Contributions de la biodiversité marine aux sociétés humaines : comment passer d'une approche corrélative à la causalité puis aux solutions basées sur la nature ?

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Membre Senior de l'Institut Universitaire de France

Contexte

PEPR SOLU-BIOD

Liens de causalité

How Much of the Ocean Is Protected?
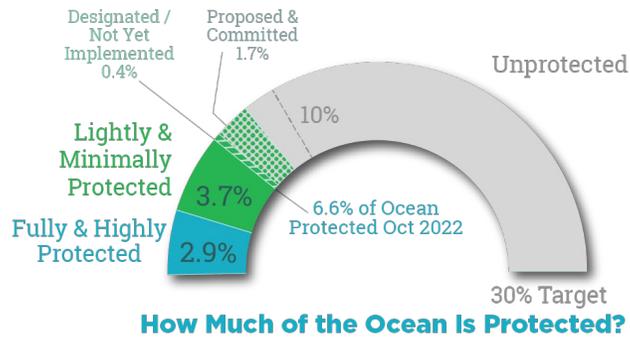
Protection

Restauration

#30x30
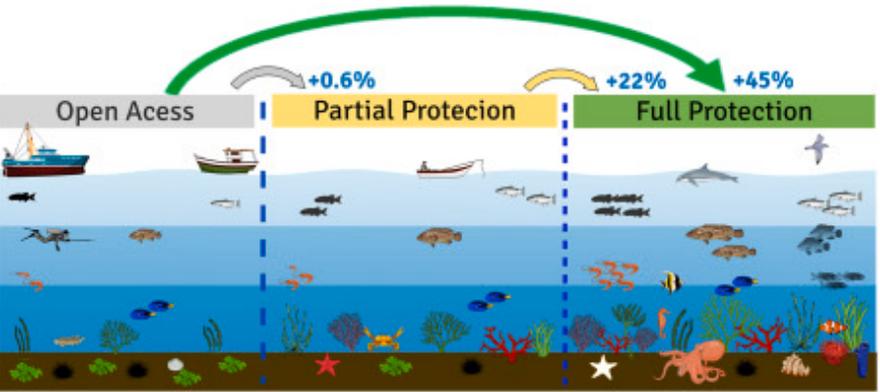
Cas d'étude

Nature for nature
Intrinsic value of nature
Space allocated for nature
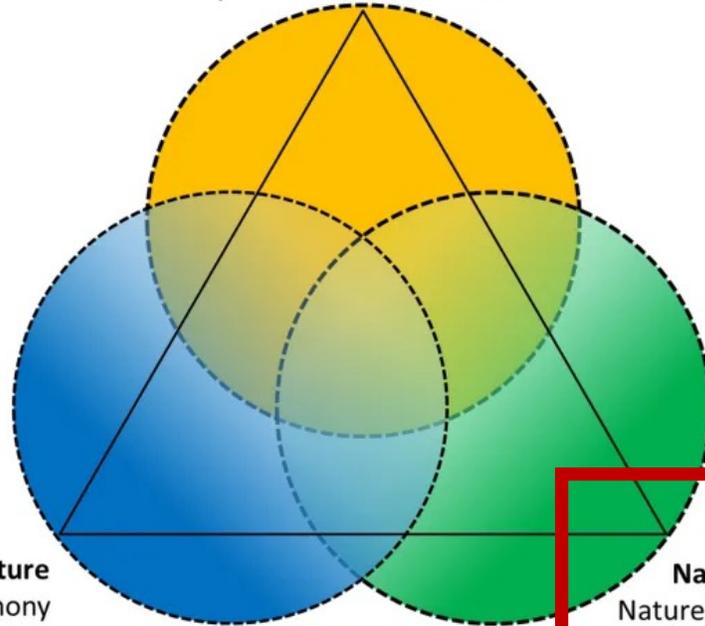
Nature as culture
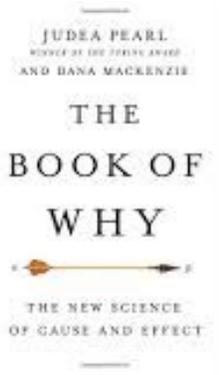Living in harmony
People one with nature

