CHREA NATIONAL PARK, ALGERIA

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WHAT IS THE PROBLEM?

In Algeria, the policy of preserving natural resources through the creation of protected areas fully financed by the State is facing major difficulties on the ground, such as: usage conflicts between the various sectors, with development projects often taking precedence over the protection of habitats; management costs that are increasingly difficult for the administrations responsible for these areas to bear; additional costs caused by the degradation of ecosystems providing goods and services; and increased pressure from local populations, whose increase in number and uncontrolled access complicates and aggravates this degradation.

Pilot site description

Chréa National Park is located 50 km South-West of Algiers over an area of 26,587 ha, 85% of which is woodland. It was created by Decree no. 83.461 of 27 July 1983 and classified by the UNESCO "Man and the Biosphere" programme as a Biosphere Reserve in 2002. The natural vegetation includes pure or mixed forest formations, with a variety of dominant species, including the Atlas cedar (endemic species), cork oak, evergreen oak, Algerian oak, Aleppo pine and Barbary thuja. It is also home to extensive flora and fauna biodiversity (representing 36% and 25% of national biodiversity respectively).

Users include a resident population, estimated at 6,000 inhabitants, and a non-resident population, primarily represented by tourists and second-home owners, estimated at 2 million visitors each year.

The pilot site was chosen because:

- it presents a large range of ecosystem goods and services,
- the goods and services are well conserved (protected area) and can serve as a reference and point of comparison for other more degraded sites,
- there is longstanding and ongoing collaboration with ecological researchers.

Goods and services selected for the study

The goods and services selected are representative of the environmental and socio-economic issues at a local, regional and national level. They are also directly covered by the site's management objectives and are included in the priority objectives listed in the management plans for the site and other nearby protected areas.

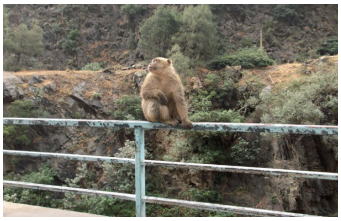
Three goods and services have been selected:

1. Water purification (regulation):

The supply of water for local populations to drink and for irrigating the region's farmland is heavily dependent on the pilot site's water resources and the regulation and purification role of woodland ecosystems.

2. Recreation associated with the Barbary macaque monkey (culture):

This study contributes to the implementation of a ecotourism that is organised, economically viable (possibility of self-funding) and ecologically sustainable (preservation of Barbary macaque monkey populations which have been negatively impacted by excessive visitor numbers).



3. Arbutus berry picking (supply):

Optimising and rationalising the picking of these products in government-owned forests requires better management of uses and the usage rights granted to resident communities. It is likely to alleviate usage conflicts in these areas.

A TWO-STEP ASSESSMENT: ECONOMIC VALUE AND COSTS-BENEFITS ANALYSIS

Socio-economic assessment in baseline conditions

The following economic assessment methods were used: the cost-based method for the "water purification" service, the travel-cost method and the contingent valuation method for the "recreation associated with the Barbary macaque monkey" service, and the market price method for the "arbutus berry picking" service.

Multiple data sources[1] were used for these assessments:

- Data collected from sector and territorial administrations in various forms (studies, reports and direct communication);
- Data from field surveys of visitors and arbutus berry pickers to collect information about visit frequency and the transport cost related this visit and data on the quantities of arbutus berries collected and sold.

1 The reference year for the economic assessment of the services described below is 2014, the year in which data was collected. Discount rates have been applied to any values not from this period.

