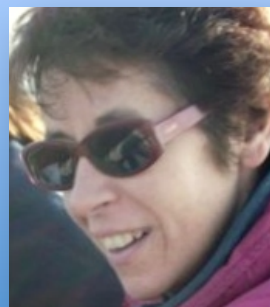
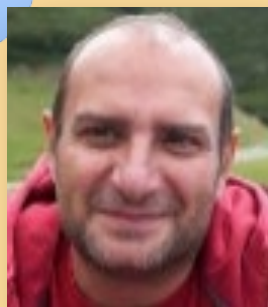


# ATTIVITÀ IN CORSO & PRIORITA' STRATEGICHE

## CENTRO TEMATICO MEDITERRANEO



*Dino Pierri, Paolo Colangelo, Angela Boggero, Giorgio Matteucci, Giuseppe Corriero*

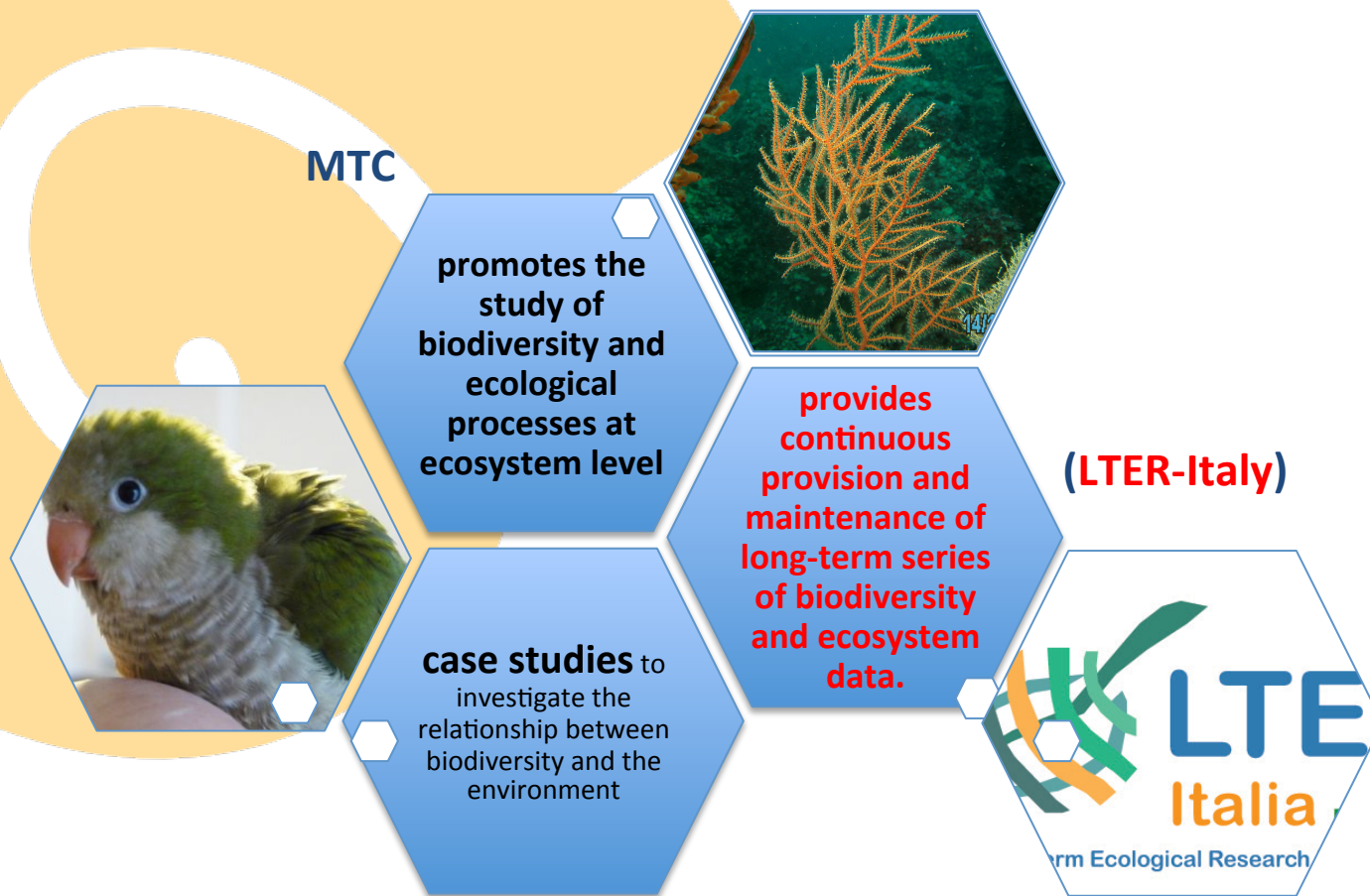


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**16 Dicembre 2015 ROMA**



## The Mediterranean Thematic Centre (MTC)

links the nodes of a network of institutions allowing to deal with several topics, a wide range of organisms and long-term data series.



