JOURNÉES SCIENTIFIQUES

CeMEB

SERVICES ÉCOSYSTÉMIQUES

CONTRIBUTION DE LA NATURE À L'HOMME

28 NOV 2022

29 NOV 2022

SOLUTIONS FONDÉES SUR LA NATURE

UNIVERSITÉ MONTPELLIER | FRANCE 2030

Journée SFN organisée en partenariat avec :

BiodivOc Biodiversité Occitanie | La Région Occitanie Pyrénées - Méditerranée

The futures of reef services in the Anthropocene

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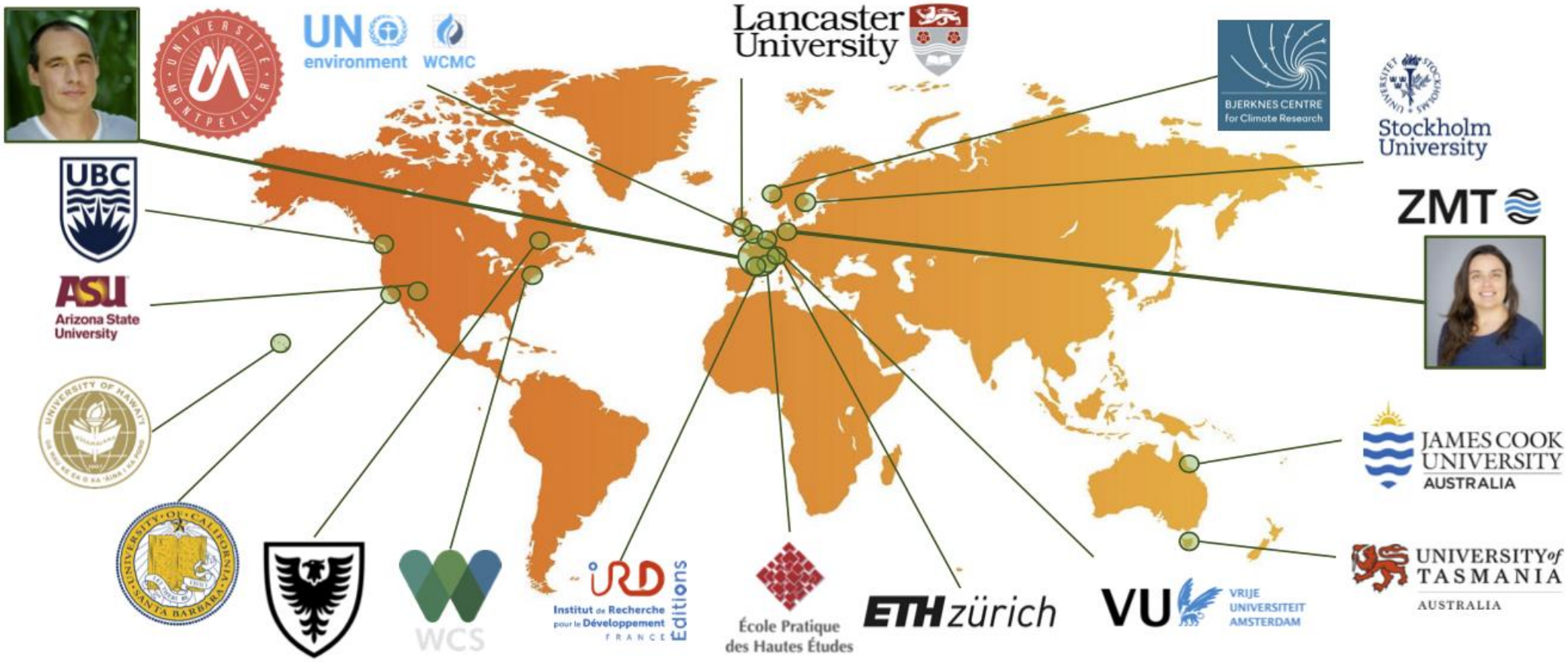
Université de Montpellier
Laboratoire MARBEC
Institut Universitaire de France

biodiversa+
European Biodiversity Partnership

Consortium

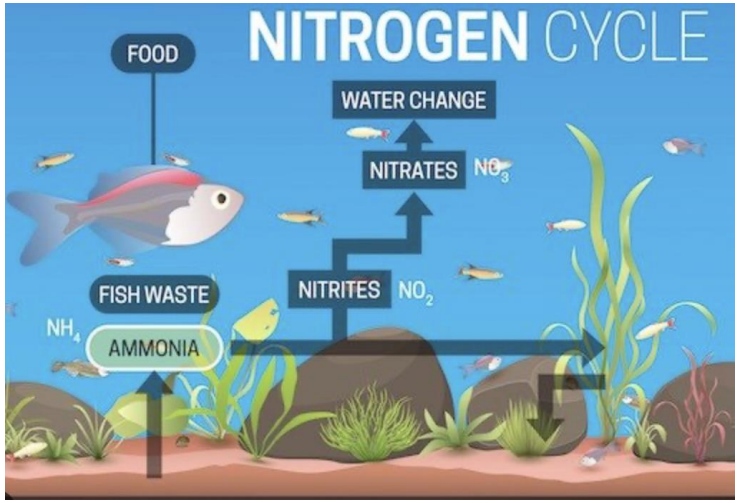


NSF DFG Deutsche Forschungsgemeinschaft German Research Foundation The Research Council of Norway NWO Netherlands Organisation for Scientific Research FORMAS NSERC CRSNG FNSNF ANR

1st Ambition

Beyond fish biomass and biodiversity: the need to estimate and predict Ecosystem Services or Nature's Contribution to People provided by reef fishes

- Biomass Production (g/m²/year), a flow-based rate measure
- Nutrient cycling that affects marine productivity (N, P)
- Regulation of the carbon cycle that affects CO_2 concentration
- Aesthetic value that sustains well-being and tourism
- Nutritional value insuring food security (zinc, iron, omega-3)

