

Multiple Services from Alpine Forests and Policies for Local Development*

Ilaria Goio¹, Geremia Gios¹, Rocco Scolozzi² and Alessandro Gretter²

¹*Department of Economics, University of Trento*

²*Research and Innovation Centre, Fondazione Edmund Mach –Michele all'Adige (Trento)
Italy*

1. Introduction

The starting point of the analysis here presented is the concept of ecosystem services, which could help us appreciate natural systems as vital assets, recognizing the central roles that they play in supporting human well-being, either at the local or global level. In fact, ecosystem services provide benefits, in terms of goods and services, both to people living in the mountains and to people living outside them. At the moment, these services are seriously threatened, and “their global degradation is increasingly jeopardizing development goals” (OECD, 2008). As a consequence, it is necessary to reverse this trend while, at the same time, meeting the increasing demands of and interests in such services.¹

The focus of our study are the alpine forest ecosystems, which represent a fundamental resource for people living in mountain areas and for human society, in general.² In fact, it is commonly known that forests nowadays fulfil several other functions, in addition to what has been perceived as their main function (the productive one). These functions include the protective function, the landscape and recreational function and the ecological function. This functionality means that forests not only produce goods but also various social and environmental services,³ contributing, in many different ways, to the welfare of humans. This capacity is well summarized in the concept of “multi-functionality”. It is clear that “better understanding of the full range of goods and services supplied by forests is essential for optimal utilization of forests, and it may provide an economic rationale for sustainable forestry” (Lange, 2004).

* This paper is the result of its authors' common reflections. However, single sections have been written, as follows: Ilaria Goio wrote 1, 3, 4.1 and 6.1, Geremia Gios wrote 4, 5 and 6; Rocco Scolozzi wrote 2; and Alessandro Gretter wrote 6.2.

¹ “One of the most important problems that our society currently faces is how to strike a suitable balance between the conversion of natural capital to economic production and its conservation to provide ecosystem services” (Farley & Costanza, 2010).

² According to the Millennium Ecosystem Assessment (MEA, 2005) the “environmental conservation and sustainable land use in the world's mountains are not only a necessary condition for sustainable local livelihoods, but also for well-being of nearly half the world's population who live downstream and depend on mountain resources”.

³ Historically, the nature and value of these services have largely been ignored until their disruption or loss has highlighted their importance (Daily et al. 1997).

Within this framework, the main objective of this work is to define the management policies that allow efficient and effective use of goods and services produced by forests.

Clearly, these policies will differ in relation to the kinds of goods or services considered and also in relation to the specific socio-economic and environmental context of a given area. In particular, in our analysis, we will make reference to the landscape and recreational function and to its economic assessment, as partly learned by our working experience in the Alpine context of the Autonomous Province of Trento (Italy).

We would like to suggest to the public and local policy makers of the southern part of the Alps, some general economic policy instruments. The objective of these policy instruments is twofold: on the one hand, they permit policy makers the use (“with a sufficient flexibility in order to operate within constantly changing circumstances” [OECD, 1999]) of the above-mentioned goods and services. On the other hand, these policy instruments provide a useful support for orienting their action towards a territorial policy, which is able to give, from the perspective of sustainable development,⁴ equal justice to the economic, social, and environmental components of forests.

Within the process just outlined, a key role is played by the local and non-local stakeholders. That is, some stakeholders are the actors who provide environmental benefits, and therefore, have to be remunerated. Other stakeholders should pay for taking advantage of the environmental benefits. For this reason it is necessary to understand how the cited actors perceive the factors connected with sustainability, facilitating and promoting an enriching exchange of views, knowledge and initiatives. To provide a complete and reliable overview, these point of view exchanges should involve both public and private actors, creating new synergies and new partnerships in the area.

This chapter is structured as follows. The next section explains the principal characteristics of ecosystem services and section 3 provides some considerations about the multi-functionality of forests. In section 4, specific reflections on forest joint-productions are presented, including brief considerations of market factors and payment for ecosystem services. Section 5 focuses on the particular case of landscape and recreational services and section 6 illustrates some policy implications for public decision makers in the alpine areas, with particular reference to the need for a participative approach, and offers evidence from Alpine examples.

2. Ecosystem services from mountain areas

Ecosystems are complex systems that provide humanity with vital services through interacting ecological processes. With regard to mountain areas, forest ecosystems provide wood products and a wide range of non-wood products and services, e.g., regulation of the climate and water supply, purification of the air and drinking water, protection against soil

⁴ The Brundtland Commission's report, published in 1987, defined sustainable development as "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). Recently, the Research Institute for Humanity and Nature (Kyoto, Japan), proposed a reinterpretation of the sustainable development concept, referring to the idea of futurability. "Sustainability is a static and conservative concept that focuses on the continuation of the present-day anthroposphere (i.e., *sustainable parasitism*), although dynamic co-evolution between human and nature could be an alternative definition" (Newman, 2005). "In contrast, futurability is a more dynamic and ambitious concept that seeks truly sustainable and futureable human-environment interactions, namely *futureable mutualism*" (Handoh & Hidaka, 2010).

erosion and the support of soil fertility. Forest ecosystems also play an important role in the aesthetic and recreational values of landscapes, supporting increasing worldwide tourism. Studies conducted since the 1980s indicate that forest values may be much higher than timber values per hectare (Peters et al., 1989). As a consequence, there has been an increasing realization that many other products and services generated by forests are essential to the well being of local communities and are required by society at large. In particular, the FAO (2005) defined non-wood forest products as products and goods “that are tangible, of biological origin other than wood, derived from forests, other wooded land and trees outside forests.” These non-wood forest products include mushrooms, fruit, leaves, plants and animals collected or grown in forests, and they are used as food, fodder, medicine and raw materials for handicrafts. They have significance as cultural objects and as a source of income. This definition of non-wood forest products neglects intangible forest services (e.g., ecotourism, bio prospecting) and forest benefits (e.g., soil conservation, watershed protection and maintenance of biodiversity), which are clearly more difficult to assess and quantify than goods. Therefore, a new open system of terms for forest-dependent resources was proposed (Mantau et al., 2001, 2007): “Forest Goods and Services (FOGS), defined as resources of biological origin, associated with forests, other wooded land and trees outside forests”.

Specific typologies were proposed to describe the forest transactions (uses) of interest to facilitate analyses or marketing. They consider three basic levels: 1. resource, 2. product and 3. user.⁵

Each of these levels may be internally classified into many hierarchical levels. For example, the “resource” plant may provide a “product” such as erosion control for the “user” state, but may also offer a different “product,” such as fuel wood to the “user” local community. In effect, each resource may be structured into several products, and these products, in turn, are handled and consumed by many different user groups. A systematic taxonomy definition of goods and services (Mantau et al., 2001) may help in the examination and description of the value chains that are increasingly being developed as a basis for interventions to promote successful commercialization of FOGS.

