CONSEJERÍA DE MEDIO AMBIENTE Y ORDENACIÓN DEL TERRITORIO

JUNTA DE ANDALUCIA

Observatorio Cambio Global Sierra Nevada

SIERRA NEVADA PARQUE NACIONAL PARQUE NATURAL

SIERRA NEVADA GLOBAL CHANGE OBSERVATORY

Cairngorms NATIONAL PARK Pàirc Nàiseanta a' Mhonaidh Ruaidh

EUROPARC FEDERATION

Cairngorms Research Seminar
21/22 October 2015

Rut Aspizua Cantón
Agencia de Medio Ambiente y Agua
Sierra Nevada National and Nature Park
& Biosphere Reserve
rut.aspizua.ext@juntadeandalucia.es

What will you find in this snapshot on SNGCO?

- INTRODUCTION TO SIERRA NEVADA GLOBAL CHANGE OBSERVATORY
- HOW COLLABORATION HAS BEEN DEVELOPED BETWEEN RESEARCH AND MANAGEMENT. RANGE OF PARTNERS INVOLVED AND ASSIGNED TASKS
- BENEFITS FOR MANAGEMENT FROM SNGCO: FROM THEORY TO PRACTICE IN ACTIVE AND ADAPTIVE MANAGEMENT. PRELIMINARY RESULTS AND NEW INITIATIVES

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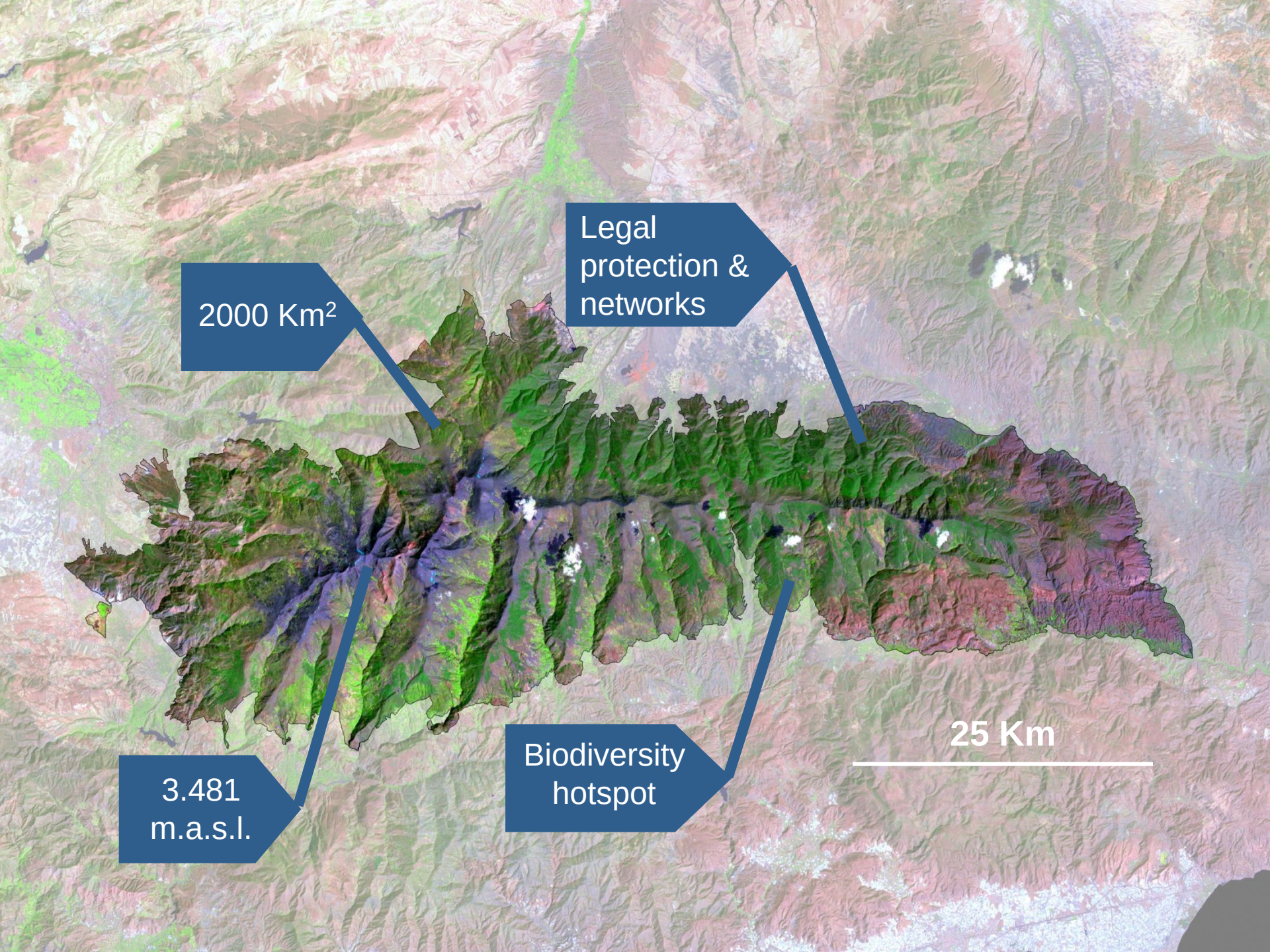
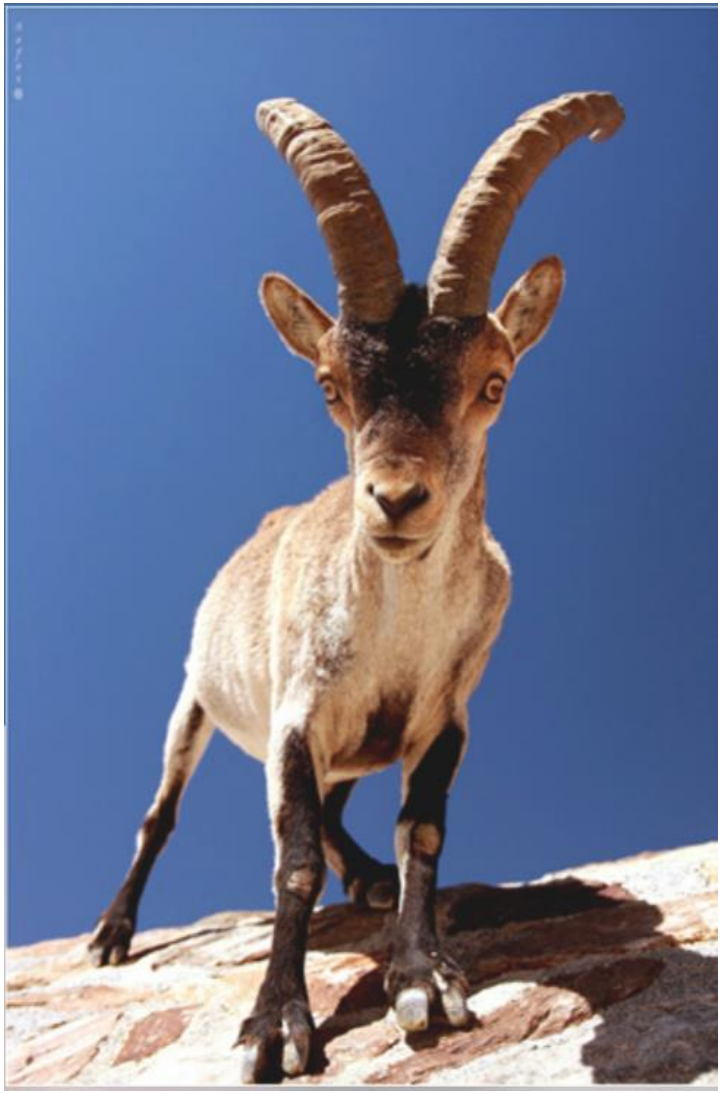
25 Km


