

The Holodiv project : integration of holobiont diversity in the management and conservation of animal marine forests



Introduction

Conclusion

Gorgonians : important species in Mediterranean marine forests

THREATENED BY INCREASING HUMAN PRESSURES

Adaptive abilities ?

- potential population trajectories
- management and conservation

➔ **Holodiv project**

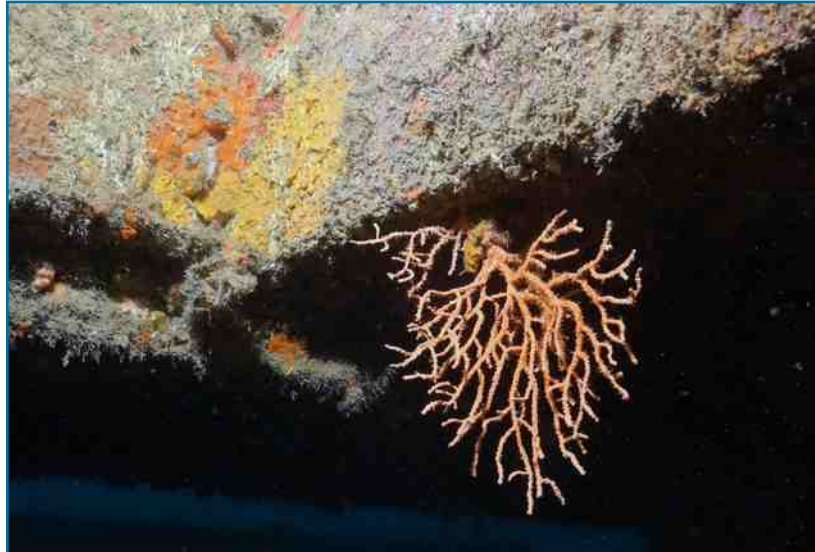


Gorgonian populations near Marseille ;
Photo : F. Zuberer, OSU Pythéas

Pressures and vulnerability:

- Mortality events: thermal anomalies, pathogens
- Fishing, oversedimentation
- Pollution
- Diversity of response (species, populations)
- Synergistic effects?

Garrabou et al., 2009; Pivotto et al., 2015 Topçu et al., 2019



The yellow gorgonian *Eunicella cavolini* on artificial reef

Photo D. Guillemain, OSU Pythéas

Evolution ?



Management options:

- Marine protected areas
- Artificial substrates
- Transplants:
 - New population
 - Demographic or genetic effects

The Holodiv project : integration of holobiont diversity in the management and conservation of animal marine forests



