

stone
reefs

The biodiversity crisis



WHAT IS BIODIVERSITY?



WHY IS IT DISAPPEARING?



**WHY IS BIODIVERSITY
IMPORTANT?**

Biodiversity is comprised
of a balanced ecosystem

Bundvegetation
(f.eks. ålegræs)

Fugle

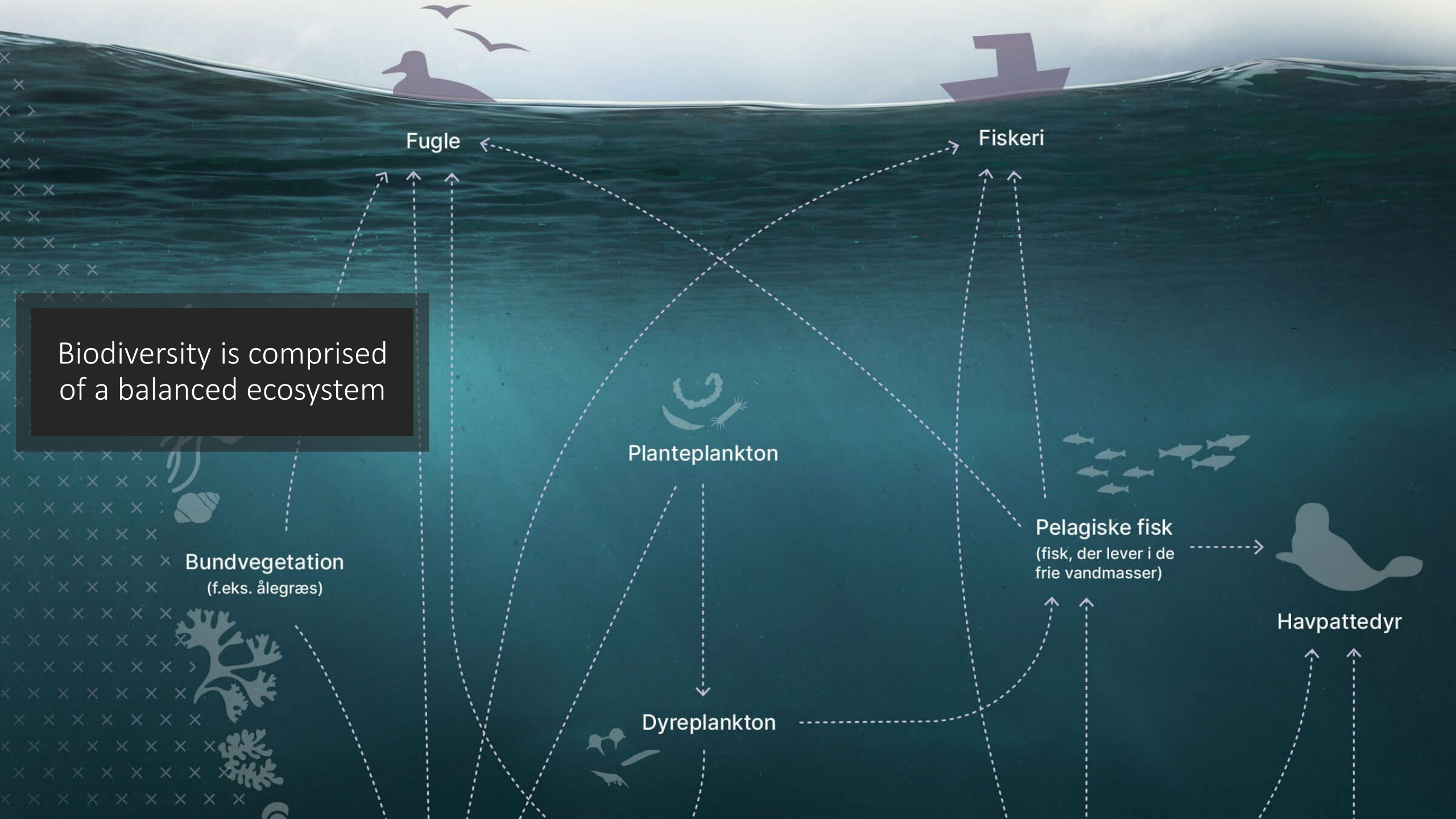
Fiskeri

Planteplankton

Pelagiske fisk
(fisk, der lever i de
frie vandmasser)

