BioSpace25 - Biodiversity insight from Space
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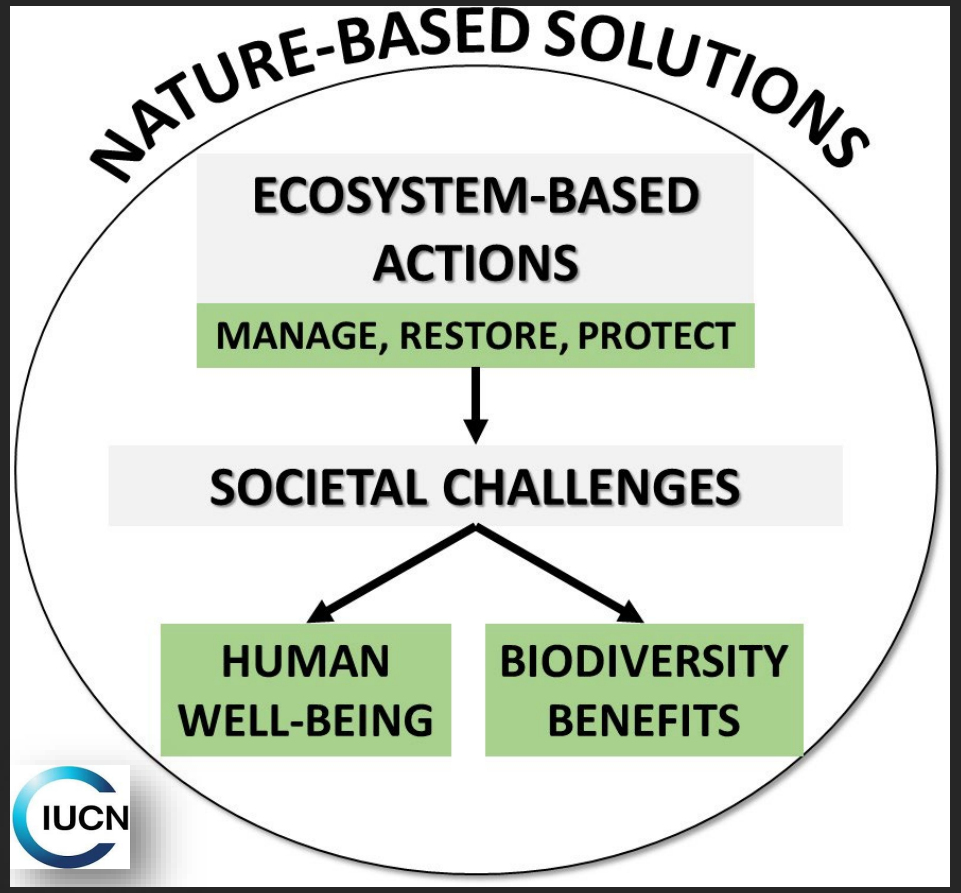
Space-based monitoring of mangroves for anticipatory Nature-Based Solutions: a three-point research agenda

Proisy C., Catry T., **Blanchard E.,** Augusseau P.-E., Collet M., Marsal Q., Staquet A., Abril G., Anthony E., Boriau E., Ackerer L., **Béguet B.,** Blanchard F., Duchemin J.-B., Fromard F., Gardel A., Granjon L., Hossaert M., Joly D., Jupin J., Maury T., Peyrefitte C., Roche P., Scemama P., Thébaud O. and Walcker W.,

Nature-based solutions: going beyond the concept to ensure their socio-environmental effectiveness and relevance



