



Managing the Commons: from Local Natural Resources to Global Issues

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Objective of the course

- Getting familiarized with the issue of multiple users of a natural resource
 - Key processes and dilemmas
 - The ways to address these dilemmas

Introduction: SETTING THE SCENE

Many kind of resources

- Pastures
- Forest, plants
- Fisheries
- Water resources
- Global commons (global warming, etc.)

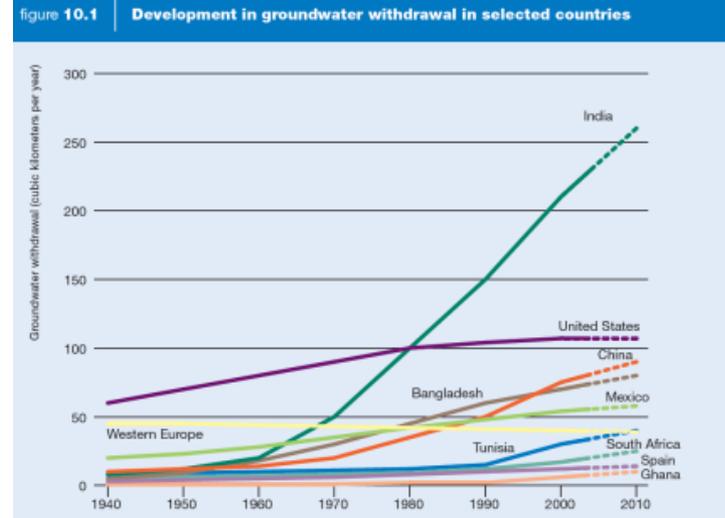
II. Boom in the use of groundwater

(Shah et al., 2007).

Table I. Contribution of groundwater used for irrigation for countries where data are available

Country	Groundwater as part of water resource used (%)	Total irrigation water use ($10^9 \text{ m}^3 \text{ yr}^{-1}$)
Saudi Arabia	96	15.31
Bangladesh	69	12.60
Tunisia	61	2.73
Jordan	55	0.74
India	53	460.00
Iran	50	64.16
Pakistan	34	150.60
Morocco	31	10.18
Mexico	27	61.20
China	18	407.80
South Africa	18	9.58
Nepal	12	28.70
Peru	11	16.30
Malaysia	8	9.70
Egypt	4	45.40
Mali	3	1.32
Indonesia	1	69.20

