

Round Table Online Event  
14/09/2020



# SlE - Towards Lecce2021



UNIVERSITÀ  
DEL SALENTO



[www.congresso.ecologia.it](http://www.congresso.ecologia.it)

Ecosystem, biodiversity and environmental services conservation and  
management in a changing scenario

Blanca RAMOS. Sierra Nevada National Park (SE Spain).  
Round Table "Arctic and Alpine ecosystems in face of climate change"

# CLIMATE CHALLENGES

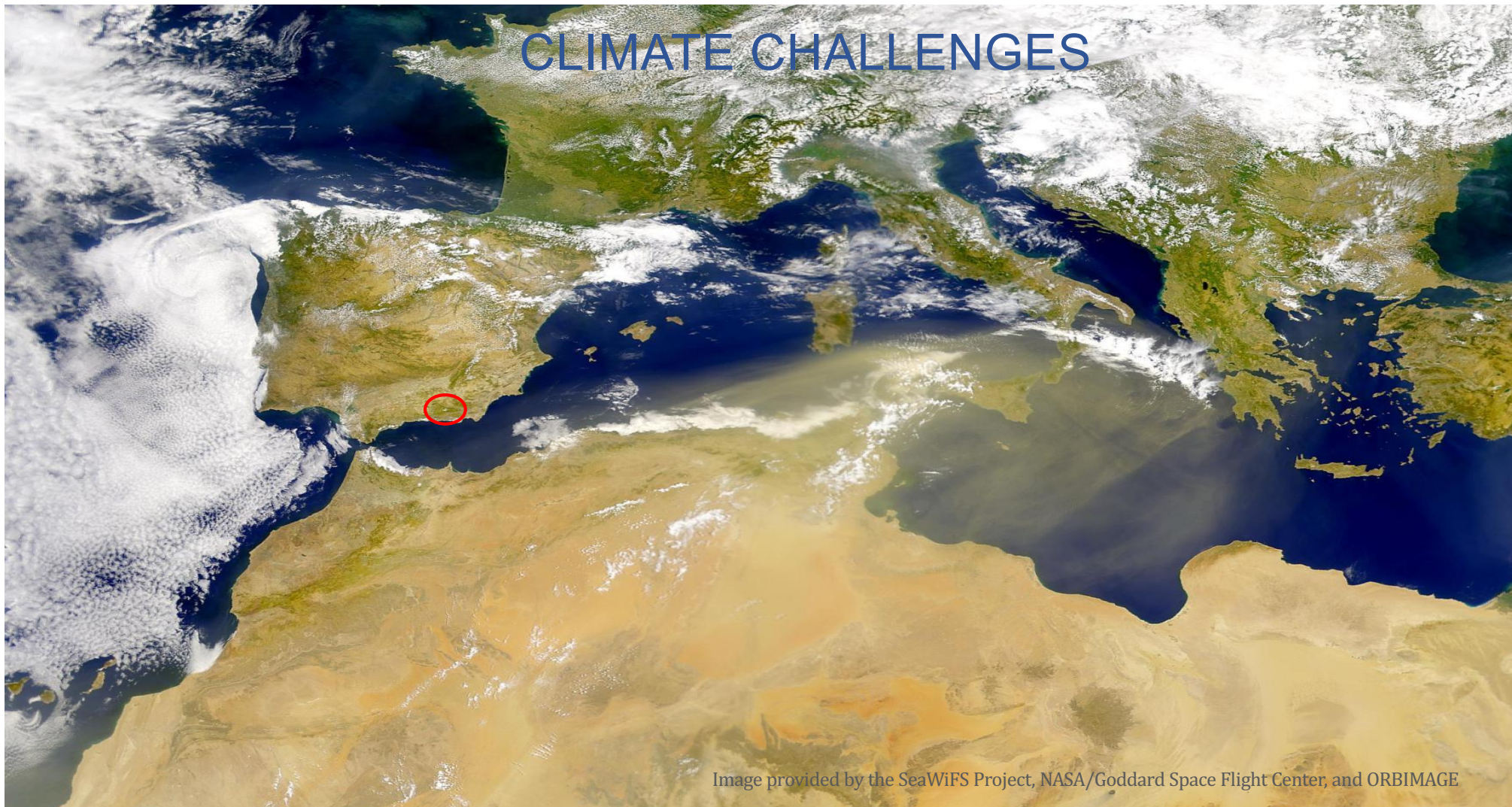
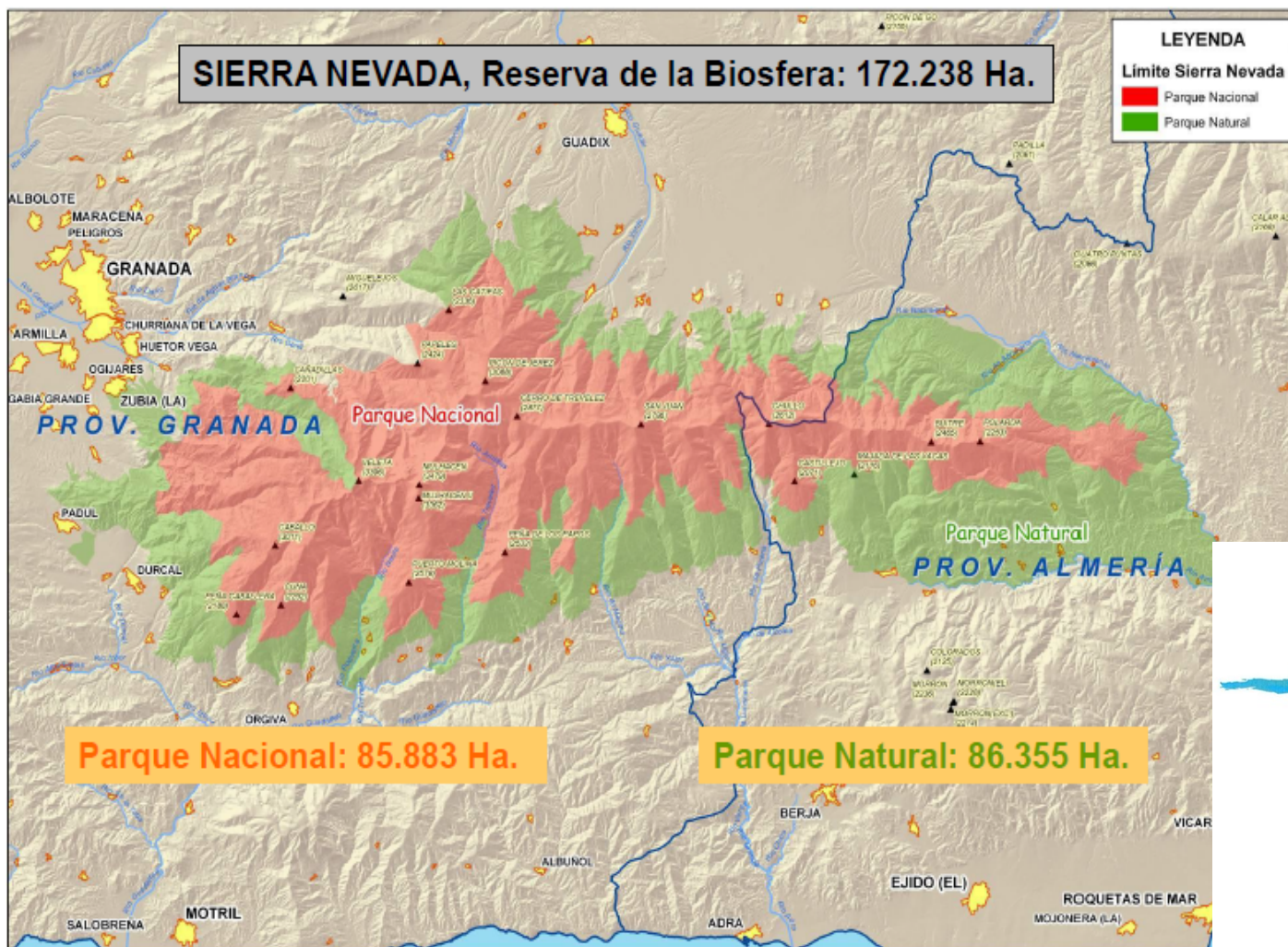