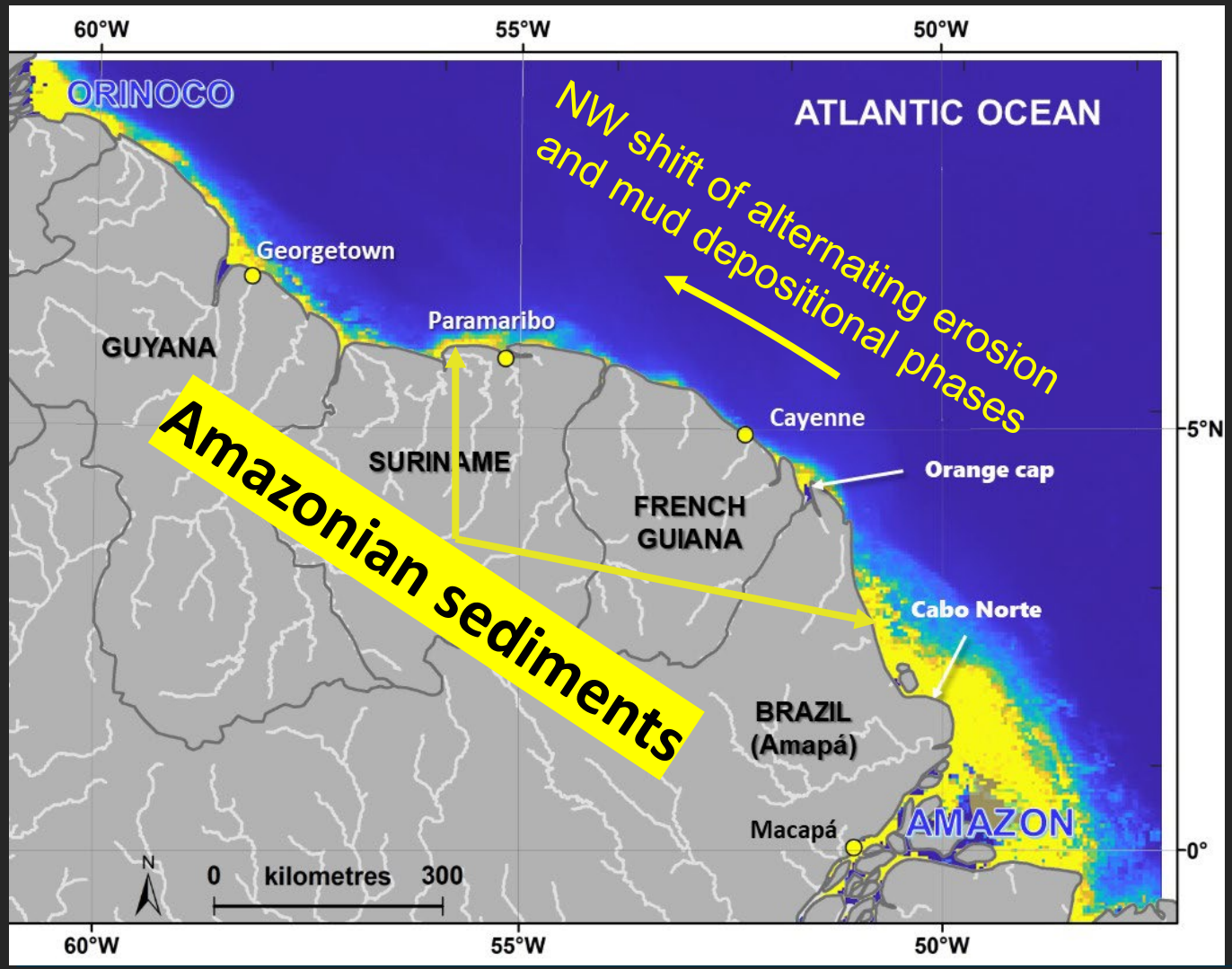
More than biodiversity monitoring

Work with local stakeholders to co-design, co-implement, and co-validate NbS actions for sustainable local planning

A review of EO support to Mangrove-based solution for sustainable development in the Global South