Havpattedyr

Dyreplankton

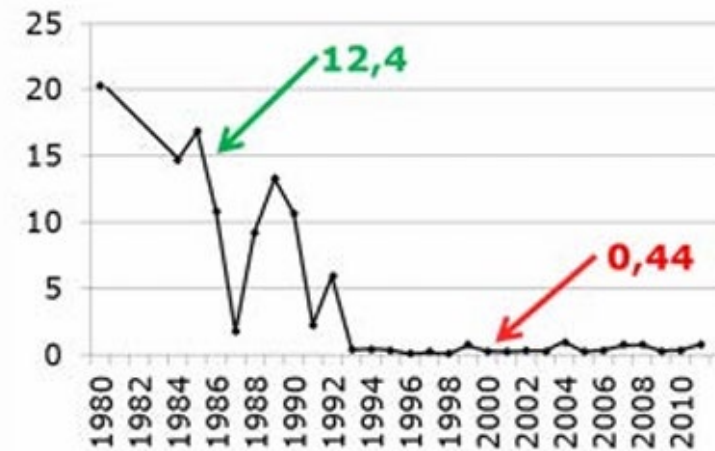
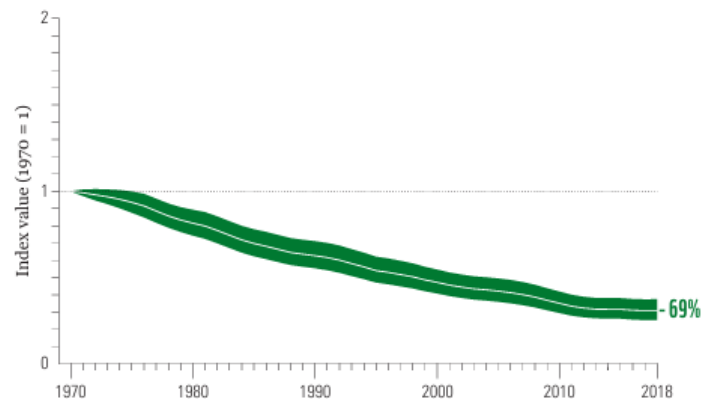


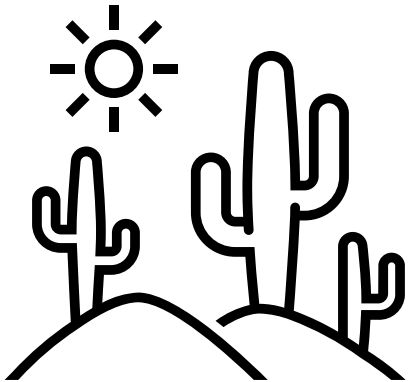
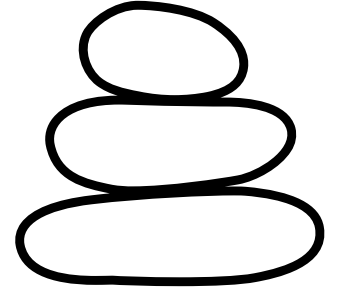
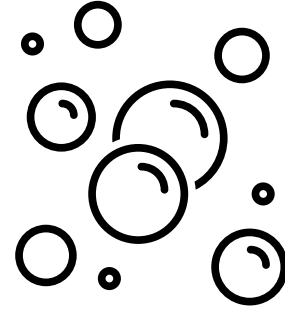
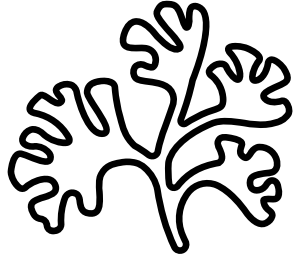
Development in blue biodiversity