Madramootoo, 2011

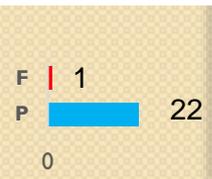


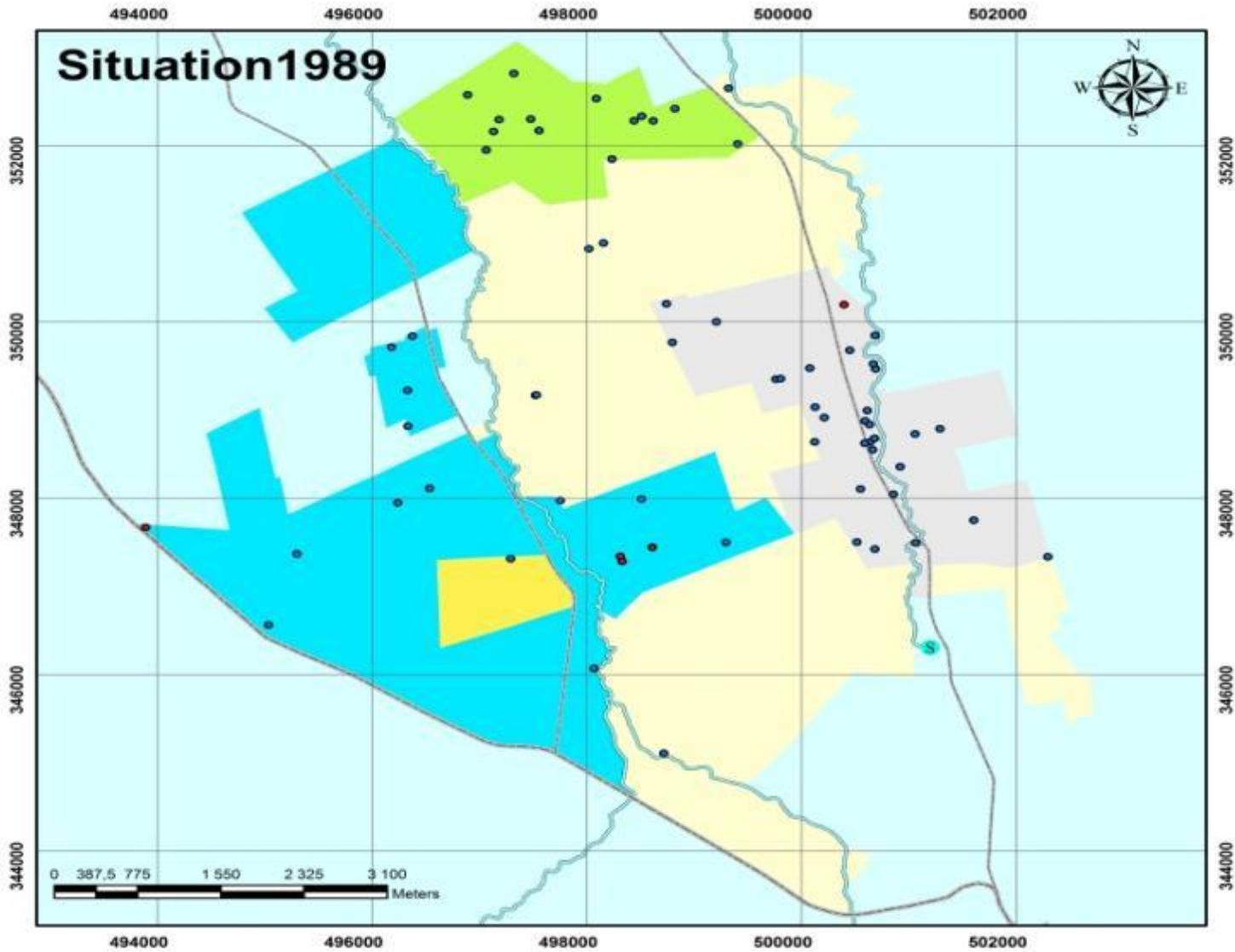
Growth from 70s onwards => creation of “groundwater economies”

In India:

- Diffusion of low cost pumps
