

INTENSIVE GROUNDWATER USE
MISMANAGEMENT RISK
OR
MISSED MANAGEMENT OPPORTUNITY?

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OBSERVATORIO DEL AGUA
WATER OBSERVATORY

Plan

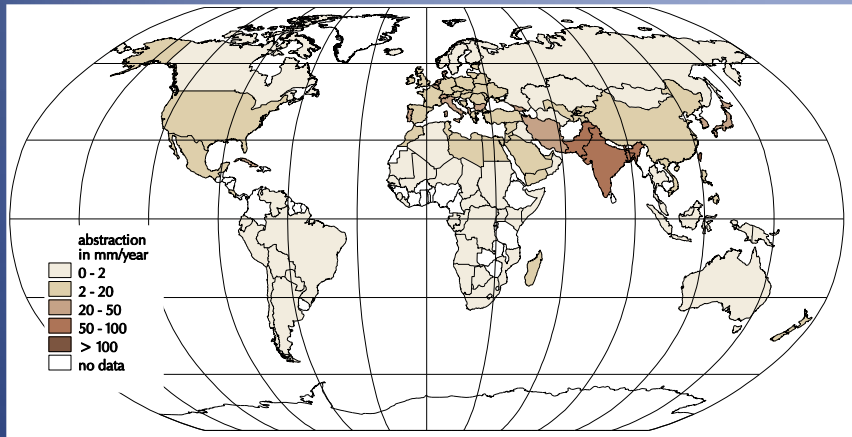
1. Introduction: Intensive groundwater use
2. Mismanagement Risk?
3. Missed Management?: Groundwater Tools and Methods
4. Case study: a tale of 2 Manchas
5. Conclusions

INTRODUCTION

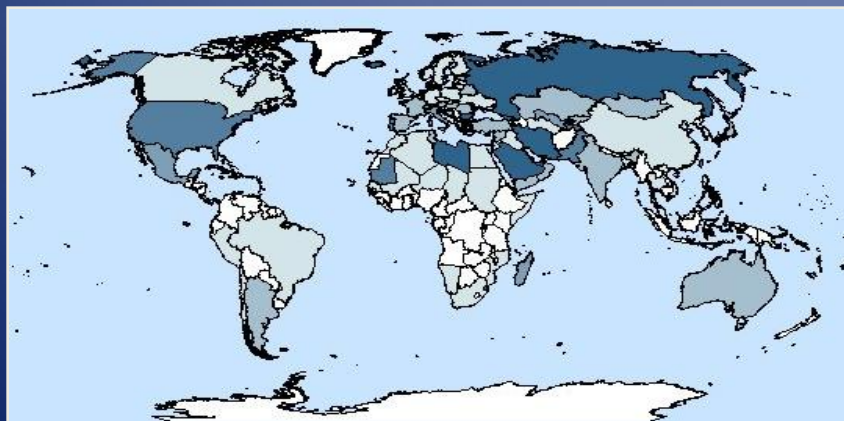
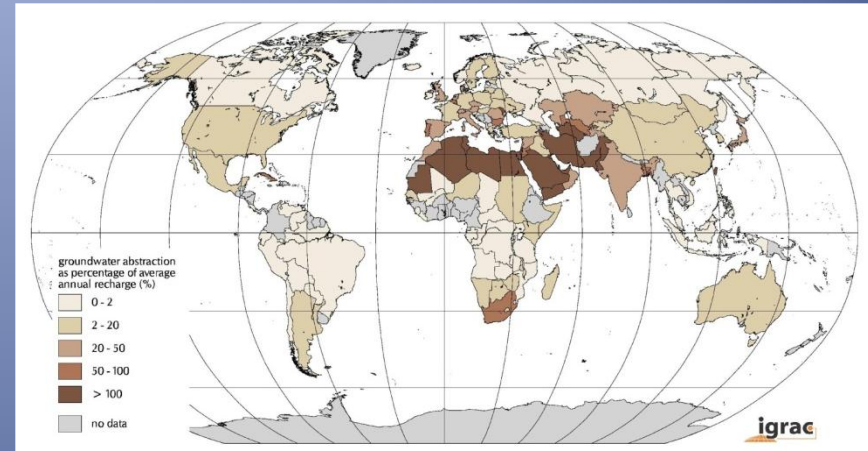
- Political Geography- interested in the spatial analysis of *who gets what* (and why)
- As an Institutionalist: why groundwater?
- *Groundwater has some inherent characteristics that make it fascinating from an institutionalist point of view (i.e. rules and norms both formal and informal on the appropriation of natural resources)*
- Intensive groundwater use: mainly done 'outside' formal rules but is it a *tragedy of the commons*?