Nature for society
Nature's benefits to people
Ecosystem services
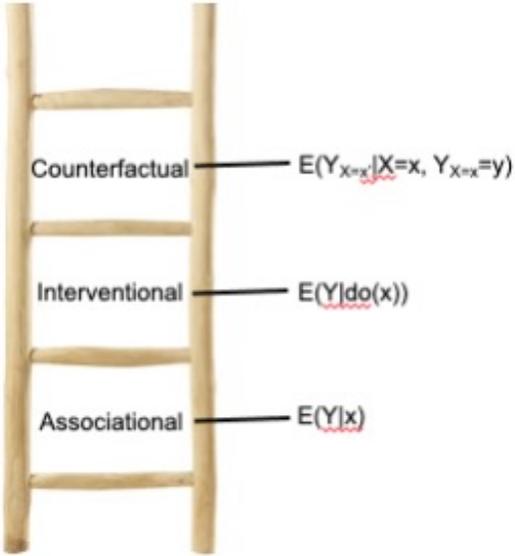
?

End Poverty in All its Forms Everywhere

1 NO POVERTY

Liens de causalité

Counterfactuals: (Imagining)

What would happen under different circumstances?

Interventions: (Doing)

How can I make [...] happen?

Associations: (Seeing)

How are variables related?

Counterfactual — $E(Y_{X=x}|X=x, Y_{X=x}=y)$

Interventional — $E(Y|do(x))$

Associational — $E(Y|x)$

Association AMP - Pauvreté

ANALYSIS

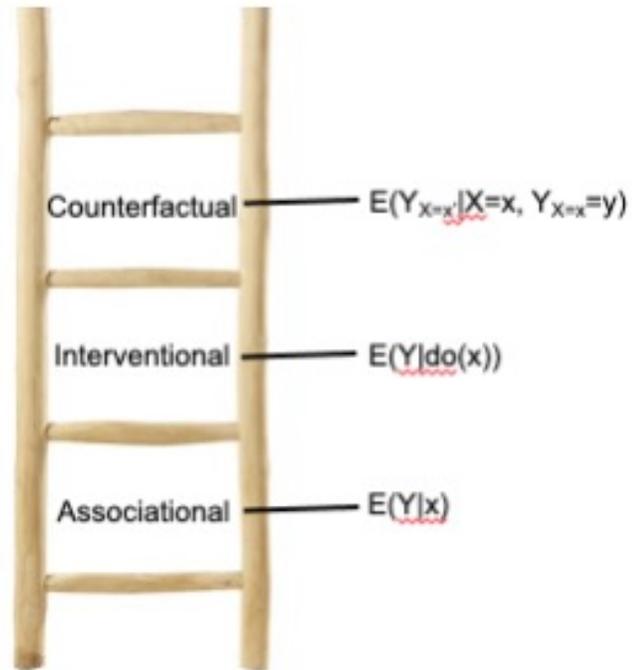https://doi.org/10.1038/s41893-019-0306-2

nature sustainability

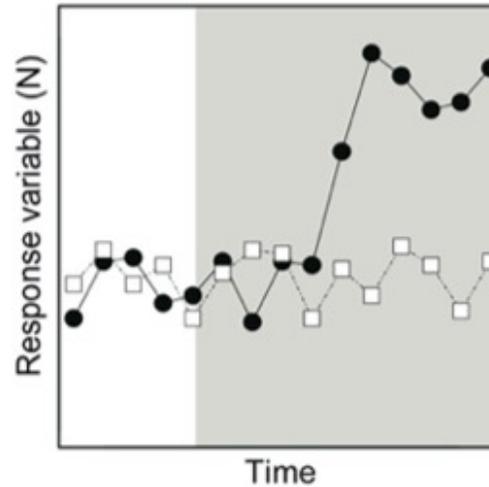## Well-being outcomes of marine protected areas

Natalie C. Ban [1*], Georgina Grace Gurney[2], Nadine A. Marshall[3], Charlotte K. Whitney[1], Morena Mills[4], Stefan Gelcich[5], Nathan J. Bennett[6,7,8], Mairi C. Meehan[9], Caroline Butler[10], Stephen Ban[11], Tanya C. Tran[1], Michael E. Cox[12] and Sara Jo Breslow[13]

		Positive effects (%)	Negative effects (%)	Ambiguous effects (%)	Number of data points
All	All combined	51	31	17	606
Cultural	Number of users	44	34	22	59
Economic	Income	65	16	20	51
	CPUE	73	11	17	66
	Catches	61	20	19	124
	Cost of fishing	0	100	0	13

