Helping Protected Areas Adapt to a changing climate

Digital Siggen Seminar 23-25 March 2020

How to adapt the management of a protected area to climate change

The case study of Basque Country's Natura 2000

EUSKO JAURLARITZA GOBIERNO VASCO

To include the climatic perspective in N2000:

1. FRAMEWORK
2. What has been done before?

Diagnosis & search for information sources.

3. What we have?

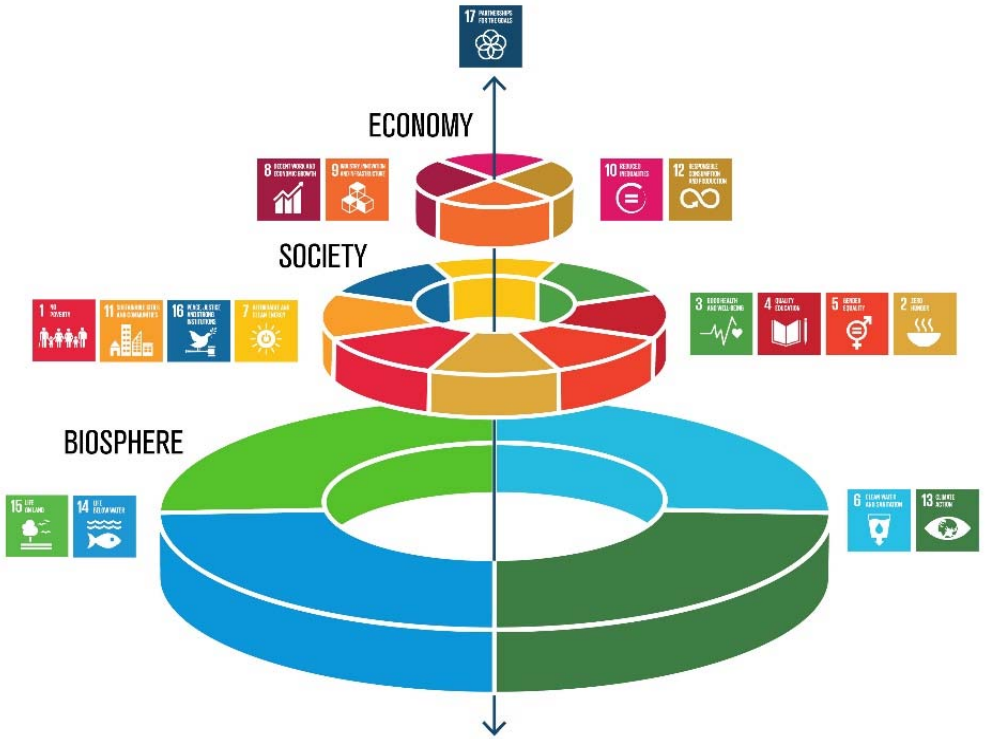
How much time/resources?Current N2000 management plan. Opportunities & Integration of cc.

4. What can/will do?

Adaptation of the current management plan to cc. Participation/Feedback.

We need a framework for our methodology and to promote adaptation

Framework



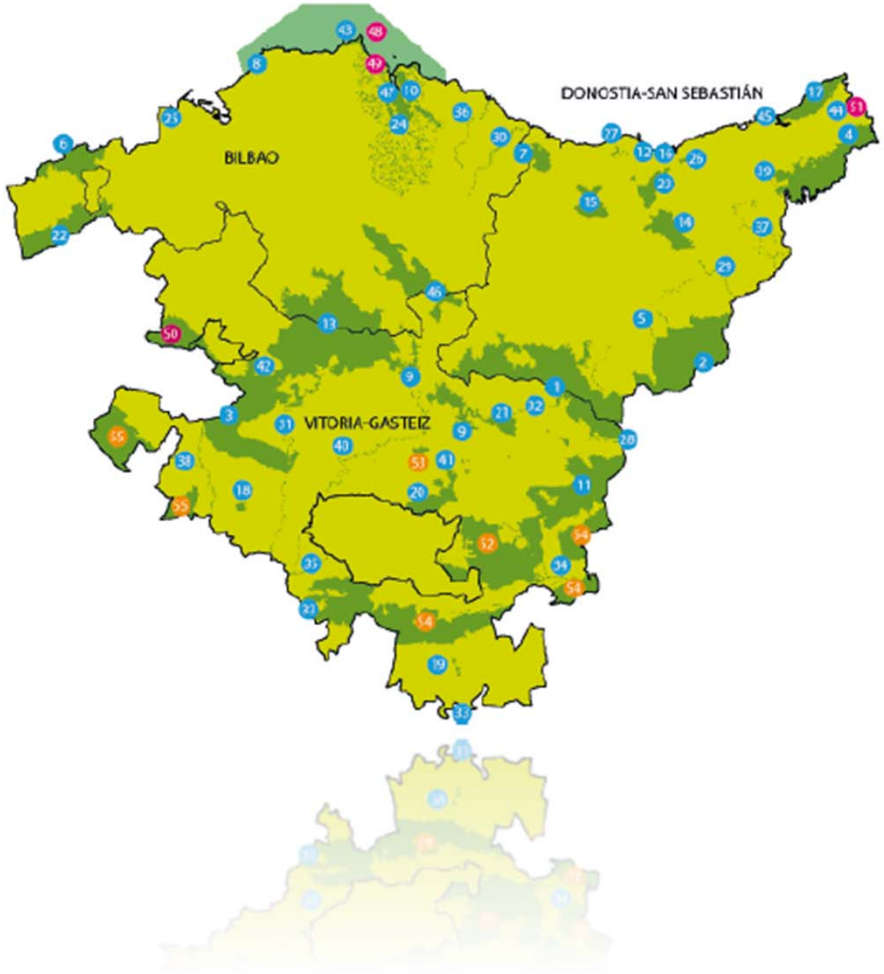
https://www.stockholmresilience.org/research/research-news/2016-06-14-how-food-connects-all-the-sdgs.html

KLIMA 2050 BASQUE COUNTRY

ihobe

- **Surface area:** 7,235 km².
- **Population:** 2,178,949 inhabitants.
- **Population density:** 301 inhabitants/km².
- **Number of municipalities:** 251.
- **Official languages:** Basque, a unique language with no known connection to other languages of the world.
- **Three internationally-renowned capitals**
  Bilbao: Lee Kuan Yew World City Prize 2010
  Donostia-San Sebastián: European Capital of Culture 2016
  Vitoria-Gasteiz: European Green Capital 2012
- **Per capita income:** 129%. Third place in the European ranking (European Union: 100%)
- **University graduates:** 43% of young people are university graduates (European Union: 24%).
- **Human Develope Index:** 0,98. Basque Country is first ranked country
- **Environmental Performance Index:** 69,7. Basque Country is 4th ranked country place in Europa
- **Carbon sink:** 53% of the surface area covered by trees (European Union: 37.8%).

