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Optimizing the production of goods and services of Mediterranean forest ecosystems in the context of global changes



The current extension and state of Mediterranean forest ecosystems are strongly determined by anthropogenic pressures, biological and abiotic processes. **85 million ha of forests in the Mediterranean countries** or 2% of the global forest area provide valuable goods and services to a region which population is predicted to grow from 507 million people in 2010 to 570 million by 2025 (95% in south-eastern Mediterranean countries). In addition, climate change affected the Mediterranean region throughout the twentieth century and has accelerated since 1970 exacerbating already existing pressures and the vulnerability of ecosystems and populations.

This project, conducted in 5 Mediterranean countries, has the five following components.

Estimation of goods and services socio-economic

5 Improvement of coordination and experiences sharing between actors in the region and on the international scene *Activities are ongoing* Optimization and valorization of

Mediterranean forests contribution to climate change mitigation *Activities are ongoing*

Improvement of forest ecosystems governance through participatory

vulnerability and adapting capacities of forests

Data and tools production related to

APPROACH

CHOSEN EXAMPLE: Siliana watershed (Tunisia) and Senalba forest (Algeria)

CONTEXT:

- Forest subject to the pressure of local populations and climate change that could affect the provision of goods and services (Siliana).
- Forestdominated by Pinus helpensis affected by lack of regeneration and overgrazing (Senalba)

METHOD:

- Estimation of forest cover changes (1990-2010) based on free satellite images and open source software (e.g. QGIS, pktool)
- Multifactorial spatial approach for assessing the vulnerability of forest cover to climate change and anthropogenic factors
- Projection of vulnerability of forest cover to 2050 and 2070 (IPCC scenarios)
- Evolution of available climatic data (temperature, precipitation)
- Emberger coefficient

PRELIMINARY RESULTS

Maps of vulnerability of the Siliana catchment (Tunisia) in 2000 and projection to the horizon 2016-2035

APPROACH

CHOSEN EXAMPLE: Chrea National Park (Algeria) – Macaca Sylvanus

<u>CONTEXT</u>:

- Endangered species on the IUCN Red List and CITES Annex II
- Socio-economic issues with recreation (the only park in the region for the surrounding urban population)

METHOD:

- Travel cost method to know the consumer surplus representing the well-being of visiting the site
- Choiceexperimentmethod to determine the consumer willingness to pay in addition to the cost of travelling to the site to see realized the scenario of his choices.

<u>COST-BENEFIT ANALYSIS</u>: evaluate and compare alternative scenarios to reduce the site's excessive attendance

and the impact on the monkeys

- Baseline: Current attendance
- Scenario 1: Supervision by local guides
- Scenario 2 : New recreation area

Time horizon: 10 years - Discount rate: 8.5%

PRELIMINARY RESULTS



APPROACH

CHOSEN EXAMPLE : Maâmora Forest (Morocco)

<u>CONTEXT</u>: Highly populated forest and subject to strong pressure by local people whose survival often depends on the resources they collect

<u>METHOD</u>: **Stakeholders' Strategies Analysis (MACTOR)** To identify conflicts between stakeholders who have different interests and projects and to estimate power and influence relations by studying their convergences and divergences vis-à-vis issues.

PRELIMINARY RESULTS

Examples of convergent objectives between stakeholders

| USERS | 5 | LOGGERS |
|---|---|---|
| Priorities: Make the most of available pasture resources Action means: Non- compliance with the deferred grazing Conflicts with lawful users | 5 convergent objectives e.g. strengthen mitigation actions on forest resources | Priorities: Strengthen their economic record Ensure sustained supply products Action means: Business organization Lobbying and advocacy with the HCEFLCD |
| | 11 | OFFENDERS |





Non vulnérable au climat, pression humaine faible et conditions stationnelles moyennes
 Non vulnérable au climat, pression humaine forte et conditions stationnelles défavorables
 Peu vulnérable au climat, pression humaine forte et conditions stationnelles moyennes
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 Moyennement vulnérable au climat, pression humaine faible et conditions stationnelles favorables
 Limites du gouvernorat de SILIANA
 Routes principales
 Principaux cours d'eau
 ¥ Villes

