How do we adapt protected area management in a changing climate?

Workshop 5.3

EUROPARC FEDERATION

EUROPARC CONFERENCE 2019, LATVIA


“Good Afternoon”
introduction
[10’]

LIFE NATUR' ADAPT

Who are your hosts today?

Olivier de Sadeleer

Project Manager
LIFE Natur'Adapt

Anne-Cerise Tissot

Project Coordinator
LIFE Natur'Adapt

João Dinis

Head of Office for accelerating urban transition

CASCAIS AMBIENTE

Jose Antonio Atauri Mezquida

Coordinador de proyectos

ex

Warming up…

Go and meet the people who work on the same type of “habitat” as you.

Goal - Form sub-groups

[7’]

Slide TBC

3’ of inspiration

https://youtu.be/-Q0xUXo2zEY

survey report

Climate change adaptation in European Protected Areas, state of play.

[15’]

LIFE NATUR' ADAPT

...in a nutshell

LIFE NATUR' ADAPT

LIFE NaturAdapt is a 5-year project developed with the enthusiastic support of…

Life

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE ET SOLIDAIRE

EUROPARC FEDERATION

Natur'Adapt is ...

- An experiment that aims at **integrating climate change** into protected area management practices as a collective process.
- **10 partners** French & Europeans

Among ourselves we talk about...

Vulnerability assessment

Adaptation measures

Collaborative platform

Exchanges and best practices

Major milestones for EUROPARC Federation

- survey (online & phone) — **DONE**
- “climate change” task force — **BEING STARTED**
- Dissemination & capacity building — **ONGOING**
- EUROPARC22 - European Conference on Climate change adaptation for Protected Areas — **TO BE STARTED**

Major milestones for EUROPARC

- **Dissemination & capacity building ONGOING**

- **European Conference on Climate change adaptation for Protected Areas TO BE STARTED**


Natur'Adapt
survey results

Objectives

Confirm our underlying assumptions and **feed the project from the ground up.**

Modus operandi - 3 phases

PHASE 1 - Short online

497 responses

43% FR - 57% EU

PHASE 2 - In-depth survey

72 responses

PHASE 3 - Video interviews

10 professionals in nature conservation and/or land management

Key learnings

LIFE NATUR' ADAPT

1

Climate change effects are observed among European protected areas

increasing temperatures // prolonged droughts

heavy rainfall very concentrated in time

rising sea and ocean levels // soil erosion

disruption of seasonal and phenological cycles

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2

Climate change

is a priority for 77% of respondents

in the short term for 87% of them

... but remains <u>secondary</u> to the destruction, alteration and fragmentation of natural habitats

LIFE NATUR' ADAPT

3 It is possible to build upon existing planning practices

80% of respondents do plan the management of their protected area

61% use a standardized method

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4

Taking climate change into account is <u>an emerging practice</u>

Innovators are already at work. There are inspiring examples.

4 Adaptation planning

67% of respondents **did not do** a vulnerability assessment

&

22% of respondents **do take climate change** into account

LIFE NATUR' ADAPT

4

Vulnerability assessment consequences

- Development of awareness campaigns
- Establishment of specific monitoring
- Designing an adaptation plan
- Development of new partnership within the territory

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LIFE NATUR' ADAPT

4

Key steps to integrate climate change today

Try, learn, adapt, try again

EUROPARC FEDERATION

LIFE NATUR' ADAPT

4

Towards a methodology...

1. The spark

2. The preparatory phase: Bibliographical research, meet experienced people. Imagine the future climate

3. Vulnerability assessment

4. **Establishment of monitoring of climate variables and effects.**

5. **Planning and implementation of adaptation measures**

6. Monitor & learn

Adapt & try again

EUROPARC FEDERATION

5

90% of respondents say that

Protected Areas have a role to play in climate change mitigation?

- “Tools” to strength the structural resilience of territories and providing Ecosystem Services
- Observatories or sentinels of climate change
- A space to experiment sustainable transition
- Climate change awareness

How to integrate climate change in the management of your area ?

Preparing for climate change adaptation
in your Proteced Area

Case study

Key learnings from Cascais Ambiente

[20’]

Climate Action in Cascais

CASCAIS
AMBIENTE

Cascais

+ 97 km2

+ 30 km coastal line

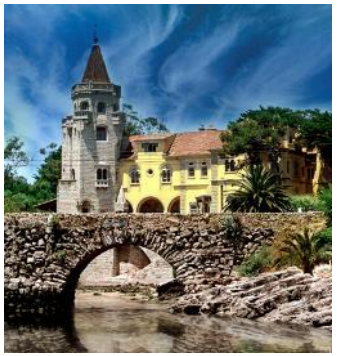
+ 1/3 of protected landscape

+ Metropolitan Area of Lisbon

+ Renowned tourist destination

+ 206 000 inhabitants

+ Unrivaled heritage







Cascais

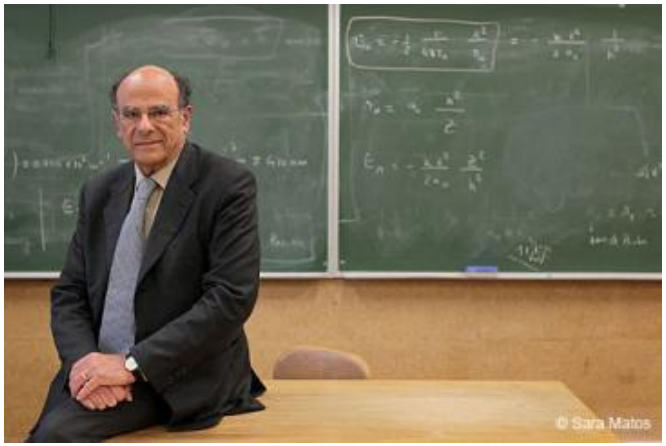
. . . . . .

Cascais

How did it start?

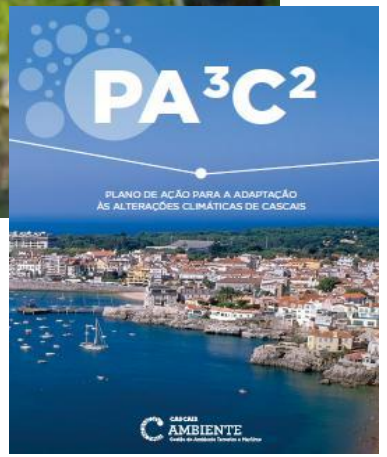
+ **PECAC** (2009) is the result of a multidisciplinary team coordinated by the CC-IAM group of the Faculty of Science of the Lisbon University.

- Water resources
- Coastal zones
- Biodiversity
- Agriculture
- Human health
- Tourism



Cascais' Action Plan for Climate Change Adaptation

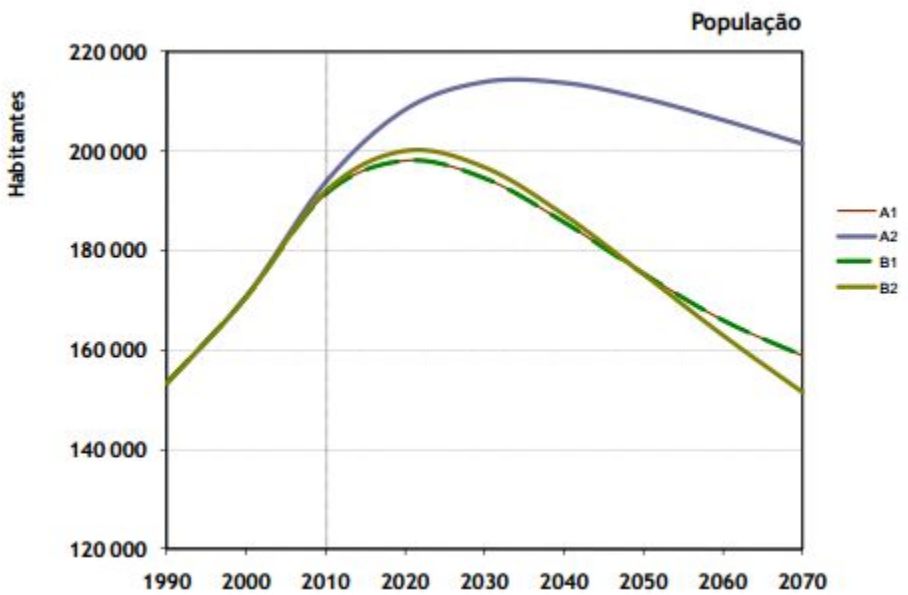
. . . . . .

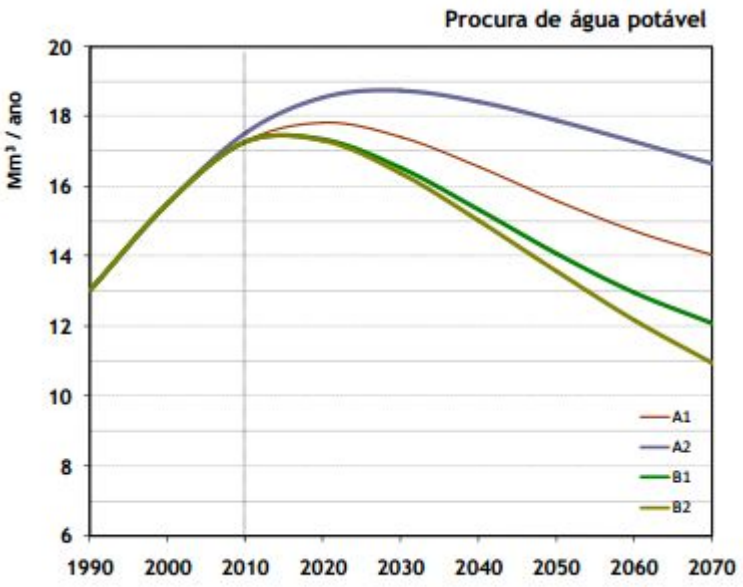


Social-economic scenarios:

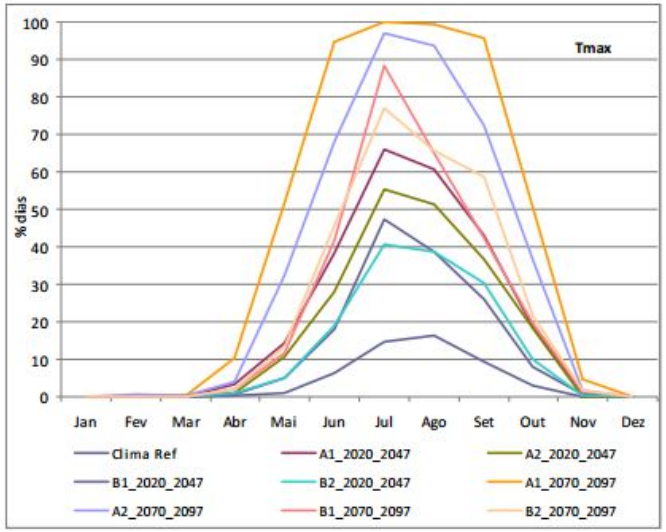
Most scenarios defend an increase of population by 2020, followed by a slight decrease. We will also see a decrease in family members as well as an aging process.

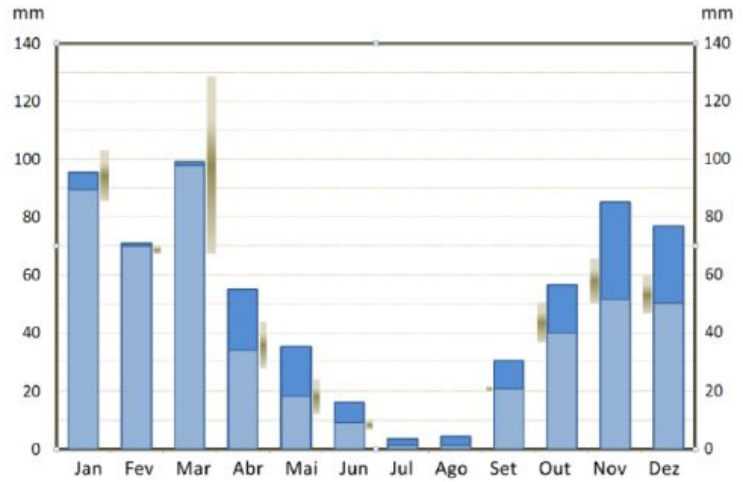
It is predicted a reduction on general gas emissions due to increase of use of public transportation; reduction of water consumption (except with the scenarios that point out temperature rise); reduction of residues production due to increase of recycling.