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Causalité AMP -> Pauvreté
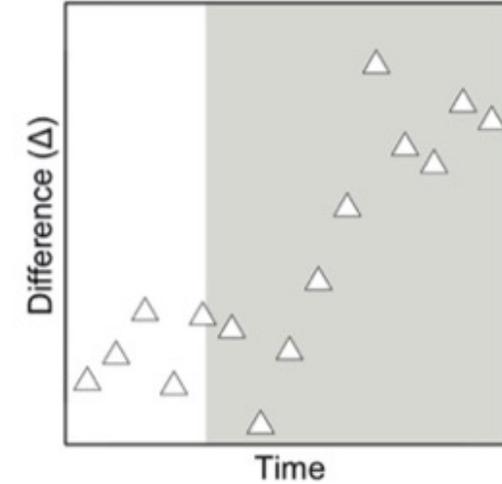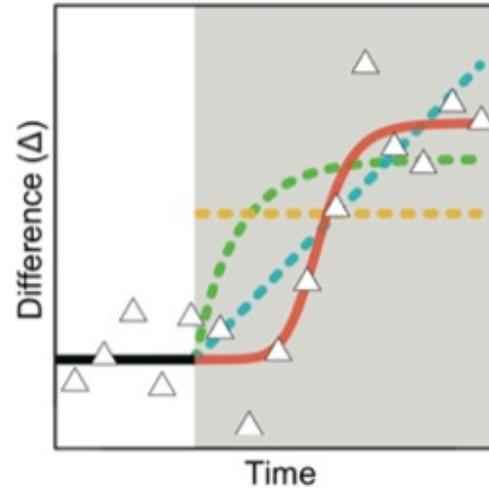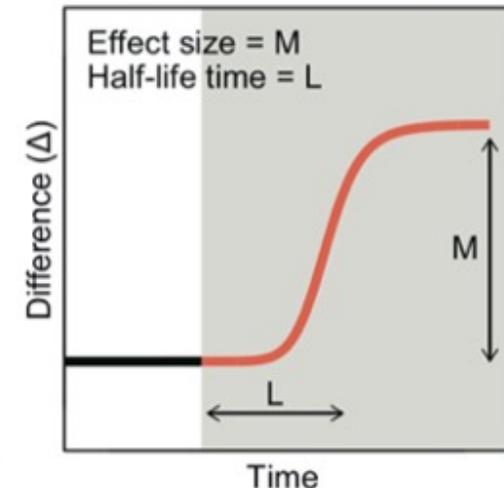
Projet MPA-POVERTY

Matching Traités - Contrôles

Villages traités ●
Villages contrôles ●
Zone Tampon 10km ▭
Zone Tampon 200km ▭
AMP IUCN CAT

