Encounters with the Moral Economy of Water

Convergent Evolution and Diffusion in the Andes, in Valencia, and in Other Parts of the World

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Some initial assertions

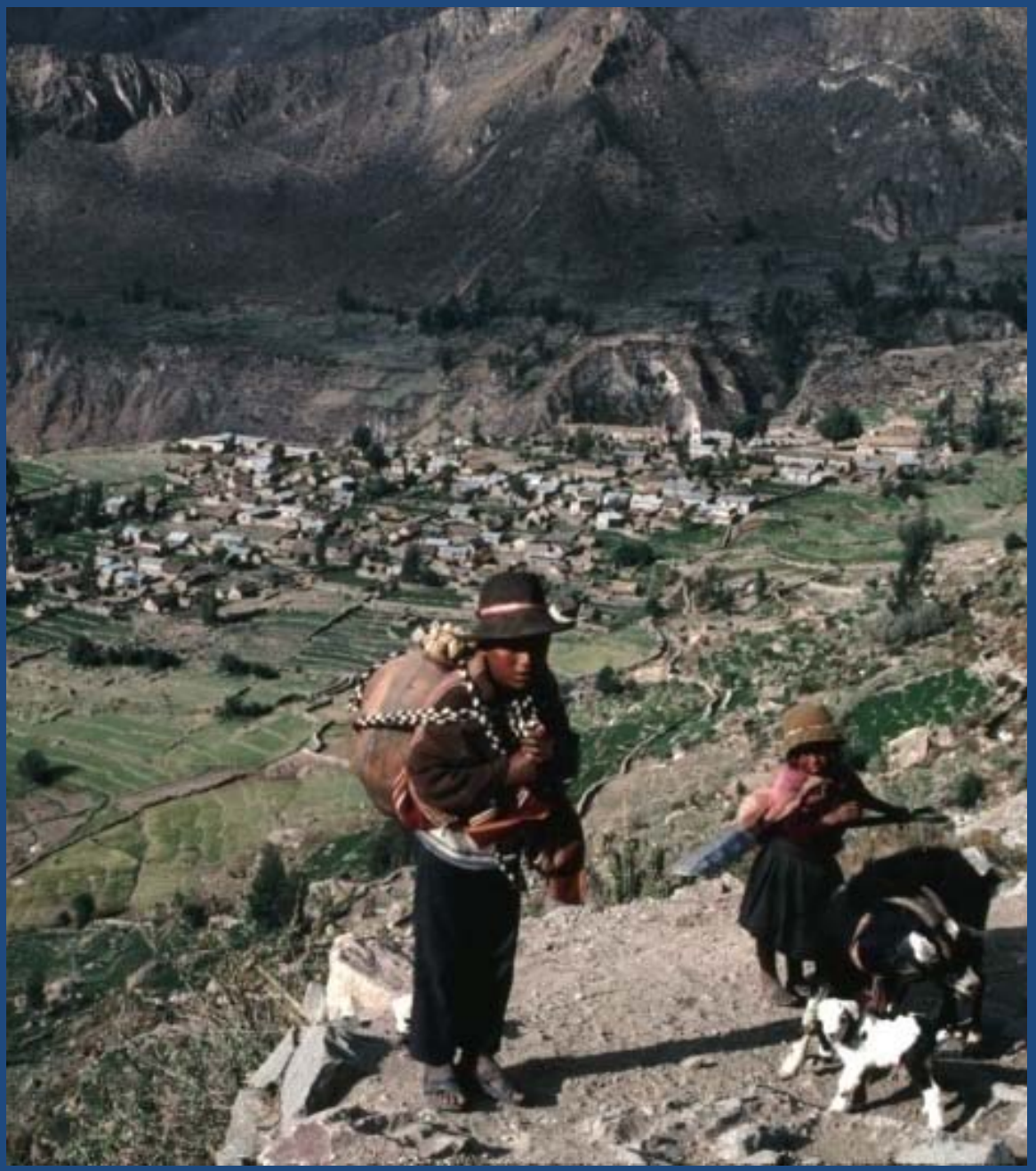
- The task of defending *acequia* systems here in New Mexico, as examples of the efficient and sustainable use of scarce water for irrigation, is somewhat easier than we think
- So is the challenge of making them more resilient in a globalized world characterized by population growth, commercial development, and 'runaway' climate change
- Why? We know a lot more about these systems than we think.
  - Hundreds of successful community-managed irrigation systems are known to exist throughout the world (Maass and Anderson, Coward, Siy, Wade, Lansing, Ostrom, Sengupta, Lam, Ostrom and Gardner, Rivera, Rodriguez, Cox, etc.)
  - The local *acequia* traditions diffused or were transplanted here by Spanish colonists coming to the New World from the Mediterranean coast of Spain, and are ultimately of Islamic origin.
  - But many others evolved independently in different settings – such as the Peruvian Andes -- and are striking examples of *convergent social evolution*: the emergence of highly similar responses to the challenge of sharing a water scarcity
- These are all examples of *a single type of system,* a model for irrigation whose unique dynamics are only now becoming well understood

