

# THE BIODIVERSITY HUB

Maria Chiara Carrozza, President CNR | Paris, April 14, 2023





Consiglio Nazionale  
delle Ricerche

**CULTURAL HERITAGE**  
**LIFE SCIENCES**  
**GREEN TRANSITION**  
**DIGITAL TRANSITION**  
**CLEAN ENERGY**  
**SUSTAINABILITY**  
**BIODIVERSITY**  
**CIRCULAR ECONOMY**  
**PEACE AND**  
**SCIENTIFIC DIPLOMACY**  
**ONE HEALTH**



1923 CNR 2023

LA  
**RICERCA**  
VENUTA  
DAL  
**FUTURO**

[VIDEO CNR](#)

# 2022: AMENDMENTS TO THE ITALIAN CONSTITUTION



## Art. 9

“The Republic promotes the development of culture and scientific and technical research. It protects the landscape and the historical and artistic heritage of the nation. Protect the environment, **biodiversity** and ecosystems, also in the interest of future generations. State law regulates the ways and forms of animal protection”



## Art. 41

“Private economic initiative is free. It cannot take place in conflict with social utility or in such a way as to cause damage to safety, freedom, human dignity, **health or the environment**. The law determines the appropriate programs and controls so that public and private economic activity can be directed and coordinated for social and environmental purposes”



# ECONOMIC GROWTH, PROS AND CONS



## PROS

- ❑ PACE OF CHANGE OVER THE PAST 50 YEARS: UNSEEN IN HUMAN HISTORY, WITH INCREASES IN GLOBAL ECONOMIC OUTPUT, WELL-BEING AND LIFE EXPECTANCY
- ❑ THE POPULATION HAS DOUBLED, THE GLOBAL ECONOMY HAS QUADRUPLED AND MORE THAN 1 BILLION PEOPLE HAVE BEEN LIFTED OUT OF EXTREME POVERTY
- ❑ GLOBALLY, WE PRODUCE MORE FOOD, ENERGY AND MATERIALS THAN EVER BEFORE



- ❑ HUMAN ACTIVITIES HAVE ALREADY SERIOUSLY ALTERED 75% OF TERRESTRIAL ENVIRONMENTS AND 66% OF MARINE ENVIRONMENTS
- ❑ ABOUT 25% OF PLANT AND ANIMAL SPECIES ARE THREATENED BY HUMAN ACTIONS, WITH ONE MILLION SPECIES ON THE VERGE OF EXTINCTION, MANY WITHIN YEARS OR DECADES
- ❑ SCIENCE AND TECHNOLOGY HAVE PROVIDED WAYS TO OVERCOME NATURAL LIMITATIONS

## CONS

# NATURE RESTORATION, BEYOND ETHICS



**More than half of global GDP – some €40 trillion – depends on nature**

Nature restoration will be a central element of the EU's recovery plan from the coronavirus pandemic, providing immediate business and investment opportunities for restoring the EU's economy.

*«Biodiversity supports human and societal needs, including food and nutrition security, energy, development of medicines and pharmaceuticals and freshwater, which together underpin good health. It also supports economic opportunities, and leisure activities that contribute to overall wellbeing».*



## World Health Organization

Six industries:



Chemicals and materials



Aviation, travel and tourism



Real estate



Mining and metals



Supply chain and transport



Retail, consumer goods and lifestyle



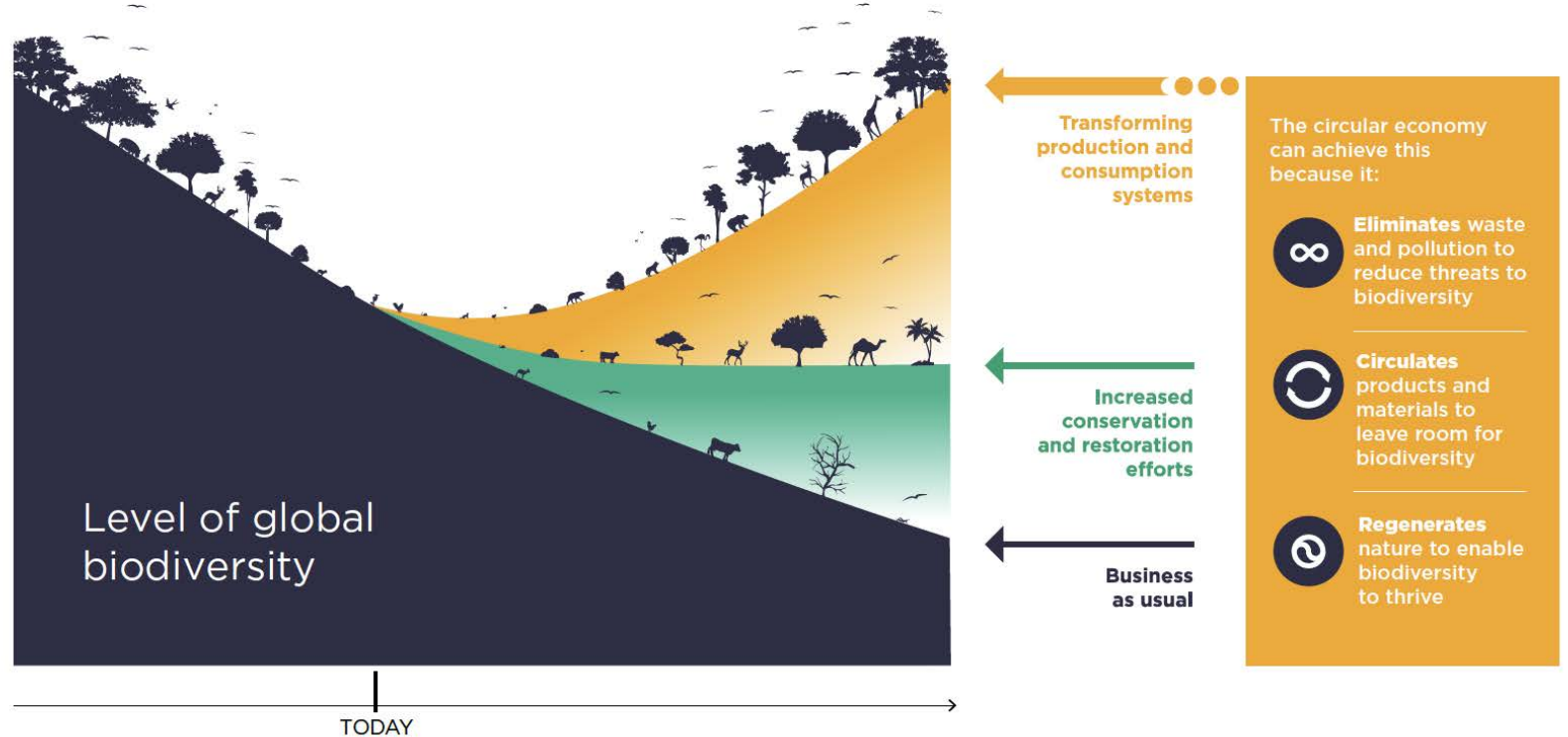
# NATURE RESTORATION, BEYOND ETHICS



«Biodiversity loss is widely recognised as a systemic risk that threatens not only our prosperity but our very future as a species. To halt and reverse this loss, a transformative change to its main underlying cause - our extractive, wasteful and polluting economy - is urgently needed. The circular economy is being rapidly recognised as a powerful framework to achieve this seismic shift as it creates value in ways that rebuild biodiversity and provide other society-wide benefits».