Figure 3: The global Living Planet Index (1970 to 2018)
The average change in relative abundance of 31,821 populations, representing 5,230 species monitored across the globe, was a decline of 69%. The white line shows the index values and the shaded areas represent the statistical certainty surrounding the trend (95% statistical certainty, range 63% to 75%).
Source: WWF/ZSL (2022)¹⁸⁴.

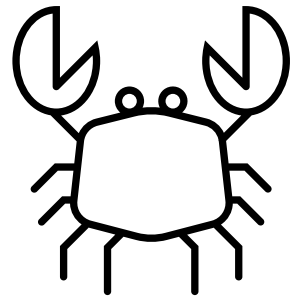
Key

- Global Living Planet Index
- Confidence limits





The blue biodiversity in
coastal areas



What is
the
cause?

LOSS OF BIODIVERSITY



HABITAT LOSS

degradation, & destruction



OVEREXPLOITATION

eg. over- fishing, hunting, farming



OCEAN ACIDIFICATION

absorption of large amounts of carbon dioxide by the oceans.



Pollution

Plant and insect populations, usage of highly dangerous, non-selective insecticides



INVASIVE SPECIES

being introduced into foreign habitat



CLIMATE CHANGE

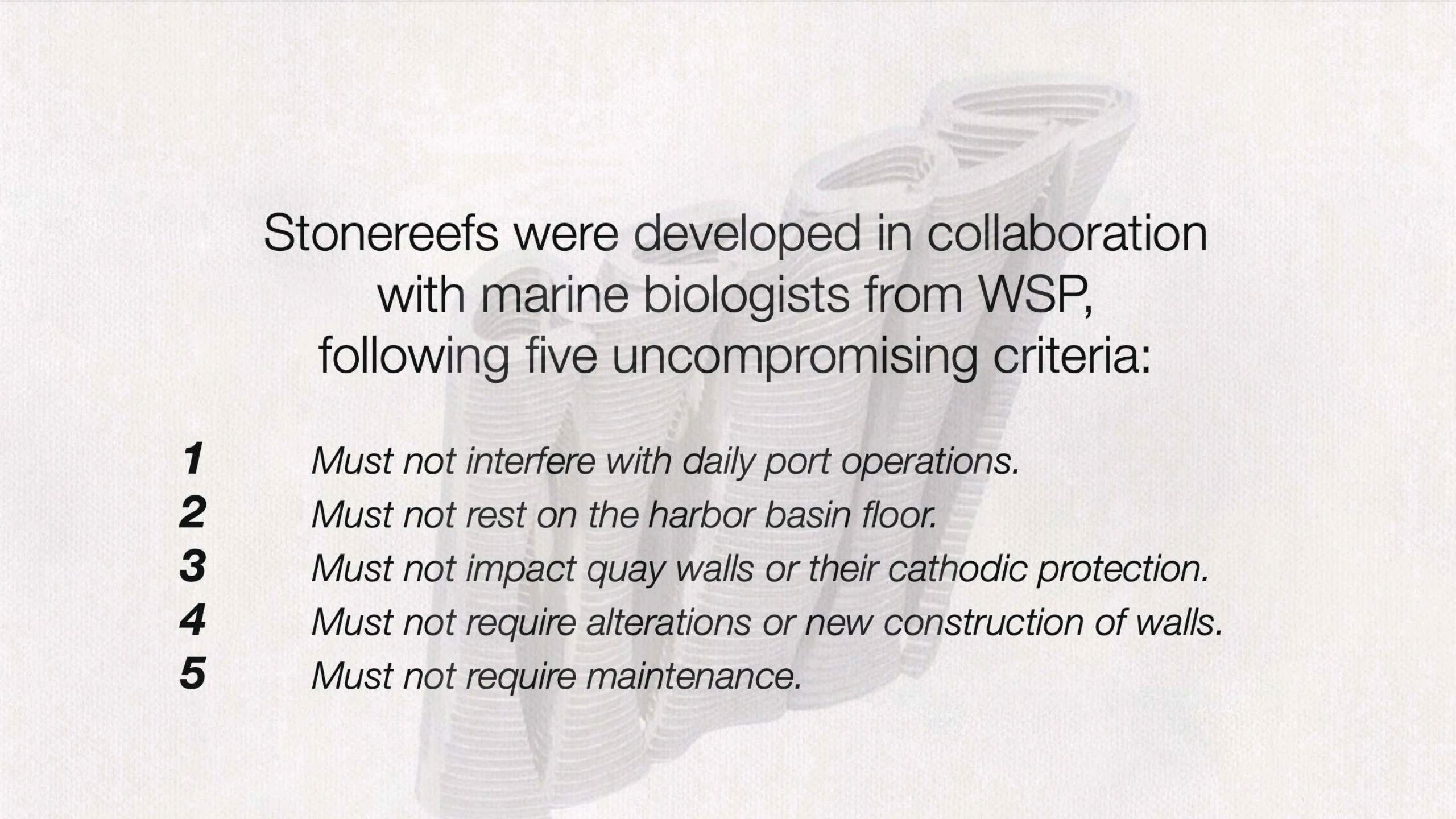
eg. extreme weather, rising sea levels, including drought, bushfires, storms

