ASSESSING HABITATS VULNERABILITY - A MACROECOLOGICAL APPROACH WITHIN THE LIFEWATCH ITALY "ALIEN SPECIES SHOW CASE"

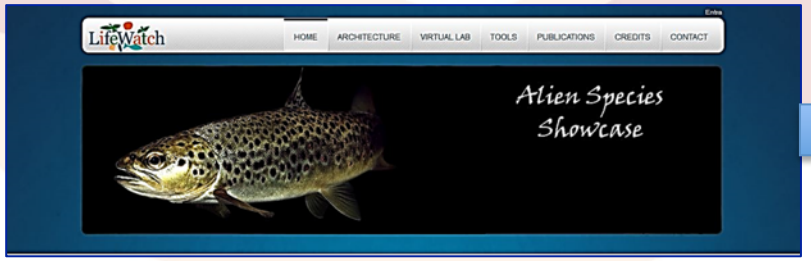
Cataldo Pierri

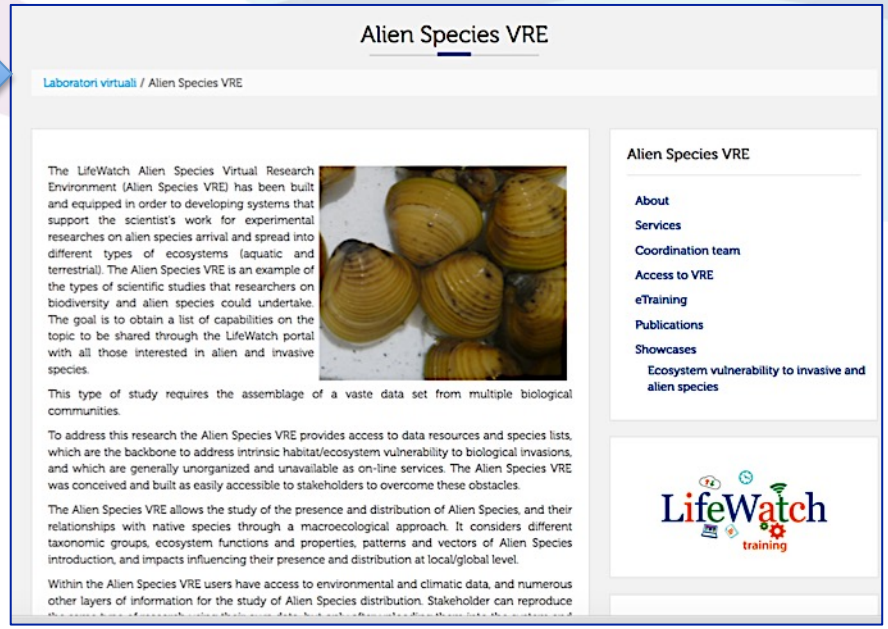
CNR_IBAF – ROMA, Department of Biology – BARI, LifeWatch Italia

and P. Colangelo, C. Bergami, B. Balech, F. Cianferoni, S. De Felici, N. Fiore, A. Oggioni, P. Tagliolato, I. Rosati, A. Boggero

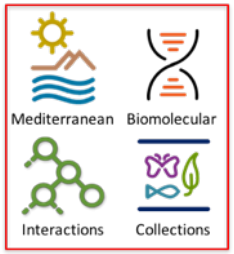
Earth and Environmental Sciences are rapidly entering the new paradigm of large scale, data-intensive analytics to understand our complex and ever changing planet

AS are considered one of the major threat to biodiversity, even though their role is going to be reconsidered



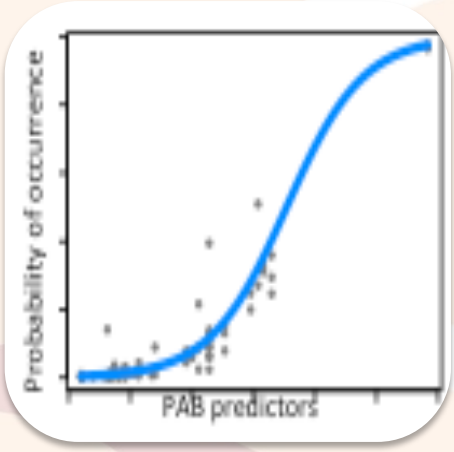


the case study of alien species LifeWatch has a core represented by a database of biotic resources (occurrence) and abiotic resources (linked to geo-referenced sites)