Besides the FOGS, as defined above, the concept of ecosystem services better recognizes potential values for ecological/ecosystem processes *per se*. The MEA (2005) breaks ecosystem services into four different classes:

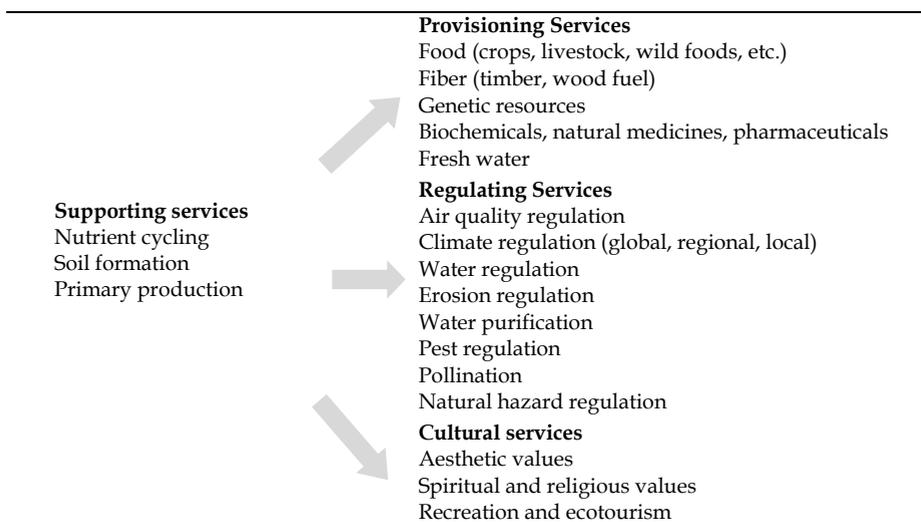
- *Provisioning services*, which are the products obtained from ecosystems, including food, fiber, fuel, genetic resources, ornamental resources, freshwater, biochemical, natural medicines, and pharmaceuticals.

⁵ In more depth:

- Resource: in the context of the forest, anything of biological origin that is of use to humans and the basis for any output. For instance, resources for goods are energy, carbon, land, water, materials, plants, foodstuff, fibre, medicine, extractives and live plants or animals.
- Product: anything that can be offered to a market that might satisfy a want or need. A product can be a simple marketable good (e.g., fuel wood) or service (e.g., recreation) or combination of both (i.e., composite products or commodities, such as Christmas tree markets and guided mushroom-picking walks).
- User: any group of people that benefits from a product. This category includes collectors, processors, middlemen, retailers and the end-user or client. It therefore describes the market or value-chain for a given product.

- *Regulating services*, which are the benefits obtained from the regulation of ecosystem processes, including air quality regulation, climate regulation, water regulation, erosion regulation, water purification and waste treatment, disease regulation, pest regulation, pollination, and natural hazard regulation.
- *Cultural services*, which are the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences, including cultural diversity, spiritual and religious values, knowledge systems, educational values, inspiration, aesthetic values, social relations, sense of place, cultural heritage values, recreation, and ecotourism.
- *Supporting services*, which are necessary for the production of all other ecosystem services.

Figure 1 summarizes well the different classes with reference to the mountain ecosystems. Mountains and their ecosystems provide all services from each of the four main MEA categories, as widely documented in the RUBICODE project.⁶



Source: modified from Patterson, 2009

Fig. 1. Broad categories of mountain ecosystem services

3. On forest multi-functionality

As described in the previous sections, it is commonly known that forests are defined as multi-functional⁷ assets, providing, at the same time, different goods, connected with the productive

⁶ This project, aiming at rationalizing biodiversity conservation in dynamic ecosystems, focuses on assessing the ecological resilience of those components of biological diversity essential for maintaining ecosystem services. It provides this focus in order to suggest priorities for biodiversity conservation policy on the basis of dynamic ecosystems and the services they provide (<http://www.rubicode.net>).

⁷ According to the OECD (2001), the term «multi-functionality» “refers to the fact that an economic activity may have multiple outputs and, by virtue of this, may contribute to several societal objectives at

function (such as timber and non-timber products), and services connected with the ecological functions (such as soil conservation and protection, watercourse protection, hunting, fishing, protection of biodiversity, and the carbon cycle). As presented in the figure 2, these outputs (goods and services) can be classified differently with respect to the parameters of rivalry and excludability (Fisher et al., 2009; Gios & Clauser, 2009; Patterson & Coelho, 2009) and, thus, with reference to forests. These outputs could be purely private (excludable and rival - timber and non timber products) or purely public (non-excludable and non-rival⁸ hydro-geological services). Moreover, there is a spectrum of forest goods ranging between purely private and purely public goods. Some of these “intermediate goods” are qualified as club goods (excludable and non-rival - landscape-recreational function) or as open access resources (non-excludable and rival) or “common-pool resources” (Hardin, 1968). This latter category characterizes many (not just natural) resources. Their need for management has led to the establishment of various institutions in the Alps since the 11th century. Notably, the Autonomous Province of Trento treats almost 60% of overall surface (over 3,000 Km²) land and goods as collective property and manages them as common-pool resources.

Usually, the productive function is defined as the «market function» while the others categories are referred to as «non market functions». In the first case, the forest generates some inputs for the productive processes that can be exchanged in the market and subsequently have a monetary value. Conversely, in the second case, the forest provides public goods (such as carbon sinks) and mixed goods (such as landscape and recreational values) that cannot be exchanged in the market, and therefore, cannot be priced. Moreover, as many studies have demonstrated and as we have already mentioned, “forests have a higher value than that solely connected to production aspects” (Goio et al., 2008).

We should consider that central to the debate on multi-functionality is the degree of the conjunction of the production of secondary goods compared to that of primary goods and the inevitability of this conjunction. Since the 1950s, some authors (Carlson, 1956; Marshall, 1959) have tried to define «joint-production» as involving things that cannot be produced separately, and are joined by a common origin. More recently, according to Shumway et al. (1984), “the joint production encompasses all production situations in which two or more outputs or products are interdependent”. These inter-linkages could arise for three different reasons:

1. “there are technical interdependencies in the production process;⁹
2. outputs are produced from a non-allocable input;
3. outputs compete for an (allocable) input that is fixed at the firm level”¹⁰ (OECD, 2001).

once. Multi-functionality is, thus, an activity-oriented concept that refers to specific properties of the production process and its multiple outputs.”