INTENSIVE GROUNDWATER USE

Groundwater abstraction intensity, in mm/a averaged over entire countries



Groundwater development indicator: abstraction as a percentage of present-day mean recharge.



Groundwater abstraction per capita
(related to dependency on groundwater)



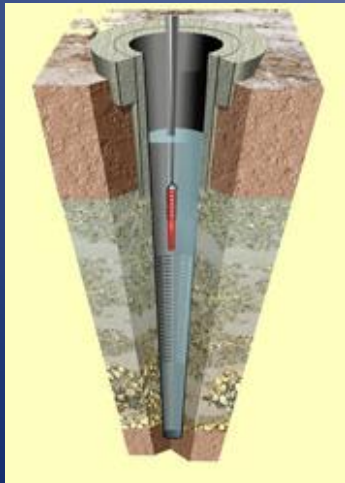
Groundwater STORAGE VOLUME
(Blue = Large and Brown = Small)

SOURCE: van der Gun
2008 from GGIS, 2005

WHY



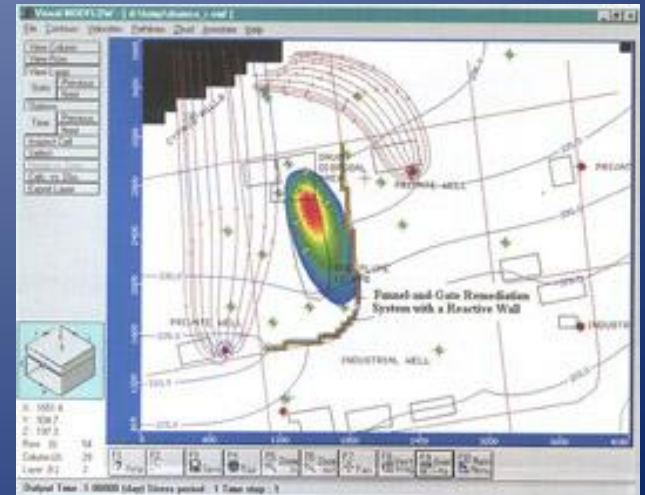
From the dug-well to the deep borehole.



From the water wheel to the pump.



From the water-witches to Hydrogeology.



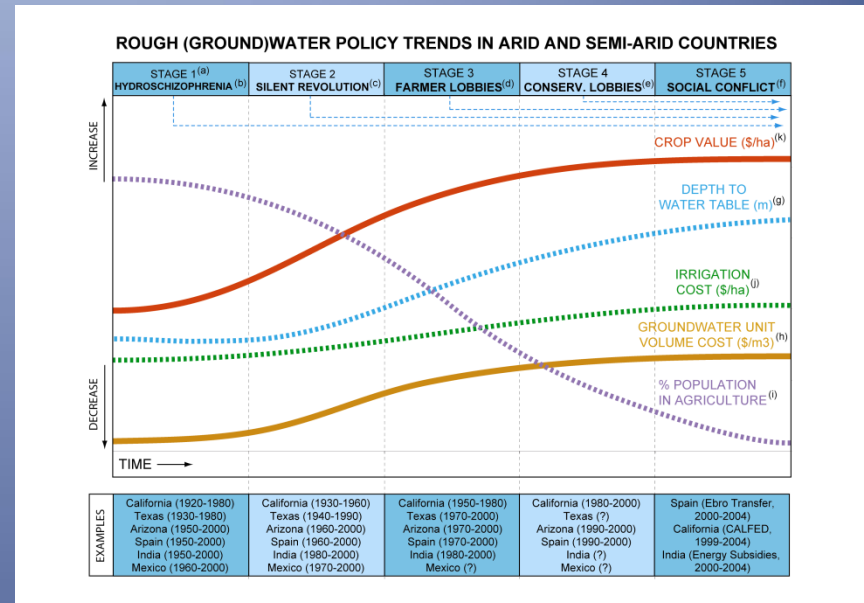
SILENT REVOLUTION OF INTENSIVE GROUNDWATER USE

From 100–150 Mm³ (1950)
to about 950–1,000 Mm³ (2000)
Most extracted natural resource

+

key strategic value

1. for human, food and environmental security
2. resilience
3. autonomy and empowerment
4. transboundary nature
5. drought proofing



= MISMANAGEMENT?