Table 1: Results of the socio-economic assessment

Good or service	Physical quantity	Unit economic value	Total economic value (2014)	Economic value per forest ha
Water purification	Volume of water transferred from the study site to provide communities with drinking water 4,927,500 m³ per year	Unit cost of purification avoided €0.29 per m³	Total cost of purification avoided €1,442,990 per year	/19,600 ha **€73.62 per ha per year**
Recreation: Barbary macaque monkey	Average number of site visitors existing: 85,000 people 8500 planned guided visits 8500 planned visits due to the creation of a new recreation area	Consumer surplus per visitor per year: €2.63 per visit Willingness to Pay: €0,6 to €0,65 (with/without food basket) Willingness to Pay : €0,52 € per visit	Total social benefit of the visit €223,550 per year €5100 to €5500 per year €4420 per year	/1,300 ha **€171.96 per ha per year**
Arbutus berry picking	Quantity of arbutus berries picked in 2014 (kg per year): 4,445 kg per year	Average sales price €3.23 per kg	Revenue for pickers €13,687.14 per year	/200 ha **€68.43 per ha per year**

Cost-Benefit Analysis of management scenarios

1. Recreation associated with the Barbary macaque monkey:

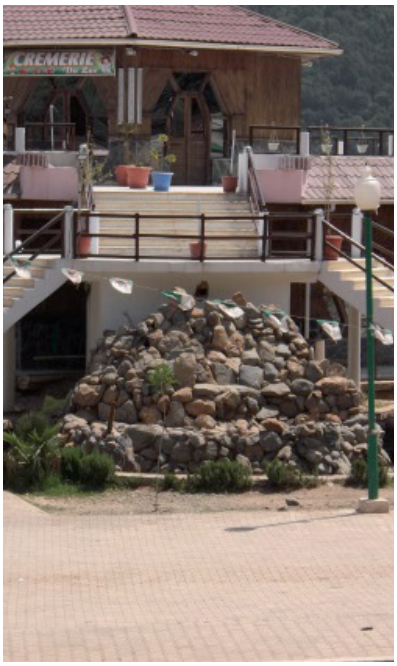
The following scenarios were selected:

- **Business-as-usual scenario:** Current site visitor numbers with limited and sporadic operations from park officials.
- **Alternative scenario 1**: Measures to support and supervise visitors using nature guides (guided tours, surveillance, creation of marked trails and signs, brochures). It is assumed that 10% of visitors will opt for the guided tour which is 8,500 per year.
- **Alternative scenario 2:** Operation of a new recreational area to reduce the number of visitors on the existing site. The investment cost is estimated at €92,000. It is assumed that 10% of the current number of visitors will choose to visit the new site, and an increase in the number of visitors of 2% annually.

Table 2: Net present value (NPV)* of the "Recreation associated with the Barbary macaque monkey" service

Indicators	Business-as-usual scenario	Scenario 1: visitor supervision	Scenario 2: new recreational area
Costs associated with the management scenarios	€44,229	€29,401	€119,582
Net benefits (benefits - costs)	€1,674,528	€1,695,508	€1,461,588
Increase/decrease in the service value (alternative scenario - business-as-usual scenario)	/	€20,980	-€212,939

* Discount rate is 8.5% (National Office of Statistics, www.ons.dz), Time frame: 10 years



Alternative scenario 1 is the most beneficial to implement in light of the results of the CBA. The benefits created are distributed between stakeholders as follows:

- **The State (Forest Administration):** savings of €14,828 on expenses for monitoring visitors and raise public awareness, which will be provided by the nature guides;
- **Society**: increase of €689 for improved visit quality and €5,463 of revenues generated by the activity of nature guides.

The three scenarios show similar and proportional variation with regard to the change factors selected. In each instance, it is Scenario 1 that proves to be the most profitable. It can therefore be deduced that a reduction in visitor flows and the social benefit associated with visits will have little impact on the benefit of implementing the most profitable scenario.

2. Arbutus berry picking

The following scenarios were selected:

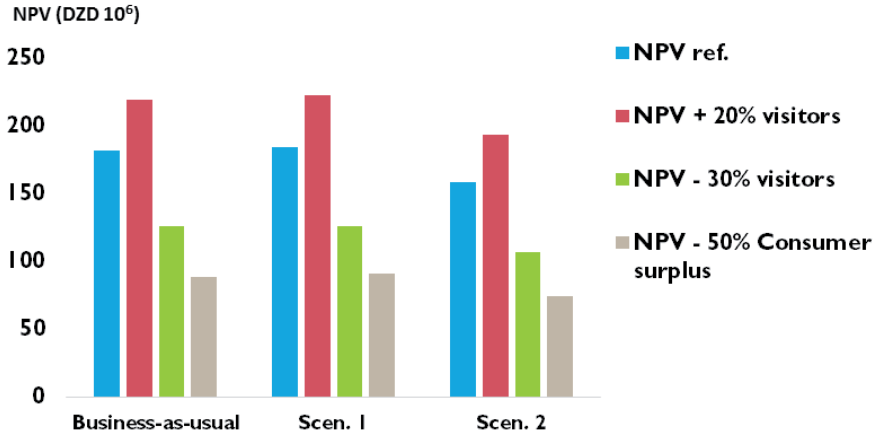
- **Business-as-usual scenario**: Uncontrolled collection carried out to the exclusive benefit of the pickers.
- **Alternative scenario 1**: A farm-out agreement where beneficiaries are given the exclusive right to pick arbutus berries within a clearly defined area, with associated incentives such as the provision of 5 hives to 4 beneficiaries[2]. In return, pickers undertake to monitor the forest area during the wildfire season free of charge. This results by halving monitoring costs incurred by the administration during the summer season.

The alternative scenario is more beneficial than the business-as-usual situation. The benefits created are distributed as follows:

- **The State (Forest Administration)**: savings of €6,367 on wildfire surveillance expenses;
- **Society represented by local pickers**: creation of €23,895 in additional profit from the sale of arbutus berry honey (new product).

The sensitivity analysis shows that current practices for the picking and sale of arbutus berries produce fairly significant profits and involve few costs to the extent that, even if revenue were to halve, it would not affect profitability, regardless of the scenario considered (business-as-usual or alternative scenario). Nevertheless, it is clear that Scenario 1 is more sensitive to a 50% drop in revenue for pickers.

Figure 1: Change in NPV for the « Recreation associated with the Barbary macaque monkey » service depending on the visitors number*



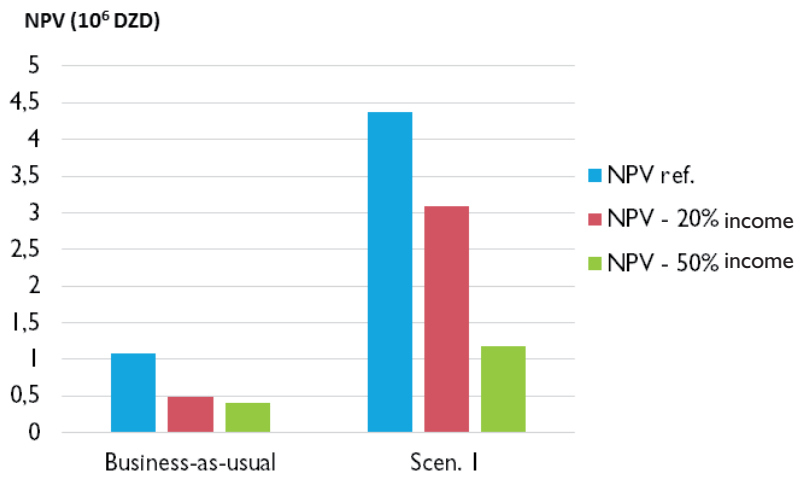
* €1 = 0.0092 Algerian Dinar (DZD)

Table 3: Net present value (NPV)* of the "arbutus berry picking" service

CBA results	Business-as-usual scenario	Scenario 1: Farm-out agreement
Costs associated with the management scenarios	€17,343	€10,976
Net benefits (benefits - costs)	€9,913	€40,175
Increase/decrease in the service value (alternative scenario - business-as-usual scenario)	/	€30,262

* Discount rate : 8.5% (National Office of Statistics, www.ons.dz) ;Time frame: 10 years

Figure 2: Change in NPV for the « arbutus berry picking » service depending on the income associated with berry picking



1 A production of 8kg per hive is planned with a price of €32 per kg.

RECOMMENDATIONS AND MAIN LESSONS LEARNED

Study contributions and limitations

This study made a significant contribution to discussion of the cost of drinking water, which is a pressing issue for improving public service, in particular securing supply for populations in a context of increasingly difficult climatic conditions.