⁸ To briefly clarify, the term «non-rival» means that a unit of the good can be consumed by one individual without diminishing the consumption opportunities available to others, from the same unit. In contrast the term «non-excludable» refers to the situation in which it is physically or institutionally (i.e. through laws) impossible, or very costly, to exclude individuals from consuming a good.

⁹ Instead of $Y_1 = f_1(L_1, K_1, T_1)$ and $Y_2 = f_2(L_2, K_2, T_2)$, it is $Y_1 = f_1(Y_2, L_1, K_1, T_1)$ and $Y_2 = f_2(Y_1, L_2, K_2, T_2)$. Where:

Y = production

L = labour

K = capital

T = land

This means that, in the case of joint production, the production Y_1 is function not only of the usual production factors (L, K, T) but also of the production Y_2 and vice versa.

In the case of technical complementarities, (1) the products have to be produced together, or, in the other cases (2 and 3), outputs can be produced separately. However joint-production is cheaper because of the presence of economies of scope.

	Excludable	<u>EXCLUDABILITY</u>	Non excludable
RIVALRY	<i>PRIVATE GOODS</i>		<i>COMMON POOL RESOURCES (OPEN ACCESS)</i>
	timber and non-timber products		local fishing and hunting
	patented processes from genetic resources		access to genetic materials
	eco-tourism	Hunting and fishing licensing	carbon sequestration
	natural parks with entrance fees	water quality trough ecosystem protection	existence of species and ecosystems
	flood control trough ecosystem protection		
Non rival	<i>CLUB GOODS</i>		<i>PURE PUBLIC GOODS</i>
	Local	<u>LOCALITY</u>	Global

Adapted from Landell-Mills & Porras (2002); OECD (2001)

Fig. 2. Different utility flows provided by forests

A second critical aspect is that the time horizon is different depending on the output that is evaluated. The emphasis is usually on the market failures resulting from the difficult assignment of an adequate property rights system.

Within this framework, the multi-functionality aspects that assume greater significance, may be identified as the following: the “type and strength of the link between forest production and secondary products; synergies and trade-offs between the various forest products; specificity of the forest in the provision of services and products not directly commercial; and the fact that the market is unable to assign a price to many secondary products, thereby requiring public intervention” (Henke, 2004). In many cases, as stressed by Janse & Ottitsch (2005), “synergies and the integration of these various components/products is not always without conflict”.

¹⁰ $Y_1 = f_1(L_1, K_1, T_1)$ and $Y_2 = f_2(L_2, K_2, T_2)$ but $L < L_1 + L_2, K < K_1 + K_2, T < T_1 + T_2$. In this case Y_1 and Y_2 can be produced separately but the costs connected with the production factors are higher than those of the joint production.

Evidently, inappropriate means of development, such as excessive intensification, mechanization, over-exploitation of resources, environmental pollution and urbanization are only some of the factors that could increasingly threaten the multi-functionality of forest ecosystems. Hence, this ecosystem can continue to provide their goods and services, in a rapidly changing world, only if multi-functionality is taken into account in their management. As a consequence, as we discuss in detail in the following sections, with the objective of properly defining the management options and opportunities, it is important to characterize, precisely, the different utility flows performed by forests and to evaluate them.¹¹ It is clear that the choice of the policy tools that have to be adopted will be: "a) different, depending on whether the goods are private, public or mixed and on the kind of joint production carried out; b) strictly connected with the specific socio-economic and environmental context of a given area; and c) flexible in order to operate within constantly changing circumstances" (OECD, 1999).

4. Some specific reflections on forest joint-productions

In the case of forests, we are dealing with the two aspects of joint-production examined in the previous section. In particular, there is technical complementarities with reference to timber production and carbon fixation, and economies of scope with reference to the production of timber and the landscape. As a consequence, the non-commodity outputs are joint products with timber production. This circumstance means that joint products, that clearly create benefits for people living inside and outside the local areas, have different characteristics. In other words while timber is a market product that is "paid", the others are non-market products and are, therefore, "unpaid". It is important to point out the strong impact that the production of non-market outputs, has on the structure of the private costs related to market forest production. In fact, if the increase in private costs exceeds certain levels, this increase may affect the sustainability of the system. In such cases, the most effective solution is to pursue economies of scope rather than scale, because the costs to produce two or more outputs together are less than those for obtaining the same outputs through different production processes.

With the objective of maximizing the environmental externalities associated with forests, the production process should, consequently, be organized in a precise and defined way. The choice of many alpine areas has been and is so now, that of «natural forest management». The problem is that this kind of management causes an increase in the use costs, due to: a) higher cutting and logging costs, related to constraints on the maximum cutting area and to the need to adopt more environmentally friendly techniques.; b) constraints on the characteristics of forest's roads (reduced width, practicable by less efficient equipment); c) the acquisition of heterogeneous material (by species, diameter, features) imposes higher costs for the selection and start-up to the sale.

There are no specific researches able to quantify, in the alpine areas, the additional cost related to the natural forest management. However, some experts (Pollini et al., 1998) estimated that the increase is about 20-30 % of the forest utilisation. In addition, the natural forest management determines also a lower level in the production, and as a consequence, less available wood mass for the next links in the productive chain.

¹¹ The assessment and valuation of ecosystem services, since the seminal papers (Costanza et al., 1997), has "recently focused on an extensive research, with the number of publications increasing almost exponentially" (Fisher et al., 2009).

In particular cases, the cited circumstances lead to the abandonment of the cultivations or to damages to the non-market functions.

In the table 1, we try to link the possible private and social benefits, the different typologies of goods and services provided by forests. This classification occurs, largely, in the alpine context and, in particular, in the area that we are considering as our “case study”.

Typology	Private benefits	Social Benefits/Externalities
Forest products	Market based value	Production-chain activities
Hydro-geological	Preservation of forest soil, protection from erosion, landslides, floods	Preservation of lowland soil, water regulation
Climate regulation		Carbon fixation, air depuration
Landscape and recreation	Tourism	Recreational and aesthetic benefits

Table 1. Forest goods and services and private and social benefits

4.1 Brief considerations about markets and payment for ecosystem services

In regard to sustainable forest management,¹² it is necessary to pay particular attention to the costs of multi-functionality and to identify techniques that can internalize the positive externalities provided by forests. This effort will help ensuring a fair distribution of costs and benefits among the local population, the economic actors, the other stakeholders and the entire society. Many authors believe that important opportunities exist for provisioning forest ecosystem services, whether through “governance” (Gibson et al., 2000, 2005), “payment systems and markets” (Engel et al., 2008; Johnson et al., 2001), adjustments to life cycle processes, “or other means” (Patterson & Coelho, 2009). Clearly, as previously mentioned, this process is not easy because of the presence of utility flows that have the characteristics of public or mixed goods.