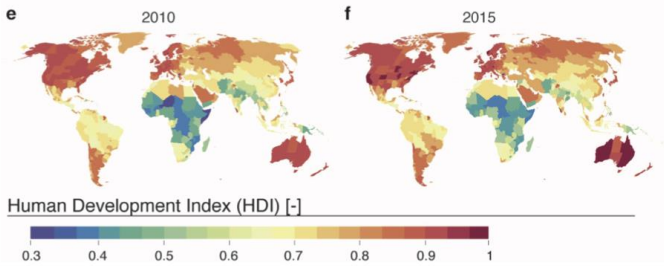


2nd Ambition

Beyond climate scenarios: the need and the challenge to build socioeconomic and institutional scenarios on shallow reefs

- Population density
- Human gravity (density/access)
- Human Development Index (HDI)
- Management, so protection measures

The World Population Prospects



30x30: protect 30 per cent of the world's oceans by 2030
Several levels of restrictions: No-Take vs. Partial MPA

Objectives

1. Quantifying for tropical and temperate shallow reefs globally five ecosystem services provided by reef fishes (RLS data)

2. Determine the conditions (social-environmental) under which these ecosystem services are currently maintained or threatened

3. Predict the potential futures of these services in social-ecological systems under various global change scenarios

4. Disseminate our results to stakeholders

REEF LIFE SURVEY

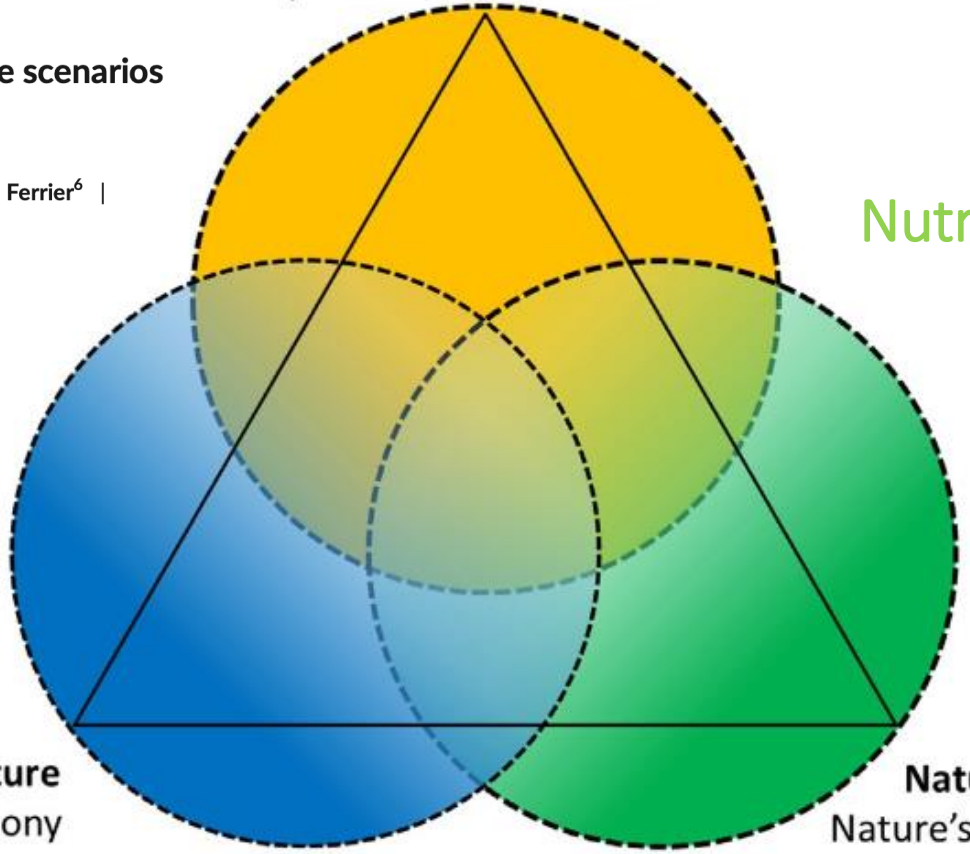
Services, NCP or NFF

RESEARCH ARTICLE

PEOPLE NATURE | BRITISH ECOLOGICAL SOCIETY

Developing multiscale and integrative nature–people scenarios using the Nature Futures Framework

Laura M. Pereira[1,2,3] | Kathryn K. Davies[4] | Eefje den Belder[5] | Simon Ferrier[6] |



Nutrient cycling (N, P, C)

