

## **BioGIS 360**

**Tool for global biodiversity monitoring, mapping and reporting**

**Green Deal Data Space Webinar | Biodiversity  
10 may 2023**

## Intro – BioGIS 360

Large-scale expansion of solar and wind energy is vital for a sustainable, low-carbon future. However, Energy company must take care to ensure that these technologies do not pose risks to nature and livelihoods. Today, monitoring, controlling and measuring biodiversity and its loss is a complex process and often not fully valid if complete, reliable and certified information bases are not used. Recent studies have highlighted how, during the different process among solar and wind plant process, most of the operators in the sector use less than 40% of the cartographic resources necessary to define, measure and map the biodiversity present in a given place.

We solve these challenges with a POC with a big customer in Italy; BIOGIS 360 want to mix:

- 1. worldwide official Biodiversity data and maps**
- 2. local official data (In Italy there is the national Biodiversity portal which publishes very detailed geographical data)**
- 3. citizen science contribution data (GBIF INAT)**
- 4. satellite image data.**

BIOGIS developed by IPTSAT is a (G.D.S.S.) Geographic Decision Support System that allows operators to have access to a single data hub source that collects all the cartographic information relating to biodiversity (maps and global, European and national constraints) enriched by satellite coverage updated up to 2 times a week to have a complete degree view of every worldwide area of interest.



## BioGIS 360 WebApp

Here is an example of the demo webApp, completely customizable according to client's needs.

A



F

## BioGIS 360 List of layers

Global Biodiversity Data

IUCN\_Red\_List

- Critically Endangered
- Endangered
- Vulnerable
- Near Threatened
- Least Concern
- Data Deficient
- Not Evaluated

Italian KBA Key Biodiversity Area



Ramsar Zones



World DB Protected Areas



### IUCN RED LIST OF THREATENED SPECIES

THE IUCN RED LIST IS AN INDICATOR OF THE HEALTH OF THE WORLD'S BIODIVERSITY PERFORMED BY THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE'S RED LIST OF THREATENED SPECIES ESTABLISHED IN 1964. IT HAS EVOLVED TO BECOME THE WORLD'S MOST COMPREHENSIVE INFORMATION SOURCE ON THE GLOBAL CONSERVATION STATUS OF ANIMAL, FUNGI AND PLANT SPECIES PROVIDING INFORMATION ABOUT RANGE, POPULATION SIZE, HABITAT AND ECOLOGY, USE AND/OR TRADE, THREATS, AND CONSERVATION ACTIONS THAT WILL HELP INFORM NECESSARY CONSERVATION DECISIONS.

[KEY BIODIVERSITY AREAS \(KBAs\) ARE IMPORTANT SITES FOR CONSERVATION BASED ON THE RARITY OF SPECIES IN THEIR OWN COUNTRY, EVEN IF THE SPECIES IS WIDESPREAD IN OTHER COUNTRIES. THE KBA PROGRAMME SUPPORTS THE IDENTIFICATION, MAPPING, MONITORING AND CONSERVATION OF KBAs TO HELP SAFEGUARD THE MOST CRITICAL SITES FOR NATURE ON OUR PLANET – FROM RAINFORESTS TO REEFS, MOUNTAINS TO MARSHES, DESERTS TO GRASSLANDS AND TO THE DEEPEST PARTS OF THE OCEANS.](#)

**RAMSAR SITES** ARE WETLAND OF INTERNATIONAL IMPORTANCE. THE CONVENTION ON WETLANDS IS AN INTERGOVERNMENTAL TREATY THAT PROVIDES THE FRAMEWORK FOR NATIONAL ACTION AND INTERNATIONAL COOPERATION FOR THE CONSERVATION AND WISE USE OF WETLANDS AND THEIR RESOURCES

THE **WORLD DATABASE ON PROTECTED AREAS (WDPA)** IS THE MOST COMPREHENSIVE GLOBAL DATABASE ON TERRESTRIAL AND MARINE PROTECTED AREAS. IT IS A JOINT PROJECT BETWEEN THE UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP) AND THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE (IUCN), MANAGED BY UNEP WORLD CONSERVATION MONITORING CENTRE (UNEP-WCMC). PROTECTEDPLANET.NET IS THE ONLINE INTERFACE FOR THE WDPA.



## BioGIS 360 List of layers Country Biodiversity Data

Spatial Distribution Species art. 17



### SPATIAL DISTRIBUTION SPECIES ART. 12 E ART. 17

DATASETS CONTAIN HABITAT AREAS OF A LIST OF SPECIES COMPILED BY THE COUNTRY, POPULATION SIZES, TRENDS, PRESSURES AND THREATS, AND CONSERVATION STATUS AT THE NATIONAL BIOGEOGRAPHICAL LEVEL.