Ellen MacArthur Foundation – The Nature Imperative

FIGURE 1 THE CIRCULAR ECONOMY PLAYS A CRUCIAL ROLE IN BENDING THE CURVE ON BIODIVERSITY LOSS<sup>1</sup>



**DIRECT FACTORS OF THE LOSS OF BIODIVERSITY**

- USE OF THE SEA AND THE LAND
- OVEREXPLOITATION
- CLIMATE CHANGES
- POLLUTION BY ALIEN SPECIES





*The world is a fine place and worth the fighting for*  
Ernest Hemingway



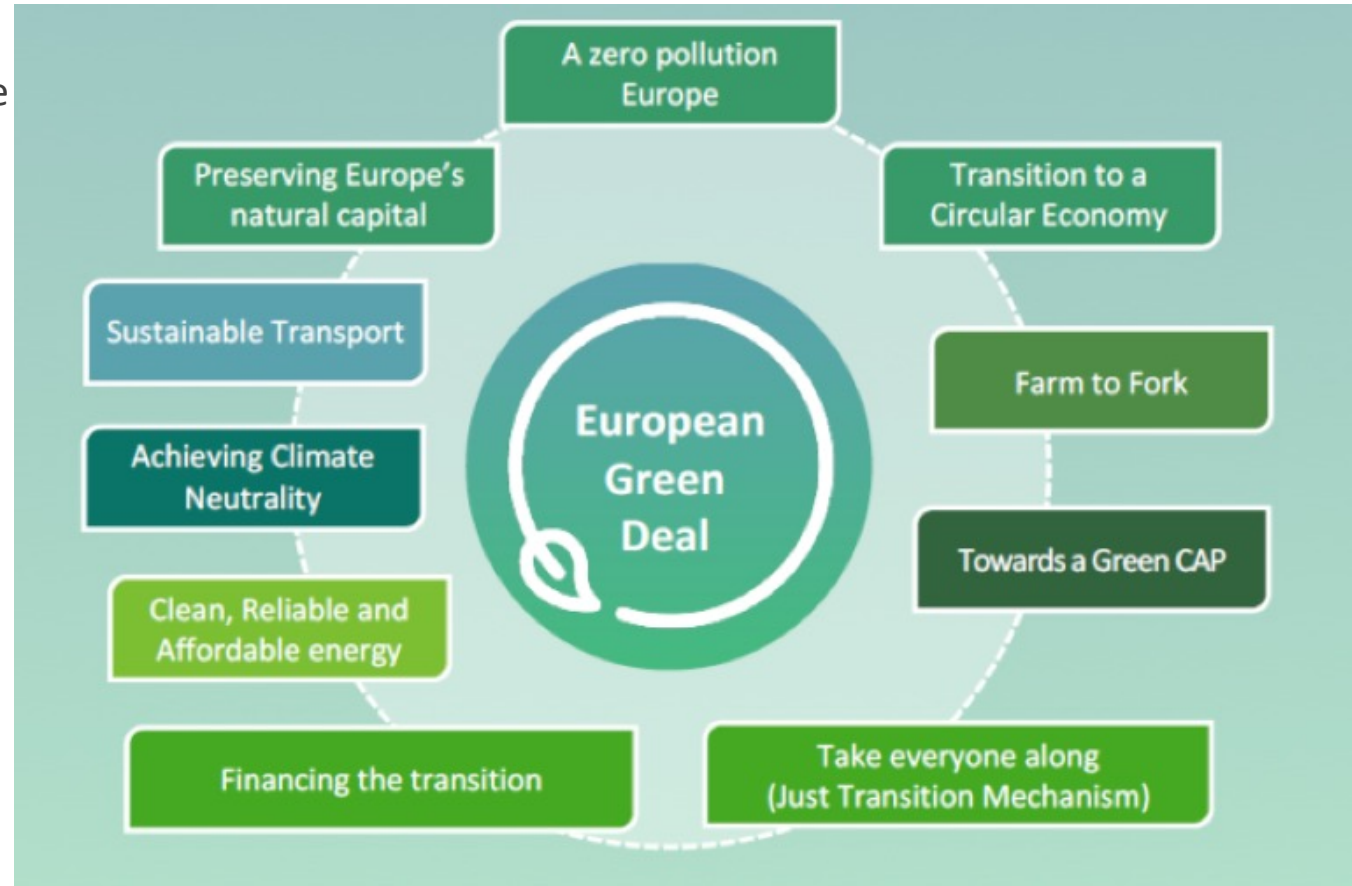


# THE EUROPEAN GREEN DEAL

Climate change and environmental degradation are an existential threat to Europe and the world. To overcome these challenges, the European Green Deal will transform the EU into a modern, resource-efficient and competitive economy, ensuring:

- NO NET EMISSIONS OF GREENHOUSE GASES BY 2050
- ECONOMIC GROWTH DECOUPLED FROM RESOURCE USE
- NO PERSON AND NO PLACE LEFT BEHIND

The European Green Deal is also our lifeline out of the COVID-19 pandemic. **One third of the €1.8 trillion** investments from the NextGenerationEU Recovery Plan, and the EU's seven-year budget will finance the European Green Deal.



The European Commission has adopted a set of proposals to make the EU's climate, energy, transport and taxation **policies fit for reducing net greenhouse gas emissions by at least 55% by 2030**, compared to 1990 levels.





*The programme aims at giving Europe a new push to a global positioning.*

*Horizon Europe is to be the biggest and most ambitious EU Research Innovation programme ever.*

*It builds on the success of Horizon 2020 and improves it further by fostering a stronger support to breakthrough innovation through the European Innovation Council, by creating greater impact through R&I missions and by streamlining partnerships landscape.*

**Mariya Gabriel**, European Commissioner for Innovation, Research, Culture, Education and Youth



**HORIZON EUROPE**

# FOUR KEY STRATEGIC ORIENTATIONS



**KSO A:** Promoting an open strategic autonomy by leading the development of key digital, enabling and emerging technologies, sectors and value chains to accelerate and steer the digital and green transitions through human-centred technologies and innovations

**KSO B:** Restoring Europe's ecosystems and biodiversity, and managing sustainably natural resources to ensure food security and a clean and healthy environment

**KSO C:** Making Europe the first digitally enabled circular, climate-neutral and sustainable economy through the transformation of its mobility, energy, construction and production systems

**KSO D:** Creating a more resilient, inclusive and democratic European society, prepared and responsive to threats and disasters, addressing inequalities and providing high-quality health care, and empowering all citizens to act in the green and digital transitions



*The Italian **National Recovery and Resilience Plan** supports the creation of 5 National Centers dedicated to frontier research related to technological areas consistent with the priorities of the European research agenda and with the contents of the National Research Plan 2021-2027.*

1. HIGH PERFORMANCE SIMULATIONS, COMPUTATION AND DATA ANALYSIS
2. AGRICULTURAL TECHNOLOGIES (AGRITECH)
3. DEVELOPMENT OF GENE THERAPY AND DRUGS WITH RNA TECHNOLOGY
4. SUSTAINABLE MOBILITY
5. **BIODIVERSITY (MEDITERRANEAN HOTSPOT)**

A worldwide problem:  
**Biodiversity losses**



The screenshot shows the website of the Ministero dell'Università e della Ricerca (MUR). The header includes the MUR logo, the ministry name, a search bar, and social media icons. A navigation bar below the header has three tabs: UNIVERSITÀ, RICERCA, and AFAM. The main content area features a news article titled "PNRR: nascono i 5 centri nazionali per la ricerca" dated Wednesday, 15/06/2022. The article text states that the minister presented this news to the Council of Ministers, with 1.6 billion euros allocated to 144 universities, research entities, and companies. It mentions the creation of 5 National Centers for research in the "from research to business" line of the "Education and Research" mission of the National Plan, funded by 1.6 billion euros. The article is accompanied by a photo of a person in a lab coat and gloves working with test tubes in a laboratory. At the bottom right, there is a logo for the Piano Nazionale di Ripresa e Resilienza (PNRR) featuring the European Union flag.

