Chapter 1.3.4: Incentives to Promote the Sustainable Management of Natural Resources in Watersheds

A. General

Watersheds provide a wide range of goods and environmental services, such as clean water, which are fundamental for both people and the environment. Nowadays the demands for these goods and services are constantly growing. Yet the capacity of particularly upper watersheds to provide these goods and services is increasingly at risk because of the increasing environmental degradation which has been brought about by the overuse of resources, resulting from both population growth and economic development [1].

The Millennium Ecosystem Assessment has estimated that worldwide 60% of ecosystem services are either categorised as degraded or being used unsustainably [1]. Even though most governments have committed themselves in international conventions\(^1\) to undertake efforts to protect biodiversity and use forests, soil and water resources in a sustainable manner, action at the national and local levels often still lags behind. The degradation of ecosystems, such as watersheds, leads to dramatic losses of their functions, including the provision of various goods and environmental services\(^2\).

Incentive structures that promote inappropriate use or even outright misuse are often the reasons for such unsustainable use and degradation of natural resources. Many problems of unsustainable resource use result from inappropriate incentive structures, such as the lack of clearly defined property rights or the inadequate enforcement of existing rules. These inappropriate underlying incentive structures are often quite similar, regardless of whether water, forests, land, the atmosphere or biodiversity are at stake.

In this chapter we will introduce the concept of incentives, and also present a framework for their systematic analysis as well as the design of alternative incentive structures. We will also briefly report on this framework which has already gone through a process of pilot testing in the Mekong region.

B. Incentives to Promote the Sustainable Management of Natural Resources

An analytical framework that enables the systematic analysis of incentives and the design of alternative incentive structures has recently been developed by GTZ ([3], [4]). The framework is firmly rooted in the modern theory of environmental and institutional economics and is applicable to any kind of questions related to natural resource use. Additionally it provides a common terminology which is suitable for analysing incentives in various fields of natural resources management. An overview of this framework is presented in figure 1.

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\(^1\) See also: Chapter 2.1: International and Regional Policy Framework

\(^2\) See also: TA: Characteristics of Goods, Services and Property Regimes [1.3.3]
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The framework consists of two parts:

- **Part 1: Situation analysis** – “understanding present incentives” – consisting of steps 1 to 4
- **Part 2: Analysis of change** – “designing alternative incentives” – consisting of steps 5 to 8

The framework features can be practically applied and therefore have been used in several case studies throughout the world. It can be used to:

- Better understand the role of incentives in resource management
- Compare resource use problems and underlying incentive structures in order to benefit from these insights in future work
- Conduct ex ante as well as ex post analysis of plans and interventions
- Design and plan future interventions
- Improve the capacity for analysis

A summary of the framework’s key elements will be presented, but we will not discuss the individual steps as a separate technical annex. See: TA: Steps of the Incentives Analysis and Design Process [1.3.4]
**C. Part 1: Understanding Incentives**

Box 1: Incentives are factors that motivate human behaviour. These can be positive to promote certain behaviour, but they can also be negative incentives (disincentives) that deter people from doing something. Incentives can be classed as material and non-material, with an example of the latter being reputation and appreciation [3].

There are the following **three types of incentives** which motivate people’s behaviour towards the use of natural resources:

1. The characteristics of the goods and services themselves
2. The characteristics of the users, the community and other actors
3. The characteristics of the rules that have been put in place

(1.) The characteristics of the goods and services themselves will largely determine the incentives for their use, or in other words it will determine whether the goods and services are protected or exploited. Goods and services that are provided by watersheds, such as erosion control, the reduced risk of downstream flooding and the maintenance of water quality often have the features of public goods. Public goods and services are characterised by their non-excludability, which means that nobody can be excluded from enjoying the benefits of these goods and services, even if they do not pay for the privilege. For instance, every individual member of a downstream population benefits from high water quality, no matter whether he or she is involved in rewarding an upstream population for its maintenance. This is also known as “free riding behaviour” as individuals profit from someone else bearing the costs of a good’s provision. Maintaining the quality of public goods is sometimes also known as producing positive externalities. Unfortunately markets typically fail to compensate those who maintain the quality of public goods.

In contrast there are private goods, such as those that are provided by a privately owned forest, which will normally be managed more actively and sustainably, because their owners directly benefit from these actions. In summary, the beneficiaries of public goods and services have little or no incentive to pay for their supply or maintenance, largely because they can not be excluded from using them. So instead of paying for or maintaining them, there is a strong incentive for free riding behaviour. Where everybody adopts free riding behaviour, there will be absolutely no willingness to pay for public goods and services, and so they will not be actively maintained, and are likely to become degraded [8]. For details on the various categories of goods (public, private, etc), please refer to a separate technical annex⁴.