The MAGELLAN project https://www.pepr-solubiod.fr/

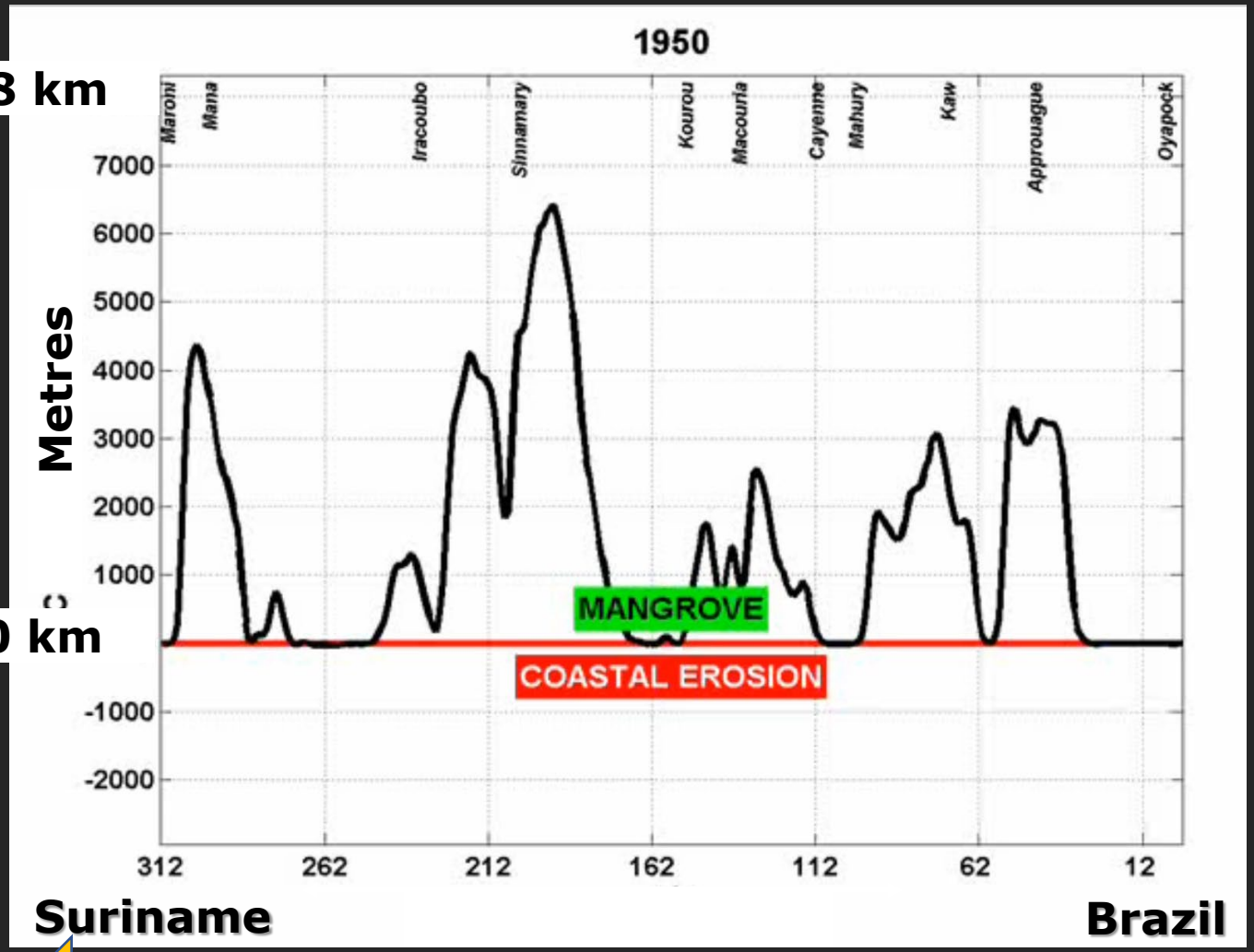
French Guiana, a pilot site for Mangrove-based Solutions



- The longest muddy coastline (1500 km)
- Circulation of giant mud banks to the north-west
- Coastal instability
- Considerable impacts on coastal zone management
- >60% of Europe's mangroves area
- Mangroves still preserved due to low human population and activities… in rapid increase

Which NbS to preserve mangroves for a sustainable future in French Guiana?

