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Workshop 7 – Sustainable Groundwater Management in Urban and Rural Areas
Session B – Rural Areas

INVITED PAPER

INTENSIVE GROUNDWATER USE: A SILENT REVOLUTION THAT CANNOT BE IGNORED

M.R. Llamas
Royal Academy of Sciences, Spain. mrllamas@geo.ucm.es

P. Martínez-Santos
Complutense University of Madrid, Spain. pemartin@geo.ucm.es

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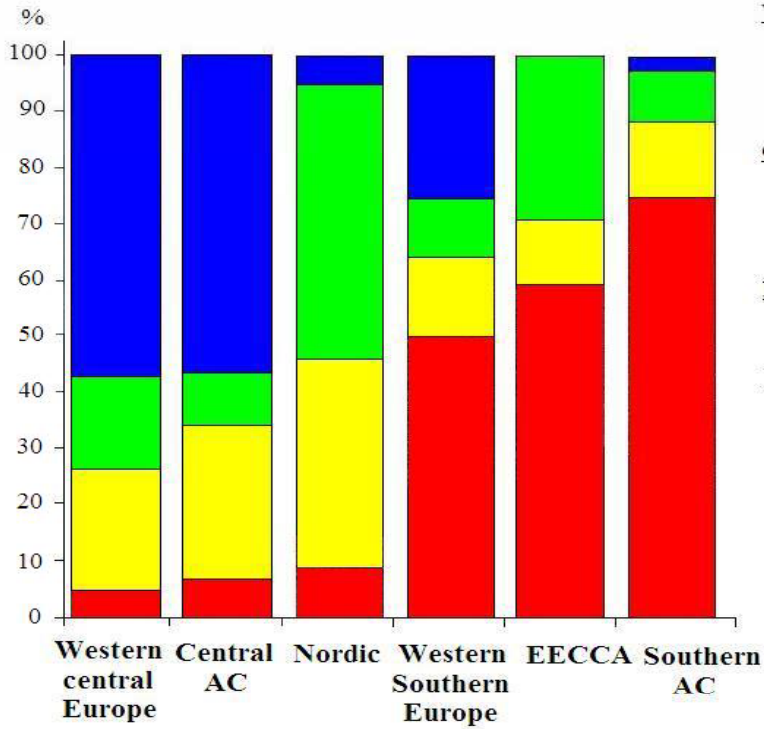
1. INTRODUCTION (I)

- This is the first time groundwater deserves a double Workshop in the World Water Week.
- Intensive groundwater use is a new phenomenon.
- Should water crisis occur, it will be felt mostly in irrigation in arid and semi-arid countries.
  - Though important, urban water supply only amounts to 10% of worldwide consumptive use.

1. INTRODUCTION (II)



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, Swden, Norway, Iceland.

Western Southern:
Spain, France, Greece, Italy, Andorra, Portugal, San Marino, Monaco.

EECCA:
Kazakhstan, Turkmenistan, Tajikistan, Kirgyzstan, Ukraine, Russian Federation, Belarous, Uzbekistan, Republic of Moldova, Armenia, Azerbaijan, Georgia.

Southern accession countries:
Cyprus, Malta, Turkey.

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

Sectorial uses of water in Europe (EEA, 2003)

3. WHY “SILENT REVOLUTION”?

- It has been carried out by millions of modest individual farmers.
- Water decision makers have seldom paid attention to this phenomenon.
- It has produced great socio-economic benefits, as well as some problems (mainly ecological).
- Documented problems to date are often irrelevant due to the enormous groundwater storage capacity of most aquifers.

4. CAUSES OF SILENT REVOLUTION (I)

- Wide availability of modern well drilling technologies.
- Invention and commercialization of the submersible pump.
- Hydrogeology has become a solid body of science.