- Decrease of average farm size => the need to intensify
- Use by many small-scale farmers
- Electricity subsidies

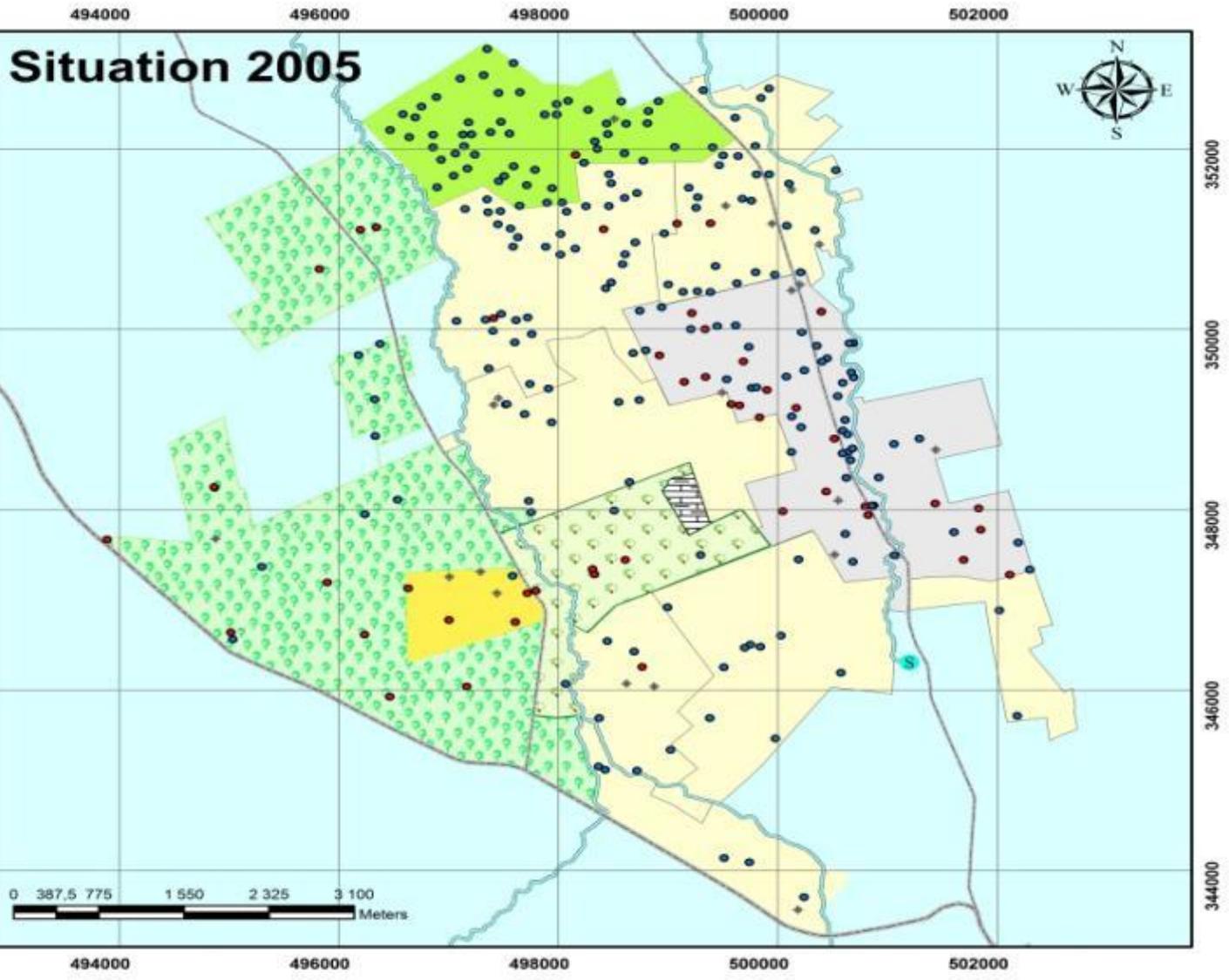
Example in Morocco (Ameur, 2013)