Climate Scenarios and Vulnerability Assessment





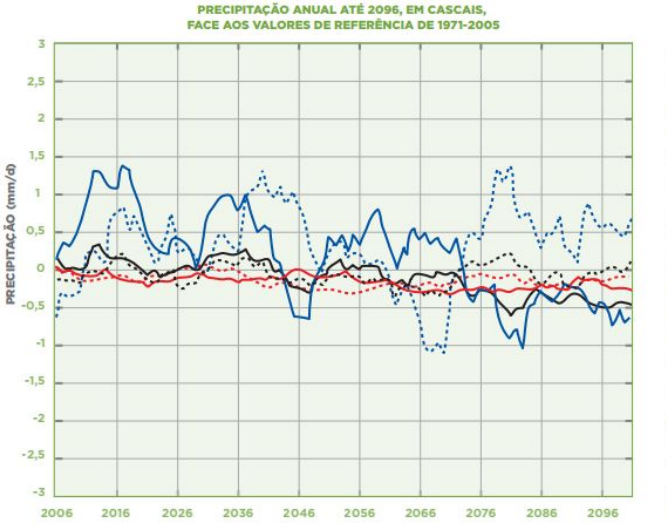
Temperatura mínima (°C)

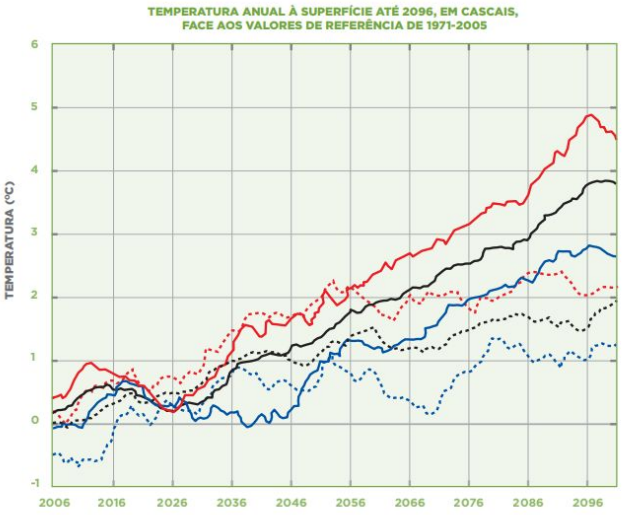
	actual	meados do séc. XXI				finais do séc. XXI			
		A1	A2	B1	B2	A1	A2	B1	B2
Janeiro	5.5	1.5	1.4	0.8	0.7	3.0	2.8	1.6	1.3
Fevereiro	5.8	2.0	1.4	1.3	1.1	4.0	2.8	2.6	2.3
Março	7.2	2.2	1.5	1.3	0.9	4.3	3.0	2.5	1.7
Abril	8.3	2.3	1.5	1.0	0.9	4.6	2.9	2.1	1.9
Maio	9.5	3.3	2.5	1.7	1.6	6.6	4.9	3.4	3.1
Junho	11.8	4.3	3.1	2.3	2.1	8.6	6.3	4.5	4.1
Julho	13.0	4.8	3.8	2.5	3.0	9.7	7.6	5.0	6.1
Agosto	12.9	4.4	3.7	2.3	2.3	8.8	7.4	4.7	4.6
Setembro	12.8	4.2	3.2	2.5	2.1	8.4	6.4	5.0	4.1
Outubro	11.5	3.4	3.0	2.0	1.8	6.7	6.0	4.0	3.7
Novembro	8.6	1.9	1.5	1.1	0.8	3.8	3.1	2.2	1.5
Dezembro	6.2	1.4	0.9	0.5	0.3	2.8	1.8	1.0	0.6

Temperatura máxima (°C)

	actual	meados do séc. XXI				finais do séc. XXI			
		A1	A2	B1	B2	A1	A2	B1	B2
Janeiro	11.7	2.0	1.7	1.3	1.1	3.9	3.4	2.5	2.3
Fevereiro	12.2	2.0	1.6	1.4	1.3	4.0	3.1	2.8	2.5
Março	13.8	2.1	1.5	1.0	0.9	4.2	3.0	2.1	1.7
Abril	15.5	3.0	2.0	1.1	1.3	5.9	3.9	2.2	2.6
Maio	17.3	4.6	3.5	2.2	2.1	9.1	7.0	4.5	4.3
Junho	19.6	5.5	4.1	3.1	2.9	11.0	8.2	6.2	5.8
Julho	21.6	6.0	4.9	3.4	4.1	11.9	9.7	6.8	8.1
Agosto	21.9	4.9	4.1	2.6	2.6	9.7	8.2	5.2	5.1
Setembro	21.1	4.5	3.4	2.8	2.2	9.0	6.8	5.7	4.4
Outubro	18.9	3.9	3.3	2.2	2.0	7.8	6.5	4.4	4.0
Novembro	15.3	2.2	1.8	1.4	1.4	4.5	3.7	2.8	2.9
Dezembro	12.6	1.9	1.3	0.6	1.1	3.7	2.6	1.2	2.1

Cascais' Action Plan for Climate Change Adaptation





Climatic variable	Impacts
	Decrease of average of precipitation
	Increase of average temperature, mainly maximum
	Sea level rise
	Increase of extreme precipitation events

ex

Going beyond temperature and precipitation…

Establish a list variables useful to describe your climate and its effects that would be interesting to follow up for your “habitat”

[8’]

Photo: Vincent Munier

BREAK

[15′]

Developing climate change adaptation for your Proteced Area

Case study 1

Key learnings from Cascais Ambiente

[30']

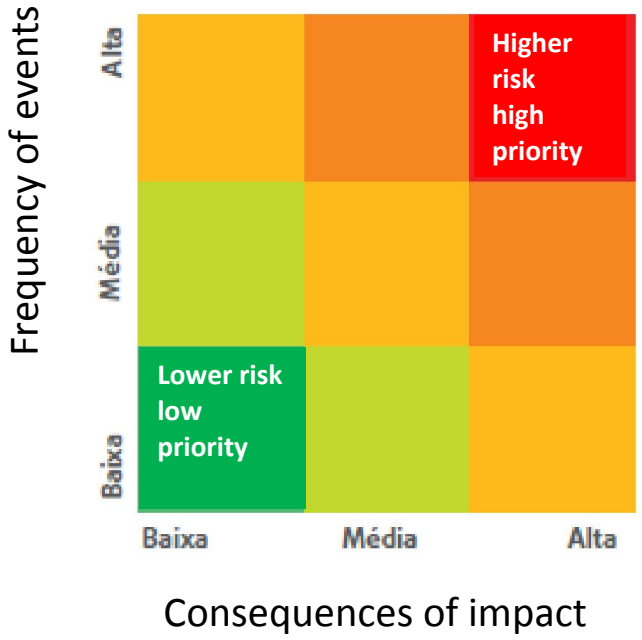
Climate Scenarios and Vulnerability Assessment

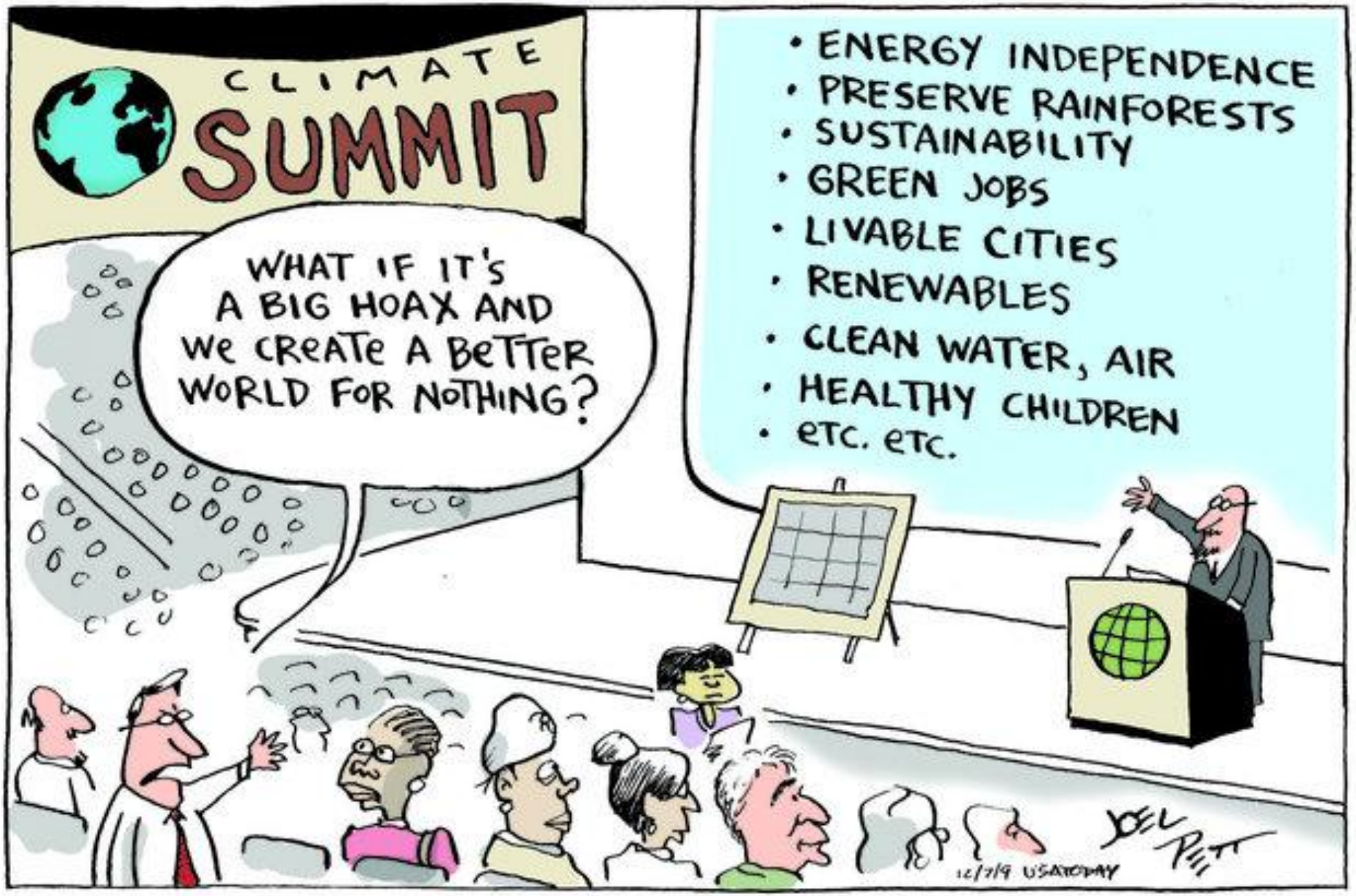
Risks and vulnerabilities:

Vulnerability can be interpreted as the likelihood of someone or something to suffer any given negative impact.

In climate change scenarios, current vulnerabilities tend to be aggravated in the near to far future.

It is, thus, crucial to study the adaptive capacity of any territory or community to assess the risks in different scenarios.




CLIMATE
SUMMIT
WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER WORLD FOR NOTHING?
• ENERGY INDEPENDENCE
• PRESERVE RAINFORESTS
• SUSTAINABILITY
• GREEN JOBS
• LIVABLE CITIES
• RENEWABLES
• CLEAN WATER, AIR
• HEALTHY CHILDREN
• ETC. ETC.
12/7/19 USATODAY
JOEL PETT

Biodiversity:

It is excepted an increase of favorable conditions for forest fires what will lead to the destruction of habitats. Humid systems will face stress due to less available water.

Mammals, reptiles, amphibian, and insects are resilient to climate variations but the destruction of habitats will increase its vulnerability.

Agriculture:

It is expected an increase of Carcavelos wine. However, if the high temperature rise scenarios we will face the end of land + climate conditions for this culture.

Also expected is the loss of productivity for cereals and irrigation cultures.

Climate Scenarios and Vulnerability Assessment

Coastal areas:

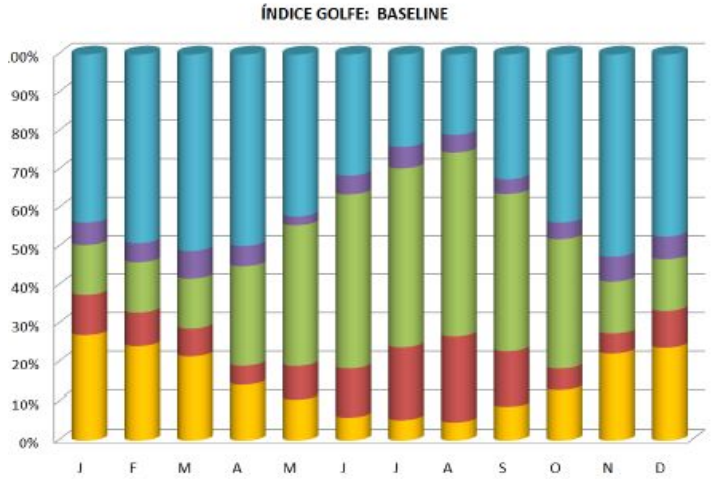
Scenarios point for a reduction of useful sand area associated with sea level rise and changes in the ocean currents/waves.
By the end of the century this can lead to less 50%, average, sand loss.

Also, the increase of extreme weather events can lead to an upscale of erosion.

Tourism:

It is likely to foresee less thermal stress days due to cold temperatures during winter. On the other side, we will face more hot days during summer season.

Simultaneously, we will face an increase of optimal days for beach and nautical tourism and golf. It is an opportunity to reduce tourism seasonality.



Water resources:

Less precipitation with increase of evapotranspiration (potential) from temperature rise will reduce available drinking water, particularly in the streams and the Pisão-Atrozela aquifer.

