Universidad del País Vasco · Euskal Herriko Unibertsitatea

Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura · Hezkuntza, Zientzia eta Kulturarako Nazio Batuen Erakundea

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Nature, basis of well-being

Ecosystem Services of the **Basque Country**

Developing a participatory process to include ecosystem services in landscape planning

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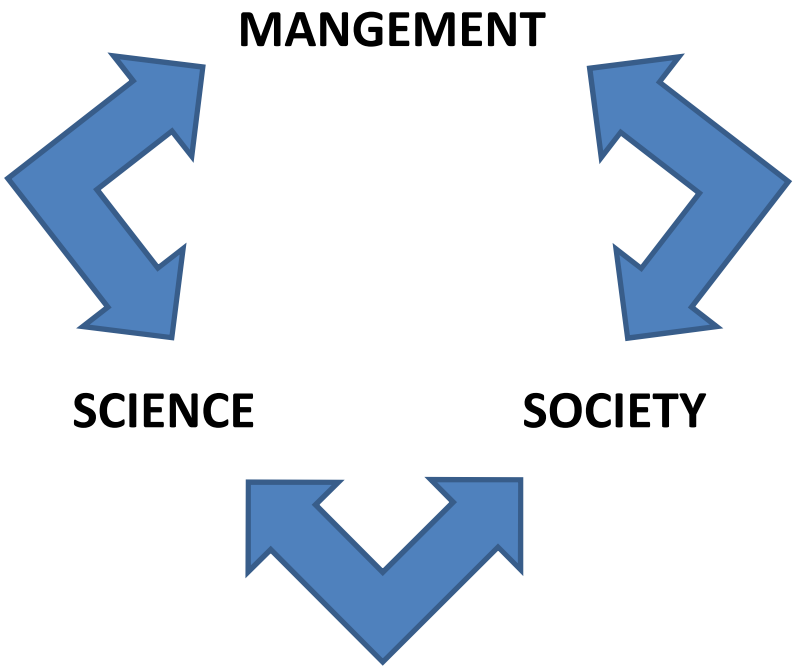
Biodiversity for Human well being

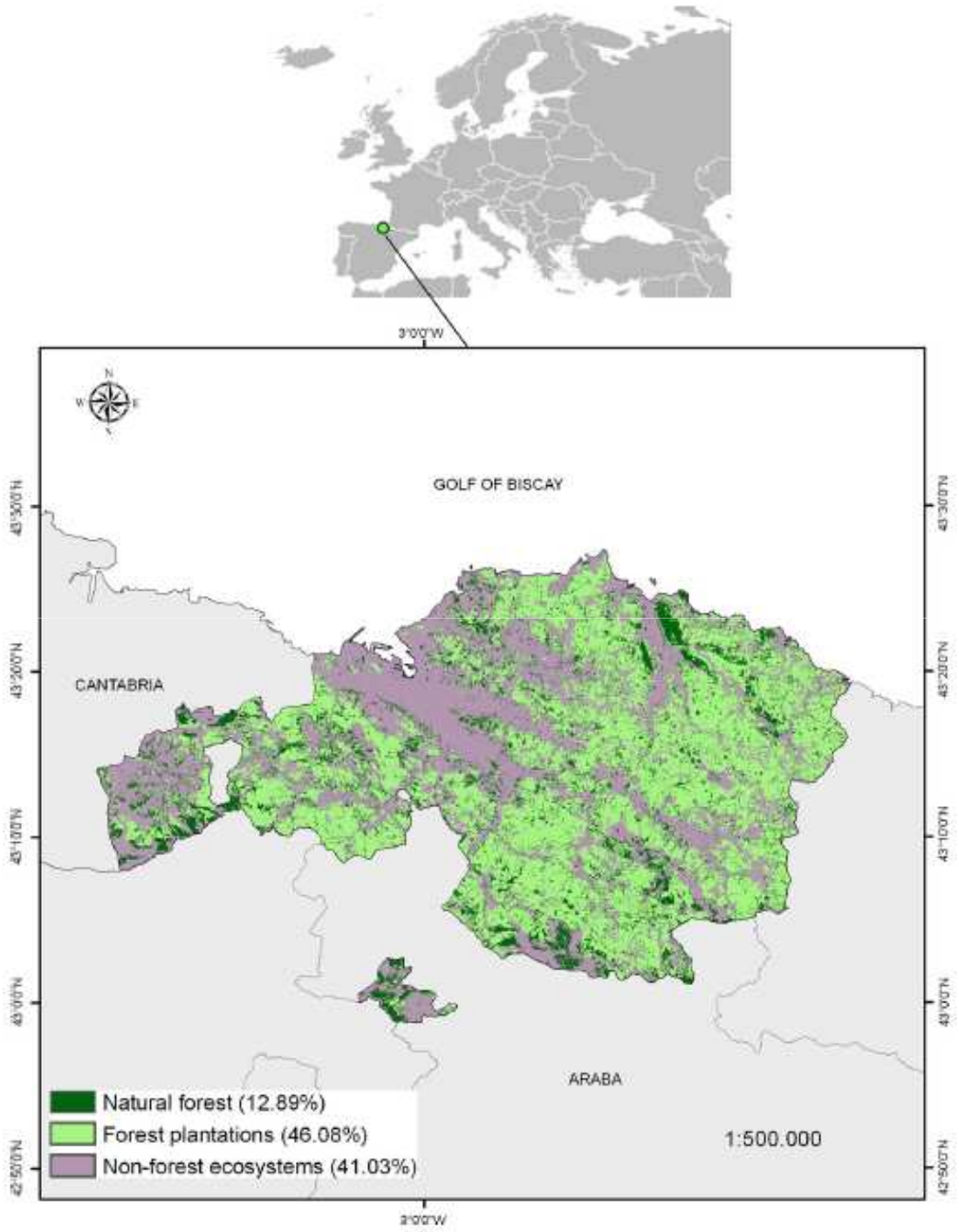
Ecosystem Service Framework provides a space for coordination and dialogue between scientist, managers/politicians and Stakeholders