2000 Km²
Legal protection & networks
3.481 m.a.s.l.
Biodiversity hotspot
25 Km

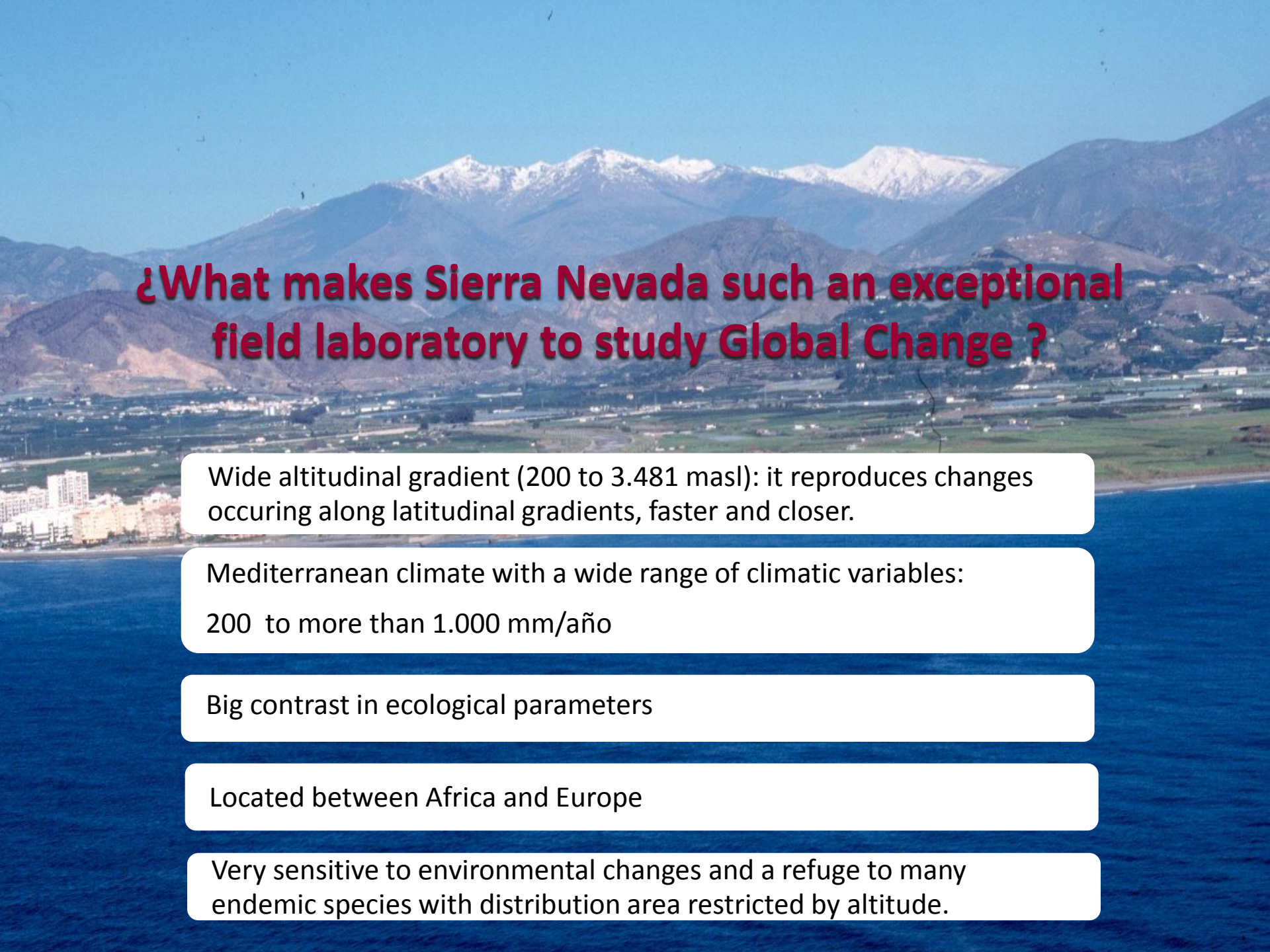
Biodiversity hotspot



2100 sps.vascular plants (21% of European flora) 66 exclusive endemisms.

10.000+ sps. of invertebrates, 200 sps of vertebrates. 26 habitat types from the H.D.

National Park. BR, Natura 2000, LTER site, UICN green list, GLORIA site



¿What makes Sierra Nevada such an exceptional field laboratory to study Global Change ?

Wide altitudinal gradient (200 to 3.481 masl): it reproduces changes occuring along latitudinal gradients, faster and closer.

Mediterranean climate with a wide range of climatic variables:

200 to more than 1.000 mm/año

Big contrast in ecological parameters

Located between Africa and Europe

Very sensitive to environmental changes and a refuge to many endemic species with distribution area restricted by altitude.

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Major projects and networks

Local node

*** To build the knowledge needed to promote resilience of Sierra Nevada ecosystems to face global change.**

*** To implement adaptive management of natural resources in Sierra Nevada**

Local actors

Scientists

Managers

Park Direction

Strategy

Hire people for field monitoring, data storage & analysis

Scientific coordination & assessment
Information system development

Structure

MONITORING PROGRAMME

Exhaustive
(+ 40 methodologies)
Collects information on
socio-ecological systems
and puts toghether new and existing
data series. Long term variation and science.

DISSEMINATION FORUM

Common place for
debate, knowledge exchange,
dissemination and sensibilization

Observatorio
Cambio Global
Sierra Nevada

INFORMATION SYSTEM

Specific tool to storage analyse and consult generated data to ensure its accesibility and utility.