Nutritional value

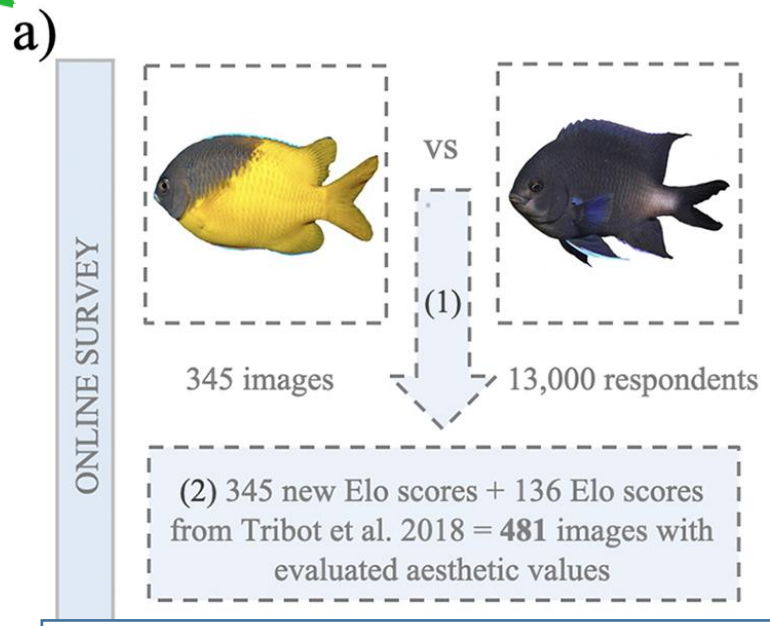
Biomass Production

Aesthetic value

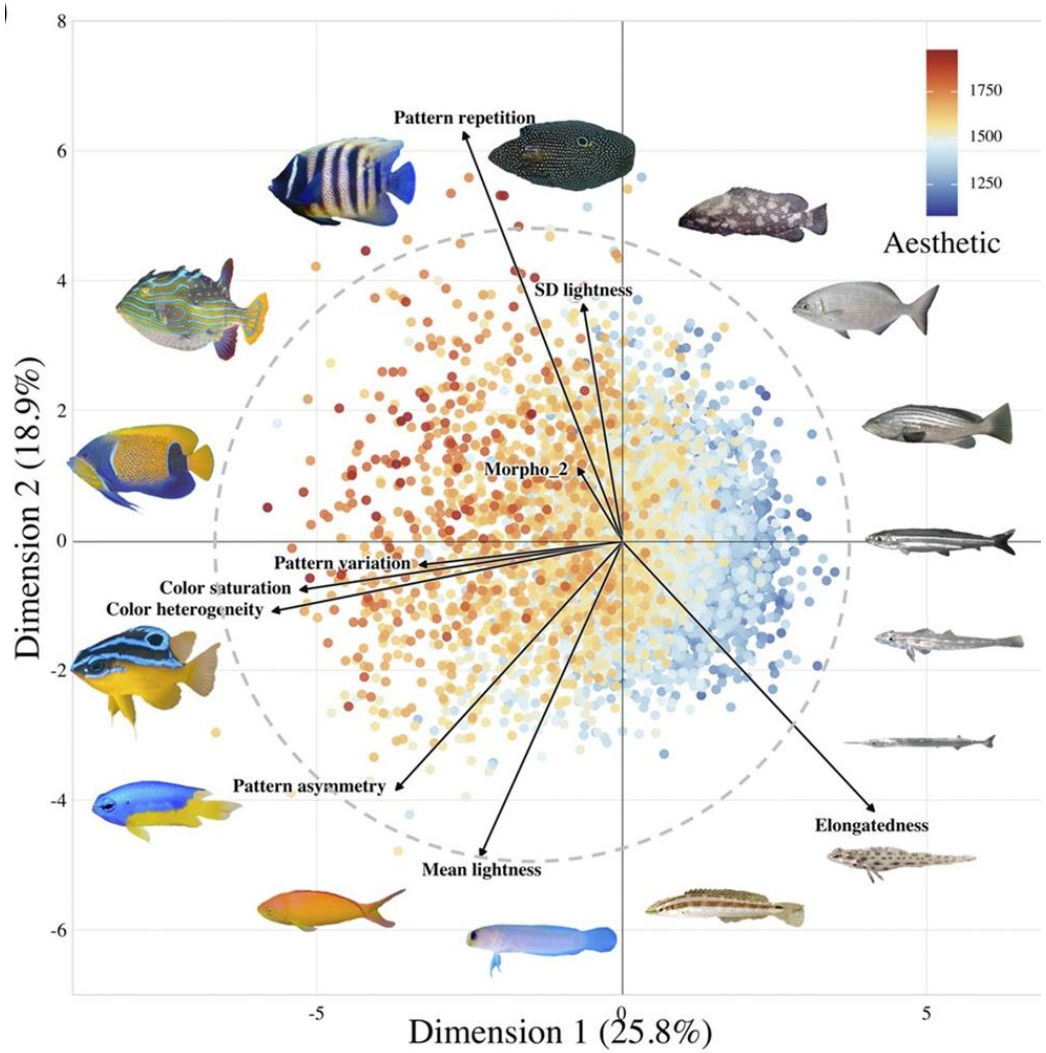
Services, NCP or NFF

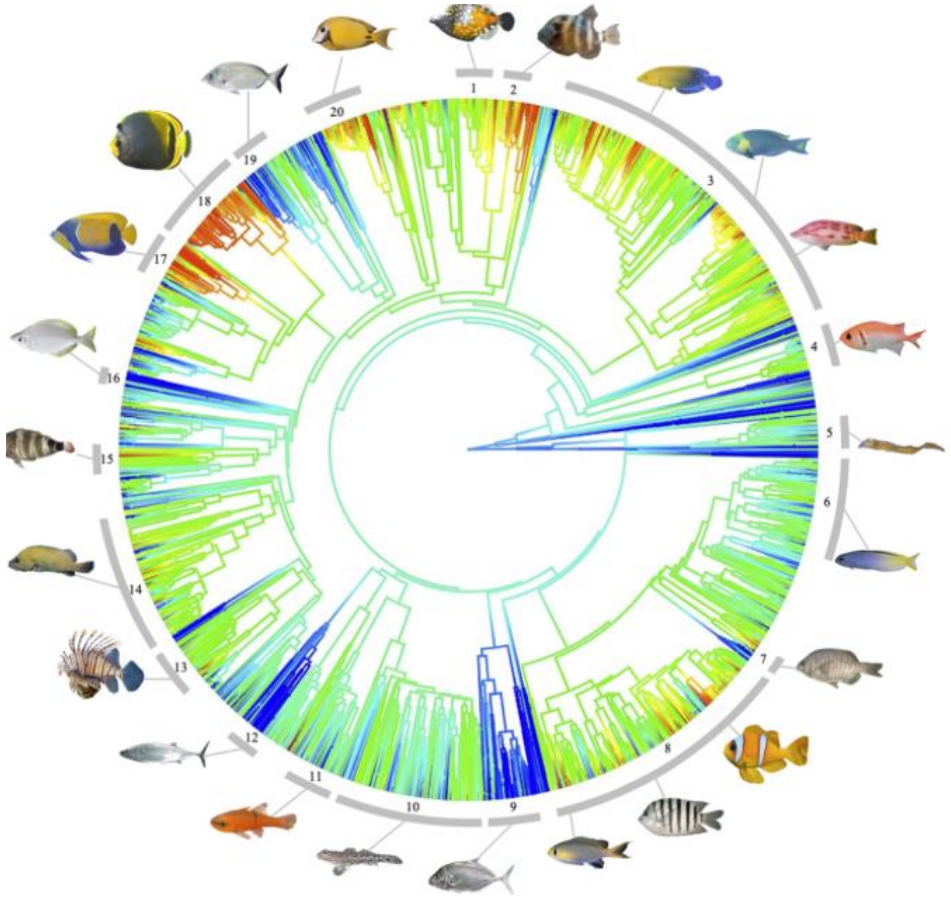
- Material NCP — Biomass Production — Nutritional value
- Non-material NCP — Aesthetic value
- Regulation NCP — Nutrient cycling (N, P, C)

