PIONEERING ADAPTATION SOLUTION FOR VULNERABLE ISLAND AND COASTAL TERRITORIES:
SYMBIOTIC AND BIOPHILIC SMART OFFSHORE ECOSYSTEM

Indigo Civilization
the ocean dwellers

01/2026

"We are the people of the world's largest ocean, Te Moana O Hiva. For us, the "people of the canoe", protecting our ocean means being resilient to the damaging consequences of climate change and staying true to our Polynesian identity. The ocean is our cultural identity. For us, he is not what separates us but what unites us. Our ocean is the cement of our social cohesion. »

“Te Moana O Hiva – Ocean Declaration" 2019

"We want to demonstrate that it is possible to adapt to climate change and rising sea levels, without fighting or fleeing the sea. We want to initiate a new form of symbiotic collaboration with the Ocean to transform constraints into opportunities. We want to contribute to the resilience and thriving of vulnerable communities and all the Ocean dwellers."

Frédéric Pons, President of the Indigo Civilization

SUMMARY

In a few words…

Living in symbiosis with & on the Ocean to meet the world's future challenges

1.

A cutting-edge symbiotic ocean adaptation solution, following a nexus water-energy-food, to meet the current and future challenges of island and maritime territories particularly threatened by the consequences of climate change.

Smart Offshore Ecosystem

2.

A world-renowned multidisciplinary team orchestrated by a French non-profit and general interest organization, The Indigo Civilization, to orchestrate an ambitious de-risked **Research / Action project**, on the basis of a rich state of the art.

3.

An exceptional territory to welcome a pilot whose experience curve will serve other vulnerable coastal and island territories around the world (⇢ 800 million individuals).

Bora Bora, French Polynesia

Biophilic, inclusive and profitable offshore blue economy as a sustainable adaptation solution,
through a hybrid financial mechanism combining philanthropy and private capital,
to promote solutions that can be applied globally.

1.

The context, the global problem

1.1 Future global challenges

In 2050…

Scarcity of land and depletion of resources: the world's population would grow by 26%. The need for accommodation would increase accordingly and 50% of the population would be concentrated within 100 km of the coast.

Rising waters: between 300 million and 1 billion people would see their terrestrial environment flooded and would be forced to migrate.

Lack of drinking water: 52% of humans suffer from chronic water stress in their environment and a lack of access to drinking water.

Food challenge: using the current intensive techniques of agriculture, an additional 22 million km^2 of arable land would be needed to feed the population, the equivalent of North America. According to the UN and Nature Journal, global demand for food and seafood would roughly double.

Energy challenge: global energy consumption would increase by 68%.

Pollution: CO^2 emissions would increase by 35% in the countries with the highest population growth.

Loss of biodiversity: Nearly 90% of land animals could lose their habitat with current farming methods. 90% of coral reefs, home to 25% of the planet's marine biodiversity, would disappear.

Collateral threats: according to MIT, 4 societal consequences are also to be expected (famine and malnutrition, migration, conflicts / geopolitical, and diseases).

Sources: IPCC, NOAA, AIE, OMM, Growing Blue, WEF, MIT, UN, Blue21

1.2 As a result, the rise of Blue Economy

Projection

In the medium term, our world will face environmental challenges and societal issues.

Man will go to the sea to look for solutions to meet his needs: food, energy, materials.

The blue economy, which is currently worth about $3.3 trillion, is expected to reach $5.1 trillion by 2050 and outpace global economic growth (McKinsey / WEF).

The Ocean will become an increasingly dense and coveted workspace (9 x by 2050 - DNV).

Threat

As is often the case in the history of humanity, this development could be done in a desynchronized and siloed way.

This approach could duplicate mistakes made on land in the past.

Opportunities

Encouraging the development of a circular and biophilic blue economy.

Learning to work in symbiosis with the Ocean.

Collaborating with the marine world to create profitable synergies to all living beings.

1.3 Consequence: the anthropization of the oceans

Projection

To date, we estimate that about 3 million people are already working and living at sea for long periods of time (merchant and military marines, tourism, oil and gas).