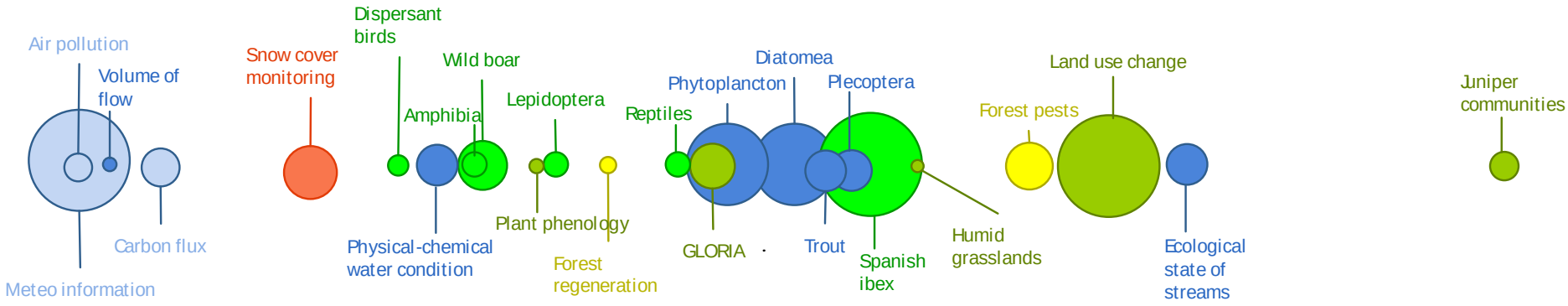
ACTIVE MANAGEMENT

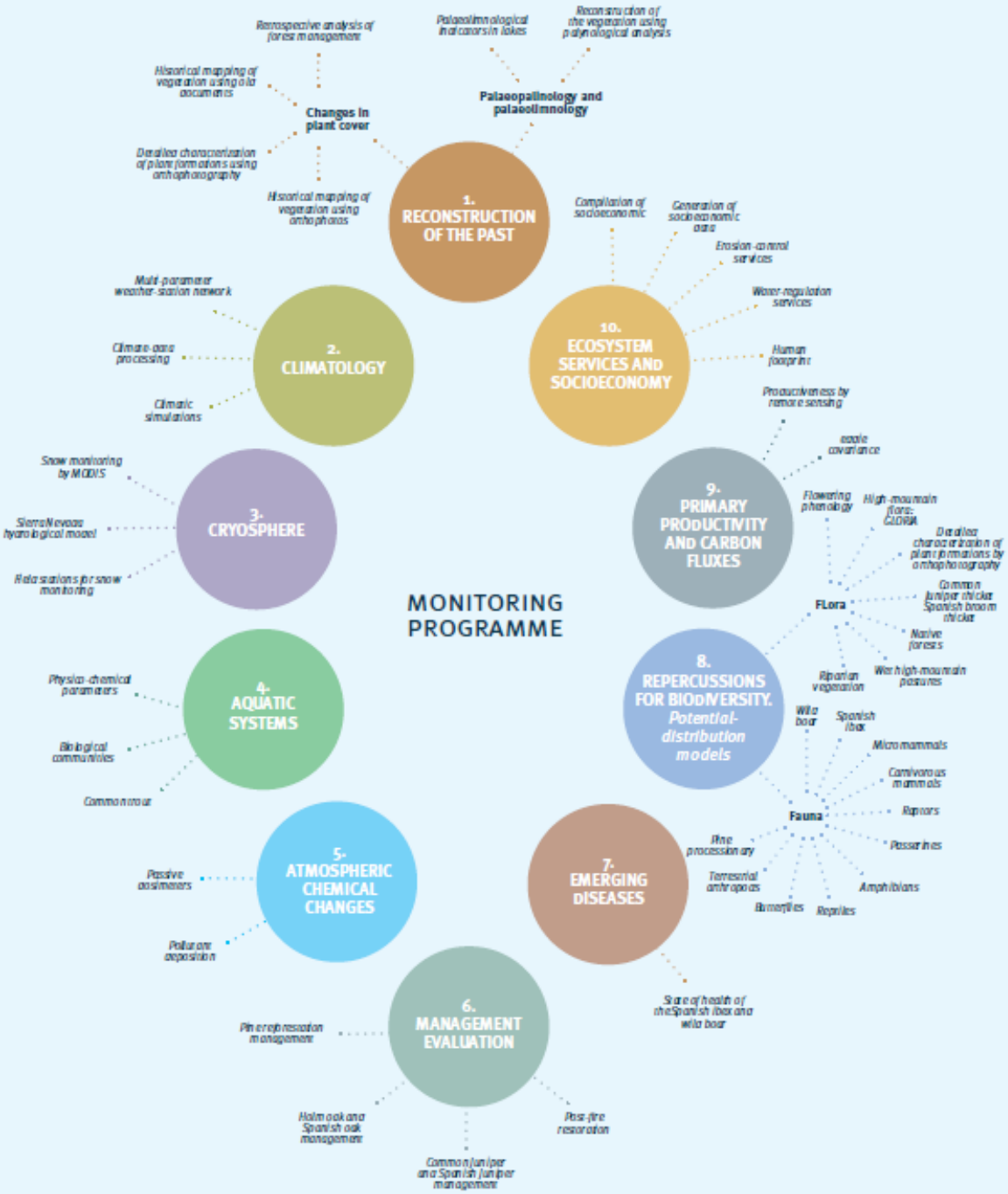
Field laboratory to test
management meassures that
look for ecosystems adaptation to global
change impacts in order to avoid a
reduction on services
provision