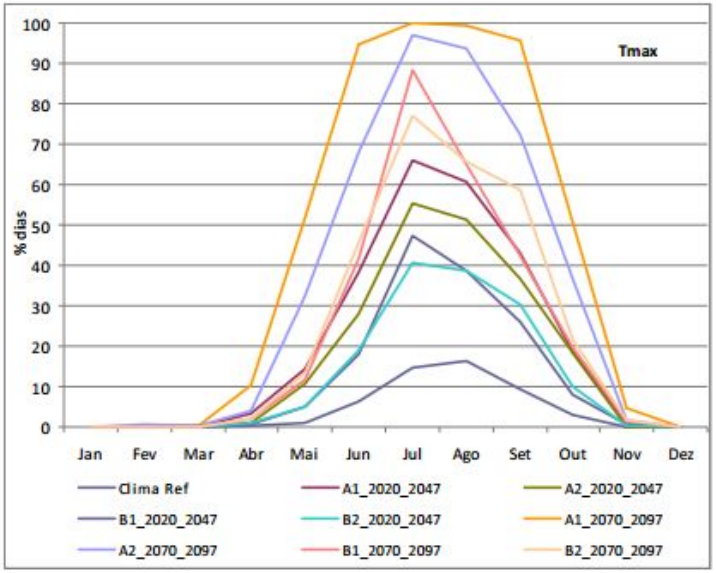
By the second half of the XXI century, this aquifer will face a reduction of 25% of water volume that will rise up to 50%.

Health

High temperatures can lead to thermal stress situations and an increase of mortality. For a threshold of 30ºC, every degree increase leads to an increase of 4,7% of related deaths.

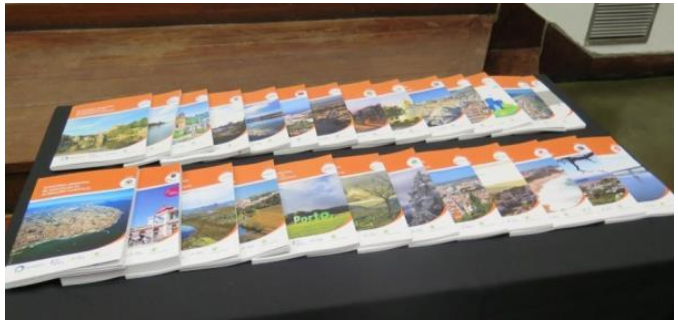
Air pollution from car traffic, ozone level increase (due to high temperatures) and other particles can lead to increase to cardiovascular and allergic problems.

An increase of diseases transmitted by mosquitoes from tourism activity and temperature rise.



Engagement + Integrated activities

European Commission
Climate Action



Covenant of Mayors
for Climate & Energy

ClimAdaPT.Local

Interreg
Sudoe

our world
our dignity
our future

THERMOS

eea grants

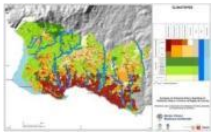
BASE

CDP
DRIVING SUSTAINABLE ECONOMIES

INNOENT

Action

PECAC



1st Masterplan

CDP
DRIVING SUSTAINABLE ECONOMIES

Reporting and monitoring platform

Process promotion within Portuguese speaking countries

our world
our dignity
our future

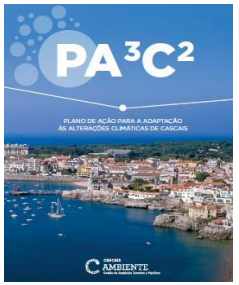
1100 participants

Exchange of knowledge and lobby between EU and Amazon communities

THERMOS

Heat network monitoring

Open source Software



2017
Climate Change Adaptation Action Plan

2009

BASE
BOTTOM-UP CLIMATE ADAPTATION STRATEGIES TOWARDS A SUSTAINABLE EUROPE

150 participants

30 institutions

European Commission
Climate Action

Providing data for the *EU Climate Action*

Cooperating in the Mayors adapt

ClimAdaPT.Local

27 beneficiary municipalities

Finalist on best adaptation project at COP 22

National network for climate adaptation

INNOENT
EDUCATION

50 people duly capacitated

Fablab access and design platform

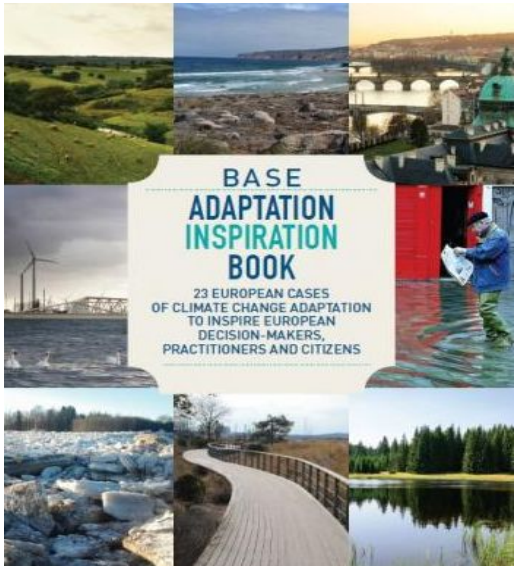
National Strategy for Climate Change Adaptation

EU Strategy for Climate Change

Covenant of Mayors (climate & energy)

COP 21 Paris Agreement

Adaptation


BASE
ADAPTATION
INSPIRATION
BOOK
23 EUROPEAN CASES
OF CLIMATE CHANGE ADAPTATION
TO INSPIRE EUROPEAN
DECISION-MAKERS,
PRACTITIONERS AND CITIZENS

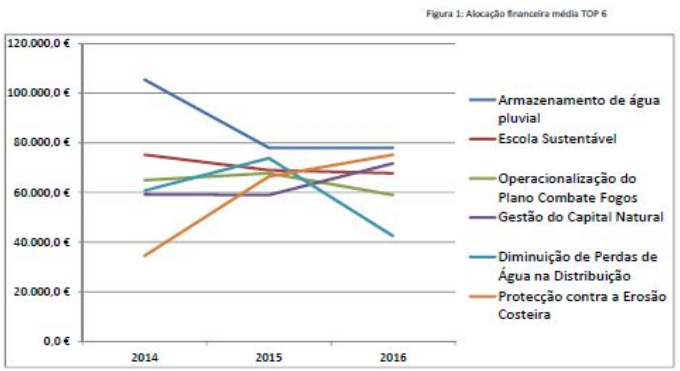


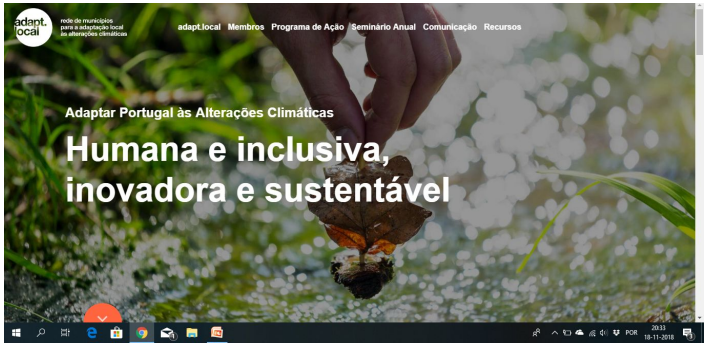
Figura 1: Alocação financeira média TOP 6
120.000,0 €
100.000,0 €
80.000,0 €
60.000,0 €
40.000,0 €
20.000,0 €
0,0 €
2014
2015
2016
Armazenamento de água pluvial
Escola Sustentável
Operacionalização do Plano Combate Fogos
Gestão do Capital Natural
Diminuição de Perdas de Água na Distribuição
Protecção contra a Erosão Costeira

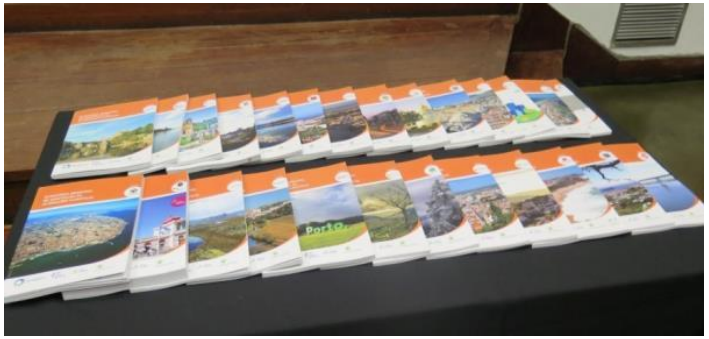

Eu já criei a minha empresa!

Adaptation

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

ClimAdaPT.Local
Estratégias Municipais de Adaptação às Alterações Climáticas





Adaptation


A good life is simple
overdeveloped.eu
Change
the Future
Start today!
www.change-the-future.eu
Why
pollute our air
when the winds of
change are blowing?
overdeveloped.eu


Why have a lead foot
when you can have
buns of steel?
A good life is simple. overdeveloped.eu
30
50
25
2015 European Year for Development

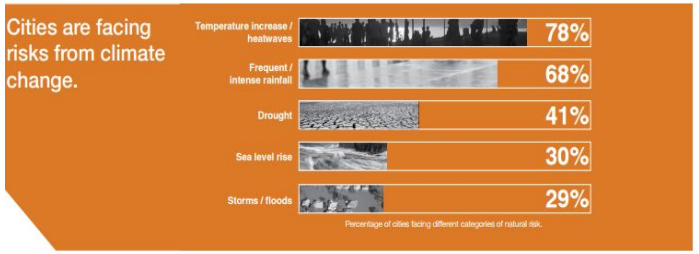
Adaptation

INNOENT
EDUCATION

CDP
DISCLOSURE INSIGHT ACTION

City of Cascais

Written by CDP · Report analysis & information design for CDP by AECOM · In partnership with C40 CITIES · Bloomberg Philanthropies



Adaptation


Interreg
Sudoe
Smart Heritage City
European Regional Development Fund
FCT
FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA
O TEU TEMPO É AGORA!
2018
AÑO EUROPEO DEL PATRIMONIO CULTURAL
#EuropeForCulture


THERMOS

Structured action 2030

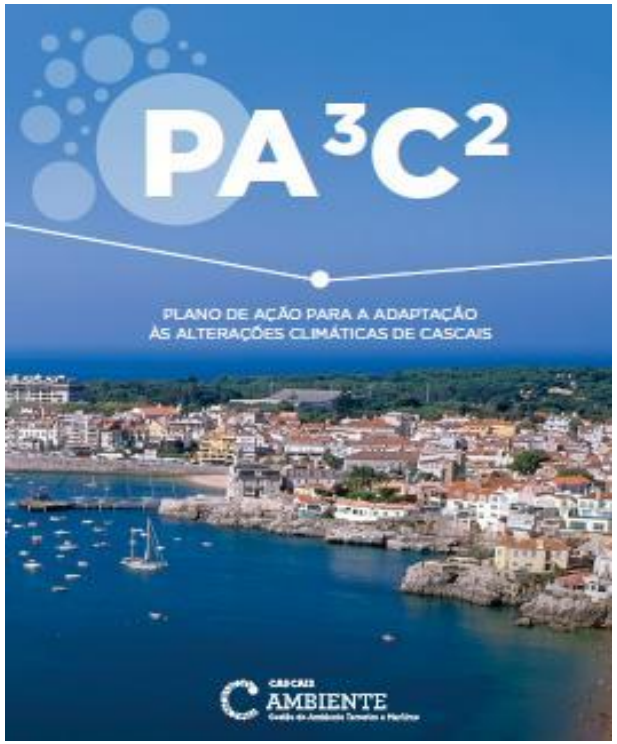
+ Planning ahead: 3 political terms

+ Updated climate scenarios with IPCC 5. Corroboration of PECAC's scenarios.

+ inter-institutional collaboration and co-responsibility

+ Integration with UN's Sustainable Development Goals 2030 and national commitments

+ Submitted on Town Hall Meeting – mandatory commitment



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

Cascais' Action Plan for Climate Change Adaptation

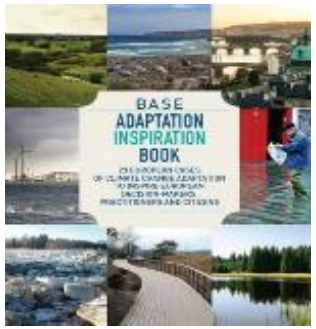
+ Workshops with stakeholders following "BASE Adaptation's" methodologies

+ multi-institutional workgroup aggregated by sector

+ Retrieve information on what existing projects can cope with climate change and what needs to me added (integrated)

+Independent commission for implementation

+ Inclusive



13 CLIMATE ACTION

Cascais' Action Plan for Climate Change Adaptation

	Adaptation Measures
1	Stakeholder awareness
2	Residual and pluvial water separation network
3	Sustainable school
4	Local alternatives to water supply
5	Green corridors and riverbeds requalification
6	Eliminate pollution in water beds
7	Reforestation in the natural park with native species and control of invasive ones
8	Full implementation on the fire prevention plan
9	Coastal erosion prevention actions
10	Contingency plan for heat waves
11	Vigilance and control of vector diseases
12	New urban green parks and natural infiltration areas
13	Legislation for bioclimatic architecture in urban areas

+ 13 Measures

+ 82 actions

+ €11 500 000 investment

+ Mostly "non-structural" or "green solutions".

+ "gray solutions" for water supply infrastructure

+ Transversal reply to the Sustainable Development Goals 2030

Cascais' Action Plan for Climate Change Adaptation

	Adaptation Measures
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+ 13 Measures

+ 82 actions

+ €11 500 000 investment

+ Mostly "non-structural" or "green solutions".

