

Economic valuation of forest goods and services, Tunisia

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1. What was the problem?

Forest ecosystems in Tunisia are very valuable, by providing a wide array of goods and services that improve the well-being of the Tunisian society as a whole. The values that Tunisian forest ecosystems provide, however, remain mostly non-marketed, and the actual financial revenue generated from Tunisian forests is currently low. Furthermore, free access to forest resources induces an overuse of forest products that leads to forest degradation, especially when existing forest regulations are not enforced.

Conserving and expanding Tunisian forests requires large investments. But can they be justified from an economic point of view? A study conducted by the National Forest Programme (NFP) and the Food and Agricultural Organization (FAO) addressed this question. This work, led by the Society of Natural Sciences of Tunisia (SNST) and supervised by the Department of Forestry (DGF), mobilized five experts from different disciplines during 2011-2012. The study aimed at estimating the Total Economic Value (TEV)¹ of Tunisian forests.

2. Which ecosystem services were examined and how?

According to the TEV framework, the study examined the following ecosystem services: provision of wood, non-wood forest products (NWFP), grazing habitat, potential for hunting and recreation, watershed protection, carbon sequestration and biodiversity conservation. In addition to these positive outputs, the study captured the value of negative externalities induced by the current pressure on forests, such as deforestation and forest degradation due to forest fires, as well as agricultural damages caused by wild fauna.

¹ The TEV classifies the goods and services in two categories according to how the society benefits from them: (1) use values, which includes direct, indirect and option values; and (2) non-use values, which comprises existence and bequest values.

a) Methods:

The study used different methods for the biophysical and economic valuation of forest benefits. The **biophysical quantification** of the forest cover in terms of forage production, prevention of sedimentation and carbon sequestration was primarily based on existing forest inventories (of 1989 and 1998-2001), other cartography, remote sensing, sampling and GIS models. Use of these sources helped determine the area, wood increment, biomass and forage production by type of forest and region.

In addition, the impact of forest cover on sedimentation was estimated as the difference in sedimentation rates in two situations - if the forest cover exists and without forest cover. The sedimentation rates were estimated using different models of soil losses such as Morgan, Morgan and Finney (MMF)², and Pacific Southwest Inter-Agency Committee (PSIAC)³. Carbon sequestration was estimated using the IPCC model and biomass data from the forest inventories.



Figure 1: Provision of grazing habitats in forest areas is important for local livelihoods



Figure 2: Forests play an important role in reducing sedimentation

Secondly, the **economic valuation** of the multiple goods and services was based on different methods:

- market price method (timber and fuelwood, some NWFP, hunting, carbon sequestration),
- price of substitute goods (forage, some NWFP),
- method of benefit transfer (recreation),
- production function approach (watershed protection),
- preventive expenditures (biodiversity conservation),
- damage costs (forest fires and deforestation),
- replacement costs (damages caused by forest wildlife).

These methods were first applied to two case studies representative of the two main forest ecosystems in Tunisia, and then to the whole of Tunisian forests. The first case study concerns Barbara watershed where cork oak forests contributes to dam protection. Similarly, for the second site, Siliana watershed, the Aleppo pine contributes to the protection of the downstream dam, in addition to the provision of other products and services.

² MMF estimates the soil loss induced by the sloping erosion.

³ PSIAC estimates the quantity of sediment based on different factors that describes the watershed, the climate, the soil, etc.

b) Results:

Results show that the TEV of Tunisian forests amounted to USD 142 million in 2010, corresponding to USD 120/ha⁴. This TEV represents 0.3% of GDP, and 20 times the value of net benefits generated by forest products sold by the state. Grazed forage represents the main benefit with 55% of TEV, followed by the protection against soil erosion with 21% (Figure 3).

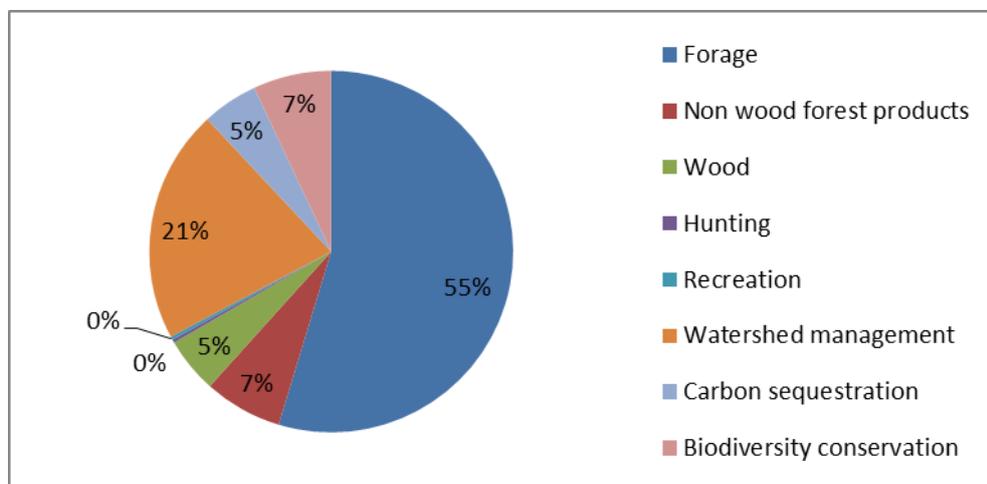


Figure 3: Distribution of the value of forest goods and services in Tunisia in 2010

At the same time, the overuse of forest resources and forest fires usually cause high social costs associated with the loss of current and potential future productions, carbon emissions, land degradation and loss of biodiversity. Furthermore, the lack of sustainable management plans for wildlife stock can cause significant damage to surrounding farmlands. These external costs reduce the total current benefits of forests by about 6% (FAO/DGF 2012b).