Introduction

Context

The holobiont

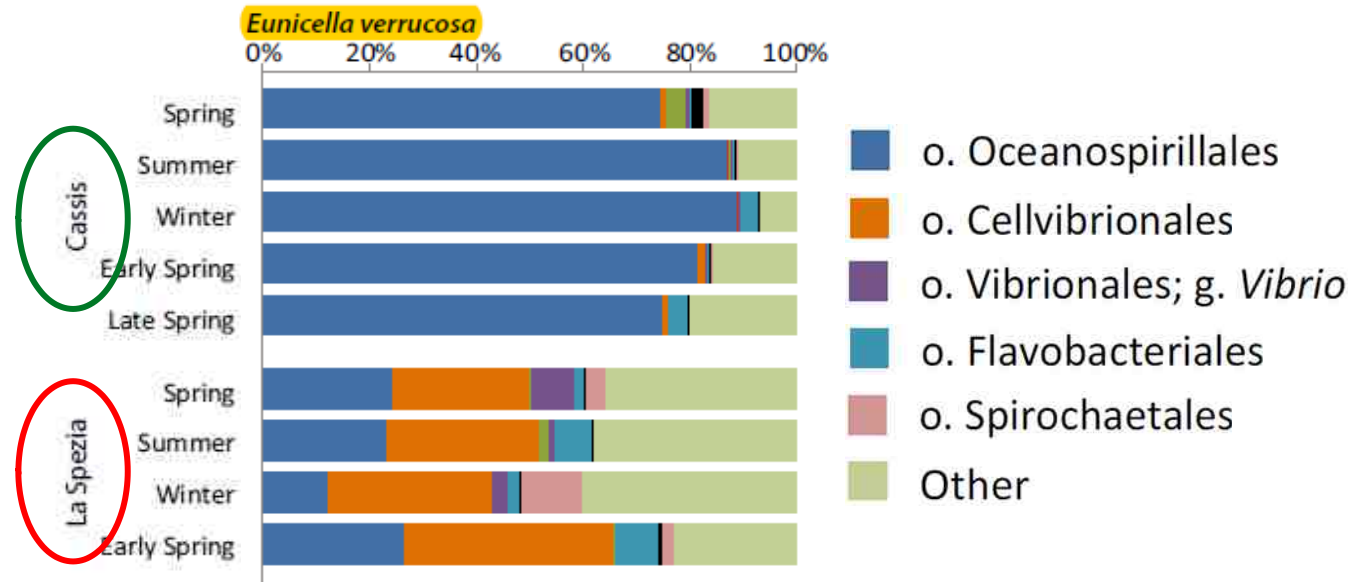
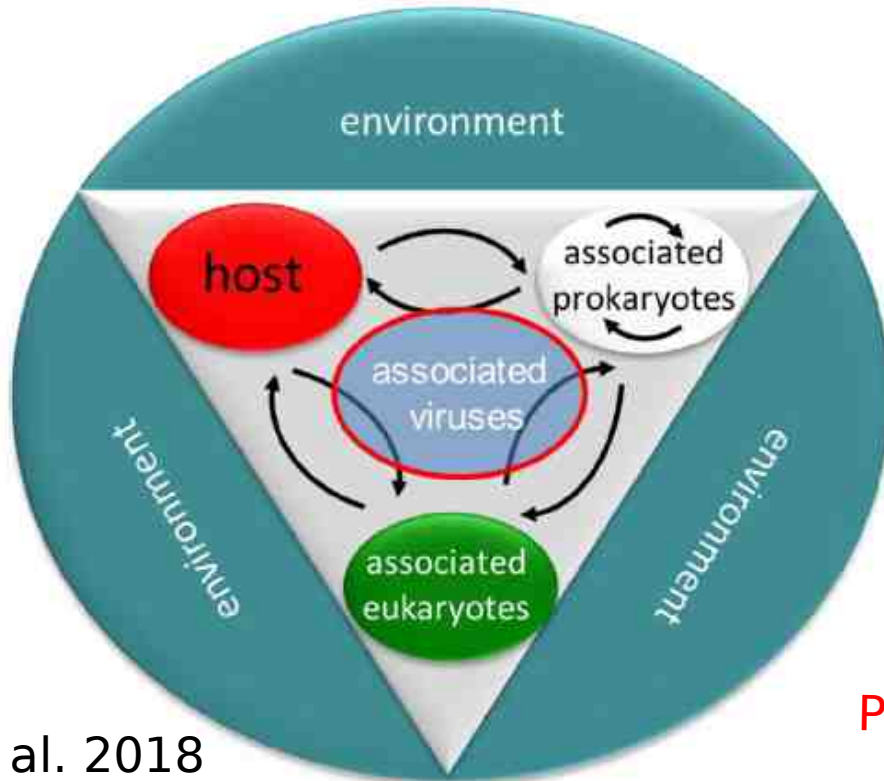
Conclusion

Holobiont : host and associated microbiome (viruses, prokaryotes, eukaryotes)

- different levels of diversity
- different dynamics

} → Adaptation?

Microbiome flexibility in *Eunicella* spp.