The Moral Economy of Water

- First encountered in several communities in the Peruvian Andes in the late 1980's and 1990's
  - (Trawick 2001a,b; 2002a,b; 2003a,b, etc.)
- Also in ongoing work in Valencia, Spain, from 2003-2013
  - (Trawick 2008, 2010; Ortega Reig 2009, 2011)
- The same kind of system has emerged *independently* in both settings as a way of adapting to water scarcity and to drought (distinct Andean and Islamic hydraulic traditions)
- It also exists in hundreds of other successful systems, **smallholder systems**, in many other parts *of the world*
- These community-managed systems are *based on the same operating principles*; they conform to *a single model*, and they create ***equity*** (fairness) and ***transparency*** in the same way
- *They are highly efficient, sustainable and resilient, especially when seen from a social, rather than merely a technical and agronomic, point-of-view*

Huaynacotas, Peru

- a small-scale system (320 ha.) operated by a single peasant community
- a smallholder community but stratified (1-3 ha.)
- production mainly for subsistence
- households have highly similar water needs
- One of several communities like it in the same valley and elsewhere



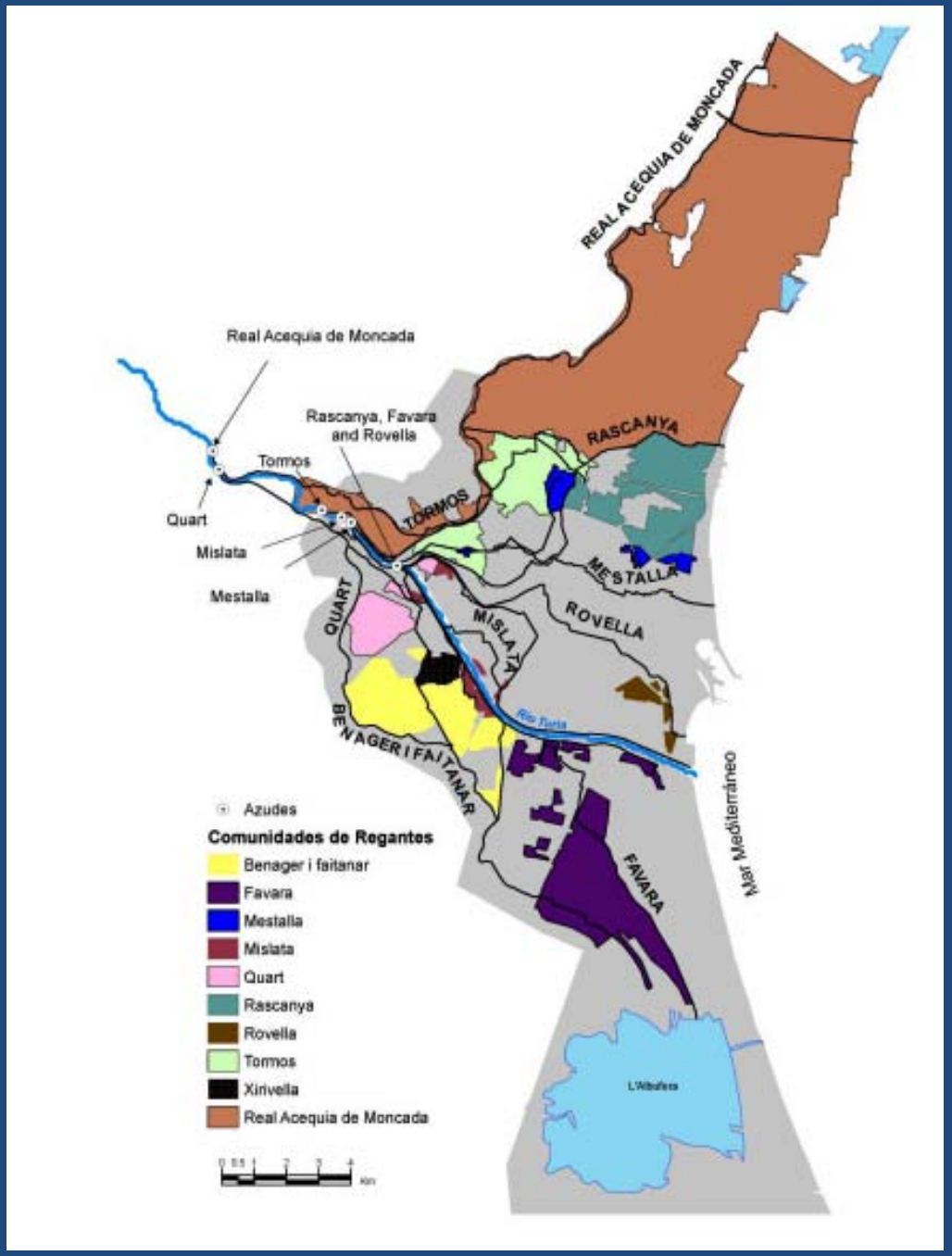
Valencia, Spain

- a multi-community system of medium scale (8800 ha.)
- governed communally by >18,000 farmers organized into 10 canal communities
- These *small commercial farmers* supply much of the food for a city of more than 1 million people
- The communities are stratified within the same narrow range
- A smallholder system (<1 to ~3 ha.)

Operating principles (one or more steps of conceptual abstraction above the working rules)

Autonomy – each community has and controls its own flow of surface water, fixed portions that are distributed and used according to customary rules