Network of Protected Areas in the Basque Autonomous Community



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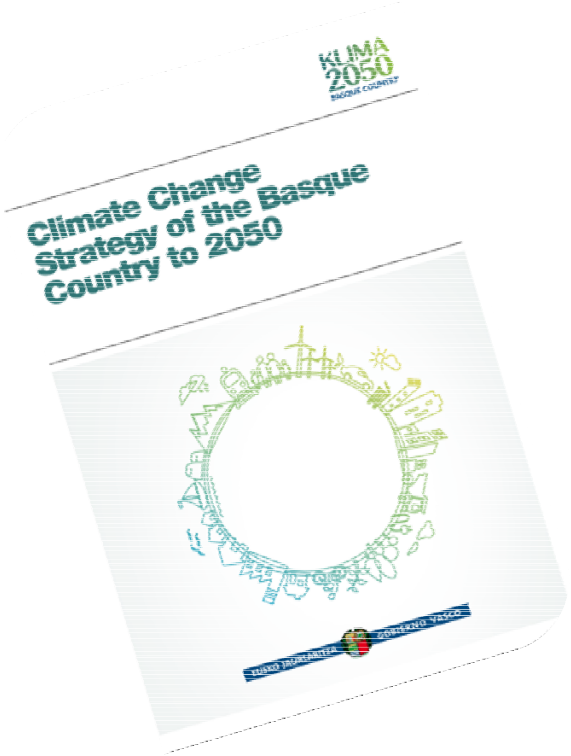
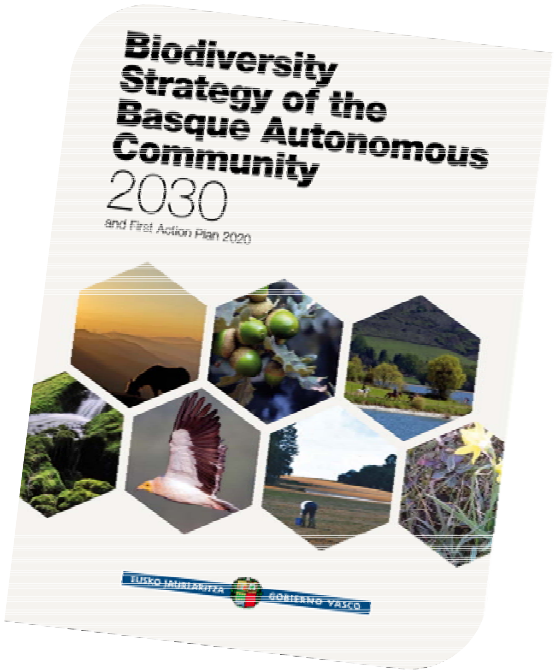
How to adapt the management of a protected area to climate change

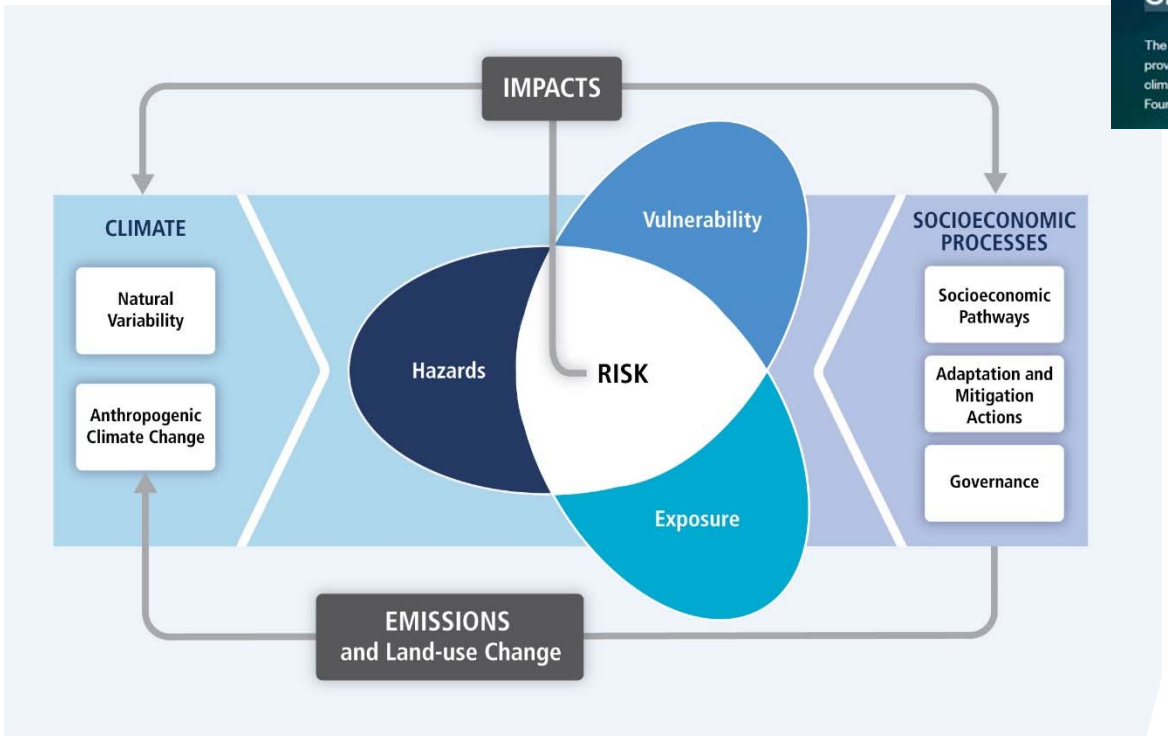
Framework

‘Encouraging the resilience of the ecosystems, integrating the climate change variable in the management of the natural environment’

