



BEeS

The LifeWatch ERIC Biodiversity & Ecosystem eScience Conference

Seville
22-24/05/23



Threats and challenges to biodiversity and ecosystem conservation from an eScience perspective

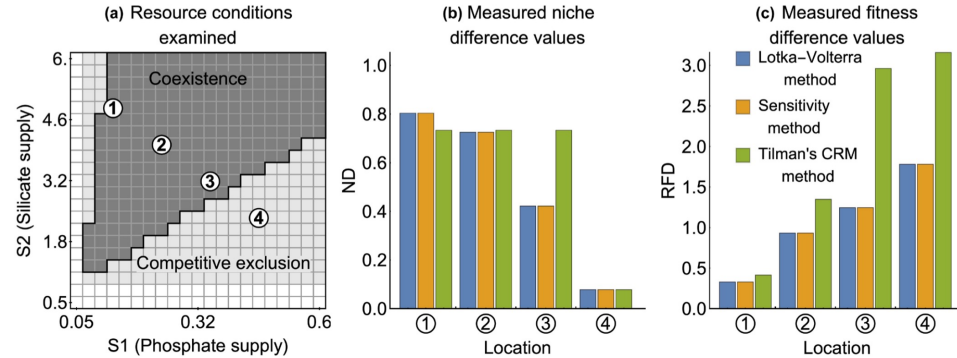


The ITINERIS project e-services for deepening current understanding on biodiversity and ecosystem responses to climate changes. Basset A. Shokri Saravi, M., Cozzoli, F., Marrocco, V., Titocci, J., Rosati, I

Understanding ecological responses to climate change is key priority to mitigate the impact on the organization, conservation, management and exploitation of biodiversity and ecosystem services.

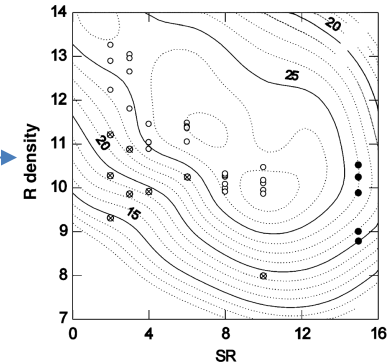
Different mechanisms of biodiversity organization (e.g., coexistence conditions) are known, **but** their relevance is not.

Climate change is affecting phenotype/species relative fitness, **but** we still do not know how and with what outcome.



Niche-mediated

Body size-mediated



○ Coexistence conditions
● Large consumer exclusion
⊗ Small consumer exclusion

Climate change and ecological responses: challenges for conservation and recovery

1. ***Niche (filtering) theory***

1. Shifts in species distributional ranges;
2. Changes in community structure;
3. Shifts in ecosystem distributional ranges.

