.</p> <p>Danube and Rhine River Management Committees are good examples, but these existed before the WFD.</p> <p>Finally, there is need to enforce transboundary cooperation beyond the EU-MS. For example, in the Balkans, more than 80% of groundwater are shared in between Serbia, Albania, Romania, Greece, Bulgaria etc. Some of these are not actually MS but they are interested in applying the WFD principles.</p>
<p>EU added value</p>	<p>Water is not the priority of all MS and without the WFD, the results would not have been reached within the same timeframe.</p> <p>The integrated management of river basins and ecosystems is important and can see benefits from this approach.</p>

Change of Water Exploitation Index (WEI+) under 4 planned measures, under 2 degree climate



CONCLUSIONS

1. "Good" Hydro-Governance (HG) for sustainability
2. Conditions for Change & How to Achieve HG
3. Water Diplomacy & Conflict Resolution
4. Social Capital and Step-by-Step Approach
5. Lessons Learned: Comparing EU, California HG

At Interstate Level



CAPACITY BUILDING



JOINT MANAGEMENT/RBO



HYDRO-DIPLOMACY/COOPERATION

At Interstate Level



Science

- Surface water
- Groundwater



Law/Policy

- Decision making
- Consultation



Socio- economics

- Participation
- Funding



Scaling

- National
- Regional
- Local

Social Drivers at State Level

Ganoulis & Fried, 2018

**COOPERATION FOR WATER:
A VERY OLD STORY**



**GOOD GOVERNANCE
BASED ON
SCIENCE/KNOWLEDGE**

Science= episteme= epi (under) + standing= understanding

Technology= τεχνη +
λογος=

art + knowledge =
beauty + science



thank you
for
your attention!

Ευχαριστώ!