Fluctuations of the coastal mangrove shorelines from EO



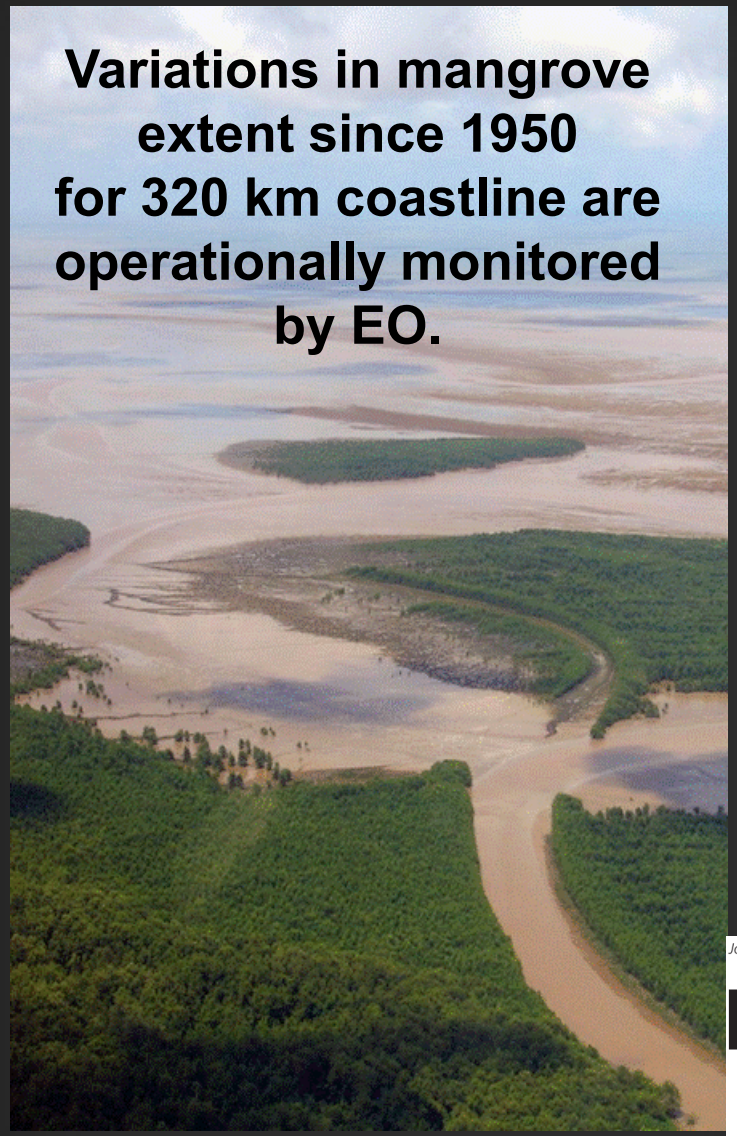
NW shift of mud banks

High biomass mangroves

NbS #1: A warning system to anticipate coastal erosion and siltation

because preserved mangroves adapt to coastal change!

session “Ecosystem Extent”



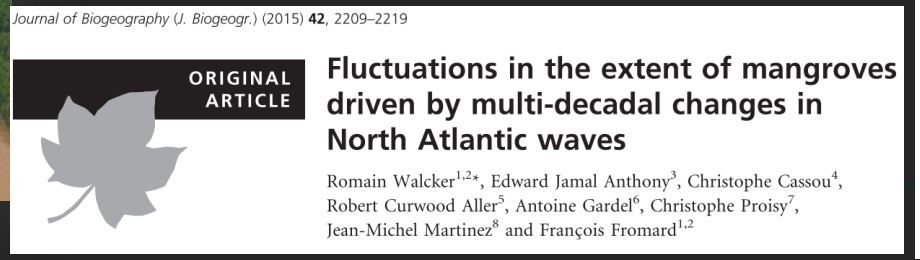
Time series (annual)

Benefits for general understanding

We identified oceanic regular waves as major drivers. Mud banks protect. The MANG@COAST model linked to Marine Copernicus database.