+ "gray solutions" for water supply infrastructure

+ Transversal reply to the Sustainable Development Goals 2030

Adaptation: Awareness and Education

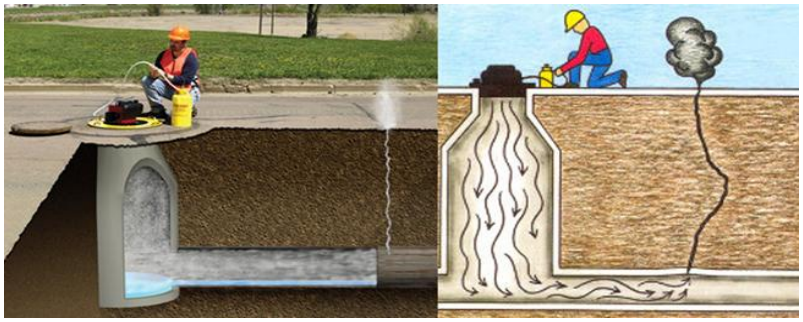
CLIMATHON CASCAIS
UNIVERSIDADE NOVA SBE
26 out'18

+ 30 000 citizens reached

+ 200 professionals trained

+ 20 communication actions

Adaptation: Water resources



+ complete secondary water supply system (higher areas)

+ elevation stations maintenance and self-supply concluded

Adaptation: Civil protection and health

dados incendio - Bloco de notas

Ficheiro Editar Formatar Ver Ajuda

Date	Time	Temp Out	Hi Temp	Low Temp	Out Hum	Dew Pt.	Wind Speed	Wind Dir	Wind Run
06-10-18		19:30	18.7	19.1	18.7	71	13.3	0.0	NE
06-10-18		20:00	18.4	18.7	18.4	75	13.9	0.0	NNE
06-10-18		20:30	18.2	18.4	18.2	75	13.7	0.0	NNE
06-10-18		21:00	17.8	18.2	17.8	74	13.1	0.0	NNE
06-10-18		21:30	17.7	17.8	17.6	70	12.1	0.0	NNE
06-10-18		22:00	17.4	17.7	17.4	69	11.6	0.0	NNE
06-10-18		22:30	17.1	17.4	17.1	72	12.0	0.0	NNE
06-10-18		23:00	16.9	17.1	16.9	73	12.1	0.0	NNE
06-10-18		23:30	16.7	17.0	16.7	76	12.5	0.0	NNE
07-10-18		00:00	16.6	16.8	16.6	77	12.6	0.0	NE
07-10-18		0:30	16.5	16.7	16.5	77	12.5	0.0	N
07-10-18		1:00	16.6	16.6	16.4	74	11.9	0.0	NNE
07-10-18		1:30	16.9	17.1	16.5	71	11.6	0.0	---
07-10-18		2:00	20.4	20.4	16.9	63	13.1	0.0	N
07-10-18		2:30	20.5	32.6	20.4	63	13.2	1.6	N
07-10-18		3:00	18.7	20.6	18.4	65	12.0	0.0	N
07-10-18		3:30	18.0	19.1	18.0	65	11.3	0.0	NNW
07-10-18		4:00	17.1	18.0	16.9	68	11.2	0.0	NW
07-10-18		4:30	16.3	17.1	16.2	74	11.6	0.0	NW
07-10-18		5:00	15.8	16.3	15.7	74	11.2	0.0	---
07-10-18		5:30	15.7	15.9	15.4	70	10.3	0.0	NNW
07-10-18		6:00	15.6	15.8	15.5	69	9.9	0.0	WNW
07-10-18		6:30	15.2	15.7	15.2	72	10.2	0.0	---
07-10-18		7:00	14.9	15.2	14.8	72	9.9	0.0	---
07-10-18		7:30	14.6	14.9	14.6	73	9.8	0.0	---
07-10-18		8:00	14.4	14.6	14.4	74	9.9	0.0	---
07-10-18		8:30	14.6	14.6	14.4	75	10.2	0.0	---
07-10-18		9:00	14.8	14.8	14.5	73	10.0	0.0	---

+ all year monitoring

+ all riverbed areas cleaned and monitored

+ information shared between health stakeholders

Meteo.cascais.pt

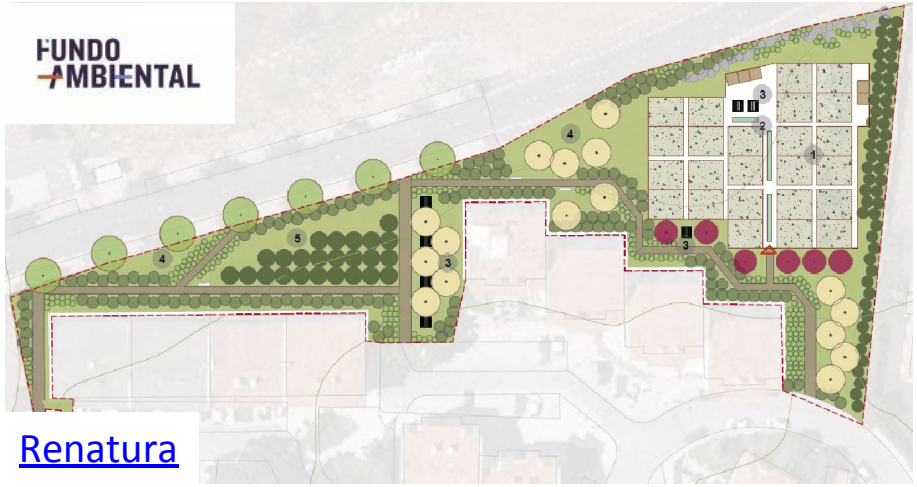
Adaptation: Ecological infrastructure and resilient urban green spaces

+ 17 autochthones species

+ 5000 volunteers

+ best practice manual for urban green spaces design and maintenance

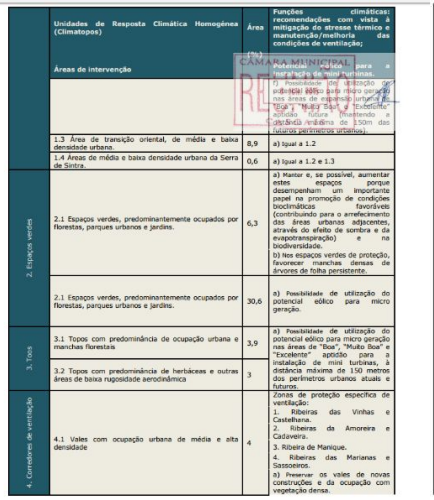
+ dune system maintained



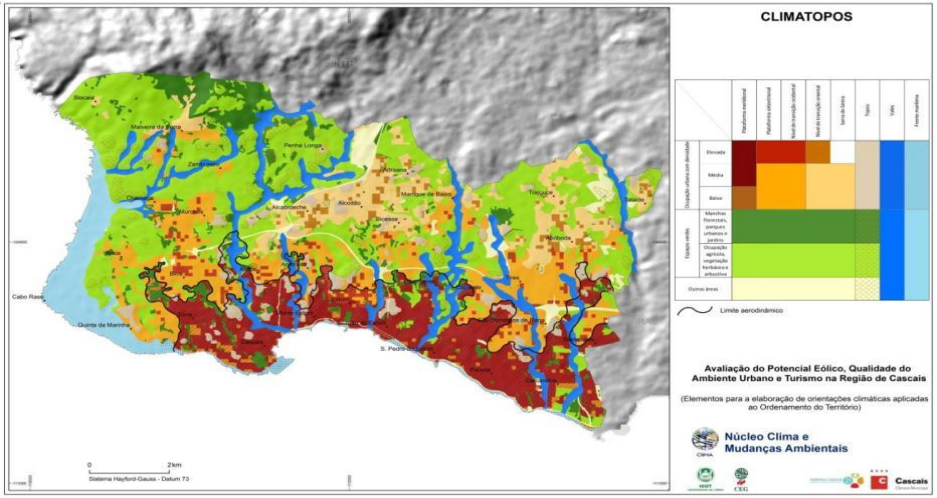
Renatura

Adaptation: Ecological infrastructure and resilient urban green spaces

Adaptation: Spatial Planning



Unidades de Resposta Climática Homogénea (Climatopos)	Área	Funções climáticas: recomendações com vista à mitigação do stresse térmico e manutenção/melhoria das condições de ventilação;
Áreas de intervenção		Potencial eólico para a instalação de mini turbinas.
1.3 Área de transição oriental, de média e baixa densidade urbana.	8,9	a) Igual a 1.2
1.4 Áreas de média e baixa densidade urbana da Serra de Sintra.	0,6	a) Igual a 1.2 e 1.3
2. Espaços verdes — 2.1 Espaços verdes, predominantemente ocupados por florestas, parques urbanos e jardins.	6,3	a) Manter e, se possível, aumentar estes espaços porque desempenham um importante papel na promoção de condições bioclimáticas favoráveis (contribuindo para o arrefecimento das áreas urbanas adjacentes, através do efeito de sombra e da evapotranspiração) e na biodiversidade. b) Nos espaços verdes de proteção, favorecer manchas densas de árvores de folha persistente.
2.1 Espaços verdes, predominantemente ocupados por florestas, parques urbanos e jardins.	30,6	a) Possibilidade de utilização do potencial eólico para micro geração.
3. Tipos — 3.1 Tipos com predominância de ocupação urbana e manchas florestais	3,9	a) Possibilidade de utilização do potencial eólico para micro geração nas áreas de "Boa", "Muito Boa" e "Excelente" aptidão para a instalação de mini turbinas, à distância máxima de 150 metros dos perímetros urbanos atuais e futuros.
3.2 Tipos com predominância de herbáceas e outras áreas de baixa rugosidade aerodinâmica	3	
4. Corredores de ventilação — 4.1 Vales com ocupação urbana de média e alta densidade	4	Zonas de proteção específica de ventilação: 1. Ribeiras das Vinhas e Castelhana. 2. Ribeiras da Amoreira e Cadaveira. 3. Ribeira de Manique. 4. Ribeiras das Marianas e Sassoeiros. a) Preservar os vales de novas construções e da ocupação com vegetação densa.



+ integrated team for urban process benefits under sustainable development principles

+ climate chart for urban processes

+ special ruling for large infrastructures

+ ecosystem services

+ regulation for adaptation

Cascais' Action Plan for Climate Change Adaptation

Lessons

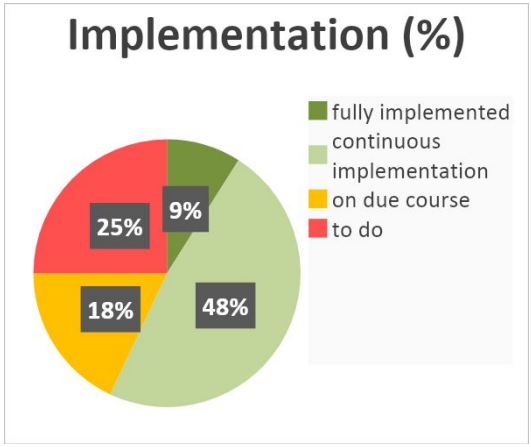
+ **Team coordination** and knowledge leveling were unexpected challenges

+ Non-structural actions, such as training and awareness should be considered **a priority for action momentum**

+ Most actions which tackle vulnerabilities are **nature based solutions.**

+ Cities must ensure the inclusion of adaptation actions in **planning instruments and construction regulation.**

+ Together, climate action strategies will provide a **transformative spirit to innovate** and find new approaches for resource efficiency: win-win



CASCAIS

Tudo *começa nas* pessoas

João Dinis joao.dinis@cascaisambiente.pt

Developing climate change adaptation for your Proteced Area

Case study 2

Key learnings from Teide National park

[30’]

Integrating climate change adaptation into management of protected areas. Pilot case: Teide National Park (Spain)

José Antonio Atauri Mezquida
jose.atauri@redeuroparc.org

Fundación Interuniversitaria Fernando González Bernáldez para los Espacios Naturales

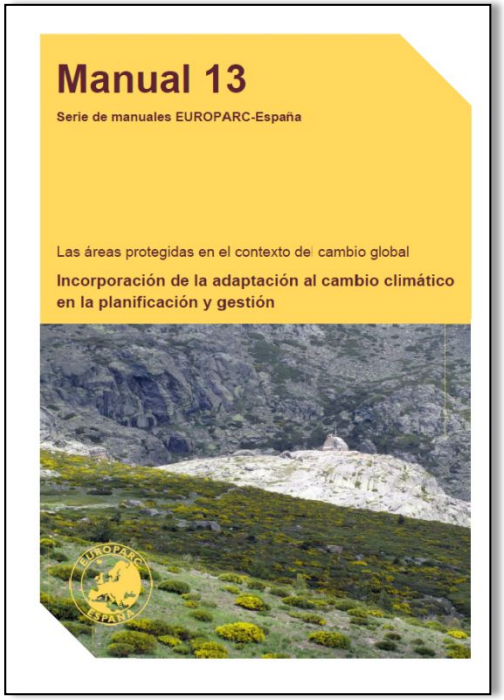
EUROPARC España

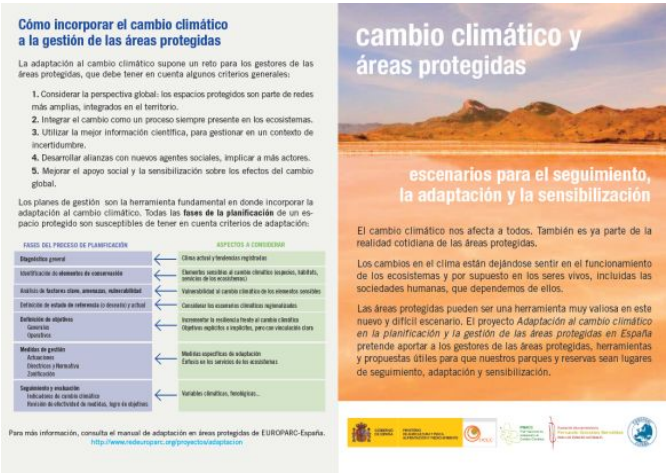
EUROPARC CONFERENCE 2019, LATVIA

Ķemeri National Park

INCORPORATING CLIMATE CHANGE ADAPTATION INTO PLANNING AND MANAGEMENT

1. Analysis of a sample of management plans (n=60)
3. Compilation of adaptation projects in PA
4. Survey to managers and scientists
5. Three Workshops
6. Implementation in 4 case studies
7. Compilation in a technical Manual
8. Dissemination of results