INTEGRATIVE, ADAPTATIVE AND RESILIENT MANAGEMENT

Study area

Bizkaia
2.216 Km^2
1.151.113 Inhab.
(520 Inhab/km^2)
111 towns



Methodology

1. **Participatory process**: community vision for region´s SD

   Considering: opportunities and constrains

   Identify key drivers and research needs

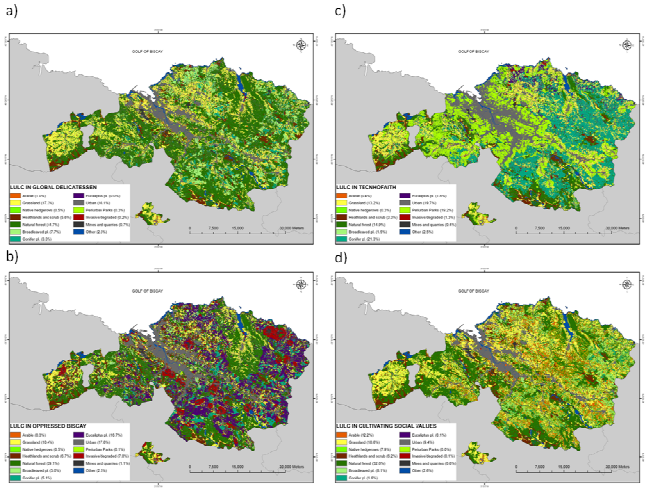
2. **Scientific research**: lack of knowledge for effective policies



Methodology: Participatory process

1. Structured questionnaire (285 stakeholders)
   Key drivers

2. Two participatory workshops (66 stakeholders)
   i. Discuss key drivers and relevant
   ii. Future scenarios in terms of provision of ES
   and human wellbeing designed a target scenario (2050)
   Defining management strategies and identifying research needs



Methodology: Scientific research

1. **Spatial analysis**: GIS-based approach
2. **Aim**: Synergies/tradeoffs: Biodiversity *vs* Carbon sequestration

   Map´s scale: 1:10.000

   EUNIS habitat classification

   54 forest units into: Natural forests – Forest plantations

Biodiversity: - native plant and vertebrate richness

- threatened animal richness

Carbon storage: in living and soil forest systems

Results: Participatory process

1. **Forest management most important**
2. **Change from timber production model promoting structural and functional diversity (ES)**
3. **Landscape multifunctionality**

Table 1 Summary of the main results obtained in the participatory process

Questionnaire results (% of respondents)	Participants' perception on forest systems and their services	Most relevant drivers of change	Sustainable target scenario description	Management proposals
34.29 % explicitly mentioned forest aspects on their open answers	Natural forests have a higher potential to provide ES to society than exotic plantations	Governance and institutional coherence	Proactive work is performed from the local to the global scale and vice versa	Coherence between policy and actions is needed: governments at different scales have an important role to play
Highest potential for successful intervention among drivers of change	Currently some important ecosystem services, such as the aesthetic value of landscape diversification, are not sufficiently reinforced	Land and urban planning	Landscape multi-functionality is key in this scenario: biodiversity and carbon storage are enhanced	Strategic landscape planning and management is needed
Indirect driver: primary sector development (88.57 % assigned the highest value)	The applied forest management type is relevant for the quality and quantity of ES	Primary sector development	Local sustainable productivity is promoted	New financial mechanism and incentives should be created
Direct driver: forest management (85.71 % assigned the highest value)	Current lack of profitability: new business options (e.g., diversification of species)	Forest management	Sustainable forest management is reinforced, and the quality and variety of forest are improved	Changes in forest management and landscape planning should be promoted in an integrative and proactive way
		Ecosystems degradation	Autochthonous ecosystems and their functionality are conserved and recovered	Public lands are used to recover natural forest ecosystems
		Innovation and science	Society uses scientific knowledge to protect ecosystem functionality	Research and traditional knowledge recovery are essential
		Participatory policy making model	Education, local participation and knowledge society	Public awareness on the importance of Landscape multi-functionality should be reinforced
				Promotion of environmental education from early stages
				Scientific and local knowledge should be spread to society through educational campaigns