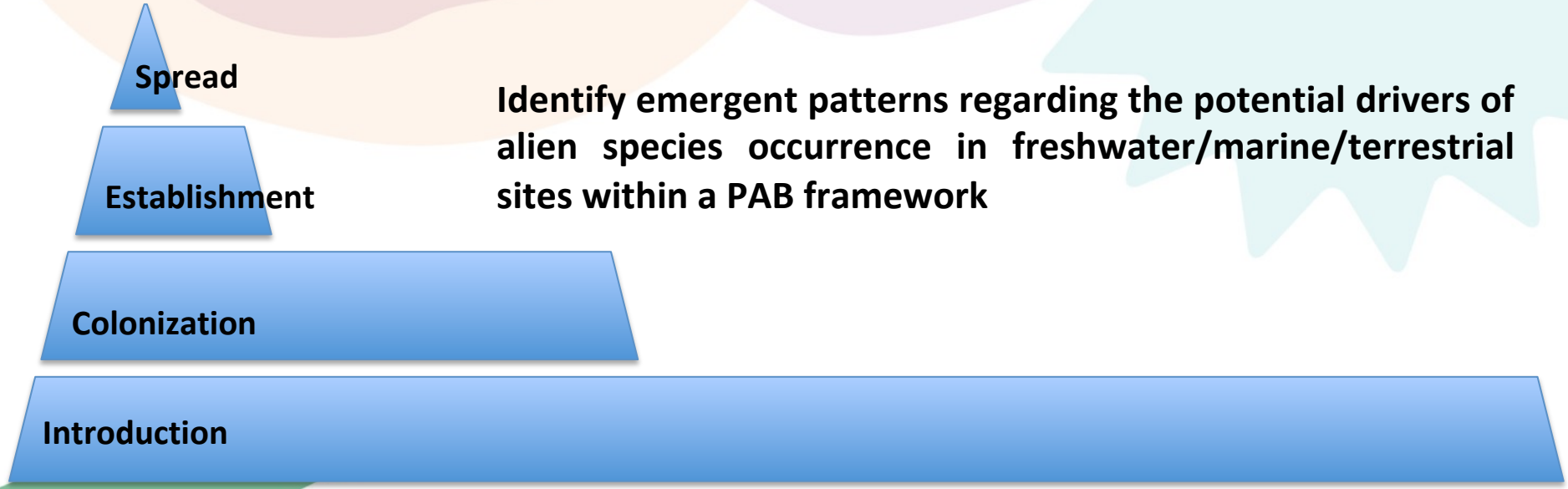
ICT group

a **macroecological** approach to invasion biology!



Habitat vulnerability
Are different systems/habitat more susceptible to invasion?

Invasion drivers
Which abiotic, biotic and pressure attributes of the recipient site affect invasion probabilities (presence/absence)?



Identify emergent patterns regarding the potential drivers of alien species occurrence in freshwater/marine/terrestrial sites within a PAB framework

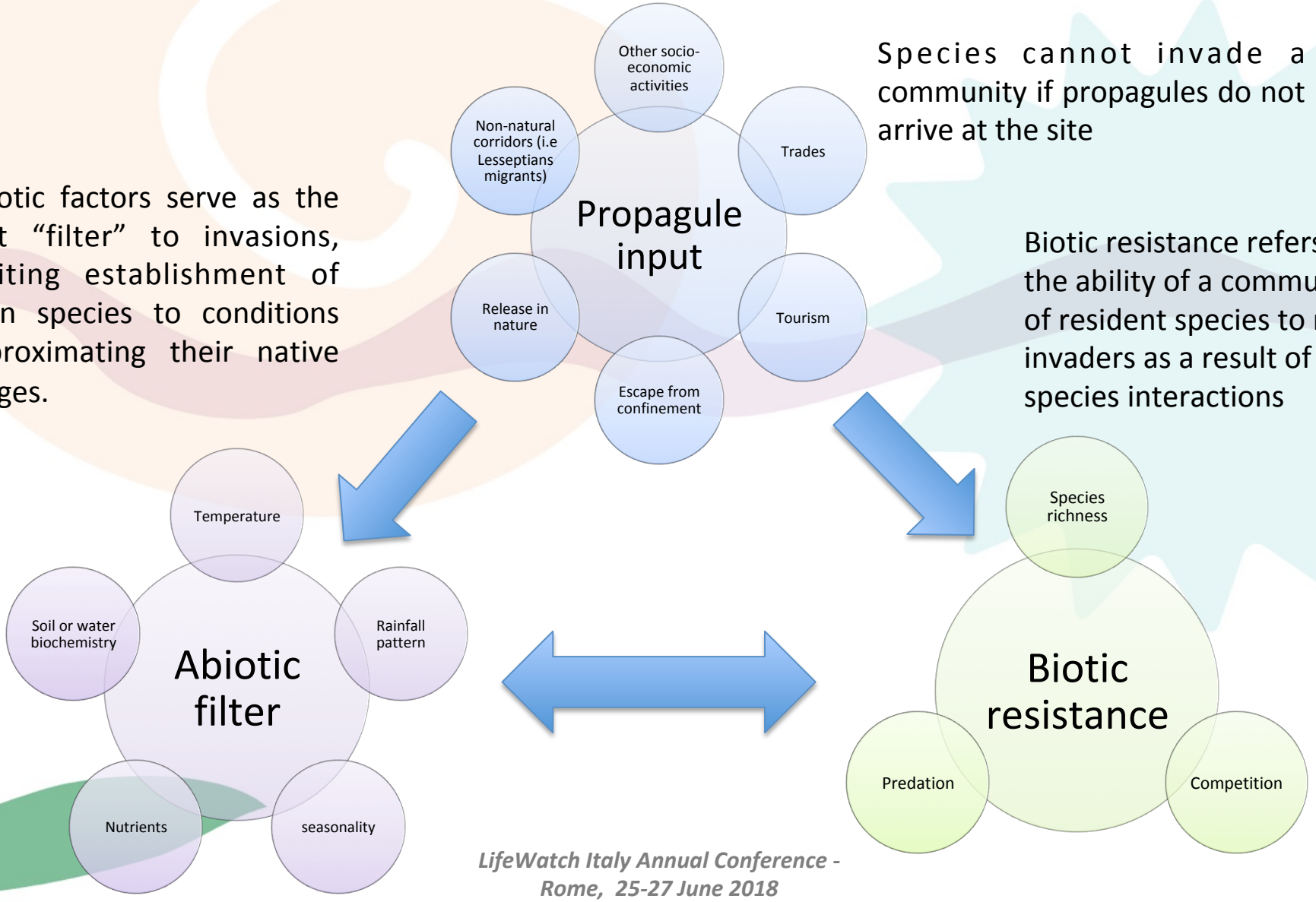
Catford, J., Jansson, R., Nilsson, C. (2009). "Reducing redundancy in invasion ecology by integrating hypotheses into a single theoretical Framework".

The Propagule, Abiotic, Biotic framework

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

Abiotic factors serve as the first "filter" to invasions, limiting establishment of alien species to conditions approximating their native ranges.