LTER ITALY



# 1<sup>st</sup> case study

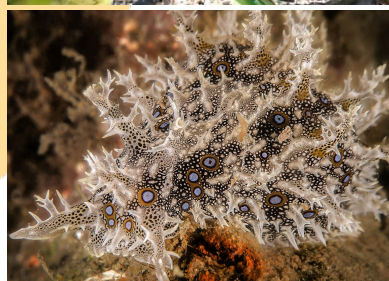
## Habitat vulnerability to AS Invasion

UNIVERSITY OF BARI  
UNIVERSITY OF SALENTO  
UNIVERSITY OF CAMERINO  
UNIVERSITY OF FERRARA  
UNIVERSITY OF FIRENZE  
UNIVERSITY OF GENOVA  
UNIVERSITY OF MOLISE  
UNIVERSITY OF PARMA  
UNIVERSITY OF PERUGIA  
UNIVERSITY OF ROMA 3  
UNIVERSITY OF ROMA «LA SAPIENZA»  
UNIVERSITY OF ROMA «TOR VERGATA»  
UNIVERSITY OF SASSARI  
UNIVERSITY OF TORINO  
UNIVERSITY OF VENEZIA «CA FOSCARI»  
UNIVERSITY OF MARCHE  
UNIVERSITY OF MILANO «BICOCCA»

Italy



Europe



CNR-ISE  
CNR-ISMAR  
CNR-IBBE  
CNR-IREA  
CNR-IBAF  
CNR-IAMC

ENVIRONMENT AGENCY PUGLIA  
ENVIRONMENT AGENCY OF BOLZANO  
CORPO FORESTALE DELLO STATO  
SZN ANTON DOHRN  
ESTE



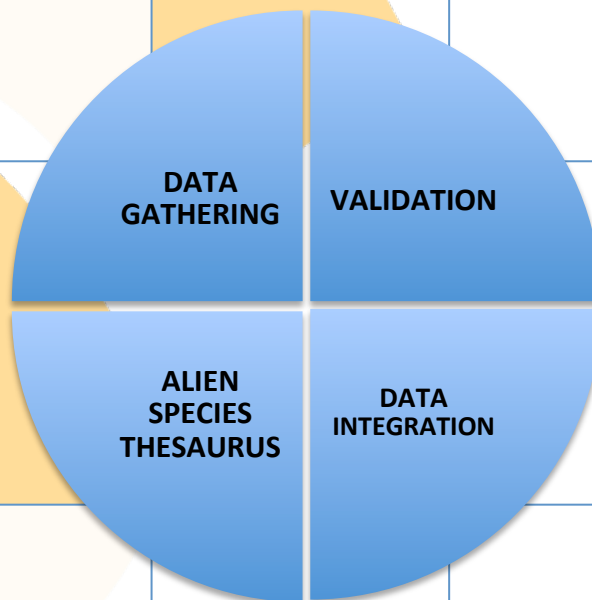
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# WHAT WAS DONE

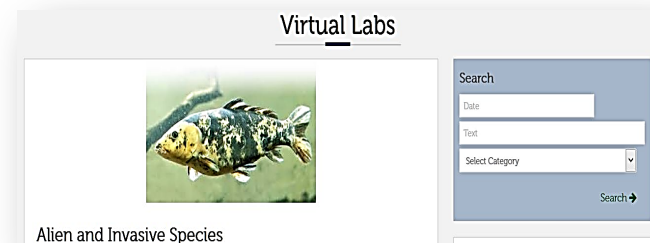
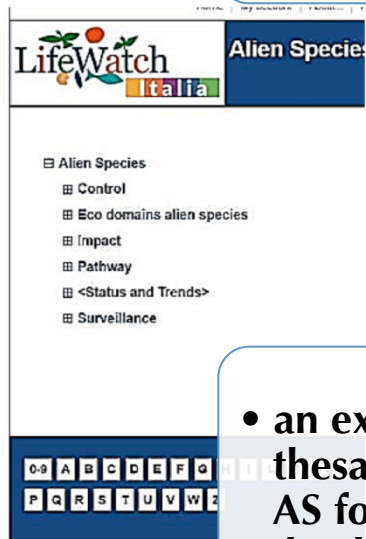
- exploratory work on available data then increased over time

- Data Cleaning (taxonomic reliability and consistency) manually by the LW experts, then through the tools of data cleaning available on the LW portal