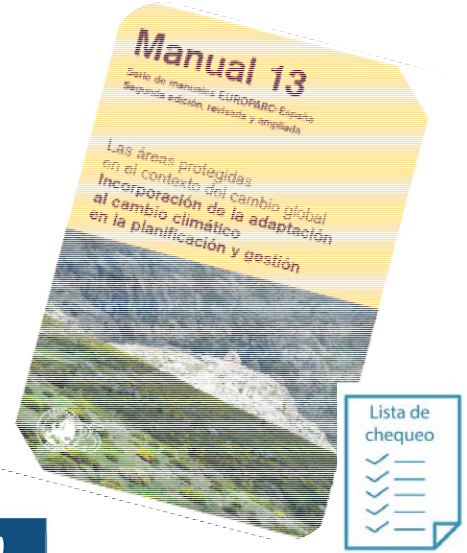




Framework


IMPACTS
CLIMATE
Natural Variability
Anthropogenic Climate Change
Hazards
Vulnerability
RISK
Exposure
SOCIOECONOMIC PROCESSES
Socioeconomic Pathways
Adaptation and Mitigation Actions
Governance
EMISSIONS and Land-use Change


ipcc
REPORTS
WORKING GROUPS
ACTIVITIES
NEWS
AR5 Synthesis Report: Climate Change 2014
The Synthesis Report (SYR) of the IPCC Fifth Assessment Report (AR5) provides an overview of the state of knowledge concerning the science of climate change, emphasizing new results since the publication of the IPCC Fourth Assessment Report (AR4) in 2007.

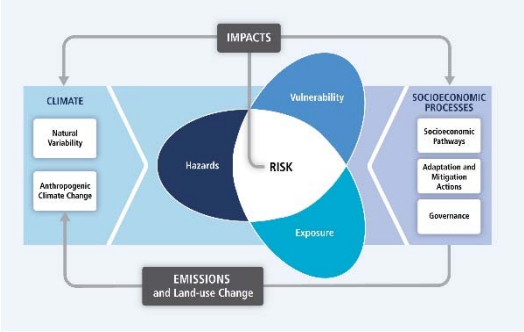

Manual 13
Las áreas protegidas
en el contexto del cambio global
Incorporación de la adaptación
al cambio climático
en la planificación y gestión
Lista de chequeo

How to adapt the management of a protected area to climate change

Climate Risk assessment for N2000: the elements

- 58 N2000 Sites
- 40 terrestial habitats

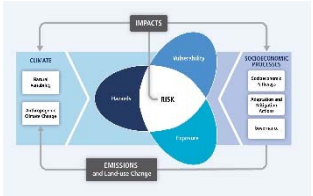
INTENSIVE
QUANTITATIVE
GIS BASED ANALYSIS