'Joint' use or 'disjointed' use?

BRUSSELS, Sep 2001



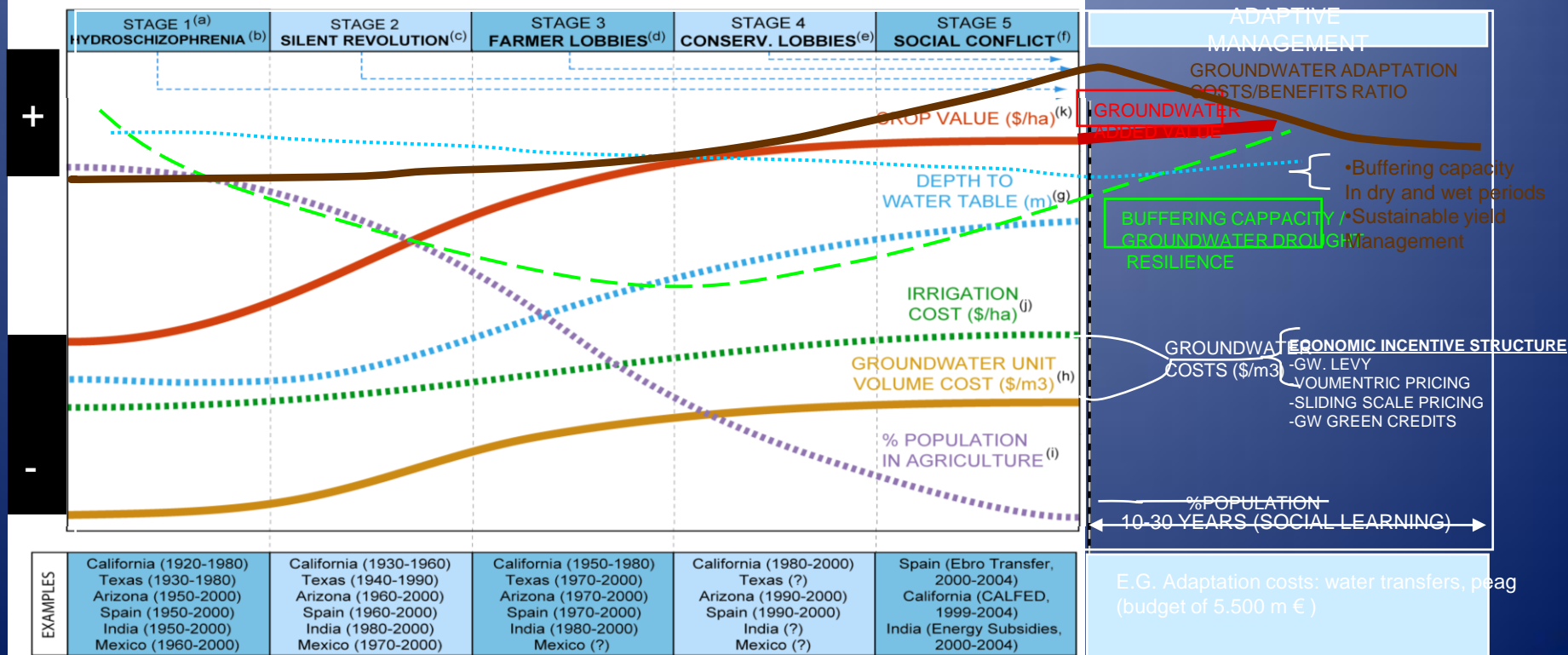
SARAGOSSA, Oct 2002



VALENCIA, May 2003



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



ADAPTIVE MANAGEMENT

GROUNDWATER ADAPTATION COSTS/BENEFITS RATIO

GROUNDWATER RESILIENCE

- Buffering capacity
- In dry and wet periods
- Sustainable yield
- Management

ECONOMIC INCENTIVE STRUCTURE

- GW. LEVY
- VOLUMETRIC PRICING
- SLIDING SCALE PRICING
- GW GREEN CREDITS

10-30 YEARS (SOCIAL LEARNING)

E.G. Adaptation costs: water transfers, peag (budget of 5.500 m €)

MISSED MANAGEMENT?