Monitoring Programme

- **The monitoring programme has aprox. 40 protocols scientifically validated**

- **They collect information for more than 100 environmental variables**



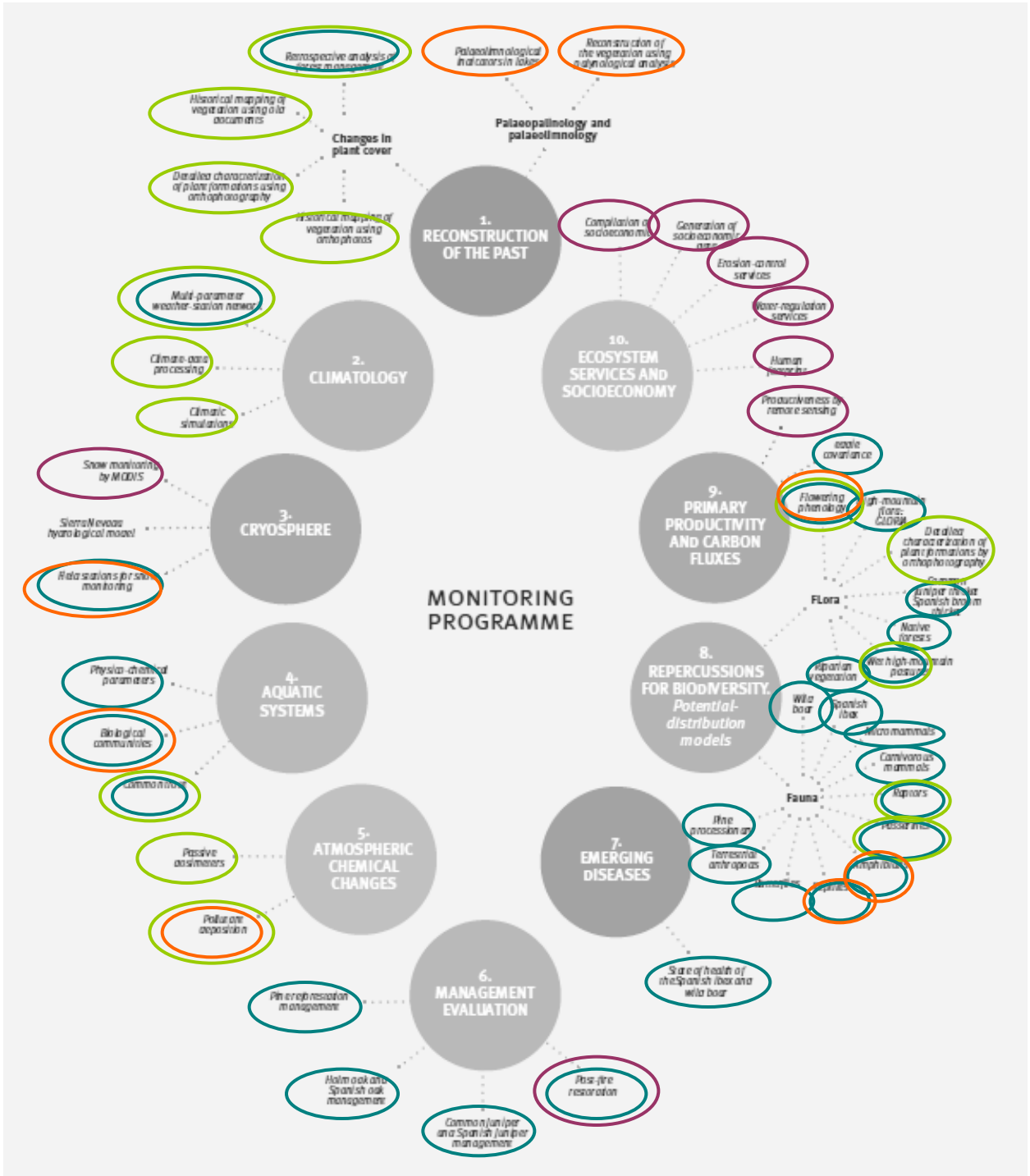

MONITORING PROGRAMME
1. RECONSTRUCTION OF THE PAST
Palaeopalinology and palaeolimnology
Palaeolimnological indicators in lakes
Reconstruction of the vegetation using palynological analysis
Changes in plant cover
Retrospective analysis of forest management
Historical mapping of vegetation using old documents
Detailed characterization of plant formations using orthophotography
Historical mapping of vegetation using orthophotos
2. CLIMATOLOGY
Multi-parameter weather-station network
Climate-data processing
Climatic simulations
3. CRYOSPHERE
Snow monitoring by MODIS
Sierra Nevada hydrological model
Relocations for snow monitoring
4. AQUATIC SYSTEMS
Physico-chemical parameters
Biological communities
Common otter
5. ATMOSPHERIC CHEMICAL CHANGES
Passive samplers
Pollutant deposition
6. MANAGEMENT EVALUATION
Pine encroachment management
Holm oak and Spanish oak management
Common juniper and Spanish juniper management
Post-fire restoration
7. EMERGING DISEASES
State of health of the Spanish ibex and wild boar
8. REPERCUSSIONS FOR BIODIVERSITY. Potential-distribution models
Flora
Detailed characterization of plant formations by orthophotography
Common juniper thicket
Spanish broom thicket
Native forests
Wet high-mountain pastures
Riparian vegetation
Fauna
Wild boar
Spanish ibex
Micromammals
Carnivorous mammals
Raptors
Passerines
Amphibians
Reptiles
Batrachians
Terrestrial arthropods
Pine processionary
9. PRIMARY PRODUCTIVITY AND CARBON FLUXES
Productiveness by remote sensing
Flowering phenology
High-mountain flora: GLORIA
10. ECOSYSTEM SERVICES AND SOCIOECONOMY
Compilation of socioeconomic data
Generation of socioeconomic data
Erosion-control services
Water-regulation services
Human footprint

Park rangers

People hired by the Park

iEcoLab

Other research groups



Observatorio Cambio Global Sierra Nevada

Team

CMAyOT – Sierra Nevada

CEAMA – UGR (iecoLAB)

Regino Zamora (Scientific coordination)

+

4 people from his research group. (Scientific and information commetee)

Javier Sánchez (Dir. E.N.S.N), **Ignacio Henares** (Conservador), **Blanca Ramos** (Project Director) **Antonio Gómez** (Rangers Coordination), Jesús Vallejo y M.A. Mesa (Second Rangers coordinators)

8 rangers | 8 rangers | 8 rangers | 8 rangers

Climate & atmospheric pollution

Plants & forests

Animals

Rivers & lakes

Ignacio Maldonado (Economical responsible)

11 tecnicians, 8 field workers

AMAyA (public Agency)

Other research Groups

Dpto. Física de la Atmósfera – UGR,

Grupo Puertos y Costas CEAMA

Dto. Ecología (UGR),

Univ. RJC-Madrid,

Instituto Pirenaico de Ecología,

U. A. Barcelona,

Univ. Insbruk (Austria)