Alternation or turn-taking – the communities on either side of the river alternate in extracting their flows, irrigating together on a single cycle; their farmers do likewise, taking turns in the same coordinated way (normal cycle in the dry season extends from every 8 up to every 15 days)



Contiguity in distribution - within the communities, water is distributed to fields in a fixed contiguous order based only on their location, starting at one end and moving systematically, canal-by-canal and field-by-field until all lands have been irrigated

Uniformity (one dimension of *equity* or fairness)

among water rights: all fields are irrigated *with the same frequency*, so that the impact of scarcity is shared evenly by all of them

Uniformity in technique:

all farmers irrigate in the basic same way, using one of two standard methods that in each case impose an upper limit on water consumption and on irrigation time, thereby creating a fairly uniform land-to-water ratio

Proportionality: the other dimension of *equity*

among water rights: No one is allowed to use more water than the amount to which the extent of their land, and the specific technique being utilized, entitle them (nor can they legally get water more often that everyone else)

Proportionality among duties: people's contributions to canal maintenance must be proportional to the amount of irrigated land they have, and to the amount of water they use (also ***between rights and duties***)

Transparency –
everyone knows the rules and, because the order of turns is fixed and contiguous along each canal, they have the ability to confirm, with their own eyes, whether or not those rules are being obeyed, thereby playing a major role in protecting their own rights (derived from ***contiguity***)

Boundary maintenance – any unauthorized expansion of irrigation -- which would lower the frequency of water use for everyone -- is prohibited (Ostrom 1990)