- an exhaustive thesaurus on AS for database management

- Metadata (surface, habitat, lat&long, year)
- AS Occurrence with ecological/ anthropic/ environmental drivers



## A VIRTUAL LAB

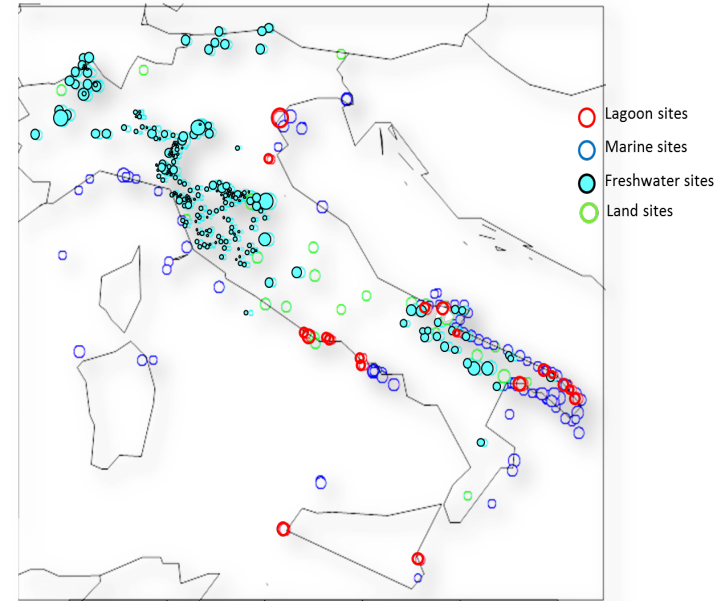


The large database allows to test generalized invasion patterns

## A large taxonomic, habitat and geographic coverage

34386 TOTAL OBSERVATIONS  
12406 SPECIES  
563 SITES  
42 PHYLA  
36 HABITATS (EUNIS LEVEL 2)  
40 YEARS OF OBSERVATIONS

The **LifeWatch Biodiversity database** contains both native and alien species distributed within Eunis habitats along the Italian peninsula.



The accuracy of the results is linked to the spatial, ecological, taxonomic, and temporal data homogeneity.

Access to data is a priority strategy



Data papers



## PRIORITIES



**Molecular and genetic metadata of AS already present in the database (CT Biomolecular)**

**Access to data**

**New Case Studies**

**Dissemination of activities and results, data integration, high performance computation tools and services in the AS Virtual Lab**

**Special Session on AS impacts**

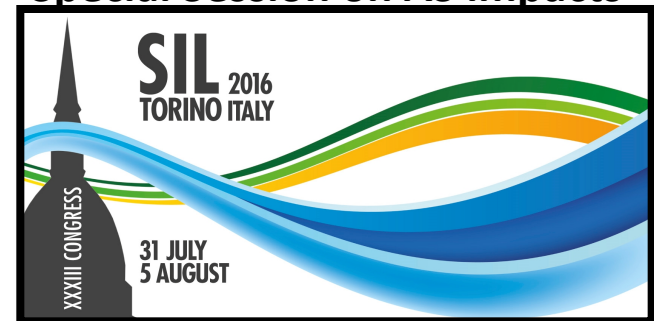


**15<sup>th</sup> World Lake Conference**

**Lakes: the Mirrors of the Earth**

**1-5 September, 2014 – Perugia, Italy**

**Special Session on AS impacts**



**33<sup>th</sup> International Society of Limnology Conference**

**July 31<sup>st</sup> to August 5<sup>th</sup>, 2016 – Torino, Italy**



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Data Portal

## Virtual Labs



Alien and Invasive Species

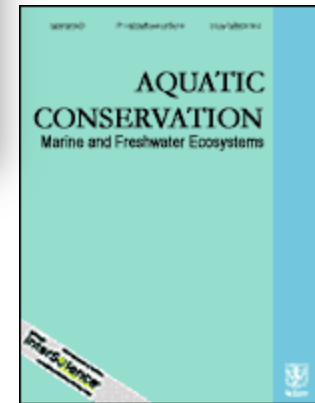
Search

Date

Text

Select Category

Search →



- *Ecosystem vulnerability to alien and invasive species: a case study on marine habitats along the Italian coast.*

