



ECOPOTENTIAL

**Improving future ecosystem benefits through
Earth Observations**



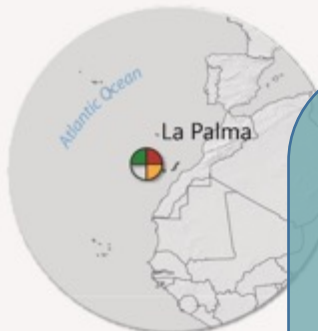
This project is funded by
the European Union
(Grant agreement No. 641762)



www.ecopotential-project.eu

ECOPOTENTIAL Project Sites

25 protected areas from Europe and beyond Europe, covering all European biogeographical regions plus arid and savannah ecosystems, and including several kinds of conservation status



| Biogeographic Regions | |
|-----------------------|--|
| Alpine | |
| Anatolian | |
| Arctic | |
| Atlantic | |
| Black Sea | |
| Boreal | |
| Continental | |
| Macaronesia | |
| Mediterranean | |
| Pannonian | |
| Steppic | |

| ECOPOTENTIAL Sites | |
|-------------------------------------|--|
| International Marine Protected Area | |
| Large Marine Ecosystem | |
| National Park | |
| Natura 2000 site | |
| World Heritage | |
| Biosphere Reserve | |



The ECOPOTENTIAL community: 250+ researchers



Funded by the
European Union

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Make the best use of Earth Observations to characterize the state and changes of ecosystems and improve management and conservation in Protected Areas and beyond

Mountain

Gran Paradiso, Italian Alps

Arid and semi-arid

Marine

LME Caribbean Sea

Coast and transitional

Danube Delta, Romania

48 partners

4 ecosystem types

26 Protected Areas



ECOPOTENTIAL in a nutshell



Funded by the European Union



Media
Services



Europe's eyes on Earth

Looking at our planet and

For the ultimate



olutions catalogs

ECOPOTENTIAL

- ECOPOTENTIAL Catalogue
- ECOPotential VLab

OBSERVER: Inspire, Explore, Act - How the Copernicus 'Eyes on Earth' Roadshow is nurturing a new

Use existing Earth Obs. data

use of COPERNICUS data

Generate EO data products

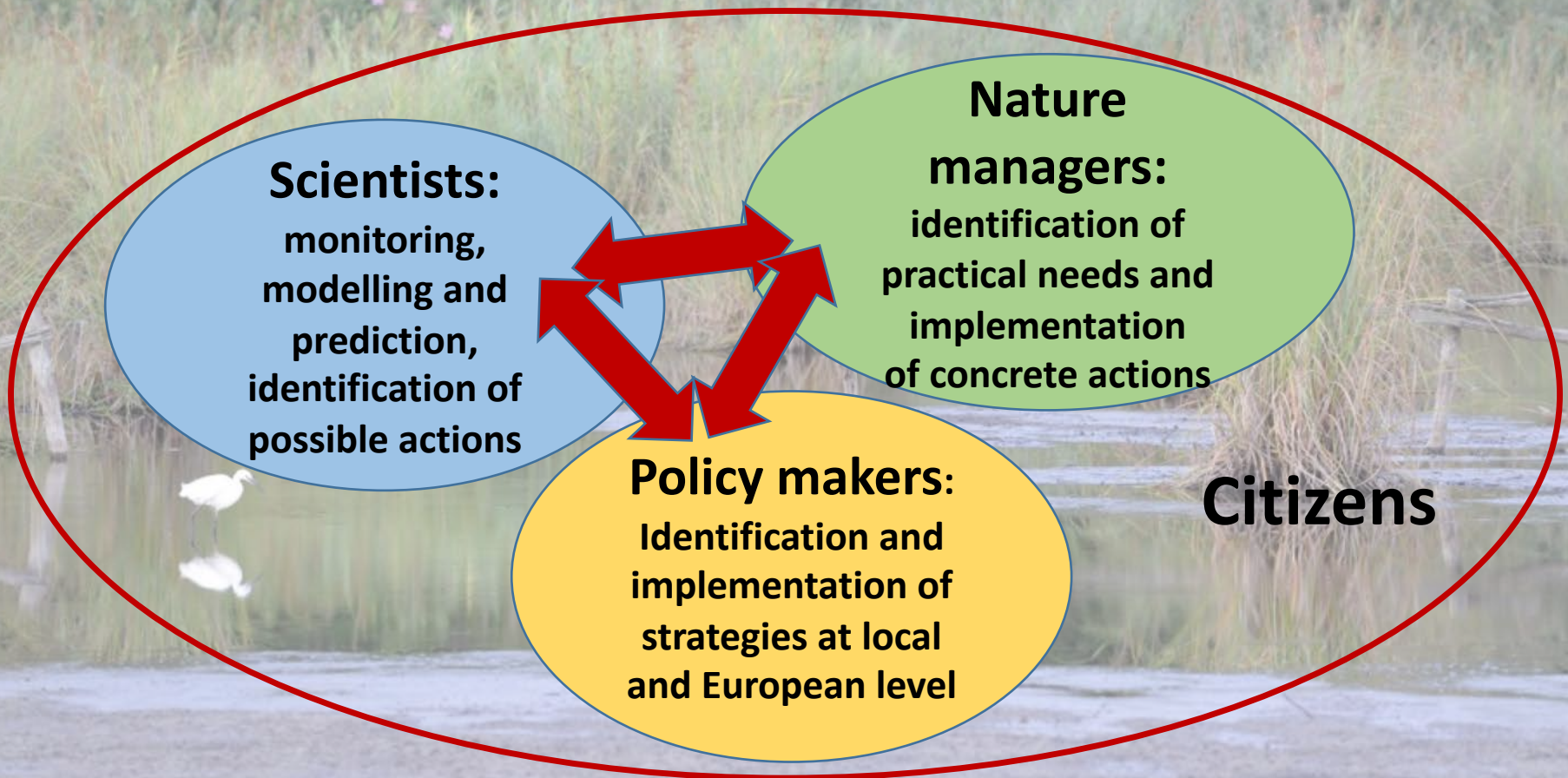
Make data open and available through GEO/GEOSS

Atmosphere

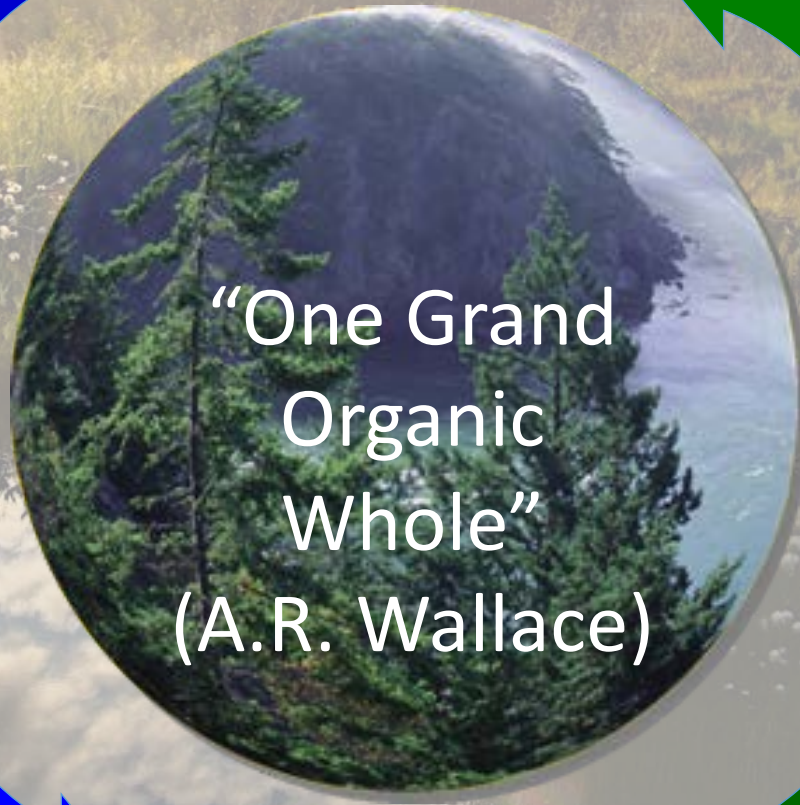
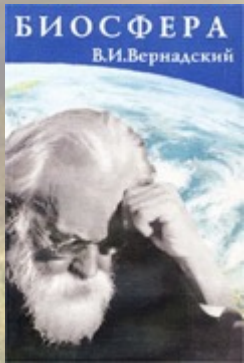
Marine

Land

A system approach to nature conservation in times of rapid change



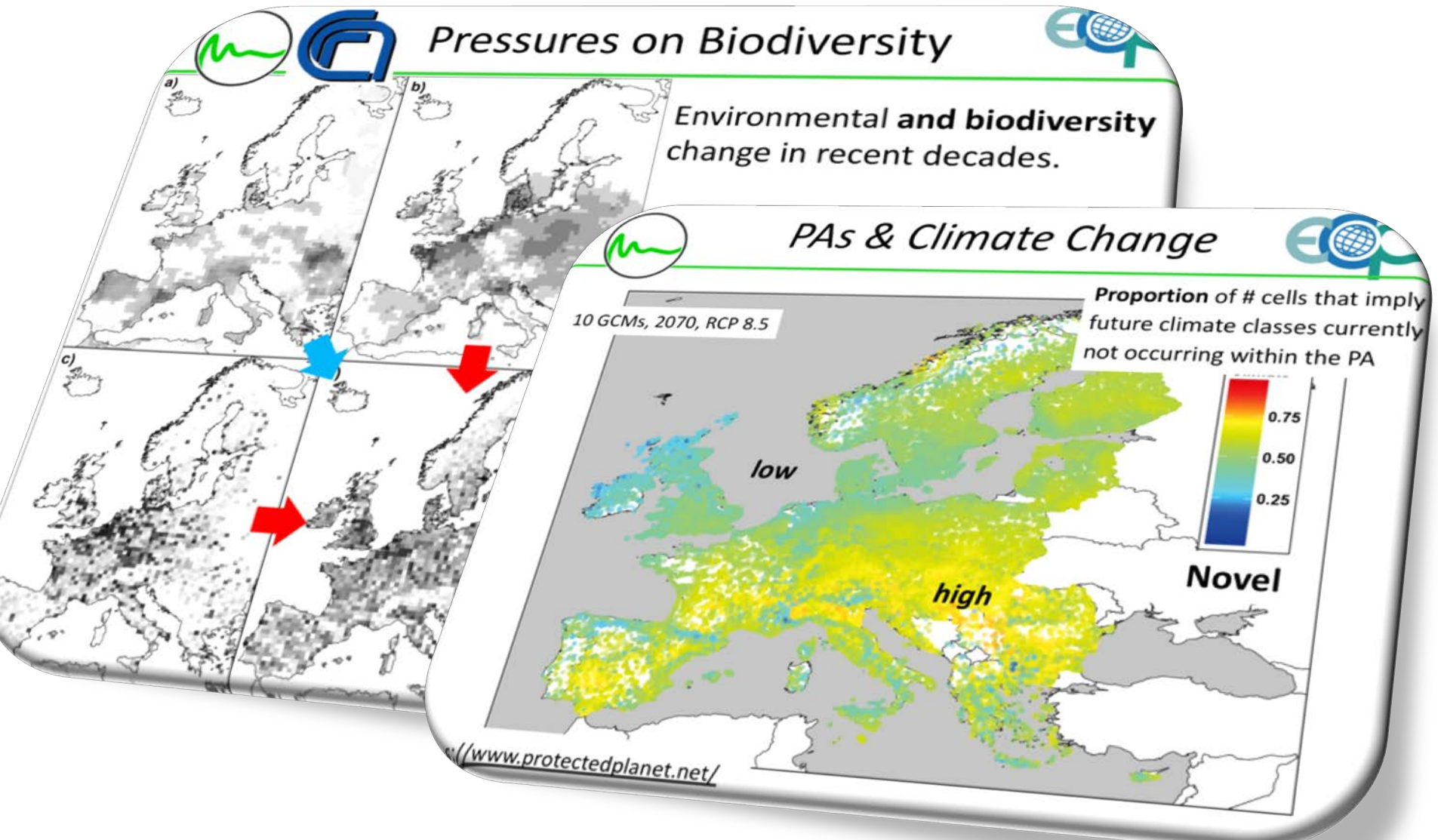
ECOSYSTEM'S CONCEPT



Geosphere

Biosphere

ECOSYSTEMS GLOBAL TRENDS



ECOSYSTEMS ESSENTIAL VARIABLES

Essential Variables are a minimal set of variables that describe a system's condition and trends by providing reliable, traceable, observation-based evidence for addressing **specific questions** and applications, including **monitoring**

ESSENTIAL CLIMATE VARIABLES (ECVs)

Atmospheric Temperature
Atmospheric Precipitation
(...)

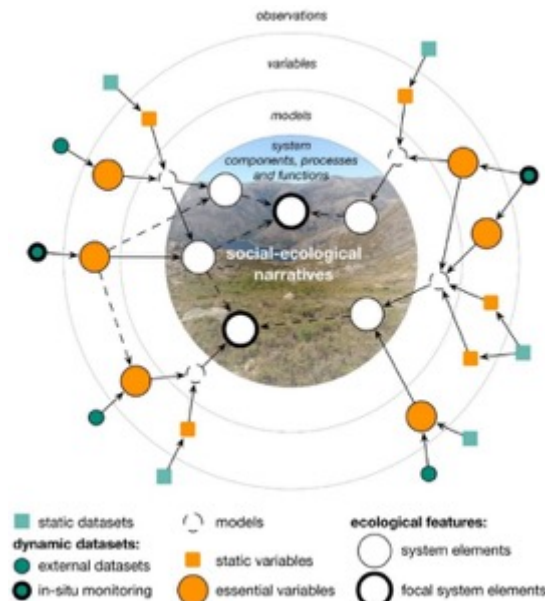
ESSENTIAL OCEAN VARIABLES (EOVs)

Phytoplankton biomass
Chlorophyll-a
(...)

ESSENTIAL BIODIVERSITY VARIABLES (EBVs)

Species distribution
Ecosystem extent
(...)