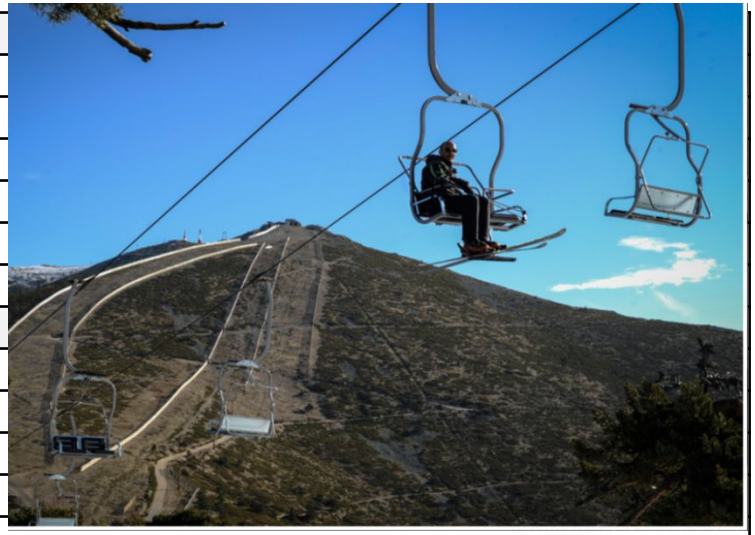




MINISTERIO DE AGRICULTURA, ALIMENTACIÓN Y MEDIO AMBIENTE
ORGANISMO AUTÓNOMO PARQUES NACIONALES
CENTRO NACIONAL DE EDUCACIÓN AMBIENTAL
oecc Oficina Española de Cambio Climático

SETTING THE SCENE

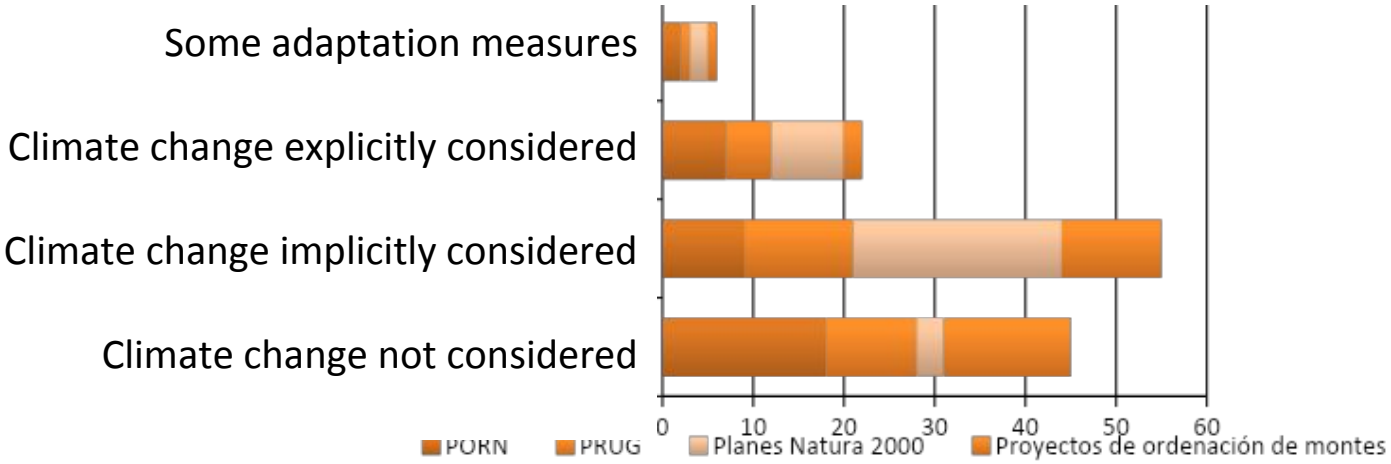
Evidence of climate change



CHANGES IN CLIMATIC VARIABLES
- Decreased number of snow days
- Decreased time of snow permanence
- Decreased number of extreme cold days
- Altered pattern of rainfall
- Decreased mean annual precipitation
- Increased mean temperature in ocean waters (0-50 m)
MORE FREQUENT / INTENSE EXTREME EVENTS
- Longer droughts
- Increased forest fire risk
- Increased autumn storms
- Increased frequency of floods
- Coastal storms more frequent and intense
CHANGES IN PHENOLOGY
- Delay in leaves fall in deciduous species
- Earlier blooming
- Alteration of reproductive phenology in birds and butterflies
- Alteration of migration patterns in birds
- Alteration in pollination
CHANGES IN HABITAT DISTRIBUTION
- Elevation of forest ecotone
- Local extinction of alpine species (i.e. *Antenaria dioica*)
- Decline of deciduous forests (*Taxus*, *Sorbus*, etc.)
- Substitution by xeric species
- Invasion of exotic species
- Decline of humid habitats (moors).

SETTING THE SCENE

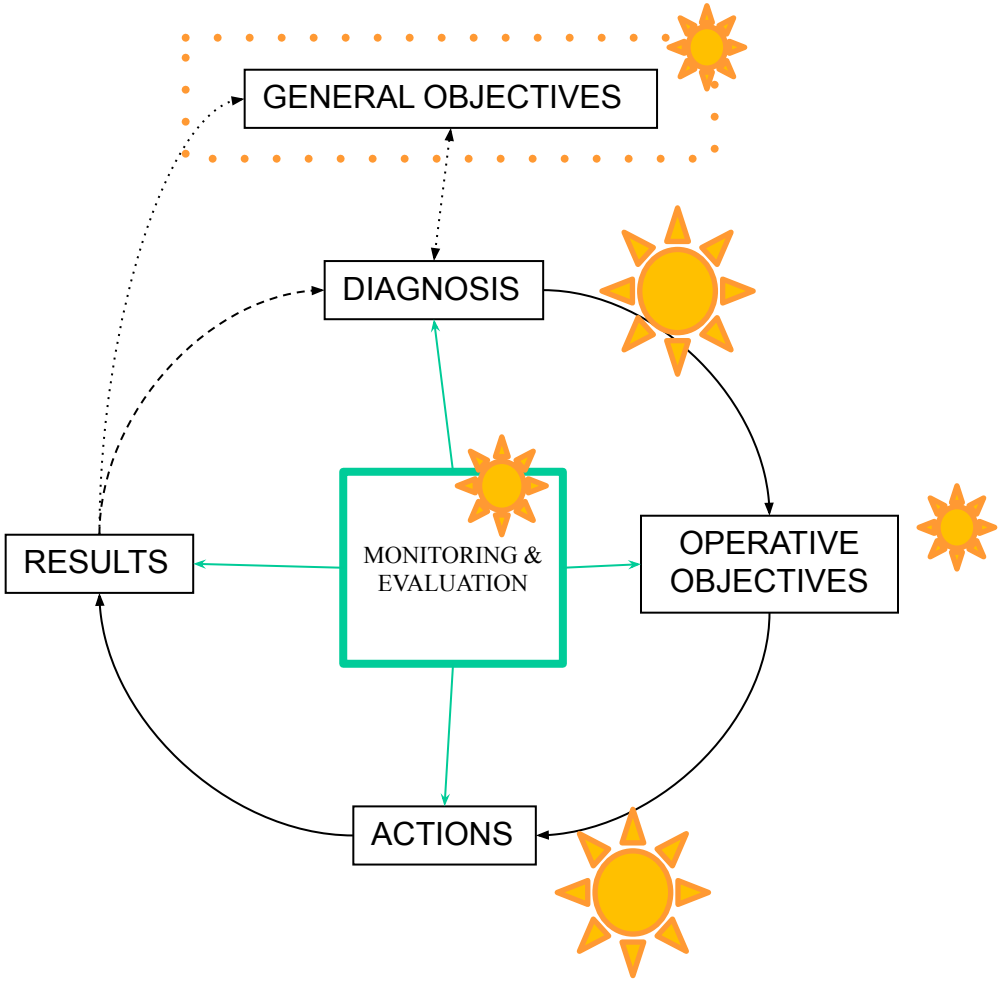
To what degree is climate change adaptation included in management plans?



Source: online survey to managers (n=70) and scientists (n= 85)

ADAPTATION IN THE PLANNING PROCESS

Climate change adaptation in the management cycle

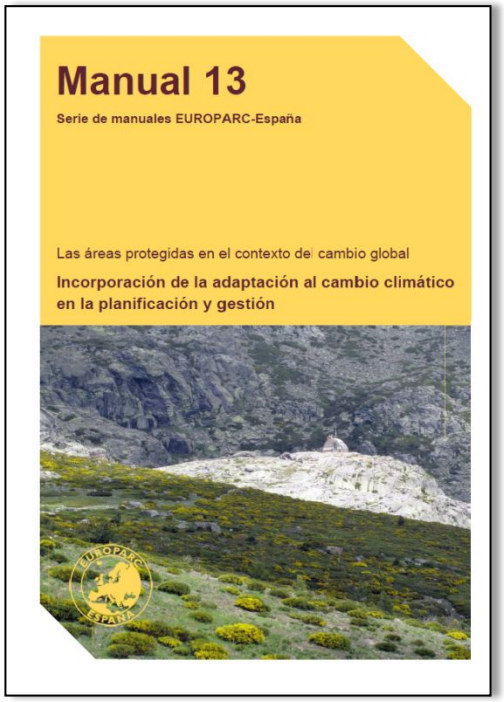


ADAPTATION IN THE PLANNING PROCESS

PLANNING PROCCESS	CLIMATE CHANGE ISSUES
Diagnosis	Current climate and registered trends
Identification of target conservation elements	Sensible elements to climate change (species, habitats, ecosystem services)
Vulnerability analysis	Climate change vulnerability of target elements
Definition of future secenarios	Regional climate change scenarios
Definition of management objectives General Operative	Increase resilience to climate change Clear link to climate change adaptation
Management meassures Actions Regulations Zoning	Adaptation meassures. Focus on ecosystem services
Monitoring and evaluation Climate change indicators Effectiveness assessment	Consider climate variables and other climate change indicators (i.e. Phenology)

ADAPTATION IN THE PLANNING PROCESS

"Guidelines for adaptation in planning and management of protected areas"