## Italy: hotspot in the Mediterranean

More crucial than ever to study adaptation and mitigation of ecosystems to climate change

- ❑ Among the countries with the highest biodiversity in Europe
- ❑ Endemism rate among the highest in the Mediterranean basin
- ❑ A mosaic of different habitats ranging from island and coastal environments to mountain habitats and aquatic biotopes







*Everything you can imagine, nature has already created*  
Albert Einstein



1  
2  
3

GOAL  
Scientists

GOAL  
Open Data

GOAL  
Biodiversity Gateway

GOAL  
Deployment of KETs

GOAL  
Go to Market

5  
4

## THE BIODIVERSITY MOONSHOT



The general objectives of such a unique **cross-disciplinary** and **innovative** platform are:

**UNDERSTANDING and ADDRESSING**

direct drivers for biodiversity decline at marine, terrestrial and urban level

**VALORIZING**

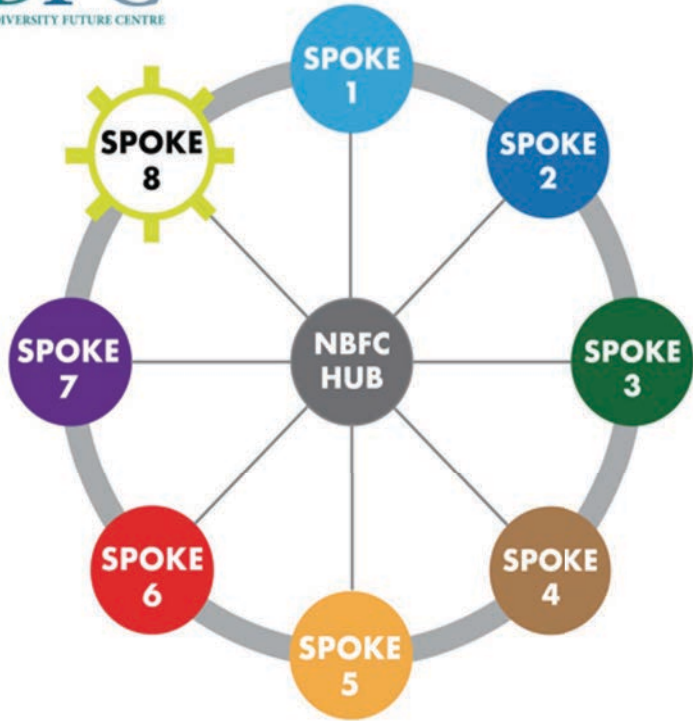
biodiversity to make it a central element for sustainable development



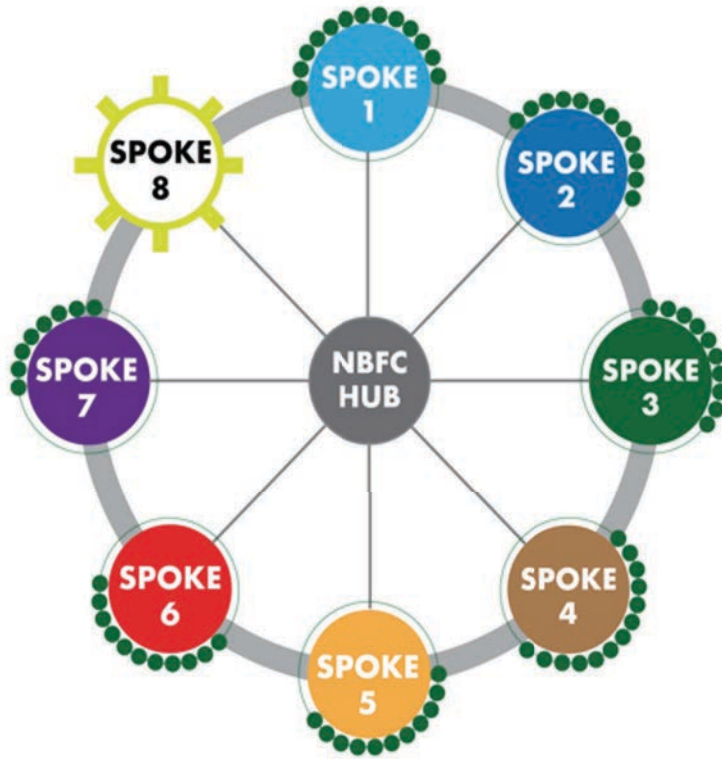
# OPERATIONAL UNITS INVOLVED



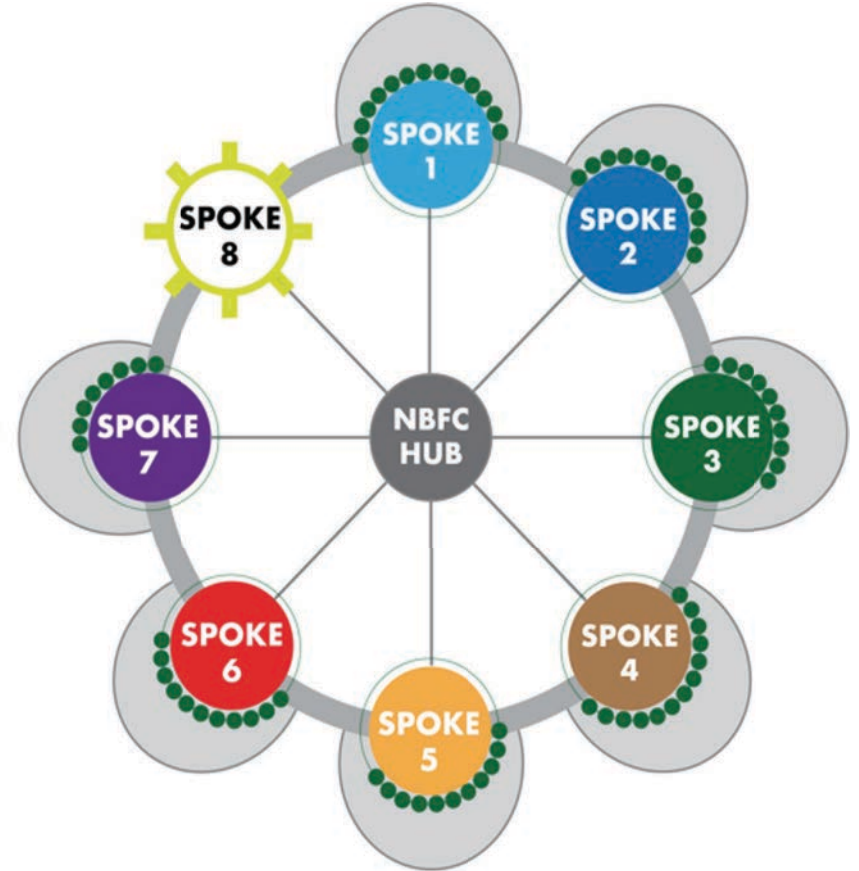
**NBFC**  
NATIONAL BIODIVERSITY FUTURE CENTRE