Pollution ?

van de Water et al. 2018

The Holodiv project : integration of holobiont diversity in the management and conservation of animal marine forests



Introduction

Context

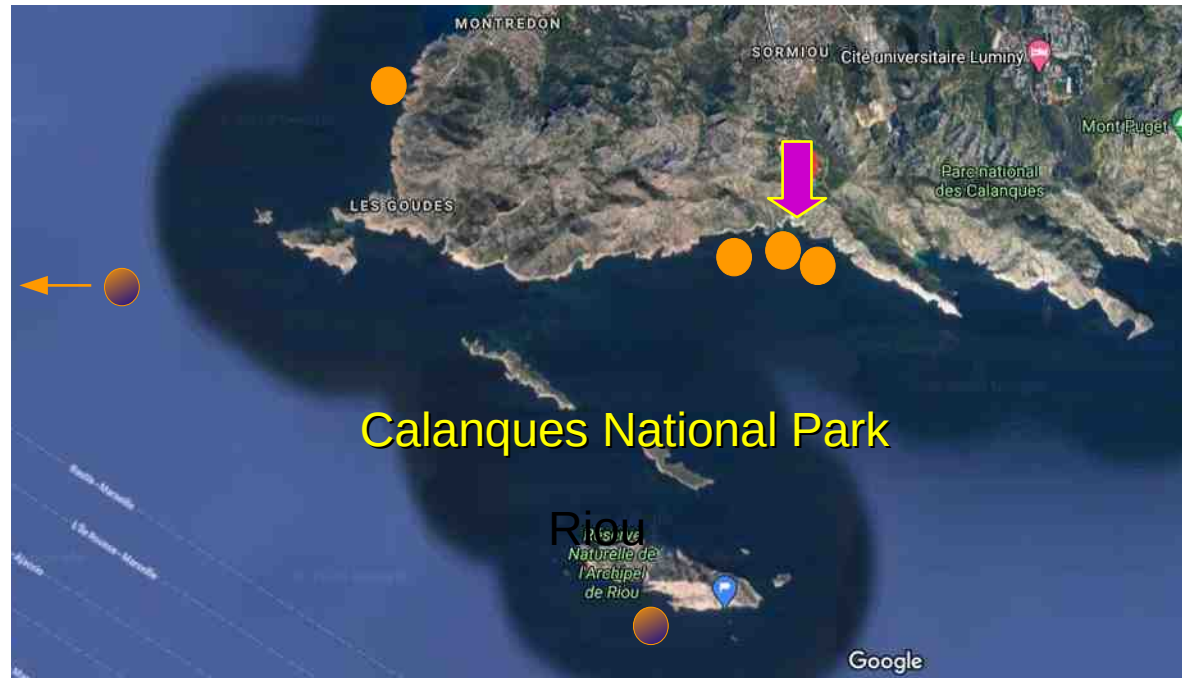
The holobiont

Model sp.

Conclusion

Sites: ex. Marseille

- different depths ●
- inside and outside MPA
- sewage outfall ↓
- + Algeria: Annaba
- + Turkey: Marmara



Model species:
Eunicella cavolini



Photo F. Zuberer / OSU Pythéas

Methods:

- Metadata: temperature, contaminants
- Host populations: size structure, necrosis, genomics (RAD-Seq)
- Associated microbes: 16S and 18S metabarcoding; viral genomes
- modelling management strategies

The Holodiv project : integration of holobiont diversity in the management and conservation of animal marine forests



