Collective Action
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1 Common property and NRM

In many societies, natural resources such as water, rangelands, forests, fish stocks, etc. are often held as common property and/or are collectively managed. Understanding common property and management regimes is therefore vital in natural resources management (NRM).

The concept of common property (also referred to as "collective goods", "common goods", "public goods", "the commons", "collective resources", "common pool resources", etc.) refers to something that is used as if it belonged to all members of a group. The group may be large or small. An essential aspect of common property is that no member can be excluded from the use of the resource.

In fact, many have argued that management of common property resources can never be sustainable, because the fundamentally selfish individual will maximise his/her private benefit by over-exploiting these resources to the detriment of the resource and therefore to society in general. For example, when an individual using a common grazing resource adds one animal to his herd, this individual gains a small additional benefit from that resource in the short term; but if all herdsmen sharing that common grazing resource keep adding animals to their herds, the resource will be degraded leading to a reduction in the number of animals that the resource can carry in the long term and consequently to a reduction in the collective wealth of the users of the resource. This view leads many to state that privatization of resources is the best policy to encourage sustainable management. However, others argue that this view is simplistic, does not distinguish between various common property regimes

that exist, that behaviour of group members is not driven by self-interest alone, and that collective and sustainable NRM is not only feasible but also vital.

Understanding the concept of common property and their management is essential in dealing with a wide variety of issues, usually where resources are overused (e.g. water resource depletion, overgrazing, firewood shortages, overfishing, etc.), polluted or degraded (acid rain, use of agro-chemicals, waste dumping, carbon dioxide discharges and global warming) or simply where individual action is not enough to achieve the required result (pest management, water management).

Addressing these NRM issues requires not only technological, but also organisational solutions. Moreover, these two solutions interact. Constraints in the organisational capacity of the users limit the choice of technological solutions. This insight may lead to different research or development priorities than would be chosen based on technological criteria alone.

2 Common property regimes

By “common property regimes” we refer to the set of rights and duties that a group of resource users share in relation to a particular resource as well as the institutions that define the conditions of access to, and control of, goods and services arising from this resource. These rights and duties, and these institutions can take different forms depending on the type of resource, the size of the group, the local culture and the broader political, economic, and social systems that influence tenure in a particular country.

Tenure defines the terms on which something (land, trees, water, etc.) is held, covering the rights and obligations of the holder. Having tenure of something or having “access” to a resource is not the same as “owning” it. Someone can have tenure of land or use it without having possession (what we usually call “property”). It is important to realise that in matters of “property” and “tenure” formal legal systems and customary rights coexist and both give or deny legitimacy to claims. For example, in many African and Asian countries, communities exercise control over land without being recognised as owners by the country’s legal system (the land may be officially “owned” by the state). In such cases, the community can decide on land allocation and the members of that community have the right to products from that land without legally owning it (“usufruct rights”).

Sometimes the rights to resource use are so well established and long-term that for management purposes the tenure becomes almost indistinguishable from ownership; in such cases the resource may be inherited through generations and even rented or bought and sold; even though legally the land is owned by the state. Land tenure in several African countries functions in this way.

On the other hand, there may be no established individual or group rights at all, and access/use may be open to everybody. The concept of “property” as related to this type of “**open-access**” resource is similar to “non-property”: if a good belongs to everybody, it effectively belongs to nobody. This often causes the resource to be used and overused, and there are no social authorities that define or can effectively enforce the rights of individuals or groups to the use of that resource. In such cases, each resource user usually ignores the consequences of his behaviour on others,

and nobody feels obliged to invest in management or conservation of the resource. An example is the state forests in several countries, which are often degraded by overuse in spite of national laws or the occasional forest guard. Another example is international fish stocks, which have been severely depleted and are now the subject of difficult international negotiations.

Between these two extremes, there is a range of **restricted access resources**, to which only a particular group of people have access. This is what is usually referred to as **"common property"**. The concept of "property" applies here because it gives exclusive rights to some people and excludes others. This exclusivity of rights motivates people to invest and manage the good to benefit their interests. This property regime is similar to a shared private property. Features of common property resources include:

- No individual from the group has exclusive right to the use of the resource, and no one from the group can be excluded from this use (although their use can be *restricted*).
- Group members have secure expectations that they can gain access to future use of the resource.
- There are functioning criteria for group membership.
- There are defined guidelines for resource use.
- There is an enforcement mechanism for managing deviant behaviour.

3 Collective action

Collective action is where individuals undertake collective effort based on mutual interests and the expectation of mutual benefits.