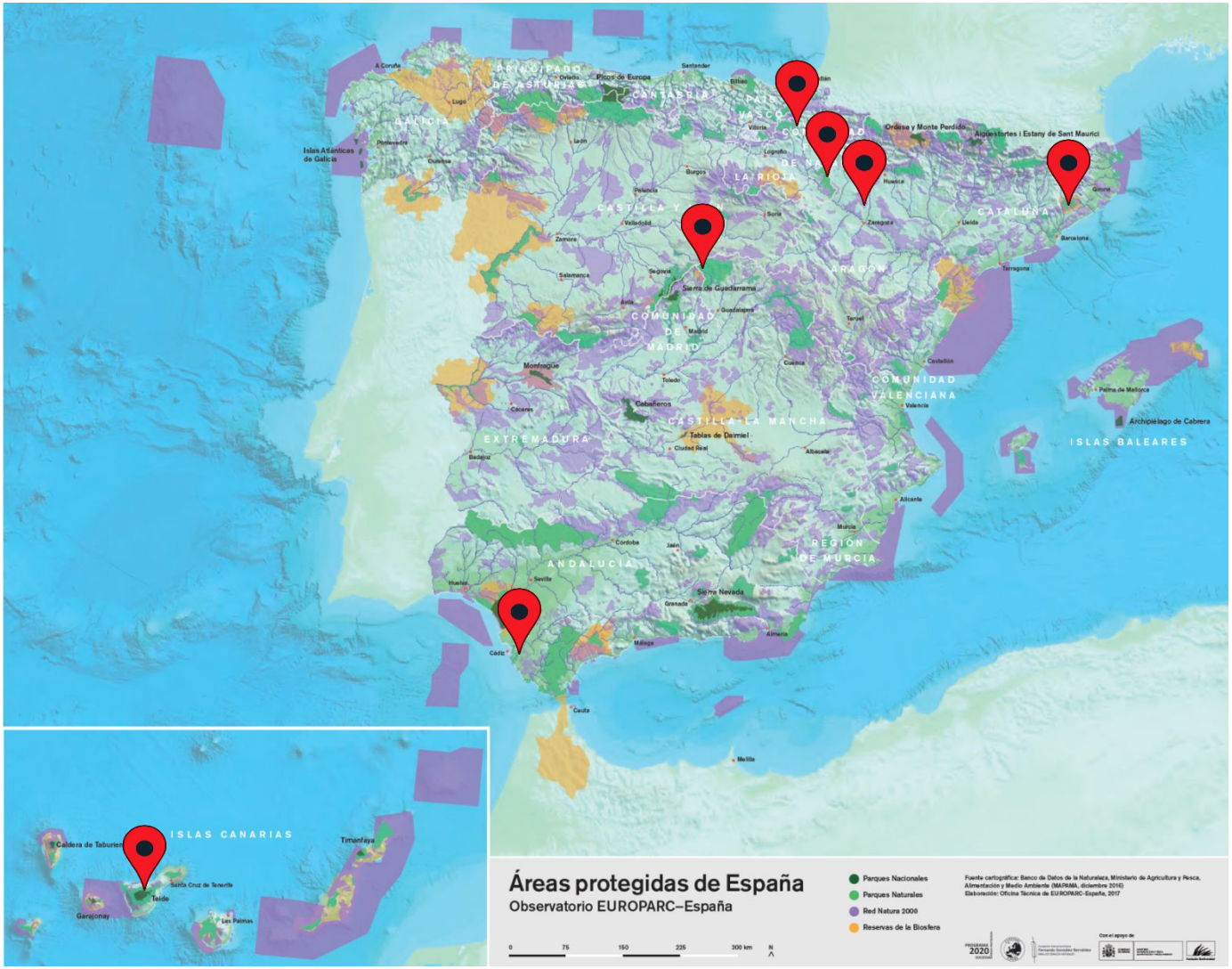


+

Checklist

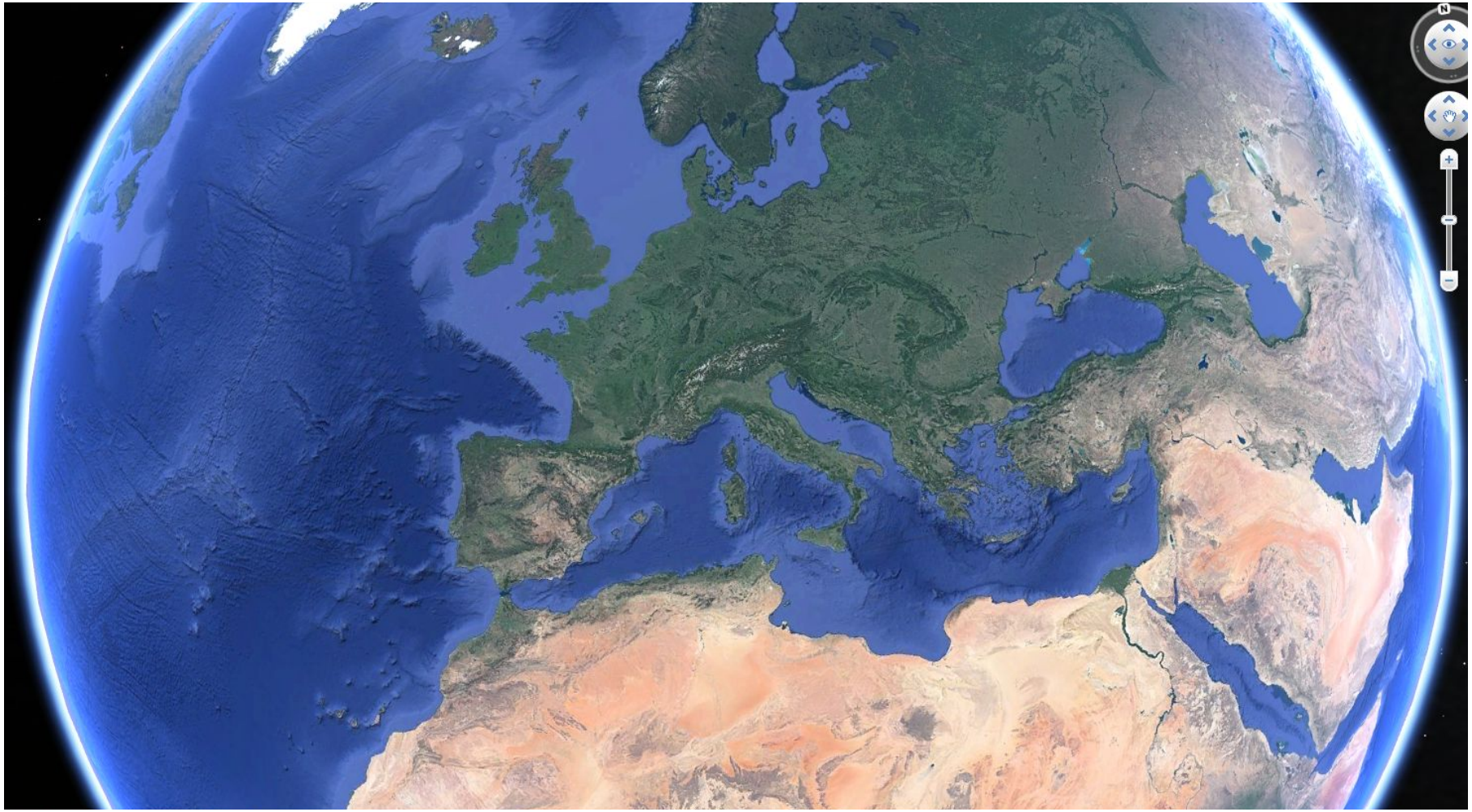
	CRITERIO	S/N	FUENTE DE VERIFICACIÓN
Marco legal			
	Se ha consultado el marco legal específico de cambio climático, a escala nacional, así como planes o estrategias regionales, o planes de acción local		Plan Nacional de Adaptación, planes y estrategias autonómicas
	Se han identificado posibles sinergias o contradicciones con eventuales planes o actuaciones de mitigación del cambio climático		
	Se han identificado posibles sinergias o contradicciones con los documentos de planificación del área protegida y otros instrumentos de planificación sectorial (bosques, aguas, costas...)		PORN, PRUG, plan de gestión Natura 2000, proyectos de ordenación forestal, etc.
Fuentes documentales			
	Se han consultados las fuentes documentales básicas sobre cambio climático, al menos a escala nacional (ver Anejo)		
	Se ha consultado la información científica y técnica relevante a la escala de trabajo		
	Se ha consultado a expertos sobre los efectos locales del cambio climático (científicos, gestores, guardería, agentes locales...)		
	Se han identificado expresamente las carencias de información existentes respecto a la evidencia del cambio climático o sus efectos		
Caracterización climática y evidencias de cambio climático			
	Se ha descrito el clima actual, con referencia a las variables clave que lo caracterizan		
	Se aportan evidencias actuales del cambio climático en el área protegida		
	Se han describen los escenarios climáticos previstos a escala global (región biogeográfica)		
	Se describen los escenarios climáticos a escala regional		
	Se ha descrito el clima actual desde una perspectiva bioclimática (relación de las variables climáticas con la distribución de los tipos de ecosistemas o de vegetación) y los cambios bioclimáticos esperables a partir de los escenarios de cambio climático,		
	Se identifica de forma explícita el cambio climático como un factor de cambio relevante para al áreas protegida		

4 – PILOT CASES



PILOT CASE:

- **Teide National Park** (Management Plan (2002) expired/under revision)



PILOT CASE:

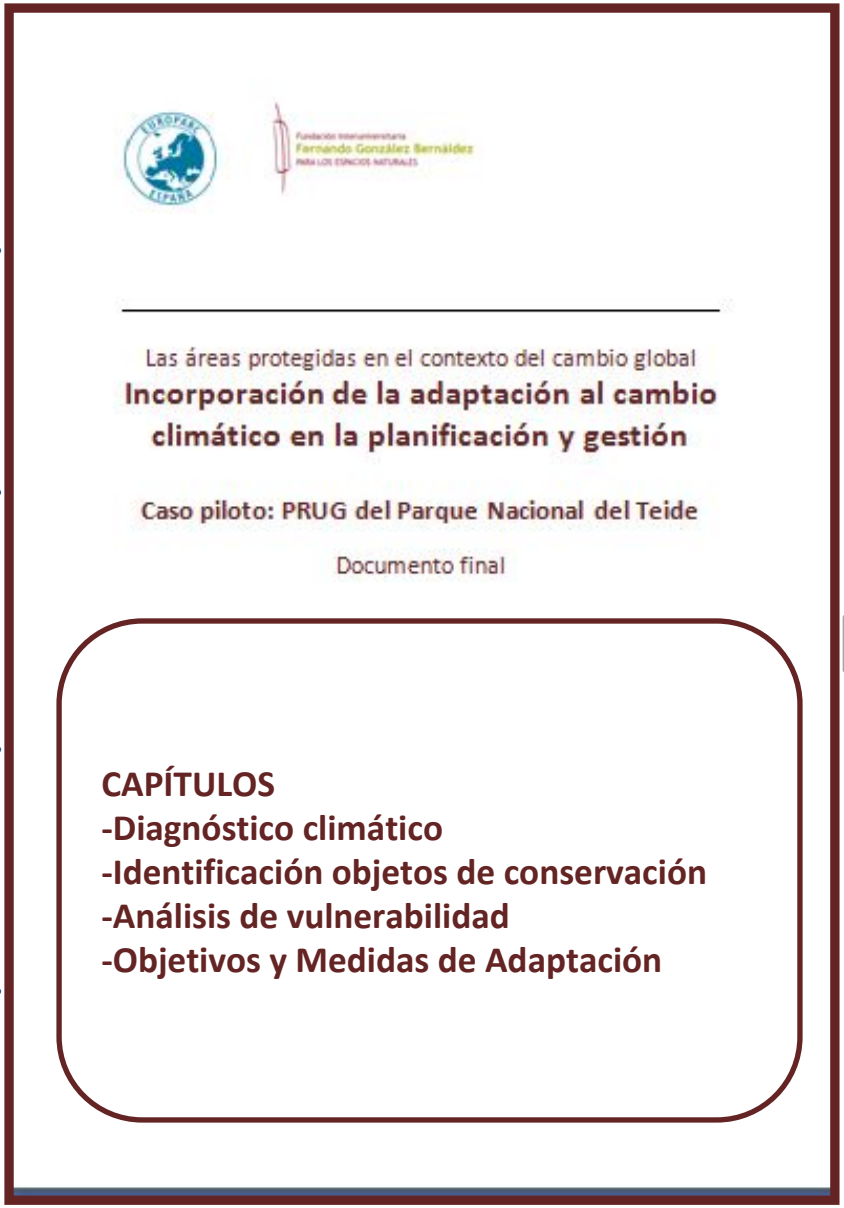
- **Teide National Park** (Management Plan (2002) expired/under revision)

1. Revision of bibliography

2. on-line survey to experts

3. Park Managers

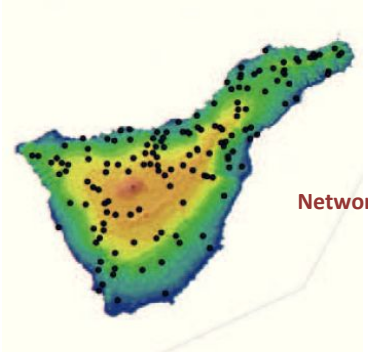
4. Participartion process (local stakeholders)



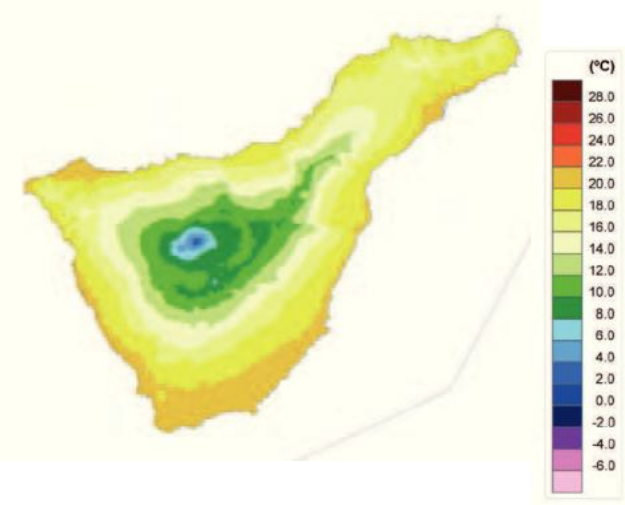
MANA-GEMENT PLAN? 2019*

1. Diagnosis

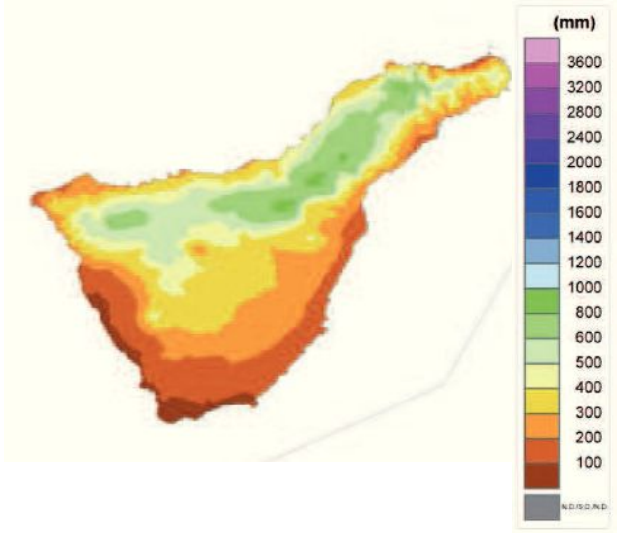
Climate characterization



Network of weather stations in Tenerife Island



Anual Mean Temperature

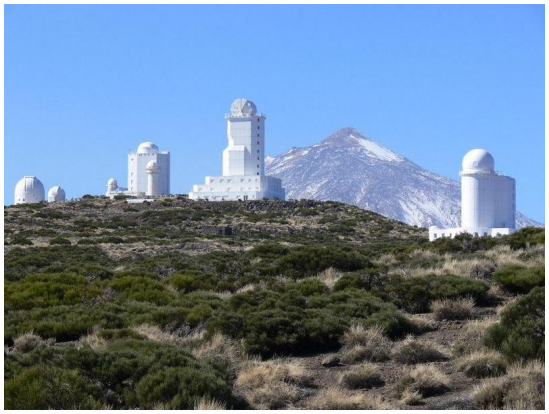


Anual Mean Precipitation

SOURCE: Atlas climático de los archipiélagos de Canarias, Madeira y Azores. Temperatura del aire y precipitación (1971-2000)