A category that has been widely analyzed in this context is that of the “Payment for Ecosystem Services” (PES). According to Muradian et al. (2010), the PES¹³ “are a transfer of resources between social actors, which aim to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources”. Wunder (2005) in particular, attributes the following features to the PES:

1. “a voluntary transaction where,
2. a well-defined environmental service (or a land use likely to secure that service),

¹² During the Second Ministerial Conference on Forest Protection in Europe, held in Helsinki in 1993, the following definition of «sustainable forest management» was introduced: “the correct management and use of forests and forest land in such ways and to such a degree as to conserve their biodiversity, productivity, renewal capacity, vitality and a potential that guarantees their important ecological, economic and social functions both now and in the future, at a local, national and global level without bringing damage to other ecosystems (www.mcpfe.org)”. The European Commission (2001), subsequently, stressed that “sustainable forest management is the fundamental aim of development in the forestry sector, where the term «sustainability» refers not only to the regular production of timber, in the forestry sense, but also to the whole range of environmental, economic and social services performed by forests”.

¹³ Having in mind that “democratic mechanisms for allocating essential and non-substitutable resources may be preferable to markets, at least until basic needs are met” (Farley & Costanza, 2010).

3. is being 'bought' by a (minimum one) service buyer,
4. from a (minimum one) service provider,
5. if and only if the service provider secures service provision (conditionality)."

Very few PES schemes achieve the standards proposed by Wunder (Muradian et al., 2010; Porras et al., 2008). "Generating adequate resources or ensuring a just distribution of payments may require non-voluntary approaches such as taxes or mandatory service charges" (Patterson & Coelho, 2009). Whether payments should be voluntary or coerced through taxation should in fact be determined by the physical characteristics of the resource (Farley et al., 2010; Kemkes et al., 2010). "Services dominated by private good characteristics are amenable to voluntary payments, while services with public good characteristics are not" (Patterson & Coelho, 2009).

5. The landscape-recreational function

In this framework, an example is represented by the last typology presented in the table 1. It is the landscape-recreational function, which we now further analyze.

Natural resources¹⁴ and, thus, forests, under certain conditions¹⁵ that we identify in this and the following sections, could guide the local development of mountain areas, ensuring that income arising from the territory remains with local communities. Although the concept of local development is very broad, according to Greffe (1989, 1990) it can be considered "a process through which a certain number of institutions and/or local people mobilise themselves in a given locality in order to create, reinforce and stabilise activities using, as well as possible, the resources of the territory." In addition, "local development policies can help to achieve sustainable development goals. In fact, they are based on facilitating structural adjustment and enabling economies and societies to adapt to changing conditions, combating social exclusion and maintaining social equilibrium, and making the best use of social, economic and environmental resources in the local area" (OECD, 1999). It should be noted that, the increasing globalization of the economy and changing technologies have opened new markets and new competition with regard to which local development policies need to offer new responses.

According to the paradigm of the total economic value (TEV)¹⁶, which mainly differentiates between use and non-use value, the landscape-recreational function can be subdivided into different components (Table 2). Specifically, "the recreational and scenic values require the direct use of the good: the first one derives from the possibility of carrying out tourist-recreational activities in environmental contexts of quality, and the second one is related to the benefits produced by observing certain typologies of landscape" (Goio et al., 2008). In contrast, the evocative value "derives from the desire that a landscape encompassing aesthetic functions should exist, and from knowing that its

¹⁴ According to Barbier (2002), "these resources should be viewed as important economic assets, which can be called natural capital".

¹⁵ We are referring, for example, to the control of natural resources, of investments and of legal and administrative rules.

¹⁶ "The concept of total economic value (TEV) is one framework that economists have developed for categorizing the various multiple benefits arising from natural systems" (Barbier, 2002). In particular, it is a tool for the assessment of the intrinsic value of environmental goods aimed at economic evaluation of all functions regardless of their market interest.

associated traditions, culture and lifestyles continue to exist through its conservation” (Novelli, 2005).

From the perspective of local development, each component is related to different management options and to different benefits for people living inside and outside the local area.¹⁷

<i>Recreational value</i>	Use value
- Areas with user-oriented management ¹⁸	
- Areas with resources-oriented management ¹⁹	
<i>Scenic value</i>	Use value
<i>Evocative value</i>	Non-use value

Source: Gios & Clauser, 2009

Table 2. Different components of the landscape-recreational function

In table 4 we present some of the possible ways for “internalizing” the landscape-recreational function.

As shown in table 4, these ways are related to the different kinds of goods or services considered. In the case of private goods related to “user-oriented management” the internalization could be a ticket or a fee, while in the case of public goods what is needed is public support. Finally, for mixed goods connected with resources-oriented management, an approach based on the management of “commons” is required.

Typology of goods	Target	Form of internalization
Private	Areas with user-oriented management	Ticket
Public	Landscape as scenery	Public support
Mixed	Areas with resources-oriented management	Approach based on management of “commons”

Table 3. How to internalize the landscape-recreational function

With reference to the landscape-recreational function it is necessary to introduce an element characterizing many mountain areas: the tourism activity. Although this activity can foster the economic development and is a source of employment for the local population, in some cases, it can, also, lead to an imbalance among the various components of ecosystems, producing negative trade-offs (Dollinger, 1988). These trade-offs, sometimes, become very difficult to manage.

¹⁷ “One particular landscape typically has different functions for different people” (Heilig, 2003).

¹⁸ We refer to areas that generate direct revenue. These include the following:

- areas with quick and excludable admission (e.g. adventure parks and golf courses) (Type I) and
- areas characterised by the provision of direct use¹⁸ services and ad hoc facilities accessible through the payment of fees (e.g. hunting, fishing and mushroom collection) (Type II).

¹⁹ Includes areas characterized by the provision of direct use, free of charge services (that is, open-access protected areas) that, under certain conditions, allow the creation of other sources of revenue (e.g. restaurants, hotels and guides) (Type III).

6. Some policy implications for decision-makers

In this framework, if the «ultimate aim» is the enhancement of the landscape-recreational function, a strategy able to incorporate jointly, forest management, the kind of landscape-recreational components and, finally, the characteristics of the tourism system has to be adopted. For this purpose, it is really important to take into account not only the specific characteristics of the forests, but also the system in which they are included. These considerations are summarized in the following table (n°4).

