

Adaptive Water Management in Brazil and Chile

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Our research framework

- Conflicts over water exacerbated due to CC
- Water scarce regions in LDC: more vulnerable
- And less able to adapt to the negative consequences of water regime changes
- Need of policy adaptations aimed at improving short-term efficiency, equity, and long-term sustainability

Our research framework

- Adaptation is about decision making and choices
 - what choices are available
 - what factors enhance or limit such choices
 - what makes a human/natural systems more adaptable than others
- Adaptive capacity is enhanced by production and transfer of knowledge and technology
- Used the Integrated Water Resource Management framework: use of economic incentives, societal participation, integration across scales, adoption of the basin as the unit of management

Fact sheet: Chile

- Prior 1981 water management centralized. Legislation recognized water rights but subject to considerable degree of regulation
- 1981 Water Code created a water market seeking higher economic efficiency and conservation
- Water market independent of land market
- Private parties can request water rights. Once a source is declared exhausted, rights can be reallocated through public auctions
- Allocation criteria of water rights by the authority establish no preferential uses
- Authority has the legal power to intervene a basin in times of scarcity and reallocate water to ensure supply to urban areas. Water leases exist too.
- Private parties are in charge of water management, including its distribution according to water rights
- Water users have to get organized in Water Users Organizations. Only those who own water rights are members

Fact sheet: Brazil

- Prior to 1990: Centralized, top-down, conflict-ridden approach to water management
- Early 1990s several states enacted specific legislation. In 1997 Federal Govt. followed, and enacted law creating the National Policy of Water Resources and the National System for the Management of Water Resources
- New system included organization of management at the basin level, decentralization of decision-making and resources, a new system to allocate water rights, creation of instances for public participation (river basin, State, and National water councils), implementation of water user permit and charging system at the basin level.
- To date, more than 100 river basin councils exist. They generally have a tri-party composition: i) state agencies (incl. sanitation and water utilities), ii) municipal (and state and federal) governments. iii) civil society: federation of industries, NGOs, universities, etc.
- Council attributions include: establish a water charging system, allocation of revenues, designing and approving water resource management plans, negotiation of conflicts, promotion of water/related activities such as education, training, etc.

Three basins in Chile

- **Limarí:** located in the semiarid region of northern Chile. Most important activity is agriculture. Production of fresh fruit for foreign markets. Three reservoirs regulate water supply.
- **Maule:** located in central Chile, with most successful agriculture. Has large hydropower utility and a reservoir in upper section. Conflicts because of flooding by utility. Large farming companies, engaged in climate-related technology, associated to a University climate center.
- **Itata:** located in central-southern Chile. Traditional agriculture. No reservoir. Farmers not engaged in utilization of technology

Three basins in Brazil

- Jaguaribe: located in Ceará, dry NE. In one of its three sections, Jaguaribe Baixo, climate info is routinely used. Info used to support Council decisions to distribute water among irrigated farmers, large agribusiness, and water utilities. Considered to be one of the most democratic decision-making processes in Brazil
- Paraíba do Sul: SE Brazil, covers country economic epicenter: Sao Paulo, Río de Janeiro, Minas Gerais. Industrial activity is principal. Interbasin water transfers. Pricing of water faced initial resistance
- Itajai: Santa Catarina do Sul, SE Brazil. Subject to disastrous flooding. Main water users are industry and utility companies. Council was pushed by local university. Efforts made to gain access to technical info, as a way to put pressure on the govt. to fulfill its obligations

Use of economic incentives

- Water reform has increased economic efficiency in both countries.
- In Chile, the water market has increased efficiency, but has limited access for those who cannot pay.
- State has used a wide array of economic instruments to increase agricultural output.
- In Brazil, the rationalization of water allocation has improved through negotiated allocation (in NE Brazil at least) and the implementation of water charging in SE. Pricing of water met high resistance initially by industry, but threats of more stringent regulations decreased it. Revenues have been reinvested in the basin (as public works, erosion control project, and wastewater treatment plants).

Participation

- Participation and interaction is higher in Brazil. Its reform was aimed at improving it.
- In Chile, it all depends on how many rights a user holds, and he gains control of the organization. During extreme droughts an “interventor” decides allocation, with no negotiation.
- Poorer, illiterate, smaller members tend not to participate
- This results in better coordination and negotiated decision-making in Brazil, a possible higher adaptive capacity. In Paraiba do Sul, after three dry years, renegotiation was useful to avoid conflict between Sao Paulo and Rio de Janeiro. A “Task Force” was appointed, and for the first time obtained a reduction in the amount of water transferred to Rio.

Democratic use of information

- Techno-scientific Information can play an important role in democratization of decision-making process.
- However, users believe that it is neither widely available nor easily accessible and understandable. And that power is skewed in favor of técnicos (in Brazil) and of the president of the board (in Chile).
- Disparate level of knowledge between técnicos and general members of councils or of Asociaciones de Usuarios is a constraint to democratization → technocratic insulation

Integration at different scales

- Brazil's reform is more conducive to integration because of representation of different societal sectors in Councils. However, little evidence of authority of Council over sectors, government, and private sector.
- In Chile, private networks of water users exchange information with the public agencies. This because agencies play key role in funding irrigation projects and provide effective solutions to common interests.
- The division of basins into sections (Chile) opens possible conflicts within the basin. E.g. Inter-basin water transfers vetoed by one organization

What system is more adaptable?

- In Chile, prevalence of water market is advantageous in the short term, but poses huge challenges under more restrictive future conditions (see newspaper)
- Participation is skewed, favoring those who own more water rights
- Technical knowledge is appropriated by those leading the organizations, or those who can pay, and there is no guarantee it will be transferred to all
- Economic instruments and incentives are widely used: market water pricing, subsidies for irrigation, and more recently, a fine for no-use, but...
- On-going increased demand for water may have devastating consequences shortly

What system is more adaptable?

- There is a higher “potential” for adaptation in Brazil’s case, but...
- Information is not always accessible to all, creating inequalities between technicians and users. These inequalities are perceived as more important than economic and political
- Techno-scientific knowledge is intensively used in at least one studied basin, and has been successfully transferred to many users.

Thanks for attending this
session!!

Basic definitions

- Adaptive capacity: ability of a system to adjust to CC, CVar and extremes, to moderate potential damages, to take advantage of opportunities or to cope with the consequences (IPCC 2001)
- Adaptation: actual actions and responses of a system to exposure (amount of (potential) damage caused to a system by a particular climate-related event or hazard), and can result in an equal or improved situation or worse situation (maladaptation).
- The capacity of a system to absorb disturbances and reorganize while undergoing change and retain function, structure, identity and feedbacks (Folke, Hahn et al. 2005)