Genopretning af biodiversitet i vores
havne og lystbådehavne med

3D-printede elementer

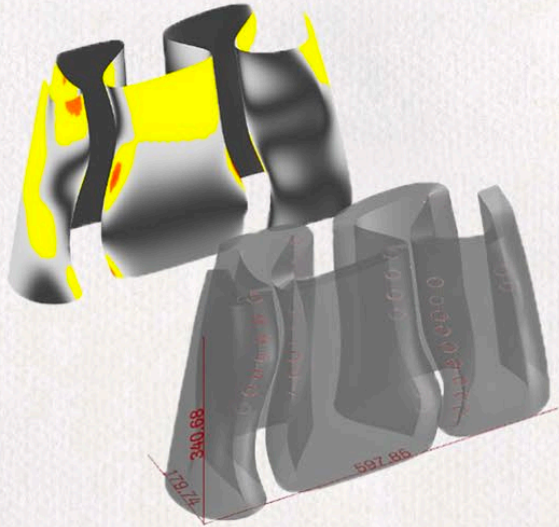


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Stonereefs were developed in collaboration with marine biologists from WSP, following five uncompromising criteria:

- 1** *Must not interfere with daily port operations.*
- 2** *Must not rest on the harbor basin floor.*
- 3** *Must not impact quay walls or their cathodic protection.*
- 4** *Must not require alterations or new construction of walls.*
- 5** *Must not require maintenance.*



01 DESIGN

RESTORES AND INCREASES BLUE BIODIVERSITY

Stonereefs' reef modules are designed to boost biodiversity in marine environments for municipalities, ports, organizations, and businesses within the maritime sector.



02 PRINT

UTILIZES EXISTING QUAYS WITHOUT AFFECTING PORT OPERATIONS

The reef modules are tailored to transform existing quay facades into optimal habitats for marine life without disrupting port activity.



