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Theories and methods for the study of common goods. Three case studies: water, forests and coasts

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The current PhD study meeting is about theoretical and methodological approaches for the study of environmental common goods and in particular water, forests and coasts.

Basurto begins the dissertation with a foreword: the idea is to illustrate and to give, as a study resource, the framework developed by Elinor Ostrom to help governing the commons. But a brief sign of history is first necessary.

To start the reasoning in the 1960s is important, because at that time the number of population was growing very rapidly and it was the first time that environmental issues started to be a very obvious concern for development. It is in the Sixties that many concepts were developed about who had the best chances to solve the problems: whether the State, the market or the people. Garrett Hardin, as a microbiologist, published a very influential paper in 1968, called «The tragedy of the commons»; this paper has influenced the environmental policy decision making throughout the world, because it questioned how we could solve the environmental dilemma. He proposed essentially that the mentioned tragedy is indicative of the problems that emerge when the individual interest comes in conflict with collective interests. The main issue with the tragedy of the commons is, in fact, the same of the classic prisoner's dilemma. This dilemma illustrates essentially the following concept: individual interest versus societal or group interest. In mathematical terms, both the tragedy of the commons and the prisoner's dilemma illustrate the same phenomenon. Garrett used a hypothetical example: a camp of free grass (as a common good) where cows eat the grass (individual, own-self interest) increasing their number; nobody knows what will happen to the common good in the future. The result for the entire society is the running-out of the resources (tragedy), the overexploitation of the cows.

Garrett answered that had to be the State to give a solution to the dilemma: the humans are always looking for their self-interest as maximisers and the State is in the best position to say who could access the good and when. But at the centre of the problem there is the uncertainty that every farmer has about how the land will be tomorrow, because he needs to exploit it and to use it. The consequence is that everybody has the certainty to use immediately the resource. That's at the core of the prisoner's dilemma and at the core of every environmental issue, in essence. Is the uncertainty that users have about the future availability of the resources: this situation would be avoided from everybody but anybody can avoid it. In this terms, the fundamental question is: who we are? Garrett assumed that some people are self-interested, maximisers; the self-interested is only interested in the advantage for himself and the maximisation of his utility. We know now, in terms of economics, that not everybody is a maximiser. Anyway, Hardin proposed, for the solution, to give control to the State and to the markets (privatization); what's the logic behind privatization? Principally, the internalization of the costs of use. These were the two main solutions proposed for policies to manage forests, water, air, fisheries and all commons. Actually, there are a lot of policies that are giving the control to central governments or to the markets. Are these the only solutions? No, they aren't. By this way, the contribution of Elinor Ostrom was, in fact, to challenge those two approaches and say «what about the people?».

This school has developed a lot of theoretical tools to understand when a self-organization or a self-government can help to avoid the tragedy of the commons. Elinor Ostrom was awarded of the nobel prize in economics in 2009 for developing this line-thought and other possible solutions to avoid a overusing of environment. Without being an economist, she is the only woman that has been awarded of the nobel prize in economics.

The question that we're asking for is not «which solution is better?» (markets, central government or self-government) but «when»: *when* does the chosen solution work better?

Ostrom gave space to the role of citizens, which is at the core of some democratical ideas; which is our role in solving environmental issues? When are we overusing the commons?

We can understand these issues with some empirical case studies on forests, water and fishing.

There's an important study, published in 2011 (Lauren Persha et al.), about eightyfour forests in six developed and underdeveloped countries, that illustrates and demonstrates the correlation between the size of a forest and an index of sustainability (about how well the forest is used); in mathematical terms, it demonstrates that when the people and the users of the forest are involved in the rulemaking, a higher sustainability is obtainable than when the users are not. So the people are helpful to avoid the tragedy of the commons.

On fishery, there's a study by Cinner et al. (2012) about fortytwo coral reefs in five countries (Kenya, Tanzania, Madagascar, Indonesia, Papua New Guinea) that is very important because it made three comparisons; it compared the biomass in places where: or no fishing is allowed, or the fishing is allowed but managed by both government and fishermen together, or there's no local management and no fishing regulation. This last choice was the most preferred because it granted the maximisation of self interest.

There's an interesting work on the use of water and, in particular, on the role of irrigation systems.

One of the most interesting studies has been conducted in Nepal. Nepal is a country that is very diverse, in terms of landscape. People depend on rice and on rice terraces, where bringing the water is not a simple issue: farmers need to build canals in order to bring water from a point to another one. In the Eighties, the people had very simple canals: what is the advantage to have this very simple kind of water canals? They have to be cleaned, to be remaked constantly, etc. and they're not efficient; so the central government invested a lot of money to cover these canals with cement, to get more water efficiency. And in effect, the water efficiency was increased and this provided a very good case to study systems that work in a modern way of intervention: in fact, the system was managed by the users, that had to maintain it. Which one of the canals, in terms of water efficiency and other measurers of performance, do perform the best?

Ostrom and her group went to Nepal to study the irrigation systems in terms of agricultural productivity, economic efficiency and distributional equity. They found that those cementline irrigation systems performed less than non-cementline irrigation systems: the reason was the rule making process that the farmers

had when there were only simple canals; some of those people couldn't write or read, so they wrote their rules with informality. At the beginning of the rainy season, each year, people needed to come together to clean the channels and that gave the opportunity to people to discuss, to negotiate and to coordinate. A case about fishery in the Gulf of California: the Seri and Kino communities.