Aesthetic value



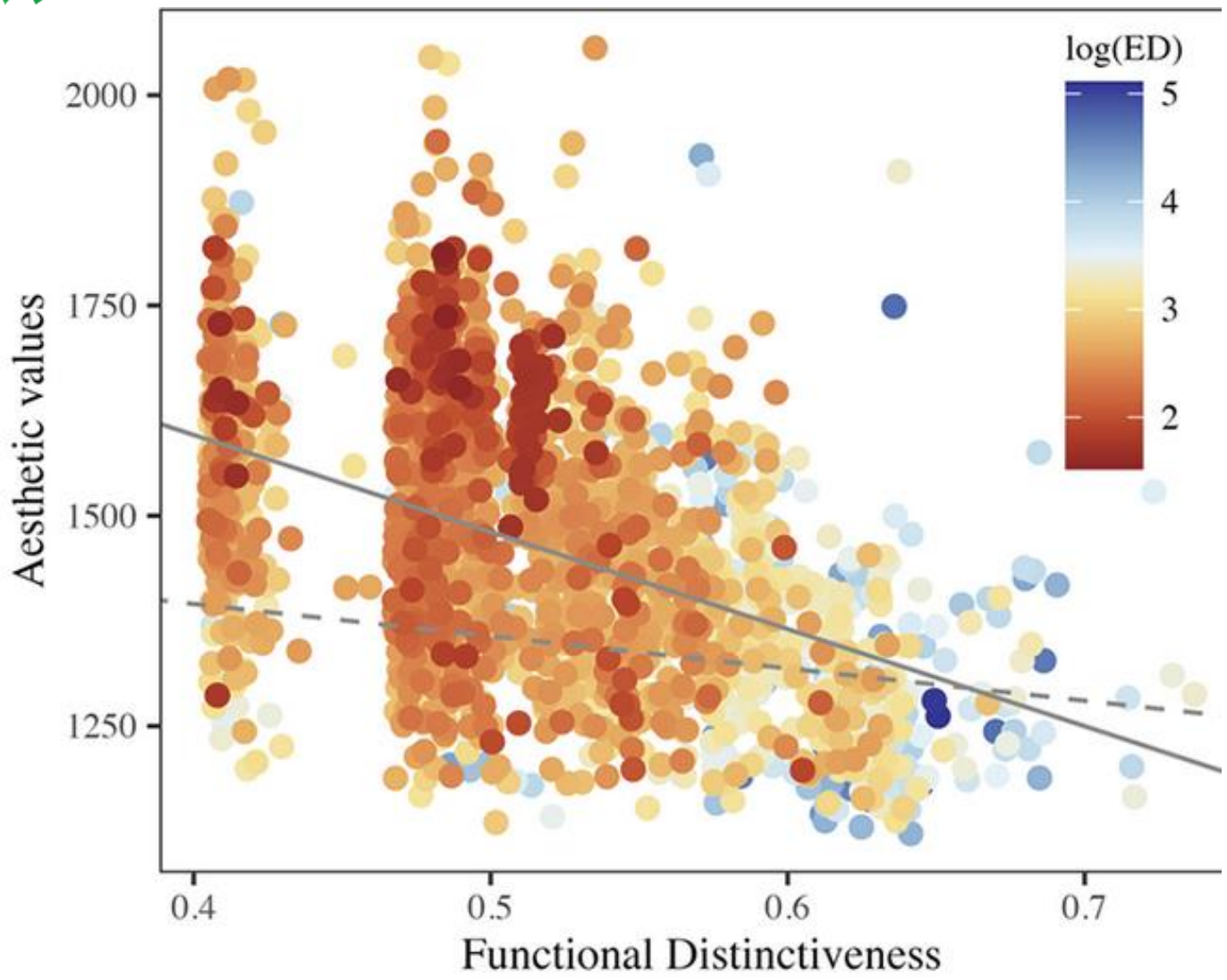
Aesthetic value

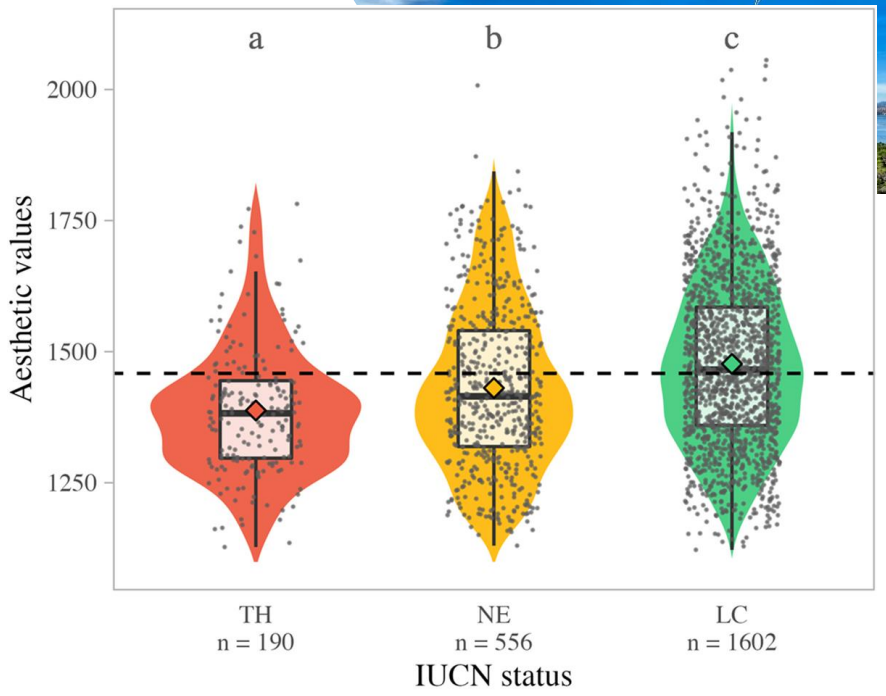


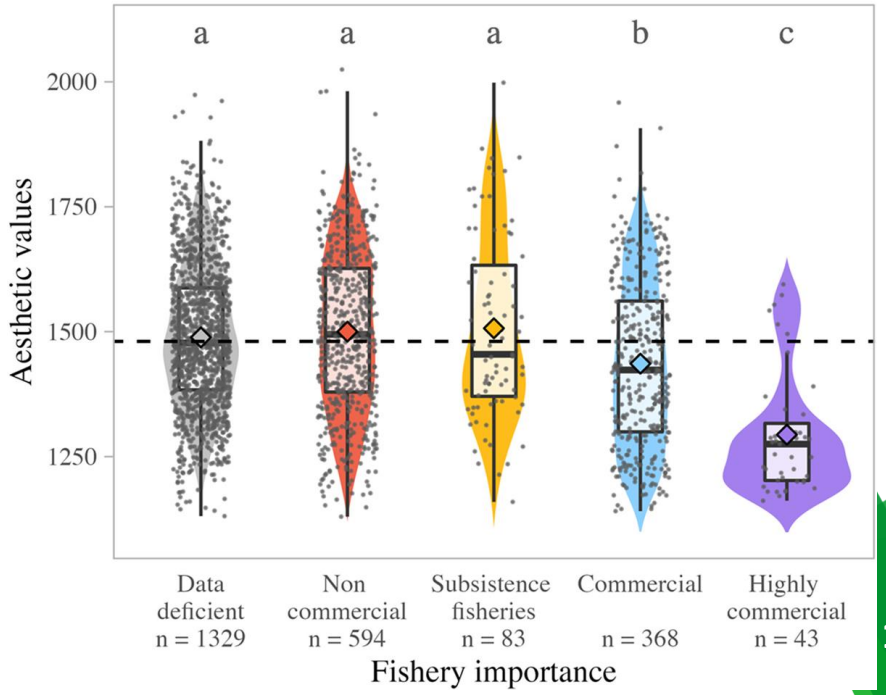


1. *Monacanthidae*
2. *Balistidae*
3. *Labridae & Scaridae*
4. *Holocentridae*
5. *Muraenidae*
6. *Blenniidae*
7. *Embiotocidae*
8. *Pomacentridae*
9. *Carangidae*
10. *Gobiidae*
11. *Apogonidae*
12. *Scombridae*
13. *Scorpaenidae*
14. *Serranidae*
15. *Cirrhitidae*
16. *Gerreidae*
17. *Pomacanthidae*
18. *Chaetodontidae*
19. *Sparidae*
20. *Acanthuridae*

Aesthetic value







Aesthetic value

PLOS BIOLOGY

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