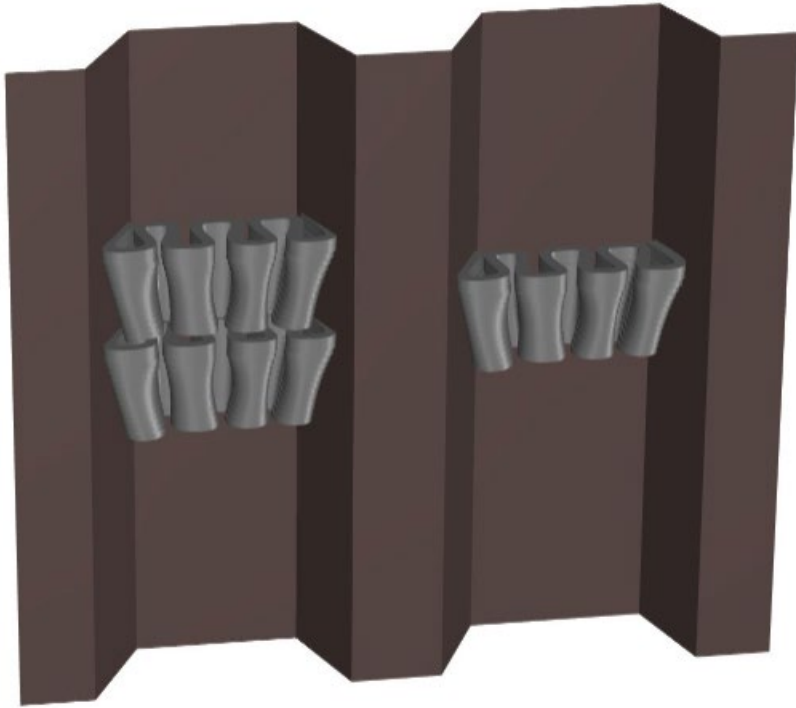
03 BIODIVERSITY

FOUNDATION FOR FLORA AND FAUNA WITH ROUGH SURFACE

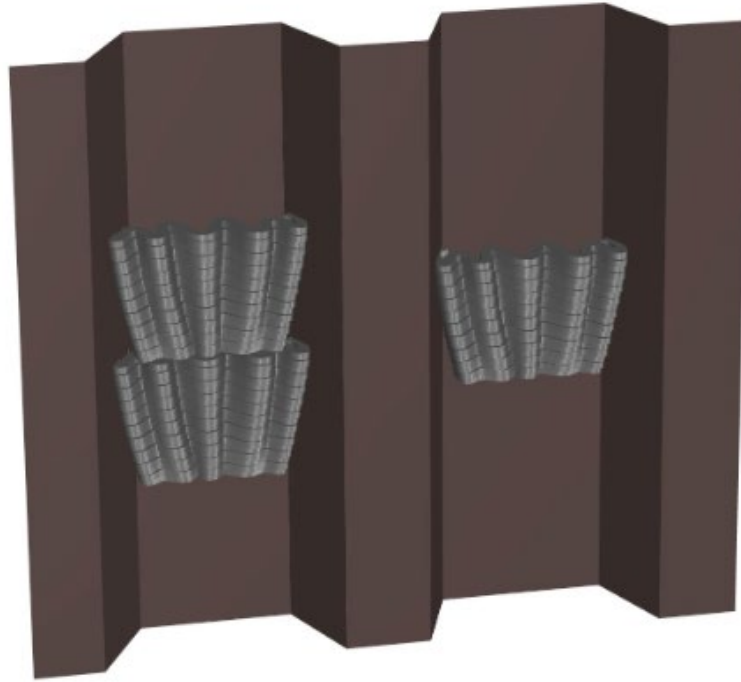
The modules' rough surface provides a foundation for algae, plants, and organisms. Designed for fish and marine plants, they offer essential cavities and surfaces.



