

FIRST REWARD WORKSHOP
THE FUTURE OF GROUND WATER IN THE MENA REGION
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**WISE GROUNDWATER MANAGEMENT:
SYSTEMIC APPROACHES TO PLANNING AND
DECISION-MAKING IN IWRM**

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1.- INTRODUCTION

- **GROUNDWATER IS STILL THE “CINDERELLA” AMONG MOST HIGH-LEVEL WATER DECISION-MAKERS.**
- **HOWEVER, ALTHOUGH IT IS STILL OUT OF SIGHT IS BECOMING LESS OUT OF MIND.**
- **SOME CURRENT WATER ISSUES MAY MEAN A GREAT STEP FORWARD FOR A BETTER USE AND MANAGEMENT OF GROUNDWATER.**

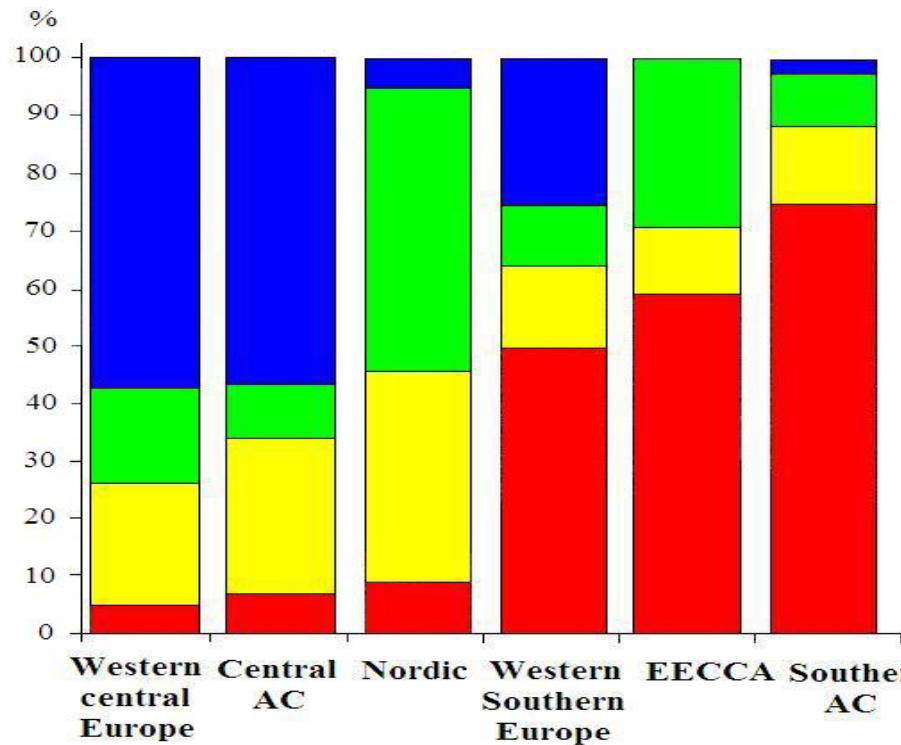
2. AIM

- 1. PRESENT THE INTENSIVE GROUNDWATER USE SILENT (QUIET) REVOLUTION: FACTS, DRIVERS, PROS, CONS AND TRENDS.**
- 2. SHOW THE RELEVANCE OF GROUNDWATER IN REVISITING THE PARADIGM OF WATER SCARCITY IN RELATION TO THE WATER FOOTPRINT.**
- 3. DEBATE THE MANY DIMENSIONS OF GW SUSTAINABILITY.**
- 4. MENTION THE ROLE OF GW VS GLOBAL/CLIMATE CHANGE.**
- 5. GW AS A MEAN TO ACHIEVE THE MDGs.**
- 6. SPECIAL ETHICAL ISSUES IN GW**
- 7. INSTITUTIONS FOR GW GOVERNANCE.**