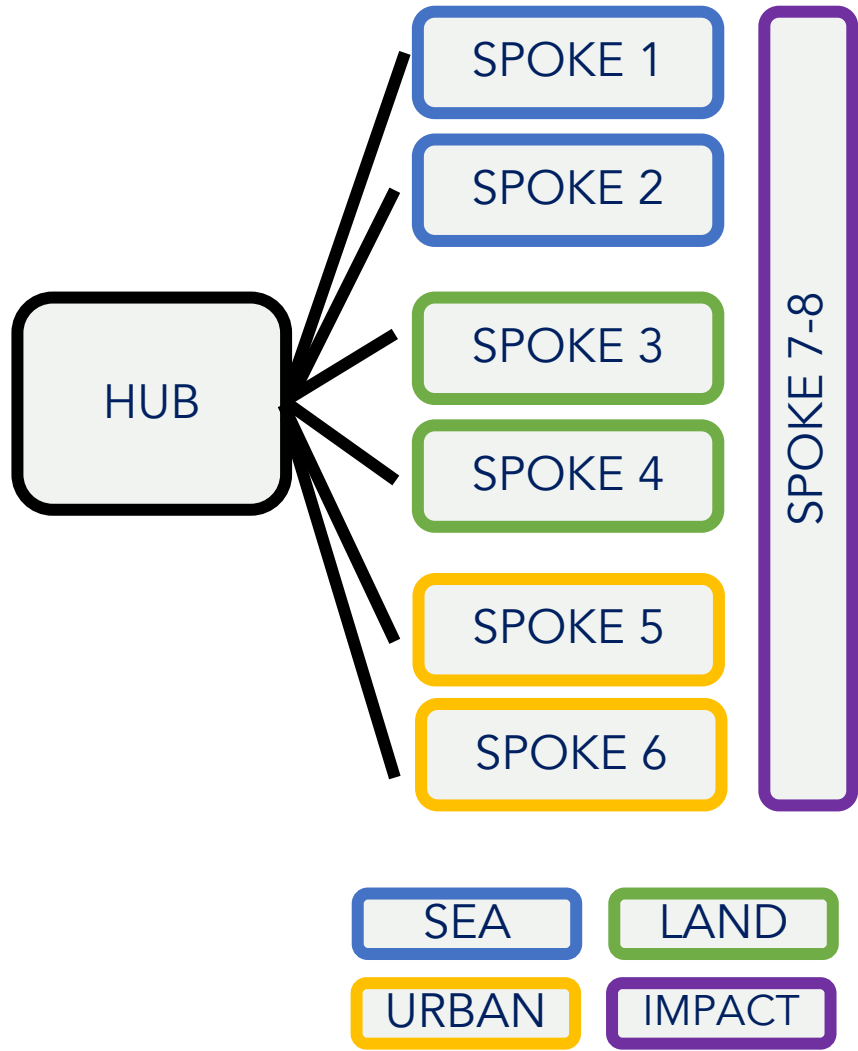
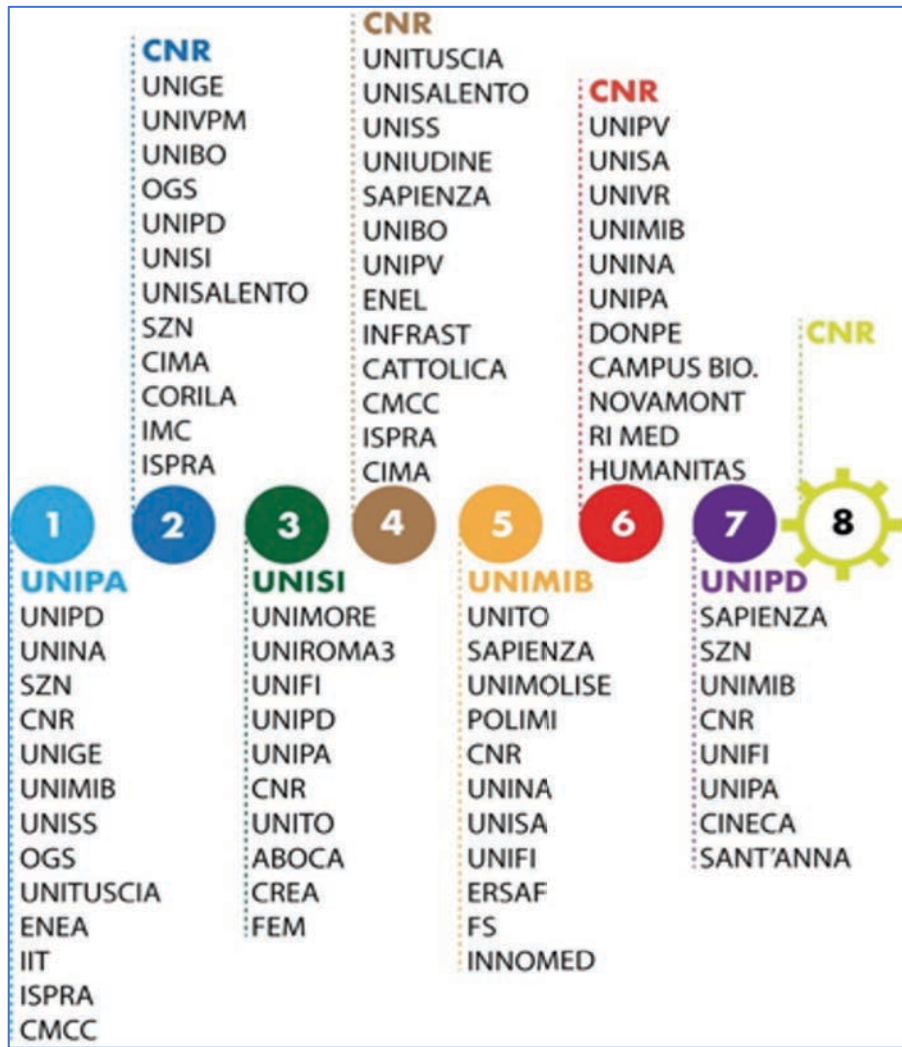
8 SPOKES interact with the HUB



Each spoke has **AFFILIATES**



A **NODE** is composed of a spoke and its affiliates





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## SPOKE 1

**Mapping and monitoring actions to preserve marine ecosystem biodiversity and functioning**

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## SPOKE 2

**Solutions to reverse marine biodiversity loss and manage marine resources sustainably**

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## SPOKE 3

**Assessing and monitoring terrestrial and freshwater biodiversity and its evolution: from taxonomy to genomics and citizen science**

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## SPOKE 4

**Ecosystem functions, services and solutions**

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## SPOKE 5

**Urban biodiversity**

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## SPOKE 6

**Biodiversity and human wellbeing**

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## SPOKE 7

**Biodiversity and society: communication, education and social impact**

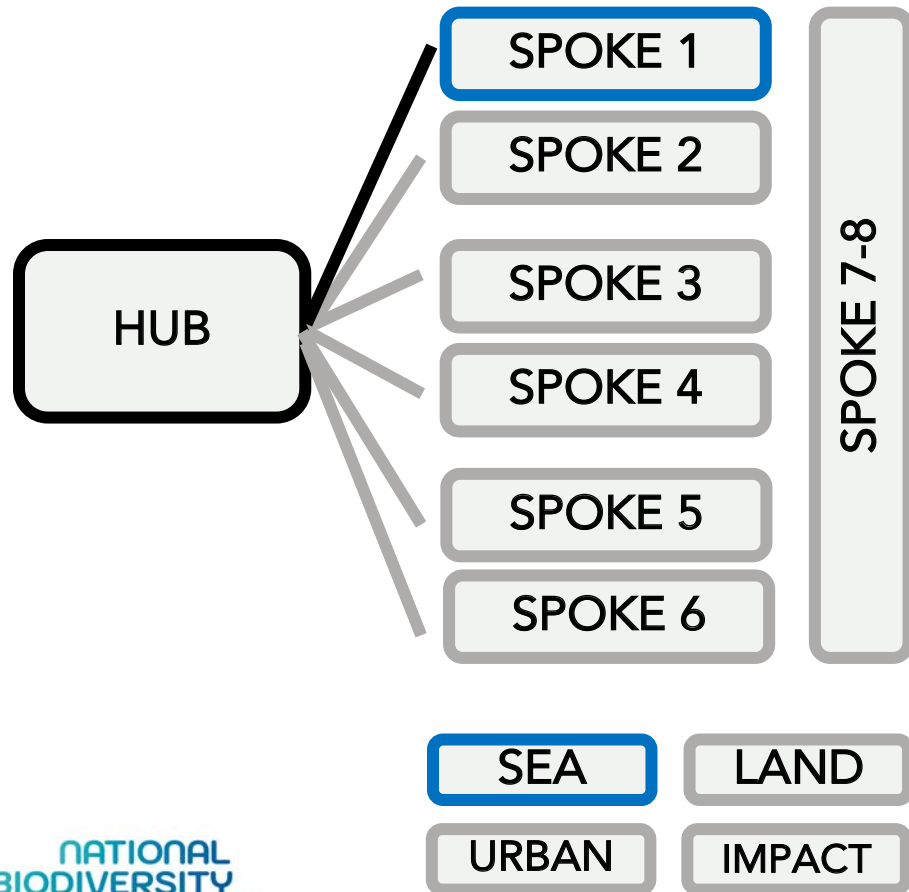
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## SPOKE 8

**Biodiversity Open Innovation & Development of KETs.**



## MAPPING AND MONITORING ACTIONS TO PRESERVE MARINE ECOSYSTEM BIODIVERSITY AND FUNCTIONING



- ❑ Development of an integrated, georeferenced and self-sustaining National (Marine) Biodiversity Observatory reference database of genetic, molecular, taxonomic and ecological data (including human uses and environmental data)
- ❑ Sensitivity, vulnerability and adaptation to climate change stressors, early warning of impacts, resilience and predictive modelling
- ❑ Innovative strategies to conserve marine biodiversity to reach EU targets
- ❑ Transboundary cooperation strategies in the Mediterranean Sea