Spatial Distribution Species art. 12



**POSIDONIA OCEANICA** IS AN ENDEMIC SPECIES TO THE MEDITERRANEAN SEA THAT FORMS DENSE AND EXTENSIVE GREEN MEADOWS THAT PROVIDE IMPORTANT ECOLOGICAL FUNCTIONS AND SERVICES AND HARBOUR A HIGHLY DIVERSE COMMUNITY. P. OCEANICA MEADOWS ARE IDENTIFIED AS A PRIORITY HABITAT TYPE FOR CONSERVATION UNDER THE HABITATS DIRECTIVE (DIR 92/43/CEE).

Posidonia



**IMPORTANT PLANT AREA (IPA)** IS DEFINED AS "A NATURAL OR SEMI-NATURAL SITE EXHIBITING EXCEPTIONAL BOTANICAL RICHNESS AND/OR SUPPORTING AN OUTSTANDING ASSEMBLAGE OF RARE, THREATENED AND/OR ENDEMIC PLANT SPECIES AND/OR VEGETATION OF HIGH BOTANICAL VALUE."

Important Plant Area (IPA)



**ITALIAN PROTECTED AREA (SIC-ZPS):** SITE OF COMMUNITY IMPORTANCE ARE SITES DESIGNATED AT THE NATIONAL LEVEL WHICH AIM TO THE PRESERVATION OF NATURAL AND SEMI-NATURAL HABITATS THAT ARE COMMONLY INTERESTING FOR THEIR RARITY AND THEIR PRIMORDIAL AND ECOLOGICAL SPECIAL CONSERVATION.

Italian Protected Areas (SIC-ZPS)



SPECIAL AREA OF CONSERVATION ARE DESIGNATED UNDER THE BIRDS DIRECTIVE 79/409/CEE AND THEY ARE STRATEGIC SUITABLE AREAS FOR THE PROTECTION OF THE MOST THREATENED BIRDS SPECIES.

Coastal marine naturalness



**COASTAL MARINE NATURALNESS** ARE CHARACTERIZED BY HIGH COMPLEXITY AND DIVERSITY AS REGARDS THE NATURAL SETTING AS WELL AS FOR EXTENT, HISTORY, TYPE, AND DEGREE OF CONTAMINATION.

Bathymetry



MEASUREMENT OF SEA DEPTH

Monumental Trees



A **MONUMENTAL TREE** IS A PLANT THAT HAS PARTICULAR LANDSCAPE, NATURALISTIC, MONUMENTAL, HISTORICAL AND CULTURAL VALUE

Marine mammals sanctuary



**MARINE AREA** OF 87,500 SQ. KM SUBJECT TO AN AGREEMENT BETWEEN ITALY, MONACO AND FRANCE FOR THE PROTECTION OF MARINE MAMMALS, WHICH LIVE IN IT.

Protected Natural Areas (EUAP)



**LIST OF PROTECTED NATURAL AREAS (EUAP)** ESTABLISHED UNDER LAW 394/91. PROTECTED AREAS ARE DISTINCT IN NATIONAL PARKS (PNZ), MARINE PROTECTED AREAS (MAR), MARINE STATE NATURAL PARKS (PNZ\_m), NATIONAL NATURE RESERVES (RNS), REGIONAL NATURE PARKS AND RESERVES (PNR - RNR), SUBMERGED NATURAL PARKS (GAPN), OTHER NATURAL AREAS PROTECTED (AAPN).

Enel Green Power Infrastructures



EXAMPLE OF ENEL GREEN POWER INFRASTRUCTURES IN ITALY

## BioGIS 360 List of layers

- ▼  Observation
  - ▼  Species Sensitive to Wind & Solar Infrastructures (GBIF)
    -
  - ▼  Species Sensitive to Wind & Solar Infrastructures (INaturalist)
    -

**SPECIES SENSITIVE TO WIND & SOLAR INFRASTRUCTURES** COMING FROM GBIF AND INATURALIST ORGANIZATION (MOST IMPORTANT CITIZEN SCIENCE PROJECT WORLDWIDE), THEY ARE CITIZEN SCIENCE ORGANIZATION COLLECTING AND PRESENTING INTERNATIONAL PLANT, ANIMAL AND OTHER NATURE OBSERVATIONS. THE AIM OF OBSERVATION.ORG IS TO PROVIDE AN UP TO DATE INSIGHT INTO BIODIVERSITY.