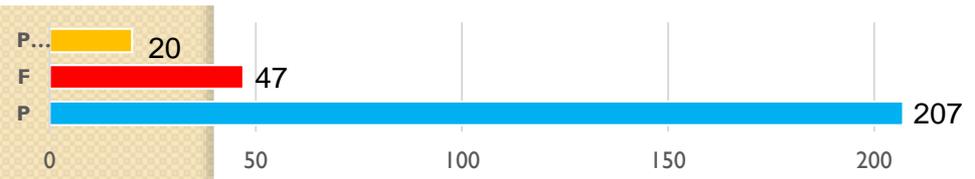


Source: Fatah Ameer, 2013

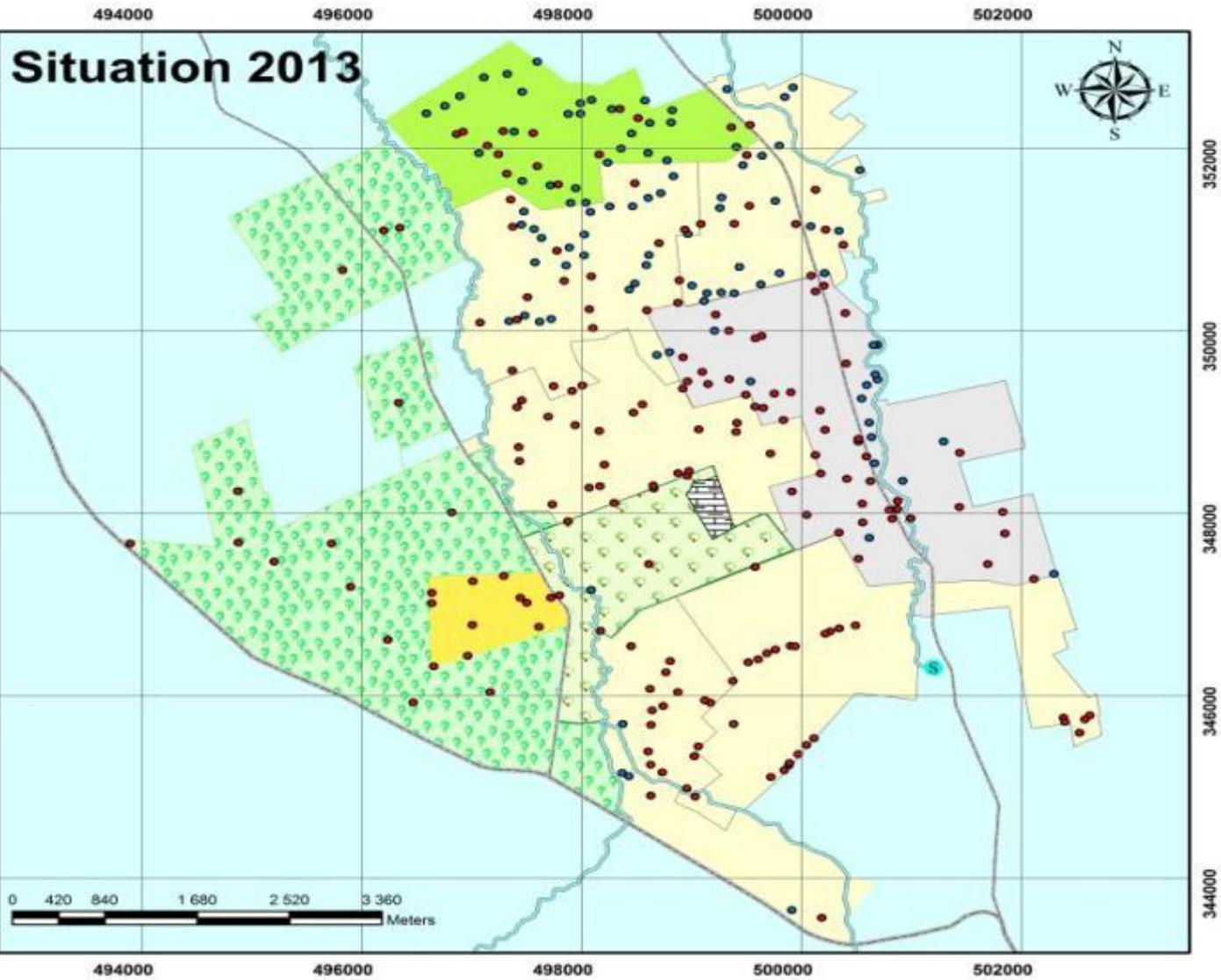




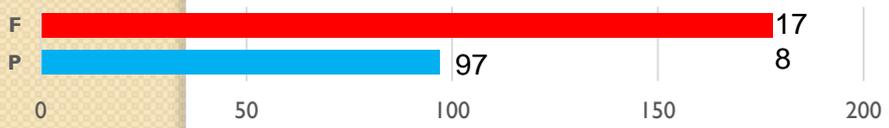
Source: Fatah Ameer, 2013



Boreholes
Wells