(2.) The characteristics of the users, the community and other actors determine the incentives to cooperate in the management of natural resources. A homogenous community, characterised by social cohesion, a sense of trust and agreed goals will already have strong incentives to manage their resources sustainably. On the other hand, a community in which power imbalances dominate, and in which there is competition over resources rather than cooperation in their management, will be lacking such incentives. This type of community will therefore have a greater tendency to misuse natural resources, and will have a more urgent need to create alternative incentive systems that encourage more sustainable management of its resources. The analysis takes into account the history and culture of the community, such as the origin of its members, their ethnicity, their language, as well as their religious and moral beliefs. It also considers social factors such as family structures, gender relations, the overall degree of social cohesion, the occurrence and resolution of conflicts and the opportunities that exist to gain

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⁴ See also: TA: Characteristics of Goods, Services and Property Regimes [1.3.3]
a reputation. Finally it reflects on economic factors such as livelihood strategies, the distribution of wealth and market access.

(3.) The characteristics of the rules that have been put in place need to be considered, as they are a major component of the overall incentive system. Both formal and informal rules, and the way in which they are enforced determine how natural resources are used. Laws and regulations that are inappropriate, inconsistent or technically flawed may be hard to follow. On the other hand, even the best laws and regulations will not create sufficient incentives for the sustainable management of resources unless they are enforced. There is a lack of such enforcement in many countries, and this has the effect of promoting the misuse of natural resources. The analysis registers the rules that exist with regard to resource use and considers whether they are formal or informal, reasonable, technically appropriate, contradictory, heeded or unheeded as well as enforced. It further considers who disobeys any of the rules and the reasons for such behaviour.

Through this analysis of incentives, a rather clear picture emerges of which incentives encourage, and which discourage the sustainable use of natural resources in a given context. The analysis provides an overall synthesis of the incentive structure, and indicates competing or conflicting, as well as dominant incentives. It highlights the present incentives to invest, to cooperate, to obey the rules and to consider the needs of future generations, to adopt rent seeking behavior⁵, etc. It provides answers to some of the following questions: Is it the contents of the rules or rather the lack of enforcement that leads to unsustainable practices? Are there any imbalances of power and access to information or one-way relationships that give people an easy opportunity to maximise personal rents?

D. Part 2: Designing Alternative Incentives

As a result of the before mentioned analysis of present incentives we can derive conclusions as to which measures would be appropriate to modify these incentives, and to stimulate particular behaviour patterns that would lead to more sustainable resource use. Some basic principles need to be considered when designing these alternative incentives:

- Incentive measures should be adapted according to the character of the goods and services. The sustainable management of a public good as opposed to a private good requires different kinds of incentives.

- Modifications of incentive structures should always refer to any existing rules and organisations, if this is at all possible and then use them as a starting point.

In the past governments tried to deal with problems related to the management of natural resources almost exclusively by opting for regulatory measures, namely conventional command and control instruments of environmental policy. Nevertheless, the reality in many settings shows that their application alone is insufficient in guaranteeing the protection and sustainable management of resources. It is for this reason that a much broader range of incentives needs to be considered.

As we have seen above, the fact that goods and services provided by watersheds often have the character of public goods, means that we specifically need to consider incentive measures that address problems related to the sustainable management of such public goods. There are three fundamental strategies that can be applied to address these problems:

- Privatise goods and services (“convert public goods into private goods”). Incentives and corresponding use and management patterns will then result from market forces

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⁵ Rent seeking occurs when an individual, organisation, or firm seeks to make money by manipulating the economic environment rather than by making a profit through trade and production of wealth [12].
and other mainly social stimuli such as reputation for instance. An example of privatisation would be granting individuals ownership or use rights to land, which was previously openly accessible to everyone.

- Develop management rules and activate them through the existing hierarchical structure (government, bureaucracy). Incentives mostly result from the avoidance of sanctions and penalties. As would be the case for example if one imposed resource use restrictions in a newly established protected area.

- Negotiate over and implement management rules by the user communities. In such events incentives would then largely depend on the characteristics of the community. An example of this would be the establishment of regulations for the management of a community forest by the community itself.

In order to design concrete incentive measures which are in line with the overall strategy that has been adopted, the analytical framework offers a range of measures from the following 4 categories:

1. Market based or economic
2. Regulatory
3. Cooperative
4. Information based

1.) Market based or economic measures influence prices and have an impact on people’s activities in the market place. Price changes can be brought about by taxes, subsidies and fees as well as other charges. They can also be brought about by privatisation through the assignment of property rights. The price of goods for instance usually rises sharply when their supply is reduced through the establishment of property rights. Price changes can direct investments, as well as management and consumption patterns towards a more sustainable resource use. The more expensive the consumption of a good is, then the higher people’s motivation is to use the good in an economical and efficient or in other words, a sustainable way. This also stimulates investments in new and more efficient technologies. Applying market based incentive measures presupposes that there is a market for the good or service in question. However this is often not the case with public goods and so markets first need to be created for them. The increasingly popular payment of environmental services (PES) approach aims to create such a market for public goods and services. Applying market based incentive measures obviously also presupposes the existence of the basic elements of a functioning market economy and land tenure regimes. Land tenure especially plays a key role in setting market based incentives or disincentives for the sustainable management of natural resources.