1. Diagnosis

Climate trends

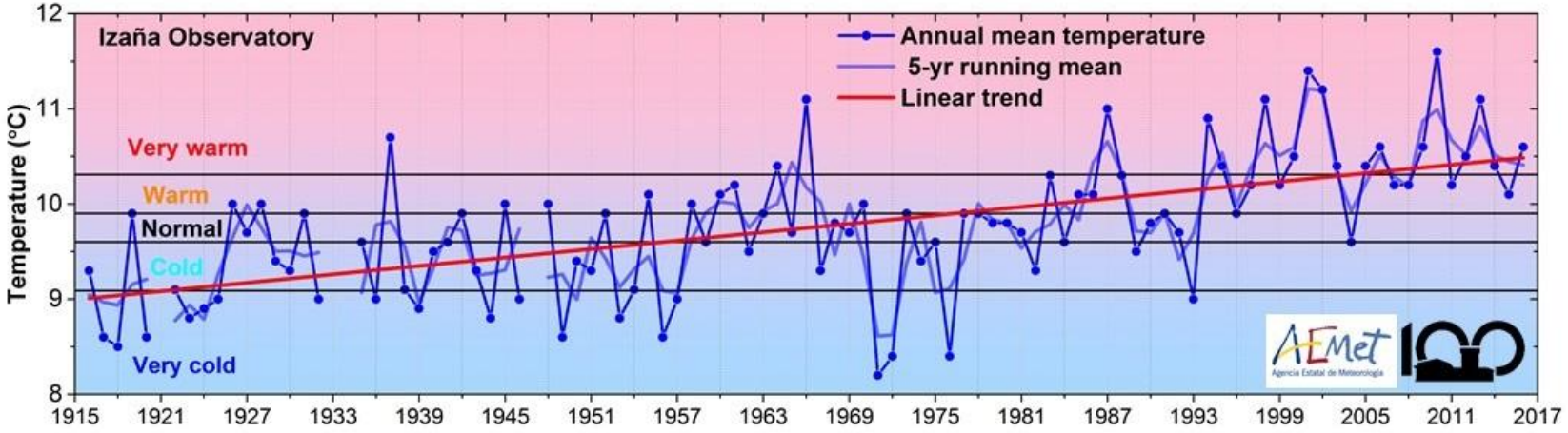


The climate record since 1915 shows a clear trend:

> Mean temperature (spring and autumn)

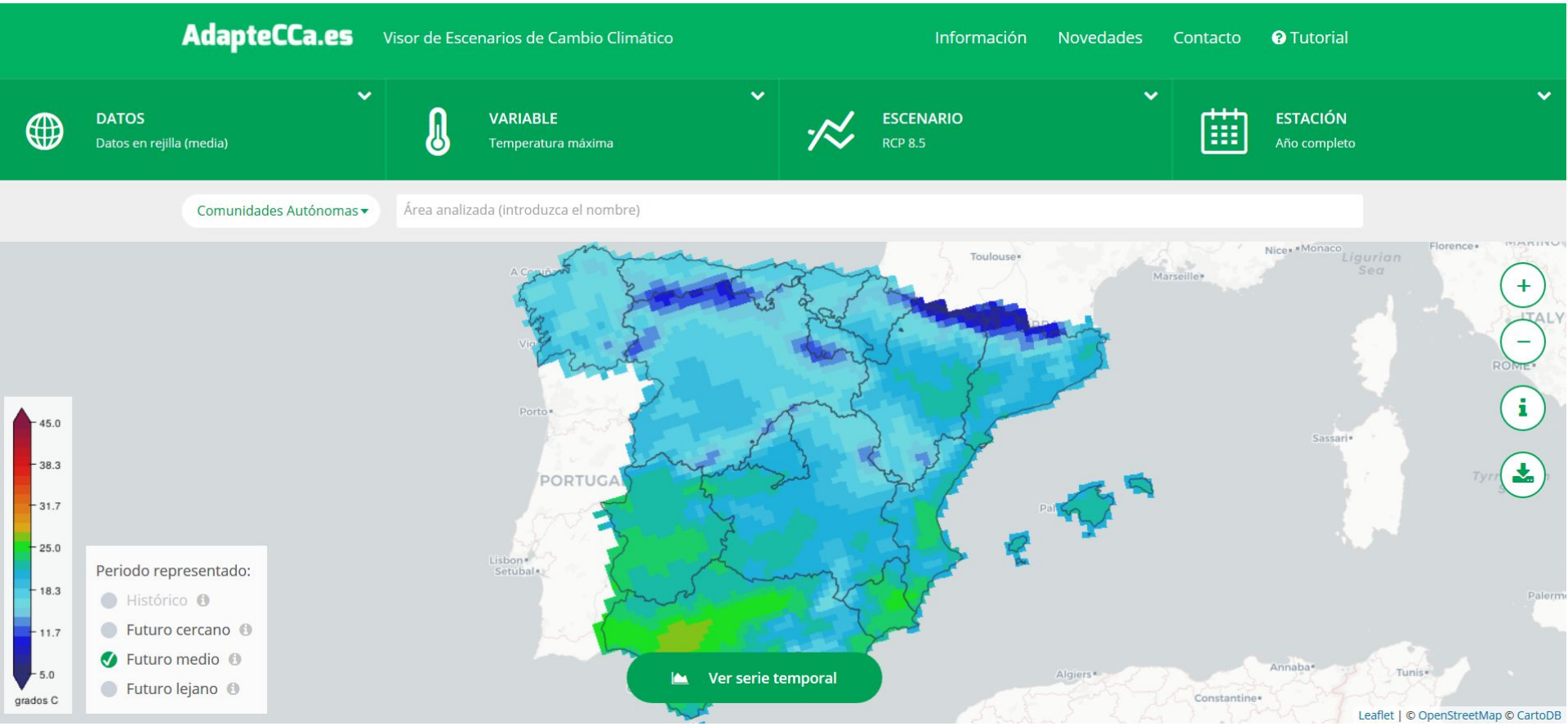
< rainfall

<inivation period



Average annual temperature trend in Izaña Observatory, Teide National Park

2. Climate scenarios

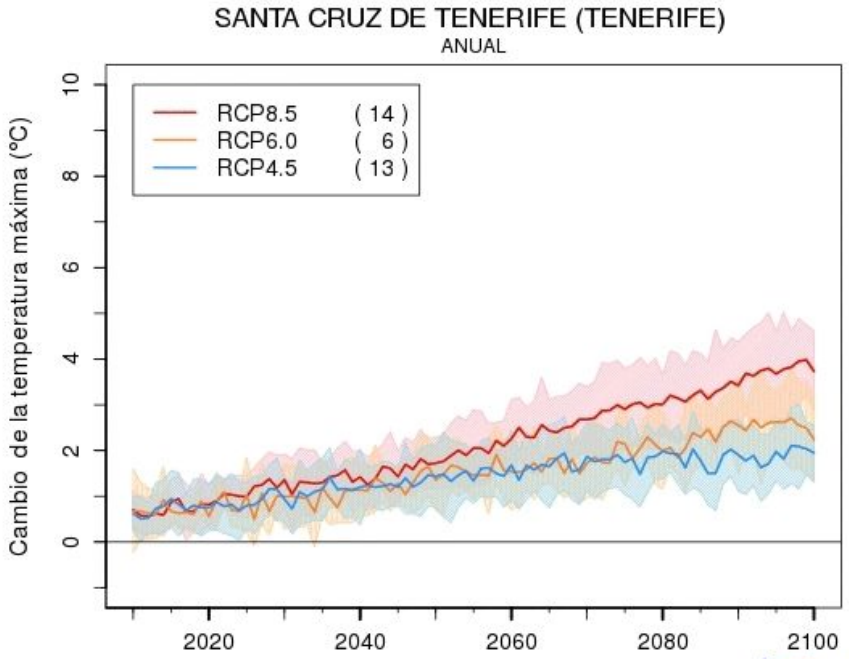


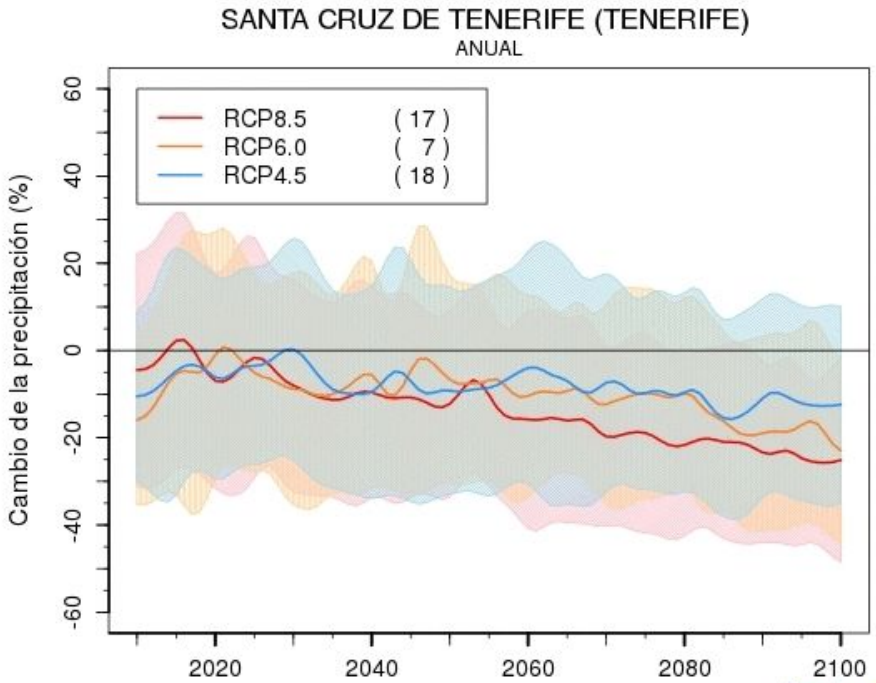
http://www.aemet.es/es/serviciosclimaticos/cambio_climat/result_graficos

2. Climate scenarios

Regional projections 2020 -2100:

> Tª mean, > Tª max, Tª min.
< rainfall



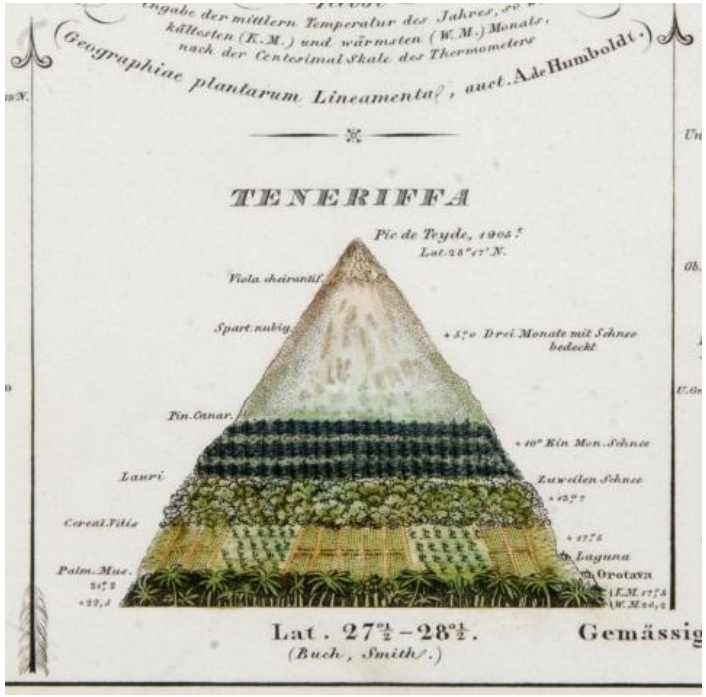


http://www.aemet.es/es/serviciosclimaticos/cambio_climat/result_graficos

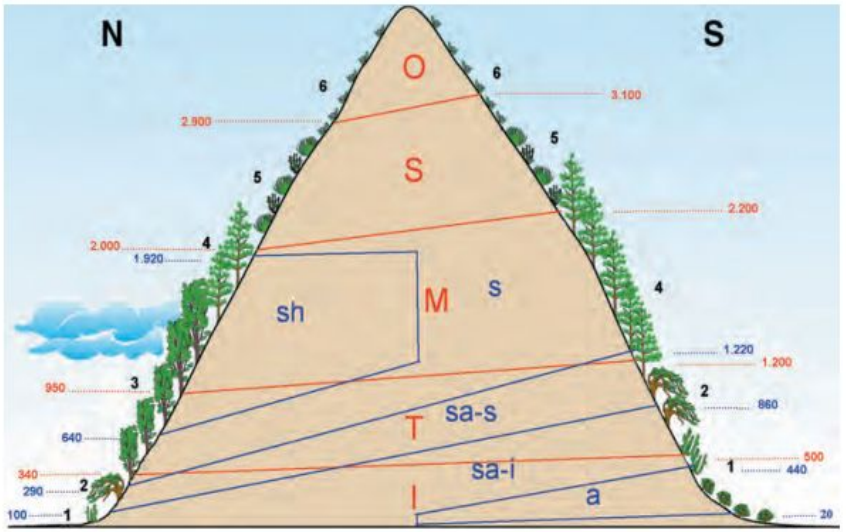
3. Vulnerability assessment

Vegetation types are linked to climate

bioclimatic zones: are broad zones of vegetation that correspond to mean annual temperatures at different latitudes and altitudes