3.- THE INTENSIVE GROUNDWATER USE **SILENT REVOLUTION (I): FACTS**

- **PERFORMED BY MILLIONS OF FARMERS IN ARID AND SEMIARID REGIONS.**
- **WITH SCARCE PLANNING AND CONTROL BY THE CONVENTIONAL WATER AUTHORITIES, MAINLY CONCERNED WITH SURFACE WATER SYSTEMS.**
- **FIFTY CENTURIES VS FIFTY YEARS.**

3. THE INTENSIVE GROUNDWATER USE SILENT REVOLUTION (II) CURRENT USES



Western Central:

Denmark, Germany, Belgium, U.K., Ireland, Austria, Luxembourg, Switzerland, The Netherlands, Liechtenstein.

Central accession countries:

Poland, Czech Republic, Estonia, Lithuania, Latvia, Romania, Slovakia, Hungary, Slovenia, Bulgaria.

Nordic:

Finland, Sweden, Norway, Iceland.

Western Southern:

Spain, France, Greece, Italy, Andorra, Portugal, San Marino, Monaco.

EECCA:

Kazakhstan, Turkmenistan, Tajikistan, Kirgystan, Ukraine, Russian Federation, Belarus, Uzbekistan, Republic of Moldova, Armenia, Azerbaijan, Georgia.

Southern accession countries:

Cyprus, Malta, Turkey.

■ Agriculture
 ■ Urban
 ■ Industry
 ■ Energy

Note: Industry in EECCA may include water use for cooling.

Sources: Eurostat new Cronos, EEA questionnaire (2002); Aquastat (FAO), 2002 for EECCA countries.

3.- THE INTENSIVE GROUNDWATER USE SILENT REVOLUTION
(III) ECONOMIC AND SOCIAL VALUE
THE ANDALUSIAN SAMPLE

Comparison of surface/groundwater irrigation in Andalusia, Spain.

INDICATOR	SURFACE WATER	GROUNDWATER	TOTAL
Irrigated surface (10 ³ ha)	600	210	810
Total production (10 ⁶ €)	1,950	1,800	3,750
Average consumption at origin (m ³ /ha/year)	7,400	4,000	6,500
Water productivity (€/ m ³)	0.42	2.16	0.72
Employment generated (EAJ/10 ⁶ m ³)	17	58	25

EAJ: Equivalent annual job

Source: Llamas et al. (2001). Data from Corominas (1999) and MIMAM (2000).

3.- THE INTENSIVE GROUNDWATER USE SILENT REVOLUTION(IV) TRENDS



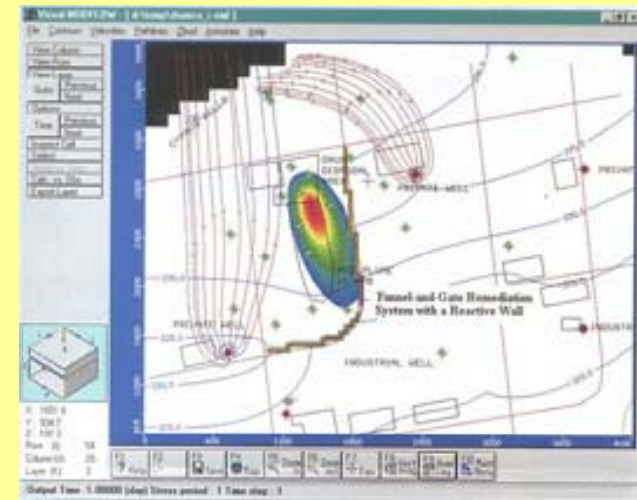
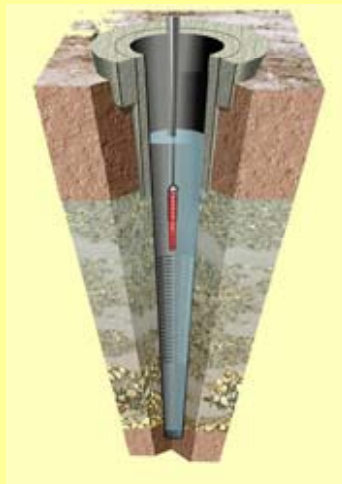
From the dug-well
to the deep borehole.