2. ***Metabolic theory***

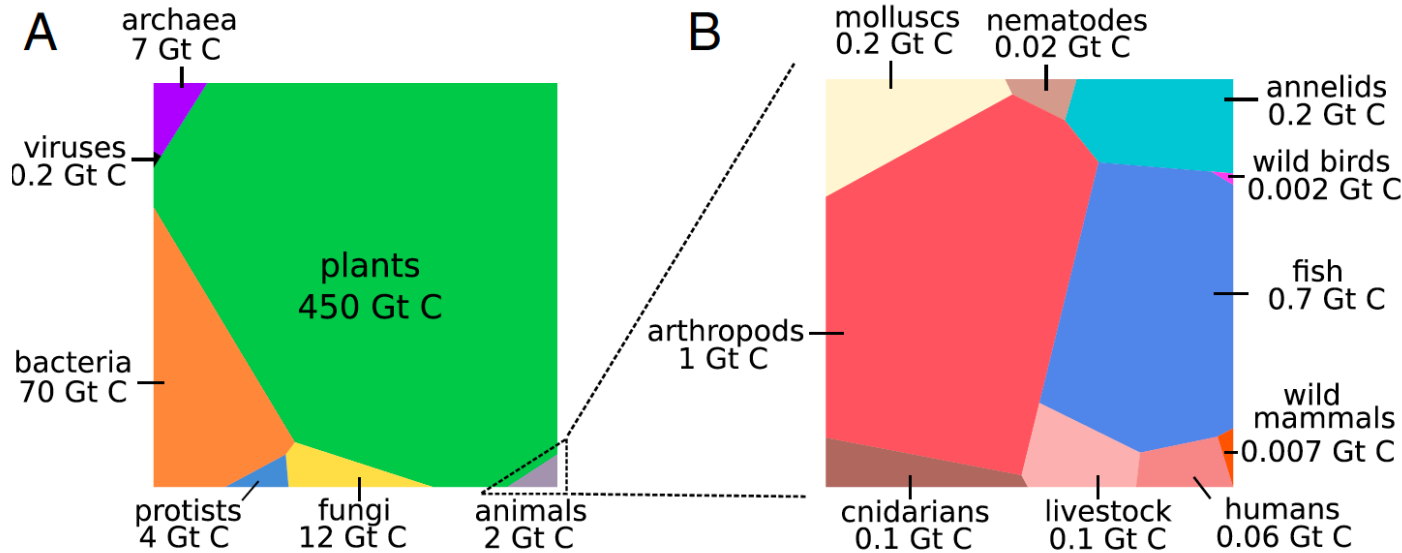
1. Increasing individual metabolic demands;
2. Alteration of biological and ecological cycles;
3. Changing intra- and inter-specific coexistence relationships; and
4. Alteration of connected ecosystem processes and functions

1. Biodiversity & functional diversity;
2. Standing biomass and dead organic matter;
3. Ecosystem services and human benefits



4. Human welfare

Climate change and ecological responses: organic matter mass and standing biomass change



Will overall standing biomass decrease in the next decades?

How much it will decrease?

Are there ecological domains or ecosystem types more exposed?

Are there potential mitigation strategies? on which basis?

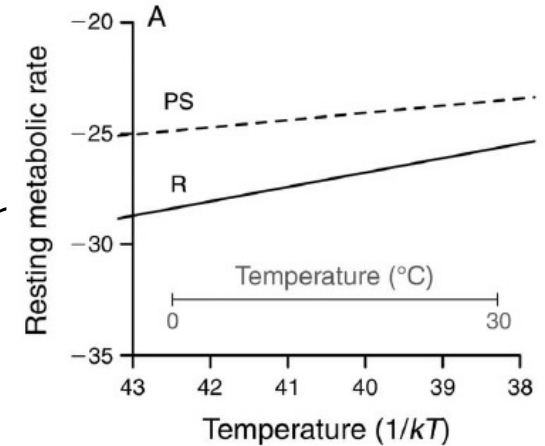
Climate change and ecological responses: organic matter mass and standing biomass change



Net consumption of organic matter mass seems likely to occur in the Adriatic basin.

Net consumption is likely to differ between marine and terrestrial ecosystems

Global warming, decreasing nutrient loading and relevance of grazing food webs are expected to cause net consumption of standing biomass



The ITINERIS project and the National Biodiversity Future Centre

ITINERIS - Italian Integrated Environmental Research Infrastructures System

➤ **7 Partners**

➤ **22 RIs:**

The participating RIs are the Italian nodes of the **ESFRI Landmarks** ACTRIS, EMSO, Euro-Argo, ICOS and LIFEWATCH, from the ENV domain and ANAEE from the H&F domain and closely linked to the ENV domain; the Italian nodes of the **ESFRI projects** DANUBIUS, DISSCO, e-LTER, from the ENV domain, and EMPHASIS and EU-IBISBA from the H&F domain and also relevant for ENV; the **EU RIs** ECORD, EUFAR, Eurofleets, JERICO and SIOS, all from the ENV domain; and the national RIs ATLaS, CeTrA, N/V Laura Bassi, and SMINO, from the ENV domain, and Geosciences and LNS, both from the PSE domain, that in ITINERIS support services in the marine domain.