Alexander von Humbolt en 1799

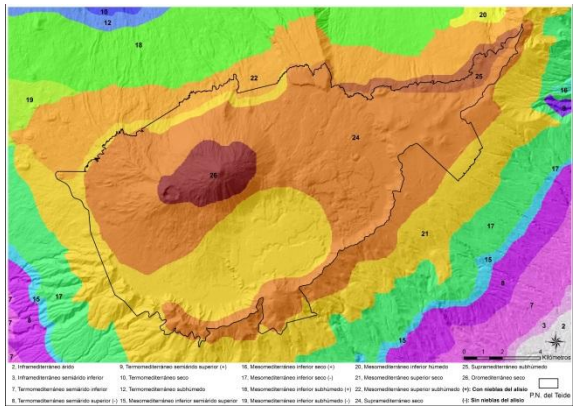


Del Arco Aguilar, 2006

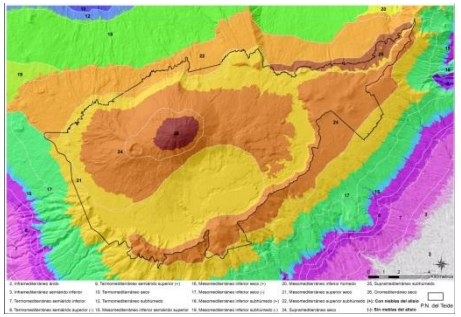
3. Vulnerability assessment

Simulation of vegetation types under climate change scenarios

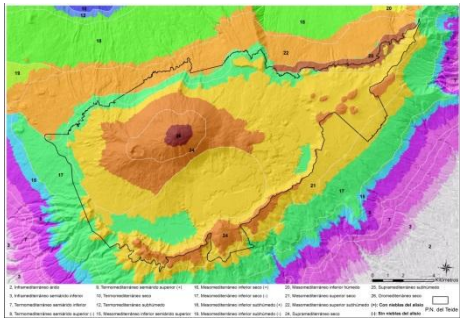
Altitudinal migration
Changes in area
Fragmentation



ACTUAL



RCP 6



RCP 8.5

Oromediterráneo seco (Com. Violeta del Teide)
Supramediterráneo subhúmedo (Retamar de cumbre)
Supramediterráneo seco
Mesomediterréno superior subhúmedo (Pinar)
Medomediterráneo superior seco
Mesomediterráneo inferior seco sin nieblas del alisio

Identification of Conservation Objects

OBJETO DE CONSERVACIÓN	CRITERIO DE SELECCIÓN
HÁBITATS/ECOSISTEMAS	
-Hábitat de la retama de cumbre (*Spartocytisus supranubius*)	A priori vulnerable al cc
- Bosques endémicos de Juniperus spp. (9560). Hábitat del cedro canario (*Juniperus cedrus*)	A priori vulnerable al cc
- Pinares endémicos de Pino canario (*Pinus canariensis*) (9550)	A priori vulnerable al cc
-Pendientes rocosas silíceas con vegetación casmofítica (8220)	Objeto de declaración ZEC
FLORA	
Stemmacantha cynaroides (Cardo de Plata)	A priori vulnerable al cc y protegida
Helianthemum juliae (Jarilla de Las Cañadas)	A priori vulnerable al cc y protegida
Bencomia exstipulata (Rosal del guanche)	A priori vulnerable al cc y protegida
Dactylis metlesicsii (Jopillo de cumbre)	A priori vulnerable al cc y protegida
Silene nocteolens (Canutillo del Teide)	A priori vulnerable al cc y protegida
Viola cheiranthifolia (Violeta del Teide)	A priori vulnerable al cc y amenazada
FAUNA	
Invertebrados endémicos	A priori vulnerable al cc




3. Vulnerability assessment

VULNERABILITY = EXPOSURE + IMPACT - ADAPTACION CAPACITY

CONSERVATION OBJECT	EXPOSURE	IMPACT	ADAPTATION CAPACITY	VULNERABILITY
Species, hábitat type, ecosistem...	Components of climate change that affect the conservation object.	Foreseeable effect of exposure to climate change on the object of conservation	Ability to respond to climate change (due to genetic variability, changes in behavior ...)	**Global assessment, resulting from discounting the impact of adaptive capacity**

3. Vulnerability assessment

Endemic *Juniperus* spp. forests (9560). Hábitat del cedro canario (*Juniperus cedrus*)

EXPOSURE	IMPACT	ADAPTATION CAPACITY	VULNERABILITY
-Average temperature increase -Reduction of annual precipitation -Alteration in precipitation pattern (advance or delay)	-Decrease of the population (Current) -Changes in the area occupied by the population (Current) -Reduction of the population's health status (vigor, recruitment rates, regeneration, etc.) (Current) - Increased fire risk (Current and Predictable)	😊Low ecological requirements, high tolerance to environmental conditions ☹Dependence of bird or lizard species for seed dispersal ☹Low growth rate	**MEDIUM**

3. Vulnerability assessment

Summary of vulnerability assessment of habitats and species

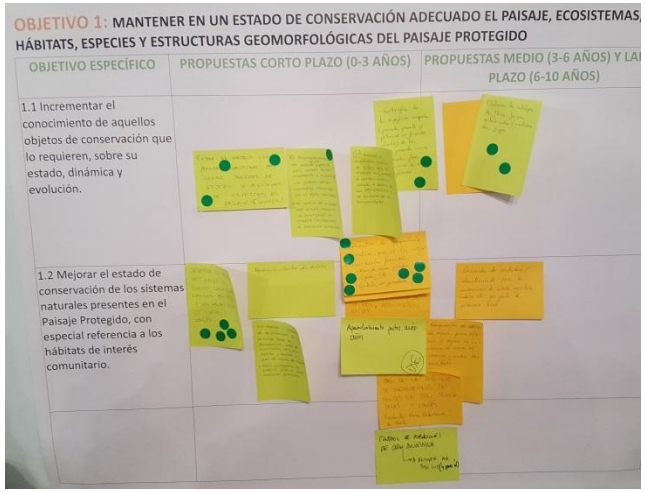
OBJETO DE CONSERVACIÓN	VULNERABILIDAD
TIPOS DE HÁBITAT	
Hábitat de la retama de cumbre (Spartocytisus supranubius)	ALTA
Bosques endémicos de *Juniperus* spp. (9560). Hábitat del cedro canario (*Juniperus cedrus*)	MEDIA-ALTA
Pinares endémicos de Pino canario (*Pinus canariensis*) (9550)	BAJA
Pendientes rocosas silíceas con vegetación casmofítica (8220)	BAJA
ESPECIES	
Especies de flora endémica protegidas	ALTA
Invertebrados endémicos	ALTA

4. Setting Adaptation Objectives

- Increase the resilience of conservation objects and decrease the vulnerability of conservation objects
- Improve knowledge of conservation objects in relation to their vulnerability to climate change
- Evaluate the effect of climate change on conservation objects

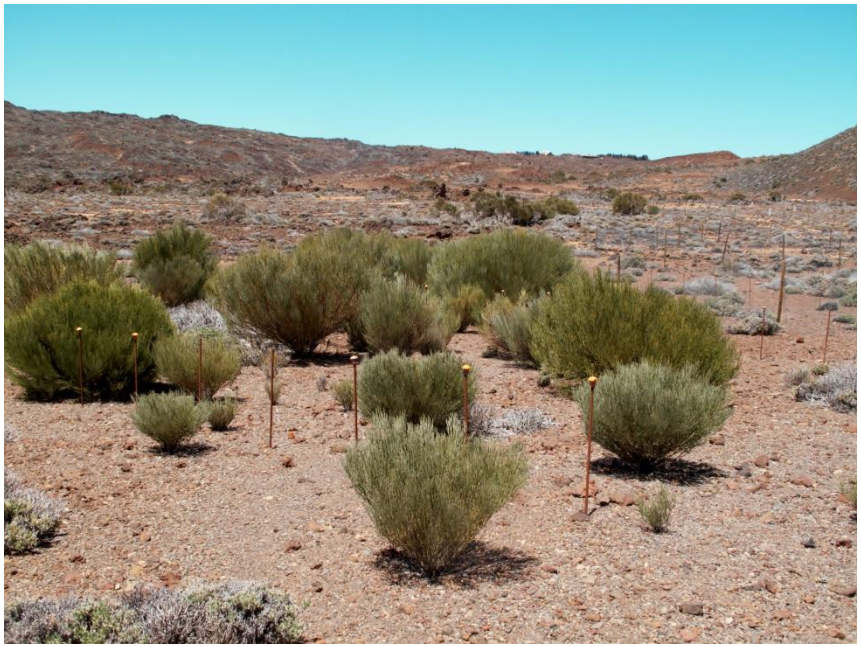
(Integration in a participatory process)

In the process of revision of Management Plan, Vulnerability Assessment was presented to experts and managers, and adaptation meassures discused



5. Adaptation measures

Measures	Conservation object
- Control of rabbit populations -Remove the exotic herbovires completely -Establishment of large-scale exclusion plots to create micro-reserves of endemic endangered flora and protected flora. -Monitoring the effect of herbivores.	**-Hábitat de la retama de cumbre (Spartocytisus supranubius)**

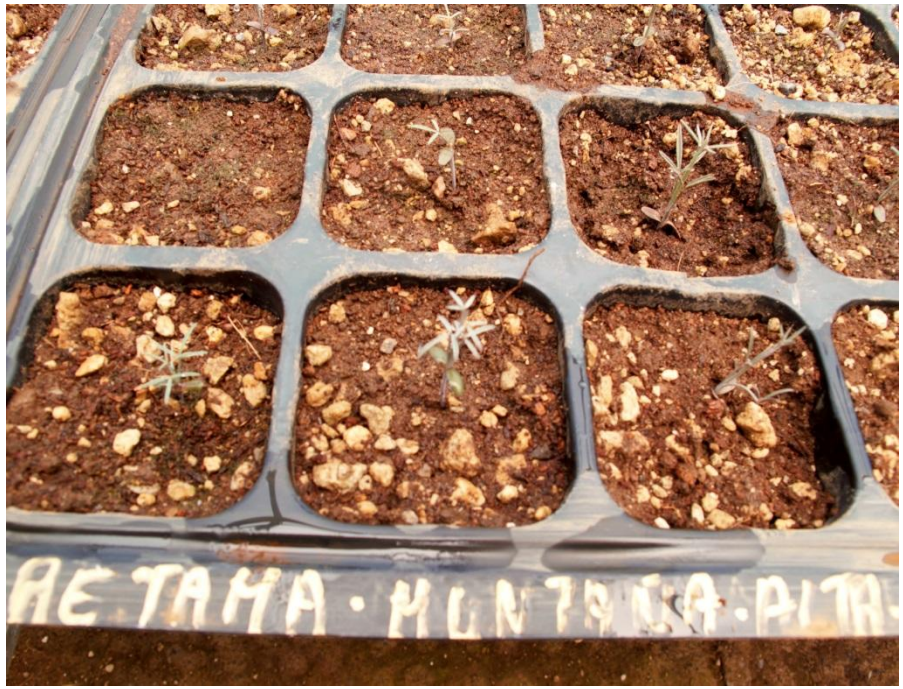


5. Adaptation measures

Measures	Conservation object
-Improvement of the habitat of the Canarian cedar (Juniperus cedrus) in degraded areas, using genetically appropriate material. - Improve water supply to the main seed dispersers -Recover crow populations (function as seed dispersers) - Control of predators of domestic origin (cats or rats).	**-Bosques endémicos de *Juniperus* spp. (9560). Hábitat del cedro canario (*Juniperus cedrus*)**

5. Adaptation measures

Measures	Conservation object
- Conserve duplicates of seed accessions in germoplasm banks of all populations of endangered endemic and protected flora species, - Development of germination and cultivation protocols and obtaining of plants in nursery	**-Species of endemic endangered flora**



Lessons learned

- Climate change is already here
- Implemente adaptation actions on a highly unpredictable environment
- Ecosystems are complex and knowledge always incomplete.
- Focus on most vulnerable conservation objects
- Promote resilience, reduce non climatic stressors
- Monitoring and evaluation

BREAK

[20’]

Photo: Ben Thouard

Meet the experts

Integrating climate change in management practices: Understanding needs and opportunities

[40’]

closing notes

Recommendation & Opportunities

[20’]

Recommendation

Do not fall into the
“paralysis of uncertainty” trap.

“Just go for it, it is very interesting, and simpler than it appears.”

Cathy Hopley, Forest of Bowland AONB

Opportunity

1

To improve collaboration with local stakeholders

Opportunity

2

To adopt a creative, dynamic and inclusive posture

Opportunity

3

To **position protected areas at the heart of local adaptation and mitigation strategies.**

Merci.

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