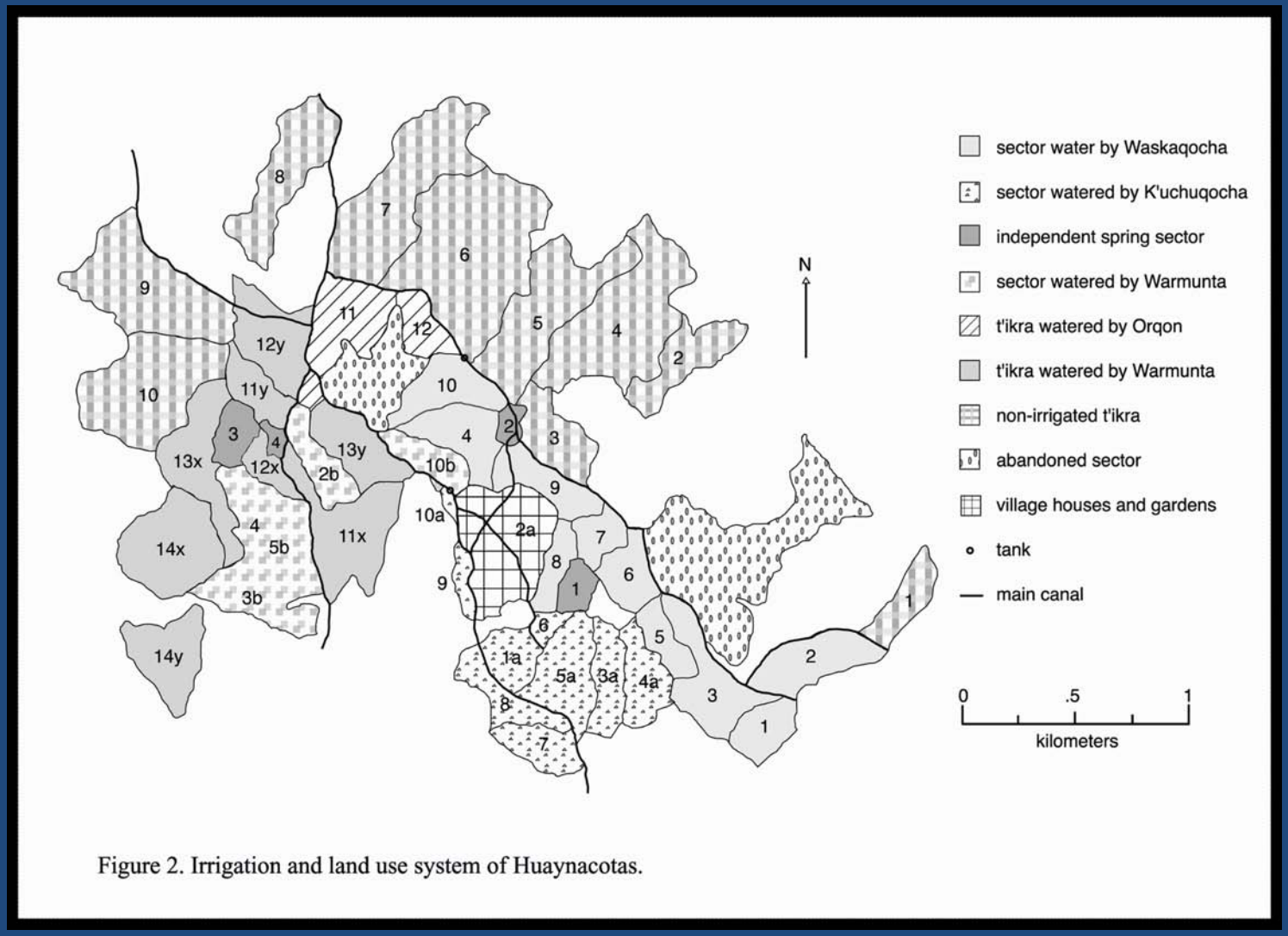


Figure 2. Irrigation and land use system of Huaynacotas.

Graduated sanctions – the penalties for rule violations are severe but vary with the seriousness of the offence

Direct and immediate feedback on the 'efficiency' of water use

- the watering frequency is determined, in a direct and obvious way, by the extent to which people are obeying the rules
- This link creates strong social pressures to conform and to use water frugally
- to do so *maximizes the watering frequency for everyone*
- This 'mechanism' only exists where the frequency is the same for everyone

Internalization of costs and benefits

- The costs and benefits of adjusting consumption to the prevailing conditions and of adapting to scarcity are largely absorbed by the members of the communities, rather than being passed on to someone else.