Number of participants: questionnaire on drivers of change = 35, workshop = 55, total (counting each individual just ones) = 66

HOW

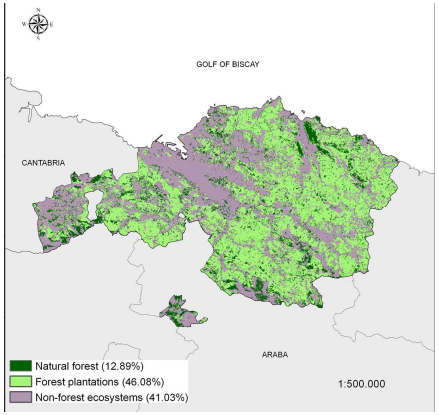
1. **Need of strategic landscape planning and management**

2. **Requested scientific knowledge: Carbon sequestration/BD**

Results: Scientific results

1. Carbon: Natural forest>Forest plantation

2. Native plant species: Natural forest>Forest plantation



3. GLM: -Threatened animal S and Vertebrate S increased with area of Natural forest

- Negative non significant with forest plantations

Table 2 Total mean carbon storage per hectare and plant richness values expressed as the total number of native vascular plant species per forest type

Forest system	Mean total carbon (tC ha^{-1})	Plant richness values
Beech forest (*F. sylvatica* L.)	212.75 ± 12.33	73
Mixed oak forest (*Q. robur* L.)	195.17 ± 14.67	79
Cantabrian green oak forest (*Q. ilex* L.)	151.65 ± 13.78	72
Coniferous plantations (*Pinus radiate* D. Don)	139.70 ± 15.71	61
Eucalyptus plantations (*Eucalyptus globulus* Labill.)	220.98 ± 10.97	30
Natural forest	187.94 ± 24.44	77 ± 3.79
Forest plantations	147.10 ± 27.96	54 ± 21.92

The dominant species in each forest system type are shown in parenthesis. Values are mean ± SDs

Table 3 GLM summary statistics for biodiversity indicators: number of threatened animal species and number of total vertebrate species at the Biscay County

Independent variables	Number of threatened animal species			Number of total vertebrate species		
	Estimate ± SE	z-value	*p* value	Estimate ± SE	z-value	*p*
(a)						
Intercept	2.73 ± 0.21	13.00	<0.001***	4.82 ± 0.09	53.89	<0.001***
Natural forest	4.81 ± 1.33	3.62	<0.001***	1.25 ± 0.58	2.14	<0.032**
Forest plantations	−0.32 ± 0.27	−1.19	0.234	−0.14 ± 0.11	−1.26	0.207
(b)						
Intercept	2.45 ± 0.43	5.69	<0.001***	4.73 ± 0.17	27.54	<0.001***
Mixed oak forest	0.07 ± 0.04	1.86	0.063	2.09 ± 1.46	1.43	0.154
Cantabrian green oak forest	0.042 ± 0.02	2.48	0.013*	0.83 ± 0.74	1.12	0.263
Beech forest	0.07 ± 0.02	2.98	0.003**	2.28 ± 1.12	2.03	0.042*
Coniferous plantations	−0.01 ± 0.01	−0.20	0.839	−0.07 ± 0.14	−0.47	0.639
Eucalyptus plantations	0.01 ± 0.01	0.98	0.326	0.13 ± 0.56	0.24	0.812

(a) Natural forest versus forest plantations, and (b) different forest types considered

SE standard error

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Conclusions

A core aspect of the sustainable target scenario chosen by participants was that a real change in social values is proposed

Landscape multi-functionality was considered key in the sustainable target scenario for what other ES apart from timber production should be promoted

To achieve this scenario, participants identified the need for a strategic landscape planning and management

Participants also highlighted the necessity for coherent and coordinated policies.

Palacios et al,. 2013. *Ecology and Society*.& 2014 Landscape Ecology.

Conclusions

A key element for the success was the stackholder´s engagement from the beginning

It was crucial the incorporation of the conceptual framework of ES

The lack of knowledge identified complemented by scientific approach allowed to develop management plans based on sound science and agreed by a wide-range of multi-sector stakeholders

Our approach gave more insight to politicians in their role of decision makers: ie. *Biscay 21: Sustainability Strategy for the County Council of Biscay* (2012) includes a *Forest ES Catalogue and Guidebook*

Palacios et al,. 2013. *Ecology and Society*.& 2014 Landscape Ecology.

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Thank you very much
Eskerrik asko

Integration of science and stakeholders improves decision-making processes

Further information:

www.ehu.es/cdsea