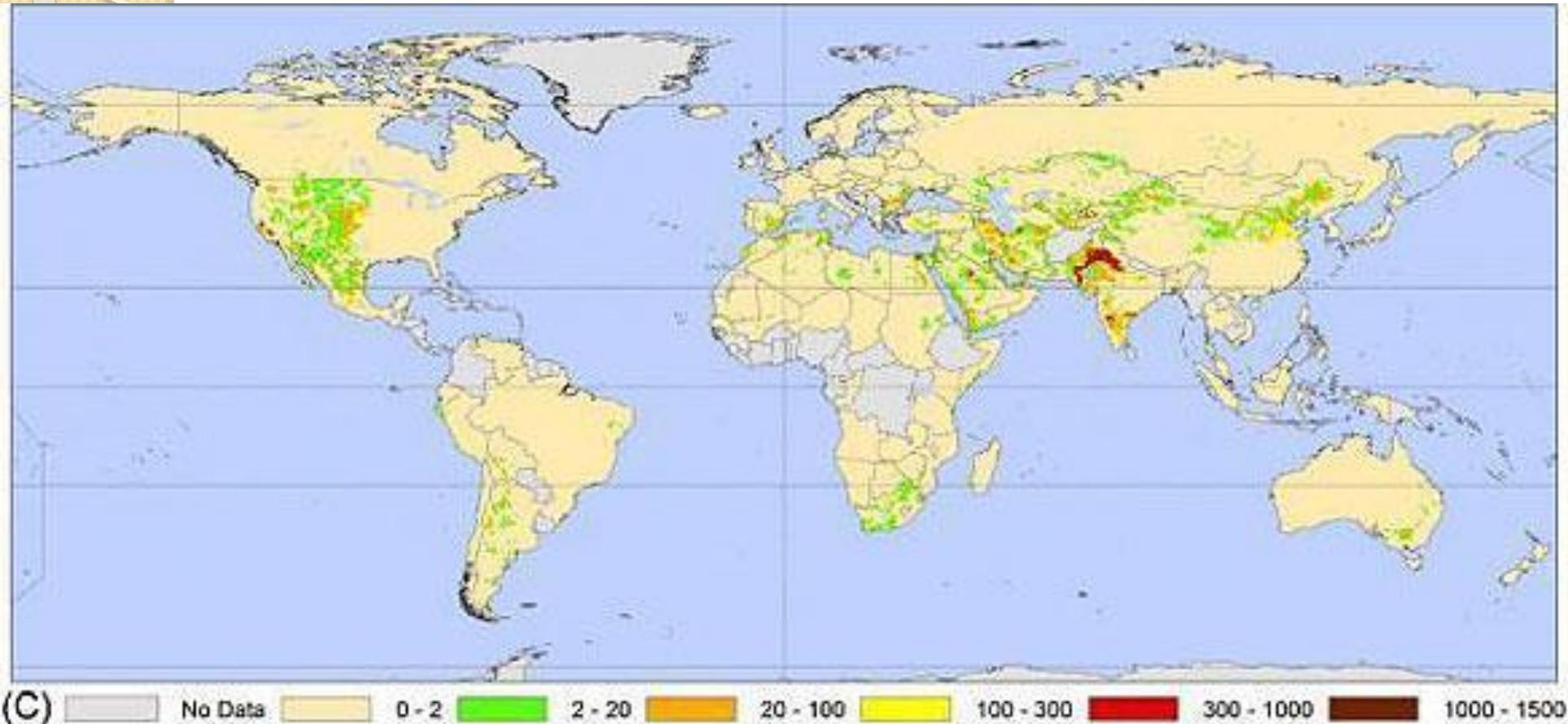


Source: Fatah Ameer, 2013



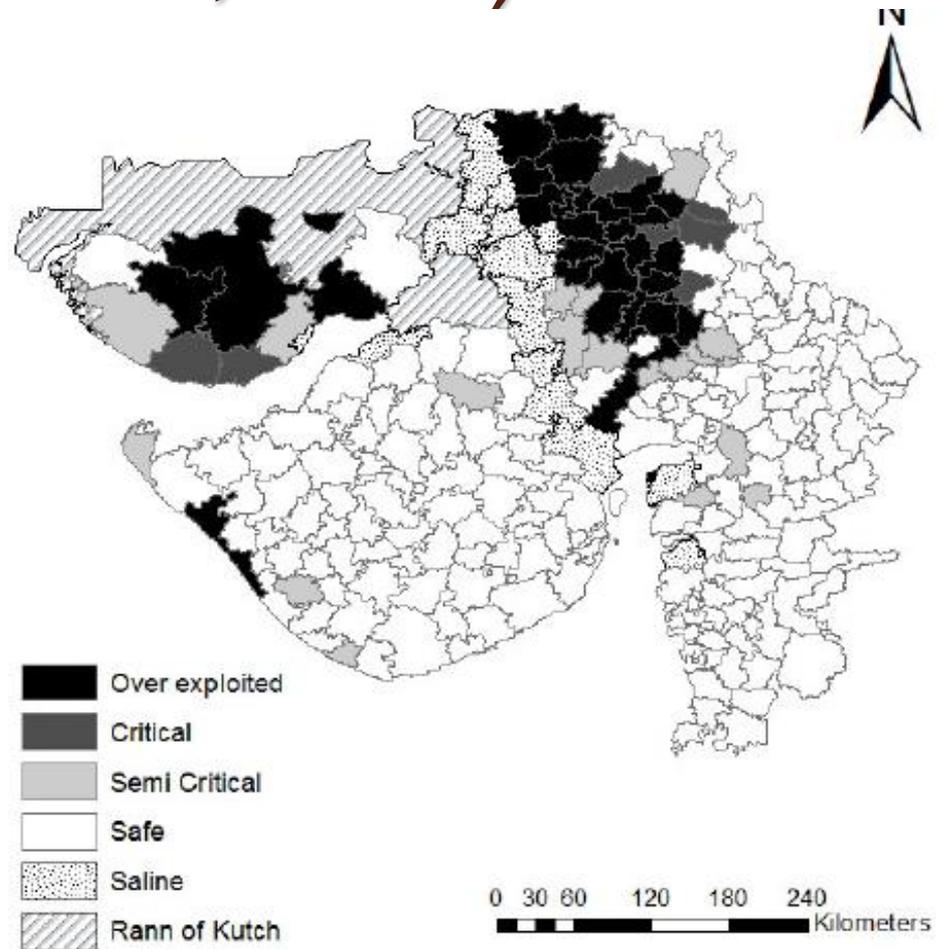
Groundwater overuse in the world

=> 10% of world agricultural production at risk (Postel)