Given the growth prospects of the blue economy, humans will work on the ocean,

Close to saturated coasts
then more and more offshore.
For reasons of comfort, impact, productivity, or taste, humans will settle at sea to live, temporarily or not.

Threats

The Ocean could be perceived as the new space to be colonized and could arouse many covetousness and abuses.

Marine biodiversity could suffer even more...

Opportunities

Anticipating a new relationship Man – Nature.

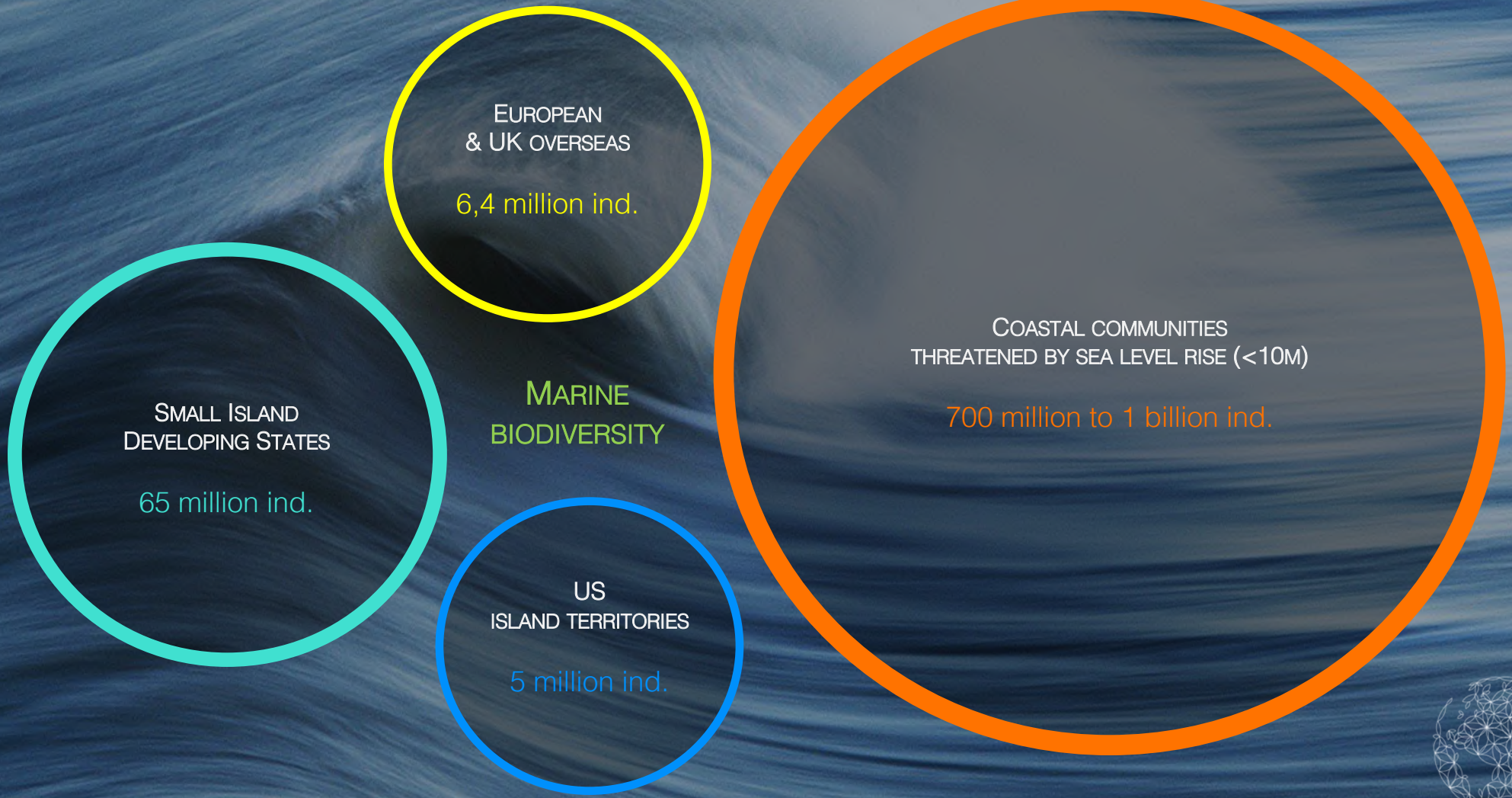
Learning to live in symbiosis with and on the Ocean.