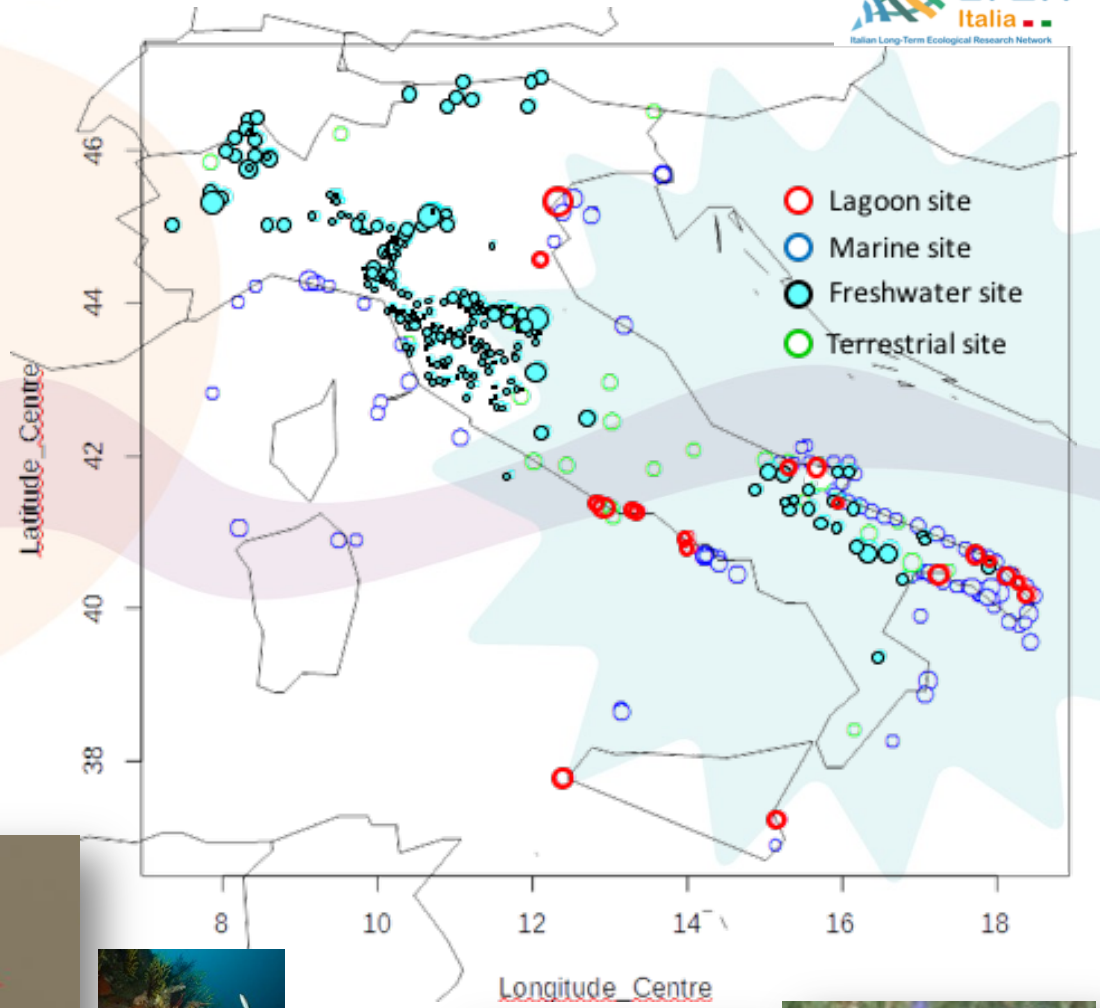
Biotic resistance refers to the ability of a community of resident species to repel invaders as a result of species interactions

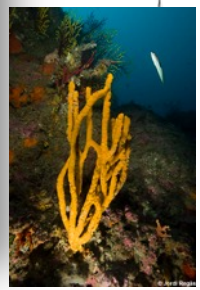


Data survey to ensure a good spatial and ecological coverage in Italy

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

EUNIS covers all types of habitat types from natural to artificial, terrestrial, freshwater and marine.

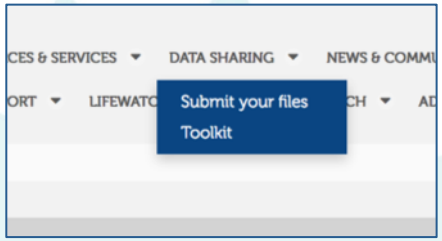




DATA ARE NOTHING IF NOT ORGANIZED AND QUALIFIED

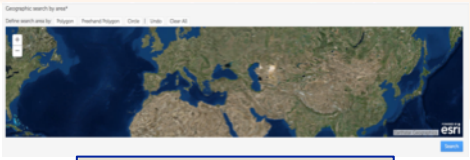
The available data are the real infrastructure