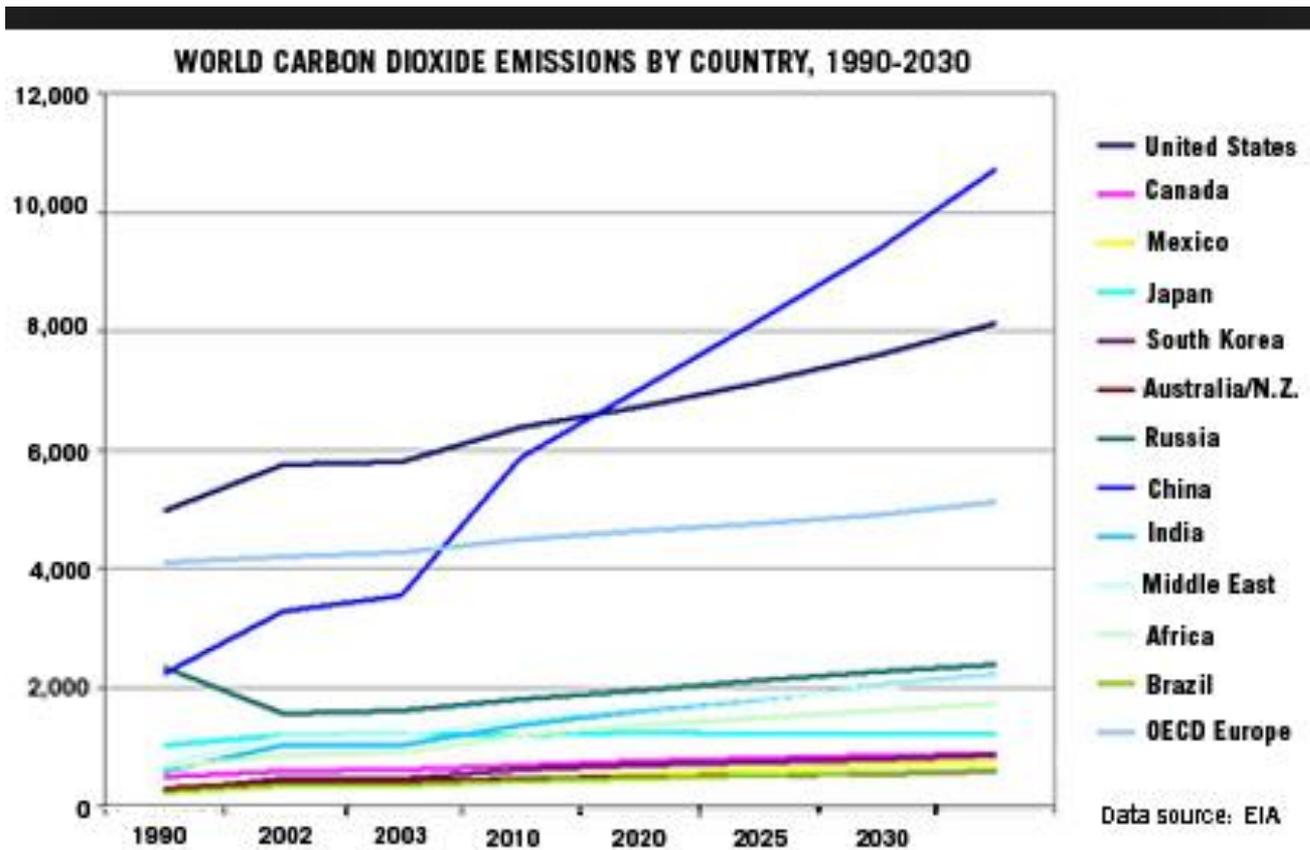
(Source: Wada et al., 2010)

Gujarat (Shah, 2013)