➤ **194** fixed-term personnel to be hired (21% Researchers, 62% Technologists, 17% Technicians)

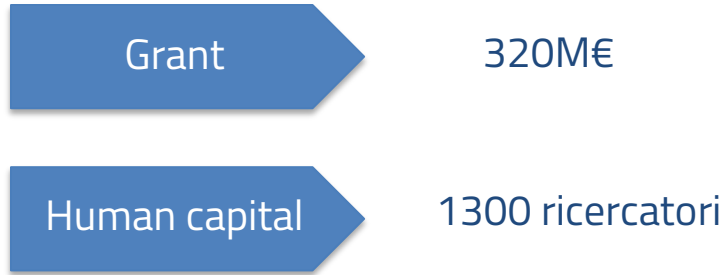
➤ **63** PhD

➤ **Total budget: 155,2 ML Euro**

➤ **Start date 1 November 2022 (for 30 + 6 months) + at least 10 years operation**

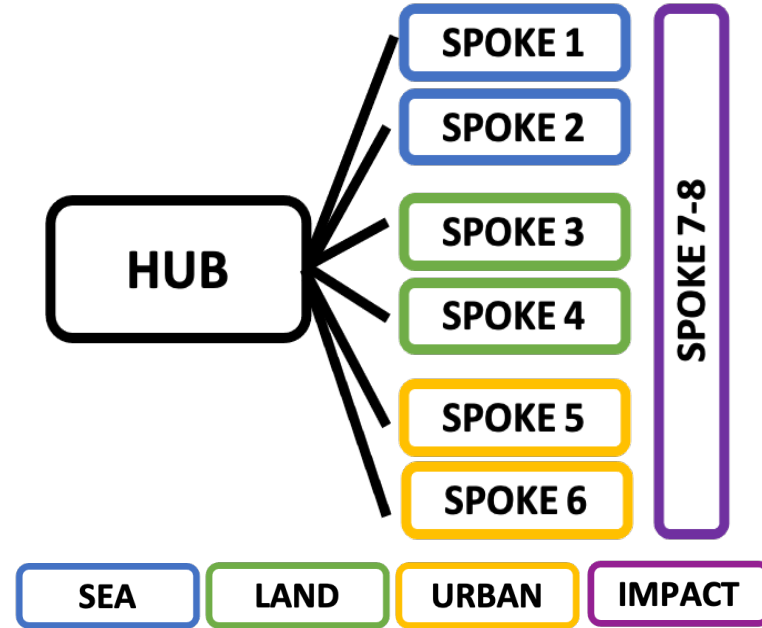
The ITINERIS project and the National Biodiversity Future Centre

NBFC – National biodiversity future Centre



Objectives:

- 1) Assess, monitor, preserve and recover marine, terrestrial and urban biodiversity.
- 2) Give value to biodiversity as a central element for the sustainability of socio-economic development.



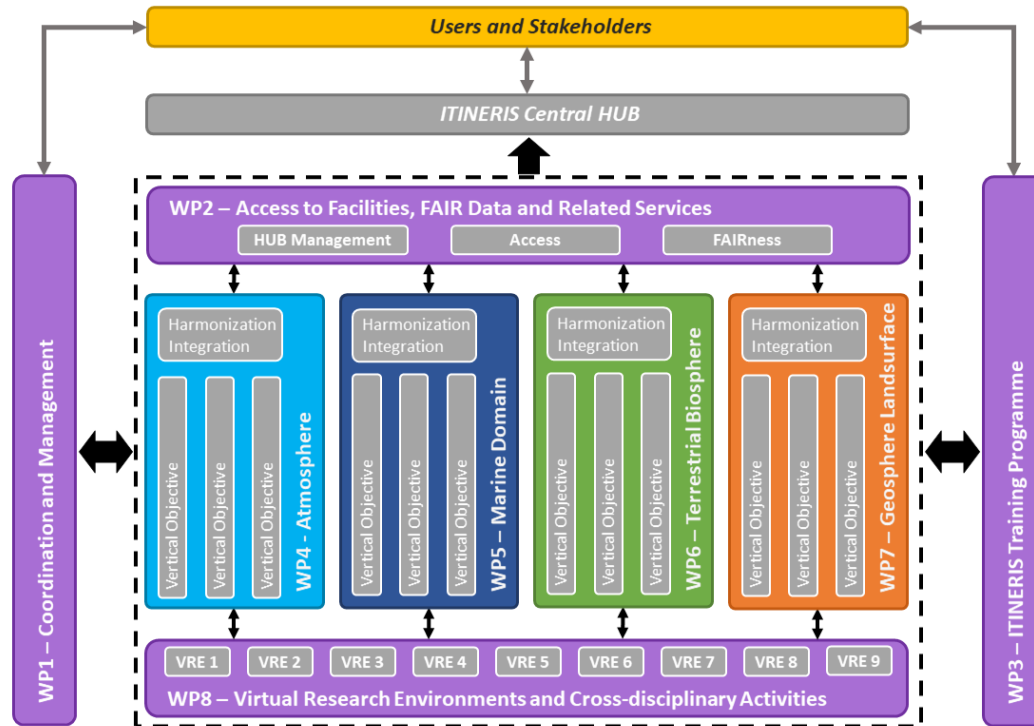
The ITINERIS project and the National Biodiversity Future Centre