The aesthetic value of reef fishes is globally mismatched to their conservation priorities

Juliette Langlois, François Guilhaumon, Florian Baletaud, Nicolas Casajus, Cédric De Almeida Braga, Valentine Fleuré, Michel Kulbicki, Nicolas Loiseau, David Mouillot, Julien P. Renoult, Aliénor Stahl, Rick D. Stuart Smith, Anne-Sophie Tribot, Nicolas Mouquet

Published: June 7, 2022 • https://doi.org/10.1371/journal.pbio.3001640

All that is gold does not glitter

Science News *from research organizations*

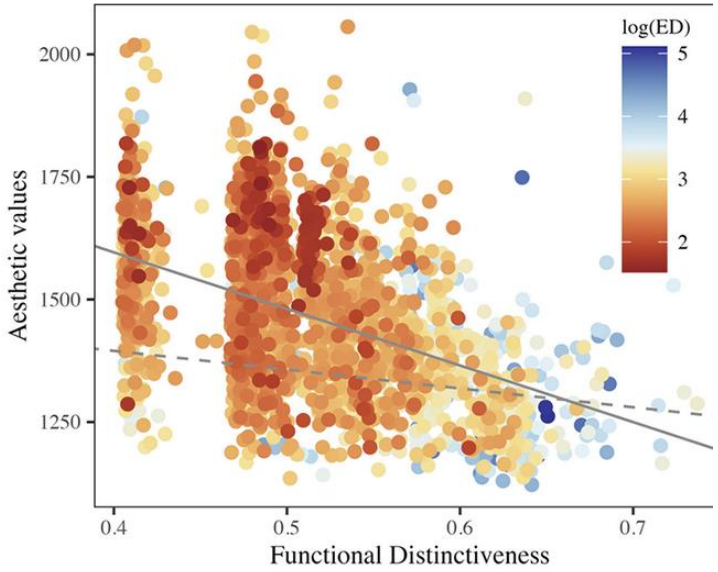
'Ugly' reef fishes are most in need of conservation support

Machine learning enables largest study to date on aesthetic preferences and fish ecology