It also demonstrated that the recreational activity associated with visiting the pilot site, which is responsible for the excessive visitor numbers that have a negative impact on wild fauna, provides a major social benefit. This should encourage the main beneficiaries to contribute to paying for this service, with a view to better organising the activity, which needs to reconcile the right to recreation with the respect of wild fauna.

Finally, this study gave relevant answers to the issue of maintaining the right to enjoy forest products for resident communities and the need to regulate any over-exploitation, by: i)- proposing co-management as a means of participatory management and; ii)- revising the sale prices of non-wood forest products.

The limitations of the study are due to:

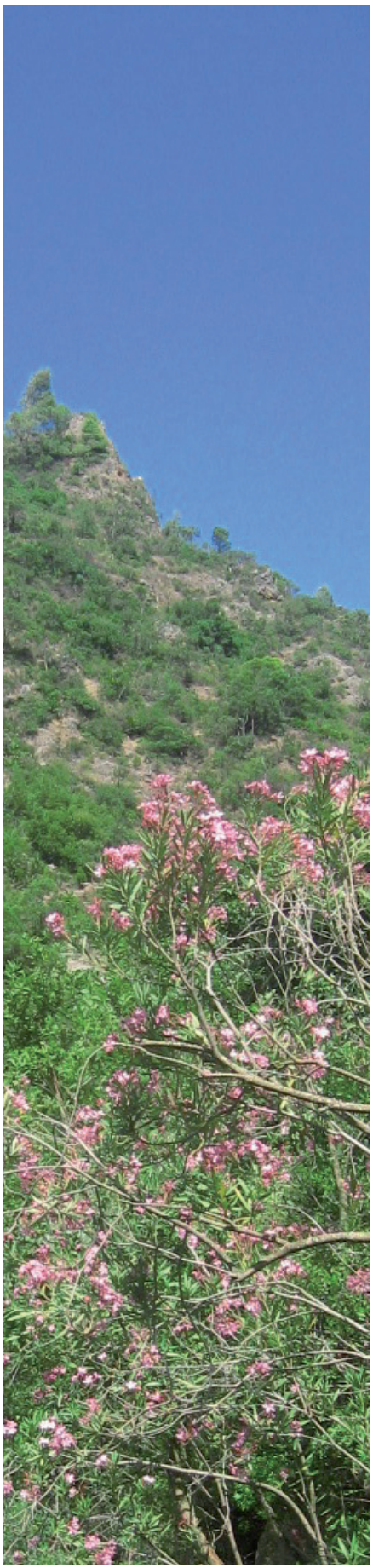
- Lack of data (water purification);
- Lack of precision for other data (number of visitors);
- Some approaches were not integrated (price approach only for water);
- Snapshot perspective (assessment over one year).

How economic assessment of goods and services could impact decision-making and public policies?

The socio-economic assessment of the value of the ecosystem goods and services selected for this project was a new approach that succeeded in promoting these goods and services in terms of their economic worth as for other more widely-known resources (timber production, agricultural produce, mining resources, etc.) and shed new light on them, in order to make them easier for the various stakeholders to take into account. The major consequence is the opportunity for the managers of this protected area to present decision-makers at various levels with management (or co-management) actions for the protection and/or sustainable use of these areas, not as budget-consuming actions, but as actions capable of improving local and national population well-being.

It will now be easier to defend the preservation of the ecosystems that provide these goods and services, and the need to pay (at least in part) for these goods and services is supported by objective and tangible arguments.

Finally, payment for ecosystem goods and services will help promote them and generate environmental solidarity between the various users/beneficiaries (populations, planners, economic sectors, decision-makers, etc.).



For more information please see full publication:

Ouadah N. (2016). *Estimation de la valeur économique et sociale des services rendus par les écosystèmes forestiers méditerranéens - Algérie, Parc National de Chréa, Algérie*. Plan Bleu, Valbonne.

This publication is available for download from Plan Bleu website: www.planbleu.org