### PARTNERS INVOLVED:

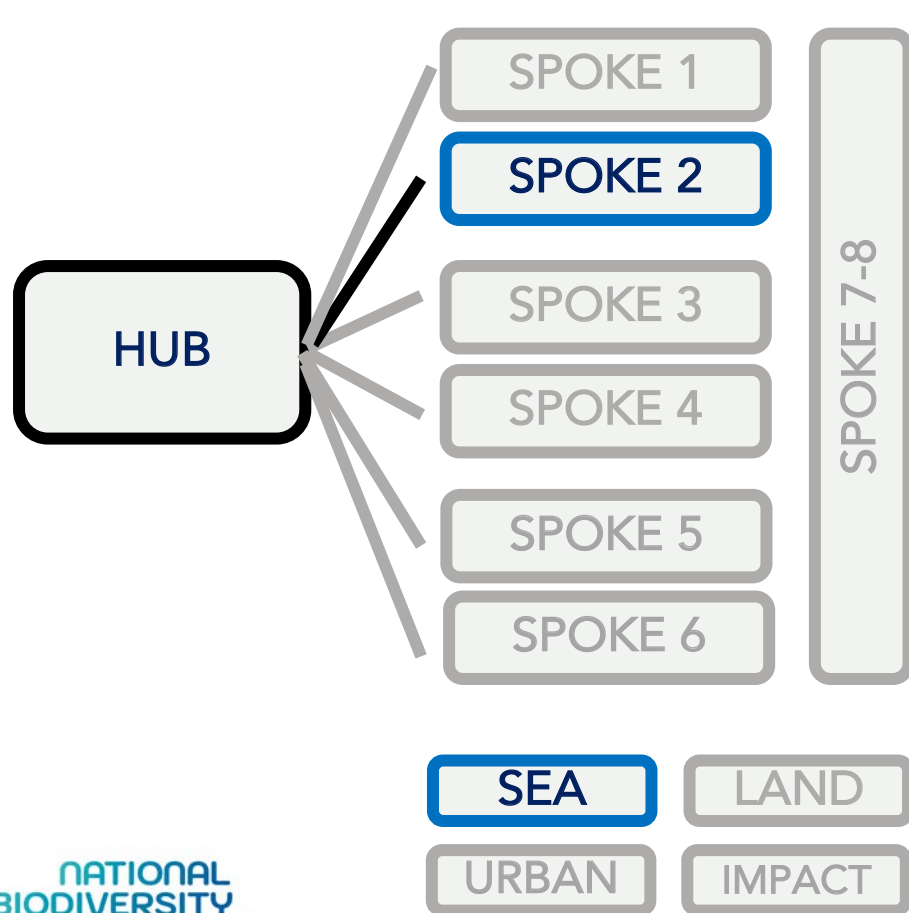
UNIPA, UNIPD, ENEA, UNINA, IIT, Stazione Zoologica Anton Dohrn, ISPRA, CNR, UNIGE, UNIMIB, UNISS, National Institute of Oceanography and Experimental Geophysics, UNITUSCIA, Centro Euro-Mediterraneo sui Cambiamenti Climatici

### LEADERS:

**Gianluca Sarà** (University of Palermo) - **Simonetta Fraschetti** (University of Napoli Federico II)



## SOLUTIONS TO REVERSE MARINE BIODIVERSITY LOSS AND MANAGE MARINE RESOURCES SUSTAINABLY



- Assess and mitigate impacts and threats to marine biodiversity
- Restore biodiversity and ecosystems
- Promote a sustainable valorization of marine resources
- Develop a biodiversity-oriented planning of the human uses of the sea
- Develop innovative multi-omics based technologies to address emergent biodiversity threats

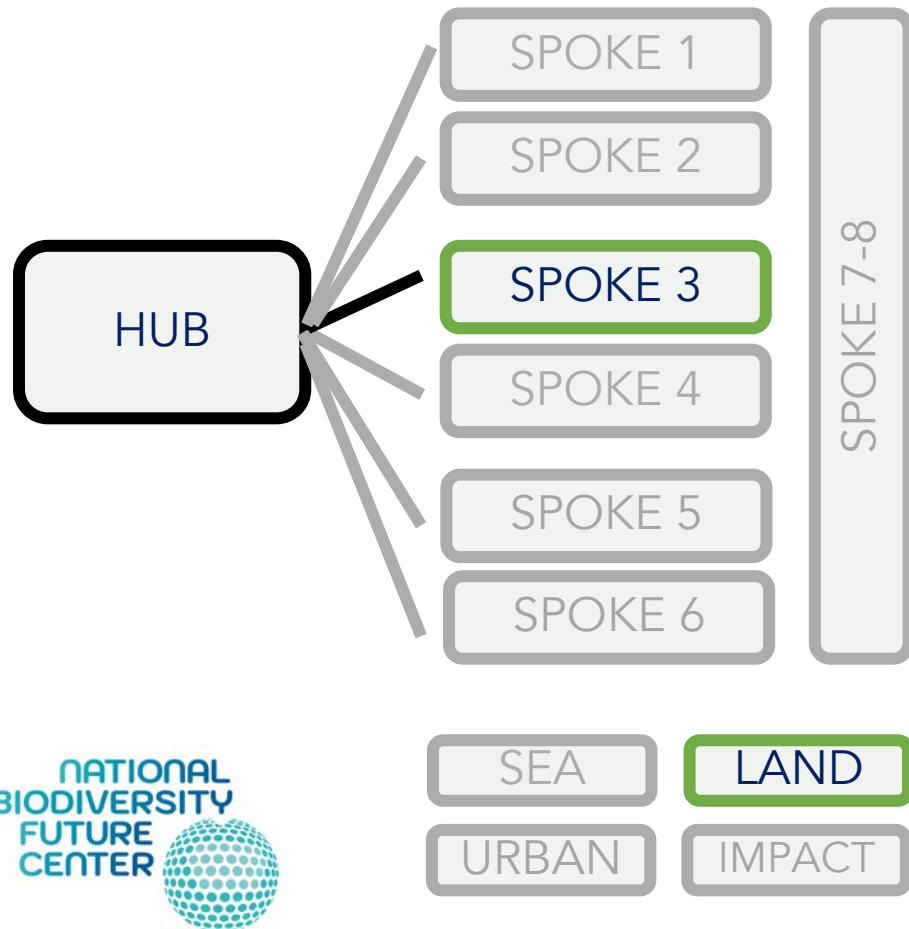
### PARTNERS INVOLVED:

CNR, UNIGE, UNIVPM, Fond. CIMA, UNIBO, CORILA, OGS, FOND. IMC, UNIPD, ISPRA, UNISI, UNISALENTO, SZN

### LEADERS:

**Gian Marco Luna** (CNR) - **Mariachiara Chiantore** (University of Genova)

## ASSESSING AND MONITORING TERRESTRIAL AND FRESHWATER BIODIVERSITY AND ITS EVOLUTION: FROM TAXONOMY TO GENOMICS AND CITIZEN SCIENCE



- ❑ Improve basic knowledge of terrestrial and freshwater biodiversity complementing traditional and modern approaches
- ❑ Assess and monitor endangered species/communities, as a consequence of climate change and anthropogenic perturbations
- ❑ Identify invasive alien species and evaluate their impact on autochthonous species
- ❑ Focus on the knowledge of soil and freshwater biodiversity in order to maximize their ecological function
- ❑ Implement citizen science projects to get citizens and local communities involved