ITINERIS - Italian Integrated Environmental Research Infrastructures System

1. ITINERIS will build the Italian Hub of Research Infrastructures in the environmental scientific domain;
2. ITINERIS will establish the Italian national system of Research Infrastructures (RI) in the environmental domain, creating a coherent and harmonized flow of data, information and knowledge across all the participating RIs.
3. The main goal of ITINERIS is to develop cross-disciplinary research in environmental sciences through the use and re-use of existing (or pre-operational) data and services and new observations, to address scientifically and societally relevant issues;
4. The ITINERIS project will produce new knowledge on environmental processes across subdomains, adopting a whole-system view and considering in particular the interactions and links among the different components, something that is often overlooked in individual RIs.

The ITINERIS project and the National Biodiversity Future Centre

ITINERIS - Italian Integrated Environmental Research Infrastructures System: Workplan



The ITINERIS project and the National Biodiversity Future Centre

ITINERIS - Italian Integrated Environmental Research Infrastructures System: VREs

8.0 Phytoplankton VRE (**PHYTO VRE**). Addresses phytoplankton guild organization and ecological responses to climate change.

8.1 Virtual Research Environment for Critical Zone services (**CZ VRE**). Addresses Critical Zone processes, soil, groundwater, droughts in face of climate and environmental change.

8.2 Virtual Research Environment for aquatic biomass services (**BIOMASS VRE**). Addresses the response of aquatic ecosystems, and, in particular, of the standing biomass, to climate change.

8.3 Crop, Plants and Pests VRE (**CPP VRE**). Addresses crop production, plant phenology, pest and disease spread, and cropping system management.

8.4 Essential Variables VRE (**EV VRE**). It will build a VRE based on the Essential Climate (ECV) and Biodiversity (EBV) Variables produced by observatories and field campaigns.

ITINERIS - Italian Integrated Environmental Research Infrastructures System: VREs

8.5 Aerosol-biosphere Virtual Research Environment (**AERO VRE**). It will include information on aerosol types and the desert dust; atmospheric boundary layer properties, to support research activities on the atmosphere-biosphere-geosphere continuum.

8.6 Carbon cycle VRE (**CARBON VRE**). It will provide services on the main carbon reservoirs (atmosphere, oceans, terrestrial biosphere and geosphere) and on direct anthropogenic emissions.

8.7 Virtual Research Environment on indicators of climate change (**CLIMA VRE**). It will gather climatic variables from different domains for providing proper indicators.

8.8 Virtual Research Environment VRE on downstream effects of environmental change (**DOWNSTREAM VRE**). It will address the nexus of climate and environmental change effects, carbon, and Earth System response.

8.9 Virtual Research Environment on isotopic information (**ISOTOPE VRE**). It will create a national VRE service to retrieve information and analysis tools to fill the gaps in the current ability to analyze isotopes from different matrices.