From the water wheel
to the pump.

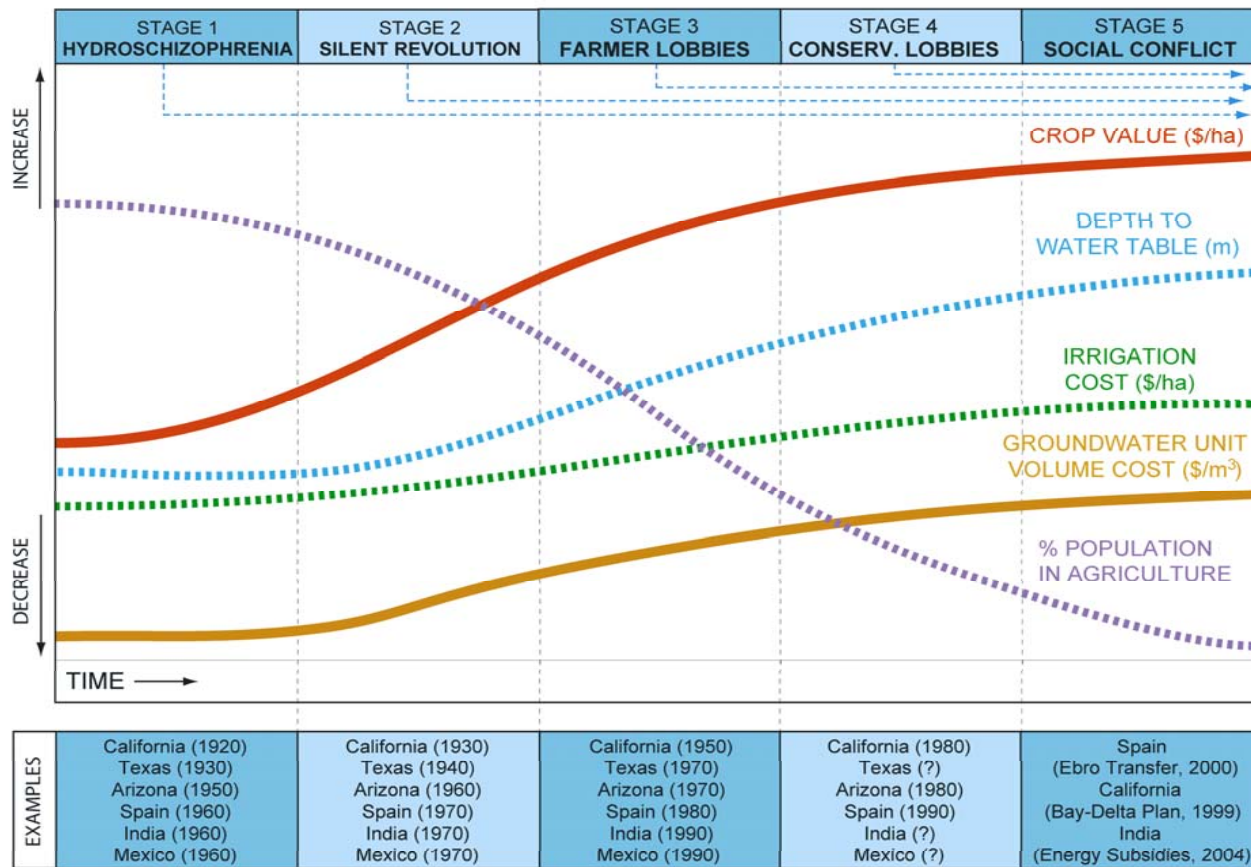


From the water-witches
to Hydrogeology.