QUIRIMBAS
Mozambique
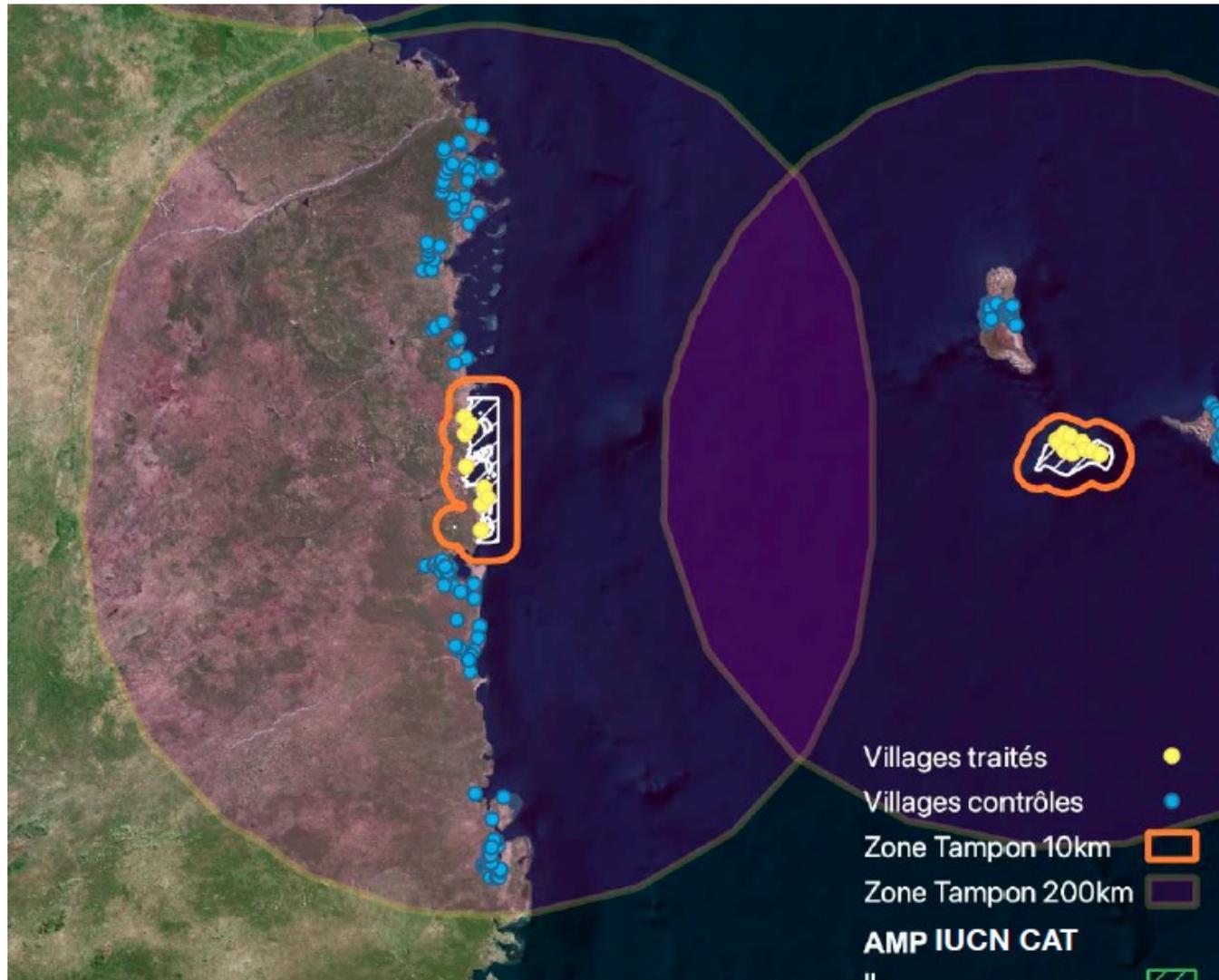
Estimation de la pauvreté

Couplage images satellites – IA - enquêtes

Input   Weight

x_1 → w_1

x_2 → w_2

x_3 → w_3

x_n → w_n

$$\sum_{j=1}^{n} x_j w_j$$

Sum → Activation Function → Output y
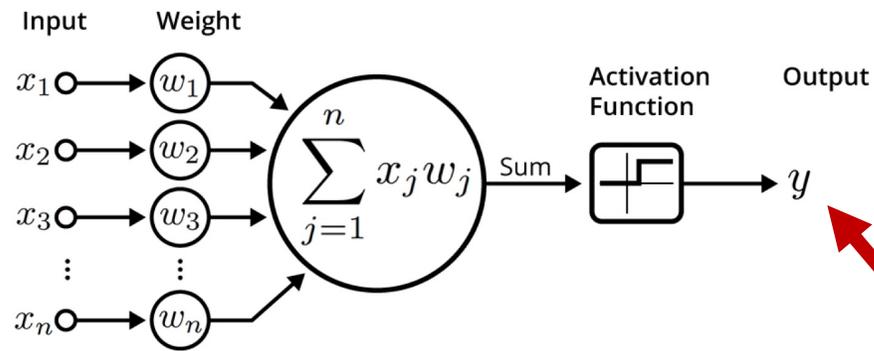
An illustration of an artificial neuron. Source: Becoming Human.