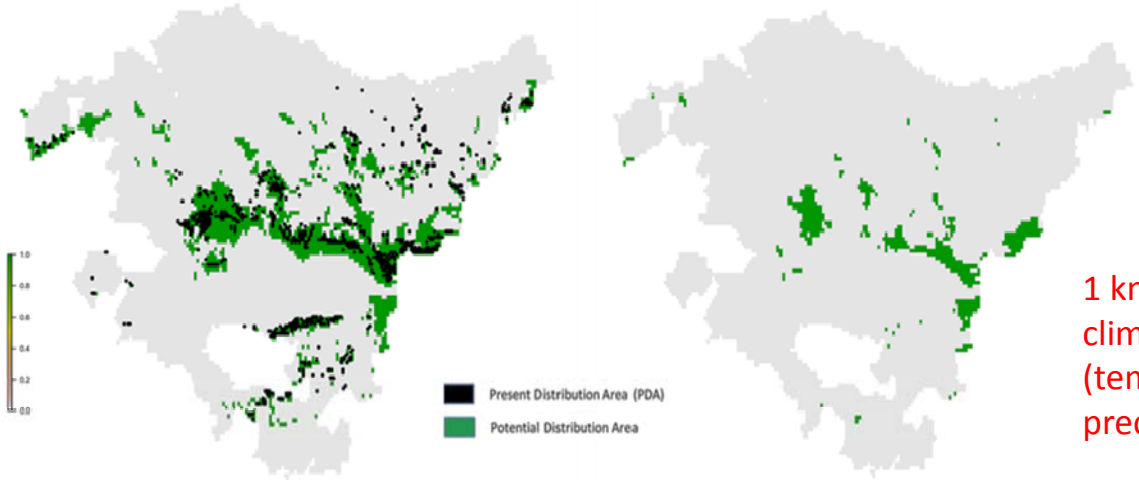


Código	Hábitat
1430	Matorrales halonitrófilos (*Pegano-Salsoletea*).
2330	Dunas continentales con pastizales abiertos con *Corynephorus y Agrostis*.
4030	Brezales secos europeos.
4040*	Brezales secos costeros
4090	Brezales oromediterráneos endémicos con aliaga.
5110	Formaciones estables xerotermófilas de *Buxus sempervirens* en pendientes rocosas (*Berberidion p.p.*).
5210	Matorrales arborescentes de *Juniperus spp.*
6170	Prados alpinos y subalpinos calcáreos.
6210*	Pastos mesófilos con *Brachypodium pinnatum*
6220*	Pastos xerofilos de *Brachypodium retusum*
6230*	Praderas montanas
6510	Prados pobres de siega de baja altitud (*Alopecurus pratensis, Sanguisorba officinalis*).
8220	Pendientes rocosas silíceas con vegetación casmofítica.
8230	Roquedos silíceos con vegetación pionera del *Sedo-Scleranthion* o del *Sedo albi-Veronicion dillenii*.
9120	Hayedos acidófilos atlánticos con sotobosque de *Ilex* y a veces de *Taxus* (*Quercion robori-petraeae o Ilici-Fagenion*).
9150	Hayedos calcícolas medioeuropeos del *Cephalanthero-Fagion*.
9160	Robledales pedunculados o albares subatlánticos y medioeuropeos del *Carpinion betuli*.
9180*	Bosques mixtos de pie de cantil calizo
91E0*	Alisedas y fresnedas
9230	Robledales galaico-portugueses con *Quercus robur* y *Quercus pyrenaica*.
9240	Robledales ibéricos de *Quercus faginea* y *Quercus canariensis*.
9260	Bosques de *Castanea sativa*.
92A0	Bosques galería de *Salix alba* y *Populus alba*.
9330	Alcornocales de *Quercus suber*.
9340	Bosuqes de *Quercus ilex* y *Quercus rotundifolia*.
9540	Pinares mediterráneos de pinos mesogeanos endémicos.
9580*	Tejedas
E5.31(X)	Helechales atlánticos y subatlánticos, colinos
G1.62	Hayedo acidófilo atlántico
G1.64	Hayedo basófilo o neutro
G1.66	Hayedo basófilo xerotermófilo

How to adapt the management of a protected area to climate change

Climate Risk assessment for N2000: quantitative exposure (species distribution modelling)





1 km x 1 km resolution for climatic variables (temperature, preciptation)

Reference scenario (1971-2000)

Climate Change Scenario (RCP 8,5 & 2100)

9120 - Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)

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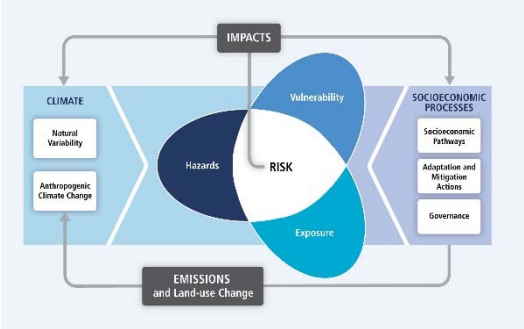

1,5 years of work & debate

70 % **Sensibilidad**: grado en que un sistema es potencialmente afectado o modificado por estímulos relacionados con el clima.

25 %	50 %	25 %
Ind. 1- Fragmentación de hábitats Ind. 1= (SA/(Número polígonos*Dispersión)	**Ind. 2- Estado de conservación del hábitat** Ind. 2 = Estado de conservación para cada tesela	**Ind. 3- Presiones sobre los hábitats** Ind. 3= Sumatorio de número de presiones por grado de presión (para cada hábitat, distinguiendo Mediterráneo y Atlántico)

30 % **Capacidad de adaptación**: capacidad de un sistema para ajustarse al cambio climático con la finalidad de moderar los daños potenciales.

50 %	50 %
Ind. 4- Superficie potencial futura compatible Ind 4= (SPF – No compatible) / SPF	**Ind. 5- Persistencia** Ind 5 = (SPF intersección con SPA)/SPA para cada hábitat

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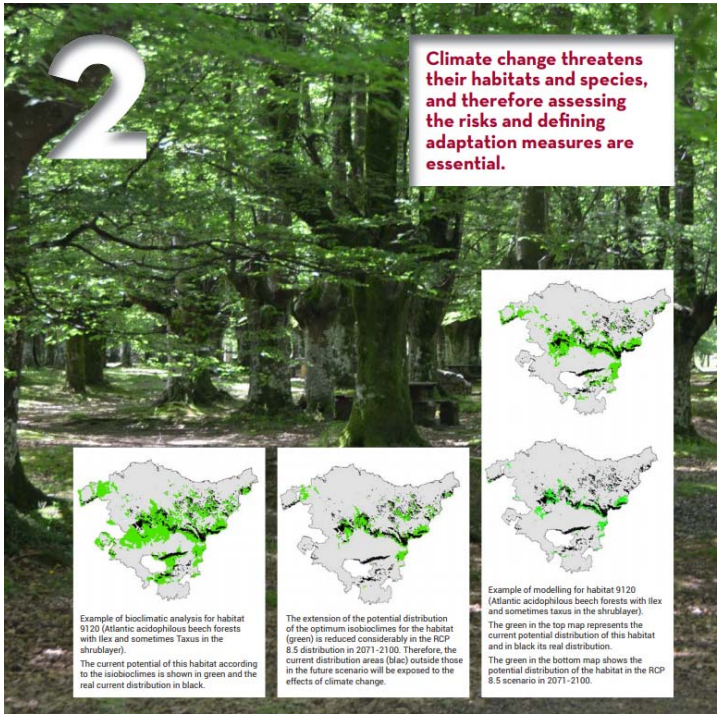

Vulnerability of the Natura 2000 Network in the Basque Country to climate change

The Natura 2000 Network accounts for 20.5% of the total surface area of the Basque Country

The Basque Country has 55 sites in the Natura 2000 Network, covering a surface area of approximately 1,500 km². Climate change threatens their habitats and species, and therefore assessing the risks and defining adaptation measures are essential. The methodology to be applied to determine the future potential distribution of habitats depends on the characteristics and information available for each region.

Habitat potential distributions by means of bioclimatic analysis

The bioclimatic analysis methodology is based on the Rivas-Martínez classification (2009), where each isobioclime represents the precipitation and temperature conditions in which a certain habitat can exist. The precipitation and temperature conditions in the future scenario may modify the current isobioclime to the point that it will become an isobioclime that theoretically could not host that habitat. Using the climate scenarios of the Basque Country as the baseline, with a resolution of 1 km, the future potential distributions were established for 79 habitats in the RCP 8.5 scenario for 2071-2100 defined by the IPCC. Their exposure to the threat was thus calculated.