TOOLKIT

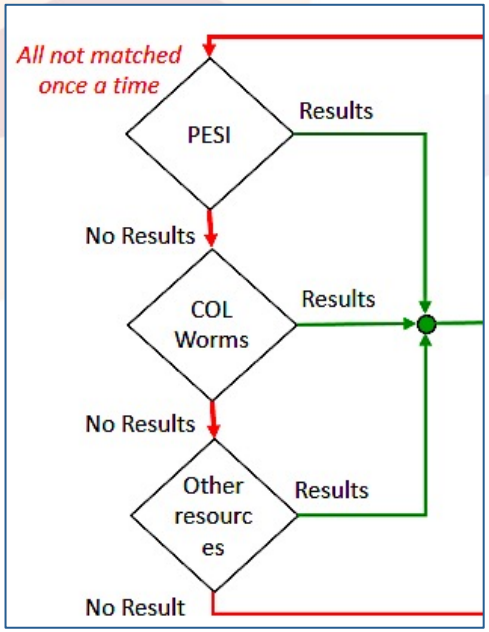


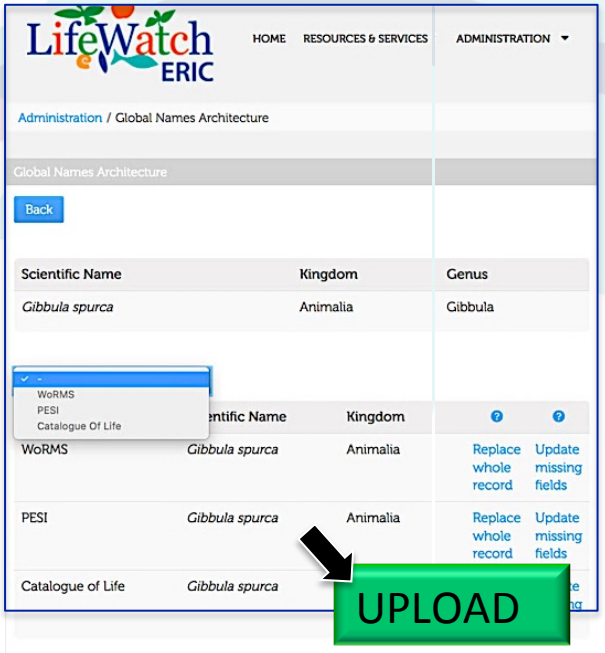
1) **DATA UPLOAD (tool kit)**
2) **DATA STANDARDIZATION (mapping, Darwin Core)**
3) **QUALITY CHECK (LW data validation, Global Name Architecture)**
4) **DATA AVAILABILITY (harvesting, acces, my knowledge, remote desktop)**

LifeWatch DATAPORTAL



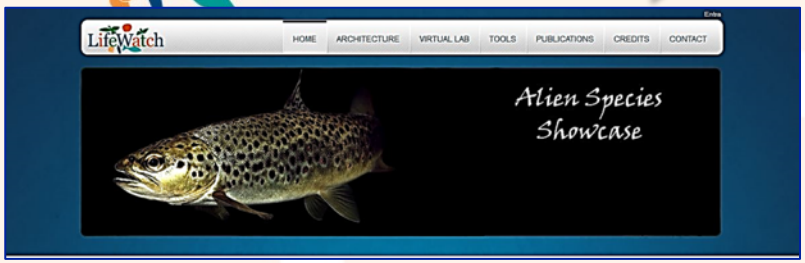
Findable
Accessible
Interoperable
Reusable



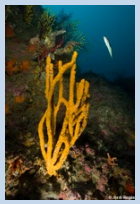


The FAIR Guiding Principles for scientific data management and stewardship

Wilkinson et al., 2016



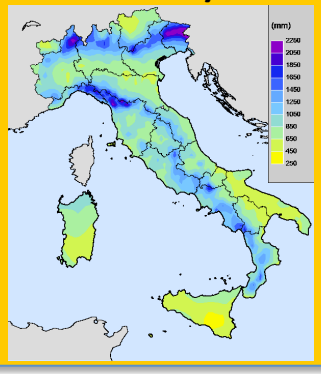
Original database
Many taxa, habitat, sites



MY KNOWLEDGE

Subsetting, reshaping

Variable extraction from rasters (pressure, abiotic, biotic)



Merging

Data matrix for modeling
(Non-normal distributed data)

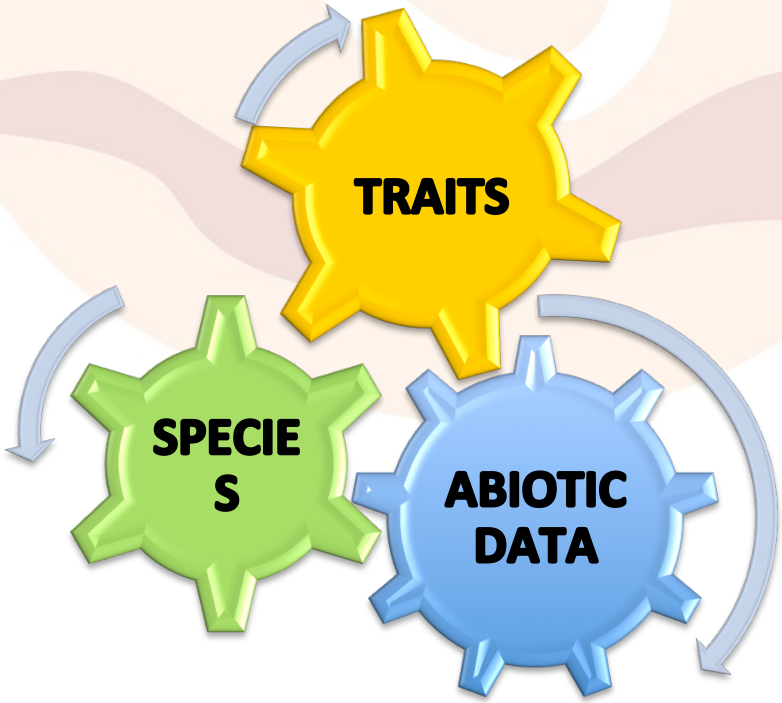
GLMM
General Linear Mixed Models

Presence/absence matrix

Ordination Techniques
PCA, MCA

Rarefaction curves

Scientific production in the framework of CT to test the functionality of the workflow