3.- THE INTENSIVE GROUNDWATER USE SILENT REVOLUTION (V) TRENDS BIS

ROUGH (GROUND)WATER POLICY TRENDS IN ARID AND SEMI-ARID COUNTRIES



4.- WATER FOOTPRINT, WATER SCARCITY, AND GROUNDWATER (I)

- **RECENT ANALYSES ABOUT VIRTUAL WATER TRADE AND WATER FOOTPRINT ARE CHALLENGING THE PERVASIVE PARADIGMS ON WATER AND FOOD SECURITY.**
- **MOST BLUE AND GREEN WATER (80-90%) IS USED FOR FOOD PRODUCTION.**
- **THE COUNTRIES WITH LESS WATER RESOURCES MAY IMPORT (BUY) STAPLE FOODS FROM COUNTRIES WITH PLENTY OF WATER (USUALLY GREEN WATER).**

4.- WATER FOOTPRINT, WATER SCARCITY, AND GROUNDWATER (II)

- **WATER POOR COUNTRIES CAN THEN USE THEIR SCARCE WATER RESOURCES FOR MORE LUCRATIVE ACTIVITIES (TOURISM, URBAN WATER SUPPLY, INDUSTRY, AND OTHERS).**
- **IN THESE REGIONS, MOST CASH CROPS ARE PRODUCED WITH GROUNDWATER IRRIGATION BECAUSE AQUIFERS ARE MORE RESILIENT TO DRY SPELLS.**
- **RAIN FED AGRICULTURE AND ALSO SURFACE WATER SYSTEMS DEPEND TOO MUCH ON CLIMATE VARIABILITY.**

4.- WATER FOOTPRINT, WATER SCARCITY, AND GROUNDWATER (III)

- **MORE CROPS AND JOBS PER DROP (ADEQUATE MOTTO FOR DEVELOPING COUNTRIES).**
- **MORE CASH AND NATURE PER DROP (ADEQUATE MOTTO FOR INDUSTRIALIZED COUNTRIES).**
- **IN THIS CASE THE ROLE OF GW IS RELEVANT.**

5.- THE MANY DIMENSIONS OF GROUNDWATER SUSTAINABILITY

- **IT SEEMS RELEVANT TO REVISIT THE SUSTAINABILITY CONCEPT APPLIED TO GROUNDWATER.**
- **IN SOME CASES ITS USE MAY BE MEANINGLESS AND MISLEADING.**
- **SEE THE PROCEEDINGS OF SEVERAL RECENT CONFERENCES (FOR INSTANCE ALICANTE 2006 SYMPOSIUM ORGANIZED BY NGWA AND EASAC).**

6.- GROUNDWATER AND GLOBAL/CLIMATE CHANGE (I)

- **GLOBALY CURRENTLY EVAPORATION FROM SURFACE WATER RESERVOIRS IS IN THE ORDER OF 50% OF GROUNDWATER ABSTRACTION. THIS FACT IS ALMOST NEVER CONSIDERED.**
- **IF IPCC PREDICTIONS ARE CONFIRMED THIS EVAPORATION WILL INCREASE.**
- **EVAPORATION FROM AQUIFERS (GROUNDWATER RESERVOIRS) IS USUALLY NEGLIGIBLE.**

6.- GROUNDWATER AND GLOBAL/CLIMATE CHANGE (II)

- **MOREOVER, IF DRY SPELLS ARE GOING TO INCREASE, THE ROLE OF AQUIFERS TO MITIGATE DROUGHTS WILL BECOME CRUCIAL IN MANY REGIONS.**
- **AS A MATTER OF FACT, CURRENTLY AQUIFERS ARE NOW AND IN MANY PLACES THE MAIN METHOD TO MITIGATE DROUGHTS AND TO GET WATER SECURITY.**
- **REMEMBER THAT MOST IRRIGATED CASH CROPS USE GROUNDWATER.**

7.- GROUNDWATER ETHICS AND THE MILLENNIUM DEVELOPMENT GOALS (I)

- **TWO MDGs ARE STRONGLY RELATED TO GROUNDWATER:**

A) TO HALVE BY 2015 THE PROPORTION OF HUMAN WITHOUT AFFORDABLE DRINKING WATER (ABOUT 1 BILLION PERSONS).