1.4 The opportunity of developing island territories

In its "Ocean Economy to 2050" report, published in 2025, the OECD sets out four strategic priorities that can help achieve a "future blue economy that is both economically dynamic and environmentally sustainable". One of them mentions the opportunities of island and coastal territories in the development of a blue economy that is both profitable and respectful of environmental constraints."

1.5 The level of the Sea rises, welcome it!

About 800 million people impacted by 2050



Sources: ISPF, UN, IPCC

2.

Our synergistic solution: Smart Offshore Ecosystem

"The Sum is greater than the sum of parts", Aristotle

2.1 The solution to experiment: Smart Offshore Ecosystem

1.

Floating maritime territorial extension with a double positive ecological and financial ROI: multi-use and mutualized, modular and biophilic.

2.

Offshore location*, within territorial waters, to alleviate environmental and anthropogenic pressures on the coastal and lagoon ecosystem.

3.

Ecosystem of sustainable and profitable co-activities derived from deep sea cold rich-nutrients rich waters starting from Ocean Thermal Energy Conversion.

4.

Anticipation and adaptation solution serving local communities: transforming current and future constraints into opportunities.

Crédits: Jacques Rougerie, S. Nummy

** Anchored on a sea shoal or in the open sea relatively close to the coast*

2.2 Sustainable objectives of SOEs

Symbiotic ecosystem,
Laboratory of the future, global pilot

Self-sufficiency,
Sustainable and profitable economic growth

Resilience of living beings,
Adaptation to global change

Blue Carbon Infrastructure,
Incremental trophic Web

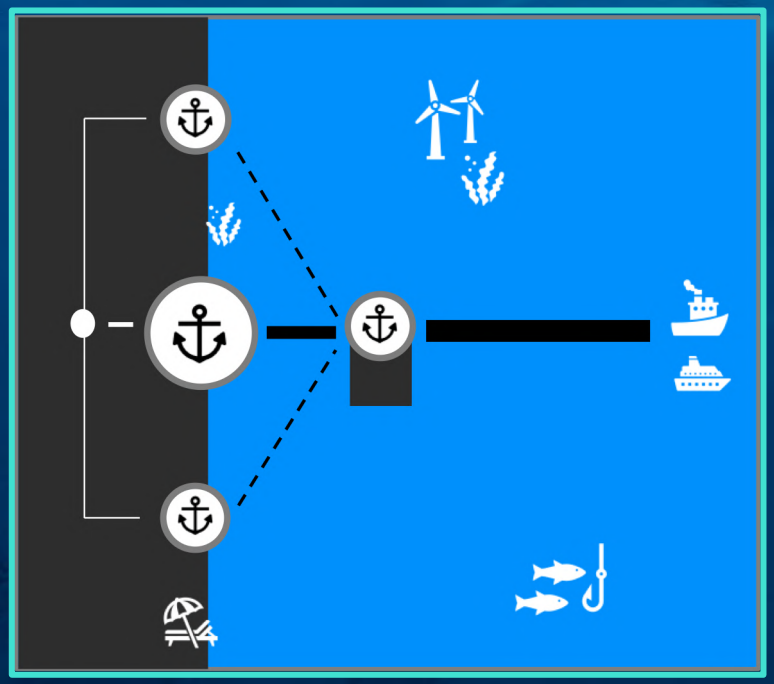
Educational Eco-Tourism