Habitat potential distributions calculated statistically

In parallel, a species distribution model based on statistical methods that seek to establish a relation between environmental factors and the presence or absence of a geographical area has been used. Specifically, a consensus model was applied using three different techniques: generalised linear models, *Boosted Regression Trees*, and Random Forests. The results were validated using two statistics (AUC and TSS). The results of the model were converted into two binary models (presence = 1, absence = 0) and finally the number of predicted pixels were counted in the Basque Country (potential area predicted by the model for the present, 1971-2000, and for the future 2071-2100 RCP 8.5).

Species potential distributions versus distribution models

After a pilot scheme with species and habitats, it was decided to use the modelling of the habitat distribution as a tool to analyse the exposure and adaptation capacity to climate change of the Natura Network in the Basque Country. Bioclimatic analysis had been therefore considered as a useful tool to prepare a descriptive discourse that establishes how the trends in precipitation and temperature variation in the future scenario can generate those effects of the future potential distribution of the habitats.

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E-mail klima2050@ihobe.eus
Telephone +34 944 23 07 43

CLIMATE CHANGE IN BASQUE COUNTRY
28 BEST PRACTICES

https://www.ihobe.eus/Publicaciones/Ficha.aspx?IdMenu=97801056-cd1f-4503-bafa-f54fa80d9a44&Cod=1848992b-2eef-4099-b949-5c17f2672552&Idioma=en-GB

How to adapt the management of a protected area to climate change

SAC/SPA

Lower climate risk
Intermediate climate risk
Higher risk
Not studied

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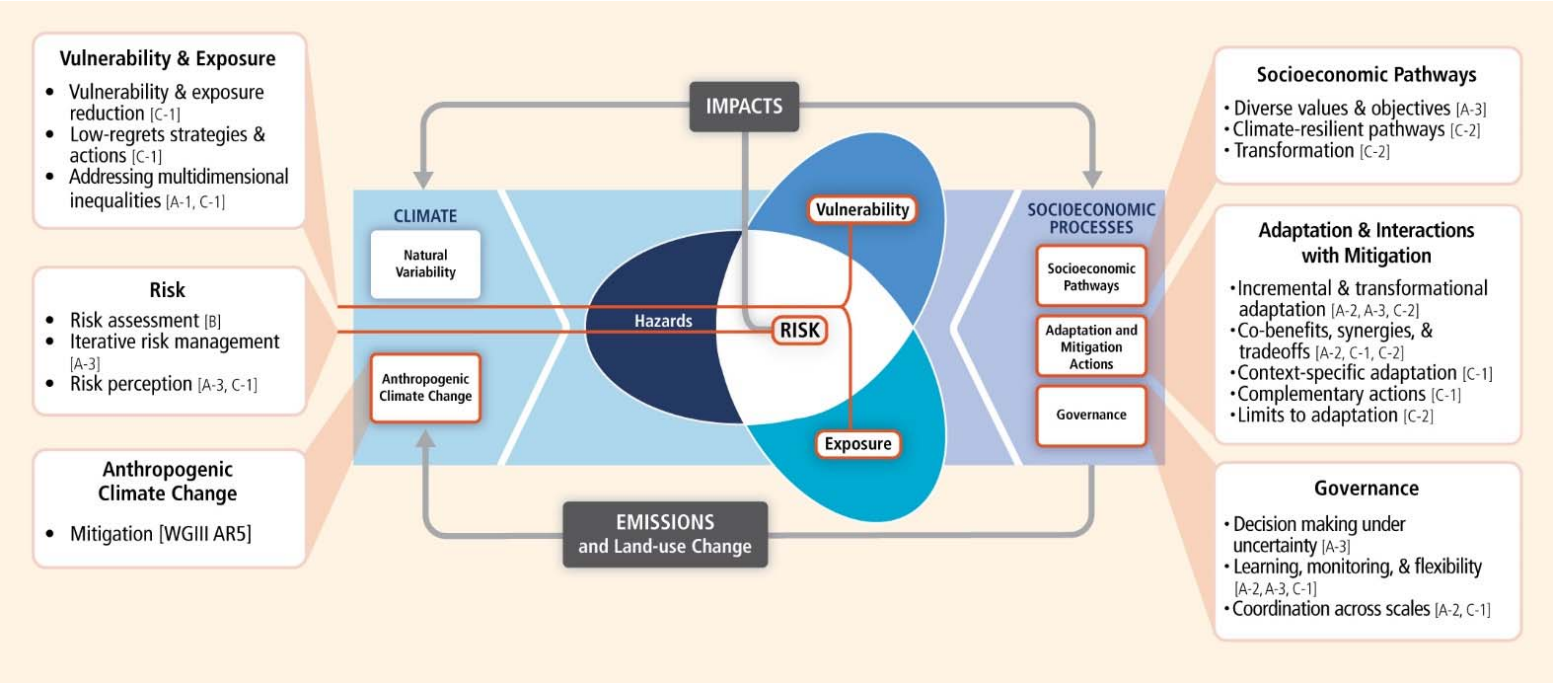
How to adapt the management of a protected area to climate change



How to adapt the management of a protected area to climate change

Framework

Structure the process (a checklist)

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PHASE III. PLANNING

ADAPTATION OF AN EXISTING MANAGEMENT PLAN TO THE CLIMATE PERSPECTIVE

1. Analysis of the management plan: diagnosis, measures.
2. Definition of objectives.
3. Definition of measures for mitigation and adaptation.
4. Participatory process.