ITINERIS - Italian Integrated Environmental Research Infrastructures System: PHYTO-VREs

1. Mechanisms of PHYTO guild organization

2. Phyto metabolic responses to global warming




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 [Atlas of Phytoplankton](#)

 [Atlas of Shapes](#)

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ITINERIS - Italian Integrated Environmental Research Infrastructures System: BIOMASS-VREs

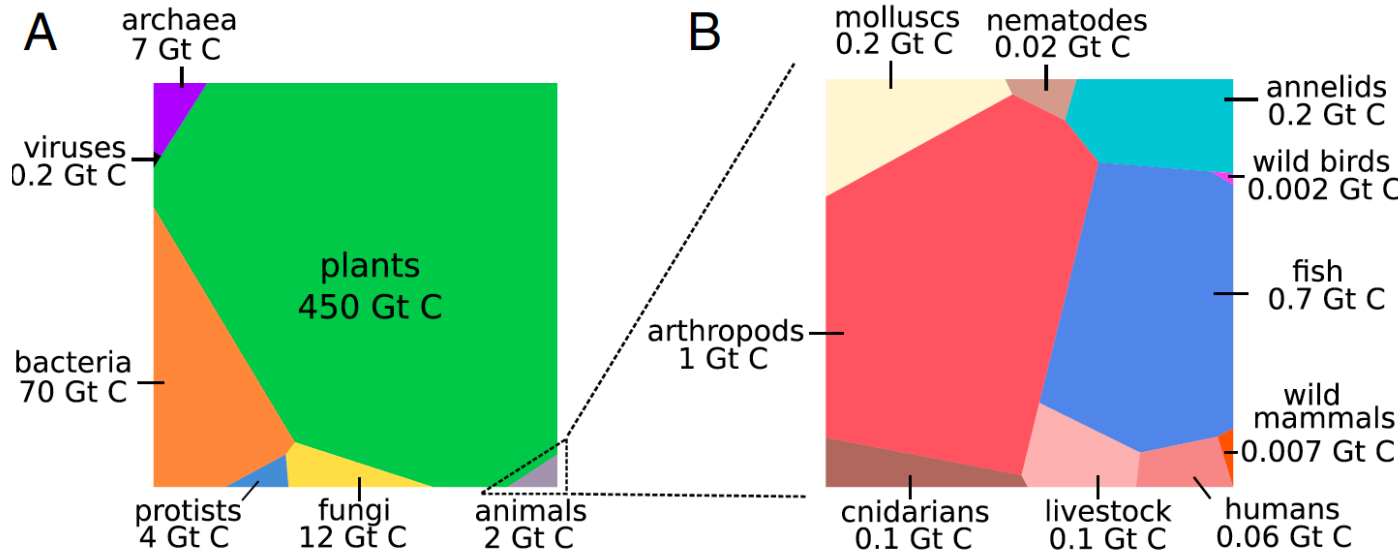
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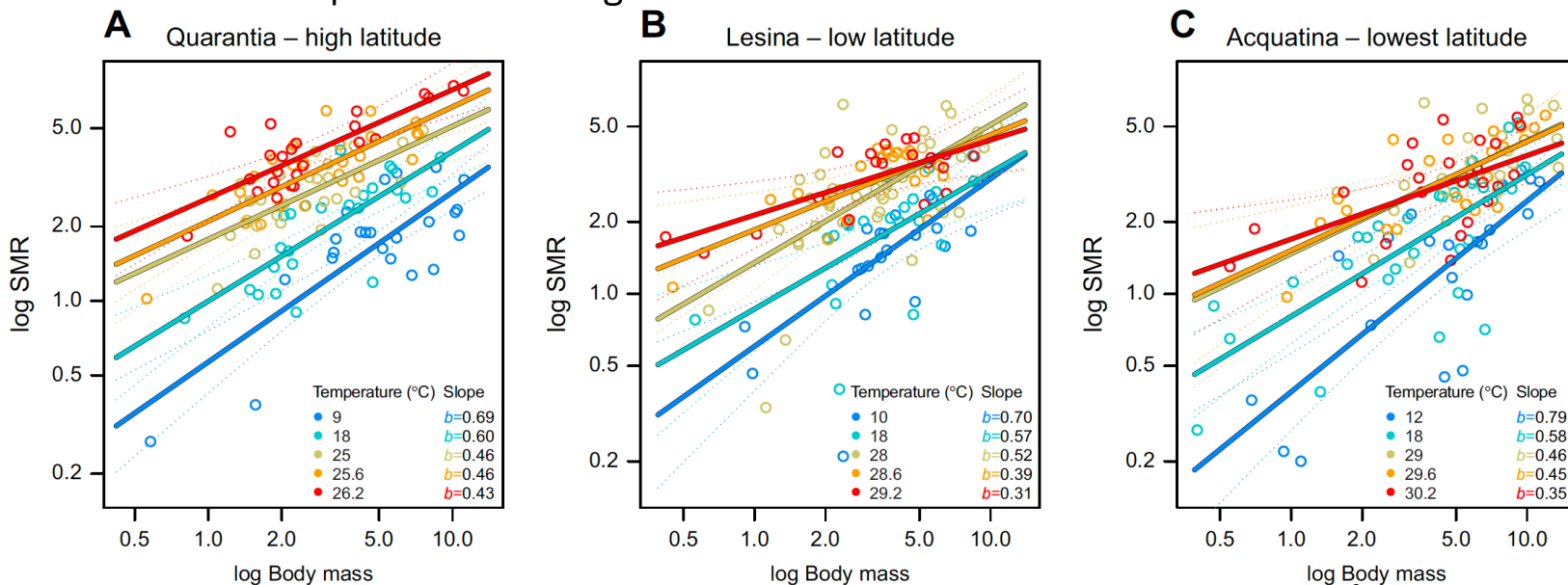
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ITINERIS - Italian Integrated Environmental Research Infrastructures System: BIOMASS-VREs