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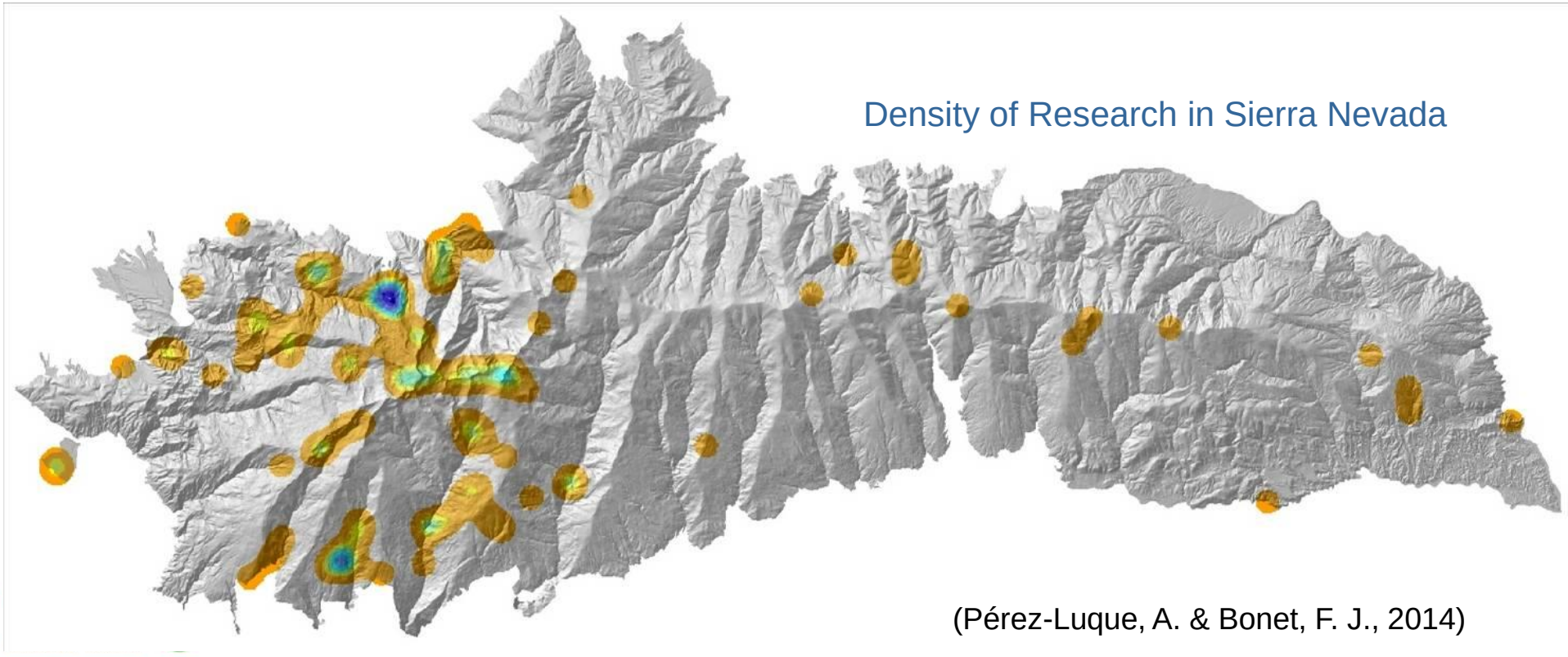
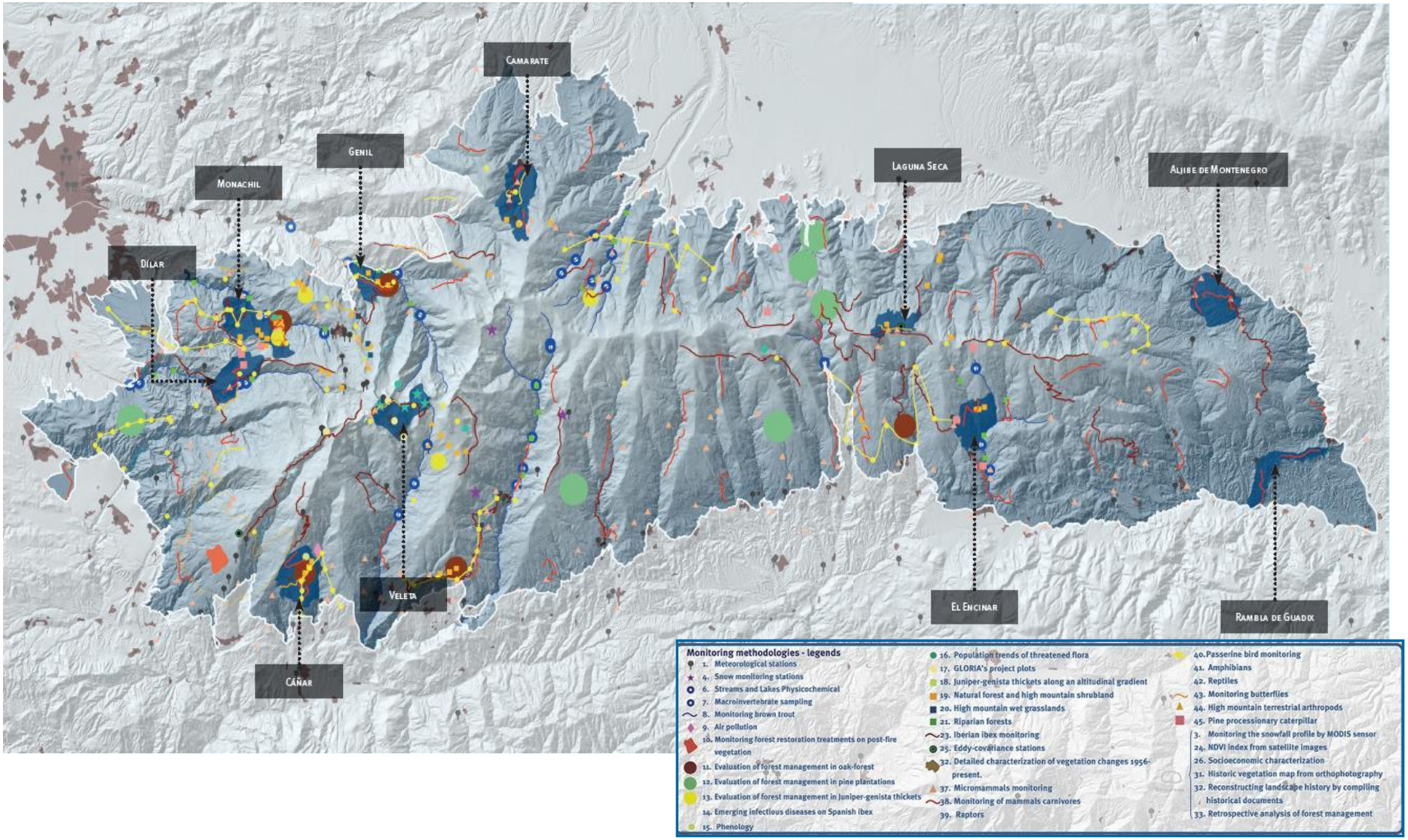
Scientific coordination of research in Sierra Nevada:

- Exchange of existing information (sharing databases of existing information that can be useful to scientists)
- Coordination of research to avoid overlaps and promote sinergies