Lets see what we already have

SPECIFIC TARGETED RESEARCH OR INNOVATION PROJECT

Deliverables 2.2 and 2.3 Meta-analysis of adaptation and mitigation measures across the EU25 and their impacts and recommendations how negative impacts can be avoided

Project acronym: **MACIS**
Project full title: **Minimisation of and Adaptation to Climate change: Impacts on biodiverSity**
Proposal/Contract no.: **044399**

Date of preparation: October 2008

Partner Responsible: University of Oxford

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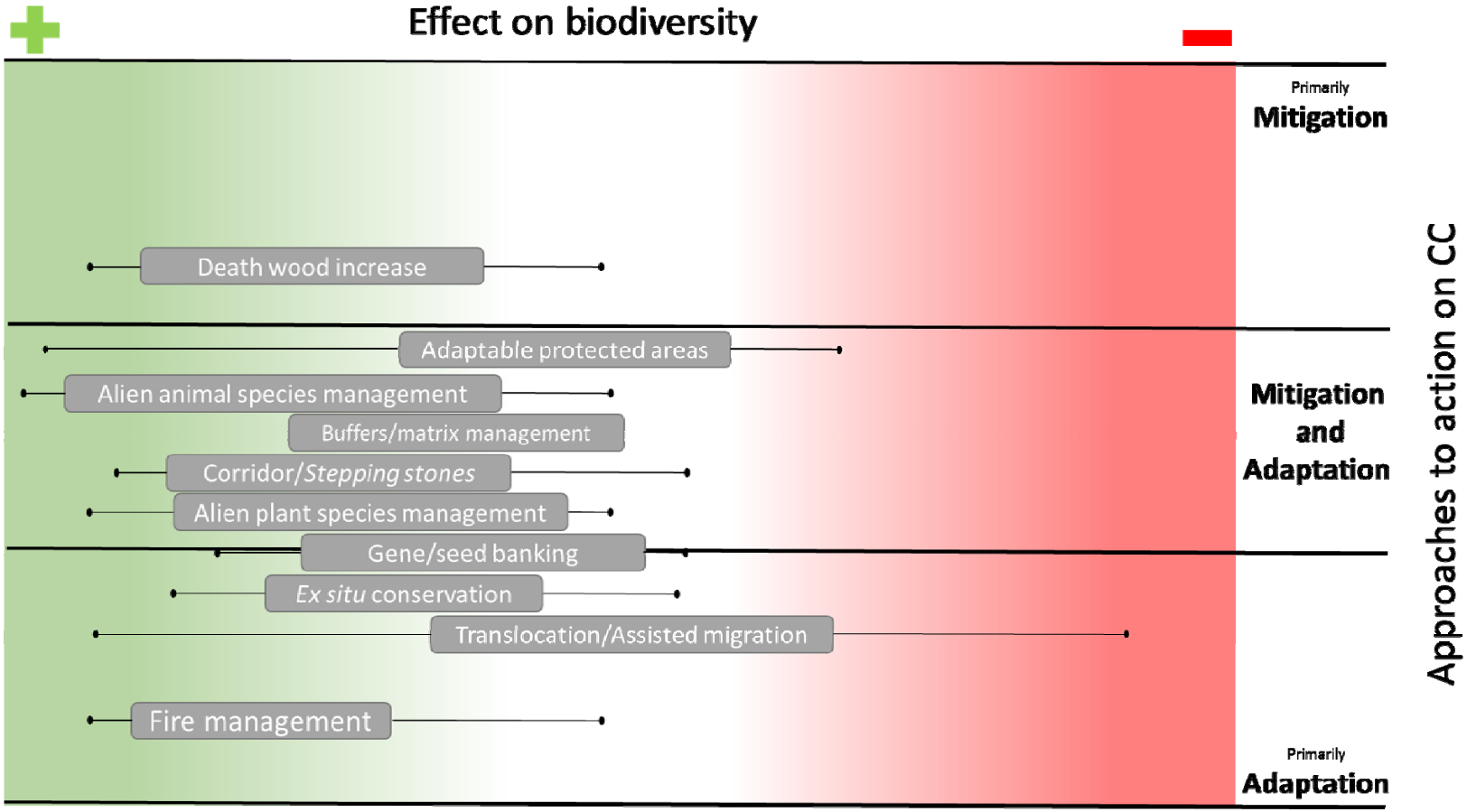


https://portal.research.lu.se/portal/en/publications/macis-minimisation-of-and-adaptation-to-climate-change-impacts-on-biodiversity(897b113a-68da-437b-b336-6a5deb4104a3)/export.html

How to adapt the management of a protected area to climate change

Analysis of the management plan: measures

- **Mitigation**
- **Adaptation**

1 year of work & debate

Still open to new comments or ideas

Natura 2000 objectives/measures	Mitigation	1- Increase C sinks in living biomass	2-Increase C sinks in dead biomass	3-Increase C sinks in soil	4-Avoid emissions linked to live biomass	5-Avoid emissions linked to dead biomass	6-Avoid emissions linked to Organic Carbon in Soil	Adaptation	1-Reduce non-climatic pressures	2-Improve the conservation status of essential elements	3-Increase connectivity	4-Ensure the required abiotic conditions	5-Manage impact of extreme events	6-Other measures
Objective 1	X													
Objetive 2														
...														

**Criteria based on Europarc adaptation manual (Europarc, 2018) and EU Guidelines on climate change and Natura 2000 (2013).*

Analysis of the management plan: measures

- Mitigation

Natura 2000 objective/measures	Mitigation	1- Increase C sinks in living biomass	2-Increase C sinks in dead biomass	3-Increase C sinks in soil	4-Avoid emissions linked to live biomass	5-Avoid emissions linked to dead biomass	6-Avoid emissions linked to Organic Carbon in Soil
Objective 1	X						
Objetive 2							
...							

**Criteria based on Europarc adaptation manual (Europarc, 2018) and EU Guidelines on climate change and Natura 2000 (2013).*

METHODOLOGY

EASY

WELL DEFINED

EXTERNALITY

FOR ADAPTATION

'WHY NOT INCLUDING IT?'

Analysis of the management plan: measures

- Adaptation

Natura 2000 objectives/measures	Adaptation	1-Reduce non-climatic pressures	2-Improve the conservation status of essential elements	3-Increase connectivity	4-Ensure the required abiotic conditions	5-Manage impact of extreme events	6-Other measures
Objective 1							
Objetive 2							
...							

*Criteria based on Europarc adaptation manual (Europarc, 2018) and EU Guidelines on climate change and Natura 2000 (2013).