By definition, the management of common property resources requires collective action. In NRM, collective action can take many shapes: examples are water users' associations (sharing the costs of water delivery, investments and maintenance of irrigation infrastructure and equipment, water management, etc.), and other formal or informal groups (regulation of grazing, forest management, etc.).

Collective action itself can be of several types, depending on the type of work and type of action.

Types of work:

- Group work - all members are required to do the work together (e.g. clean a common irrigation canal).
- Organised work - all members are required to do the work, but not together. Their work may be organised in rotation (e.g. patrolling a community forest).
- Independent work - all members are required to do the work, but they can work independently (e.g. maintaining the irrigation canals that cross one's own fields).

Type of action:

- Physical - members do physical work
- Contribution - by cash or in kind instead of physically
- Regulation - members prohibit something, supervise or enforce regulations

4 Game theory

Several branches of social science are concerned with collective action and/or common property resources: e.g. organisation theory, economic theory, and political science. They all deal with the same issue: **human behaviour** and **what motivates people** to do the things needed to produce and maintain collective goods. But each discipline looks at these issues from a different perspective and in order to answer a different set of questions (e.g. workers' motivation to go on strike, people's behaviour in a city park, citizen's behaviour regarding law and order, employee use of a free coffee machine, consumer behaviour, individual decision behaviour within a work team, etc.).

One way of looking at these issues is that of "game theory", which is a way of explaining human behaviour using a "game" model. The game is an abstract, simplified representation of a real life situation, enabling researchers to observe the strategic behaviour of the players, how they interact and how they adapt their decisions to other players' decisions. The basic assumptions of game theory are that decision-makers pursue well-defined objectives (i.e. that they are rational) and take into account their knowledge or expectations of other players' behaviour (i.e. that they reason strategically), and that they have equal access to information.

5 The prisoner's dilemma

In game theory, the prisoner's dilemma explores the conditions under which fundamentally selfish actors will spontaneously cooperate. This cooperation is based on a hypothetical situation where the police are interrogating two prisoners for a crime for which they are both suspected. These prisoners are kept in separate cells. Each prisoner is asked to confess and implicate the other, and given the options:

- if they both keep quiet, they will each get 1 year in prison on some lesser charge;
- if both confess, they will each get 4 years in prison (i.e. a reduced sentence for helping the police);
- if only one confesses and the other keeps quiet, the one who talks gets off free (for helping the police and because there is no evidence against him) while the one who stays quiet gets the full sentence of 5 years in prison (for being guilty and not helping the police).

The dilemma is that each prisoner cannot make the best decision for himself without knowing what his accomplice will do. If prisoner A confesses, he will be better off than if he keeps quiet, no matter what prisoner B does (if B confesses, A gets 4 years if he also confesses but 5 if he keeps quiet; if B keeps quiet, A gets off free if he confesses but 1 year if he keeps quiet). But if both prisoners think like this and so both confess, they will both be worse off than if they both keep quiet (i.e. they will get 4 years by both confessing, and only 1 year by both keeping quiet).

This basic principle has been developed into a game based on the dilemma of cooperation, with points given according to whether the player cooperates with the other player or defects. The most important implication of the prisoner's dilemma game is that it is rational for individuals to not cooperate with the other, because defecting leads to the best outcome for them personally whatever the other decides - but if both of them act "irrationally" and cooperate, both could gain.

If the assumptions of the prisoner's dilemma would apply to NRM issues, it could be used to analyse whether or not users of common resources (e.g. grazing land or water) will cooperate in restraining their use of the resource (to limits required to sustain it). The 4 possibilities are:

- Everyone follows the rules and limits their use of the resource – everybody gets something.
- No one follows the rules and everyone exploits the resource as much as they can - the resource is degraded, and everyone gets very little.
- An individual does not restrain his/her use while everyone else abides by the rules and limits their own use - the individual maximises his/her benefit from the resource, which is kept in good condition by everyone else's restraint.
- The individual follows the rule, but nobody else does – when the individual gets even less than he/she would if nobody followed the rules; i.e. he/she is a "sucker".

The rationale of the prisoner's dilemma would imply that the second alternative would prevail, as all stakeholders would try to maximise their own benefit in the short term, and avoid being a "sucker"; but in the long term the resource would be degraded. The implication would be that the group would need either coercion from outside (to enforce the rules), or change the tenure to a private property regime.