• PLANNING
INSTRUMENTS,
INFORMATION
AND EDUCATION

• REGULATION

ZONING
EXTENSION PROGRAMMES
AWARENESS CAMPAIGNS
NAME AND SHAME
PARTICIPATORY
MONITORING

LIMIT PUMP CAPACITY
WELL SPACING
SAFE YIELD CRITERIA
ABSTRACTION CAPS
METERING
GROUNDWATER RESOURCE
FEE

POLITICAL
WILL
LEADERSHIP
SOCIAL
NORMS

WASTEWATER RE-USE
ARTIFICIAL RECHARGE
IMPROVED IRRIGATION
GIS
JOINT USE

PRICING
SUBSIDIES
WATER MARKETS
(LEASEHOLD AND
FREEHOLD)
COMPENSATION
BANKS
FULL COST RECOVERY

• TECHNOLOGICAL
INSTRUMENTS

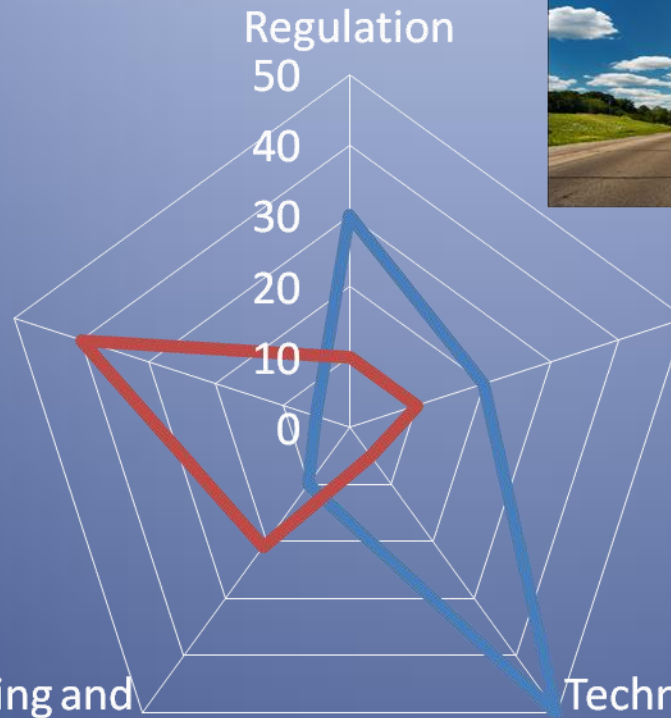
• MARKET BASED
INSTRUMENTS

e.g. Spain OPACITY OF too much INFORMATION



Collective action

Market Based Instruments



— Hard path
