Chapter 3
Challenges of Managing Common Resources

Keywords Common goods · Public goods · Tragedy of the commons · Collective action · Institutional economics

This Chapter's Learning Goals
- You know the four categories of goods.
- You know the concepts tragedy of the commons and prisoner's dilemma.
- You know how the concept of tragedy of the commons is relevant for global and local environmental problems.
- You know approaches how the social dilemma could be solved.

3.1 What Is Meant by Tragedy of the Commons?

The starting point of the analysis is the so-called tragedy of the commons. **Common goods** (common pool resources) are those natural or man-made resources that serve all members of a given community and its institutions. Unlike private goods such as cars or mobile phones, all members have free access to common goods, i.e., the goods cannot easily be fenced off. Examples of common goods are water, fish, pasture, irrigation system, and animal populations. In addition to being difficult to exclude, common goods are characterized by a high degree of rivalry, that is common goods can be overused and polluted unless use limits are enforced (see Fig. 3.1).

The **tragedy of the commons** is often illustrated by the freely accessible pasture, where every farmer can take their cattle (Hardin, 1968). In this parable the area of land is fixed whereas the number of livestock is variable. In the original story, it is not possible for an individual farmer in a village to exclude colleagues from common use, as this is a so-called common area that belongs to everyone (the so-called commons). In a situation where every farmer only considers their private costs, the number of users constantly increases. In economic terms, only private costs are considered, and the individual farmer's calculation does not include the cost of

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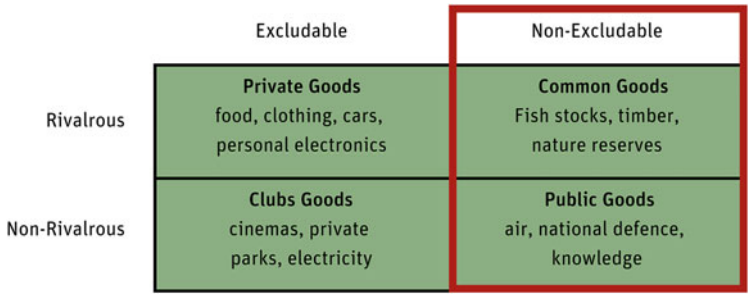

Fig. 3.1 The four different types of goods (source: own representation)

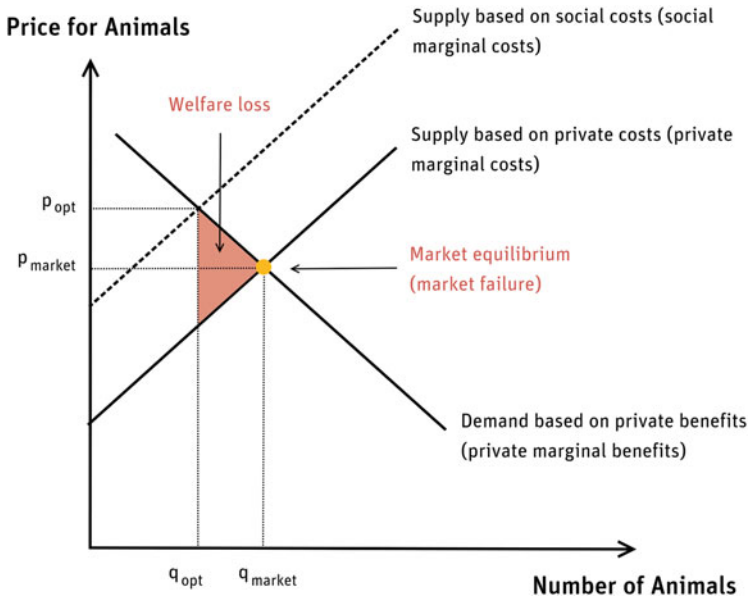

Fig. 3.2 How overuse of commons leads to welfare loss (source: own representation)

reducing the quality of the pasture. This can be depicted in a demand and supply diagram (see Fig. 3.2). Compared to a situation where farmers take into account the social, communal costs of land use, the number of animals q will ultimately be so high that the land will be overused and, from a communal point of view, too many animals will be kept ($q_{\text{market}} > q_{\text{opt}}$) ($q$ = available quantity), resulting in a loss of welfare depicted by the orange triangle. This idea can be transferred 1:1 to other examples such as fishing grounds or groundwater.