Objective: Develop and implement a sound process to identify, select, calculate and validate the Essential Variables



Guerra et al. GECCO (2019)

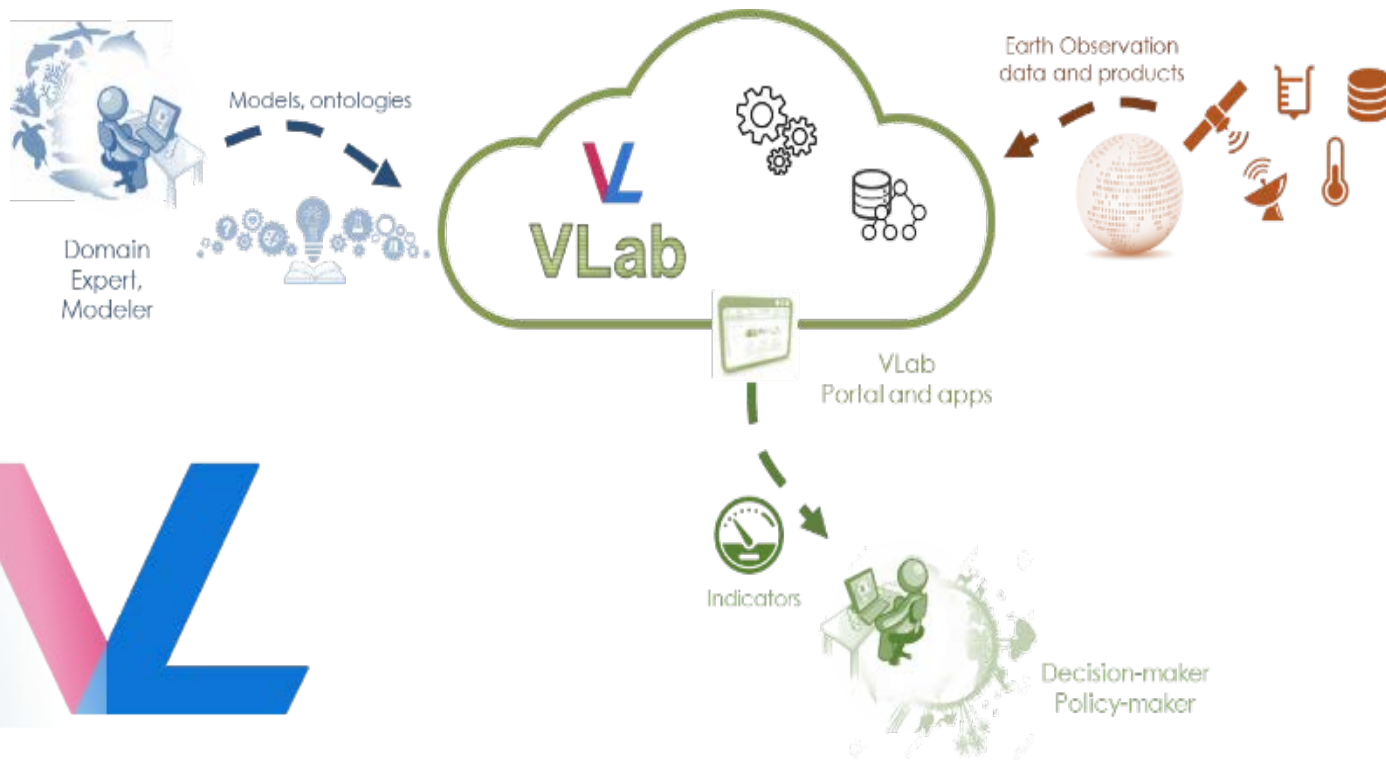
7 VARIABLES USED ACROSS STUDIES AND SCALES IN ECOPOTENTIAL

- Ecosystem structure
- Ecosystem extent
- Ecosystem function
- Species populations
- Species distribution
- Atmospheric air temperature
- Atmospheric precipitation

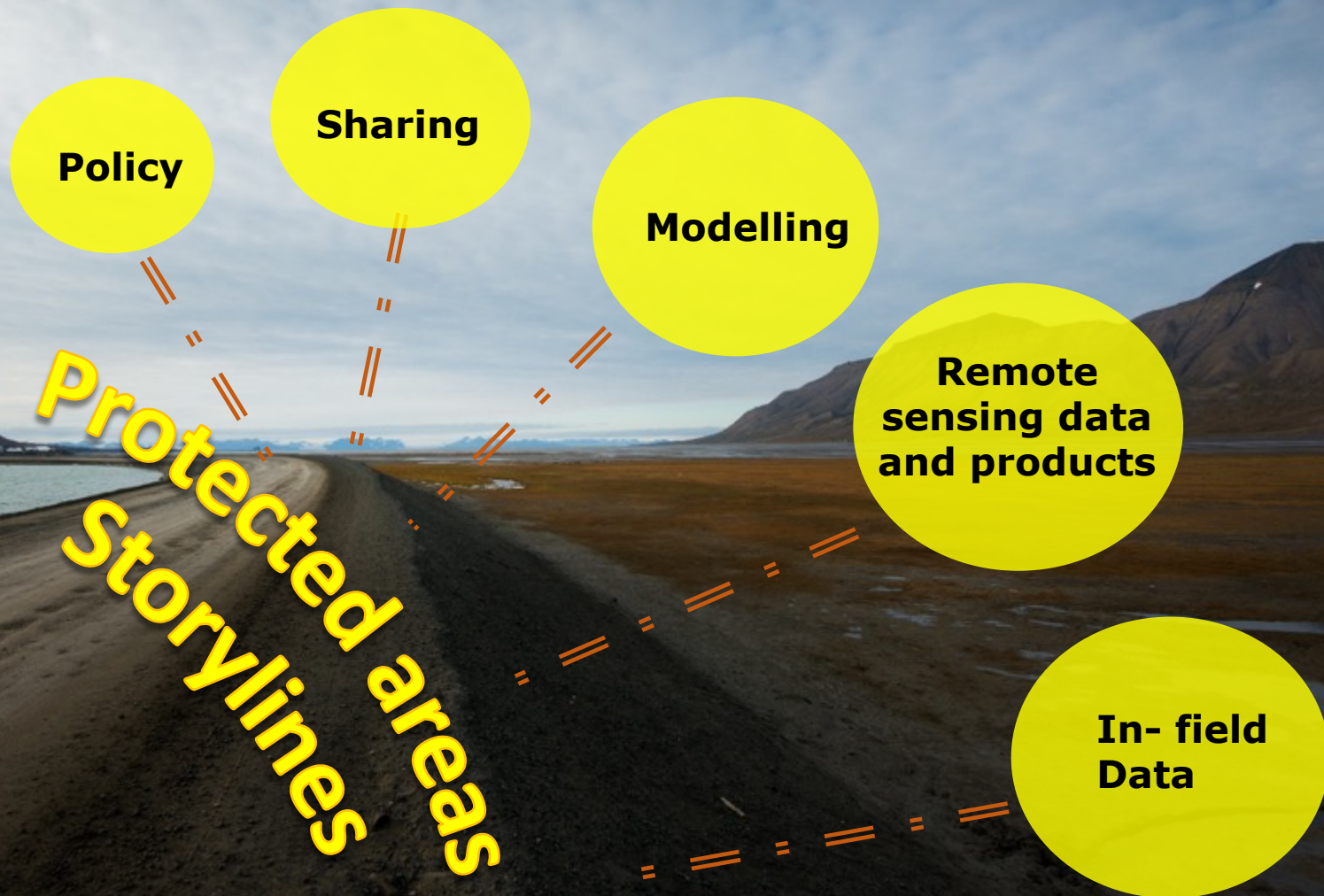
Locally relevant
(identified and used at PAs)

Globally consistent
(used across scales)

CREATING KNOWLEDGE FOR INFORMED NATURE MANAGEMENT



The ECO POTENTIAL Roadmap





Remote sensing products for protected areas



WP4 REMOTE SENSING PRODUCTS FOR STORYLINES
Dear ECOPOENTIALists,

One of the aims of the Ecopotential WP4 is to generate Earth Observation (EO) products to support activities in several other WPs. To better communicate with users of EO products, we have developed a first form to inform you which data we can provide and to collect other requirements from you. This survey will give you an overview of WP4 capabilities and will also help us identifying existing gaps and requirements concerning RS data which need to be addressed to improve and support the work in different storylines and other WPs. Please, fill one spreadsheet for every storyline (make a copy of the existent tab for every other storyline) you are involved in. In case you need more than 10 variables, fill another spreadsheet. If you have doubts or once you are done, please, send an email/the XLSX file to cristina.domingo@uab.cat. We will appreciate to receive your input, and as soon as we will receive it we will contact you concerning data availability and new requests. Thank you very much for your collaboration!

Please, select one Storyline:

Protected Area involved: Bounding box of the PA (Lat/Long WGS84/15 km buffer): 0

In case you need Very High Resolution data (less than 10 m spatial resolution), please go to row 192.

V1

Please, select the Variable you need to work with: If other variable, specify:

Select the Specific Product: If other product, specify:

Spatial and temporal resolution available: If others, specify:

Period: from to Specify months (mar to oct, only feb...):

If for this product a subset of the whole PA is needed, please specify a new bounding box (Lat/Long WGS84):
Min Lat: Min Long:
Max Lat: Max Long:

If a new bounding box is requested, please send a .shp file to cristina.domingo@uab.cat together with this survey

Priority: If Critical, please justify why:

More than 300 remote sensing products generated and available

Remote sensing data and products



The ECOPOTENTIAL implementation: DEIMS



Funded by the
European Union

umweltbundesamt^U
PERSPEKTIVEN FÜR UMWELT & GESELLSCHAFT

**In- field
Data**

Access to reliable and well documented data is needed for open science and reproducible results.

ECOPOTENTIAL uses DEIMS-SDR (Dynamic Ecological Information Management System - Site and dataset registry) to store quality-assured context information and their data products about the ECOPOTENTIAL Protected Areas

<https://deims.org/>

Earth observation driven models for ecosystems knowledge-informed management

Where:

Protected areas in Europe and beyond

For whom:

Scientific community
PA managers
Policy makers

What:

Ecosystem
Ecosystem services
Changes
Future Projections

How:

Correlative
Process-based
Conceptual.....



Modelling

Scale: from local/regional to global

Transferability: from low to high

Openness: models available on the ECOPOTENTIAL VLab



**Working with the ECOPOTENTIAL Protected Areas
- co-designing research threads with PA staff for:**

**Analysing the current state of Protected Areas and
ESS from In situ and Remote Sensing**

**Detecting ongoing changes in the ecosystems and
the environment**

**Modelling future projections on the state of the
ecosystems**

Research strategy co-designed by scientists and PA staff:

Focus on given Protected Area(s): **identify the ecosystem conservation issues** and ecosystem services, functions and processes, the **threats** and the **management policy** issues.

Co-design a **research plan** to:

Address the conservation issues

Identify and retrieve the data needed (In Situ/ RS)

Identify and develop the ecological models

PA management engagement to develop conservation and management policy options.

Project workflow





The use of Sentinel for conservation and environmental monitoring provide us new way of working

Antonis Tsakirakis, Samaria National Park



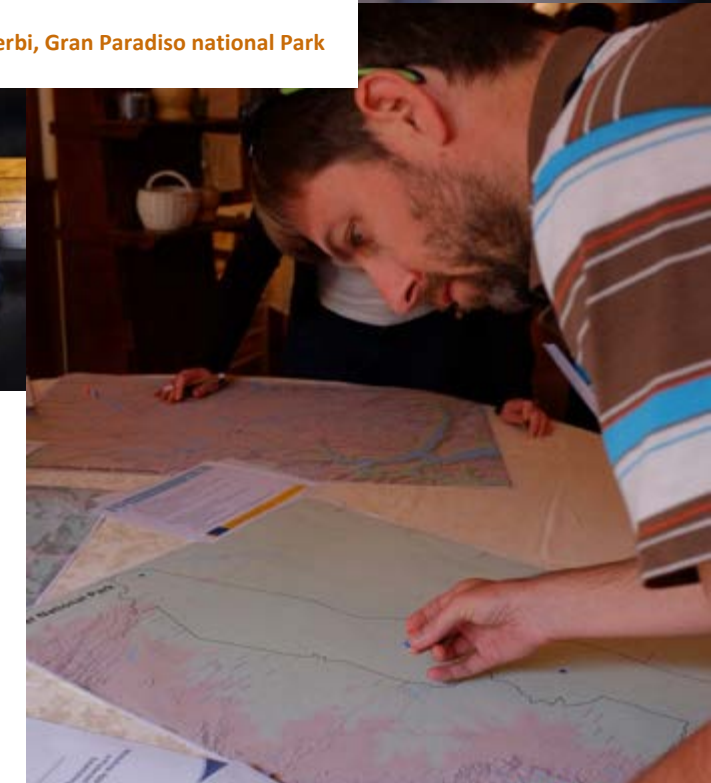
The use of Sentinel data has improved the control and management of high altitude grasslands providing plenty of information for remote areas

Ramona Viterbi, Gran Paradiso national Park



“The EODESM system provides timely information on wetland conditions and dynamics that determine the distribution of flora and fauna species. This can assist in efforts to ensure planning of conservation management”

Ricardo Díaz-Delgado (EBD Doñana) and Loïc Willm (Camargue).



Making the best use of Earth Observations

- New models, able to incorporate Earth Observations, have been developed, tested and implemented
- Creating an ecosystem community of practice
- Enhancing Protected Areas management
- Providing a Virtual Laboratory Platform for data, products, services, models and information generated by the project, as a contribution to GEO/GEOSS
- Creating new opportunities for SMEs in the field of monitoring and application of Earth observations to ecosystem study, conservation and management.