When the landscape is referred to as a specific resource for a well-defined project (for example an adventure park), the arrangements for tourist activities require large investments in equipment and structures with related management costs. In the area under consideration, cash flow can create, both directly and indirectly, jobs and sources of income. It also represents the underpinning of the traditional development pattern of some touristic districts, which has occurred since the 1960s in alpine areas. In other words, investments transform a public good into a private one. In contrast, in cases where the investments needed to utilize the natural resources are of small dimension, it is impractical to implement mechanisms of excludability from consumption, even if such mechanisms were technically feasible. It has to be noted that the forms of tourism, so-called “green” or “soft”, fall mainly into this category.

Forest Landscape as:	Touristic system	Forest utilization	Type of intervention
1) Specific resource (adventure park ²⁰)	Specific touristic project	Specialize areas oriented to a prevalent use	Active: equipment investments
2) Scenery	Weak and uni-directional links with the touristic system	maximization of biomass	Passive: diminishing the utilization, check fire and pest
3) “Complex” resource (visit to natural park)	Strong and bi-directional links with the touristic system	Naturalistic selvi-culture	Active: knowledge and dissemination investments

Table 4. Intervention related to tourism exploitation of forests

The central objective is to find, even in the case of landscape and recreational activities that do not require large investments, mechanisms that allow the enjoyment of those activities after a specific payment is made as a compensation supporting local development.²¹

²⁰ They are acrobatic paths realized in forested areas that allow direct contact with nature and the possibility of directly exploiting the trunks of the trees for the preparation of the various paths. These paths are very well developed in France, the United Kingdom (www.ttadventure.co.uk) and Italy (www.agilityforest.it).

²¹ A good example, in this context can be represented by the “Sentiero del Castagno” (Alto Adige, Italy, <http://www.valleisarco.info/it/attivita/estate/escursionismo/sentiero-del-castagno.html>) or “Les Route du Bois in Belgium, (www.lesroutesdubois.be).

In addition some further observation can be made. In the case of specific resources, the forest is managed to extract timber. However, this benefit is a “sub-product” because the dominant use of the forest is as an adventure-park. In the second case, where the forest is considered as scenery (for example in relation to sport use), an increase in the overall timber quantity produced, is a positive aspect. Its perceived value in fact increases, but the associated management costs, which clearly grow (for example for checking fires and pests), are not compensated by the market. Consequently a public support is needed. Finally, with respect to “complex resources” a double objective, related to tourism activity and timber production, has to be achieved. In this case, higher costs related to timber production should be compensated by tourism revenues. However that initiative requires investments to disseminate and share knowledge amongst the general stakeholders who use natural resources.

6.1 The need for a participative approach

The future development, especially of mixed goods in the Alps, will depend, largely, on the ability to involve local stakeholders in the environmental protection and promotion processes, establishing, at the same time, the priorities for each single area. Clearly, to make this involvement work, local actors should be able to direct the management of natural resources, in general, and of forests in particular, towards their own interests and needs. They also need to control the management options adopted.²² As known, the participative approach of local stakeholders has emerged in the last 15 years, following, precisely, the evolution of the concept of sustainable development. It is based on the belief that citizens are able to shape their own future. It is “thought up on the conviction that people are capable of defining their own future” (Jennings, 2000). As a consequence, “it uses capabilities and local knowledge to guide and define the nature of actions and strategies” (Jennings, 2000). Through efficient participative development processes, it is possible to take into account some territorial dimensions that are often neglected or not considered, such as traditions, beliefs and habits, thereby creating the preconditions for the implementation of spontaneous action by the communities involved. In the development initiatives related to the management of natural resources, however, this participation cannot be confined to the mere application of techniques to facilitate the involvement of larger social groups. On the contrary, it is fundamental that the stakeholders become aware of the issues related to natural, social and human capital, thus creating a shared sense of the problems and the basis for potential collective actions. Since sustainability refers to three different dimensions (environmental, social and economic), integrated and comprehensive territorial development is required. In order to pursue it, as already noted, it is necessary to understand how the stakeholders perceive the factors connected with sustainability, facilitating and promoting an enriching exchange of views, knowledge and initiatives. To obtain a complete and reliable overview, these exchanges should involve both public and private actors, producing new synergies and new partnerships in the area.

This field is very complex and a pre-eminent participative process does not exist, because the process “is perceived and implemented in different ways” (Buchy & Hoverman, 2000). In fact

²² According to Carpenter and Folke (2006) “management actions should be viewed as experiments that can improve knowledge of social-ecological dynamics if the outcome is monitored and appropriately analyzed”.

in the literature there are many different classifications of participation²³, "because of the concept give rise to a wide range of interpretations" (Lawrence, 2006). Some writers take into account the degree of involvement, which can be strong or weak. For the World Bank (1996), in fact, "participation is strong if there is a real influence on development decisions by local actors and weak in the case of a simple informative involvement concerning the implementation or benefits of a particular development activity". Other classifications (Rowe & Frewer, 2000) focus on the nature rather than the degree of engagement, identifying different types of public engagement by the direction of communication flows between parties. According to this view, information dissemination to passive recipients constitutes "communication", gathering information from participants is "consultation" and "participation" is conceptualized as two-way communication between participants and exercise organizers in which information is exchanged in some sort of dialogue or negotiation. Others (Biggs, 1989) describe the level of engagement as a relationship that can be "contractual", "consultative", "collaborative" and "collegiate". Finally, some engagements stand between pragmatic participation and normative participation. "The first focuses on process, suggesting that people have a democratic right to participate in environmental decision-making", while the second "arguments focus on participation as a means to an end, which can deliver higher quality decisions" (Reed, 2008).