The most important criticism of applying the prisoner's dilemma game to explain human behaviour in NRM is that the game is non-communicative and non-dynamic: each player has only two options and each player makes his decision in ignorance of the other's decision. This leads to speculation and, eventually suspicion. In NRM, people can have more than two options; they can also communicate and adjust their decision according to what they observe from others' behaviour. There are communication channels and coordination mechanisms that allow build-up of trust between the "players" and regulation of behaviour. These mechanisms avoid the need of coercion from outside or changing to a private property regime that may reduce the benefits of the resource to the group as a whole. This dimension of social learning is ignored in the game. In NRM, the situation is more complex as there are more players, with different levels of power, and more options than just cooperating

or not cooperating. Processes of communication are therefore an important component of formal or informal cooperation.

6 Free riding

"Free riding" theory as developed by Mancur Olson (1965) deals with the conditions under which individuals will behave in order to achieve common goals and those which make collective action possible. The basic premise is that as public goods are "non excludable" (i.e. nobody in the group or society can be excluded from using the good). Individuals then have an incentive to take a "free ride" – that is they will use the good without contributing to its production or management. Thus it is difficult to mobilise individuals into collective action to produce the good and, as a result, the desired good is under-produced or not produced at all.

Free riding theory relates to a situation where once such a collective good is provided, the benefits will be available to all. It also assumes that individuals base their decisions purely on self-interested cost-benefit thinking. Under these conditions, nobody will pay the costs of establishing and maintaining the collective resource or good unless some interested individual foresees a personal benefit higher than these costs. And even if an individual does establish the good (a well, for example), he or she will only be interested to do so at a level to supply his/her own needs – not to a level that will be optimal for the whole group of users. The others will not accept the costs of managing the resource or increasing its quality/quantity, because the costs of doing this will exceed the additional benefits to what they are already getting from what the most interested individual has provided them with. The theory implies that only when the costs are shared in the same proportion as the benefits is the quantity of the collective good optimized. The theory therefore suggests that, to prevent free riding and promote collective action, the only solution is to introduce inducements to contributors and/or punishment for free riding. For NRM, this would mean limiting access to those users who effectively contributed and introducing private incentives to specific users from the group, seeking ways of making the resource excludable and divisible.

The free riding theory assumes an egoistic individual behaviour towards the use of public goods. In this thinking, it is "rational" for individuals to be free riders. Rational, self-interested individuals will not contribute voluntarily to achieve their common or group interests; instead, they prefer to let others pay the cost of goods that will benefit everyone. The theory excludes any possibility of altruism or group solidarity: i.e. that individuals may engage in collective action even if they expect no personal gain.

This view is challenged by observed behaviour: even if examples do not abound, there is evidence that individuals are in some cases motivated by "social" or "moral" concerns (prestige, respect, etc.). This behaviour does not contradict the theory: social status and prestige can be regarded as "private" goods or benefits acting as selective incentives for individuals. But such motivation does challenge the idea that the degradation of public goods by selfish individuals can only be solved by privatization of these goods. Experience has also shown that neither punishment nor selective inducements are central motivating factors: there are numerous examples of villages where collective action has emerged in the absence of any private inducements or punishments.

Another criticism is that, like the prisoner's dilemma game, the free riding model assumes that individuals make their own decisions in isolation and that the behaviour of others does not influence them. It ignores the possibility that coordination of collective action can increase individual benefits and motivate individuals to join in. In reality, interaction between members can change their attitudes and behaviour.

7 The tragedy of the commons

In a widely influential article in "Science" magazine, Garret Hardin applied the same type of analysis as the prisoner's dilemma and free riding in NRM. He argued that natural resources would inevitably be over-utilised and degraded because it is rational for individuals to exploit these resources at the expense of others. They can draw benefits from their use while bearing only a minimal cost of additional resource extraction. Hardin's example was that in a "commons" such as a communal pasture, each additional animal brings additional profits to the owner of that animal. But this additional animal also reduces the amount of grass in the pasture and hence diminishes the overall benefits to other users, because that grass will no longer be available to their animals. Despite this, for each individual herdsman, the gain from putting an additional animal on the pasture will be higher than the loss of profit because of reduced grass for the rest of his herd. Thus for each shepherd, it is rational to increase his herd. But what is a rational strategy for each individual in the short term results in overgrazing and eventual depletion of the collective resource.

The tragedy of the commons is a pessimistic view of the future of natural resources. Like the free rider theory and the prisoner's dilemma, it assumes that short-term self-interest will always prevail in the use of these resources and will inevitably lead to their degradation and the eventual loss to everyone. Implying that collective action is impossible, the argument based on the "tragedy of the commons" has spurred calls for the privatisation of forest, range and other resources, or for state intervention in the management of natural resources.