If the land belonged to one farmer, the farmer could limit the number of cattle grazing thus allowing the pasture to regenerate and sustain farming over a longer period. For sustainable land management, therefore, the area used must be limited or the ownership clearly regulated.

The problem is similar for public goods. **Public goods** cannot be excluded either. In contrast to common goods, however, there is no rivalry problem (see Fig. 3.1). Due to the lack of excludability, the problem arises here that too little of a good is provided and that there is little incentive to maintain it. This leads to individuals and groups free riding the provision of a good (e.g., education or clean air). This is something that the economist Mancur Olson wrote extensively about.

3.2 The Logic of Collective Action or the Prisoner Dilemma

Mancur Olson describes the problem in his book "**The Logic of Collective Action,**" in which he shows that a group or individuals have little interest in providing a public good such as clean air if that group/individuals cannot exclude other beneficiaries from its use. In other words: Why should someone contribute to a public good if he or she can also use it without actually having contributed to its creation?

While it would be in the interest of us all to be able to breathe clean air, there are no incentives at the individual level not to pollute the air. On the contrary, the individual incentives are such that free riding makes sense. In our example, why should a group or individual go to the effort of reducing air pollution if they know that everyone else will continue to pollute? Moreover, they know that they could benefit from other party's effort to reduce air pollution without making an effort themselves. **Free riders** pose a problem because, although individuals do not pay for the public goods (either directly through fees or tolls or indirectly through taxes or personal effort), individuals can still access or use the public goods. The goods may thus be underproduced, overused, or degraded, which is a similar outcome to the tragedy of the commons.

The **Prisoner's Dilemma** is an example from game theory which illustrates how cooperation often breaks down. It can also be used to show why a collective benefit for society may not be achieved. In this game individuals optimize their individual benefit, which is why the overall benefit for all participants is ultimately not maximized. The game situation of the Prisoner's Dilemma is as follows: Two prisoners have been accused of a string of crimes and are being interrogated separately. Since the evidence is poor, there are very few punishments for both without confession. The interrogator tries to play the two prisoners off against each other. If both confess, they both go to prison for 6 years. If neither confesses, they both have to spend 1 year in prison. If only one confesses, he goes free as a key witness and the other goes to prison for 10 years (see Fig. 3.3).

Both prisoners must now consider which strategy will bring the best result for them personally and independently of the actions of the other prisoner: should they confess or not confess? For player 1, regardless of what player 2 does, it is individually best to confess; both when player 2 confesses and when he does not confess, he will maximize his benefit ($6 < 10$ and $0 < 1$, respectively). Likewise, from an individual point of view, it is best for player 2 to confess. So, if the two prisoners act based on **individual considerations**, they will both confess and

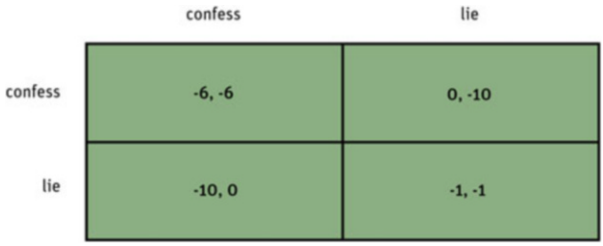

Fig. 3.3 Payoff matrix in a prisoner's dilemma (source: own representation)

accordingly both will go to prison for 6 years each. From a collective point of view, this result is not optimal. In total, the two prisoners will spend 12 years in prison. If the two prisoners would instead act as a community and both would not confess, they would only get 2 years in prison together.

In exactly the same way, although it is optimal for individual livestock farmers to keep as many cattle as possible on the common pasture, this does not lead to an optimal result from a collective point of view. If collective behavior is the desired outcome in such situations, appropriate framework conditions are needed. We will consider these framework conditions in the following sections.