The DHS Program
Demographic and Health Surveys
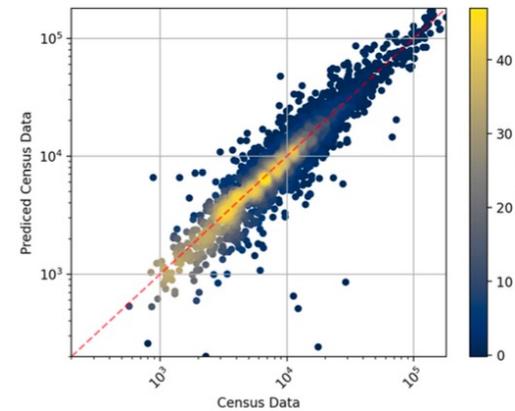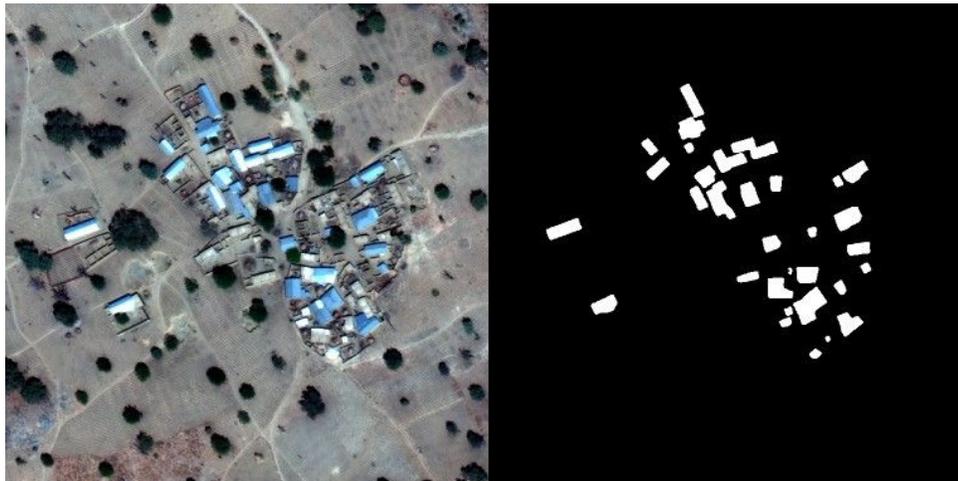
(a) Tanzania
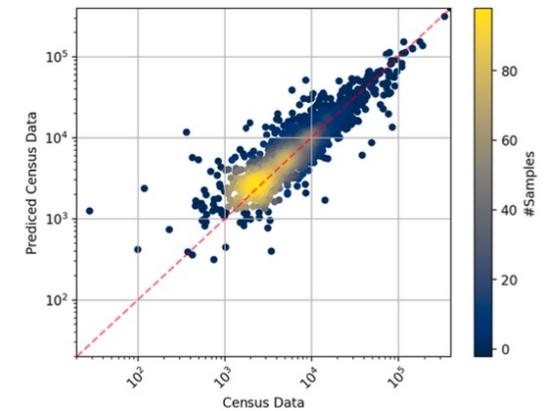
(b) Zambia

Résultats

Contrefactuel AMP - Pauvreté

Quel niveau de pauvreté pourrait-on éradiquer dans un contexte socio-environnemental donné par la mise en place d'une aire marine protégée ?
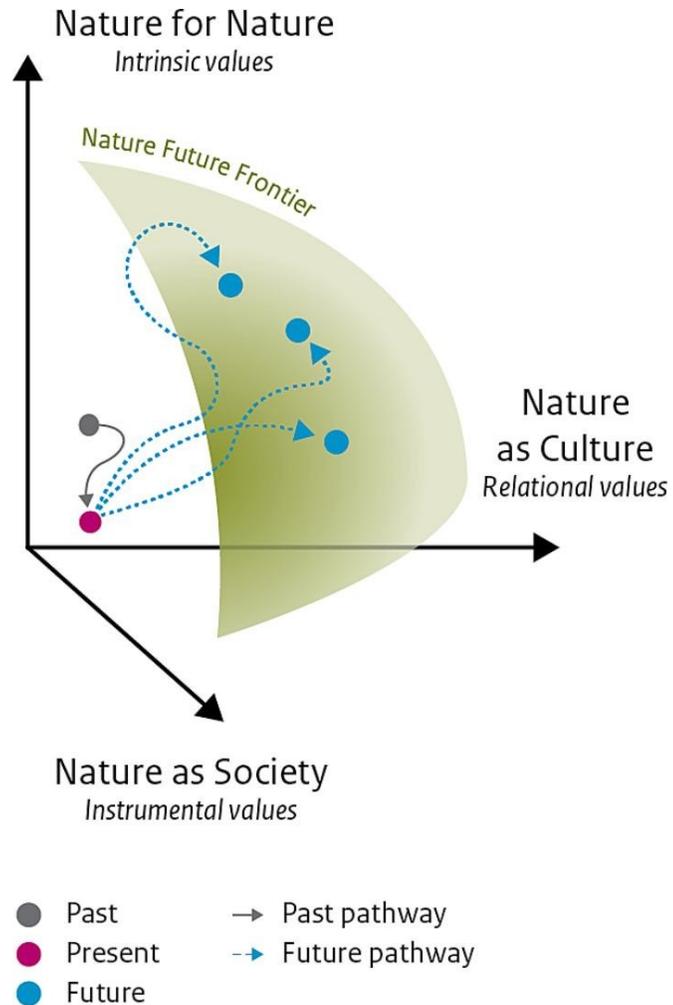
2025-2029

BLUE-AFRICA

Can blue economy interventions mitigate rural poverty and outmigration in land-drying eastern Africa?