Benefits for local planning

1. Short-term (5 years) predictions of coastal change
2. Annual newsletter on coastal vulnerability

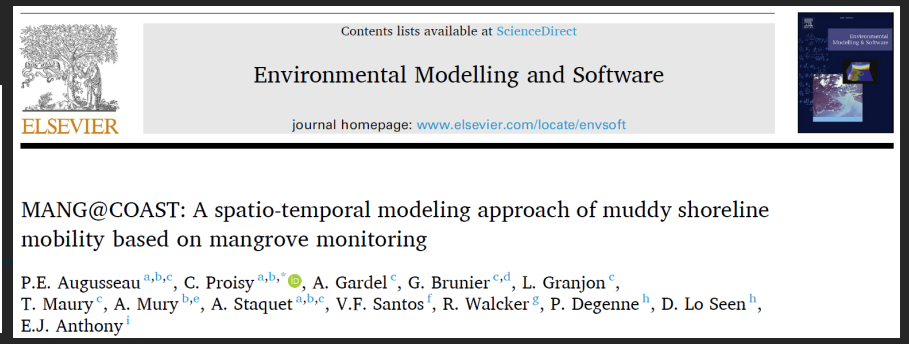


Journal of Biogeography (J. Biogeogr.) (2015) **42**, 2209–2219

ORIGINAL ARTICLE

Fluctuations in the extent of mangroves driven by multi-decadal changes in North Atlantic waves

Romain Walcker[1,2*], Edward Jamal Anthony[3], Christophe Cassou[4], Robert Curwood Aller[5], Antoine Gardel[6], Christophe Proisy[7], Jean-Michel Martinez[8] and François Fromard[1,2]