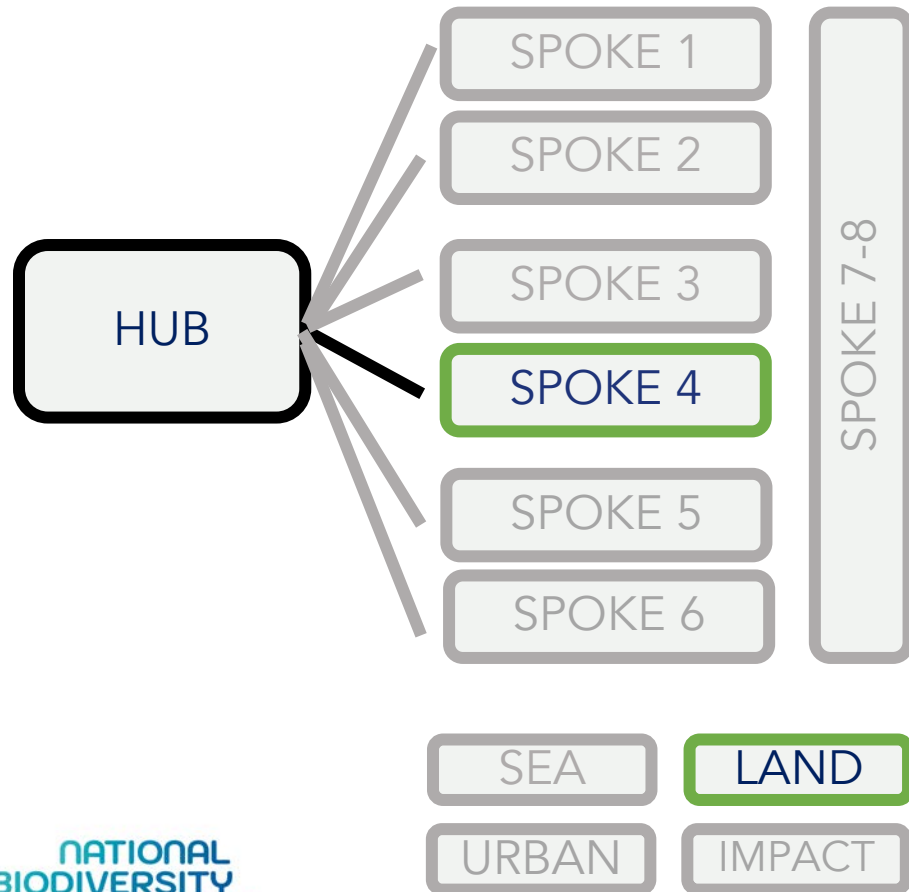
### PARTNERS INVOLVED:

UNISI, UNIMORE, ABOCA, UNIROMATRE, CREA, UNIFIRENZE, FEM, UNIPD, UNIPA, CNR-IRSA, UNITO

### LEADERS:

**Francesco Frati** (University of Siena) – **Lorena Rebecchi** (University of Modena e Reggio Emilia)

## TERRESTRIAL ECOSYSTEM FUNCTIONS, SERVICES AND SOLUTIONS



- ❑ Advanced systems for monitoring, studying and managing biodiversity, its organization, the related ecosystem functions and services in relation to natural and anthropic impacts
- ❑ Adaptation and mitigation of terrestrial ecosystems to climate change including ecological responses and future forecast scenarios
- ❑ Scenarios of Area-based conservation planning and management
- ❑ Conceptual framework and methodological tools of Nature Based Solution and Restoration Ecology
- ❑ New modeling strategies

### PARTNERS INVOLVED:

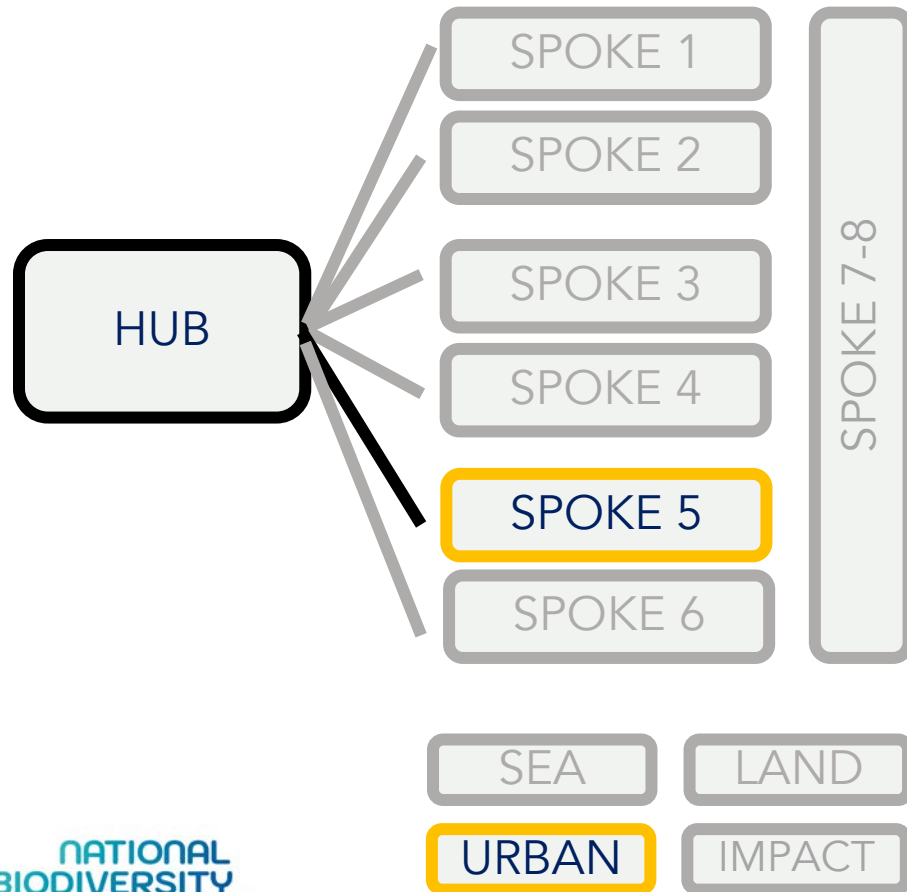
CNR, UNITUSCIA, UNISALENTO, UNISS, UNIUDINE, LA SAPIENZA, UNIBO, UNIPV, ENEL, INFRASTRUTTURE SPA, CATTOLICA, CMCC, ISPRA, FONDAZIONE CIMA

### LEADERS:

**Carlo Calfapietra**(CNR) – **Donatella Emma Ignazia Spano** (University of Sassari)



## URBAN BIODIVERSITY



- Biodiversity and ecology aspects of urban forestry
- Urban soil biodiversity
- Urban forestry
- Impact of urban forestry on supporting and regulating ecosystem services (environmental level)
- Impact of urban forestry on supporting and regulating ecosystem services (biological level)

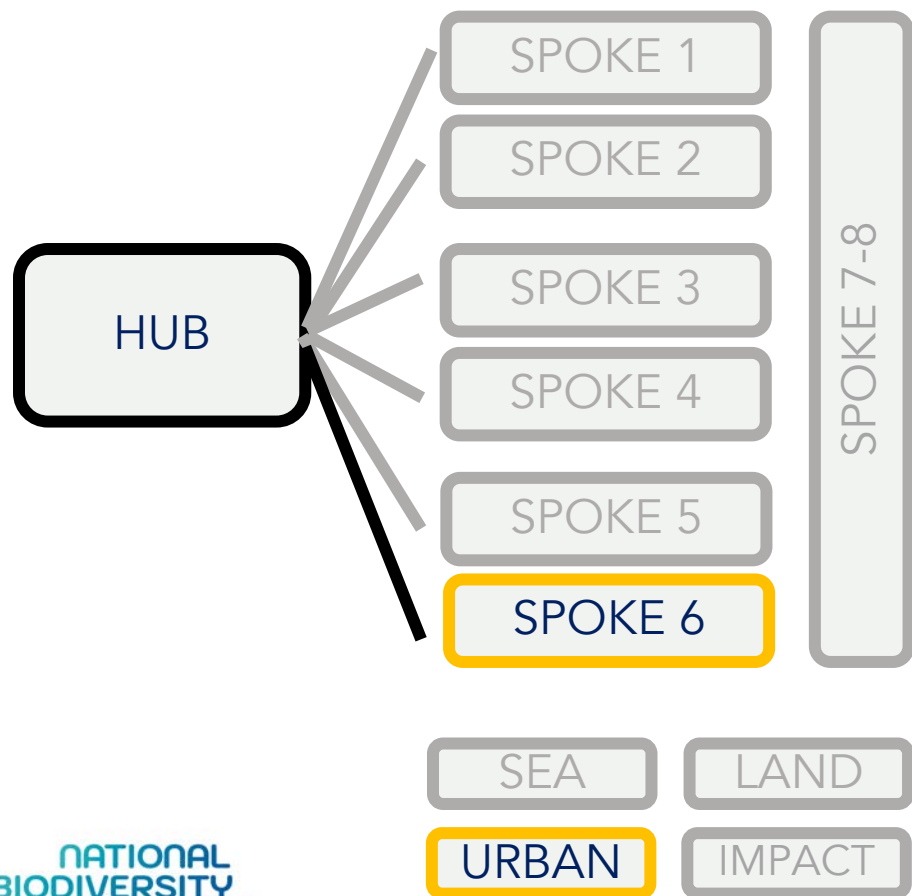
### PARTNERS INVOLVED:

UNIMIB, UNITO, ERSAF, LA SAPIENZA, FS SISTEMI URBANI, UNIMOLISE, INNOMED, POLIMI, CNR, UNINA, UNISA, UNIFI

### LEADERS:

**Massimo Labra** (University of Milano - Bicocca) – **Maria Chiara Pastore** (Politecnico di Milano)

## BIODIVERSITY AND HUMAN WELLBEING



- Biodiversity, Exposome and Urban lifestyle
- Bioprospecting and bioactivity
- Biotechnology and biodiversity
- Restoration economy

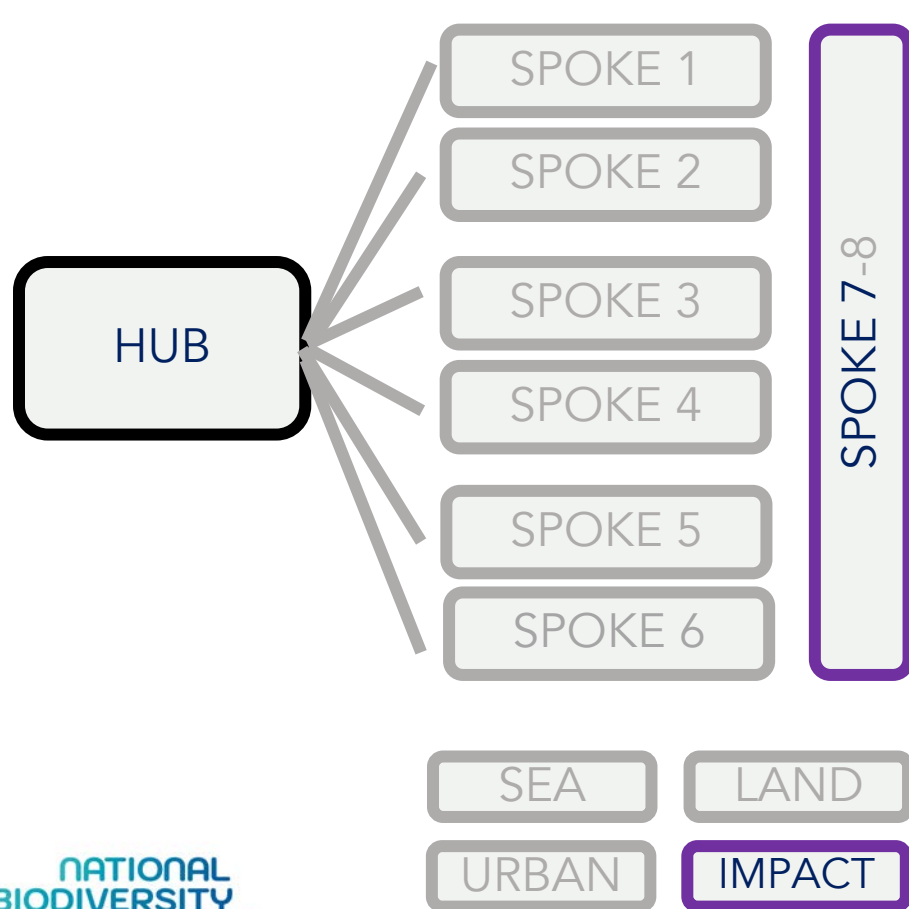
### PARTNERS INVOLVED:

CNR, UNIPV, DOMPE, UNISA, CAMPUS BIOMEDICO, UNIVERONA, NOVAMONT, UNIMIB, RI MED, UNINA, HUMANITAS, UNIPA

### LEADERS:

**Danilo Porro** (CNR) – **Hellas Cenna** (University of Pavia)

## BIODIVERSITY AND SOCIETY: COMMUNICATION, EDUCATION AND SOCIAL IMPACT



- rethinking science communication after the pandemic
- communication to young people, schools, universities
- communication to society in order to develop a widespread awareness
- Enhancement: the public administration
- Enhancement: the industrial and economic world
- Enhancement: global health
- Enhancement: Italian natural history museums
- Biodiversity Science Gateway

### PARTNERS INVOLVED:

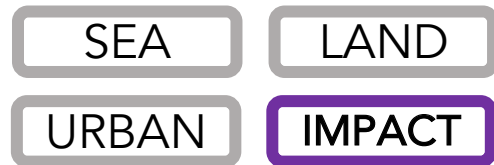
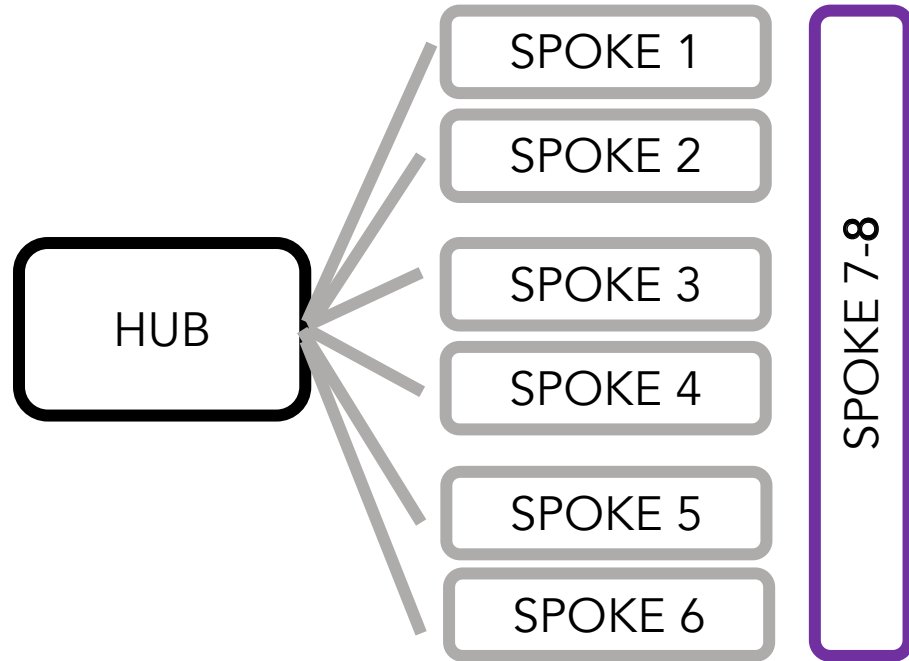
UNIPD, LA SAPIENZA, CINECA SZN, SSSA, UNIMIB, CNR, UNIFI, UNIPA

### LEADERS:

**Dietelmo Pievani** (University of Padova) – **Isabella Saggio** (University La Sapienza - Rome)



## BIODIVERSITY OPEN INNOVATION & DEVELOPMENT OF KETs.



- ❑ Monitor & protect, R&D activities of NCBF partners
- ❑ Ensure integration of the different Spokes' activities, encourage transdisciplinarity and enhance TRL advancement
- ❑ Engage Open Science and Open Innovation multidisciplinary collaborations with a variety of research communities outside the NCBF
- ❑ Support joint research projects for the adoption and development of KETs relevant to biodiversity research and innovation
- ❑ Support Open Innovation Activities, engaging the industrial ecosystem through challenges and direct support to entrepreneurial activities
- ❑ Develop T-Shaped biodiversity researchers