For this reason, different kinds of participation can be implemented, in relation to: "a) the characteristics and conditions of any specific context, b) the aims that have to be realized, and c) the ability of the stakeholders to influence the final results" (Richards et al., 2004; Tippett et al., 2007). The literature urges to move towards a high degree of participation (Arnstein, 1969; Johnson et al., 2004) or to a strong participation, as defined by the World Bank (1996). In addition, several authors believe that the success of participatory processes should be institutionalized²⁴ (Richards et al. 2004). They require a) "a sufficiently detailed and clear description of the context and objectives" (Reed, 2008), b) "to identify appropriately and adequately the role of each actor, be it public or private" (Purnomo et al., 2005), to manage any conflicts, and c) to encourage the actors to develop an adequate motivation and ability to participate, triggering a process that might be called «educational»²⁵. This approach requires

²³ For example:

- "Participation is concerned with . . . the organised efforts to increase control over resources and regulative institutions in given social situations on the part of groups and movements hitherto excluded from such control" (Pearse & Stiefel, 1979);
- "Participation can be seen as a process of empowerment for the deprived and the excluded. This view is based on the recognition of differences in political and economic power among different social groups and classes. Participation in this sense necessitates the creation of organisations of the poor which are democratic, independent and self-reliant!" (Ghai, 1988);
- "Participation is a process through which stakeholders influence and share control over development initiatives and the decisions and resources which affect them" (World Bank, 1996);
- "Participatory development stands for partnership which is built upon the basis of dialogue among the various actors, during which the agenda is jointly set, and local views and indigenous knowledge are deliberately sought and respected. This implies negotiation rather than the dominance of an externally set project agenda. Thus people become actors instead of being beneficiaries" (OECD, 1994).

²⁴ If participation is a democratic right and not just a legislative goal.

²⁵ The issue is really one of education and politics: neither the general public nor decision makers appear to be well-informed concerning the relative contributions of ecosystem services and economic growth to our well-being" (Farley et al., 2010).

knowledge of each actor to check the degree of understanding and awareness of the project, with the aim of filling any gaps. Today, it is increasingly necessary to include in the participatory processes the so-called «experts»: a) "local stakeholders, namely those who have proven experience and knowledge (location-specific), not only scientific but also operational, in reference to the area and location of interest, b) the external stakeholders, namely those who truly understand the phenomena and who have a more scientific/universal knowledge" (McCall, 2003; Fraser & Lepofsky, 2004). These categories are generally involved "simultaneously" (Reed, 2007), because local knowledge combined with what science can contribute, leads to a more complete understanding of complex systems and processes (Johnson et al. 2004), as well as the learning pathways within each category and between the two categories.

6.2 Evidence from alpine examples: Logarska Dolina

As presented in table 4, specific economic and political tools need to be created in order for stakeholders to pursue local development. Payment for ecosystem services is rather common for some resources, but not for scenery and landscape services.

There are examples of fees connected with the touristic and recreational uses of alpine territories, but they are mainly not resource-related. Many local communities are requiring daily-payment from tourists, but they cannot be individuated as in the categories of Table 4 because their practices have general purposes and, sometimes, are not supportive of the maintenance of landscape. In fact, it is necessary to aim for payments capable of financing management activities devoted to preserving and enhancing the natural and forest features of the Alps.

The role of the participation of local inhabitants is clearly presented with reference to "Logarska Dolina": a valley seven kilometers long, covered by meadows and forests, with some waterfalls, is located in the northern part of Slovenia. The attraction of this area lies in its abundant natural sights, coupled with an almost pristine environment. It has been attracting hikers since the late 1800s. Also characteristic are the farmsteads, which have, over the centuries, aided in building a cultural landscape. This valley has recently been part of the network of the "European Destination of Excellence".²⁶

In 1987, the local council of Mozirje decided to create a "Landscape Park". However, there were not enough financial resources for protecting the local flora and fauna and developing the recreational and management structures needed. An additional problem has been the increasing number of tourists visiting the valley by car and creating such diseconomies as pollution, chaos, fires and rubbish.

The small local population (at that time, ten families with 35 persons) decided to prevent an excessive use of the local amenities. According to local oral norms, the land is private and it has not been divided over the centuries through inheritance. The only public property is the

²⁶ The population of this district is primarily engaged in forestry, animal husbandry and, most recently, tourism, the prosperity from which is largely supported by this area's great natural beauty. An unspoiled natural environment, coupled with the fact that this region had not been overdeveloped, has worked to the advantage of the local community. However, the people of the Solcava District are well aware that this pristine environment must be preserved at all costs. For this reason, they have chosen to develop high quality tourism, which emphasizes the individual, offering him peace as well as the opportunity to enjoy an active holiday in harmony with nature" (from official website www.logarska-dolina.si).

traffic road situated in the middle of the valley. Although some families were able to make a living through their occupations in agriculture and forestry, others might be interested in developing some services for tourists. The local population agreed that the option of direct management was the optimal choice, even though it involved delegating this activity to external bodies. In 1992, the council of Mozirje created a public company devoted to the management of the park of the Logarska Dolina valley. There are 14 members: ten local families, two companies owning houses in the valley for the recreation of their staff, the manager of the local hotel and a member of the local tourist board. Thus, decisions are made only by persons who are living in the valley or who have a strong interest in the valley. They are members who are aiming at long-term results by taking care of the cultural landscapes as well as the employment of locals.

A decision to introduce a fee for visiting the valley was made to reduce the number of cars and to restore a sense of quiet. The valley should be crossed, preferably, by foot, with tourists leaving their cars at the free parking places located on private land at the beginning of the valley. The entering fees generated most of the money needed to manage the public company. However, more recently, most financial support has been coming from external sources, such as those from the European Union or national government. The small managing board permitted a review of a sustainable model of development, which rejected the ideas of creating golf courses, tennis halls, or new buildings on land not utilized. Few developments were permitted other than nearby local farms in order to avoid landscape fragmentation. "We are creating our house, not a leisure park," reflects the main aim of the board of the public company. What has been created is a heating network, using biomasses, and a purification plant. Five permanent positions have been created for managing the local resources and the activity of the public company.

In 2008, the Logarska Dolina Valley was incorporated into a large park that included the surrounding three valleys of the Solcava district. The cooperative system of management was used as an example. However, it has not been incorporated into the new authority. "The sense of trust and reciprocity is easier when there are few persons involved and all of them are sharing almost the same interests; the largest and most direct right of participation is the better way of management" declared Avgust Lenar, the Director of the Logarska Dolina public company (CIPRA, 2007).

Similar communities, which required the payment of a fee for entering the territories, could be found within the Alps in Natural Parks or in some municipalities where some outstanding recreational or landscape features are located (Cimoliana Valley in Friuli, Italy, nearby the peaks of Cime di Lavaredo).

Dimensioning the population involved, the property regimes and the structure of the political and management organization is playing a relevant role in defining the participatory tools and the design of the development plan and strategies. As previously mentioned in Paragraph 6.1, there are no models that can easily be adapted for the Alps. Thus, there is need to adapt or create new participatory tools and strategies, paying particular attention to the characteristics of territory and stakeholders.