HOWEVER, THE SILENT REVOLUTION IS
MARKET DRIVEN

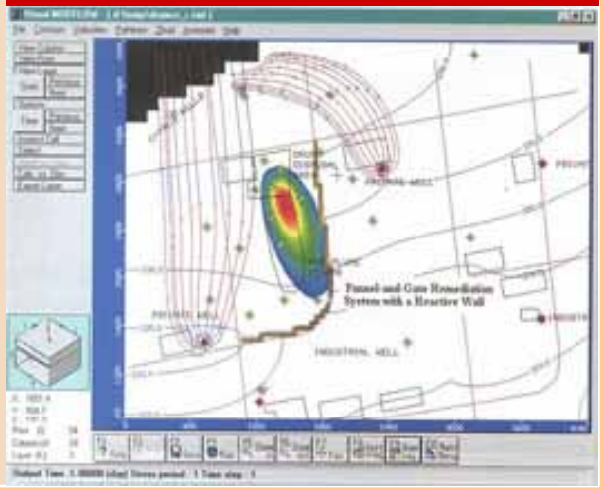
The cost of abstracting groundwater is only a small fraction of the guaranteed crop value.

4. CAUSES OF SILENT REVOLUTION (II)

From the dug-well
to the deep borehole.

From the water wheel
to the pump.

From the water-witches
to Hydrogeology.



5. BENEFITS OF SILENT REVOLUTION (III)

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).

7. MOST PERVASIVE HYDROMYTHS

- Paraphrasing Hamlet:

  “FRAILTY, FRAILTY, THY NAME IS GROUNDWATER”

  “Every water well becomes dry or brackish”

- Groundwater development is a “pillar of sand”, prone to collapse:

PLEASE LET US KNOW ABOUT **DOCUMENTED** CASES OF SOCIO-ECONOMIC HAVOC CAUSED BY INTENSIVE GROUNDWATER USE

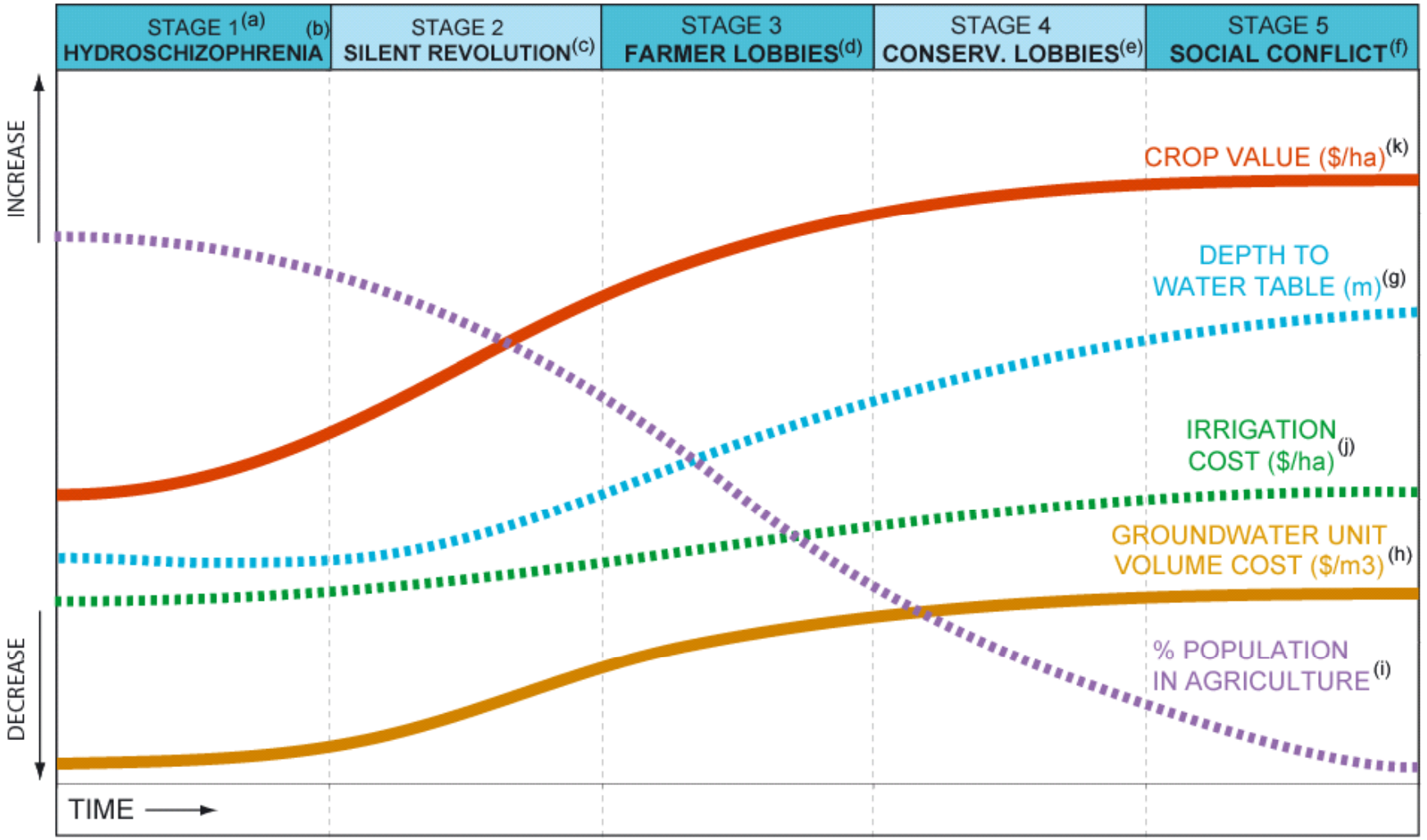
8. ETHICAL ISSUES IN RELATION TO THE SILENT REVOLUTION

- In most cases, there is a blend of:
  - Ignorance: Hidrogeology being a rather “new” science.
  - Arrogance: Professional “clicks”.
  - Institutional inertia.
  - Corruption: the main obstacle to attain adequate water management.

Groundwater development is less prone to corruption:

a) Smaller investment required
b) Shorter implementation time

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



EXAMPLES					
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9. SILENT REVOLUTION AS INVISIBLE DRIVING FORCE IN WATER RESOURCES POLICY (IV)

SARAGOSSA, Oct 2002

BRUSSELS, Sep 2001

VALENCIA, May 2003

CLAMOROUS SOCIAL CONFLICTS IN SPAIN

CREVILLENTE AQUIFER

(an extreme case)

Aquifer settings	90 Km^2 (limestones)
Estimated recharge/abstraction	2/16 Mm^3/year
Initial pumping elevation (1970s)	20-30 m
Current pumping elevation	500 m
Groundwater cost	0.30 €/m^3
Irrigation cost (grapes)	1000€/hectare/year (3,300 m^3/hectare/year)
Crop Value	25,000 → 15,000 €/hectare

10. CONCLUSIONS (I)

- In the last decades, a spectacular increase in groundwater irrigation has taken place in many arid and semi-arid countries.

- This is a Silent Revolution, carried out by millions of farmers, and it is market driven.

10. CONCLUSIONS (II)

- Groundwater irrigation can achieve the “more crops and jobs per drop” motto. A thorough worlwide assessment on the relative socio-economic efficiency of surface/groundwater is required.

- Groundwater is not the panacea. If the current situation of anarchy persists, serious problems may appear.

Storage of most aquifers suggests that these problems should not occur before 2-3 generations.

10. CONCLUSIONS (III)

- Groundwater governance requires a participatory approach of all stakeholders.
- Groundwater development is less prone to corruption that surface water projects.
- Most governments can afford the investment of putting their groundwater resources to good use, as this would only cost a small fraction of the money devoted yearly to hydraulic infrastructures.

A willingness is needed to fight ignorance, negligence, arrogance and corruption.

10. CONCLUSIONS (IV)

THANK YOU
FOR YOUR
ATTENTION

Valencia Water Court