**LEADERS:**  
**Riccardo Coratella (CNR) – Alberto Di Minin (Scuola Superiore Sant'Anna)**



## FIRMS

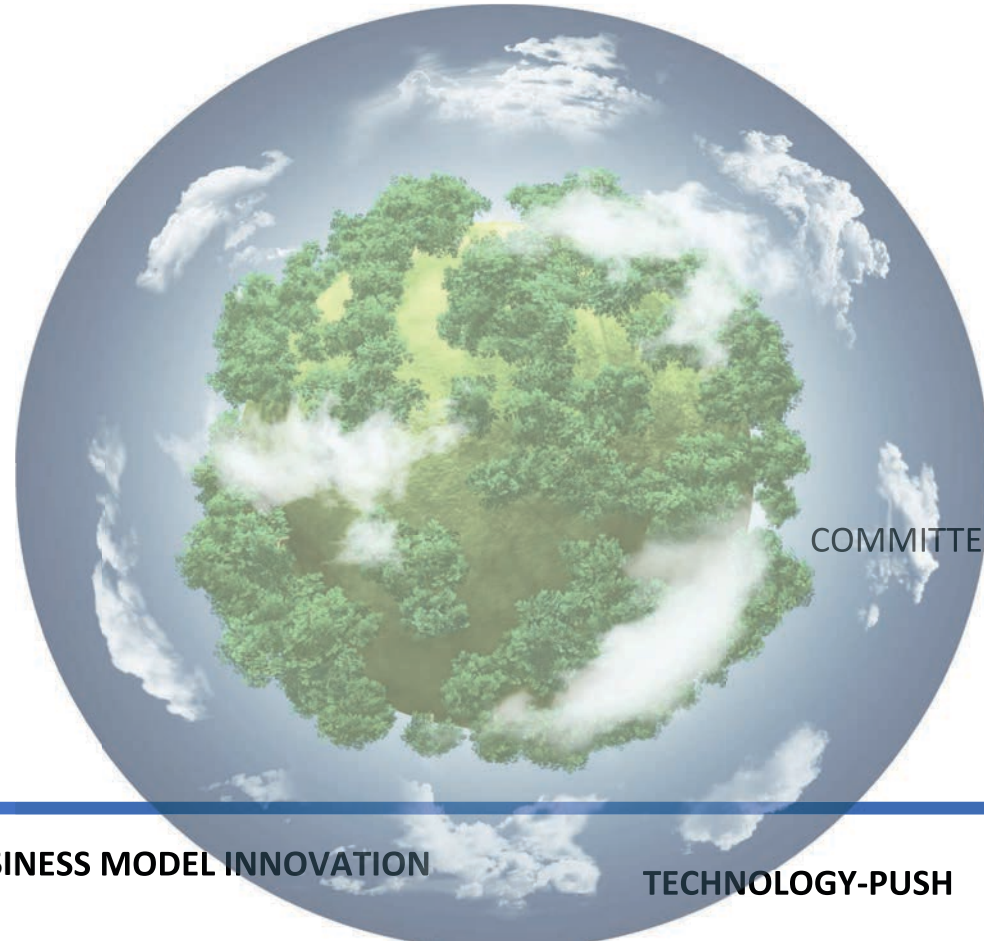
ACCELERATOR  
GRANTS  
[ACTIVITY 1]

CONNECT AND  
DEVELOP  
[ACTIVITY 2]

## PROJECTS

TRANSLATIONAL SUPPORT  
AND TECH TRANSFER  
[ACTIVITY 4]

POLICY AND SOCIETY  
[ACTIVITY 7]



## PEOPLE

PATHFINDER  
[ACTIVITY 3]

UPSKILLING  
[ACTIVITY 5]

## PROCESS

COMMITTEE MEETINGS [ACTIVITY 6]

SUPPORT TO CIO & CTO  
[ACTIVITY 8]

KETs

DEMAND-PULL

BUSINESS MODEL INNOVATION

TECHNOLOGY-PUSH



## WIDESPREAD GATEWAY

The Gateway will be multi-sited infrastructures spread on site AND on line

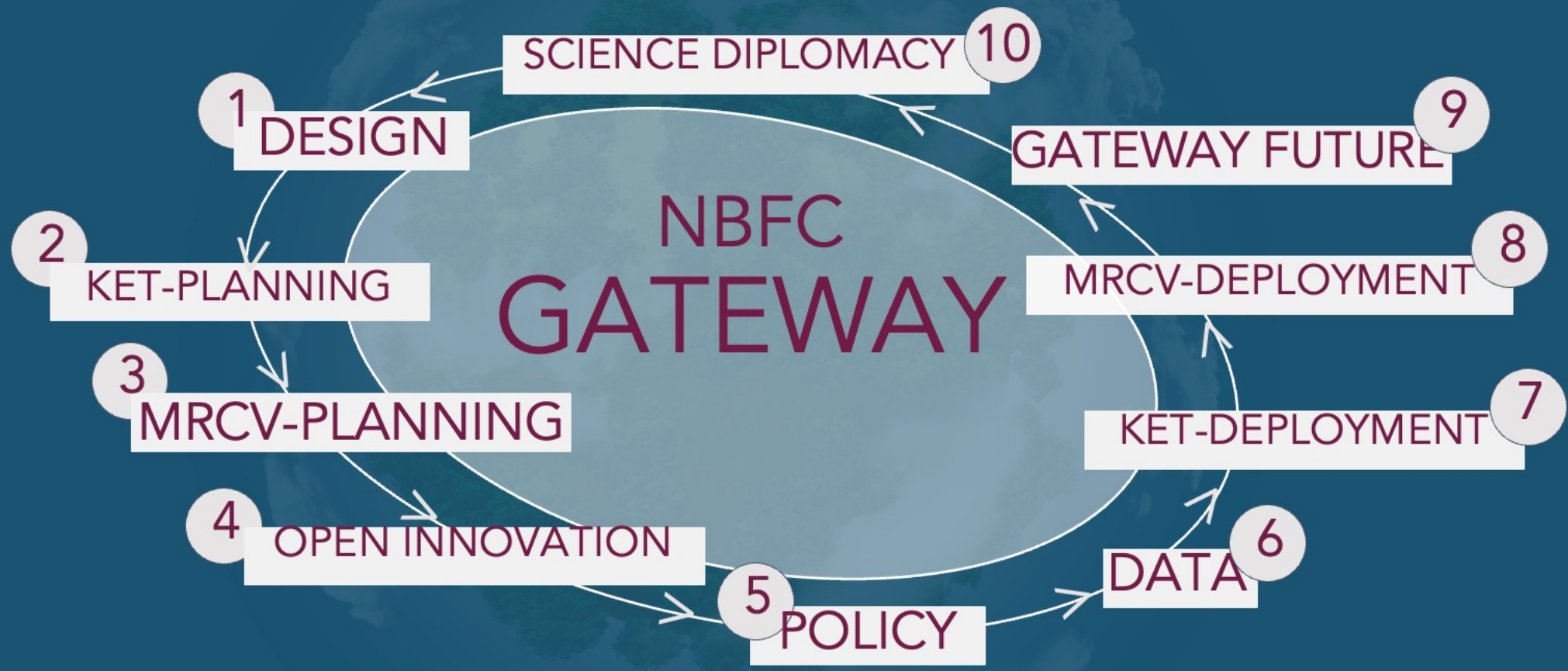


Virtual infrastructure (with some physical bases) able to transform the research into diffused knowledge and companies.

It is an Education and Innovation facility and a place where to bring scientific research to society and to the market.



# GATEWAY Enhancement AS A WORK METHOD



## TRANSFORM CLIMATE AND BIODIVERSITY GOALS INTO OPPORTUNITIES FOR SUSTAINABLE RECOVERY

The Challenge now is related to the auto-sustainability of the NBFC

... beyond 2026

<b>INVESTMENTS</b>	<b>% SOUTH</b>	<b>% DIGITAL</b>	<b>% GREEN</b>
€ 372.311.342,39	42 %	31 %	69 %
<b>CRITICAL MASS</b>	<b>% WOMEN</b>	<b>% NRRP 022</b>	<b>% NRRP 023</b>
1300 RESEARCHERS	50%	54%	22%



Science contemplates the world to change it, making it sustainable  
Maria Chiara Carrozza