*(Aquatic Conservation: Marine and Freshwater Ecosystems)*

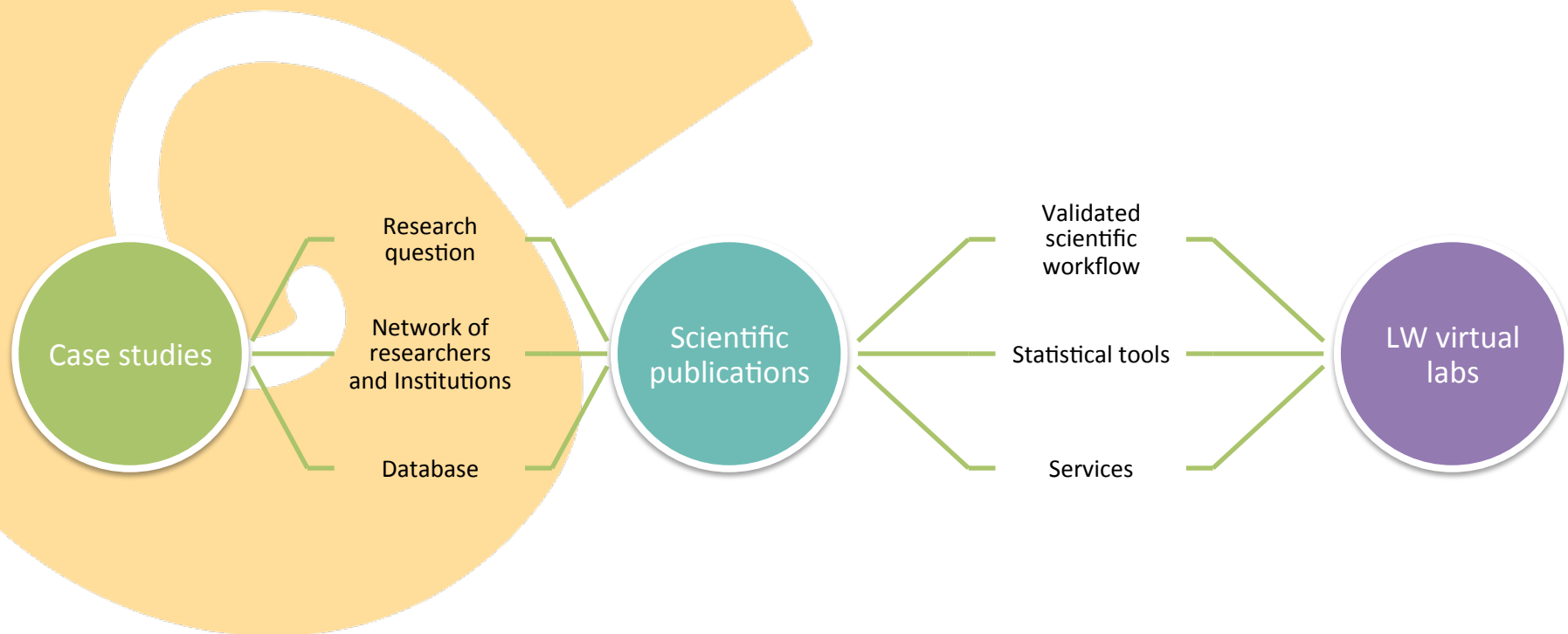
- *Weak effects of habitat type on susceptibility to invasive freshwater species: an Italian case study.*

*(Aquatic Conservation: Marine and Freshwater Ecosystems)*

- *Non-native species in Italian freshwater habitats: a macroecological assessment of invasion drivers (in prep)*
- *Modelling drivers of non-native plant introduction in a macroecological framework (in prep)*



# The CTM case studies: from research to infrastructure







# The alien species case study

- Invasion biology often focus on single alien taxon or group of related species (i.e. genera, family, orders)
- The availability of large database (i.e. LW database) allows to **test generalized invasion patters in a macroecological framework:**
  - Multiple taxa
  - Multiple habitat
  - Multiple sites