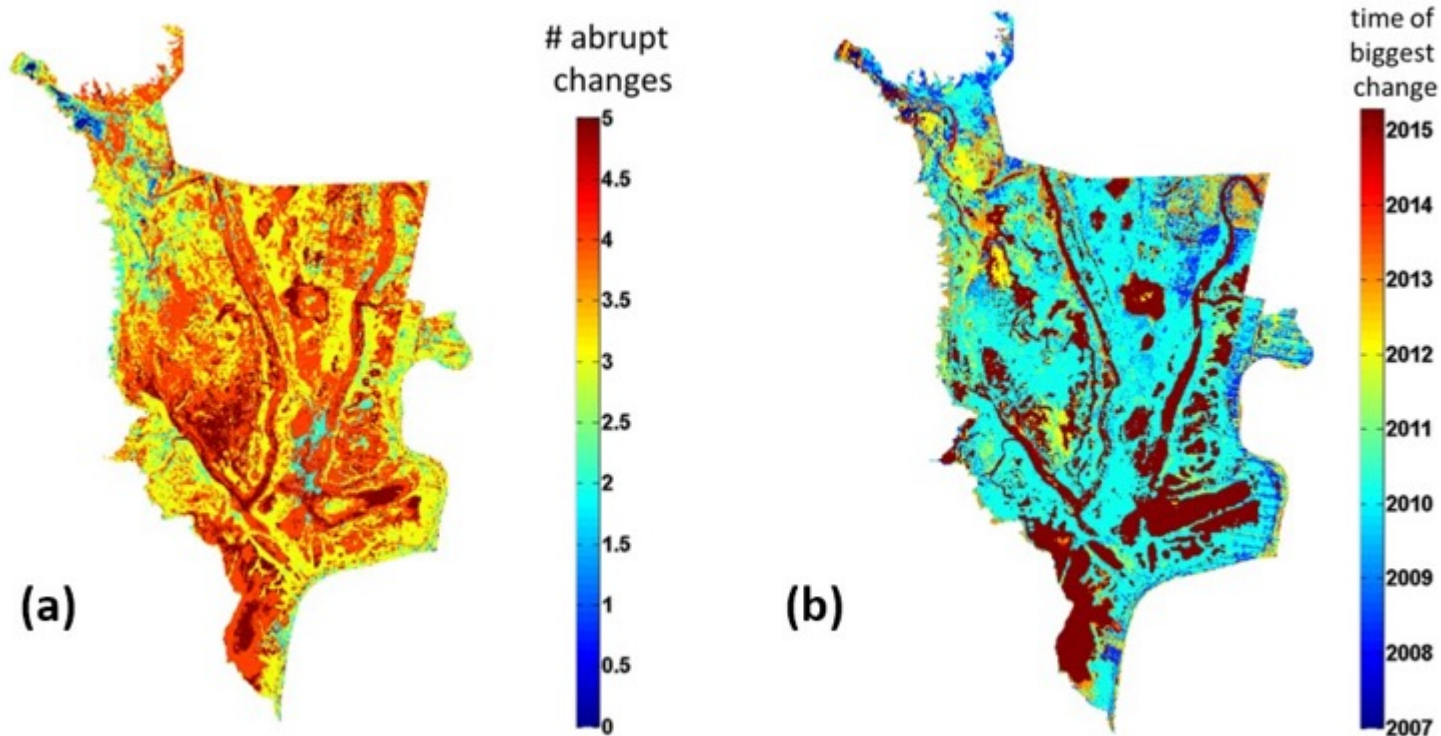
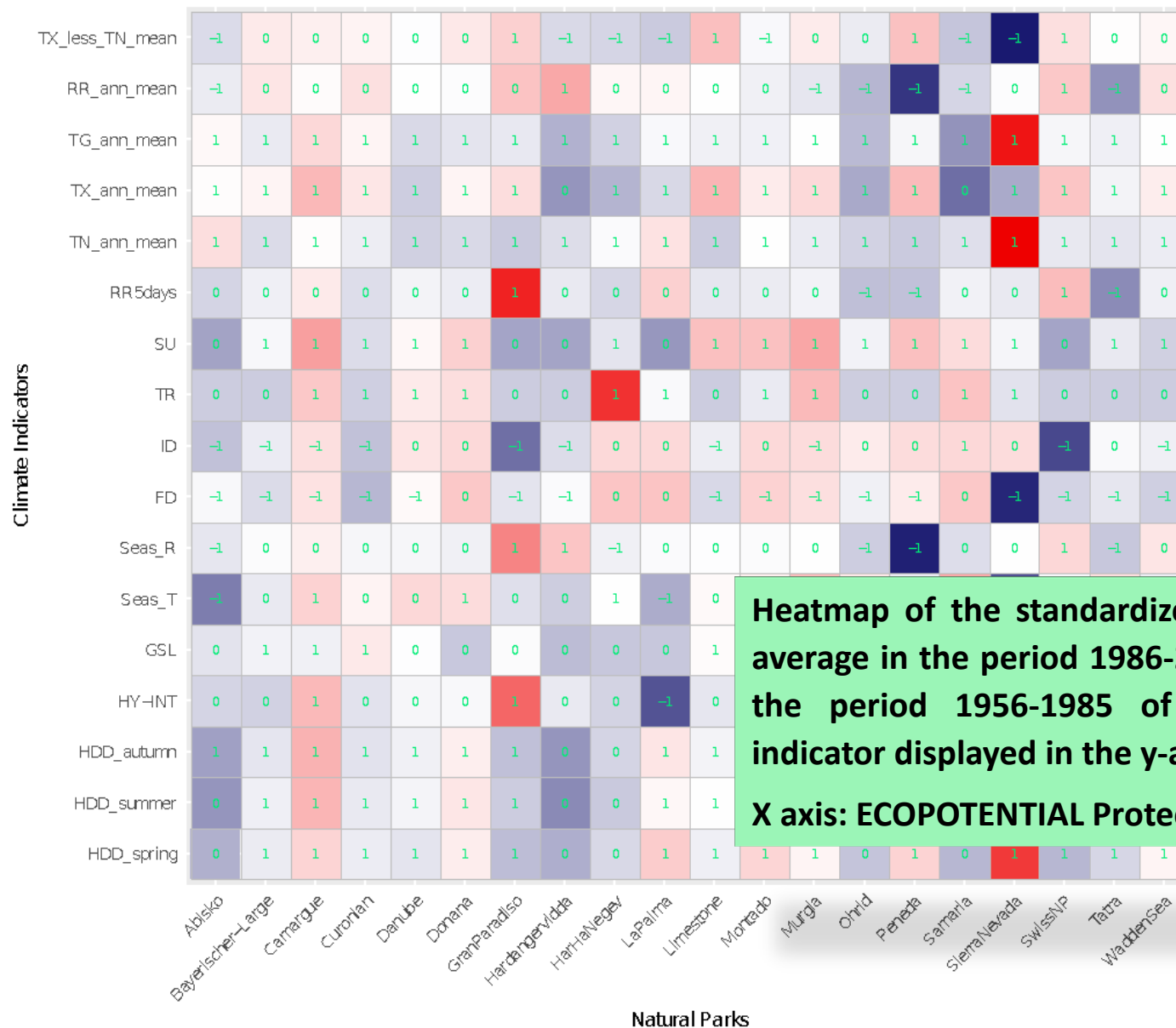


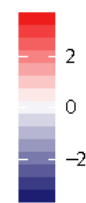
Figure 3. (a) Raster presenting the total number of abrupt changes detected from 01/01/2017 to 23/12/2016, (b) Raster presenting the time of biggest change from 2007 to 2016.

Multiple changes detected in the phenological cycles within the marshes of Doñana National Park, Spain (2007 – 2016)

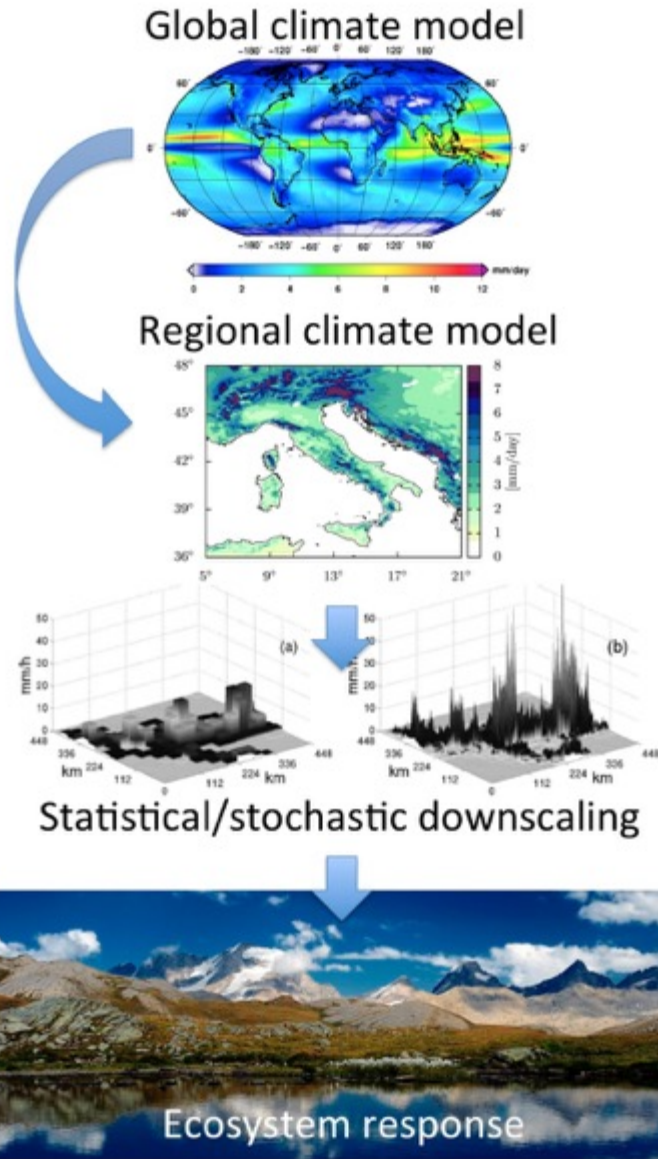
Annual indicators 1956–2015; mean diff. (std)



Vivaldo et al.
in preparation (2019)



Heatmap of the standardized change between the average in the period 1986-2015 and the average in the period 1956-1985 of each annual climatic indicator displayed in the y-axis.
X axis: ECOPOTENTIAL Protected Areas

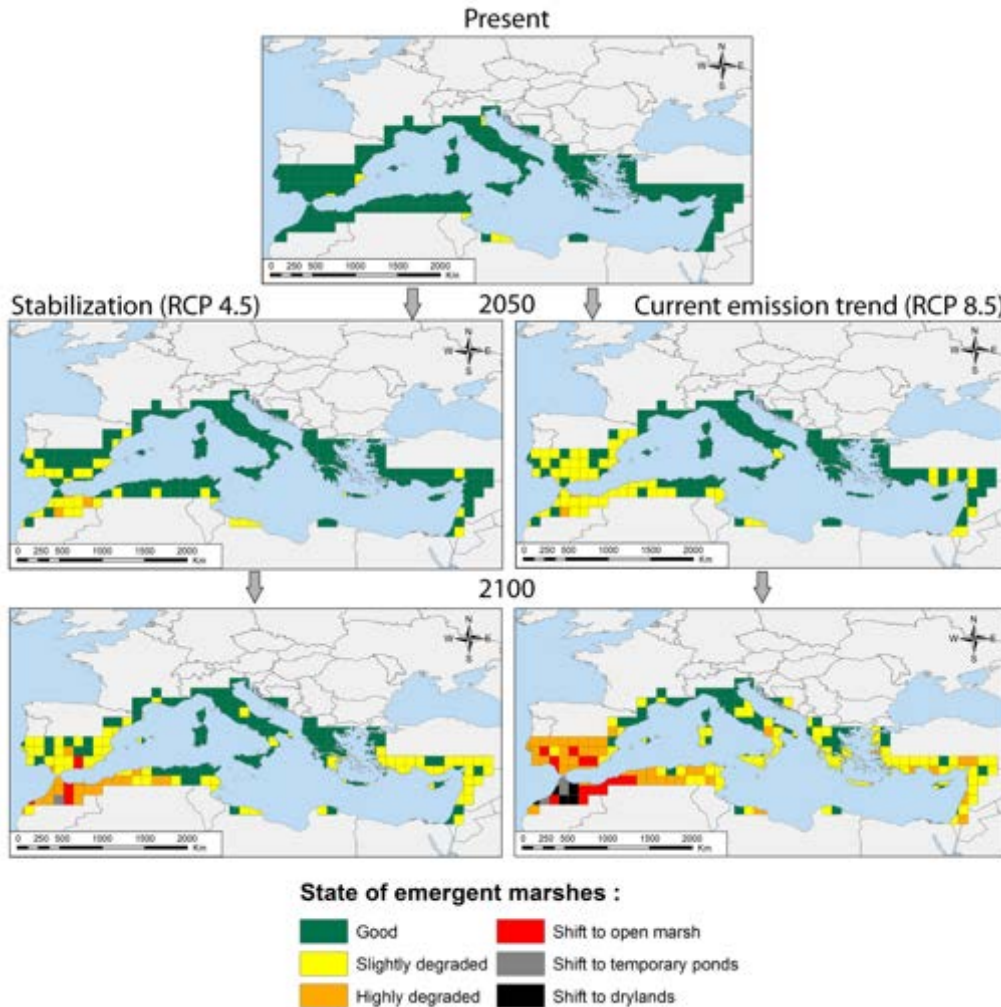


The standard prediction chain for climate change impacts has been used.

The output of a global climate/land-use change model, at coarse spatial scale, is downscaled through regional climate models and a further statistical or stochastic downscaling method.

The downscaled climate and environmental variables are then used to drive surface ecosystem models at small spatial scale.



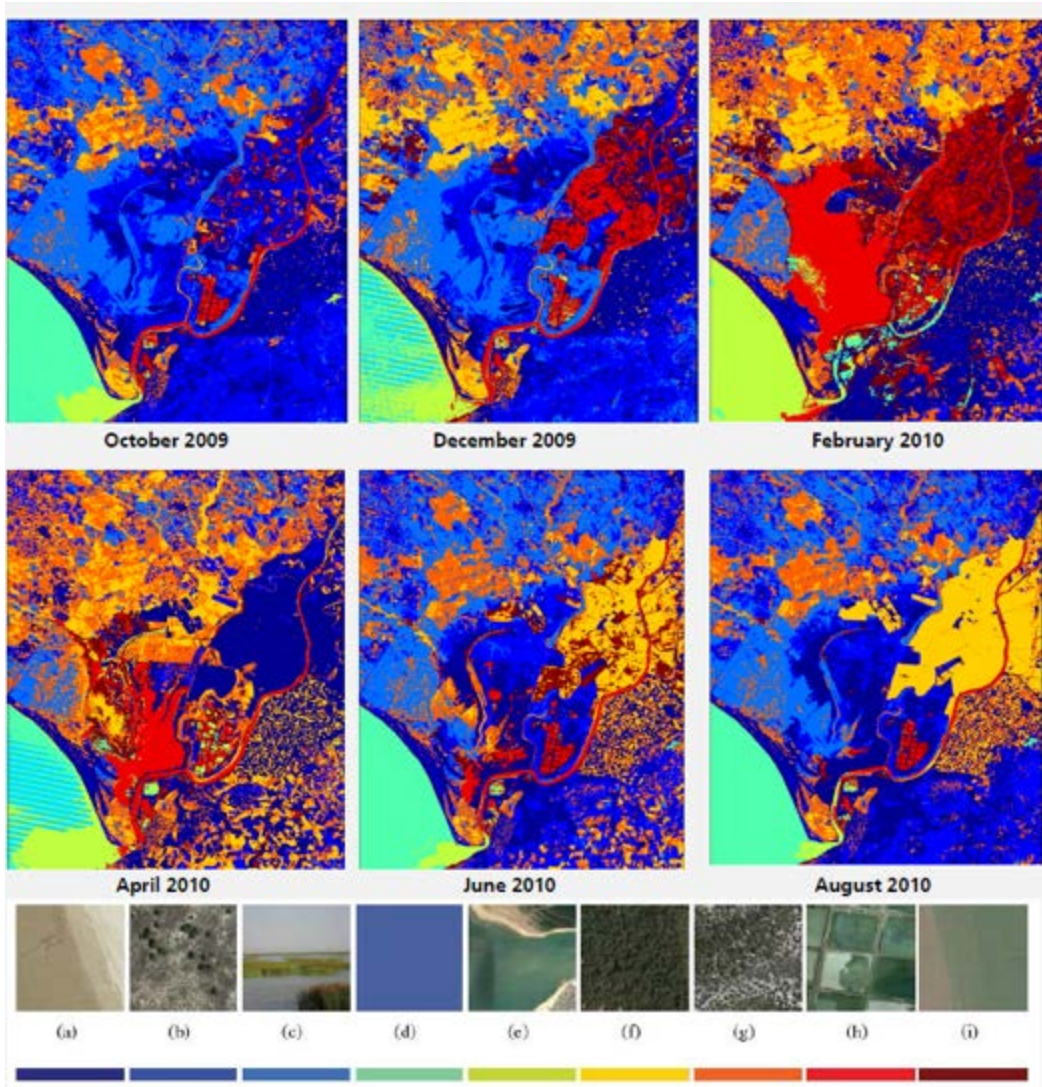


Impact of climate change on Mediterranean wetlands

Lefebvre et al., 2019

<https://doi.org/10.1016/j.scitotenv.2019.07.263>

Expected habitat change of semi-permanent marshes under the greenhouse emission scenarios RCP 4.5 (stabilization) and RCP 8.5 (steady increase) for the years 2050 and 2100.