— Soft Path

Planning and education

Technology and Data



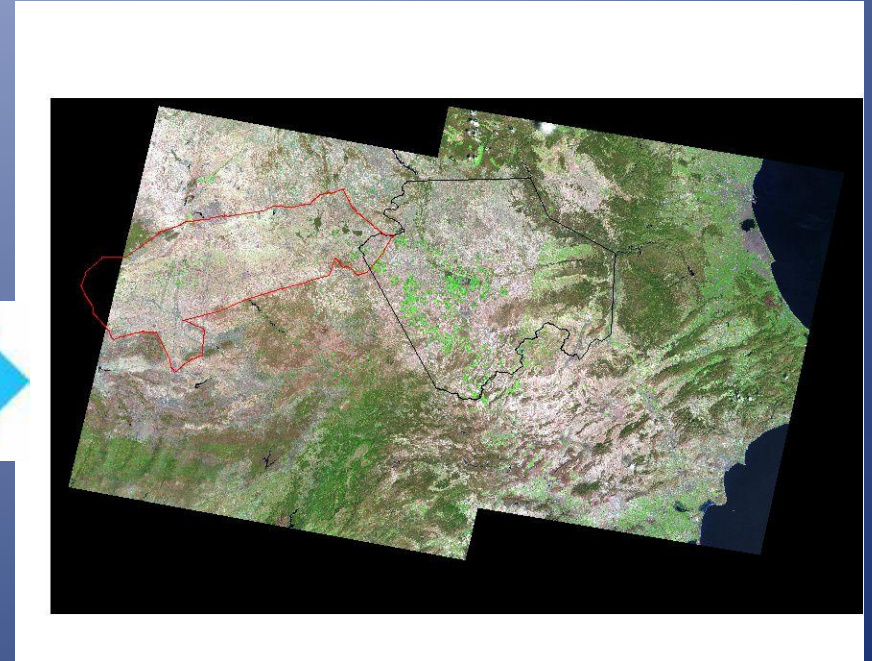
e.g. Bolivia LACK OF INFORMATION

NORMS (FORMAL/INFORMAL) AND INCENTIVES

A Tale of 2 Manchass

Western Mancha 5,000 km²

Eastern Mancha 7,500 km²

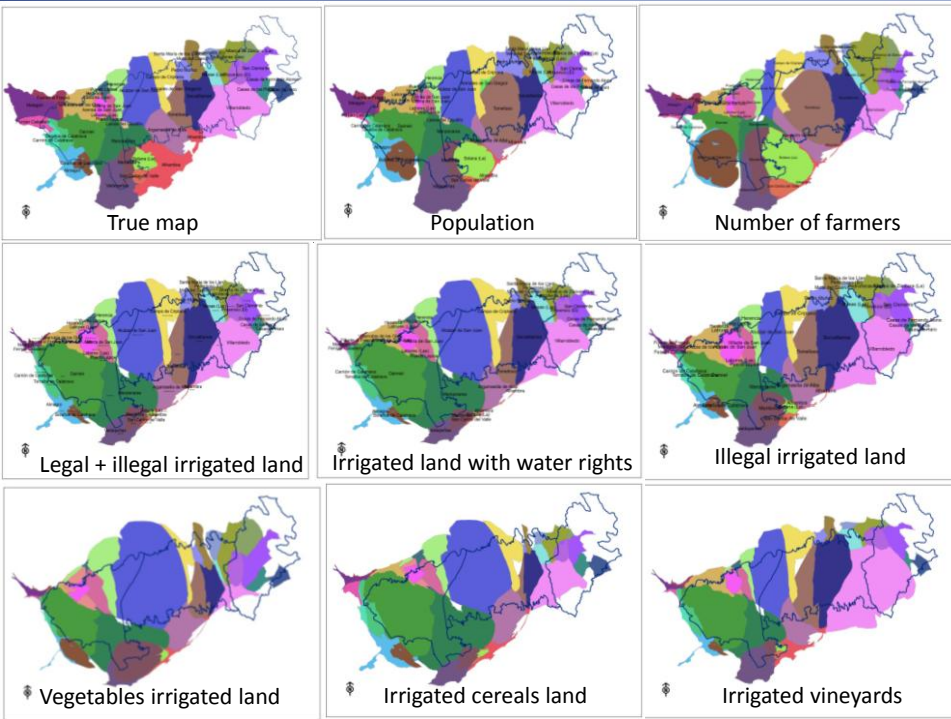


Images kindly provided by Calera and Belmonte



Western Mancha: extrinsic motivation

Tablas de Daimiel = 3bn Euros?



Legally
Irrigated ha

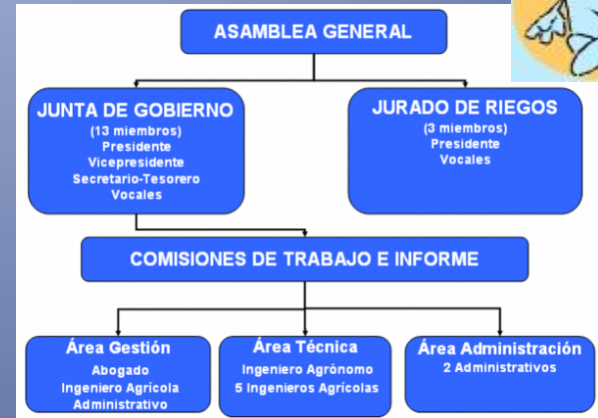


Illegally
irrigated ha



Maps by Pedro Zorrilla

Eastern Mancha: intrinsic motivation



*2nd Generation
Comparative Institutional analysis*



A Storm in a groundwater teacup

Thank You for your attention