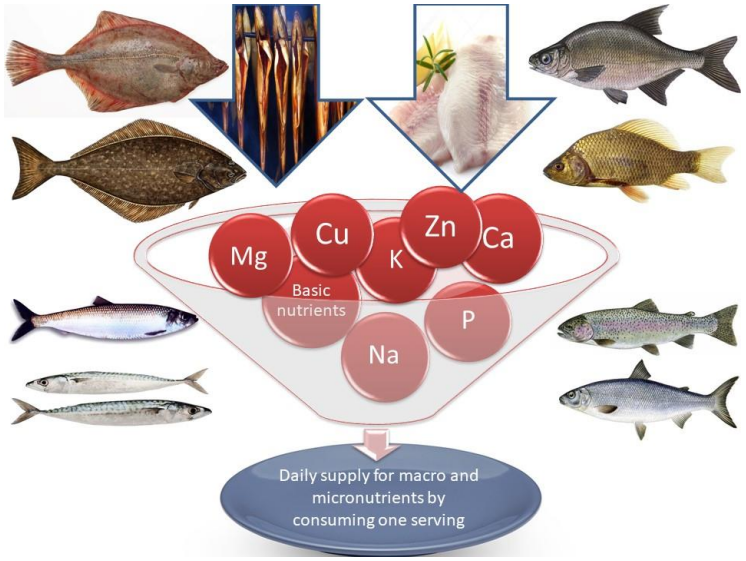
Date: June 8, 2022

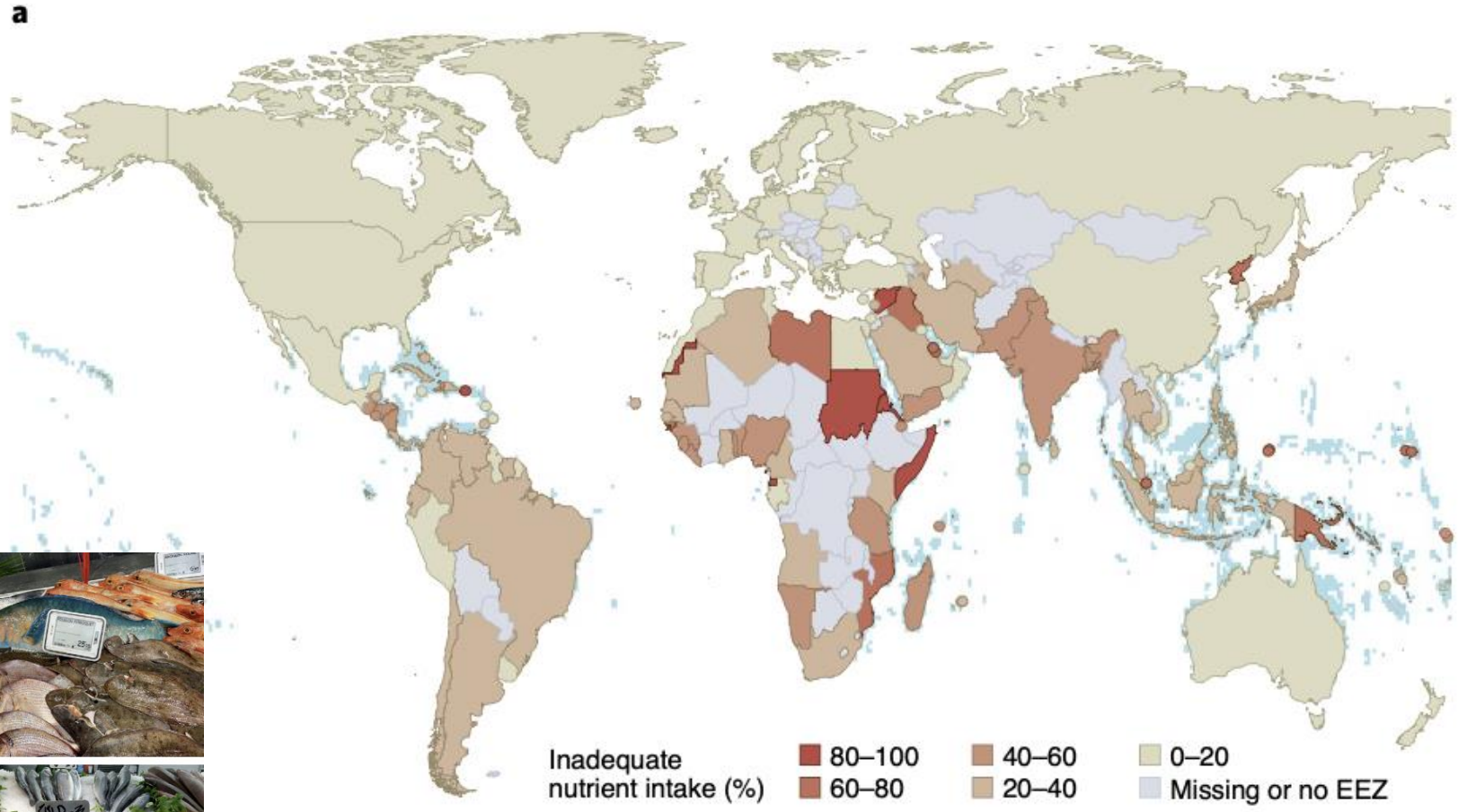
Source: PLOS

Summary: What's the relationship between people's perception of beauty and animals' conservation needs? According to a machine-learning study, the reef fishes that people find most beautiful tend to be the lowest priority for conservation support.