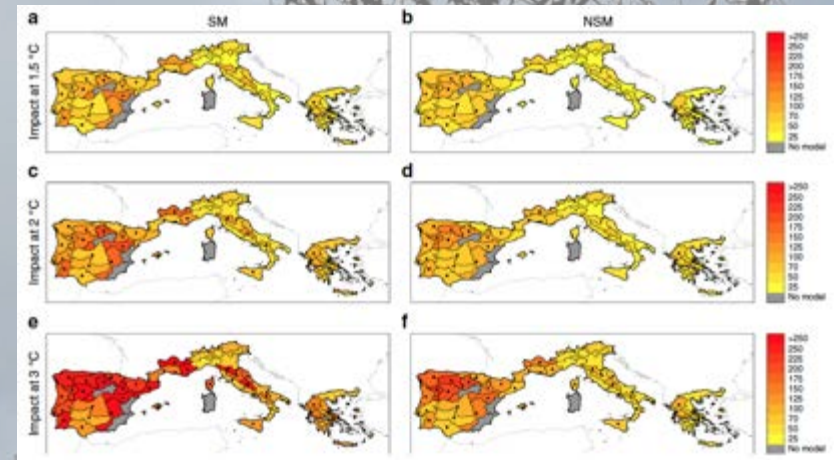


Land-cover classification of Doñana National Park from October 2009 to August 2010. Legend: a) Bare soil, (b) Very sparse vegetation, (c) Marshland, (d) Deep water such as Ocean, (e) Sediment, (f) Forest, (g) Bushes, (h) Mid-level water, (i) Shallow water.

Use of European datasets:
EFFIS, CRU TS for SPEI
Use of national inventories
Use of Remote sensing products



Marco Turco et al., Scientific Reports 2017
Nature Communications 2018a, 2018b



MAIN RESULTS:

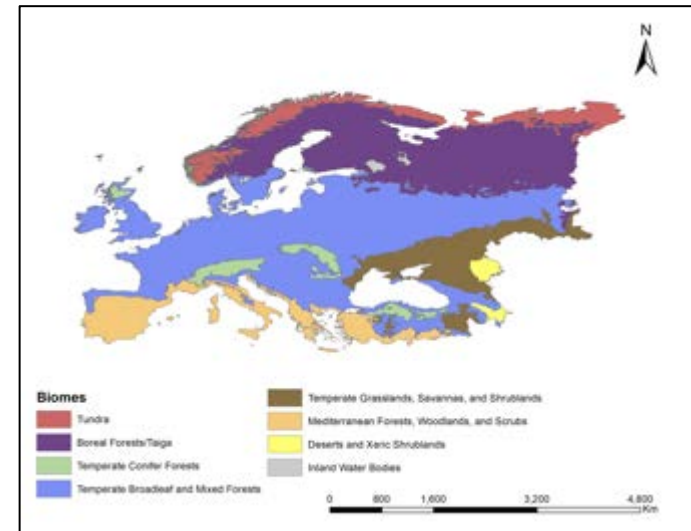
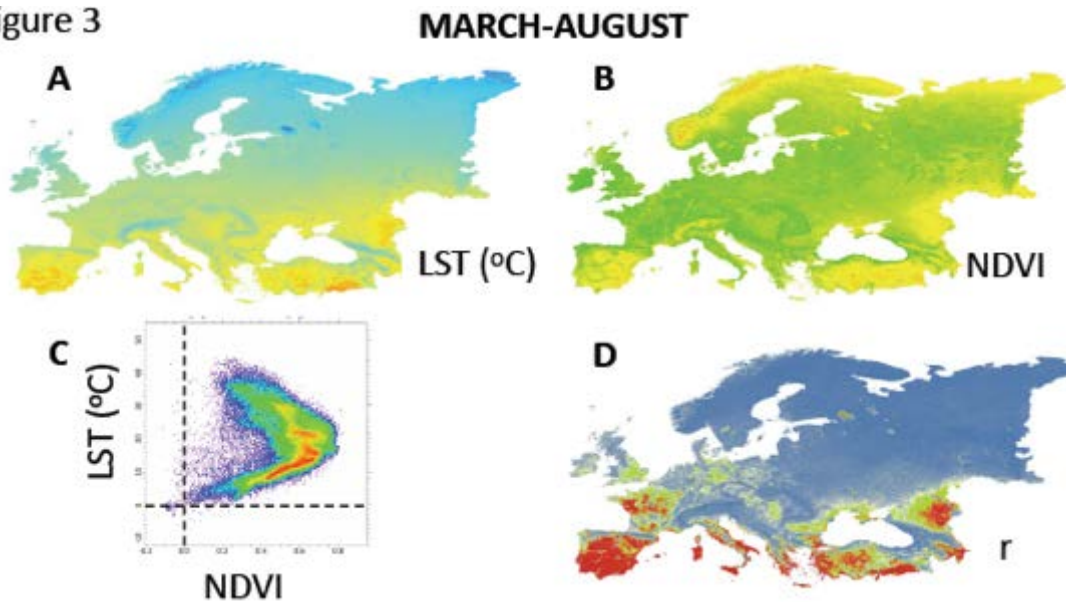
Summer burned area is highly dependent on same-summer drought conditions and delayed precipitation conditions

- With a global temperature rise > 1.5 °C above pre-industrial, estimated summer burned area in the Mediterranean can double
- Empirical fire-climate models allow improving seasonal prediction of summer burned area

Spatial and seasonal distributions of European vegetation growth limiting factors

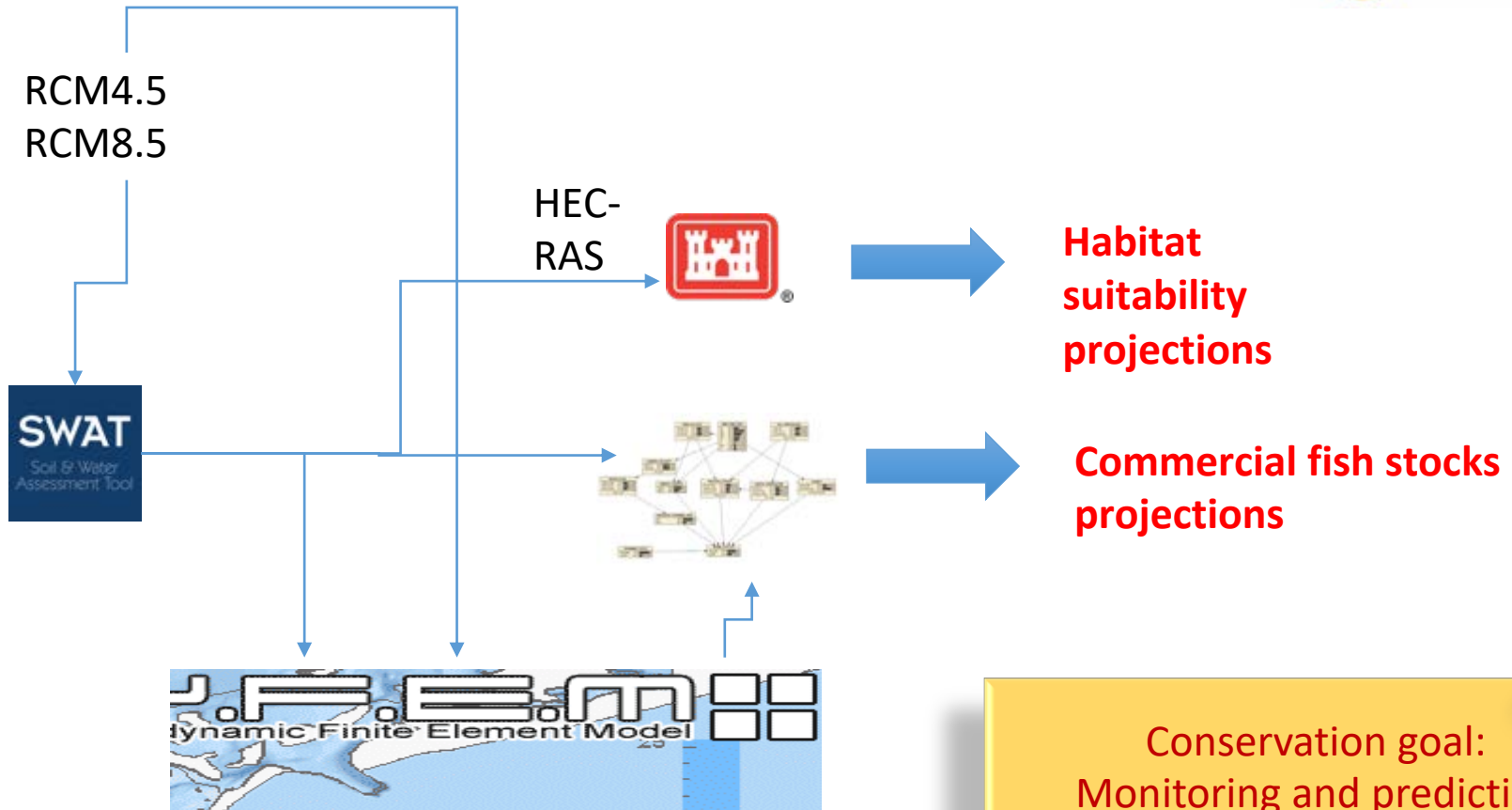
Relationships between LST and NDVI in different seasons and for different biomes

Figure 3



Karnieli et al.
in preparation (2019)

Example: Curonian Lagoon (LT): how climate changes alter the ecosystem services of a Baltic coastal lagoon?



Habitat suitability projections

Commercial fish stocks projections

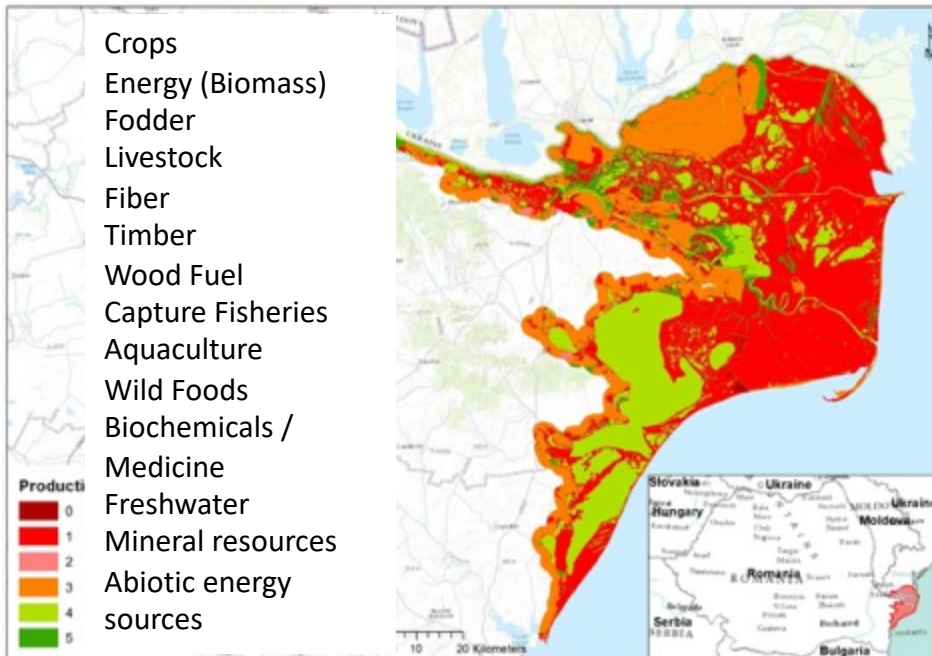
**Conservation goal:
Monitoring and predicting
cyanobacteria blooms**



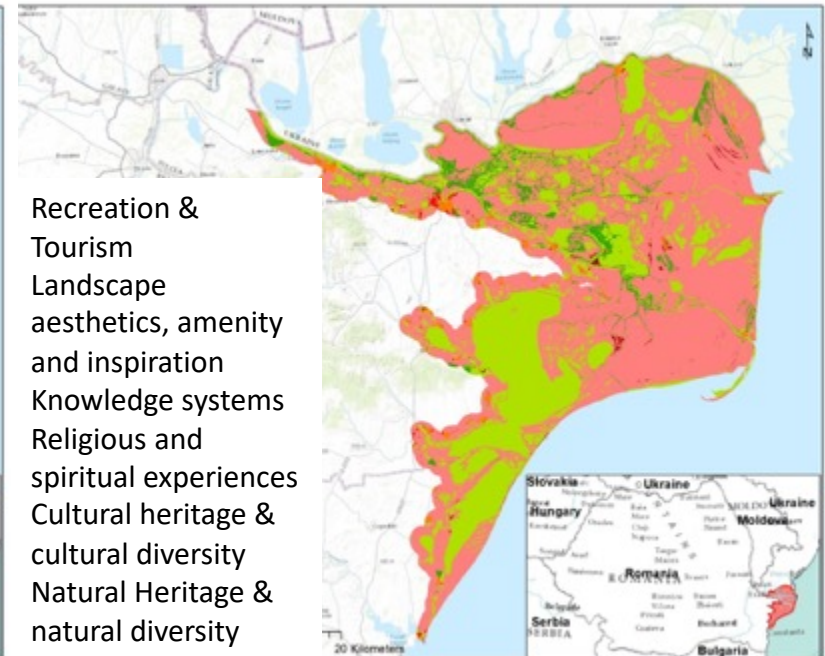
Example: Danube Delta (RO): Assessing the impact of aquatic ecosystems provisioning services on tourism