Contents lists available at ScienceDirect

Environmental Modelling and Software

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

ELSEVIER

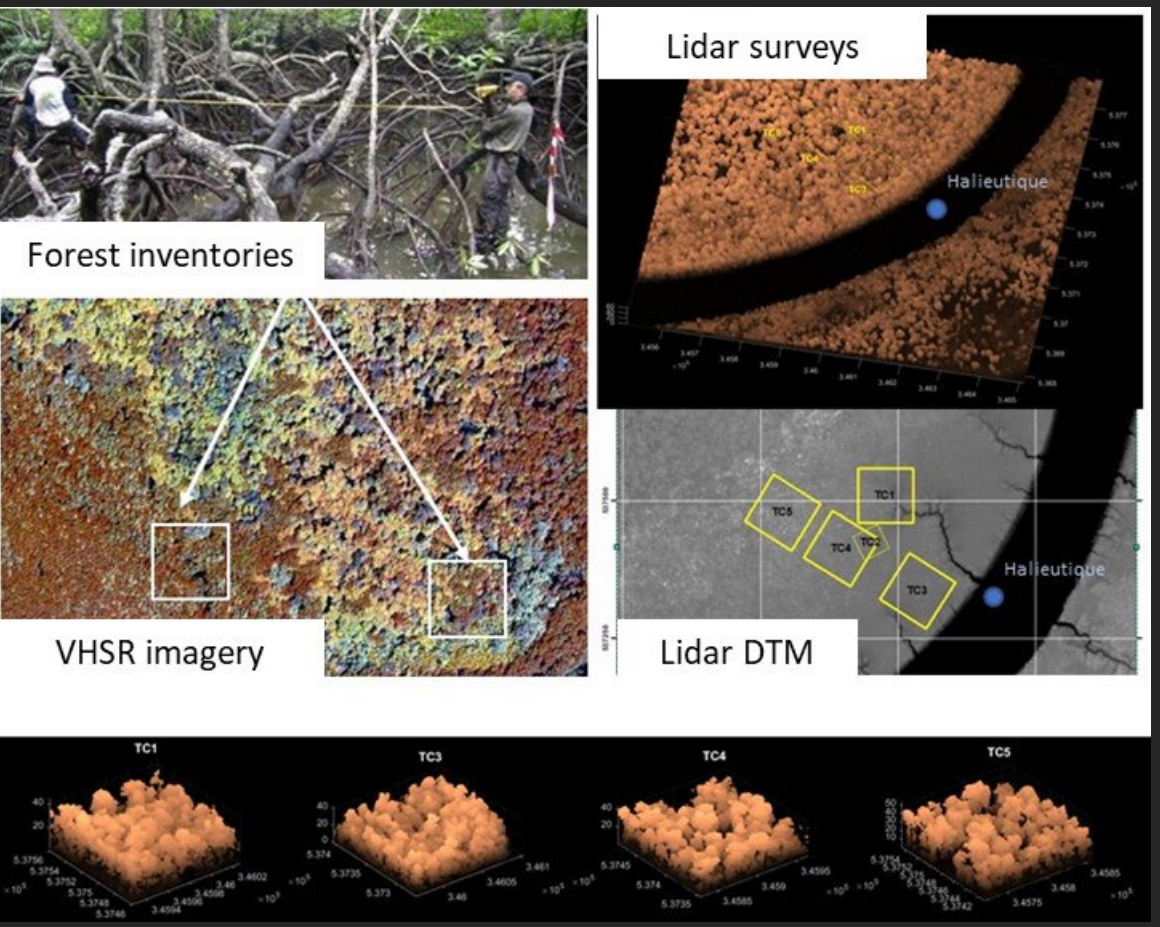
MANG@COAST: A spatio-temporal modeling approach of muddy shoreline mobility based on mangrove monitoring

P.E. Augusseau[a,b,c], C. Proisy[a,b,*], A. Gardel[c], G. Brunier[c,d], L. Granjon[c], T. Maury[c], A. Mury[b,e], A. Staquet[a,b,c], V.F. Santos[f], R. Walcker[g], P. Degenne[h], D. Lo Seen[h], E.J. Anthony[i]

NbS #2 : A warning system of changes in coastal biodiversity and resources

because the diversity of mangroves habitats may guaranty ecological resilience !

session “Ecosystem Function and Functional Diversity”



Time series of very high resolution imagery (annual)

Immediate benefits for local planning

1. New biodiversity data on unknown forests
2. Support National Natural Reserves
3. Early warning of threats to mangroves

Benefits for research

1. Support trophic & resource network
2. Support socio-economic scenarios
3. Support multi-year carbon maps

⇒ Pending ESA Costal Blue Carbon project

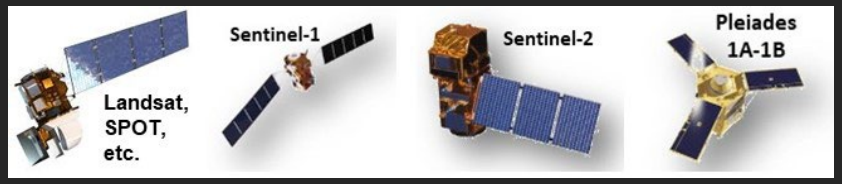
⇒ Pending TROPECOS/FAIR-CARBON project

NbS #3 : A monitoring system of changes in mangrove and human habitats,

because preserved mangroves can cope with human-induced threats

NbS #1 + NbS#2 => NbS#3

Time series (annual)