Quelles futures trajectoires ?

biodiversa+
European Biodiversity Partnership

REEF-FUTURES

The future of reef services in the Anthropocene

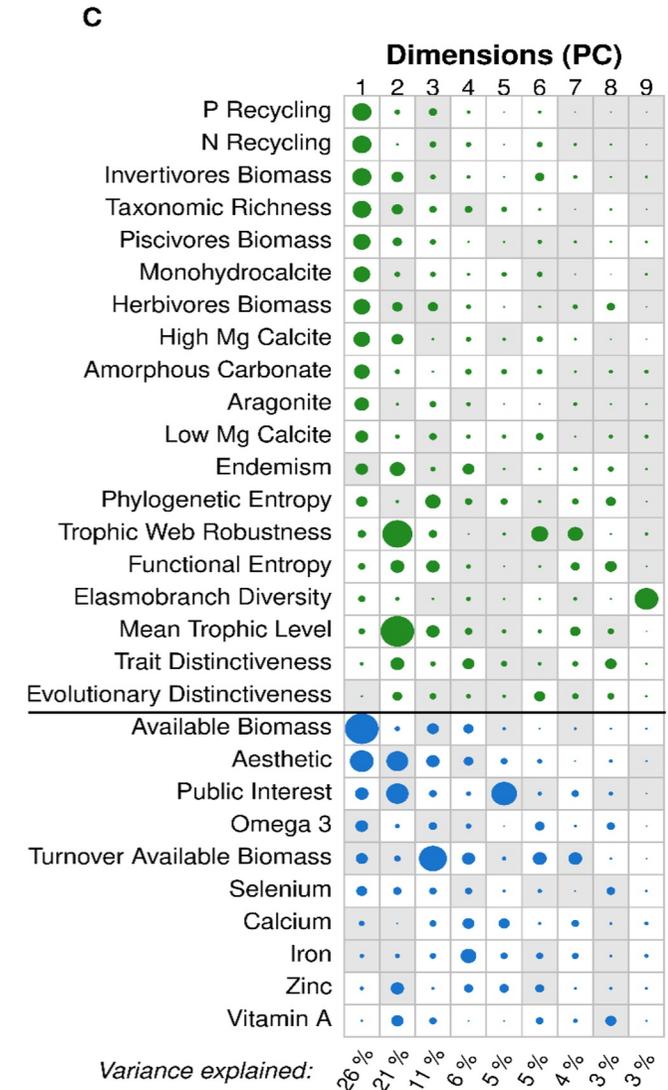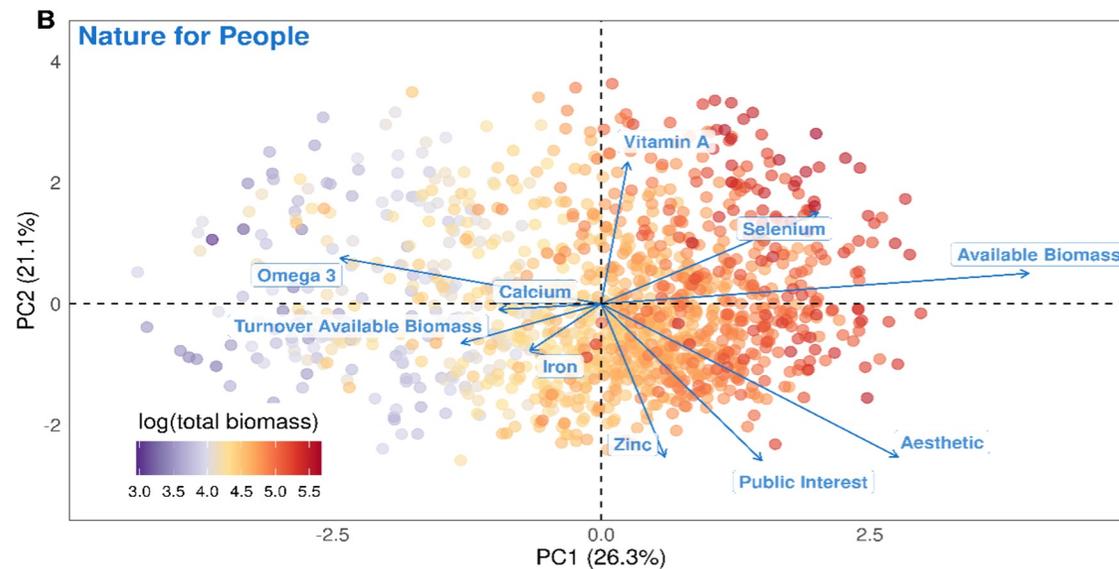**29 contributions of reef fishes to Nature and People**