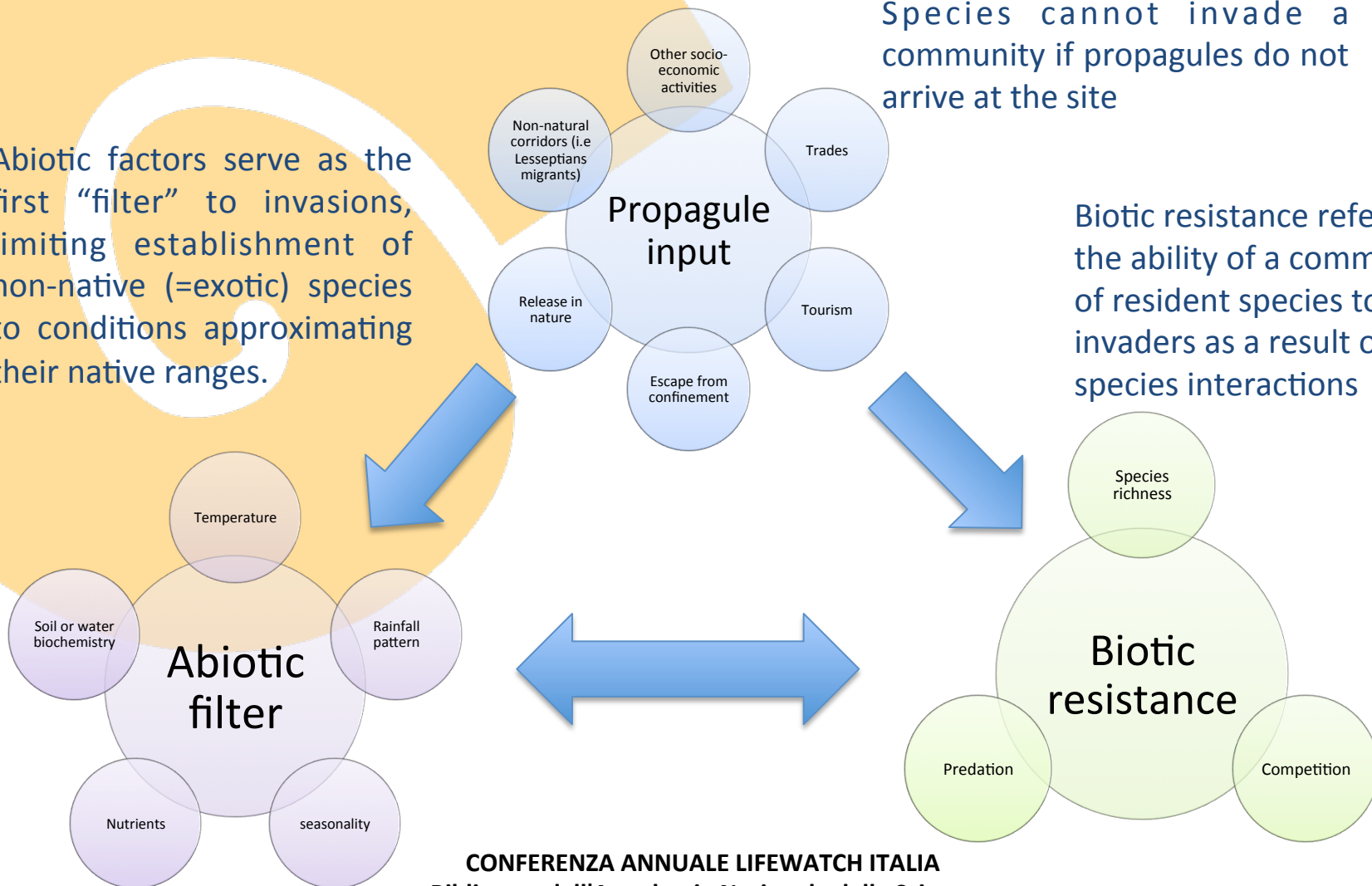


# The Propagule, Abiotic, Biotic framework

Abiotic factors serve as the first “filter” to invasions, limiting establishment of non-native (=exotic) species to conditions approximating their native ranges.

Species cannot invade a community if propagules do not arrive at the site

Biotic resistance refers to the ability of a community of resident species to repel invaders as a result of species interactions





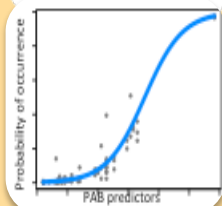
# Define research questions

Identify emergent patterns regarding the potential drivers of occurrence and richness of alien species in freshwater, marine, transitional and terrestrial ecosystems within a PAB framework



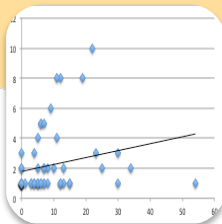
## Habitat vulnerability

Are different EUNIS habitat more or less susceptible to invasion?



## Invasion drivers

Which abiotic, biotic and pressure attributes of the recipient site affect invasion probabilities?