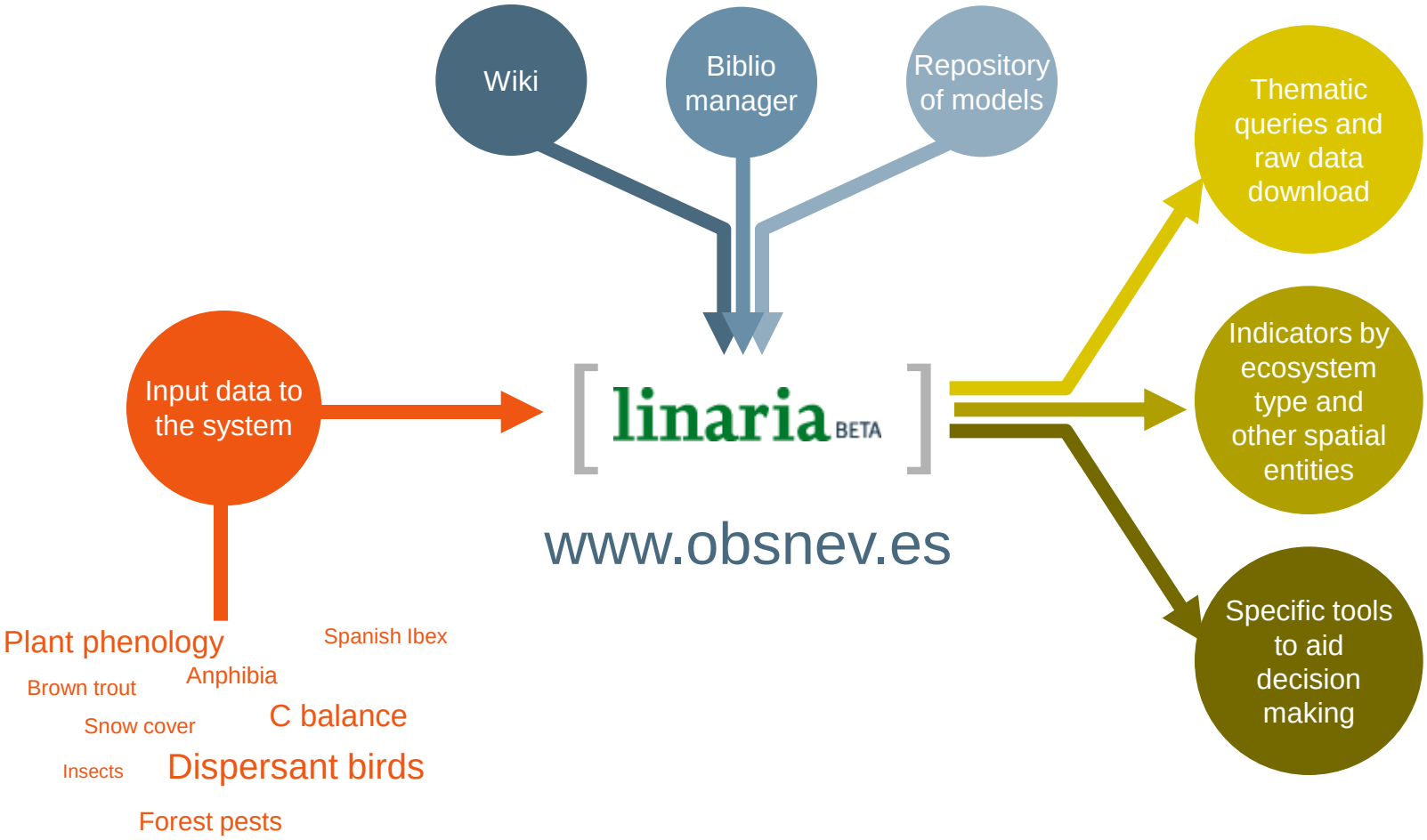


(Pérez-Luque, A. & Bonet, F. J., 2014)

Monitoring & research locations: Intensive Monitoring Stations (IMS)



Information System



DISTRIBUCIÓN ESPACIAL

Ocultar

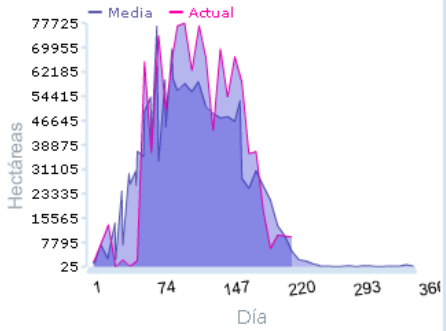
- Se localizan en la franja altitudinal 1800-3100 m.
- Formación vegetal mas extensa de Sierra Nevada.
- Caracterizada por las formas almohadilladas (pulvinulares) semiesféricas de sus componentes como respuesta a las condiciones ambientales.
- Su dinámica está condicionada por el patrón de innivación.
- Ha sufrido una escasa presión antrópica por lo que se ha mantenido su área de ocupación estable.
- Las proyecciones a futuro indican un declive potencial acusado con pérdida de área potencial.