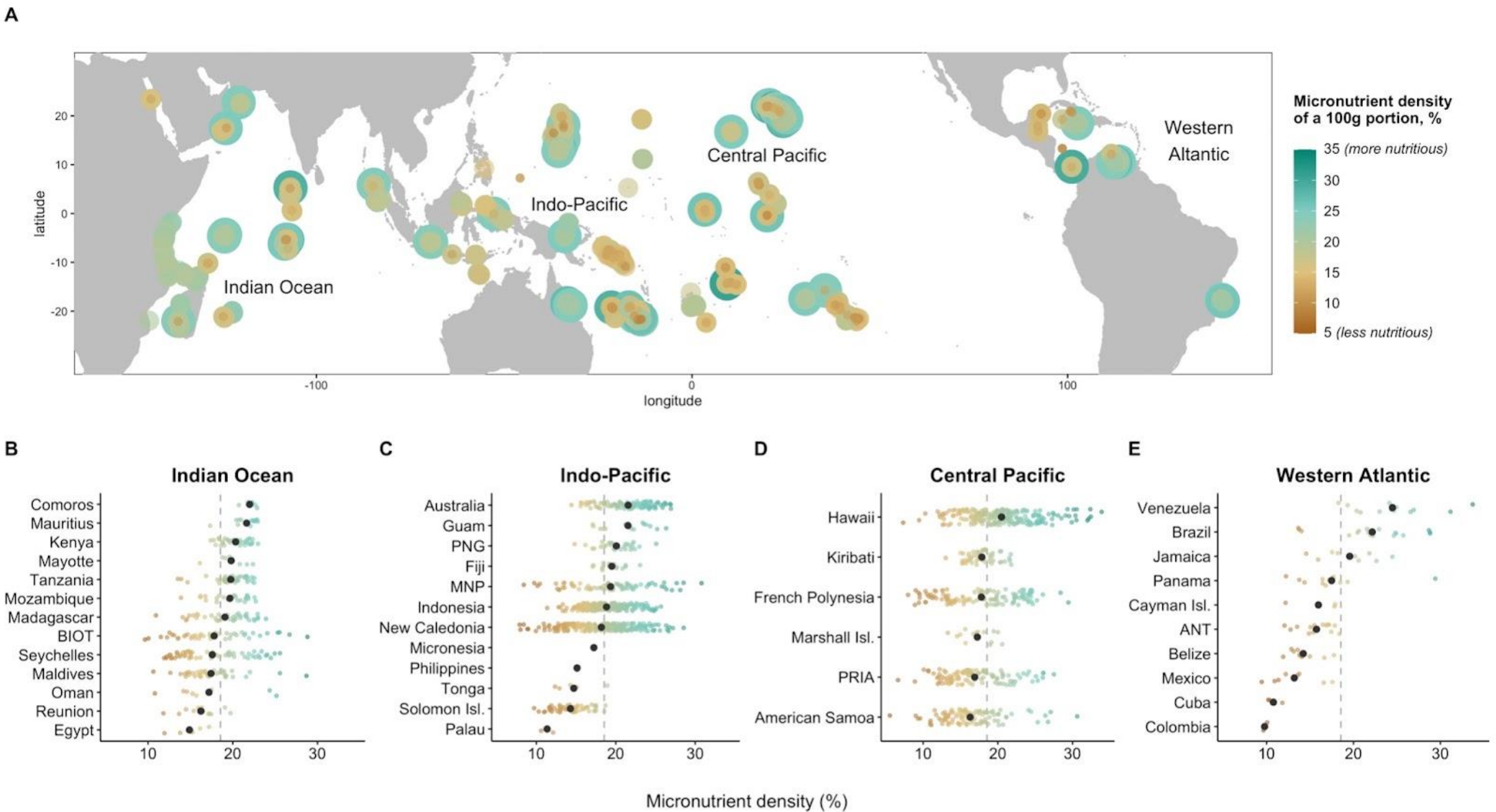


Nutritional value





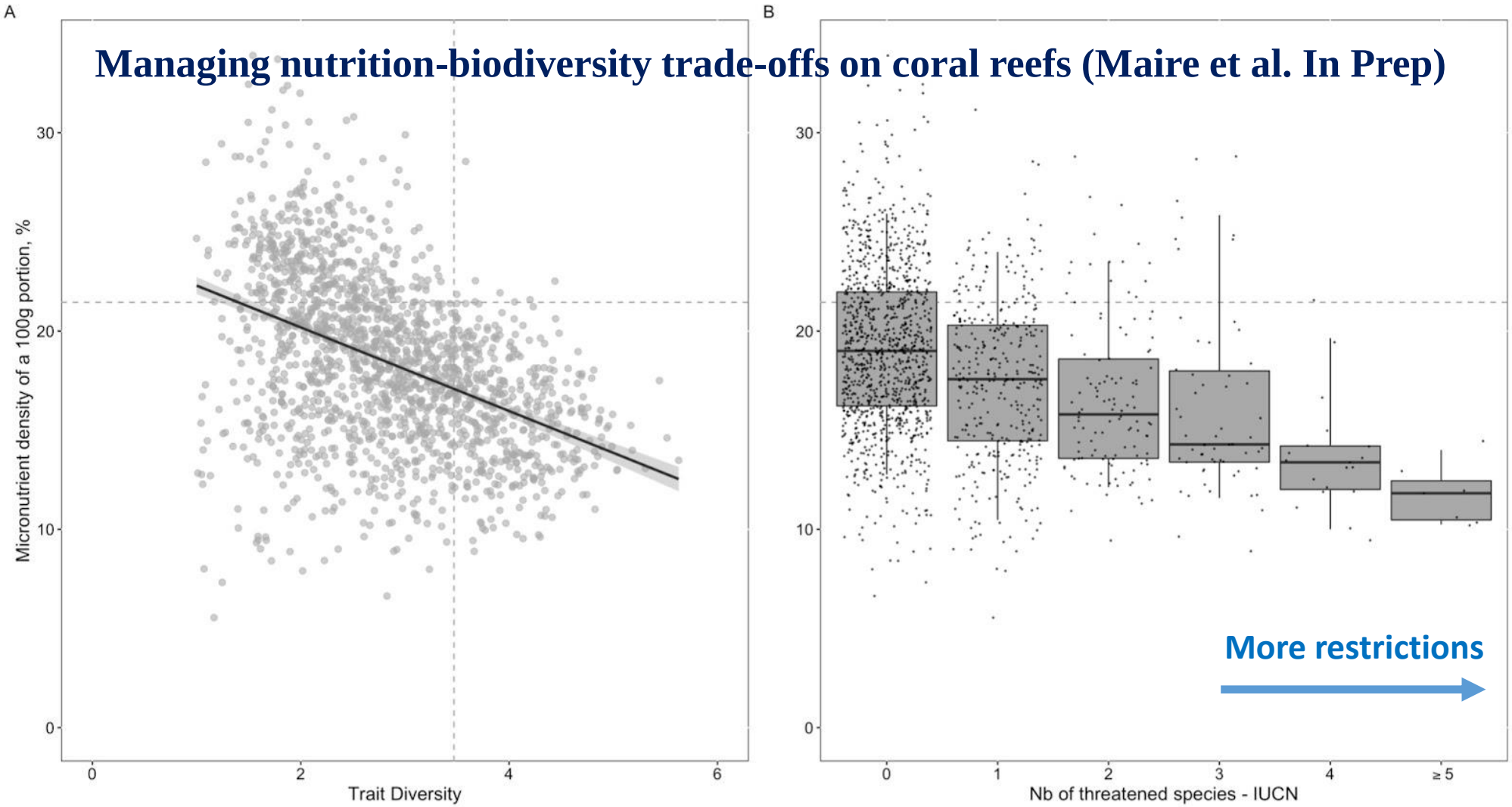
Nutritional value



Nutritional value

Managing nutrition-biodiversity trade-offs on coral reefs (Maire et al. In Prep)

Material NCP



Regulation NCP

Non-material NCP

Conclusions and Perspectives

- Many overlooked services – NCP beyond fish biomass and biodiversity

- Trade-offs between services – NCP, one species cannot do all

- Can coral reefs work for both People and Nature?

  A diversity of regulations (partial marine reserves, no-take areas) maximizes the diversity of supplied services – NCP at the regional scale