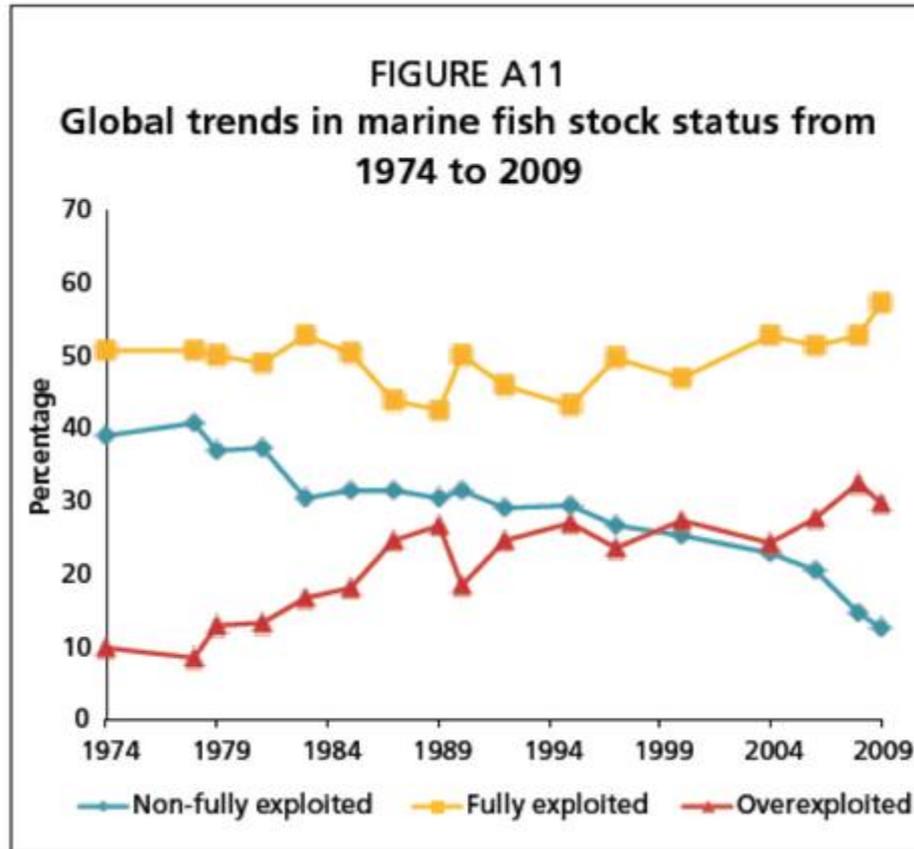


Global natural resources

Global warming



Over fishing



Branch et al. 2011

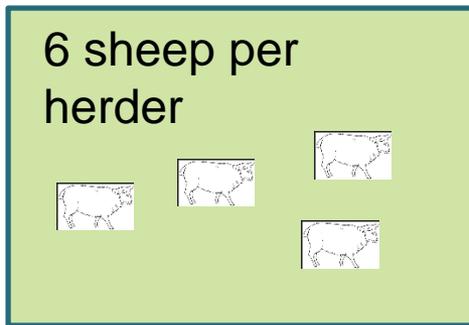
What is in common?

- Common Pool Resources
 - 1) What is taken from somebody cannot be used by somebody else (differing from a radio broadcast)
 - 2) Difficult –but not impossible – to control the access to the resource
- A priori, no specific “property regimes”

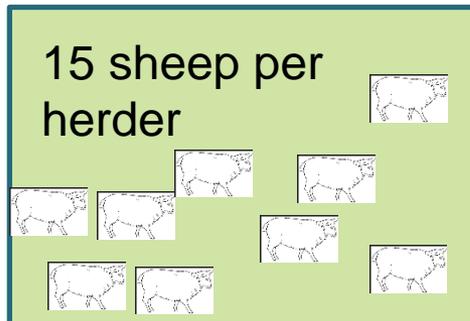
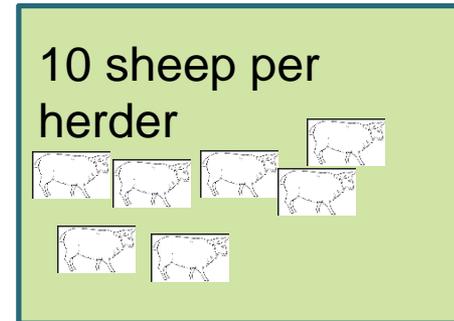
THE PROCESS