FRESHWATER INVADERS

MARINE INVADERS

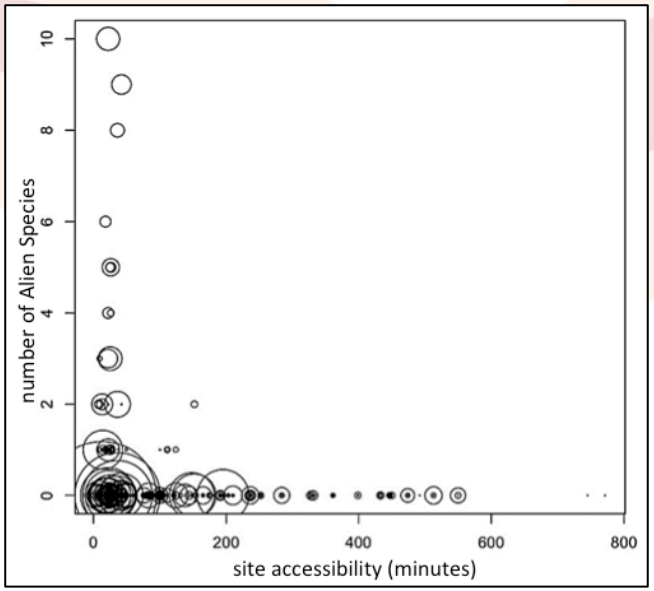
TERRESTRIAL INVADERS

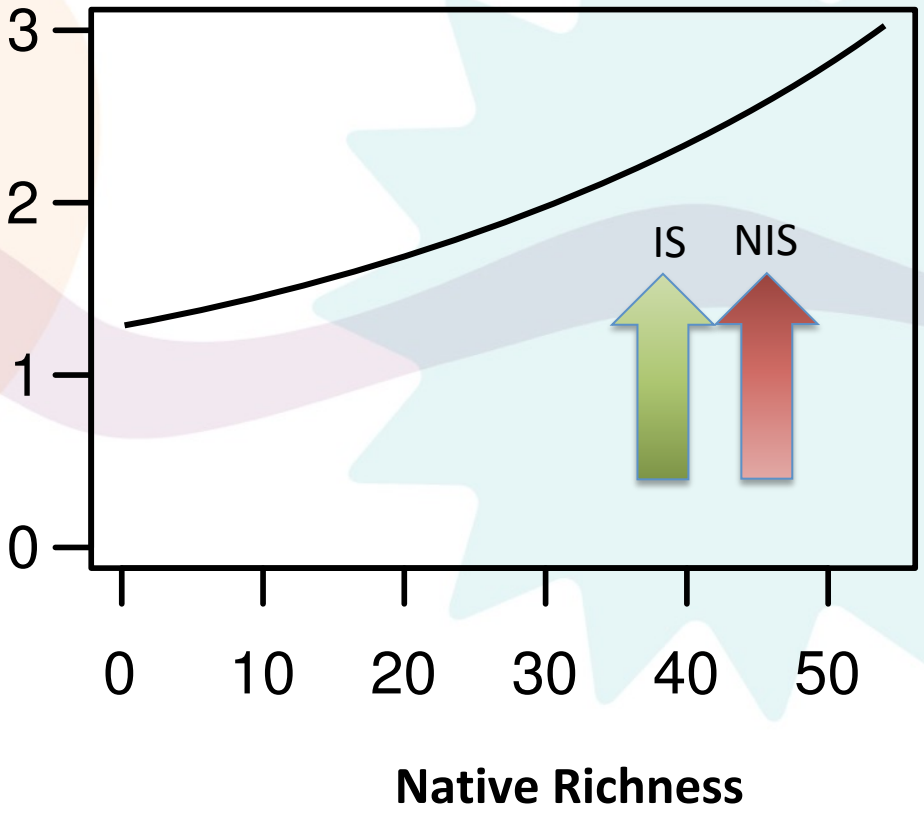
LAGOON INVADERS

Invasive freshwater species: an Italian case study

Italian freshwaters: a macroecological assessment of invasion drivers

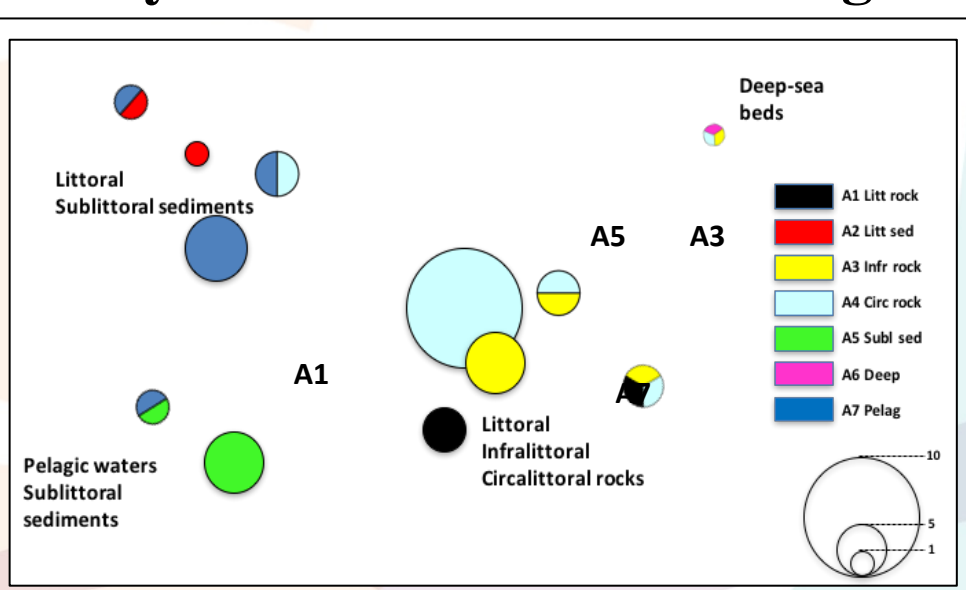
Positive correlation with accessibility, native Richness and temperature