How the Principles Interact

- Individual rights are ***clearly defined****:*
  - in terms of frequency, amount of water used in each turn, and order of turns
- Rights are ***easily protected***, mainly by the farmers themselves, in a highly transparent system
- *A* ***distinctive logic*** *is* created by the direct and obvious link between the 'efficiency' or orderliness of water use and the duration of the cycle (which is *uniform*)
- Farmers therefore have ***a strong incentive to use water efficiently*** and ***to obey the rules***
  - They are ***maximizing the frequency of irrigation*** for themselves and everyone else in the long run
  - ***a close correspondence*** (even a congruence) ***between individual self-interest and the common good***
  - Cooperation is generally seen as the only rational way to behave

The rate of water theft: virtually nil over a very long period of time

- In the inner *huerta* of Valencia, an average of 15.6 fines for theft were issued per year from 1945 to 2002, among >10,000 farmers
- An average of only two cases for every 1 million acts of irrigation
- In Moncada (the tenth user community), during six recent drought years, 16 total cases were reported among 9800 farmers, amounting to .00001% of total irrigation turns and total opportunities to steal water.
- The rate appears to be similarly low in Huaynacotas
- ***These low rates are unprecedented in the world literature on irrigation*** (and on law enforcement).

The case for convergent evolution (independent invention) in the Andes

- Inca Garcilaso de la Vega (1966[1609]:248) on local water management under the Incas

- "In districts where the quantity of water for irrigation was small, they *divided it proportionately* (as they did with everything they shared out), so that there would be no dispute among the Indians about obtaining it….The water was measured, and, as it was known from experience how long it took to irrigate a fanega of land, each Indian was accordingly granted the number of hours he needed for the amount of land he had…Water was *taken by turns, according to the order of the plots of land*, one after another. *No preference was given to the rich or nobles*, or to favorites or relatives of the kuraca [chief], or to the kuraca himself, or to royal officials or governors. *Anyone who neglected to irrigate his land at the proper time* received an ignominious punishment."

In other parts of the world

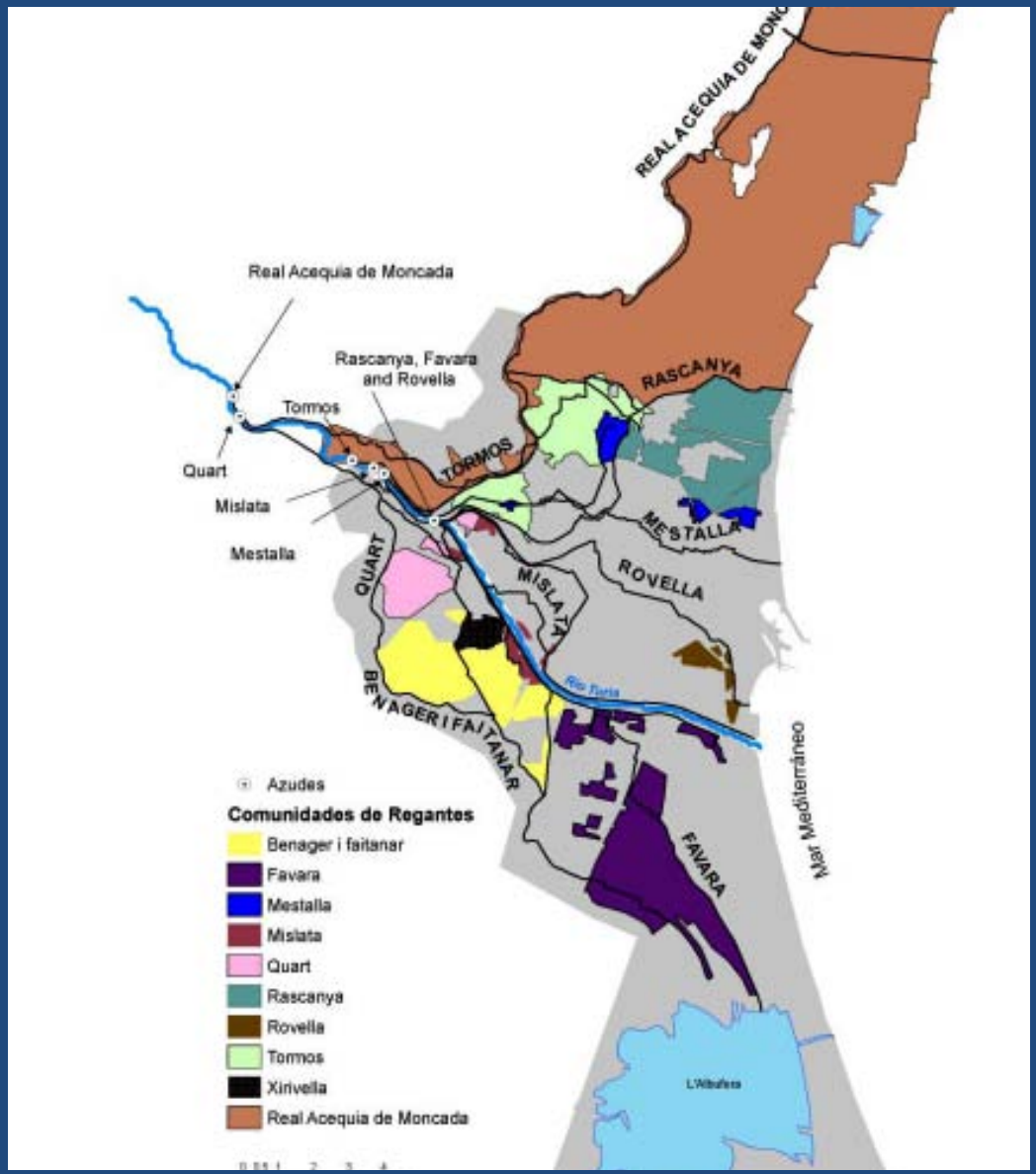
- Nearly all farmers interviewed in Huaynacotas and Valencia insisted that, *for rights to be equitable, the frequency must be the same for everyone*
- Likewise, *rights cannot be truly proportional unless the frequency is the same*
- Such uniformity is considered the most important principle and component of equity
- Proportionality is known to be the basis of 'successful' and equitable community-based management all over the world (Glick, Maass and Anderson, Coward, Wade, Ostrom, Lansing, et. al.)
- But ***uniformity must also exist in many of these cases***; it has just been widely overlooked
- A similar argument can be made in each case about the presence of *contiguity* and *transparency*
- The same model has emerged repeatedly, often independently, all over the world