Potential of ecosystem to produce services

Provisioning services

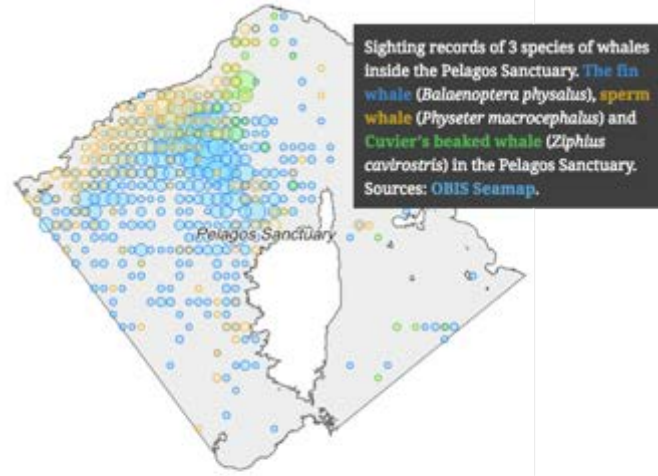


Cultural services

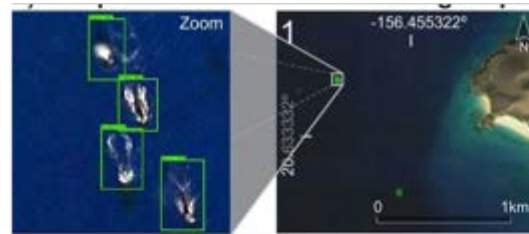


Example: Protecting marine mammals in crowded waters

The PELAGOS Cetacean Sanctuary in the Mediterranean Sea



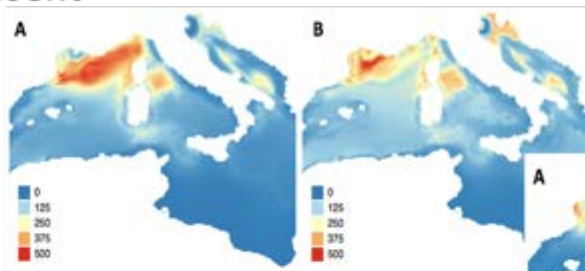
Satellite Imagery



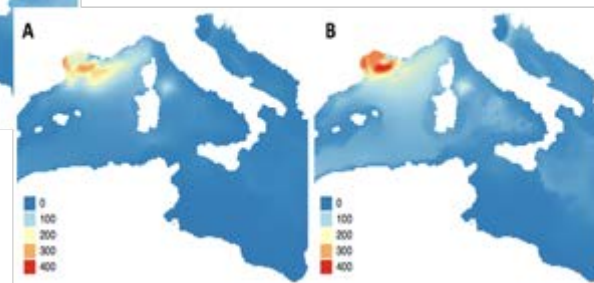
Pelagos Sanctuary

Social Media

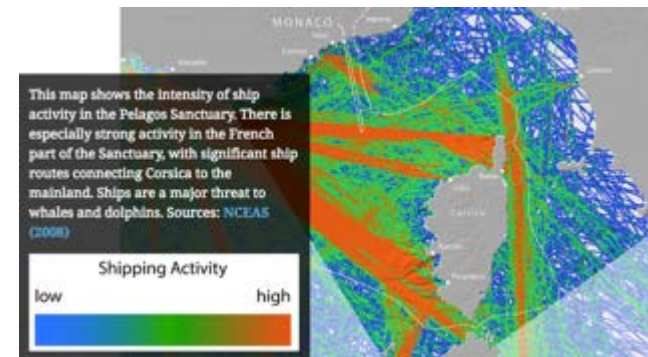
Present



Future: 2050



Ecological Modelling



Essential Variables across Storylines, space and time

Guerra et al. GECCO (2019)

A bottom-up approach for the identification of Essential Variables

Conservation managers identify locally important variables

Four steps:

1. describe and **identify the major system components, functions and processes,**
2. **Develop models** to quantitatively address these system elements
3. **Identify the set of variables that summarize observations**

4. **Prioritize which observations must be collected**

considering both in-situ and remote monitoring and the practitioners' own needs.

| Essential Variable(s) | Number of cases PAs | Number of cases Coarse scale | Number of storylines D2.2 | EBV, ECV or EO V |
|-----------------------|---------------------|------------------------------|---------------------------|------------------|
| ECOSYSTEM STRUCTURE | 4 | 5 | 14 | EBV class |
| Ecosystem extent | 2 | 1 | 7 | EBV |
| ECOSYSTEM FUNCTION | 6 | 2 | 10 | EBV class |
| SPECIES POPULATIONS | 3 | 1 | 11 | EBV class |
| Species distribution | 1 | 1 | 4 | EBV |
| Air temperature | 2 | 1 | 5 | ECV |
| Precipitation | 2 | 2 | 10 | ECV |

**In- field
Data**

DEIMS-SDR provides information on:

- 32 study areas addressed in ECOPOTENTIAL including all protected areas
- 101 data products (including observation campaigns)
- 128 datasets

1.028 long term monitoring sites are documented on DEIMS-SDR, including 101 data products, 529 datasets, 55 member networks and 953 persons.



ECOPOTENTIAL Products: in situ DATA in the GEOSS portal



**In- field
Data**

In-field metadata from DEIMS-SDR are searchable from the GEOSS PORTAL through the ECOPOTENTIAL Catalogue:
<https://www.geoportal.org/>

ecopotential

FILTERS

| | |
|---|--|
| <p>LTER Zöbelboden Austria land cover and habitats (Organisation: DEIMS-DIP) Land cover and habitats map for the LTER Zöbelboden catchment</p> | <p>Birds Diversity (Organisation: ECOPOTENTIAL Catalogue) Database built by volunteers from the Portuguese Society for the Study of Birds. Each...</p> |
| <p>Land Use Land Cover (Organisation: DEIMS-DIP) Layers of different land use land cover types (natural and anthropogenic)</p> | <p>Doñana waterbird counts (Organisation: DEIMS-DIP) Data on bird presence and abundance in Doñana is available since the 50ties, even before its ...</p> |

Doñana waterbird counts
(Organisation: DEIMS-DIP) 2 recent views ☆☆☆☆ 0.0

Data on bird presence and abundance in Doñana is available since the 50ties, even before its protection. EBD-CSIC started standardized monitoring by aerial counts in the 70ties, initially focused on wintering birds but since de early 80ties counts are conducted monthly, and up to 50 bird species are identified in 52 counting areas within the marshes. Terrestrial bird count of main bird concentrations of Doñana have been conducted at the same time (both EBD-CSIC and Park Management) but were not standardized until 2002 by EBD-CSIC. Since then, monthly surveys

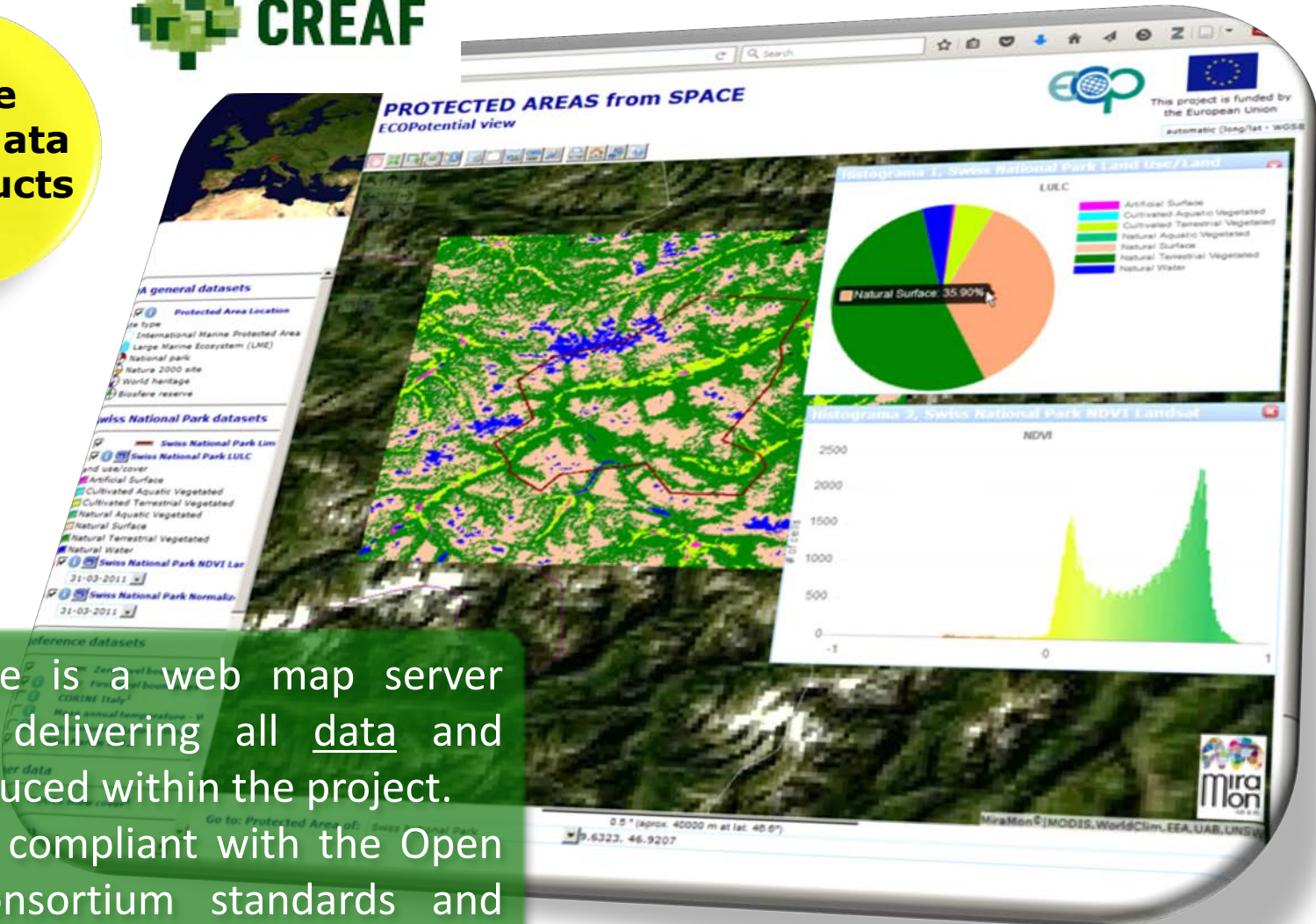
See more

| | |
|--|--|
| <p>Hardangervidda (Norway) Reindeer Hunting Data (Organisation: DEIMS-DIP) Annual hunting quota and number of killed individuals</p> | <p>Biodiversity Data Project (Organisation: DEIMS-DIP) Standardised monitoring of animal taxa (Aves, Lepidoptera Rhyacocera, Orthoptera, Araneae, ...</p> |
| <p>Danube Delta water depth (Organisation: ECOPOTENTIAL Catalogue) Monthly water depth (cm) obtained from remote sensing for the period 1995-2010</p> | <p>Kalkalpen National Park (Austria) - Topographie (Organisation: ECOPOTENTIAL Catalogue)</p> |

Sources: GEOSS (211) 1 of 18



Remote sensing data and products



PA from space is a web map server showing and delivering all data and metadata produced within the project. This service is compliant with the Open Geospatial Consortium standards and allows visual analysis.

<http://maps.ecopotential-project.eu/>

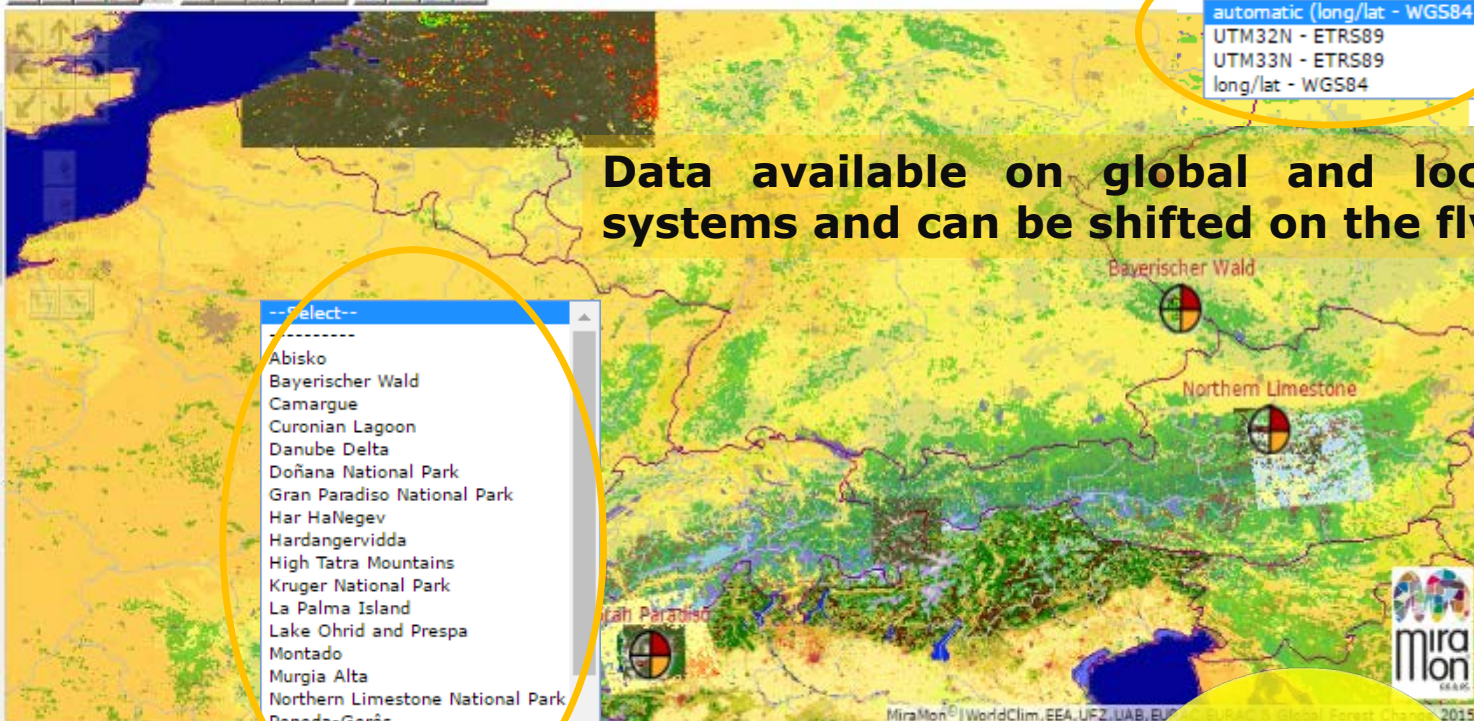


ECOPOTENTIAL Products: PROTECTED AREAS from SPACE



This project is funded by the European Union

PROTECTED AREAS from SPACE ECOPotential view



Data available on global and local systems and can be shifted on the fly

Remote sensing data and products

User can go directly to the Protected Area of interest by using the selector



PA general datasets

- Protected Area Location
- Site type
 - International Marine Protected Area
 - Large Marine Ecosystem (LME)
 - National park
 - Natura 2000 site
 - World heritage
 - Biosphere reserve

Bayerischer Wald datasets

- Bayerischer Wald Limits
- Bayerischer Wald Forest Dist
 - data values range from 1-14 indicating the year
 - 1 5 8 11
 - 2 5 8 12
 - 3 6 9 12
 - 3 7 10 13
 - 4 7 10 14

Gran Paradiso datasets

- Gran Paradiso Limits
- Gran Paradiso Global Bare Gr
 - 3 26 53 76
 - 6 33 58 83