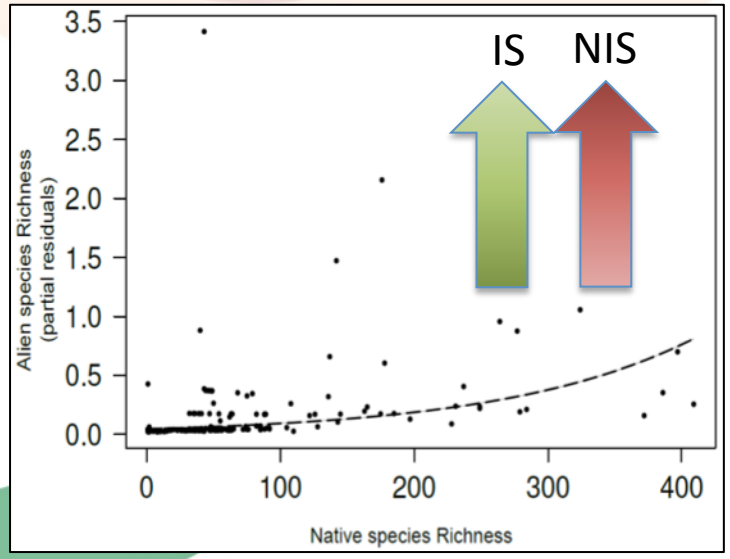


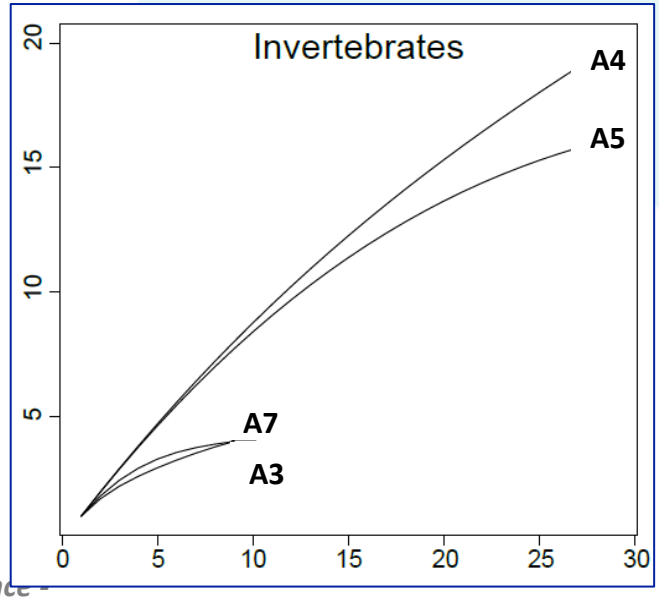


sites with high native richness can host new non-native species

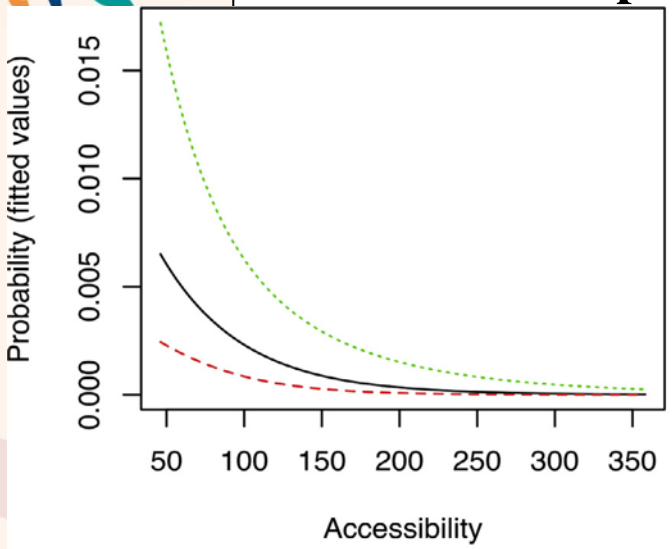
Ecosystem vulnerability to alien and invasive species: a case study on marine habitats along the Italian coast

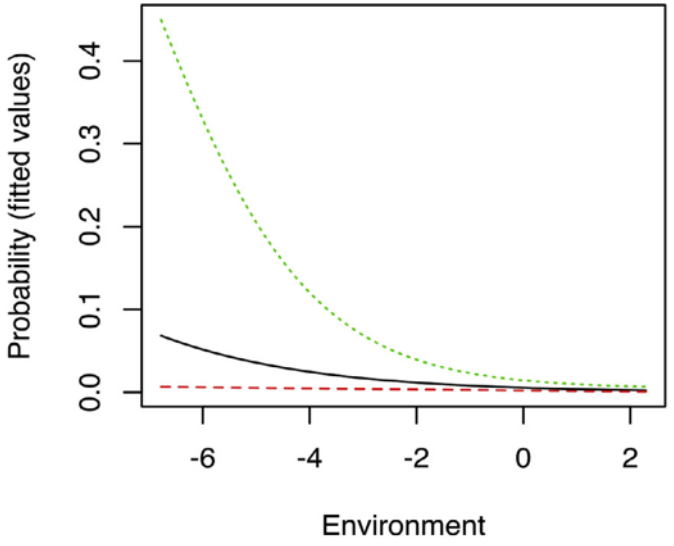


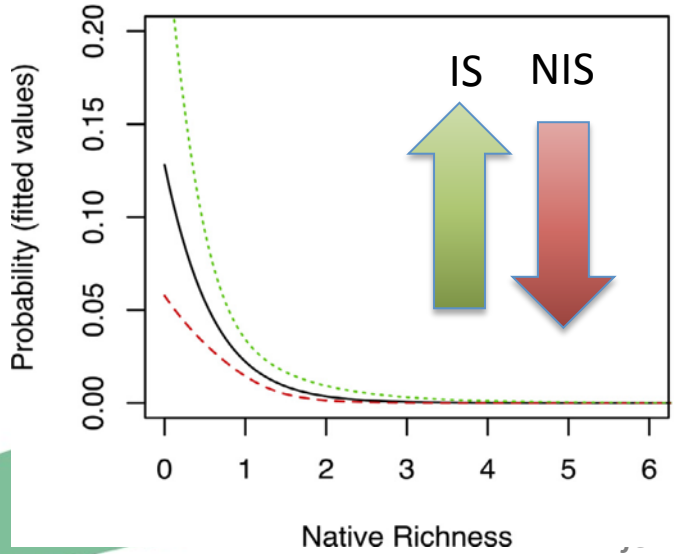




Plant invasions in Italy: an integrative approach using the European LifeWatch infrastructure database