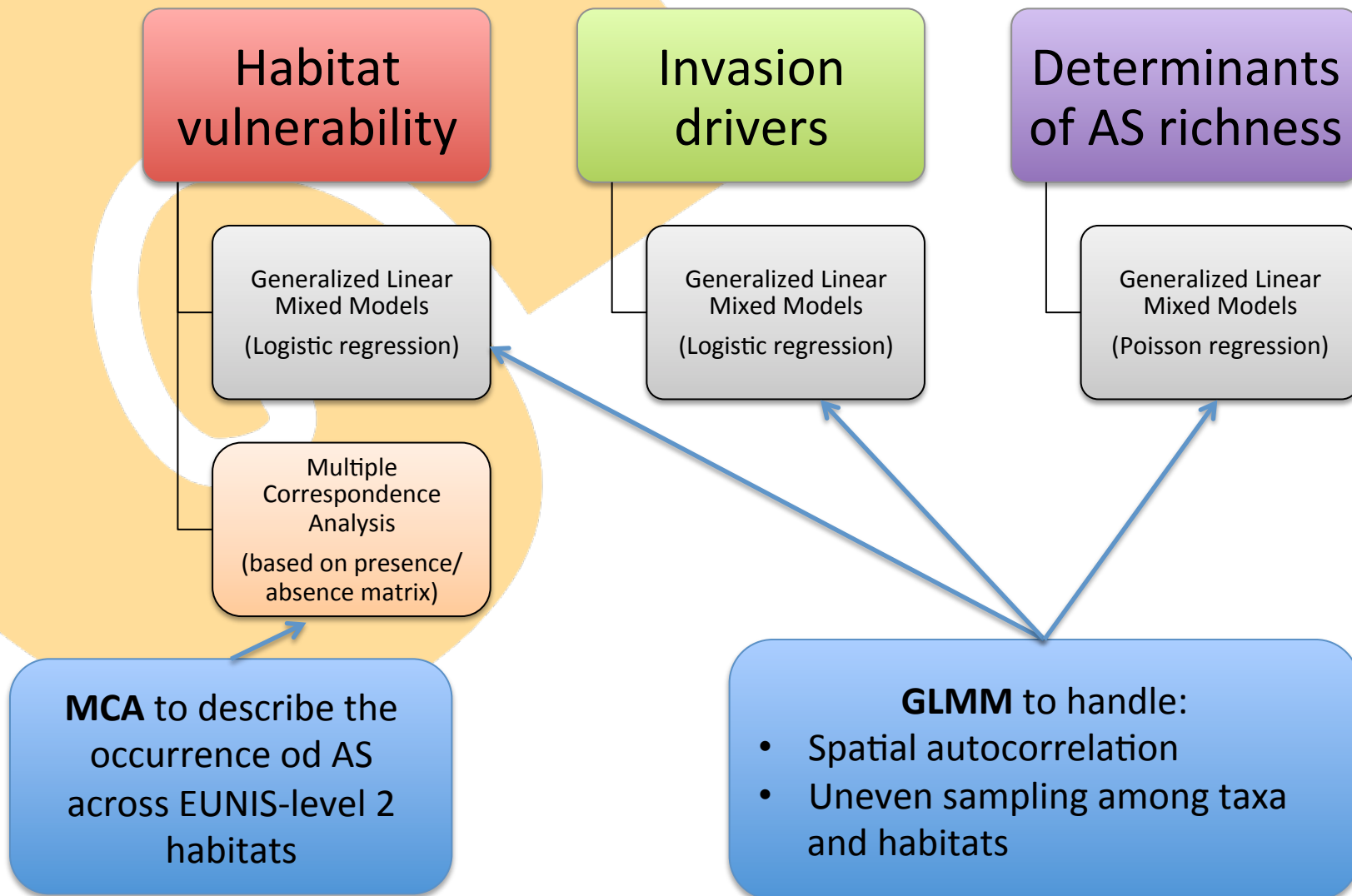


## Determinants of AS richness

What are the determinants of high or low AS richness in the invaded sites?



# Define a statistical workflow





## Case Study

Research questions

Dataset

Analytical framework

Statistical tools

Scientific papers

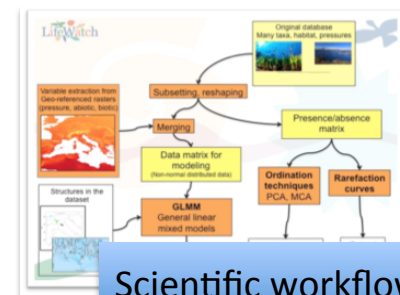
Validated protocols

## Virtual lab

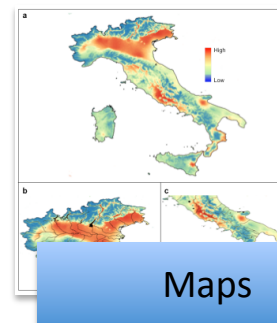
Biotic/Abiotic/Pressure variables extraction