**SPECIES SENSITIVE TO WIND & SOLAR INFRASTRUCTURES** COMING FROM INATURALIST



**NOTE : IN THIS LAYER WE FILTER ALL THE SPECIES THE SCIENTIFIC LITERATURE INDICATE HAVE POTENTIAL IMPACT IN SOLAR AND WIND PLANT GENERATIONS**

**SOURCE:**

**[HTTPS://PORTALS.IUCN.ORG/LIBRARY/SITES/LIBRARY/FILES/DOCUMENTS/2021-004-EN.PDF](https://portals.iucn.org/library/sites/library/files/documents/2021-004-EN.pdf)**



## BioGIS 360 List of layers

### CORINE LAND COVER

The CORINE Land Cover is a vector map with a scale of 50.000, a minimum cartographic unit (MCU) of 25 ha and a geometric accuracy better than 50mt. It maps homogeneous landscape patterns, i.e. more than 75% of the pattern has the characteristics of a given class from the nomenclature. This nomenclature is a 3-level hierarchical classification system and has 44 classes at the third and most detailed level (Table 1). In order to deal with areas smaller than 25ha a set of generalisation rules were defined.

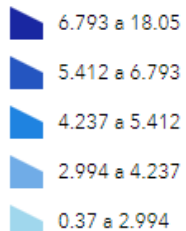
Code	Description
111	Continuous urban fabric
112	Discontinuous urban fabric
121	Industrial or commercial units
122	Road and rail networks and associated land
123	Port areas
124	Airports
131	Mineral extraction sites
132	Dump sites
133	Construction sites
141	Green urban areas
142	Sport and leisure facilities
211	Non-irrigated arable land
212	Permanently irrigated land
213	Rice fields
221	Vineyards
222	Fruit trees and berry plantations
223	Olive groves
231	Pastures
241	Annual crops associated with permanent crops
242	Complex cultivation patterns
243	Land principally occupied by agriculture with significant areas of natural vegetation
244	Agro-forestry areas
311	Broad-leaved forest
312	Coniferous forest
313	Mixed forest
321	Natural grasslands
322	Moors and heathland
323	Sclerophyllous vegetation
334	Transitional woodland/shrub
331	Beaches, dunes, sands
332	Clare rocks
333	Sparsely vegetated areas
334	Burnt areas
335	Glaciers and perpetual snow
411	Island meadows
412	Peat bogs
421	Salt marshes
422	Salt pans
423	Intertidal flats
511	Water courses
512	Water bodies
521	Coastal lagoons
522	Estuaries
610	Sea and ocean

## BioGIS 360 List of layers

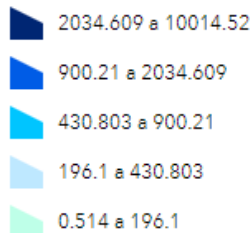
☐ Solar Power in Potential Areas (kWh/kWp)



☐ Wind Speed at 100m altitude in Potential Areas



☐ Wind Power Density in Potential Areas



With our experience and with the support of the Biology Department (prof. Fabio Attorre) of La Sapienza University of Rome, we have developed two territorial indices to support the early planning phase:

- **SPI - Solar potential area index and the**
- **WPI Wind potential area index.**

These two territorial indices represent the potential geographic areas for development of a new solar and wind power plants, in particular these indices represent areas where environmental constraints are absent and at the same time the potential for both solar radiation and wind power and speed are high. See next slide for details.



## BioGIS 360 List of layers

### Water&Wetness 2018

- 0: Dry
- 1: Permanent water
- 2: Temporary water
- 3: Permanent wet
- 4: Temporary wet
- 253: Sea water
- 254: unclassifiable (no satellite image available, or clouds, shadows, or snow)
- 255: outside area

### WATER & WETNESS 2018

The combined Water and Wetness product is a thematic product showing the occurrence of water and wet surfaces over the period from 2009 to 2018. These layers are based on multi-temporal and multi-seasonal optical high-resolution satellite imagery. In addition, these layers are also based on radar information (Sentinel-1 data) with a geometric resolution of 10m on a pan-European basis.

### DEM

### DEM

EU-DEM v1.0 is a digital surface model (DSM) of EEA39 countries representing the first surface as illuminated by the sensors. It is a hybrid product based on SRTM and ASTER GDEM data fused by a weighted averaging approach. The statistical validation of EU-DEM v1.0 documents a relatively unbiased (-0.56 meters) overall vertical accuracy of 2.9 meters RMSE, which is fully within the contractual specification of 7m RMSE (European Commission 2009)




## BioGIS 360 : Analysing Biodiversity Impact

The solar&wind biodiversity report widgets (group B) allows you to define an area of interest and analyze the potential impacts of wind & solar infrastructures on different biodiversity level (areas and species). Analysis results can be shared via a printed report or CSV file download.