Critics of Hardin have pointed out that his argument is based on an ambiguity. The "tragedy" is not due to the fact that the resources are commons (common property) but because they are open access. If access is restricted, over-exploitation is not inevitable. There are many examples of resources that have been sustainably managed by communities: an example is the management of forests in Nepal by village groups, which broke down when the forests were "nationalised" in the 1950s, and which is being re-established by modern "community forestry" projects.

8 NRM situations and the likelihood of collective action

Natural resources are too heterogeneous to allow for generalisations such as those made above. Water, forests, pastures, etc. all differ in the nature of the benefits they provide, in terms of how diverse or uniform they are, how well these benefits are known or predictable as well as how large they may be. User groups differ in terms of how identifiable and coherent they are, as well as how large they are. These different and individual circumstances make each case either more or less susceptible to arguments such as Hardin's tragedy of the commons.

But whatever the reservations about their universality, the theories described in this learning resource give useful guidelines concerning collective action.

First, they counter-balance the optimistic view prevalent in development circles suggesting that, for collective action to emerge, it is enough to "sensitize" people about their common interests and teach them how to organise.

Second, they suggest that the size of the group relative to the benefits is important.

- As long as personal interest is sufficient to produce or maintain a good, no collective organisation is required.

- Small groups require less organization (i.e. the organizational or "transaction" costs are lower). Communication is easier, so they are more efficient in making decisions, mobilising and monitoring their members. The costs and benefits are shared out among fewer individuals and are hence more visible than in large groups, and so are the effects of free riding. Individuals are more likely to have an interest in providing a collective good, irrespective of the contribution of the other members.

- Intermediate and large groups are those in which individual members have little or no interest in providing a collective good because the initial costs are high. But whereas free riders are easily detected in intermediate groups, they are not noticeable in large groups. A degree of organisation is therefore needed to enforce cooperation. It can be tacit in intermediate groups, but will usually need to be formal in large groups.

Third, they also learn that stakeholders are more likely to engage in collective action to manage a common resource if benefits:

- Are easy to identify;

- Materialize sooner rather than later;

- Accrue to local and easily identifiable groups rather than remote, diffuse groups;

- Accrue to those who incur the costs.

Thus stakeholders are more likely to work together to build and/or manage a local irrigation scheme (with quick, easily identifiable benefits that go to those who build and maintain it), rather than a large scheme. Similarly, it will be difficult to organize a soil conservation scheme if the benefit is mainly the long-term improvement of watershed characteristics and the eventual reduction of occasional flooding in downstream communities.

Fourth, and following on from the previous paragraph, the theories point to the importance of learning, trust and leadership. Leadership is necessary at the outset, to create and "sell" a vision of what might be possible in the long term through cooperation. If success is gained with smaller and short-term issues, collective action can then evolve into more complex collaborative and institutional arrangements as members learn, and as trust and leadership further develop. An example is the "*Tosepan Titataniske*" Indian cooperative in Mexico, which started to break a monopoly of local fertilizer sales and now offers a very diverse range of services

including coffee processing and marketing, savings and loans, women's artisan groups, etc.

Fifth, all three theories point to the need to combine both positive and negative sanctions when organizing collective action. Some form of coercion is necessary to back up agreements.

Finally, the theories underline the role of outside intervention in NRM. Whether the enforcement of cooperation is to be done from outside or inside the group of resource users will greatly depend on the type of collective good (complexity of management, pressure on its use, etc.) and the organisation of the users (social relations, social and economic differentiation, etc). Experience shows however that even in communities where there is a strong sense of identity and social bonds, there are tendencies to evade individual responsibilities and violate the rules governing the collective goods, particularly if solidarity with a new group conflicts with traditional solidarities. A minimal set of regulations and institutions stimulated from outside is therefore necessary to encourage collective action. In cases where collective action is more unlikely to occur spontaneously at the local level, intervention at a higher organizational level (state, national or even international) may be necessary if the resource is to be managed sustainably for the benefit of all. The danger is that such "outside" intervention has often met with failure, especially where benefits remain difficult to quantify, or where local groups incur costs but are not subsidized by a wider group of beneficiaries.

Most current thinking on NRM therefore advocates negotiation between users or affected stakeholders to formulate solutions adapted to the particular situation. Co-management, for example, is adapted to users of a single resource with similar goals (e.g. fishing or irrigation water management). Resources that provide multiple uses (e.g. forests), require other forms of arbitration and decision making and will need more complex organizational systems, building on the traditional patterns and norms of resource management.

9 References and Acknowledgements

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