Image provided by the SeaWiFS Project, NASA/Goddard Space Flight Center, and ORBIMAGE

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2<sup>nd</sup> highest mountain range in Europe (3482 m.a.s.l.)

+2.100 taxa of vascular plants (105 endemic)

Biodiversity hotspot at European scale



#### IUCN GREEN LIST OF PROTECTED AREAS

By decision of the IUCN Green List of Protected Areas Committee

#### Sierra Nevada National Park

has been designated for inclusion in the IUCN Green List of Protected Areas.

Sydney, Australia  
14 November 2014  
Valid for two years from the date of issue

*Dr. Julia Marton-Leders*  
IUCN Director General

*Dr. Ernesto Enkerlin Hoeflich*  
Chair, IUCN World Commission on Protected Areas





*Gentiana alpina*



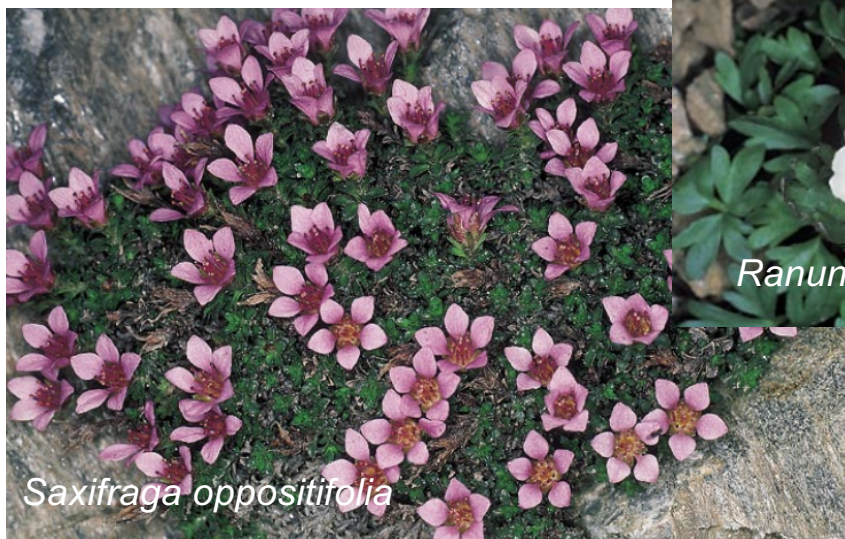
*Aconitum burnatii*



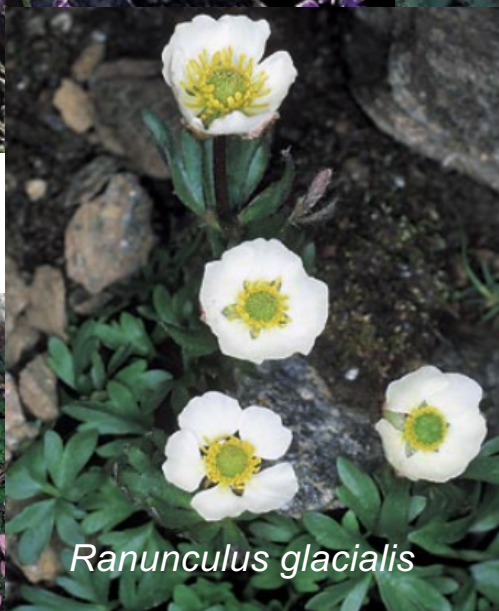
*Papaver lapeyrousianum*



*Epilobium angustifolium*



*Saxifraga oppositifolia*



*Ranunculus glacialis*



*Sibbaldia procumbens*

From: Blanca et al. (2001).  
Flora amenazada y  
endémica de Sierra Nevada.  
Univ. de Granada y Cons.  
Medio Ambiente. 408pp.