METHODOLOGY NOT DEFINED (DIY)

COMPLEX

CONSERVATION ISSUES CAN BE ALSO ADAPTATION

'LETS SEAT AND TALK'

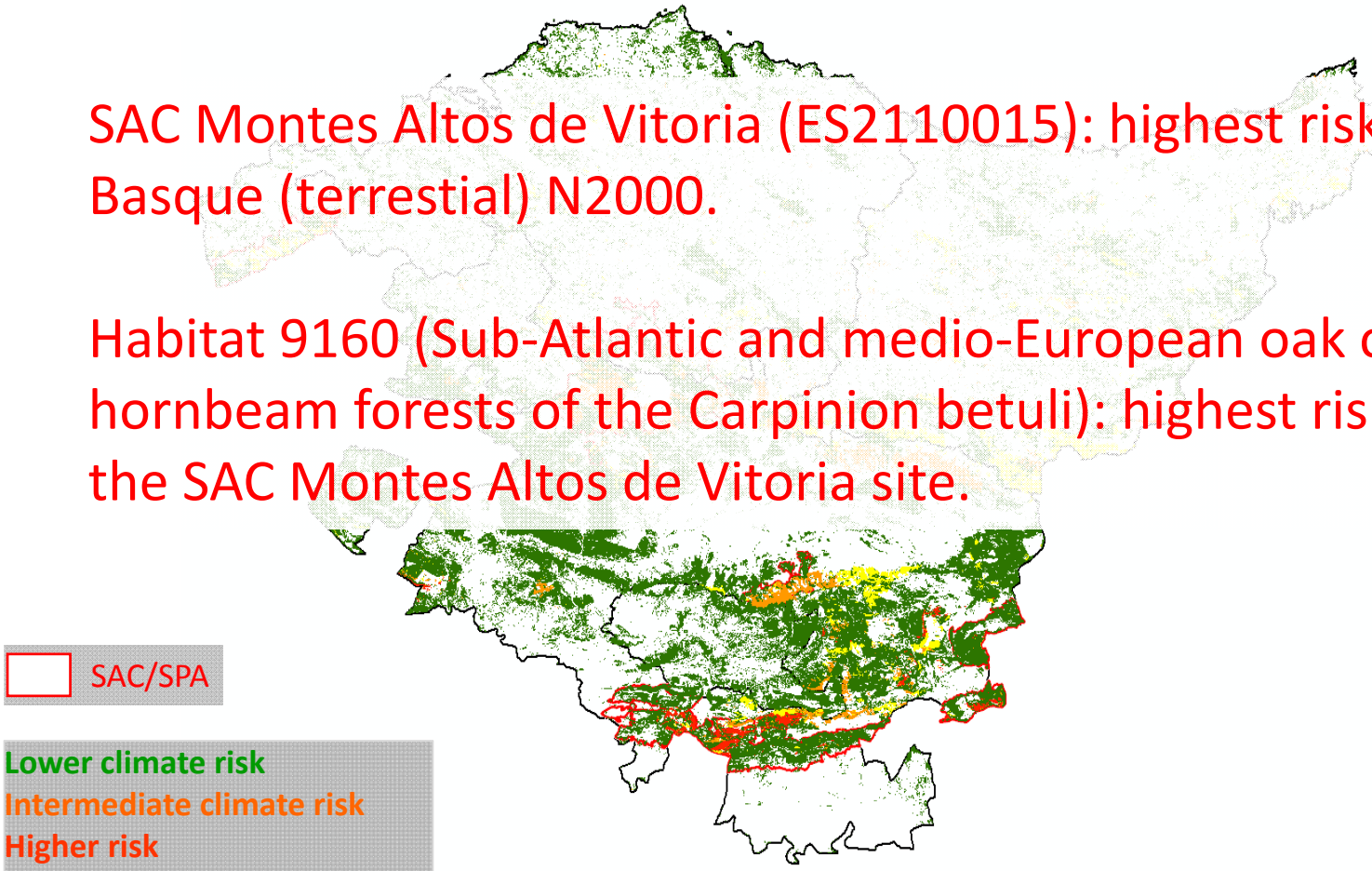
How to adapt the management of a protected area to climate change

Adaptation criteria	Examples of adaptation measures to assign each category*
1-Reduce non-climatic pressures	1a- Ecologic restoration
	1b- Buffer zone development
	1c- Increase the protected area to minimize negative impacts
	1d- Control of invasive and expanding species and diseases
	1e-Reduce or eliminate external sources of contamination or disturbance (eg exotic genotypes)
2-Improve the conservation status of essential elements	2a-Improve the structural gradient of ecosystems and spatial heterogeneity at landscape scale
	2b- Allow changes in the ecosystem taking into account the natural processes that generate the landscape
	2c- Increase the diversity of species / habitats
	2d-Maintain stable and self-regulated populations
3-Increase connectivity	3a- Develop corridors and stepping stones
	3b- Wider landscape management- Green infrastructure
	3c- Create new natural areas to minimize the existence of spatial gaps in the network
	3d- Spatial planning
4-Ensure the required abiotic conditions	4a- Water quality
	4b- Water quantity
	4c- Nutrient balance
	4d- Promote the creation of habitats / micro-habitats for species
5-Manage impact of extreme events	5a- Flood management
	5b- Storm management
	5c- Fire management
	5d- Drought management (long periods of drainage)
	5e- Landslide management
6-Other measures	6a- Review existing boundaries/need to establish new protected sites
	6b- Assisted migration, reintroduction, translocation
	6c- Asses the geographical distribution of protected area network
	6d- Increase knowledge about climatic and non-climatic pressures / impacts to redefine / adjust management measures

Case Study:
Natura 2000 in Basque Country

SAC Montes Altos de Vitoria (ES2110015): highest risk in Basque (terrestial) N2000.

Habitat 9160 (Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli): highest risk inside the SAC Montes Altos de Vitoria site.