2.) Regulatory measures involve either governmental intervention based on for example governmental command and control measures that define and enforce the legal framework or on self regulation. Regulatory interventions are a necessity to ensure the existence of well-functioning markets. For example, functioning legal regulations for the public management of funds are often an essential requirement to establish functioning payments for environmental services. The building of a framework for markets includes (a) defining standards, norms and best practices; (b) setting sanctions and fines and determining liability rules; and (c) ensuring the protection of markets, as for example through social or ecological standards. Command and control approaches can not only support market based incentive measures but they can also replace these measures. This

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6 See also: Chapter 5.4: Financing Sustainable Natural Resources Management in Watersheds
7 See also: Chapter 1.3.3: Property Rights and Land Tenure Issues
8 See also: Chapter 2.3: National Legislation
would be the case for example when conservation measures are publicly financed and implemented by the state.

(3) **Cooperative measures** motivate people to change their resource use patterns by giving them the opportunity to participate in decision making and governance processes. Such measures include for instance the establishment of dialogue fora and participatory planning. Stakeholder participation often has a very positive impact, as it fosters an acceptance of the rules and hence their more effective enforcement. In addition, the cooperation of stakeholders in public decision-making helps to identify feasible solutions in a local context. Conflict management also contributes to an improved effectiveness of market based or regulatory measures.

(4.) **Information based measures** involve a wide variety of approaches. In the management of public goods, important measures include making the externalities visible and so thereby helping actors to understand the actual benefits and costs of particular management approaches. In the case of managing private goods, the introduction of alternative more efficient management techniques through training and information is able to provide strong incentives. This is because the owners of private goods will profit from related efficiency gains themselves, and therefore they are likely to adopt alternative techniques.

More detailed information on the actual measures that fall into the above mentioned categories is provided in a technical annex\(^9\). Actual examples of how some incentive measures have been applied in practice are provided in a case study\(^{10}\).

The most effective way to achieve sustainable natural resource management is by using a combination of incentive measures from several of the categories. Typically, there is the application of a combination of regulatory measures (“command and control”) together with the introduction of economic incentives\(^{11}\), as is demonstrated in box 2.

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\(^9\) See also: **TA: Overview of Incentives and Examples [1.3.4]**

\(^{10}\) See also: **CS: Incentives for Watershed Management in the Caribbean [1.3.4]**

\(^{11}\) See also: **Chapter 5.4: Financing Sustainable Management of Natural Resources in Watersheds**
Box 2: Incentives to Reduce Deforestation – an Example from the Brazilian Amazon [11]

If current trends continue, 40% of the Amazon rainforest will be destroyed by 2050. An international scientific project examined which incentive measures would be the most effective in reducing deforestation. It also assessed through the use of models the possible effects of a scenario with changed incentives in comparison to a business-as-usual-scenario in the period between 2000 and 2050. They deduced that the combination of the following incentive measures is most likely to reduce deforestation:

**Market based or economic measures**
- Incentives for the sustainable use of the natural forest resources, including payments for environmental services that are to be provided to small farmers who practice sustainable land use

**Regulatory measures**
- Command-and-control – effective implementation of Brazilian environmental legislation principally related to private land
- Creation and implementation of new protected areas and indigenous territories

**Cooperative / Information based measures**
- Agro-ecological zoning of land use in order to determine at a regional and local level, the areas which should be protected and those which can be used for economic purposes

Implementation of the above incentive measures is expected to reduce the rate of deforestation to less than half, as well as reduce related carbon emissions by some 16 giga-tons.

E. Pilot Testing of the Framework in the Mekong Region

Pilot testing of the framework in the Mekong region took place in the form of several workshops, which involved participants from all of the four lower Mekong Basin countries [2]. The objectives of these workshops were to: (a) apply the framework to case studies; (b) evaluate its relevance to the work of participants and its usefulness in analysing natural resource management problems in watersheds as well as proposing options as possible solutions; and finally (c) conclude whether the framework is considered suitable to be subsequently applied in a practical way. National workshops were also conducted in Cambodia and the Lao PDR in each of the respective riparian languages, and all course materials were also available in each tongue ([5], [6]).

There was a very positive evaluation of the relevance and potential applicability of the analytical framework by the workshop participants, they pointed out that its practical application is highly relevant for project analysis and planning, as well as for supporting policy design, among others. In a similar vein, the Canadian International Development Research Centre has recently identified the framework as a model, from which adaptations could be suitably applied to community based natural resource management in Cambodia [7].

**References and Sources for Further Reading**