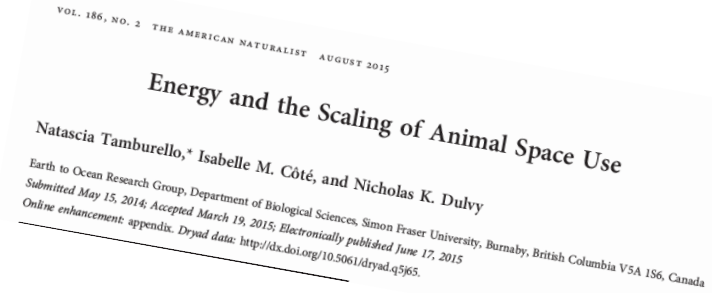
Individual metabolic demand increases with increasing temperature even in the limited temperature increase expected according to the most conservative scenarios



ITINERIS - Italian Integrated Environmental Research Infrastructures System: BIOMASS-VREs

Mining and harmonizing all source of data:

- Networking data producers on ever smaller T°C range
- Integrated data from existing repositories;
- Integrate data from different *individual personality* traits;
- Integrate experimental & modelling data of *individual personality* trait induced fitness across T°C gradients

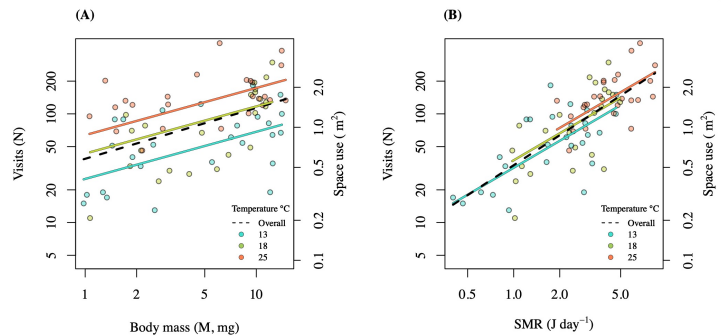


July 2014 DATA PAPERS 2027

Ecology, 95(7), 2014, p. 2027
© 2014 by the Ecological Society of America

EltonTraits 1.0: Species-level foraging attributes of the world's birds and mammals

[Ecological Archives E095-178](#)





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Threats and challenges to biodiversity and ecosystem conservation from an eScience perspective



UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa



Thanks for the attention