In this land there are two very small communities of fishermen, that depend on a rival resource. One community isn't able to avoid the tragedy of the commons; both the communities fish the same fishes, are borroughed by the same environment, share the same water and the same technology. The case study lights about how and why a community decides to regulate and why to do not regulate. The Seri and Kino are indigenous communities that live in the area from more than three thousands years and they've been fishing for long. Their social structure is a family structure: even though they all live together, fishermen look only at their family; they don't have a concept of working together for the common interest, so there's a lot of social internal division. How to avoid the tragedy? Both the communities faced a common enemy, which has been represented by the Spaniers and the Mexicans later on, that tried to exterminate them. The Spaniers tried to get rid of these indigenous groups because they could convert them to catholicism: so all the indigenous groups in Mexico and in all the New Spain that were not interested in living in missions or becoming catholic deserved to die. There were extermination wars for a long time, but the indigenous people were able to survive. The mexican farmers tried to do the same. In the Seventies, to repair this damage, the Mexican Government gave to these indigenous groups property rights, in the form of a coastal area that belongs to these communities. The Government gave them also a fishing concession, meaning that only the Seri and Kino communities can fish in the waters around the area: in essence, an exclusive fishing zone. The people fish mainly a mollusk and they use a tool to extract it from the bottom. The Kino community is a good example of open access community. There is a place where the community can control the accesses to the resource, but it's more complicated than that; in fact, there are substantially two ways of fishing: the commercial one, using scuba, compressors and technology, and the traditional collecting done by women and children as a cultural important activity.

Because the Kino fisheries have overexploited down the fishing grounds, they have begun fishing in the channel; so the community has developed a system of informal rules to do this activity: these rules played a role to avoid the tragedy of the common. One of these rules is a pay of a permit, that is completely informal: it's just a bag of two-three kilograms of molusks that are given to the indigenous authorities. Another rule is that every outsider needs to have a member of the community on the boat as a crew member, because it's tradition to the Kinos that the result of the fishing go to all the members of the crew. A third rule is that commercial fishing is allowed only in sandbars recognised by the community.

But how do they monitor the rules? What is the advantage to having a member of the community on the boat? He's a monitor, but there's also a conflict of interests.

In all of these examples of indigenous systems, in the managing of forests, water or fishery, there will always be law-breaking; there's no system of rules to monitor the access to the resources that is completely perfect. The interesting case is why, although this rulebreaking, the system does not collapse: it continues on being sustainable and it can still avoid the tragedy of the common. In this last case, the Government is not involved in the managing of the resource: the users make the rules, because they have a better recognition of the environmental, social and cultural context.

These are some of theoretical tools, the framework that we use in this school-of-art:

- focusing on the property rights dimension: the *open access* is a null condition where there are no property claims over the resource; the *private property* gives exclusivity and transferability rights over the resource; in the *state property* individuals or groups have rights to use the resource but not to transfer it to anyone else; in the *common property* a group of people have rights to use and transfer the resource. The property rights dimension focuses on the tragedy of the commons given by the conflict between individual and group interests and generated by the uncertainty about the resource's future sustainability.
- biophysical dimension;
- social dimension;
- governance dimension: the governance is the process of design, negotiation, implementation, evaluation and reform of institutions that structure the social interactions; the concept of governance is not the same of management.
- commoning dimension: the study of collective action has focused on understanding two key macro-processes: emergence of rules (from open access to access control) and robustness of self-organization (adaptive capacity) overtime;

The framework underlines the characteristics of a self-organization that successfully avoids the tragedy of the commons:

- the limits of the common good are known to the group;
- the rules about the use are congruent with the local bio-physical conditions;
- it is possible to monitor that all the individuals of the group are following the same rules;
- the users can solve conflicts between themselves (also with informal sanctions);
- the right of self-organization is known and respected by the central government.

Moreover, the framework offers a scale perspective: in other terms, the framework includes theories that include models: a mutual relationship between the constitutional-choice arena, the collective-choice arena and the operational-choice arena.

So, in the framework, the biophysical and material conditions (types of good, units, geography, technology), the attributes of the community (culture) and the rules (both formal and informal) are considered «exogenous variables»; they are put in the context of the unit of analysis, that is the action situation (composed by participants, positions, actions, information, control, net costs and benefits, potential outcomes); by this way, it is possible to observe the interactions between this last and the outcomes generated with evaluative criteria (in particular, efficiency, equity, adaptability, resilience, robustness, sustainability, accountability, morality, trade-offs).

The fundamental characteristics of the goods are excludability and subtractability; so it is possibile to classify the goods: the *toll goods* are both neither excludable and subtractable; the *public goods* are excludable and not subtractable; the *private goods* are subtractable but non excludable; the *common-pool resources* (CPRs) are both excludable and subtractable.

The fundamental consequence we deduce from all the arguments above is that it is possibile to avoid the excessive and unsustainable use of the common good when there's involvement of local actors and well defined property rights.

The characteristics that increase the probabilities for a social group to elaborate a set of rules about access and use, to avoid the tragedy of the commons, are both the characteristics of the social group and of the resource that are involved.

The study of this framework can be a source, also in the law field, to seek the solution for the tragedy of the environmental common goods.