INDICADORES

Ocultar

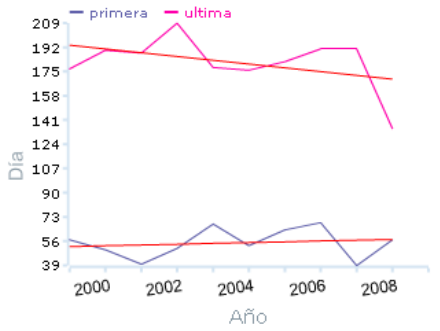
Perfil innivación

CSV PNG METADATOS



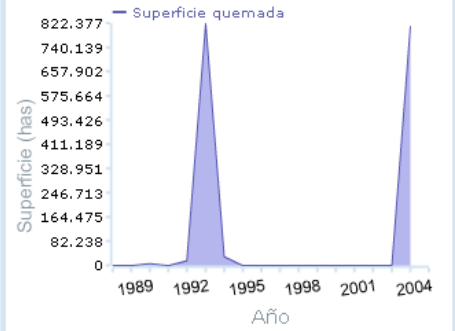
Primera - Última fecha con nieve

CSV PNG METADATOS



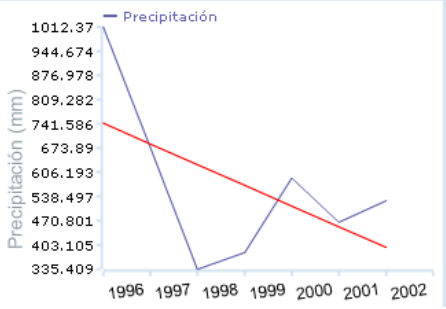
Area quemada por año

CSV PNG METADATOS



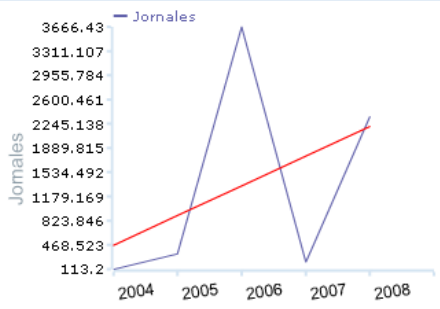
Precipitación anual

CSV PNG METADATOS



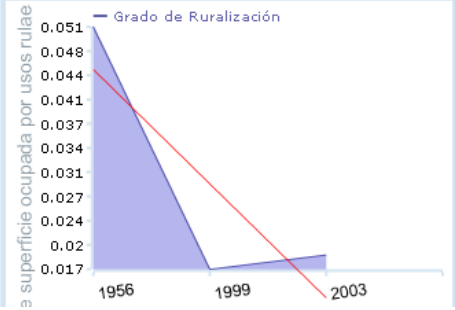
Inversión Forestal

CSV PNG METADATOS



Índice de Actividad Rural

CSV PNG METADATOS



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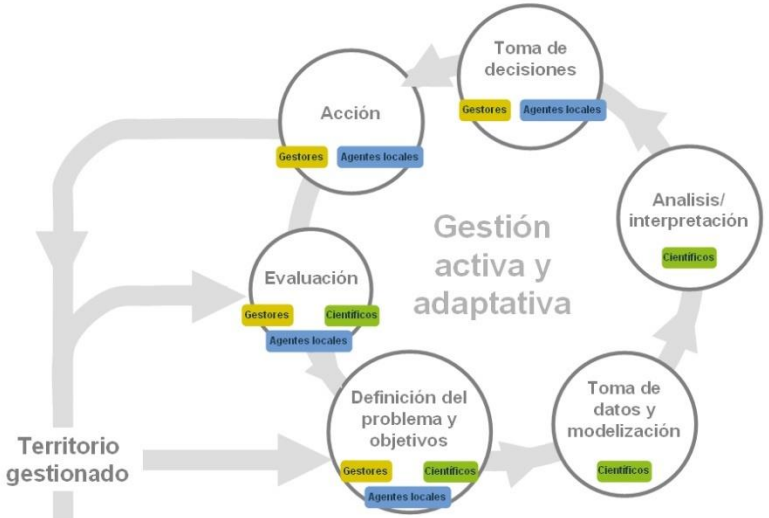
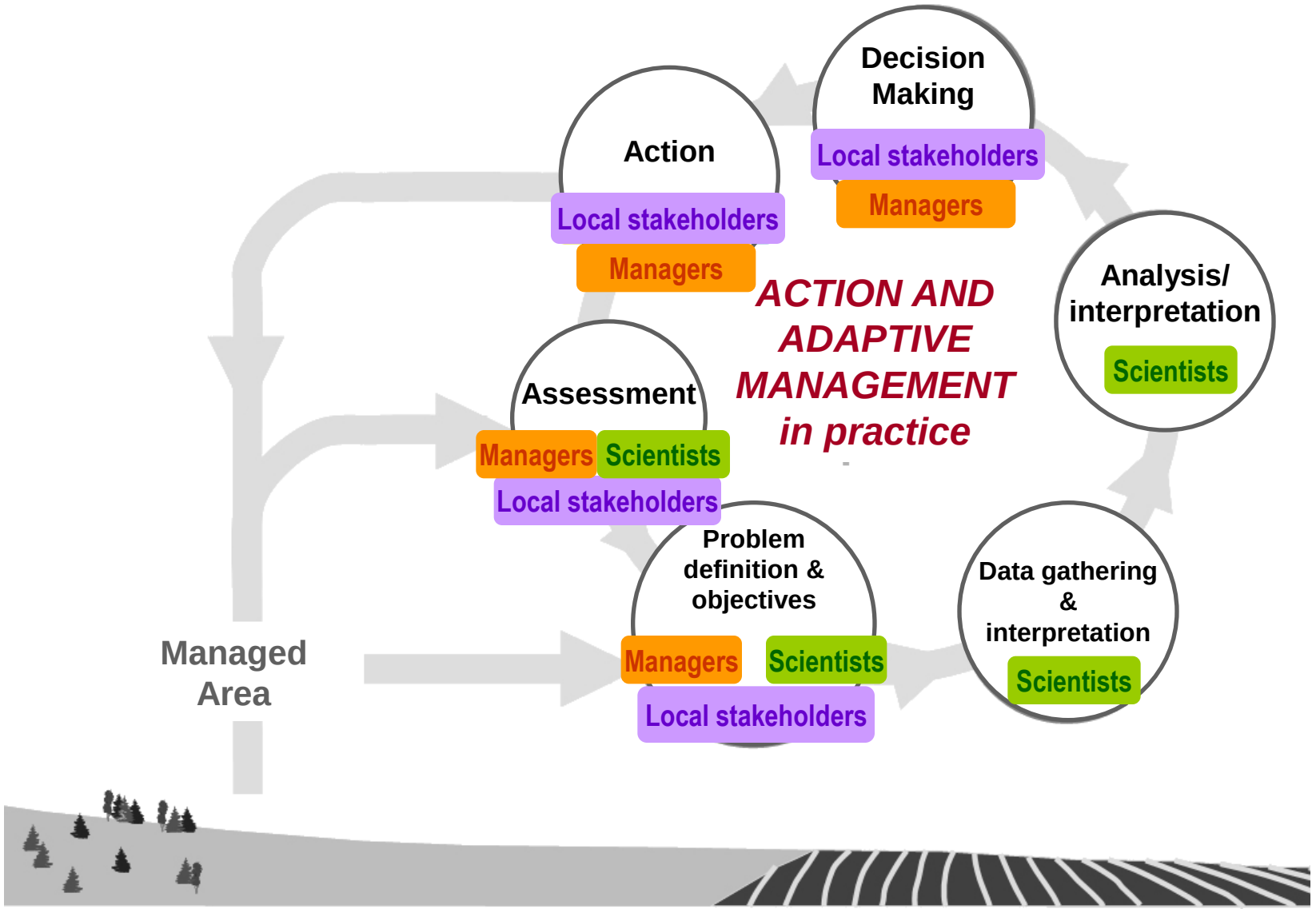
From theory to practice in active and adaptive management

Turning information into useful knowledge for ecosystems management. Assesing the effects to learn from the experience

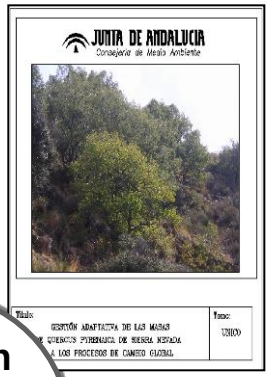
- It combines **scientific knowledge** on ecosystems functioning with **practical experience**.
- Assessing, almost **in real time**, the effects of management experimental practices to apply the newly acquired knowledge to the following decision making step
- **Uncertainty** is assumed in our interaction with live systems
- From problem definition to experimental design, data collection, analysis & interpretation → **Iterative process** open to continuous revision, leading to progressively more accurate decision making.




Decision Making
Local stakeholders
Managers
Analysis/ interpretation
Scientists
Data gathering & interpretation
Scientists
Problem definition & objectives
Managers
Scientists
Local stakeholders
Assessment
Managers
Scientists
Local stakeholders
Action
Local stakeholders
Managers
ACTION AND ADAPTIVE MANAGEMENT in practice
Managed Area

Example:

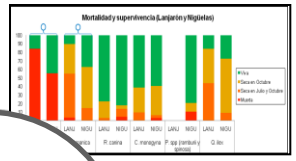
management of oak woods (*Quercus pyrenaica*) to enhance its resilience to CC