Go to: Protected Area of: --Select--

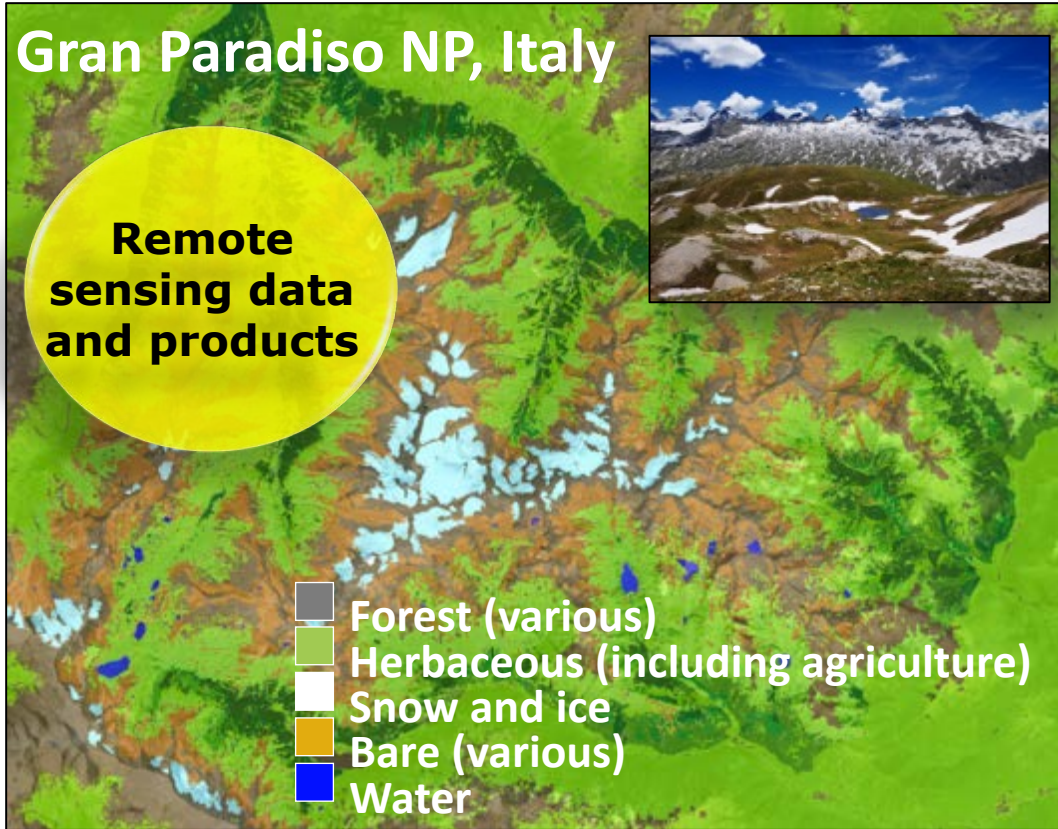
5° (aprox. 350000 m at lat. 48.4°)

96, 51.95

MiraMon | WorldClim, EEA, UFZ, UAB, ESR, IANIGLA, Global Forest Change 2015

The Earth Observation Data for Ecosystem Monitoring

<https://essilab.wixsite.com/eodesm>



Land cover classifications, Bahamas, a) prior to and b) following Hurricane Dorian and c) change. All classifications were generated from Sentinel-2 data within the VL. d) Comparable mapping of most damage, NASA's Earth Science Disasters Program

EODESM is designed to generate land cover and evidence-based change maps by simply combining environmental variables retrieved primarily from EO data.



ECOPOTENTIAL products: EODESM

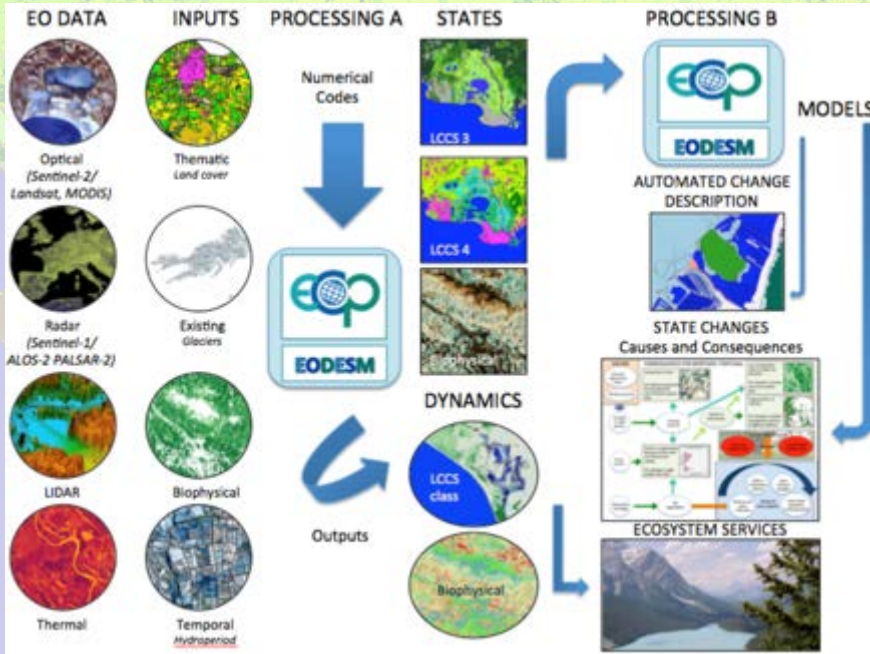


Funded by the European Union



The **Earth Observation Data for Ecosystem Monitoring (EODESM)** system allows **direct classification and change detection** for any location worldwide by combining Sentinel-2 data from any two dates from the Sentinel hub.

<https://essilab.wixsite.com/eodesm>



land cover is classified according to the Food and Agricultural Organisation's (FAO's) Land Cover Classification System (LCCS2) taxonomy

EODESM is available through the ECO POTENTIAL Virtual Laboratory.

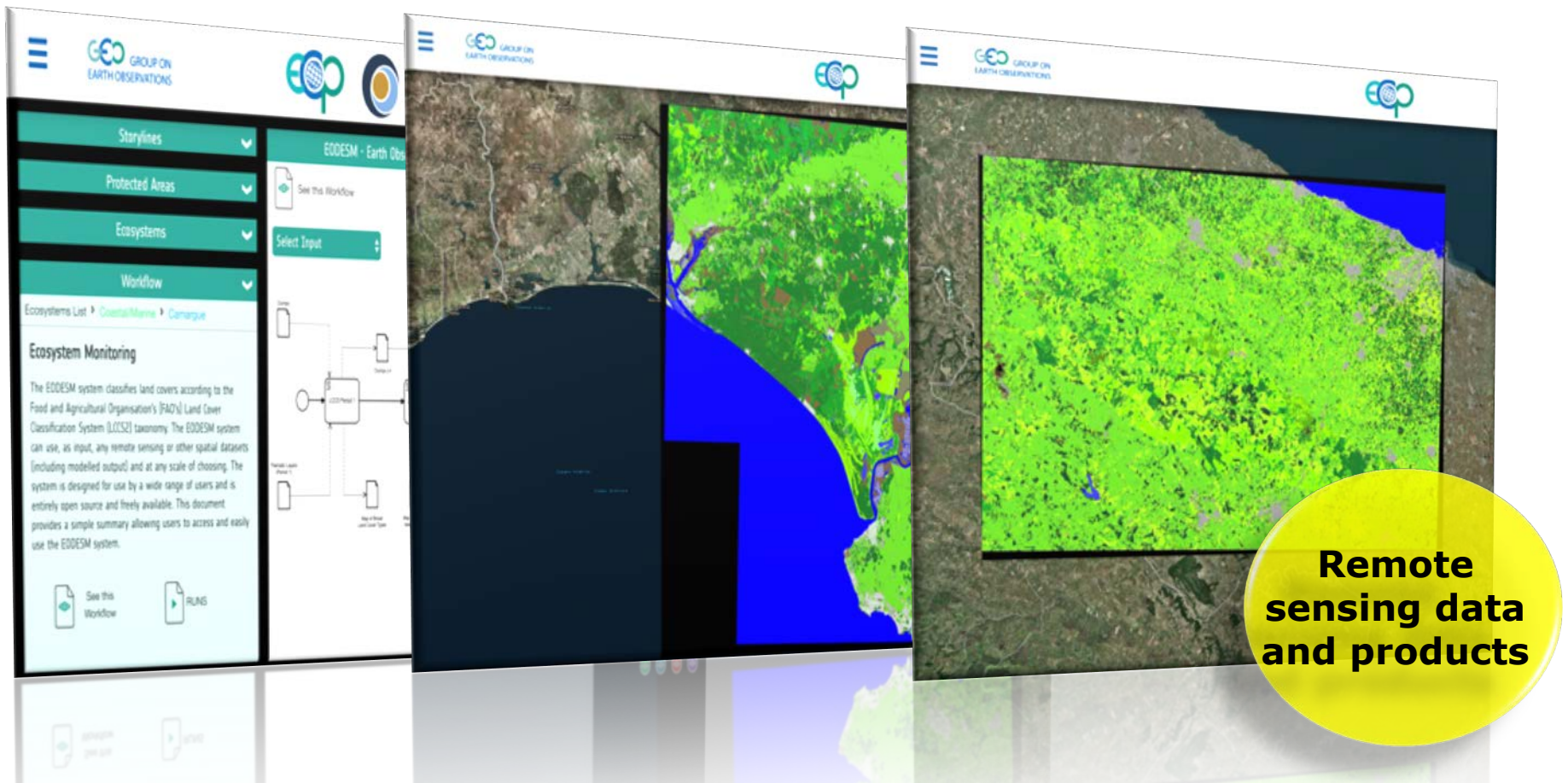
Remote sensing data and products

- Designed for use by a **wide range** of users
- Entirely **open source** and freely available



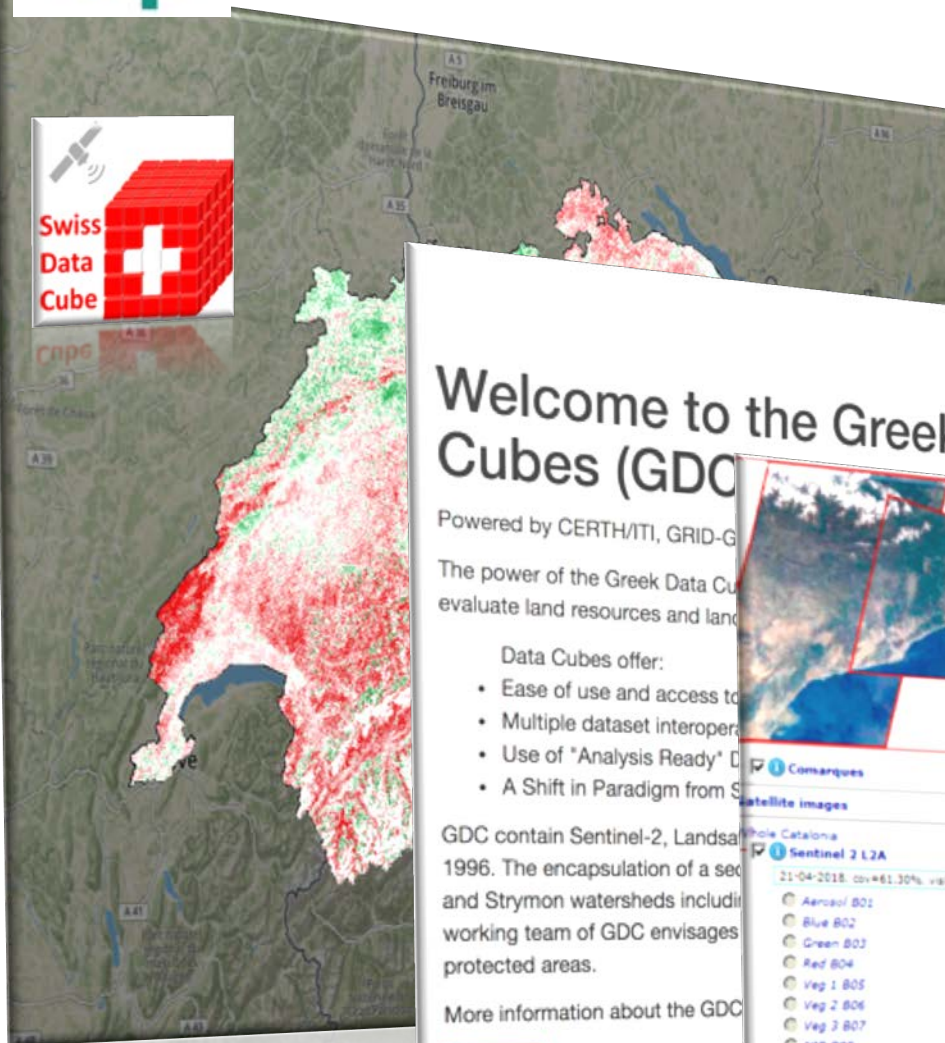
EODESM: end users can run EODESM through the Vlab and visualize the output.

<https://essilab.wixsite.com/eodesm>



The screenshot displays the EODESM web application interface. On the left, a sidebar menu includes 'Storylines', 'Protected Areas', 'Ecosystems', and 'Workflow'. The main content area shows a workflow diagram with a 'Select Input' button and a 'RUN' button. The central part of the interface features a map visualization of land cover data, with a yellow circular callout in the bottom right corner stating: **Remote sensing data and products**.

Swiss, Greek and Catalan data cubes empowered by ECO POTENTIAL and empowering ECO POTENTIAL



Welcome to the Greek Data Cubes (GDC)

Powered by CERTH/ITI, GRID-G
The power of the Greek Data Cubes is to evaluate land resources and land use changes.

- Data Cubes offer:
- Ease of use and access to data
 - Multiple dataset interoperability
 - Use of "Analysis Ready" Data
 - A Shift in Paradigm from Satellite Images to Data Cubes

GDC contain Sentinel-2, Landsat-8, and Strymon watersheds including working team of GDC envisages protected areas.

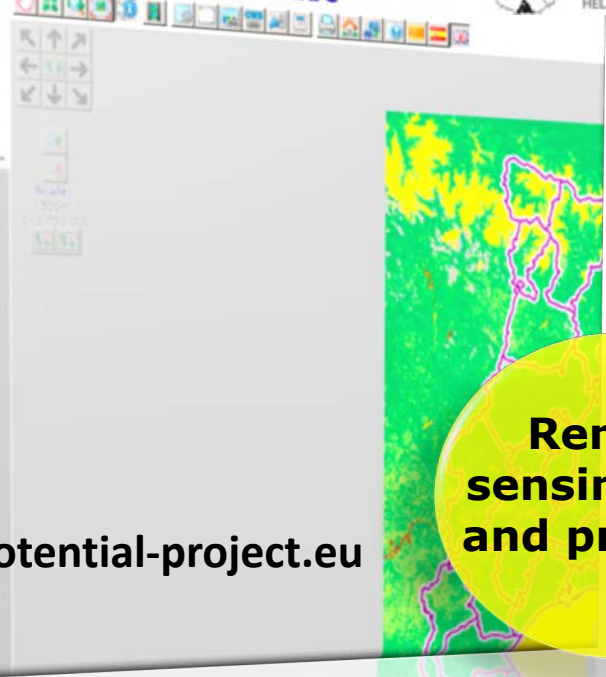
More information about the GDC

[Log In](#)



- Satellite images
- Comarques
 - Whole Catalonia
 - Sentinel 2 L2A
 - 21-04-2018: cov=41.30%, vab=97.22%
 - Aerosol B01
 - Blue B02
 - Green B03
 - Red B04
 - Veg 1 B05
 - Veg 2 B06
 - Veg 3 B07
 - NIR B08
 - Veg 4 B8A
 - Water vapor B09
 - Snow ice cloud 1 B11
 - Snow ice cloud 2 B12
 - Classification SCL
 - False color
 - False color (No clouds)
 - RGB(12,11,2) Geology (No clouds)
 - RGB(11,8,2) Agriculture (No clouds)
 - NDVI
 - SAVI

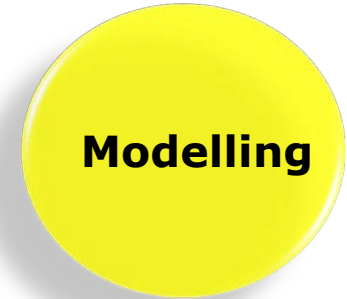
SatCat 2.0: Catalan Data Cube



Remote sensing data and products

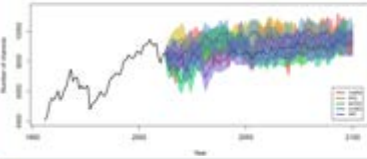
maps.ecopotential-project.eu

Process-based, conceptual, correlative, Bayesian Networks..