- What is the dimensionality of NCP on coral reefs?

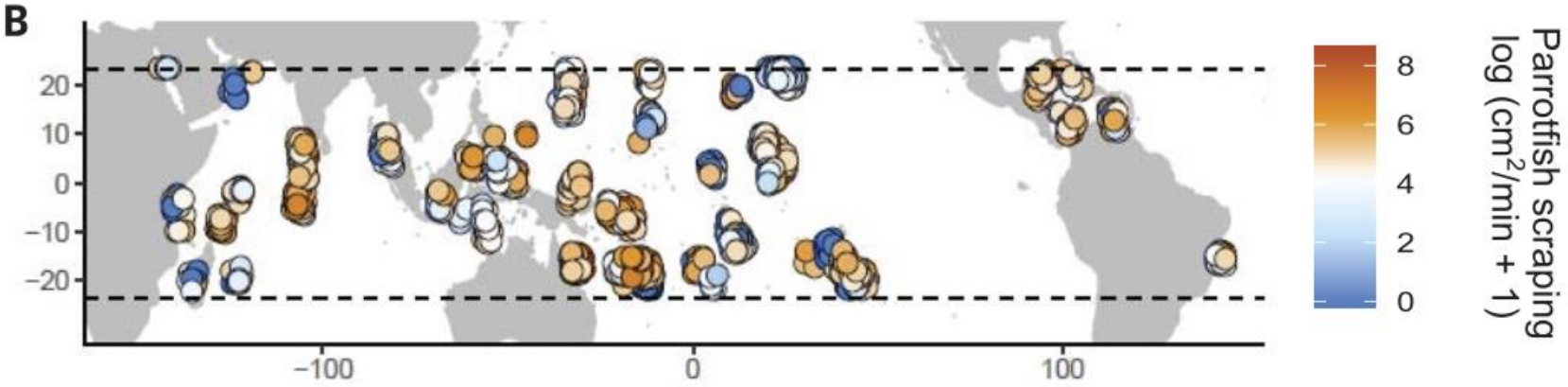
  High owning to independent services - NCP

Dissemination

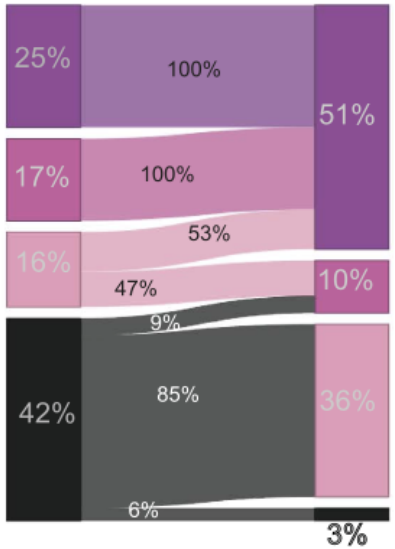
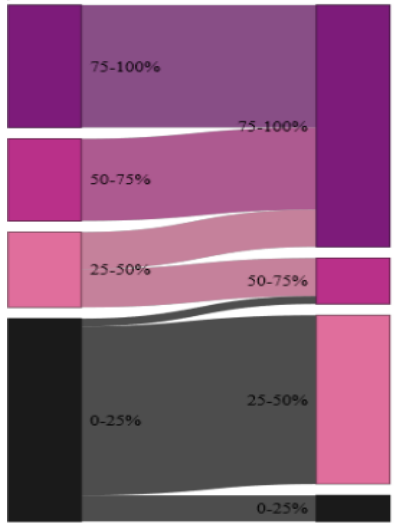
5th International Marine Protected Area Congress (IMPAC5)
Vancouver, Canada
Thursday , September 01, 2022 - Thursday , September 08, 2022

ICRS 2022 BREMEN
15TH INTERNATIONAL CORAL REEF SYMPOSIUM
03-08 JULY 2022

Management tool based on Machine Learning Models and Scenarios



No Take MPA



Partial MPA