# Decision making requires information

## Evolving from a « reactive » towards a « proactive » approach:

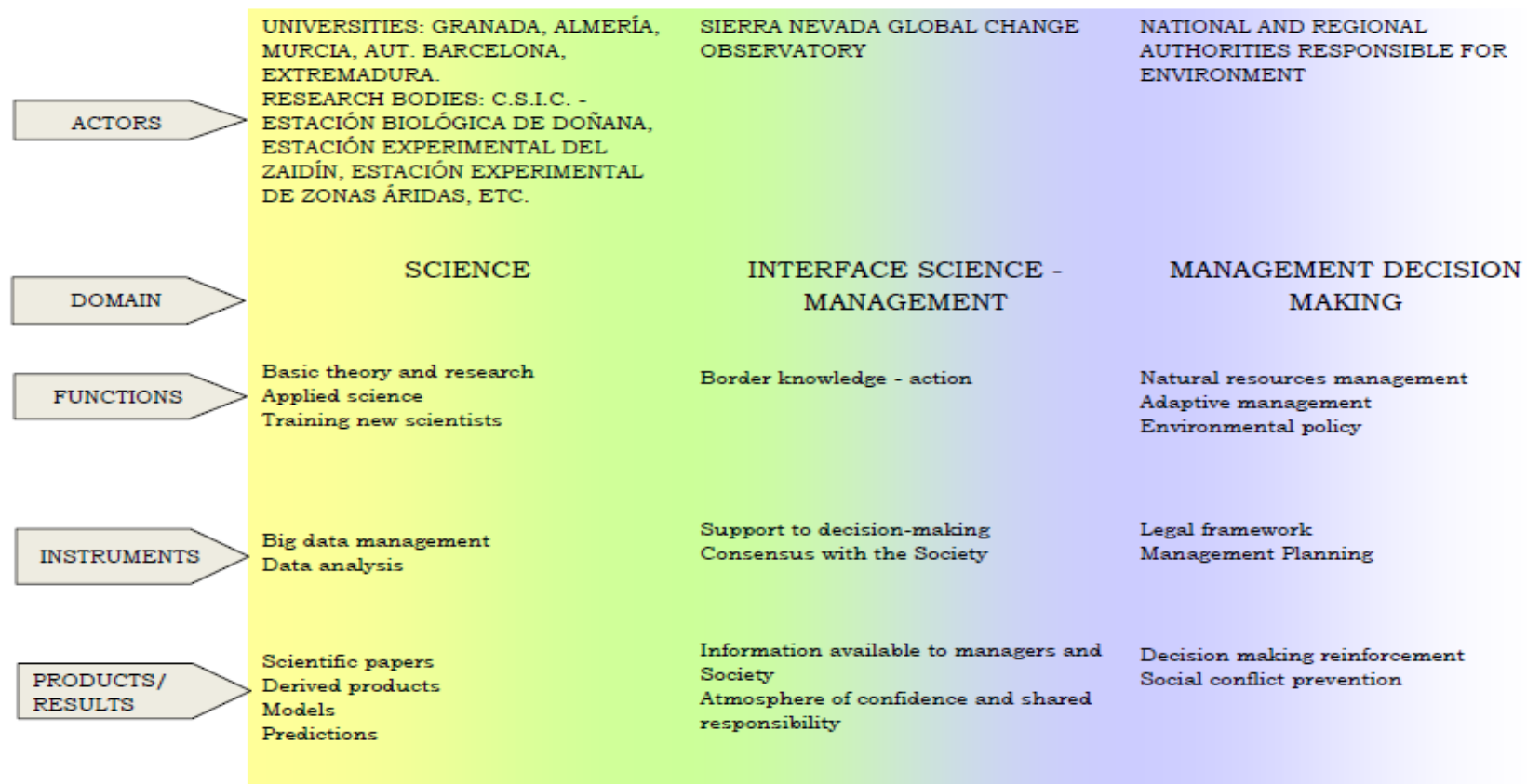
- From personal OPINIONS and RECIPES towards SCIENTIFIC EVIDENCE and KNOWLEDGE
- From TRIAL AND ERROR towards:
  - MODELS
  - SIMULATIONS
  - PREDICTIONS
- Planning process must adapt to CHANGING SCENARIOS guided by actors and drivers:
  - Climate change
  - Land use changes
  - Pollution
  - Alien-invasive species