R-shiny apps



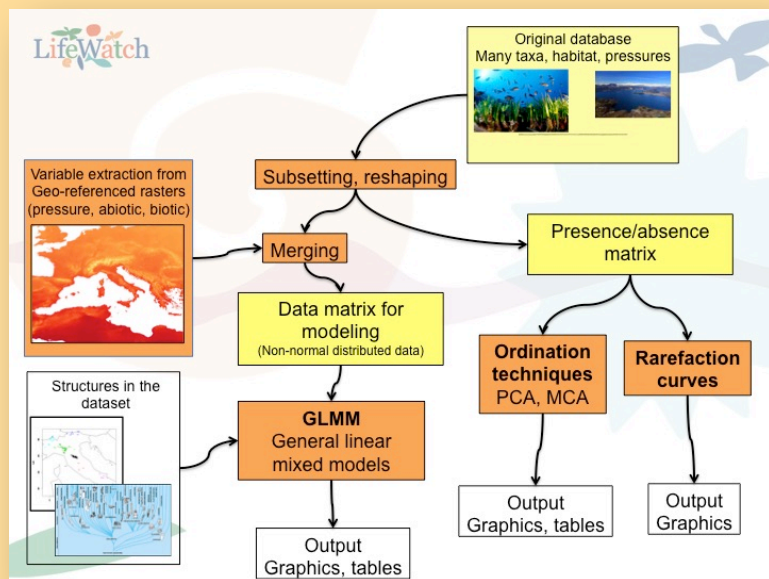
Scientific workflow



Maps



# Shiny apps and statistical workflows



## Alien species virtual lab

```
library(shiny)
library(maps)
library(raster)

shinyServer(function(input, output, session) {

  Data <- reactive({
    inFile<-input$file
    if (is.null(inFile)) {
      return(NULL)
    } else {
      dc<-read.csv(inFile$datapath)
    }
  })

  observe({
    data <-Data()
    updateSelectInput(session, "x", choices = names(data))
    updateSelectInput(session, "y", choices = names(data))
  })

})
```

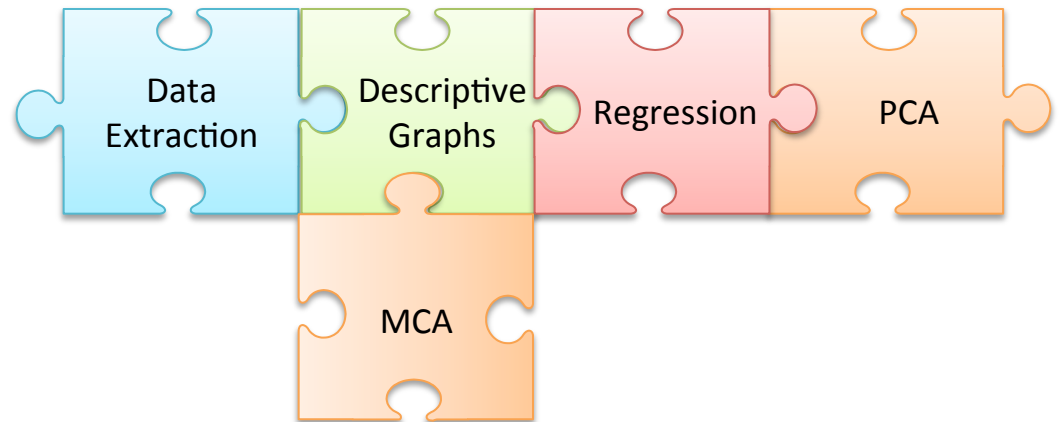
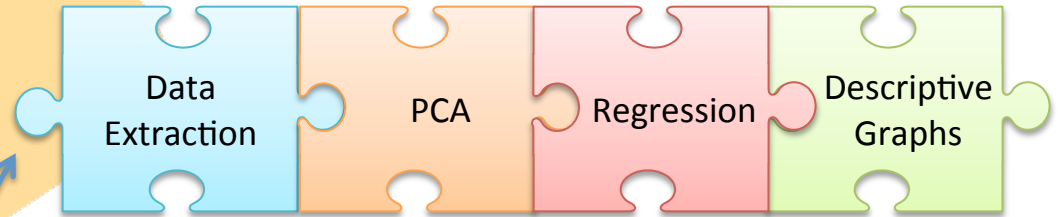
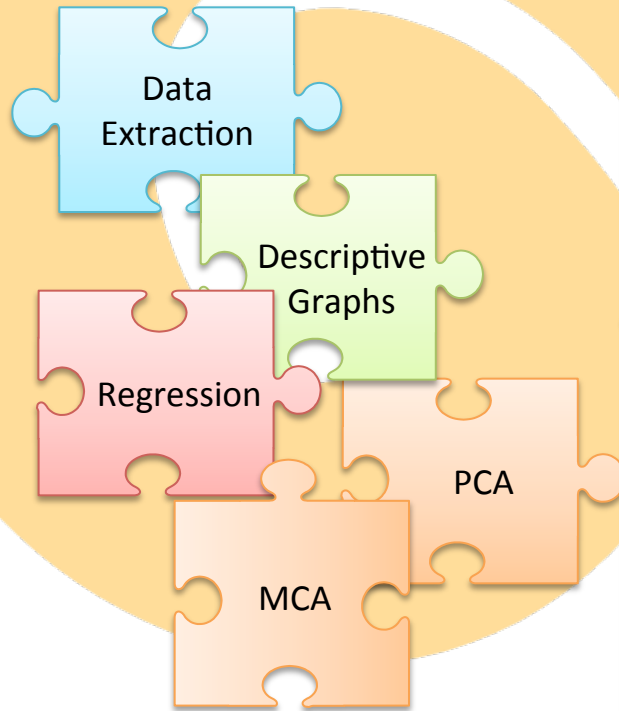
### ICT working group