B) TO HALVE BY 2015 THE PROPORTION OF MALNOURISHED HUMANS (ABOUT 800 MILLION PERSONS).

- **MANY CONSIDER THAT THESE RATHER MODEST GOALS WILL NOT BE ACHIEVED (STOCKHOLM SEMINAR AUGUST 2007).**

7.- GROUNDWATER ETHICS AND THE MILLENNIUM DEVELOPMENT GOALS (II)

- **GROUNDWATER DEVELOPMENT IS A MUST TO ACHIEVE THOSE GOALS.**
- **GROUNDWATER DEVELOPMENT IS FASTER, CHEAPER AND LESS PRONE TO CORRUPTION.**
- **FEW DECISION MAKERS OR NGOs CONCERNED WITH THE ISSUE SPEAK ABOUT THE RELEVANT ROLE OF GROUNDWATER.**
- **GROUNDWATER MINING MAY NOT NECESSARILY BE AN UNSUSTAINABLE DEVELOPMENT**

8. INSTITUTIONS FOR GROUNDWATER MANAGEMENT (I)

- **AQUIFERS ARE A CLASSICAL EXAMPLE OF COMMON POOL RESOURCE.**
- **IN CONTRAST WITH SURFACE WATER IRRIGATION SYSTEMS WHERE A “LORD OF THE GATE” EXIST, IN AQUIFERS DO USUALLY EXIST THOUSANDS OF “LORDS OF THEIR OWN WATER WELL”**
- **EXPERIENCE SEEMS TO SHOW THAT IN MOST ARID AND SEMIARID REGIONS WHERE INTENSIVE USE OF GROUNDWATER ONLY BEGAN ABOUT HALF A CENTURY AGO, THE GOVERNANCE (PLANNING AND CONTROL) OF THIS RESOURCE IS RATHER WEAK.**

8. INSTITUTIONS FOR GROUNDWATER MANAGEMENT (II)

- **IT SEEMS RELEVANT TO DESIGN BOTTOM-UP GROUNDWATER MANAGEMENT INSTITUTIONS WHICH TAKE INTO ACCOUNT NOT ONLY HYDROLOGICAL FACTORS BUT ALSO THE SOCIO-ECONOMIC CONTEXT.**
- **A STRONG STAKEHOLDERS PARTICIPATION IS USUALLY NEEDED.**
- **THIS PARTICIPATION REQUIRE A PREVIOUS GREAT EFFORT IN EDUCATION AND IN TRANSPARENCY.**

9.- CONCLUDING REMARKS (I)

- **THE CURRENT CIRCUMSTANCES MAY FACILITATE A BETTER AWARENESS AMONG POLITICIANS AND HIGH-LEVEL WATER DECISION-MAKERS ABOUT THE RELEVANCE OF GROUNDWATER RESOURCES FOR SOCIETY.**
- **GROUNDWATER IS A CRUCIAL RESOURCE TO ACHIEVE THE PARAGIDMS:**
 - A) **“MORE CROPS AND JOBS PER DROP” IN DEVELOPING COUNTRIES.**
 - AND**
 - B) **“MORE CASH AND NATURE PER DROP” IN INDUSTRIALIZED COUNTRIES.**

9.- CONCLUDING REMARKS (II)

- **GROUNDWATER USER ASSOCIATIONS SEEM TO BE THE BEST INSTITUTIONS TO ACHIEVE GOOD GOVERNANCE.**
- **THE SET UP OF THESE INSTITUTIONS CANNOT BE ACHIEVED BY A “COMMAND AND CONTROL” APPROACH. IT IS NECESSARY A BOTTOM-UP APPROACH WITH A PREVIOUS EMPHASIS IN TRANSPARENCY AND STAKEHOLDERS EDUCATION.**

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See Llamas CV in http://rac.es/2/2_ficha.asp?id=119&idN3=6&idN4=40