Hardin (1968) : the Tragedy of the Commons

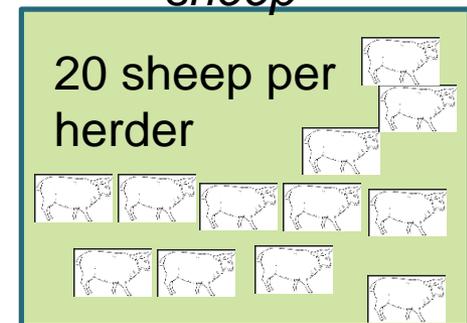
Common pasture, 10 herders



Each sheep grazes sufficiently



No benefit from any sheep



Not sufficient grazing area per sheep

Hardin: Nash equilibrium

10 sheep per
herder

20 sheep per
herder

Pareto optimum: 100 sheep

Yields the best profit for
each herder

UNSTABLE: at this position
All herders have incentive to add
Sheep

Nash equilibrium: 200 sheep

Low profits for all herders

STABLE: no herder has interest
To decrease **ALONE** the number of sheep

In the process, the decisions taken by each herder were, from an individual viewpoint

Rational from an economic point of view

A strong departure from classical view of economics on coordination through markets

Two social dilemmas

Appropriation

- The user perceives $1/n$ of costs + all benefits
- « free riders »
- Examples
 - groundwater use
 - Emission of greenhouse gases

Provision

- The user pay all cost + gets only $1/n$ of benefits
- Examples
 - Maintenance of an irrigation scheme
 - Development of institution for managing natural resources
 - Mitigation approaches for greenhouse gases

Hardin: conclusions for managing the commons

Users are not able to manage alone a resource in common access.

Without any mechanisms, rationale choices by individuals will lead to the catastrophe for all

Commons = open access

But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit-in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.

The commons, if justifiable at all, is justifiable only under conditions of low-population density. As the human population has increased, the commons has had to be abandoned in one aspect after another.

Two solutions: definition of individual property rights or state management

Ostrom: comparative approach

- **Governing the Commons (1990)**
 - Comparison of different common pool resources managed by users
 - Overexploited aquifers in California
 - Fisheries in Sri Lanka
 - Irrigation schemes in the Philippines
 - Assessment of the rules used in user-managed systems that succeeded in successfully manage commons over a long period

=> Looking for « recipes » in the rules for success

Ostrom: design principles

- 1) **Many examples of success:** by talking among each other, users can design rules to solve the « social dilemmas » (key difference with Hardin)
- 2) **Design principles that facilitate success of rules for self-governing CPR systems**

1. Define clear group boundaries.

In an irrigation scheme, the users that can access water are clearly defined.

2. Match rules governing use of common goods to local needs and conditions.

The water allocation rules in an irrigation schemes depend on local conditions and, for instance, the amount each one invests into maintaining the scheme.

3. Ensure that those affected by the rules can participate in modifying the rules.

4. Make sure the rule-making rights of community members are respected by outside authorities.

5. Develop a system, carried out by community members, for monitoring members' behavior.

6. Use graduated sanctions for rule violators.

7. Provide accessible, low-cost means for dispute resolution.

8. Build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.

Key challenges for natural resource management

- Necessary coordination to avoid Tragedy of the Commons
- Usually lack of sufficient data (groundwater, climate change)
- Costly regulation
- Many stakeholders
 - At local level: many users at local level, limited user organizations, several local administration,
 - Paris agreement: more than 197 countries
=> huge problems of coordination
- Which equity criteria to allocate resource rights between users (e.g., negotiations on climate change)
- Often inadequate legal frameworks and limited resources for organizing coordination and regulation

=> How do we organize management of natural resources in such conditions for a sustainable use?

Paris Agreement

A work in progress:

- no negotiation of emission quotas
- no penalty if a country does not meet its objective

...a still very fragile process

Some conclusions

- Similar processes around a wide range of natural resources
- Common Pool Resources: not necessarily free access
- The need for methods...and trained people to accompany process towards better management

References

- Branch, T.A., O. P. Jensen, D. Ricard, Y. Ye, and R. Hilborn. 2011. Contrasting Global Trends in Marine Fishery Status Obtained from Catches and from Stock Assessments. *Conservation Biology* 25:777-786.
- Hardin, G. (1968). The Tragedy of the Commons' (1968) 162. *Science*, 1243.
- Ostrom E. 1990. *Governing the Commons. The Evolution of Institutions for Collective Action*. Cambridge University Press: Cambridge.
- Ostrom E. 2000. *Reformulating the commons*. *Swiss Political Science Review* 6(1): 29–52.
- Ostrom E. 2000. Reformulating the commons. *Swiss Political Science Review* 6(1): 29–52.
- Postel, S. (1999). *Pillar of sand: Can the irrigation miracle last?* New York, USA: W.W. Norton & Company.