 Non vulnérable au climat, faible pression humaine et conditions stationnelles favorables

 Non vulnérable au climat, forte pression humaine et conditions stationnelles défavorables

 Peu vulnérable au climat, forte pression humaine et conditions stationnelles moyennes

 Peu vulnérable au climat, très forte pression humaine et conditions stationnelles moyennes

 Peu vulnérable au climat, très forte pression humaine et conditions stationnelles moyennes

 Peu vulnérable au climat, faible pression humaine et conditions stationnelles défavorables

 Peu vulnérable au climat, forte pression humaine et conditions stationnelles défavorables

 Moyennement vulnérable au Climat, forte pression humaine et conditions stationnelles moyennes

 Très vulnérable au Climat, faible pression humaine et conditions stationnelles favorables

 Limites du gouvernorat de SILIANA

 Routes principales

 Principaux cours d'eau

Evolution of species distribution in the Maâmora forest

Qs1: dense cork oak forest Qs2: moderately dense cork oak forest Qs3: open cork oak forest Qs4: sparse cork oaks Eu1: dense eucalyptus forest Eu2: moderately dense eucalyptus forest Eu3: open eucalyptus forest Eu4: sparse eucalyptus QsR: mixture of acacia, pinus, conifers and no-forest areas



Socio-economic value of recreation in the Chrea National Park linked to the view of monkeys

| TRAVEL COST | CHOICE EXPERIMENT |
|---|---|
| # visitors /year : 85 000 # visit/pers/year : 2,38 Travel cost to the site/pers : 0.34€ | <u>Scenario 1</u> : guided tour WTP*/pers: 0.64€ |
| Time spent watching monkeys : 52.40min | Scenario 2: new recreation area WTP*/pers: 0.49€ |
| Consumer surplus (benefit)/visit/year : 2.63€ | *Willingness to Pay |
| Total Value for the park: 223 550 € | |

Cost Benefit Analysis

| | Baseline | Scenario1: Guided tour | Scenario 2: New recreation area |
|--------------------------------------|----------|---------------------------|---------------------------------------|
| Discounted Net Benefits | | | |
| State (Forestry + local authorities) | -0,044 € | -0,029 € | -0,119€ |
| Guides | - | 0,0054 € | - |
| Visitor | 1,718€ | 1,719€ | 1,581€ |
| Additional Net Benefits | | | |
| Baseline/alternative scenario | - | 0,021€ | -0,213€ |
| Performance indicator | | | |
| Net Present Value | 1,674 € | 1,695€ | 1,461€ |

The Cost Benefit Analysis shows that :

Great social benefit resulting from the site visit, which should encourage the main beneficiaries to participate in its monetization.
Scenario 1 "setting up guided tours" is advantageous regarding the visitors well-being, in species protection and economic terms (better performance indicator and possibilities of green jobs).
Scenario 2 "opening a new recreation area" is the least efficient in terms of social benefits: the new area would offer unattractive alternative for visitors who would consider it too artificial.

| | DLLKLLFLKJ | | |
|---|---|--|---|
| K | Priorities: Increase honey production Organize the market Action means: Producers' organization Soliciting the support of HCEFLCD | 11 convergent objectives e.g. develop regulations - provide income to users | Priorities: Get revenue fitting with their needs Action means: Logging offences |
| | HUNTERS | RECREATION/SPORTSM 22 | AN |
| | Priorities: Have game during hunting season Action means: Hunting lots with security Rehabilitation of game releases | 22 convergent objectives e.g. develop a close partnership between rural municipalities and HCEFLCD | Priorities: Enjoy fresh air and landscape Action means: Hiking, sports activities, picnicking |

Examples of indicators, costs and tools for implementing suggested socio-economic models



The methodology selected promotes capacity building of national experts and uses only free data and software. It allows identifying recent forest cover evolution, related causes, factors affect forest cover distribution and possible future impacts of global changes.



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