... and more

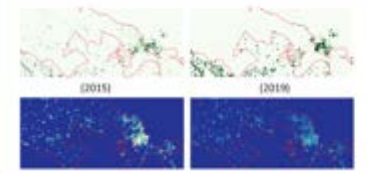
Climatic effects on population dynamics



- To estimate future population trends, the best-performing models have been forced with the time series of meteorological variables generated by 5 CMIP5 climate models in the framework of the CORDEX program for the RCP4.5 and RCP8.5 scenarios in the period 2013-2100. Applied to the chamois population in Gran Paradiso National Park.
- The analysis includes both ground count data and variables extracted by remote sensing data (e.g. presence of standing water in rice fields, MODIS time series).

Figure: Projection of chamois population in the Gran Paradiso National Park, according to the output of 5 CMIP5 climate models


Optimal control of invasive species



- Based on process based models injecting remote sensing data and products as well as in-situ data.
- Allows to simulate the spread of an invasive species with and without control actions
- Optimizes in space and time the allocation of the resources to be used for the eradication of the species in a Protected Area.
- Applied to the species *Alanthus altissima* species in the Murgia Alta National Park.

Figure: Species distribution (top) and optimal resource allocation (bottom) at two different times


Habitat suitability



- Based on topographic variables and in-situ data
- MaxEnt approach used to correlate the presence of a species (lizard *Podarcis cretensis*, Samaria National Park) to 2nd order parameters or secondary topographic attributes (geodiversity).
- The results are important for targeted conservation management of the endemic lizard.

Figure: Suitability map of the endemic lizard related to topographic variables


Cultural ecosystem services



- Combining techniques from machine learning (image analysis), natural language processing (Latent Semantic Analysis (LSA)) and self-organising maps (SOM).
- Over >20,000 photos from the Camargue region in Southern France analysed.
- Clustering algorithms revealed six distinct user groups, which including ornithology, religious pilgrimage, general use and aviation.
- Users mapped both temporally and spatially.

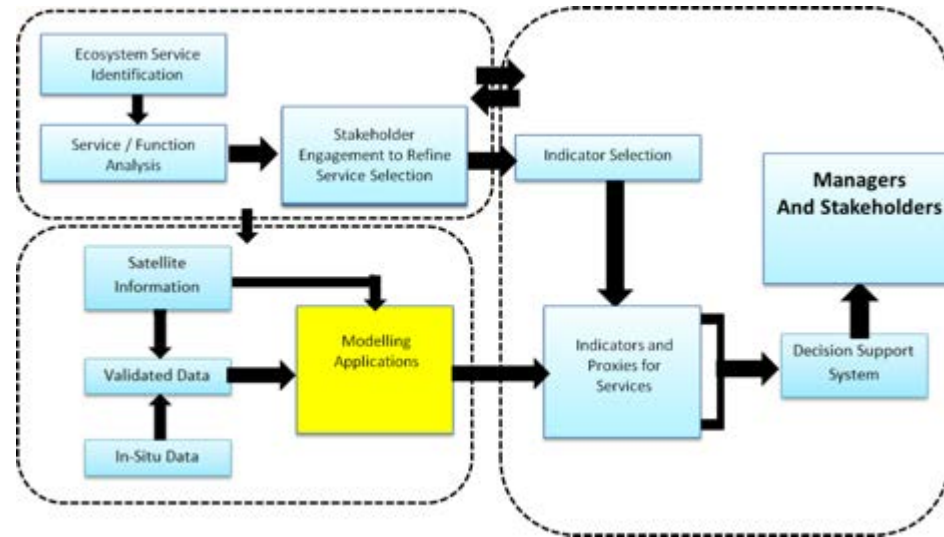
Figure: Photo-User Days (PUd) for "bird lovers" seasonally in the Camargue, France

Serious games



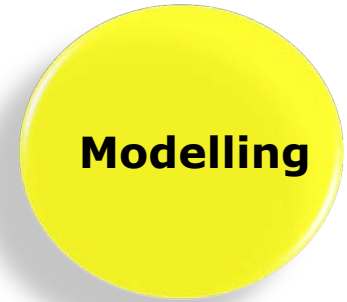
- Integration of modeling, remote sensing, expert knowledge, and monitoring data
- Takes advantage of Bayesian Belief Networks to highlight uncertainty in policy and mitigation measures.
- Allows players to explore the trade-offs in optimizing ecosystem services for specific goals.
- Facilitates discussion between stakeholders on the implementation of possible measures and the effects.

Figure: screenshot with an example of game options



Example: INSTAR

An agent-based model for forecasting forest pests



Workflows Under test **INSTAR**

Description

An Agent-Based Model aiming to aid environmental decision making in pine plantations affected by "Thaumetopoea glyscampa" forest pest. Specifically, it aims at generating a deeper understanding of the population dynamics of this pest and at forecasting the probability of occurrence and intensity of the pest outbreaks at a landscape scale under different climate as well as land use scenarios. (Further details: http://isl.ugr.es/igithub_instar)

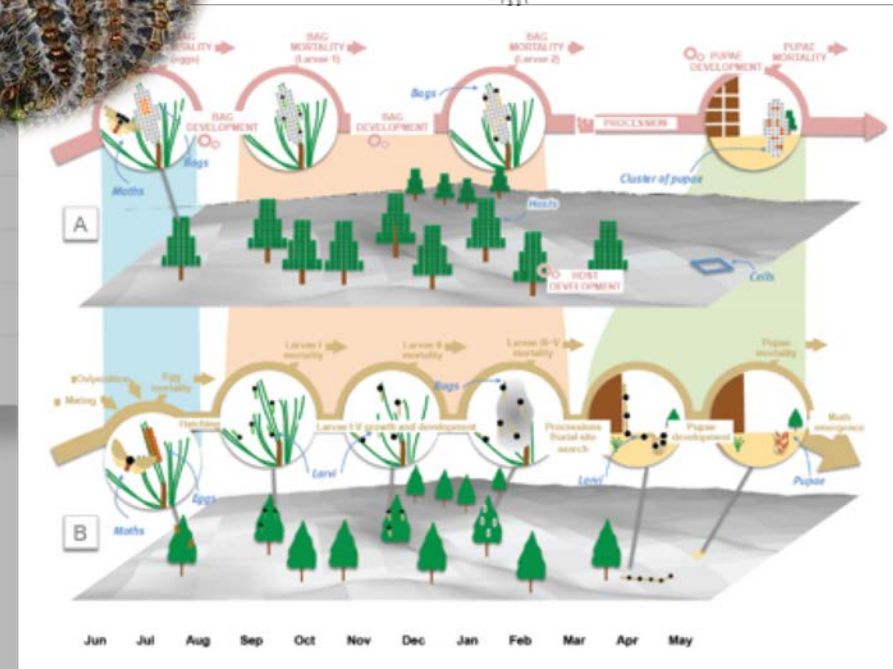
Developed by

Name: Maria Suárez-Muñoz, Francisco Bonet-García, José A. Hódar, Lucía Torres-Muros, Ramón Pérez-Pérez
 Organization: Iacoliab, UGR (<http://www.iacoliab.es>)

Diagram



UNIVERSIDAD DE GRANADA



Ecological Modelling
 Volume 411, 1 November 2019, 108764

INSTAR: An Agent-Based Model that integrates existing knowledge to simulate the population dynamics of a forest pest

María Suárez-Muñoz^a, Francisco Bonet-García^{b, A, B}, José A. Hódar^c, Javier Herrero^d, Mihai Tanase^{e, f}, Lucía Torres-Muros^g

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<https://doi.org/10.1016/j.ecolmodel.2019.108764> [Get rights and content](#)

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CERTH
CENTRE FOR
RESEARCH & TECHNOLOGY
HELLAS

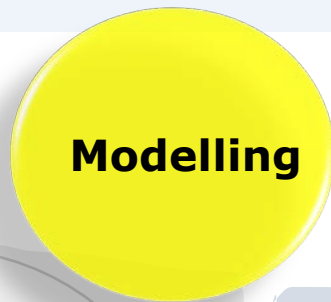
<https://vlab.geodab.org/>

Selected models and other model supportive workflows were transformed into operational online data services and integrated into the ECO POTENTIAL Virtual Laboratory (VL). Services may be utilized either stand-alone or as workflow components to generate input for further models or decision support chains.

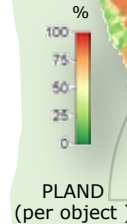
Automated execution of models or modules by the users is enabled by the ECO POTENTIAL Virtual Lab.

Users may input existing or new data and activate the online services.

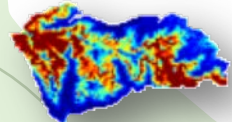
Products can be downloaded in commonly used formats.



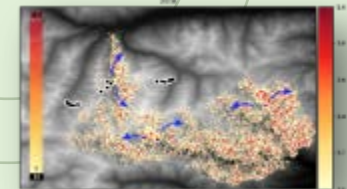
LandMetrics Calculate landscape fragmentation metrics



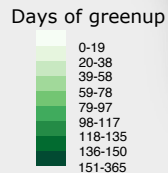
Impact of human activities and topography on species distribution



MountainMetapop
Impact of landscape topography on species distribution

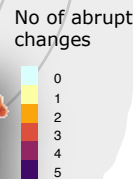
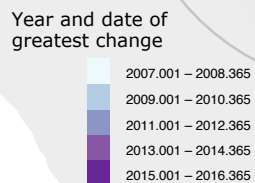


PhenologyMetrics
Calculates phenology metrics



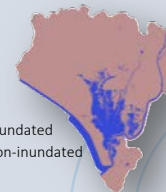
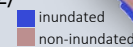
Assessment of vegetative cycles through time

PhenologyChanges
Detects changes in vegetation phenology cycle



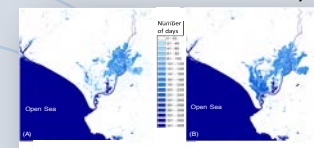
WaterMasks & LAST-EBD

Generate inundation maps with Sentinel-2/ Landsat data



HydroMap & LAST-EBD

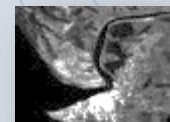
Estimate hydroperiod



Support the assessment of the hydrological cycle

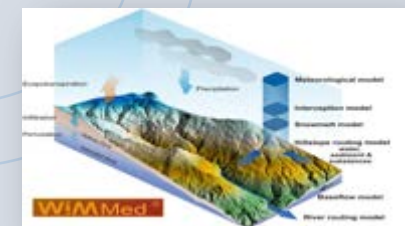
Speckle Removal

Improved speckle suppression of SAR images to be used as input data



WiMed

Calculate aquifer recharge & surface runoff



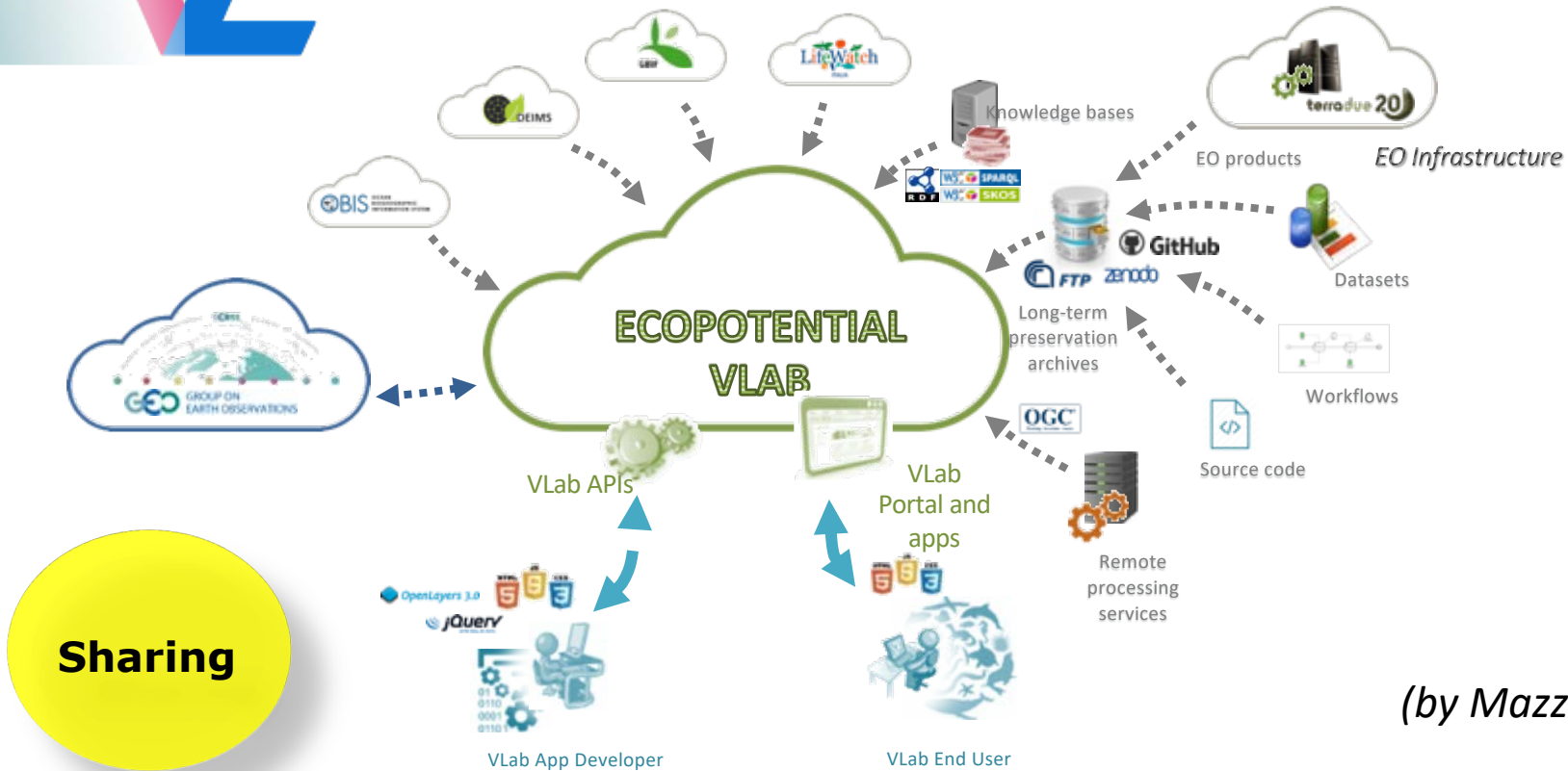


ECOPOTENTIAL products: Virtual Laboratory Platform

All data, images, products and models are made available through the VLAB



- The VLAB is interoperable with GEOSS allowing users to access datasets and publish products



(by Mazzetti et al.)