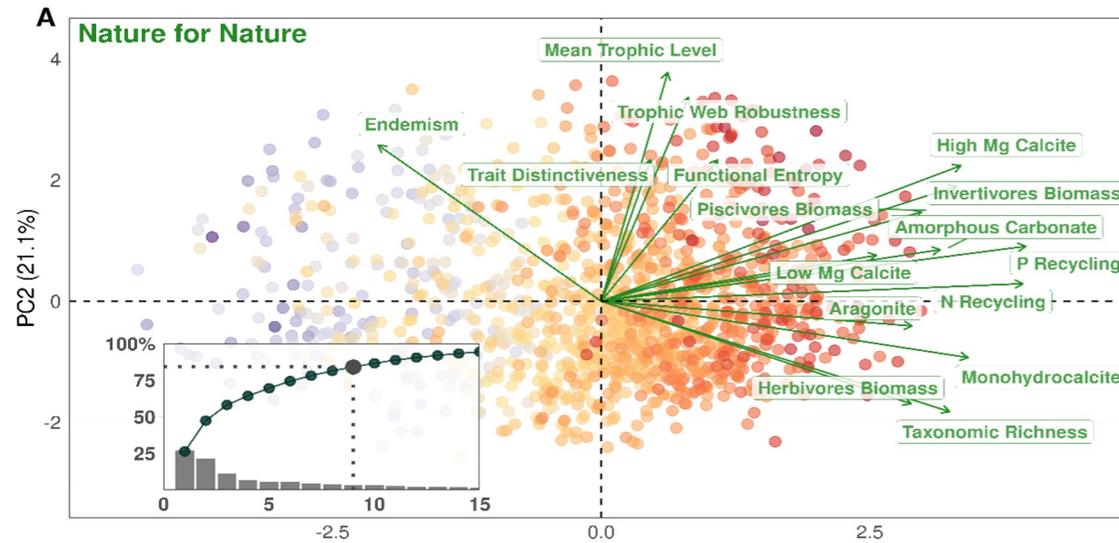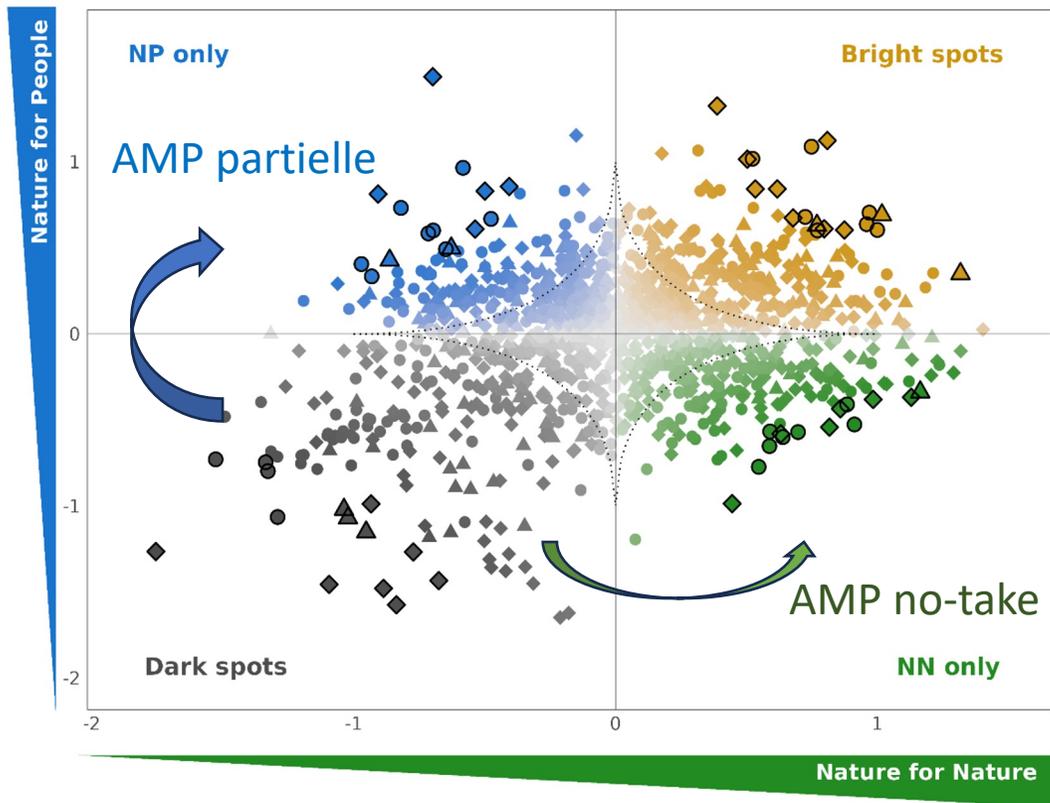**Nature-for-Nature**   **Nature-for-People**