Integrated and sustainable use of groundwater in Valencia

- Hundreds of groundwater wells exist within the 10 communities, 'private' well societies (coops) from which farmers can buy additional water
- In a typical dry season the groundwater is used *as a supplement* to irrigate high-value commercial crops as often as possible
- optimization for commercial production, maintaining a maximum watering frequency of every 8 days

Adaptation to severe drought (2005-2008)

- accomplished a 50% reduction in surface water use, almost overnight
- done by changing the alternation between communities, in such a way that *all of the operating principles were preserved*
- lengthened the cycle from 8 days to a stable 15 days *with no major increase in theft*
- The system is therefore *robust* (Ostrom et. al.)



The ‘moral economy’: a foundation for adaptive and sustainable conjunctive use

- During the drought, the supplemental use of groundwater was crucial in keeping commercial production viable
- this limited the period between waterings to 8 days for high-value crops
- Some inequities exist in access to the wells, but everyone can purchase groundwater and no one can be denied
- The rules for groundwater use are strongly shaped by the principles for surface water use
- A unique case of *integrated* and *adaptive use* of both surface and groundwater

A distinct kind of system based on a unique model

- Based on *an assumption of water scarcity* rather than of adequacy
- goes *against the dominant agronomic model*, the idea that irrigation is about meeting the water 'needs' of crops
  - Some crops (and some landowners), should therefore get more water, and get it more often, than others
- Successful smallholder systems are *based on a social and moral model*: irrigation is about sharing water fairly among fields and landowning households, whose needs are socially constructed and not just agronomically and economically driven
- **Equity** or fairness: reflects the need to *minimize conflict with one's neighbors*, to *promote cooperation*, also recognizes the right of community members to subsist and survive, to mutually exist
- This should be, and could be, the basis for the adaptive and sustainable use of surface water in many 'developing' countries today
- It could also be the foundation for an integrated, more restrained, and sustainable use of groundwater