The distribution of the forest value among stakeholders shows that local populations are the main forest beneficiaries, capturing 61% of total benefits, mainly through opportunities for livestock grazing. The Tunisian society as a whole benefits from 22% of TEV, through soil and water conservation. The international community receives 12% of the TEV through carbon sequestration and biodiversity conservation. Finally, the state of Tunisia benefits from 5% of the forest benefits through sales of forest products, such as cork and wood.

Most forest area in Tunisia is under public ownership. Nevertheless, local inhabitants are officially designated as 'forest users'⁵, with legal use rights, because they rely on forest resources to fulfill most of their daily basic needs. About 7% of Tunisia's total population (nearly 760,000 people) lives within or in the vicinity of forest areas (FAO/DGF 2012a). For them, the value of forest benefits is estimated at about \$120/capita per year, and nearly one third of their income is derived from activities using forest resources (animal husbandry, fuelwood and fruits collection and commercialization, charcoal and honey production).

⁴ Other estimates indicate US\$69/ha in Algeria and US\$94 Morocco (updated from Merlo and Croitoru 2005 to year 2010). However, these values are not directly comparable, due to differences in valuation methods and data scarcity for some individual benefits.

⁵ The Forest Code guarantees the right of use for local populations restricted to the satisfaction of family needs, from non-protected areas only, without causing any degradation.

3. Did the examination of ecosystem services generate impacts on decision-making or policies and, if so, how?

The forest strategy in preparation (2012-2021) states that there is an increased awareness for financing forest interventions in accordance with the direct and indirect contributions of the forest and the diversity of goods and services provided. It should also take into account the interests of different stakeholders. In addition, there is a need for integration of forest policy into national policies devoted to sustainable development in general, and particularly into the different strategies adopted by the major sectors of agriculture, such as forage production, the protection of water reservoirs against siltation, conservation of soil and water and crop protection.

Thus, each project or intervention should be subject to a correct assessment of all costs and benefits that are generated locally (forage production), at the national level (reducing erosion, conservation of water resources) and globally (carbon sequestration) in order to identify the best alternative from a social perspective.

In addition to the numerous studies about valuation of goods and services, the questioning of previous forest strategies and a new orientation in forest development towards improving livelihoods in remote forest areas under involvement of different stakeholders suggests the establishment of tools and instruments that enhance the provision of forest goods and services.

Different levels of valuation provide different types of results which can be used in different ways. At national level, orientation should be given to integrate grazing and watershed conservation in rural management strategies and plans, revise forest products tariffs and develop forest value chains. At local level, economic evaluation studies integrating forest services demonstrate that it is worth planting forest species such as acacia and eucalypt in eroded areas instead of cereals. Nevertheless, financing mechanisms are needed to insure tradeoffs between private income and social benefits.

4. Lessons learned

The major challenge is how to conciliate between the production of forest environmental services on one hand, and the socio-economic development of local inhabitants on the other hand. Foresters have to demonstrate that improved forest management, with the active participation of local populations, can effectively enhance environmental services, and improve livelihoods of local users. Policy and economic instruments should be developed in order to involve tradeoffs between the environmental concerns and the objectives of poverty alleviation and national development. For example, management and conservation should be accompanied by a compensation system for income losses. In addition, one of main lesson learned is that it might be worth to further develop the idea of creating a *Forest Development Fund*, funded by a tax on products and services provided by forests.

References:

Daly-Hassen H. and Ameur Ben Mansoura (2005): Chapter 7 - Tunisia, pp. 105-122. In: M. Merlo and L. Croitoru (Eds), *Valuing Mediterranean Forests: Towards Total Economic Value*. CABI Publication, Cambridge, Mass, USA, 406 p.

Daly-Hassen H., Américo Mendes, Jean de Montgolfier, et Pere Riera (2010): Biens et services fournis par les espaces boisés méditerranéens : économie et politique, 12 p. In :

Actes de la Troisième Conférence Scientifique Méditerranéenne du Groupe Inter-Académique pour le Développement : Biodiversité des Arbres et Espaces Boisés Méditerranéens, Alexandrie, Egypte, 22-24 Juin 2010.

Daly-Hassen H., Riera P., Mavsar R., Gammoudi A., (2010): Valuing the tradeoffs of Tunisian plantation forests: A Choice experiment application. *XXIII IUFRO World Congress. 23-28 August 2010, Seoul, South Korea*

FAO (Food and Agriculture Organization) / DGF (Direction Générale des Forêts) / SSNT (2012): Economic valuation of goods and services of Tunisian forests (in French), elaborated by H. Daly-Hassen, L. Croitoru, K. Tounsi, A. Aloui and S. Jebari.

Merlo M., Croitoru L. (Eds.) (2005) : *Valuing Mediterranean forests: Towards total economic value*. CABI Publishing, Cambridge, Mass, USA, 406 p.