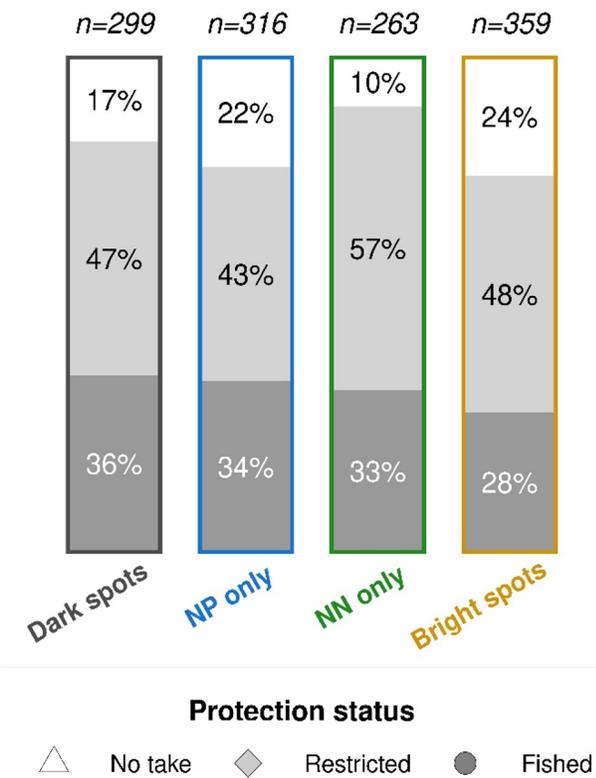|		
Biogeochemical flows	Nitrogen*	Total nitrogen excreted by the community of fishes
	Phosphorus*	Total phosphorus excreted by the community of fishes
	Carbonates* (5 polymorphs)	For each polymorph: total carbonates excreted by the community of fishes

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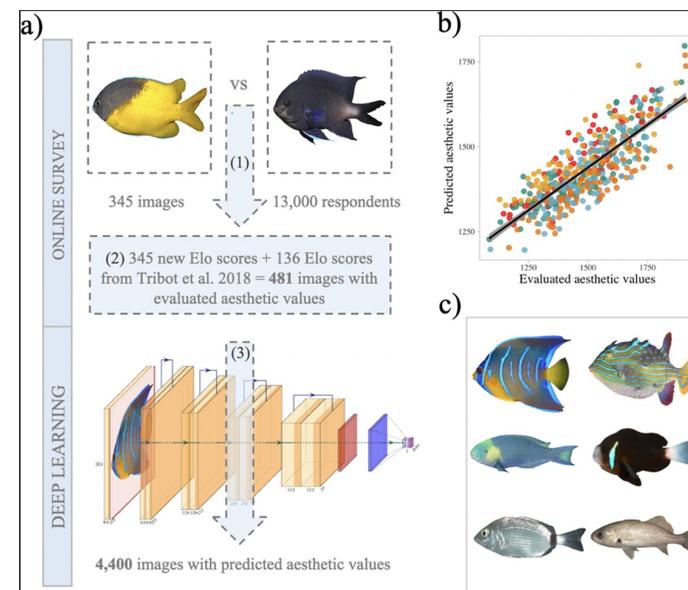
The global contribution of tropical reef fishes to nature and people

Flandrin et al., *One Earth*, Revision

A

NP only

AMP partielle

Bright spots

Nature for People

AMP no-take

Dark spots

NN only

Nature for Nature

B

n=299   n=316   n=263   n=359

Dark spots	NP only	NN only	Bright spots
17%	22%	10%	24%
47%	43%	57%	48%
36%	34%	33%	28%

Protection status

△ No take   ◇ Restricted   ● Fished

C

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