Integrate mangroves in urban planning design for health and well-being

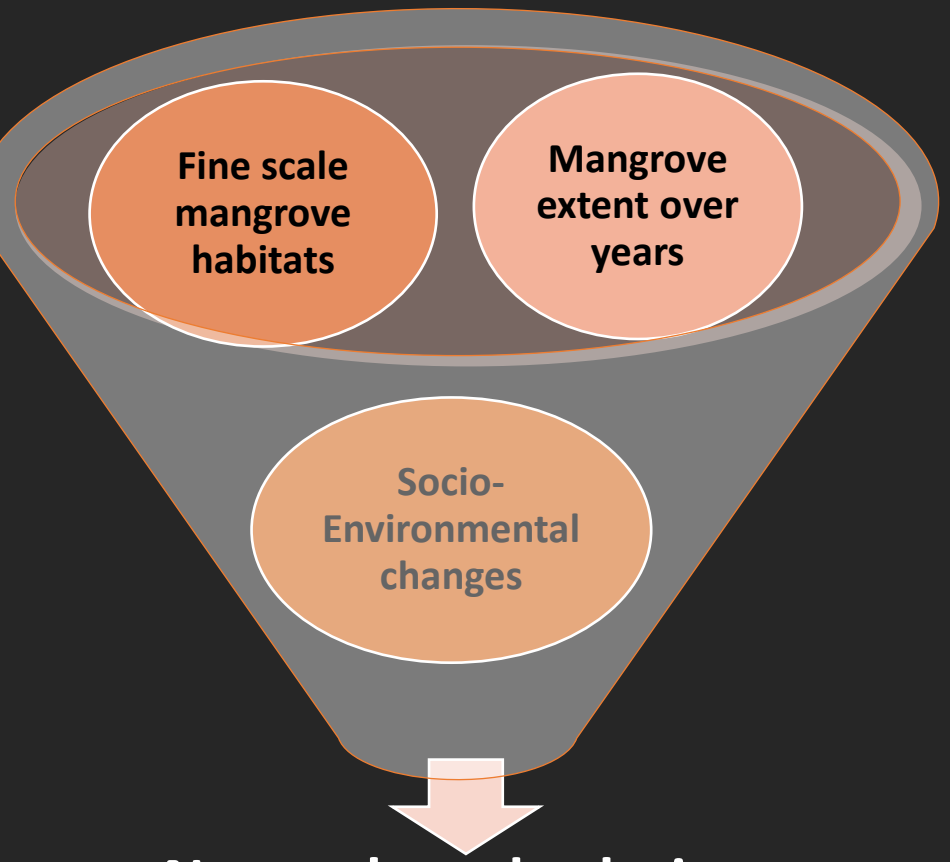
Immediate benefits for local planning

1. Services for water phytodepuration, wind protection, air temperature reduction, ecological corridors, etc.
2. Indicators of environmental degradation (coastal erosion, upstream salinization of the basements, water quality)

New researches are possible

1. Detection system of emerging pandemics
AWAARE project with Institut Pasteur (submitted)

Space-based monitoring of mangroves for anticipatory Nature-Based Solutions – in short



The MAGELLAN project
https://www.pepr-solubiod.fr/

NbS = an integrative approach
Mangrove case study in FG

1. Changes in coastal landscape
2. Changes in coastal biodiversity and resources
3. Changes in coastal health and well-being

Sound EO of mangroves require

1. A multiscale strategy of repeated image acquisitions
2. Biodiversity AND human environments together
3. Humility based on
   - Field validation
   - Understanding signal physics (radar, lidar, optical)

A question of credibility with local stakeholders.

Our recommendations

1. Biodiversity needs interdisciplinary research, and **EO has a legitimate role to play in driving this research forward.**

2. Biodiversity needs sound EO multisensor data and methods.
   => **P-band BIOMASS mission** is needed in the Tropics.

Our overarching recommendation is to get closer to local stakeholders and the public because

- EO delivers facts, not opinions !

- Biodiversity matters. Let's claim it loud and clear!

GRAZIE A TUTTI

Biodiversity ?
children talk about
it best