## **MANAGEMENT PARADIGM SHIFTING IN SEARCH OF ADAPTIVE CAPACITY BUILDING by INCREASING ECOSYSTEM RESILIENCE**

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# SIERRA NEVADA GLOBAL CHANGE OBSERVATORY

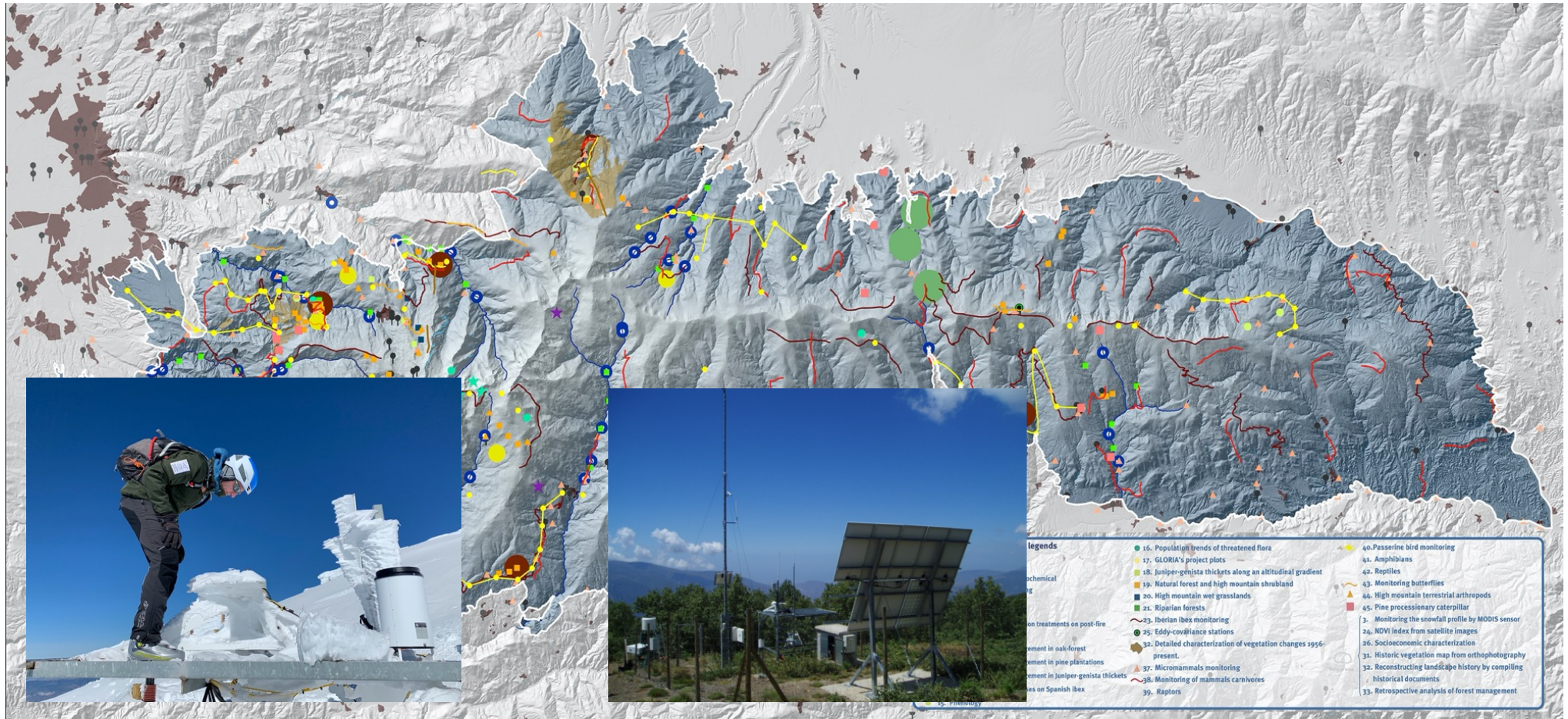
## CONCEPTUAL FRAMEWORK



Modified from Enquist et al., 2017



# Remote sensing and ground truth: Intensive Monitoring Units







## Needs: Spatial and temporal scales

- Sierra Nevada user: deep knowledge of a (relatively) small territory
- Included in NETWORKS: Assessment of situation, dynamics and conservation status of biodiversity, habitats and ecosystem services in wider contexts:
  - Regional level: RENPA - Regional Network of protected areas
  - National level: National Parks Network
  - International level:
    - Natura 2000
    - IUCN Green List of Well Managed Protected Areas
    - International monitoring networks: LTER, GLORIA, LIFEWATCH, **ECOPOTENTIAL**, ...
- Establishment of reference conditions for change characterisation
- Reconstruction of the past
- Determination of temporal change patterns: fluctuations *versus* trends, ...



# Needs: Ecosystem assessment at 3 levels

- SPECIES INVENTORIES BIODIVERSITY AND POPULATION TRENDS
- STRUCTURE OF BIOTIC COMMUNITIES
- **PROCESS AND FUNCTION:**
  - FLUXES OF ENERGY AND MATTER
  - ECOSYSTEM SERVICES CHARACTERISATION