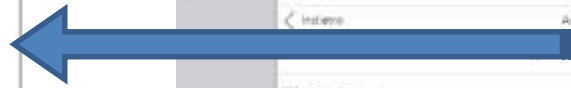
**Biodiversity Report**

Informazioni area di interesse (AOI)  
 Area: 314,12 km²  
 Gio: 29/2021 19:46:01 Ora legale dell'Europa centrale



Nome	Categorie	Area(km²)	Longitudine
IUCN_Red_List	186	No	No
Italian KBA Key Biodiversity Area	0	0	No
Ramsar Zones	0	0	No
World DB Protected Areas	0	0	No
Spatial Distribution Species art. 17	52	18.158,02	No
Spatial Distribution Species art. 12	113	27.842,01	No

#	Nome	(Designation)	Authority Type	Authority	Area(km²)
1	Parco del Verde	Site of Community Importance (Natural District)	Federal or national territory or agency	ENTE PARCO DEL VERDE	49,66
2	Monte Soglio - Monte Verde - Monte della Tana	Site of Community Importance (Natural District)	Federal or national territory or agency	ENTE GESTIONE Riserva della Tana	36,37
3	Lago di Monticchio - Lago di Montebello - Lago della Nave	Site of Community Importance (Natural District)	Federal or national territory or agency	REGIONALITÀ EMILIA ROMAGNA	11,87
4	Parco Nazionale Regionale del Fucino	Natural Park	Federal or national territory or agency	Aut. Regionale	11,32



**BioGIS 360**

Trova indirizzi o posizioni

**Solar Biodiversity Report**

Report:  Area: 314,12 km²

- IUCN\_Red\_List (186)
- Italian KBA Key Biodiversity Area (0)
- Ramsar Zones (0)
- World DB Protected Areas (0)
- Spatial Distribution Species art. 17 (52)
- Spatial Distribution Species art. 12 (113)