Taverna service oriented scientific workflow

Implement R scripts via Rshell and Rserve. Connect R scripts with other services

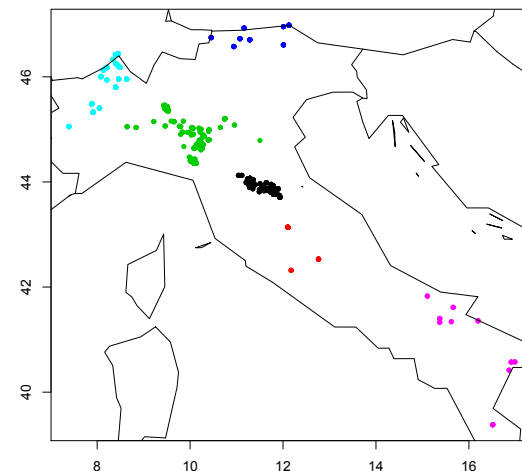
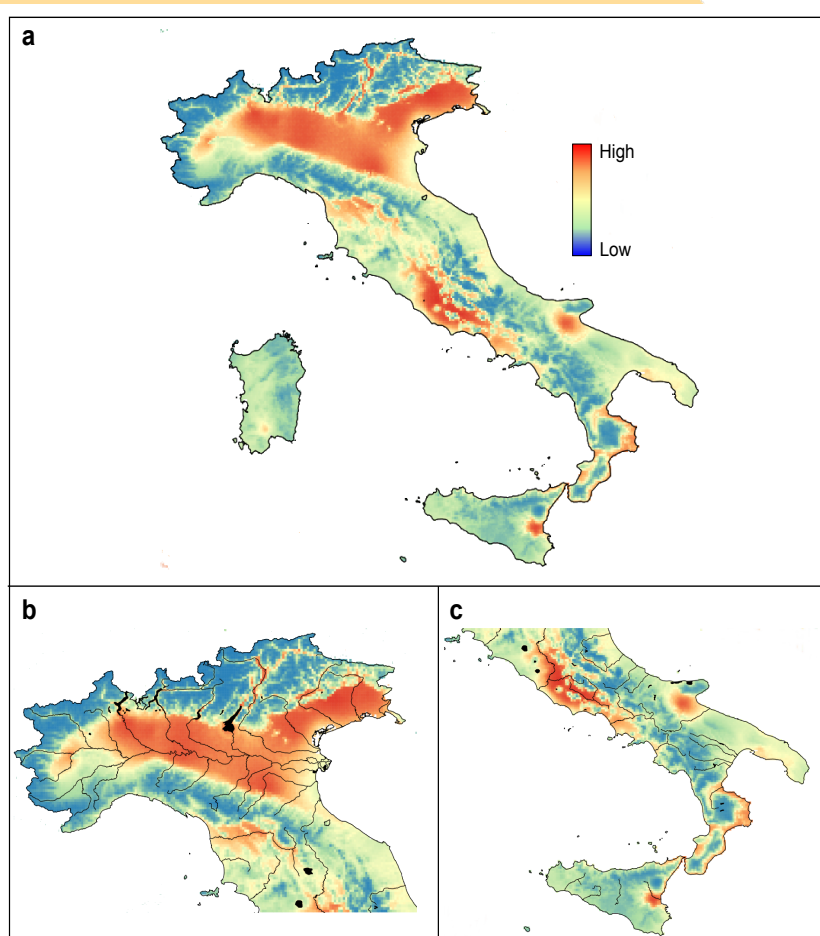


## R-Shiny Apps





# Invasion risk maps



**An important feature of our models is that it considers simultaneously different taxa and habitats, giving a picture of invasion dynamics not related to a single species.**

**In principle we can use this model to create an invasion risk map for the entire Italy.**