3.3 Social Dilemma

Elinor Ostrom sums up this usage tragedy with the concept of the social dilemma. She defines the gap between the socially desired state and individual utility optimization as follows: "Social dilemma occur whenever individuals in interdependent situations face choices in which the maximization of short-term self-interest yields outcomes leaving all participants worse off than feasible alternatives." (Ostrom, 1998: 1)

For example, it would make sense for fishermen in a region to comply with jointly fixed fishing quotas to prevent stocks from overfishing. The collective restriction would result in a benefit for all. However, since each of the parties involved knows that they will gain more in the short term if they do not follow the rules and their colleagues behave cooperatively and in accordance with the rules, there is an individual incentive to disregard the rules. This in turn means that the outcome desired by society cannot be achieved. Examples of collective dilemmas can be found in various areas: starting with the provision of public goods such as schools or an army, through the prevention of negative environmental impacts, to the development of political conflict resolution mechanisms.

Table 3.1 How to encourage/enforce sustainable behavior

Mechanism	Market	State	Self-organization
Coordination	Entrepreneurial spirit and pursuit of profit	Power and political processes in order to internalize external costs	Ambition to maintain livelihoods; auto-organization of people
Instruments	Market and price	Economic incentives and regulations	Rules given by community
Examples	(Fair) trade products	Legislation on all levels; regulations of the commons (local and global)	Shared property; land/water/fishing communities

3.4 How to Cope with the "Tragedy of the Commons," Prisoners or Social Dilemma?

The only way to cope with dilemmas is to coordinate individual activities. Coordination can be organized by markets, state, or self-organization. Markets can be effective, providing all costs are considered. The state can regulate pollution or create new economic incentives. Self-organization is when communities, on their own initiative, create new rules to coordinate their activities. In reality, we often find a mixture of the three coordination mechanisms. Table 3.1 gives an overview of the three coordination mechanisms.

The perspective of **institutional economics** espoused by Elinor Ostrom (Governing the Commons), sees the solution to major social problems in self-organization and the combination of institutional mechanisms. Ostrom called this the third way. Based on the idea, that problems within a community are best solved by that community. The community therefore has to come to together to define and enforce rules. It is often not the market or the state that provides the central solutions for the resource management, but local and regional self-restraint, as they can be shaped by communities themselves. Classical examples of this are self-managed fish stocks, alpine management, or water regimes. Self-organization is particularly suitable for local and regional problems and represents an alternative management of public goods.

Real-World Example: Community-Supported Agriculture

In community-supported agriculture, food is no longer sold on the market, but flows into a transparent economic cycle organized and financed jointly with consumers. Specifically, this is an association of farms or market gardens with a group of private households. Producers and consumers form an economic community that meets people's needs and respects the natural environment.

Based on the estimated annual cost of agricultural production, this group agrees to pay a fixed amount to the farm each year in advance. This allows the producer to use good agricultural practices, keep the soil fertile, and produce

(continued)

according to demand regardless of market pressures. In return, buyers receive the entire harvest as well as processed products such as bread, cheese, etc. The personal connection makes people aware of their mutual responsibility. Consumers experience how their food choices not only shape the cultural landscape, but also promote social coexistence, nature conservation, and (species) diversity, thus enabling sustainable agriculture.

Source: www.solidarische-landwirtschaft.org

Literature

Ostrom, E. (1990). *Governing the commons. The evolutions of institutions for collective action*. University Press.

Ostrom, E. (1992). *Crafting institutions for self-governing irrigation systems*. ICS Press.

Ostrom, E. (1998). A behavioral approach to the rational choice theory of collective action presidential address, American Political Science Association 1997. *American Political Science Review, 92*(1), 1–22.

YouTube. (2011). Tragedy of the commons. Retrieved September 09, 2020, from https://www.youtube.com/watch?v=lwaNZgY9PCQ

Further Reading

Hardin, G. (1968). The tragedy of the commons. *Science, 162*(3859), 1243–1248.

Olson, M. (2009). *The logic of collective action: Public goods and the theory of groups, second printing with a new preface and appendix* (Vol. 124). Harvard University Press.