	Estimate	Std Error	z value	Pr(>|z|)
Intercept	0.05052	1.28333	0.039	0.9686
P (Accessibility)	-0.01931	0.00884	-2.184	0.0289
A (Environment)	-0.38132	0.29641	-1.286	0.1983
B (Native richness)	-1.86734	0.80888	-2.308	0.0210

Validation of statistical models using peer-reviewed papers

Aquatic Invasions (2017) Volume 12, Issue 3: 299–309
DOI: https://doi.org/10.3391/ai.2017.12.3.04
© 2017 The Author(s). Journal compilation © 2017 REABIC

Open Access

Special Issue: Invasive Species in Inland Waters

Research Article

Alien species in Italian freshwater ecosystems: a macroecological assessment of invasion drivers

Paolo Colangelo[1,14,*], Diego Fontaneto[1], Aldo Marchetto[1], Alessandro Ludovisi[2], Alberto Basset[3,14], Luca Bartolozzi[4,14], Isabella Bertani[5], Alessandro Campanaro[6], Antonella Cattaneo[7], Fabio Cianferoni[4,14], Giuseppe Corriero[8,14], Gentile Francesco Ficetola[9,10], Francesco Nonnis-Marzano[11], Cataldo Pierri[8,14], Giampaolo Rossetti[12], Ilaria Rosati[13,14] and Angela Boggero[1,14]

AQUATIC CONSERVATION: MARINE AND FRESHWATER ECOSYSTEMS
Aquatic Conserv: Mar. Freshw. Ecosyst. (2014)
Published online in Wiley Online Library
(wileyonlinelibrary.com). DOI: 10.1002/aqc.2450

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

ANGELA BOGGERO[a], ALBERTO BASSET[b], MARTINA AUSTONI[a], ENRICO BARBONE[c], LUCA BARTOLOZZI[d], ISABELLA BERTANI[e], ALESSANDRO CAMPANARO[f], ANTONELLA CATTANEO[g], FABIO CIANFERONI[d], GIUSEPPE CORRIERO[b], AMBROSIUS MARTIN DÖRR[i], A. CONCETTA ELIA[i], GENTILE FRANCESCO FICETOLA[j], LYUDMILA KAMBURSKA[a], GIANANDREA LA PORTA[i], SARA LAUCERI[a], ALESSANDRO LUDOVISI[i], ELDA [illegible], GIUSEPPE [illegible], NICOLET[illegible]

Biogeographia – The Journal of Integrative Biogeography 31 (2016): 55–72

DATAPAPER: A geographic distribution data set of biodiversity in Italian freshwaters

ANGELA BOGGERO[1,2,*], CATALDO PIERRI[1,3], RENATE ALBER[4], MARTINA AUSTONI[2], ENRICO BARBONE[5], LUCA BARTOLOZZI[1,6], ISABELLA BERTANI[7,8], ALESSANDRO CAMPANARO[9], ANTONELLA CATTANEO[10], FABIO CIANFERONI[1,6], PAOLO COLANGELO[1,2], GIUSEPPE CORRIERO[1,11], AMBROSIUS MARTIN DÖRR[12], A. CONCETTA ELIA[12], G. FRANCESCO FICETOLA[13,14], DIEGO FONTANETO[2], ELDA GAINO[12], ENZO GORETTI[12], LYUDMILA KAMBURSKA[2], GIANANDREA LA PORTA[12], ROSARIA LAUCERI[2], MASSIMO LORENZONI[12], ALESSANDRO LUDOVISI[12], MARINA MANCA[2], GIUSEPPE MORABITO[2], FRANCESCO NONNIS MARZANO[12], ALESSANDRO OGGIONI[1,15], NICOLETTA RICCARDI[2], GIAMPAOLO ROSSETTI[7], PAOLO TAGLIOLATO[1,16], BERTHA THALER[4], NICOLA UNGARO[5], PIETRO [illegible], SILVIA ZAUPA[2], ILARIA ROSATI[1,3], NICOLA FIORE[1,17], ALBERTO BASSET[1,17], ALDO MARCHETTO[1]

AQUATIC CONSERVATION: MARINE AND FRESHWATER ECOSYSTEMS
Aquatic Conserv: Mar. Freshw. Ecosyst. (2015)
Published online in Wiley Online Library
(wileyonlinelibrary.com). DOI: 10.1002/aqc.2550

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

GIUSEPPE CORRIERO[a], CATALDO PIERRI[a,*], STEFANO ACCORONI[k], GIORGIO ALABISO[c], GIORGIO BAVESTRELLO[d], ENRICO BARBONE[c], MAURO BASTIANINI[f], ANNA MARIA BAZZONI[b], FABRIZIO BERNARDI AUBRY[f], FERDINANDO BOERO[b], MARIA CRISTINA BUIA[g], MARINA CABRINI[i], ELISA CAMATTI[f], FRINE CARDONE[a], BRUNO CATALETTO[i], RICCARDO CATTANEO VIETTI[d], ESTER CECERE[c], TAMARA CIBIC[i], PAOLO COLANGELO[i], ALESSANDRA DE OLAZABAL[i], GIANFRANCO D'ONGHIA[a], STEFANIA FINOTTO[f], NICOLA FIORE[b], DANIELA FORNASARO[i], SIMONETTA FRASCHETTI[b], MARIA CRISTINA GAMBI[g], ADRIANA GIANGRANDE[b], CINZIA GRAVILI[b], ROSANNA GUGLIELMO[g], CATERINA LONGO[a], MAURIZIO LORENTI[g], ANTONELLA LUGLIÈ[h], PORZIA MAIORANO[a], MARIA GRAZIA MAZZOCCHI[g], MARIA MERCURIO[a], FRANCESCO MASTROTOTARO[a], MICHELE MISTRI[j], MARINA MONTI[i], CRISTINA MUNARI[j], LUIGI MUSCO[m], CARLOTTA NONNIS-MARZANO[a], BACHISIO MARIO PADEDDA[h], FRANCESCO PAOLO PATTI[g], ANTONELLA PETROCELLI[c], STEFANO PIRAINO[b], GIUSEPPE PORTACCI[c], ALESSANDRA PUGNETTI[f], SILVIA PULINA[h], TIZIANA ROMAGNOLI[k], ILARIA ROSATI[b], [illegible]