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Case Study:
Natura 2000 in Basque Country

Montes Altos de Vitoria (ES2110015)

https://natura2000.araba.eus/es/-/zec-montes-altos-de-vitoria

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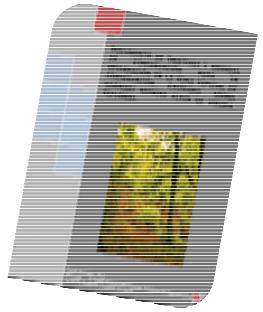
Case Study:
Natura 2000 in Basque Country
SAC Montes Altos de Vitoria



Annex II: regulations

Medidas totales	76	Sobre el total
Objetivos ligados a mitigación	4	5%
Objetivos ligados a adaptación	25	33%
Objetivos ligados a mitigación y adaptación	3	4%
Objetivos que aplican a varios ámbitos de mitigación	3	4%
Objetivos que aplican a varios ámbitos de adaptación	2	3%

- Mitigation: avoid emissions related in dead biomass.
- Adaptation: reduce non climatic preassures.

Annex III: actions

Medidas totales	59	Sobre el total
Objetivos ligados a mitigación	2	3%
Objetivos ligados a adaptación	13	22%
Objetivos ligados a mitigación y adaptación	2	3%
Objetivos que aplican a varios ámbitos de mitigación	4	7%
Objetivos que aplican a varios ámbitos de adaptación	19	32%

- Mitigation: increase C sink in dead biomass.
- Adaptation: improve the conservation status of essential elements.

1. PRIORITIZATION OF THOSE ACTIONS IN THE MANAGEMENT PLAN LINKED TO HABITAT 9160 THAT PROMOTE ITS ADAPTATION:

Acción Natura 2000	Adaptación	1-Reducir presiones no climáticas	2-Mejorar el estado de conservación de los elementos clave	3-Mejorar la conectividad	4-Mantener las codiciones abióticas requeridas	5-Gestionar las perturbaciones de evenetos climáticos	6-Otras medidas
1- Salvo por motivos de interés público que requerirán de una adecuada evaluación y de la correspondiente autorización ambiental, se prohibirá toda transformación de los bosques de la ZEC, que suponga una merma de su superficie y un deterioro de su estado de conservación.	X	X					
2- En el caso de plantaciones de especies con carácter invasor, una vez eliminados los árboles padre se procederá a erradicar también el regenerado.	X	X					
3- Con carácter general, se prohibirá la explotación forestal mediante cortas a hecho. Excepcionalmente, se podrá permitir en las áreas ocupadas por coníferas o en casos de fuerza mayor como plagas, incendios u otros desastres.	X	X					
4- En todo aprovechamiento forestal deberá mantenerse sobre el terreno un número de árboles suficientes como para mantener el hábitat forestal de la parcela. Este número de árboles nunca será menor de 10 árboles/ha, entre los que presenten mejores condiciones para favorecer a la fauna silvestre, reservando árborles de diferentes edades y tamaños. En este número no se computan los pies secos, que también deberán dejarse en el terreno, ni aquellos que se destinen a cubrir el volumen de madera muerta que se estime necesario. Debe fomentarse su permanencia durante el mayor tiempo posible.	X	X					

1. PRIORITIZATION OF THOSE ACTIONS IN THE MANAGEMENT PLAN LINKED TO HABITAT 9160 THAT PROMOTE ITS ADAPTATION :

RECOMMENDATION: PRIORITIZE THESE 7 ACTIONS OF THE MANAGEMENT PLAN

31 actions aimed at preserving and/or improving the conservation status of the essential element 'Native forests' of the SAC and contribute to the adaptation of the habitat of community interest 9160. These are aimed at:

- Reduction non-climatic pressures.
- Improve the conservation status of the essential element.
- Improve ecological connectivity.

NO REGRET

2. REVIEW OF THE 7 PRIORITIZED ACTIONS WITH THE OBJECTIVE OF INCLUDING IN A PROACTIVE WAY ADAPTATION TO CLIMATE CHANGE SPECIFICALLY IN THE MANAGEMENT OF HABITAT 9160

RECOMMENDATION: REDESIGN PRIORITIZED ACTIONS TO INCLUDE CLIMATE CHANGE

Example

Action 24 - In the process of reversion of forest plantations to forest, and without prejudice to the measures listed above, priority will be given to plots that are not proposed are located in the interior or are attached to oak groves, so that decrease the distance between the current forests or proposed the generation of forests with the smallest possible perimeter / area ratio. THIS PRIORITIZATION OF PLOTS TO BE REVERTED WILL TAKE INTO ACCOUNT THE FUTURE POTENTIAL DISTRIBUTION INTENDED FOR THE SUBATLANTIC MESOTROPHIC OAK (9160) UNDER THE CLIMATE SCENARIO 2100.

SPECIFIC CRITERIA FOR CC BASED ON THE RESULTS

Case Study:
Natura 2000 in Basque Country
SAC Montes Altos de Vitoria

NO REGRET

3. PROPOSAL FOR NEW MANAGEMENT ACTIONS TO INCLUDE IN A PROACTIVE WAY THE DIMENSION OF CLIMATE CHANGE, TAKING INTO ACCOUNT THE VISION TO 2100 :

RECOMMENDATION : INCLUDE ACTIONS AND OBJECTIVES IN A PROACTIVE WAY, TAKING INTO ACCOUNT THE EXPECTED EFFECTS OF CLIMATE CHANGE

SPECIFIC CRITERIA FOR CC BASED ON THE RESULTS

Examples:

- Identification and/or creation of climate shelters/refugia for habitats to protect based on their climatic risk (9160, 9120, 9230, G1.91).
- In the specific case of acidophilous beech forests, in anticipation of a reduction in water availability as a consequence of increased temperatures, management measures will be promoted to minimize competition for water resources (reduction of density, promotion of mixed stands of beech with other species, etc.).

SPECIFIC CRITERIA FOR CC BASED ON THE RESULTS

To include the climatic perspective in N2000:

4. What can/will do?

Adaptation of the current management plan to cc:

- Analysis of objectives and management measures.
- Prioritize climatic measures (adaptation, mitigation or both).
- Redesign measures to include the climate change.
- Include new (climatic no regret/low regret) measures.

Participation:

- Framework and first proposals accepted (and waiting for more).
- Public presentation of the method (May 2020). More participation…