7. Acknowledgment

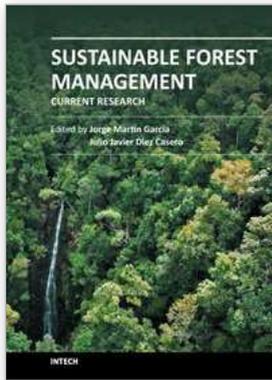
The authors would like to take this opportunity to acknowledge the Autonomous Province of Trento (PAT) for providing financial support for the research, carried out within the activities of the project "Public policies and local development: innovation policy and its effects on locally embedded global dynamics (OPENLOC)" (2008-2012; www.openloc.eu).

8. References

- Arnstein, A. (1969). A ladder of citizenship participation. *Journal of the American Institute of Planners*, vol. 26, pp. 216–233.
- Barbier, E.D. (2002). *The Role of Natural Resources in Economic Development*. CIES Discussion Paper 0227.
- Biggs, S. (1989). Resource-Poor Farmer Participation in Research: a Synthesis of Experiences From Nine National Agricultural Research Systems. OFCOR Comparative Study Paper, vol. 3. International Service for National Agricultural Research, The Hague
- Brundtland, G. (ed) (1987). *Our Common future*. The World Commission on Environment and Development. Oxford, Oxford University Press.
- Buchy, M., Hoverman, S. (2000). Understanding Public Participation in Forest Planning: a Review. *Forest Policy and Economics*, vol. 1, pp. 15-25.
- Carlson, S. (1956). *A study on the pure theory of production*. Kelley and Millman, New York.
- Carpenter, S.R., Folke, C. (2006). Ecology for transformation. *Trends in Ecology & Evolution*, vol. 21, pp. 309–315
- CIPRA, (2007). Implementing knowledge – making use of local potentials. In: CIPRA-Info 82, March 2007, pp. 26-30.
- Costanza, R., d'Arge, R., de Groot, R., Farberk, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neil, R.V., Paruelo, J., Raskin, R.G., Suttonk, P., van den Belt, M. (1997). The value of the world's ecosystem services and natural capital. *Nature* vol. 387, pp. 253-260.
- Daily, G.C., Alexander, S., Ehrlich, P.R., Goulder, L., Lubchenco, J., Matson, P.A., Mooney, H.A., Postel, S., Schneider, S.H., Tilman, D. and Woodwell, G.M. (1997). Ecosystem services: benefits supplied to human society by natural ecosystems. *Issues in Ecology* vol. 2. Ecological Society of America, Washington D.C.
- Dollinger F. (1988). Die Salzburger Naturraumpotentialkartierung. Theoretische Grundlagen des Projektes aus der Sicht des Naturraumpotentialkonzeptes und Ableitung von Bearbeitungsrichtlinien. *Mitteilungen und Berichte des Salzburger Institutes für Raumforschung*, 3+4/1988.
- Engel, S., Pagiola, S., Wunder, S. (2008). Designing payments for environmental services in theory and practice: an overview of the issues. *Ecological Economics*, vol. 65, pp. 663–674.
- European Community Commission (2001). Ambiente 2010: il nostro futuro, la nostra scelta. Sesto programma di azione per l'ambiente. *Comunicazione della Commissione al Consiglio, al parlamento Europeo, al Comitato Economico e Sociale e al Comitato delle Regioni*. COM (2001) 31 definitivo, Bruxelles, 24.1.2001.
- FAO (2005). Third expert meeting on harmonizing forest-related definitions for use by various stakeholders, *Proceedings* FAO, Rome, 17–19 January 2005
- Farley, J., Aquino A., Daniels A., Moulaert A., Lee D., Krause A. (2010). Global mechanisms for sustaining and enhancing PES schemes. *Ecological Economics*, vol. 69, pp. 2075–2084.
- Farley J, Costanza R. (2010). Payments for ecosystem services: From local to global. *Ecological Economics*, vol. 69, pp. 2060–2068.
- Fisher, B., Turner, R.K., Morling, P. (2009). Defining and classifying ecosystem services for decision making. *Ecological Economics*, vol. 68, pp. 643-653.
- Fraser, J., Lepofsky, J. (2004). The use of knowledge in neighborhood revitalization. *Community Dev. J.*, vol. 39 (1), pp. 4–12.
- Ghai, D. (1988). Participatory Development: Some Perspectives from Grassroots Experiences'. Discussion Paper No. 5., UNRISD Geneva.
- Gibson, C., McKean, M.A., Ostrom, E. (2000). *People and Forests: Communities, Institutions, and Governance*. MIT Press, Cambridge.

- Gibson, C., Ostrom, E., Williams, J.T. (2005). Local enforcement and better forests. *World Development*, vol. 2, pp. 273–284.
- Gios, G., Clauser, O. (2009). Forest and tourism: economic evaluation and management features under sustainable multi-functionality. *iForest* 2, pp. 192-197. Article available online at: <http://www.sisef.it/iforest/>
- Goio, I., Gios, G., Pollini, C. (2008). The development of forest accounting in the province of Trento (Italy). *Journal of Forest Economics*, vol. 14, pp. 177–196.
- Greffe, X. (1989). *Decentraliser pour l'Emploi. Les Initiatives Locales de Développement*. Economica. Paris
- Greffe X. (1990). Le Développement Économique Local, *Commissione Europea DGV*, Bruxelles.
- Handoh, I.C., Hidaka T. (2010). On the timescales of sustainability and futurability. *Futures* vol. 42, pp. 743–748
- Hardin, G. (1968). The Tragedy of the Commons. *Science*, 162 (3859), pp. 1243-1248.
- Heilig, G.K. (2002). Multifunctionality of Landscapes and Ecosystem Services with Respect to Rural Development. In *Sustainable Development of Multifunctional Landscapes*, Helming, K., Wiggering, H. (Eds.). Berlin, New York (Springer Verlag)
- Henke, R. (2004). *Verso il riconoscimento di una agricoltura multifunzionale. Teorie, politiche, strumenti*. Edizioni Scientifiche Italiane, Roma, Italy.
- Janse, G., Ottitsch, A. (2005). Factors influencing the role of non-wood forest products and services. *Forest Policy and Economics*, 7, pp. 309–319.
- Jennings, R. (2000). Participatory Development as New Paradigm: the Transition of Development Professionalism, Prepared for the “Community Based Reintegration and Rehabilitation in Post-Conflict Settings” Conference Washington, D.C.
- Johnson, N., White, A., Perrot-Maitre, D. (2001). Developing Markets for Water Services From Forests: Issues and Lessons for Innovators. Forest Trends, World Resources Institute, and The Katoomba Group, Washington, DC.
- Johnson, N., Lilja, N., Ashby, J.A., Garcia, J.A. (2004). Practice of participatory research and gender analysis in natural resource management. *Natural Resources Forum*, vol. 28, pp. 189–200.
- Kemkes, R. J., Farley J., Koliba C. J. (2010). Determining when payments are an effective policy approach to ecosystem service provision. *Ecological Economics*, vol. 69, pp. 2069-2074
- Landell-Mills, N., Porras, I. (2002). *Silver bullet or fool's gold? A global review of markets for forest environmental services and their impacts on the poor*. Instruments for sustainable private sector forestry series, IIED, London, UK.
- Lange, G.M. (2004). Manual for Environmental and Economic Account for forestry: a tool for cross-sectoral policy analysis. *Working Paper*, FAO, Forestry Department, Rome, Italy.
- Lawrence, A., 2006. No personal motive? Volunteers, biodiversity, and the false dichotomies of participation. *Ethics, Place and Environment*, vol. 9, pp. 279–298.
- Mantau, U., Mertens, B., Welcker, B., Malzburg, B. (2001). Risks and chances to market recreational and environmental goods and services -- experience from 100 case studies. *Forest Policy and Economics*, vol. 3, pp. 45-53.
- Mantau, U., Wong, J.L.G., Curl, S., 2007. Towards a Taxonomy of Forest Goods and Services. *Small-Scale Forestry*, vol. 6, pp. 391-409.
- Marshall, A. (1959). *Principles of economics*, Macmillan, London.
- McCall, M.K. (2003). Seeking good governance in participatory-GIS: a review of process and governance dimensions in applying GIS to participatory spatial planning. *Habitat Int.*, vol. 27, pp. 549–573.