Decision Making

Local stakeholders

Managers



Analysis/ interpretation

Scientists

Data gathering & interpretation

Scientists

Problem definition & objectives

Managers Scientists

Local stakeholders

Action

Local stakeholders

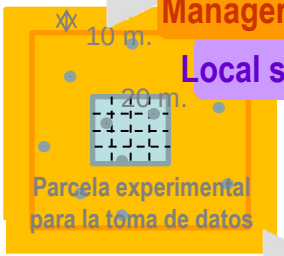
Managers

ACTION AND ADAPTIVE MANAGEMENT in practice

Assessment

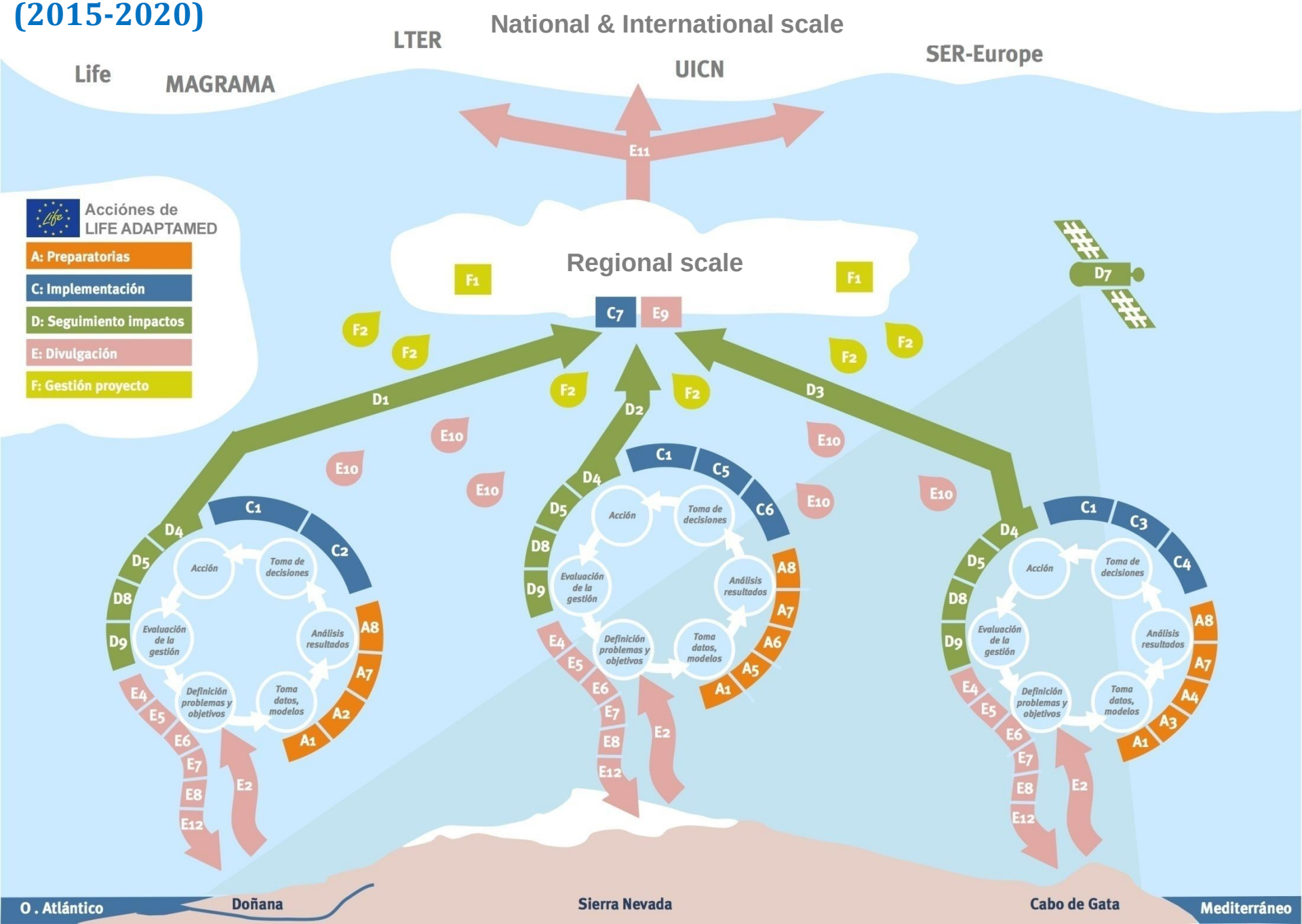
Managers Scientists

Local stakeholders

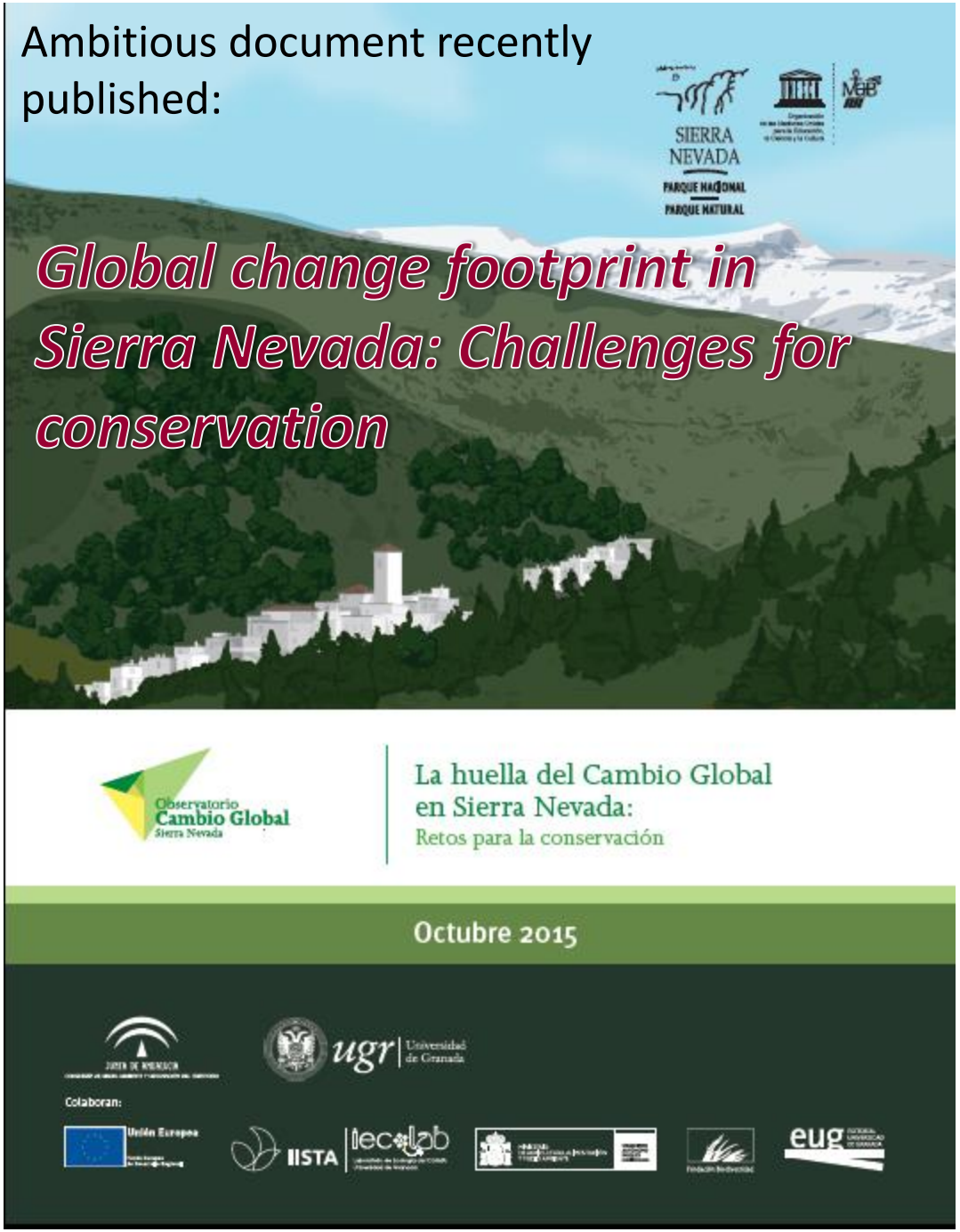


Managed Area

LIFE14 CCA/ES/000612 ADAPTAMED (2015-2020)



Ambitious document recently published:



It includes detected changes in:

- CC: past trends and and future predictions
- Snow cover and permafrost
- Land use and vegetal cover
- Impacts in rivers & lakes
- Population trends in flora and fauna
- Plant & animal phenology
- CO_2 fluxes quantification in natural and disturbed habitats
- Knowledge for ecosystem adaptation arisen from active management
- Socioeconomic impact and ecosystem services
- Atmosphere: shumman resonances, pollutants & aerosols

(English version coming soon…)

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Thank you very much for your attention!

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Unión Europea
Fondo Europeo de Desarrollo Regional

Life

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MINISTERIO DE MEDIO AMBIENTE Y MEDIO RURAL Y MARINO

ugr Universidad de Granada

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