Introduction

Context

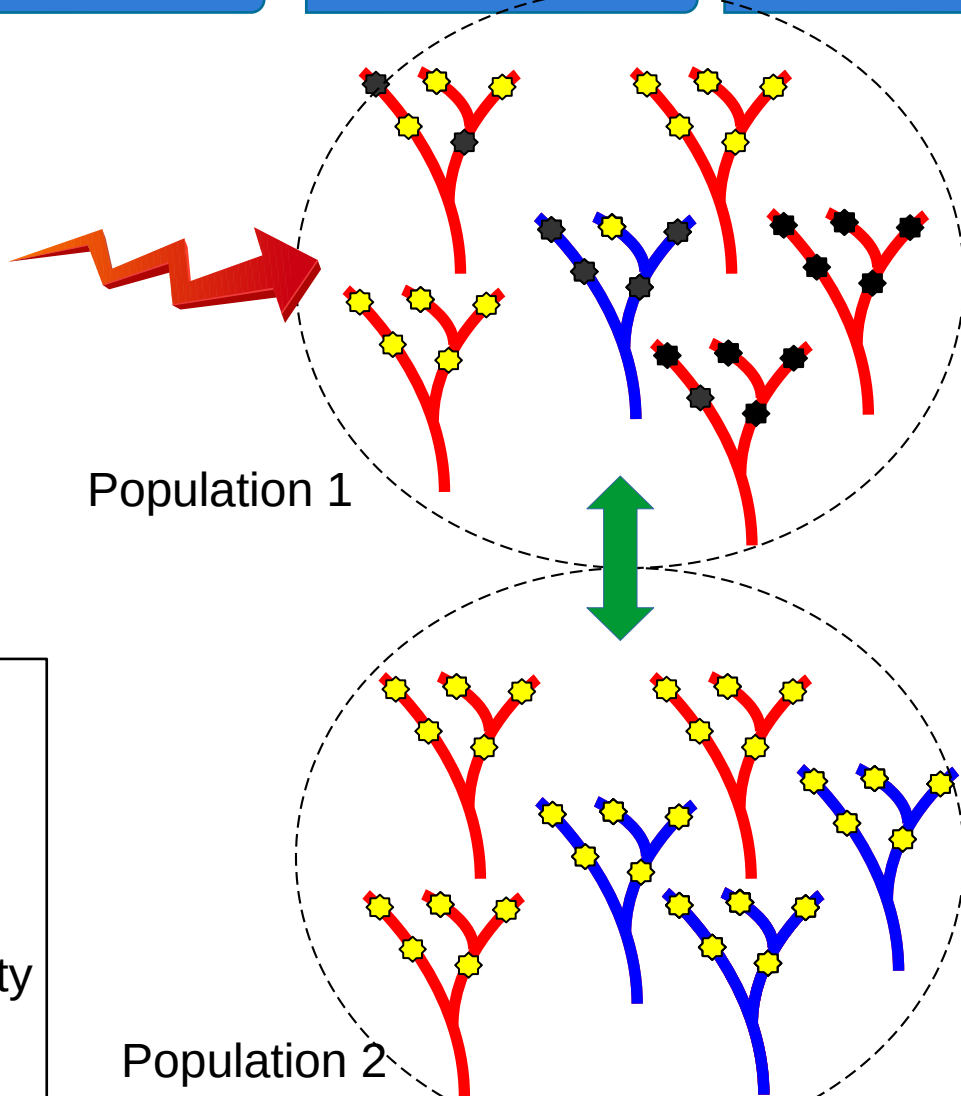
The holobiont

Model sp.

Management

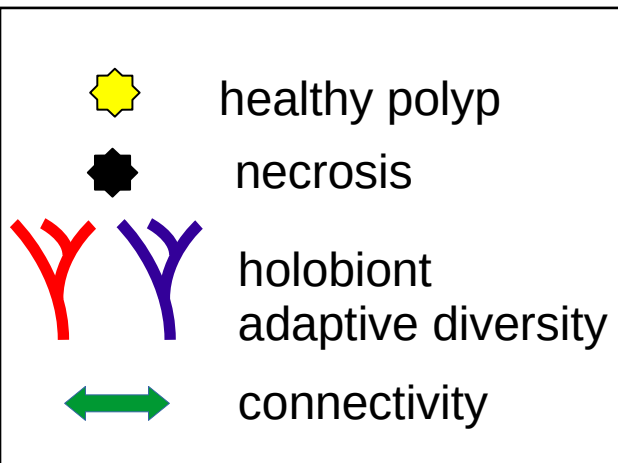
Conclusion

Temperature
Pathogens
Pollution
...



Population 1

Population 2



Management?

- natural recolonisation
- transplants
- artificial substrates



stakeholders



Scientific knowledge

- diversity
- plasticity
- local adaptation

The Holodiv project : integration of holobiont diversity in the management and conservation of animal marine forests



Introduction

Context

The holobiont

Model sp.

Management

Conclusion



On-going project
A framework relevant for other species



<https://holodiv.mio.osupytheas.fr/>



didier.aurelle@univ-amu.fr