- Millennium Ecosystem Assessment (MEA) Reports, (2005). Ecosystems and Human Well-being: Current State and Trends. Chapter 24 "Mountain Systems". Island Press, Washington, USA.
- Muradian, R., Corbera, E., Pascual, U., Kosoy, N., May, P.H. (2010). Reconciling theory and practice: an alternative conceptual framework for understanding payments for environmental services. *Ecological Economics*, vol. 69, pp. 1202–1208.
- Newman, L. (2005). Uncertainty, innovation, and dynamic sustainable development, *Sustain. Sci. Pract. Policy*, vol. 1, pp. 25–31.
- Novelli S., 2005. Aspetti economici e politici della conservazione del paesaggio rurale. Definizione delle strumento di indagine per una valutazione economica nell'astigiano. Tesi di dottorato ciclo XVI. Facoltà di Agraria, Università degli Studi di Torino.
- OECD, (1994). *Promoting Participatory Development*, Paris.
- OECD, (1999). *Best Practices in Local Development*. LEED, Notebook, 27, Paris.
- OECD, (2001). *Multi-functionality. Towards an Analytical Framework*. Paris.
- OECD, (2008). *Strategic Environmental Assessment and Ecosystem Services*, Paris.
- Patterson, T.M., Coelho, D.L. (2009). Ecosystem services: Foundations, opportunities, and challenges for the forest products sector. *Forest Ecology and Management*, vol. 257, pp. 1637–1646
- Pearse A., Stiefel M. (1979). *Inquiry into Participation*, UNRISD, Geneva
- Peters, C.M., Gentry, A.H., Mendelsohn, R. (1989). Valuation of an Amazonian Rainforest. *Nature*, vol. 339, pp. 655–656.
- Pollini, C., Spinelli, R., Tosi, V. (1998). *Tecniche per una gestione multifunzionale durevole dei boschi della montagna alpina: l'esperienza del progetto LIFE in Trentino*. Comunicazione di ricerca 98/1 I.T.L. C.N.R. S. Michele a/A (Tn), Grafiche Artigianelli, Trento
- Porras, I., Grieg-Gran, M., Neves, N. (2008). *All That glitters: A Review of Payments for Watershed Services in Developing Countries*. The International Institute for Environment and Development, London.
- Purnomo, H., Mendoza, G.A., Prabhu, R., Yasmi, Y., (2005). Developing Multi-Stakeholder Forest Management scenarios: a Multi-Agent System Simulation Approach Applied in Indonesia. *Forest Policy and Economics*, vol. 7, pp. 475–491.
- Reed, M.S. (2007). Participatory technology development for agroforestry extension: an innovation-decision approach. *African Journal of Agricultural Research*, vol. 2, pp. 334–341.
- Reed, M.S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, n° 141 (10), 2417–2431
- Richards, C., Sherlock, K., Carter, C. (2004). Practical Approaches to Participation. Socio-Economic Research Programme (SERP). The Macaulay Institute, Aberdeen.
- Rowe, G., Frewer, L. (2000). Public participation methods: a framework for evaluation in science. *Technology and Human Values*, vol. 25, pp. 3–29.
- Shumway, C.R., Pope, R.D., Nash, E.K. (1984). Allocable fixed inputs and jointness in agricultural production: implications for economic modeling", *American Journal of Agricultural Economics*, n° 66(1), pp. 72–78.
- Tippett J., Handley J.F., Ravetz J., 2007. Meeting the challenges of sustainable development – A conceptual appraisal of a new methodology for participatory ecological planning. *Progress in Planning*, vol. 67, pp. 9–98.
- World Bank, (1996). *The World Bank Participation Sourcebook*. Washington D.C..
- Wunder, S. (2005). Payments for Environmental Services: Some Nuts and Bolts. Occasional Paper No. 42. Center for International Forestry Research, Nairobi, Kenya.



Sustainable Forest Management - Current Research

Edited by Dr. Julio J. Diez

ISBN 978-953-51-0621-0

Hard cover, 454 pages

Publisher InTech

Published online 23, May, 2012

Published in print edition May, 2012

Sustainable forest management (SFM) is not a new concept. However, its popularity has increased in the last few decades because of public concern about the dramatic decrease in forest resources. The implementation of SFM is generally achieved using criteria and indicators (C&I) and several countries have established their own sets of C&I. This book summarises some of the recent research carried out to test the current indicators, to search for new indicators and to develop new decision-making tools. The book collects original research studies on carbon and forest resources, forest health, biodiversity and productive, protective and socioeconomic functions. These studies should shed light on the current research carried out to provide forest managers with useful tools for choosing between different management strategies or improving indicators of SFM.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Ilaria Goio, Geremia Gios, Rocco Scolozzi and Alessandro Gretter (2012). Multiple Services from Alpine Forests and Policies for Local Development, Sustainable Forest Management - Current Research, Dr. Julio J. Diez (Ed.), ISBN: 978-953-51-0621-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-forest-management-current-research/multiple-services-from-alpine-forests-and-policies-for-local-development>

INTECH

open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821