<https://vlab.geodab.org/>

- The VLAB allows end-users like decision-makers and protected area managers to visualize data and run models through apps and a portal.



ECOPOTENTIAL products: Virtual Laboratory Platform

The ECOPOTENTIAL Virtual Laboratory (VL) is a virtual environment supporting the ecosystem community-of-practice

From Science to Society

Allowing science-based decision-making

From Ecosystem Community to policy-makers

Generating knowledge targeted to policymakers (e.g. PA managers)

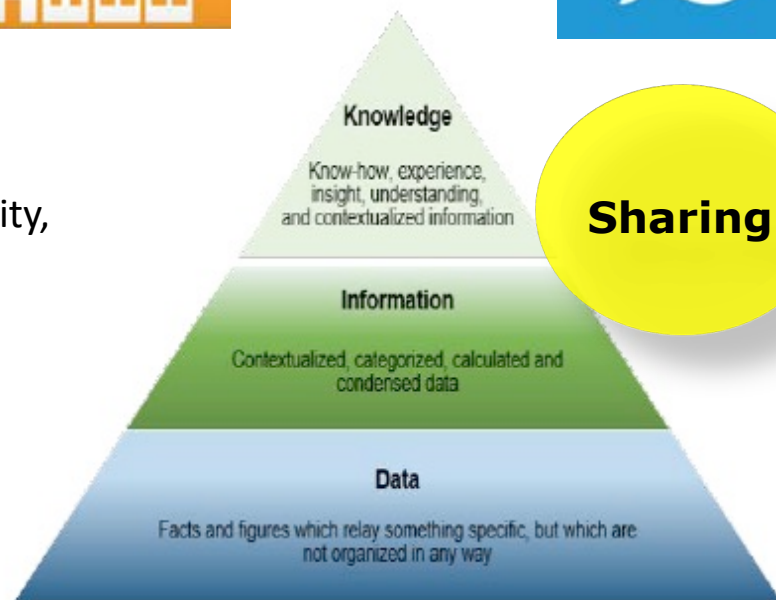
From Data to Knowledge

Generating Essential Variables, Indicators and Indices

From Open Data to Open Science

Sharing knowledge, procedures, algorithms for re-usability, Reproducibility

(P. Blonda, CNR, 3rd STI forum- New York, 2018)

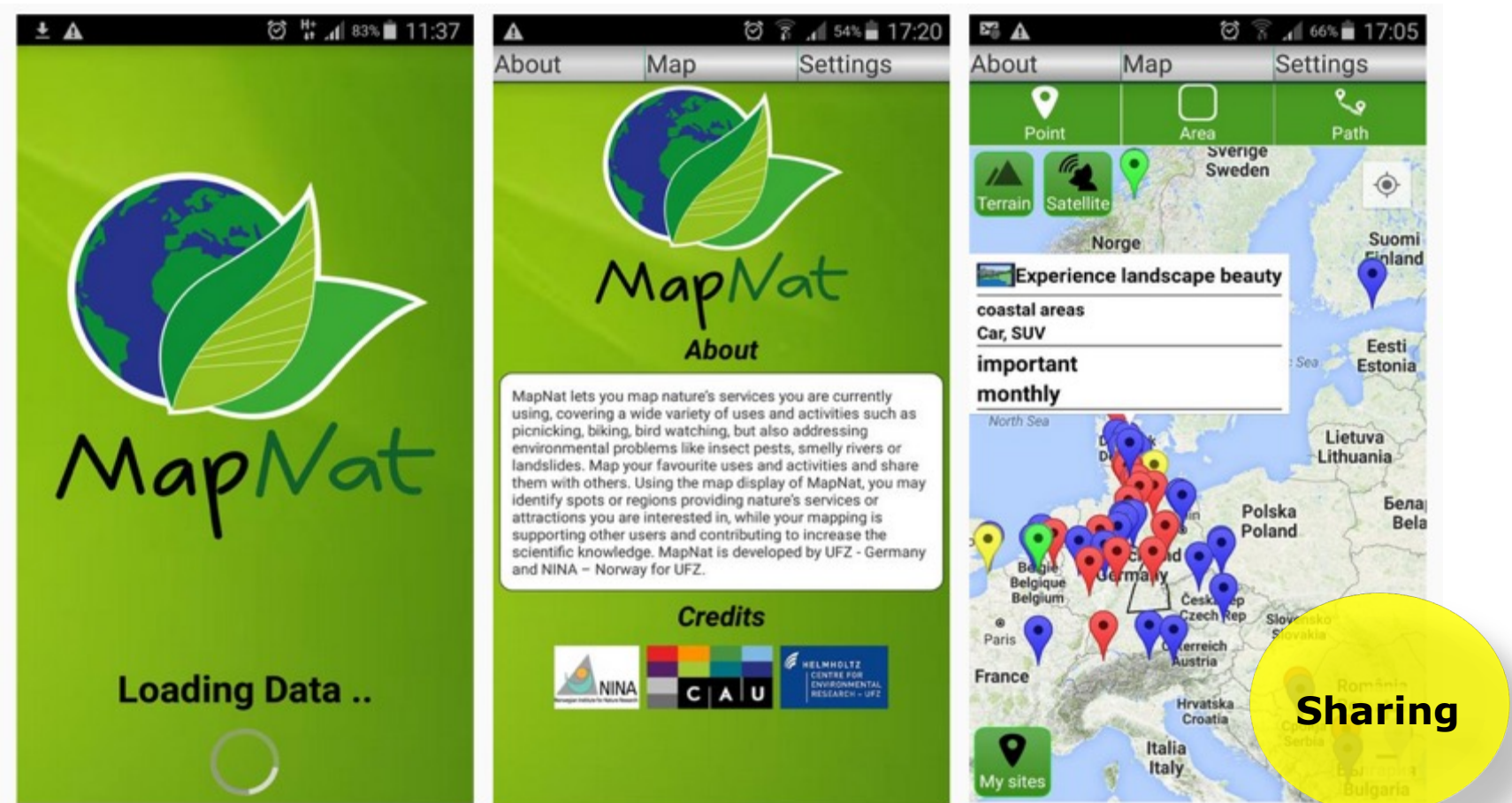


<https://vlab.geodab.org/>

Apps for participatory mapping: ESS mapping in PAs

<https://www.ufz.de/index.php?en=40618>

joerg.priess@ufz.de



gBay: a toolbox for decision support

gBay is an online toolbox that allows to link Bayesian Network models with geodata

Link: wiki.gbay.ethz.ch

gBay

Bayesian Networks with geo-data

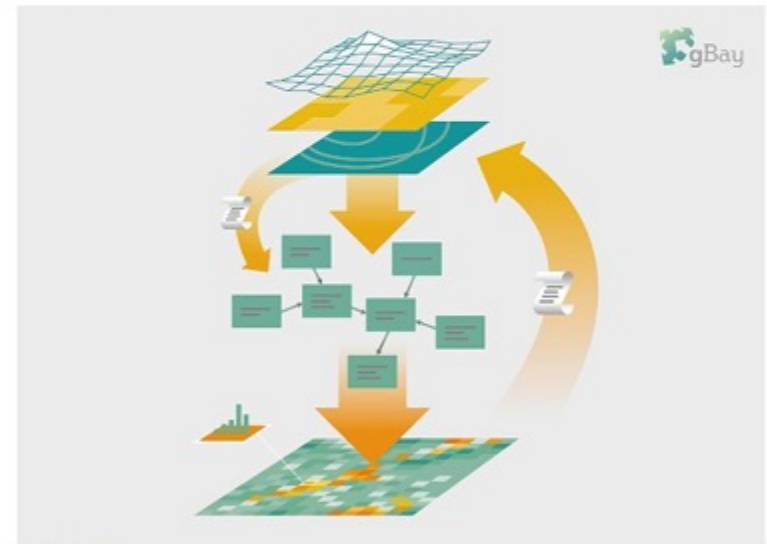
Bayesian networks (BNs) are a powerful tool to represent complex socio-ecological systems, as they can take into account both qualitative and quantitative data, while the associated uncertainties are explicitly shown and propagated through the network. Furthermore, relationships between variables in the BN are represented graphically, creating a transparent model structure that can facilitate communication with stakeholders. Because of these advantages, BNs are increasingly used to model land use change and ecosystem services.

gBay is a toolbox that links BNs to spatial (raster or vector) data. For each pixel (or polygon), the values in the input data are used as evidence in the network, and inference is performed to obtain the posterior probability distribution of the target nodes. Then, the posterior distributions of the target nodes are written into a new spatial file.

gBay supports dynamic BNs – running the network over multiple time steps, where the output of one time step is an input to the next, which can be used to model feedback loops. Advanced users can also modify spatial data directly in gBay, which allows them to take into account spatial interactions such as neighbourhood effects.

Contents:

1. How to develop a BN
2. How to use gBay
3. Iterative BNs
4. Intermediate processing
5. Examples of BNs for ecosystem services
6. Case studies



<http://gbay.ethz.ch>

gBay was developed at ETH-PLUS and is partially supported by the ECOPOTENTIAL project (funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 541752).

Contact: Ana Strih astrih@ethz.ch

The screenshot shows the gBay web interface with the following components:

- Navigation:** Home icon, gBay logo, ETH zürich PLUS logo, and 'release_corr' text.
- Configuration Panel (Left):**
 - Number of iterations: 2
 - Intermediate processing: 'release_area_fuzzy_v2.py', 'Clear python module' button.
 - Configuration: 'Save' and 'Load' buttons.
 - 'Run' button.
 - 'Email to send notification' input field.
 - 'Show console' checkbox.
- Bayesian Network Model (Center):**
 - Rug_proxy (Rug_proxy.tif):** Values: 0.00, 0.00, 0.00, 0.01, 0.01, 0.03, 0.05, 0.10, 0.50.
 - Curvature:** Values: -45.00, -20.00, -10.00, -5.00, -2.00, 0.00, 2.00.
 - slope (slope.tif):** Values: 0.00, 10.00, 20.00, 30.00, 40.00, 50.00, 60.00, 70.00.
 - Release (Target Node):** Options: Yes, No.
 - Release_c (Output Node):** Options: Yes, No.
- Policy:** A yellow circle with the word 'Policy' inside, positioned below the Release node.

Serious games for natural resources management



Visualization of measure after selection



Policy



Policy recommendations at the EU Parliament

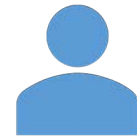


Funded by the
European Union

Policy



- Communicate ECOPOTENTIAL research results to decision-makers
- Provide PA managers with RS maps on a regular basis
- Community of Practice: lessons learned & needs of PA managers
- PA managers are experts in their field → include their knowhow into the design of projects from the very beginning
- Advocate for a central support office/ authority with a legal mandate for EO → link between the PA's and the political level (e.g. EC)



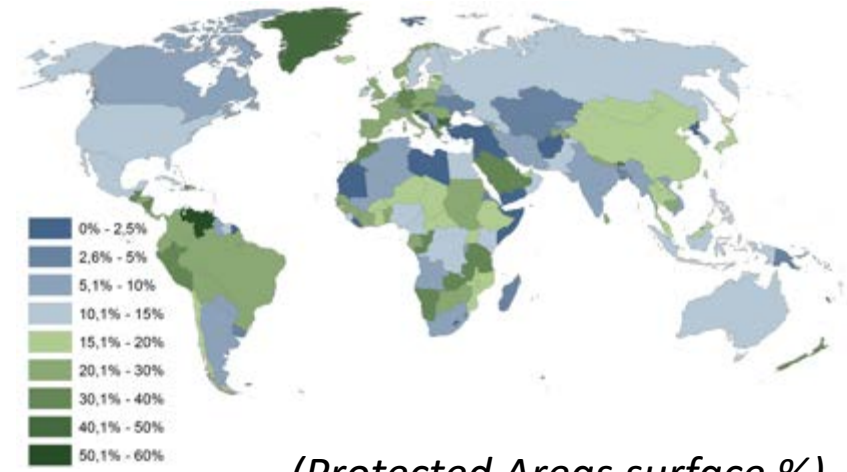
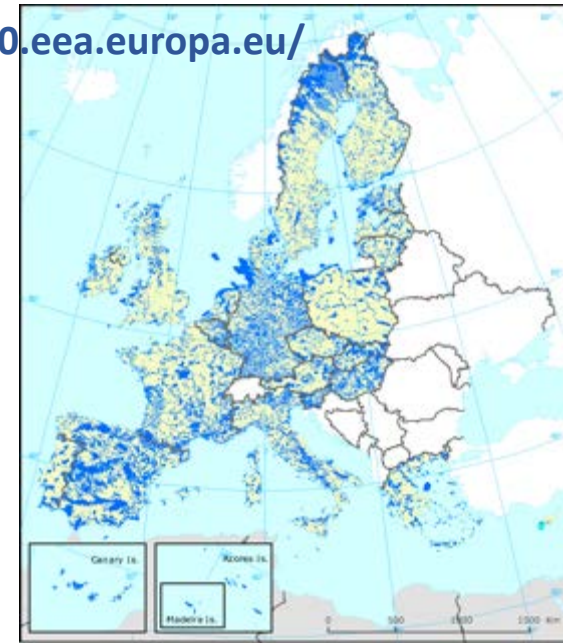
Earth Observation for Environmental Management

Science for post 2020 Environmental targets:
Insights from Earth Observation of Protected Areas

Creating knowledge and products for other Protected Areas



<http://natura2000.eea.europa.eu/>



(Protected Areas surface %)



The ECO POTENTIAL legacy

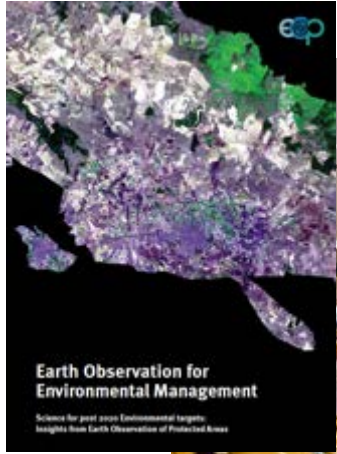


Funded by the European Union

Delivering the knowledge and products' use to other projects



Use the results for societal benefits



Science for Post 2020 Environmental Targets:
Insights from Earth Observation of Protected Areas

Thursday, 27 September 2018
09:00-11:00
PHS 1C047
European Parliament, Brussels

Policy and decisions makers



High Tech SMEs and Industries

Protected areas staff and managers



ECOPOTENTIAL

Improving future ecosystem benefits
through Earth observations

ECOPOTENTIAL has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 641762.

www.ecopotential-project.eu



Funded by the
European Union