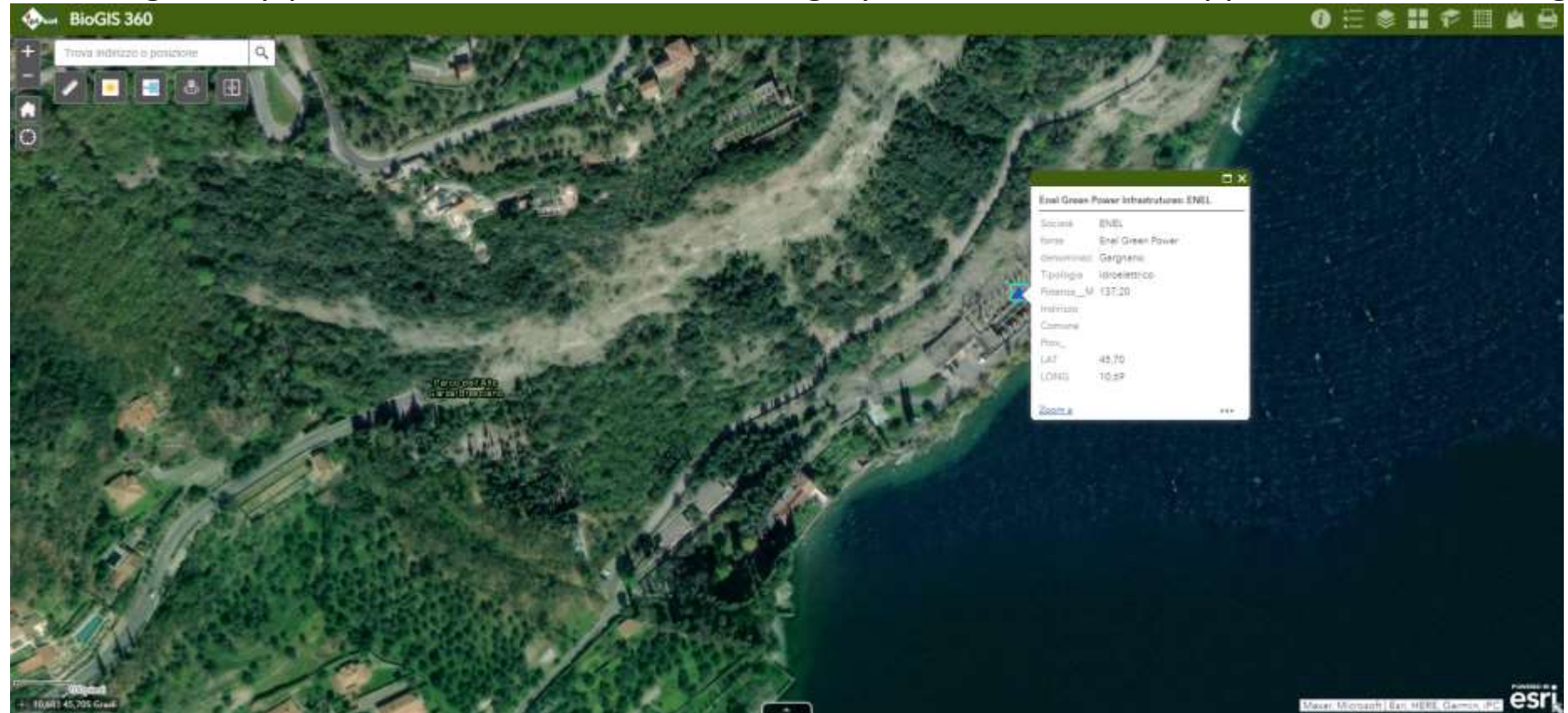




## BioGIS 360 : satellite imagery to support screening of new business areas (to be developed)

Furthermore, now we are integrating Copernicus Sentinel 2 images on a imagery widget can be added to the webApp.

The widget may provide latest Sentinel 2 te imagery over the AOI to support land monitoring

The screenshot shows the BioGIS 360 web application interface. At the top, there is a green header with the text 'BioGIS 360' and several icons. Below the header is a search bar with the text 'Trova indirizzo e posizione'. The main area displays a satellite image of a coastal area with a road and buildings. A popup window is open on the right side, displaying information for 'Enel Green Power Infrastrutture: ENEL'. The popup contains the following data:

Nome	ENEL
Fonte	Enel Green Power
Comune	Gargnano
Tipologia	Idroelettrico
Altezza_M	137.20
Indirizzo	
Comune	
Prov.	
Lat	45.70
Long	10.29
Zoom	8

## BioGIS 360 : satellite imagery to support screening of new business areas

Satellite imagery widget can offer up to date imagery to detect and observe land change to support project plan, audit and decision making process.

2019

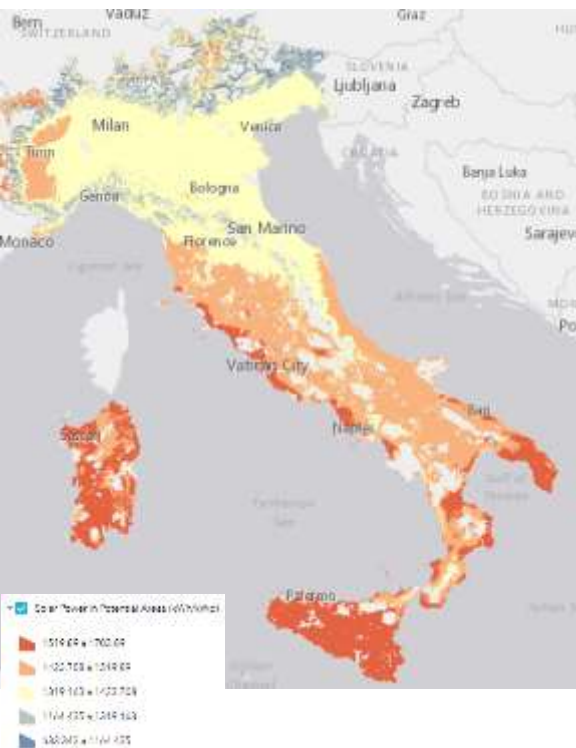
2003





## BioGIS 360 : Analysing Potential Area for new business

The layer list widget provides a list of operational layers about biodiversity including rasters showing **potential area for new solar and wind infrastructures**. In fact, from the original Italian surface all natural protected and urban area have been erased. In the remaining areas have been calculated the power solar index and the wind speed and wind power density. Comparing these index with all other biodiversity layers allow users to have a ° panorama of new business areas. (raw data acquired respectively from SOLAR GLOBAL ATLAS <https://globalsolaratlas.info/> and from WIND GLOBAL ATLAS <https://globalwindatlas.info/> )



## BioGIS 360 next steps (2024)

- Artificial Intelligence integration for automatic alert monitoring;
- Grid 1x1 km with risk analysis (tbd the model)
- Introduce new Copernicus Services from LAND and CLIMATE hub
- Introduce (on demand) high resolution satellite monitoring layer for AOI
- Introduce new Rest Services from GBIF, Inaturalist
- 3D version

INFO

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