Contents lists available at ScienceDirect

Ecological Indicators

journal homepage: www.elsevier.com/locate/ecolind

Original Articles

Plant invasions in Italy: An integrative approach using the European LifeWatch infrastructure database

Marco Malavasi[a,*], Alicia Teresa Rosario Acosta[b], Maria Laura Carranza[c], Luca Bartolozzi[d,o], Alberto Basset[e,o], Mauro Bassignana[f], Alessandro Campanaro[g], Roberto Canullo[h], Francesca Carruggio[i], Viviana Cavallaro[i,j], Fabio Cianferoni[d,o], Claudia Cindolo[k], Cristiana Cocciuffa[k], Giuseppe Corriero[j,o], Francesco Saverio D'Amico[i,j], Luigi Forte[i,j], Michele Freppaz[l], Francesca Mantino[i], Giorgio Matteucci[m,o], Cataldo Pierri[j,o], Angela Stanisci[c], Paolo Colangelo[n,o]

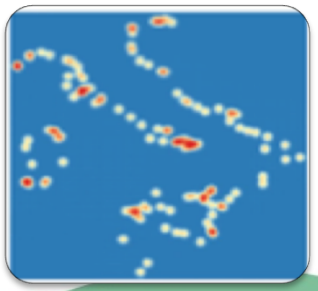
Conclusions

- **MORE DATA**
- **MORE ENVIRONMENTAL DRIVERS**
- **INVESTIGATE THE BIOLOGICAL FILTER**
- **PREDICT HIGH RISK AREAS FOR AS?**

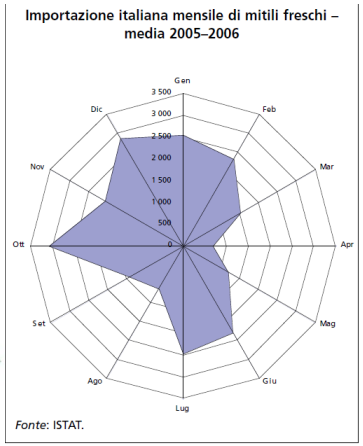
GLMM and GAMM

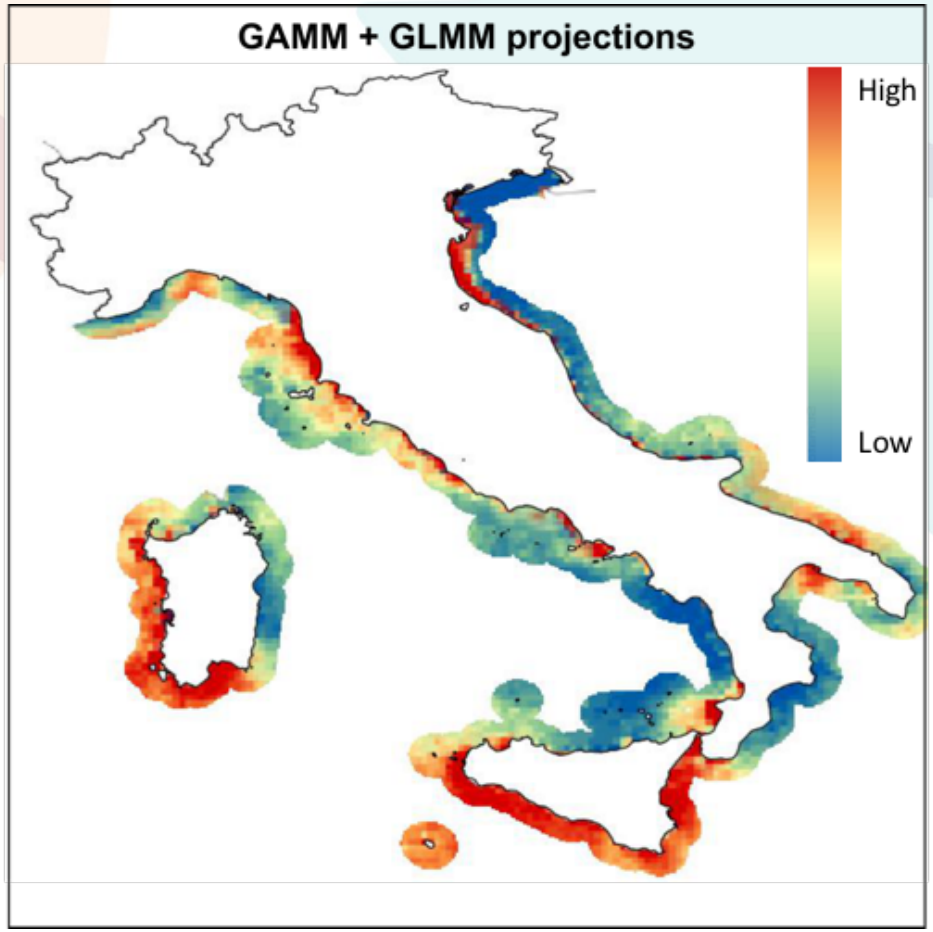
- Abiotic:
  - Temperature
  - Chlorophyll
  - Dissolved Oxygen
  - Diffuse Attenuation
  - Photosyntetically avaliable radiation
- Pressure
  - Maritime traffic
  - Mollusch farms?
- Random effect
  - geographic & taxonomic bias

Mussel farms?



Difficult to measure!





THANKS FOR YOUR ATTENTION