**ASSESSMENT (AND COMPARISON) OF CONSERVATION STATUS**

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## **Needs: Assessment of Spatial-temporal variations/dynamics**

- GRAZING
- THREATS (pests, fire, land use changes, pollution, etc.)
- VEGETATION SUCCESSION
- PHENOLOGICAL CHANGES
- ALTITUDINAL MOVEMENTS, DECAY, REPLACEMENTS OF VEGETATION COVER
- PROCESSES RELATED TO ECOSYSTEM SERVICES: CARBON BALANCE, WATER CYCLE, ENERGY BALANCE (Cabello et al., 2017)
- INVASIONS BY ALIEN SPECIES
- ASSESSMENT OF MANAGERIAL PRACTICE (increase of resilience, usefulness, efficiency, etc.)




## Needs: Assessment of natural resources

- CLIMATE AND CRYOSPHERE FEATURES, DYNAMICS AND CHANGES
- SOILS, EROSION, SEDIMENTATION
- ENDANGERED SPECIES
- WATER: HYDROLOGY, QUANTITY AND QUALITY FEATURES, SEASONAL PATTERNS
- HIGH MOUNTAIN LAGOONS
- ASSESSMENT OF FEEDING RESOURCES FOR HERBIVORES: DISTRIBUTION MAPS, AVAILABILITY, QUANTITY / QUALITY, SEASONAL PATTERNS



# Challenges

- APPROACHING THE SCALES OF MONITORING UNITS « **PLOTS** » TO REMOTE-SENSING UNITS: « **PIXELS** »
- PROVIDING ASSESSMENT AT SHORT-, MEDIUM- AND LONG-TERM: IDENTIFICATION OF ECOSYSTEM STABILITY INDICATORS
- SENSORS CAPABLE TO READ KEY VARIABLES
- STREAMLINING TECHNOLOGICAL TOOLS: AVAILABILITY FOR MANAGERS STAFF TRAINING
- FROM « **PARKS FOR SCIENCE** »  TOWARDS « **SCIENCE FOR PARKS** »