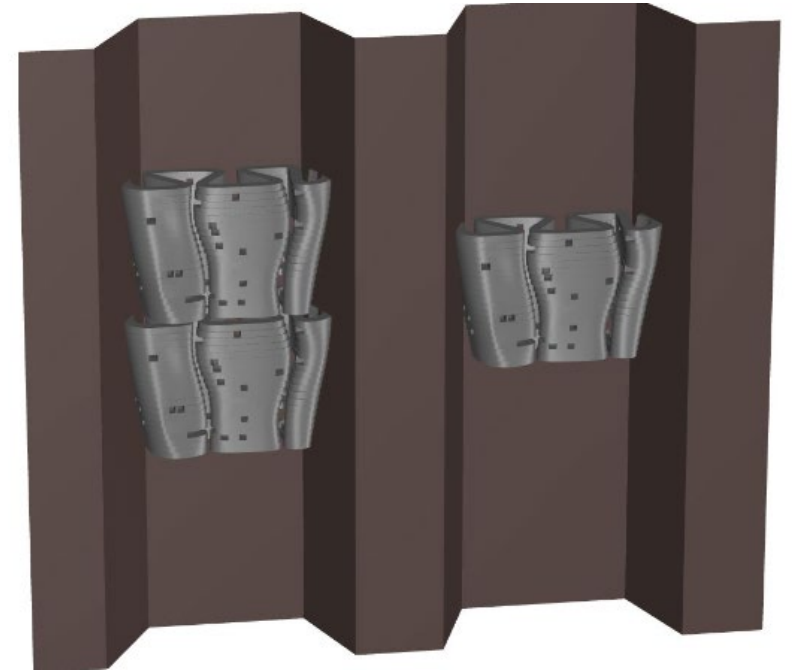
3 types of modules



Type 1



Type 2



Type 3



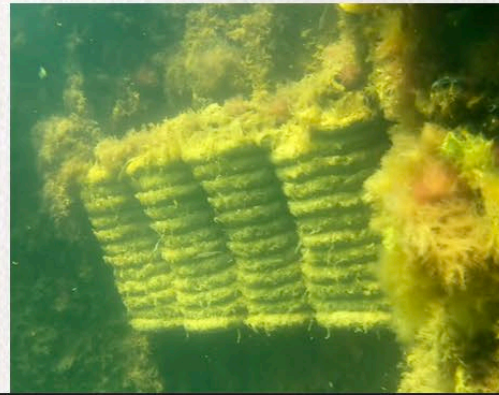
*Stonereefs is part of a monitoring project by WSP in Copenhagen Harbor. **After just five months, the results speak for themselves.***



0 months underwater



1 month underwater



3 months underwater



5 months underwater

Why use Stonereefs?



Stonereefs improve the biodiversity without disturbing harbor activities

Ships and vessels may still approach and dock in the area with our reef-module



Plug & Play

No need for new harbor-fronts or large investments, made-to-order to ensure perfect fit.



Opportunity to inform the public and teach biodiversity in schools

We have conducted teachings and students have designed their own reefs



Opportunity for harbors and municipalities to show a good example😊

Biodiversity reports, ESG, CSRD

<https://www.youtube.com/watch?v=5xNe6mHHLms&t=194s>



Stonereefs modules are made of carbon-reduced concrete. The concrete mix was developed by **experts** from the Danish Technological Institute. The concrete used consists of FUTURECEM, sand and gravel, water, and additives.



The cement is a CO₂-reduced cement (FUTURECEM), reduced by 30% compared to standard cement.

Sand and gravel are supplied by NCC, which actively works on biodiversity preservation in and around their gravel pits. They also provide EPDs, offering reliable data on the product's environmental impact.

Additives make up less than 1% of the mix design, and all are DVGW certified.

Mussel shells are also used to attract mussel larvae. The shells are a byproduct of the food industry.



With the help of the Danish Technological Institute, we have calculated the CO₂ footprint for a single Stonereefs module.

Our mix design contains 278 kg CO₂e per m³ of concrete. The concrete weighs approximately 2,400 kg per m³, equaling around 116 g CO₂e per kg of concrete.

A reef module weighing 32.6 kg therefore has a CO₂e content of 3782 g CO₂e immediately after production.

After the carbonization effect (15 years), a reef module weighing 32.6 kg will have a CO₂e content of 2738 g CO₂e.

In practical terms, 50 Stonereefs reefs equate to one kilogram of beef tenderloin in a CO₂ footprint.



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