Marine and Underwater
Research Station

2.3 Desaturated maritime spatial planning

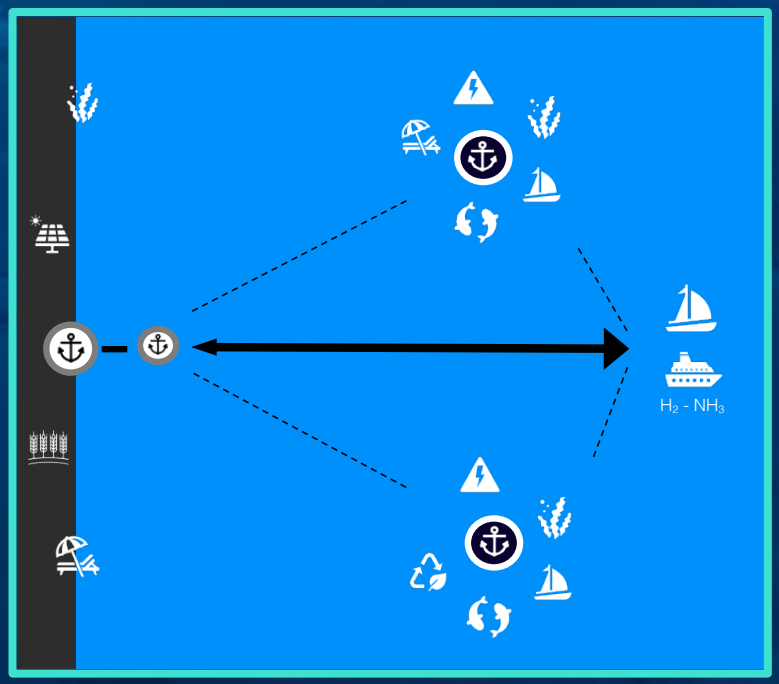
Today

Saturated Spatial Model
Mostly coastal and atomized blue economy
Globally Centralized Port Model (Hubs)



2050

Desaturated spatial model
Mostly offshore and streamlined blue economy
Smart Offshore Ecosystems extended network (within a EEZ)



Regular shipping lines

New shipping lines

Coasts

3.

Driving principle of SOEs:

A combination of mature and emerging solutions (TRL 6 ➢ 9)

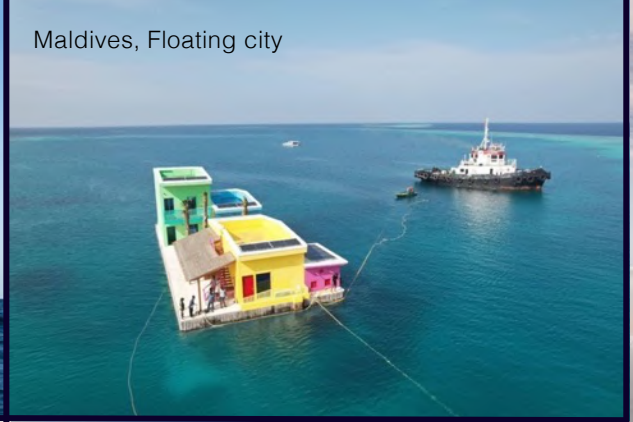
3.1 An available rich state of the art

Beyond the state-of-the-art from decades of experience gained from cyclone proof floating platforms and wind turbines, our work will especially benefit from numerous, more or less mature, technical solutions and research programmes carried out on multi-use and offshore industrial infrastructures. More than €70 million has been invested by the EU alone in research to study offshore multi-use infrastructures.

- Tropos (EU): multi-purpose floating modular offshore platforms integrating a wide range of specific activities from different sectors.
- POMU (France): multi-purpose logistics offshore platform in French Guiana.
- Mermaid (EU): offshore multi-use industrial platform on 4 European study sites.
- Space@Sea (EU): sustainable and affordable workspace at sea by developing a standardised and cost-effective modular island with low ecological impact.
- United Proiect (EU): multi-purpose offshore platform demonstrators to stimulate the blue economy.
- Musica (UE) versatile power and freshwater generation platform using renewable wind and wave energy.
- Plocan (UE): multi-purpose offshore platform for sustainable island autonomy in the Canary Islands.

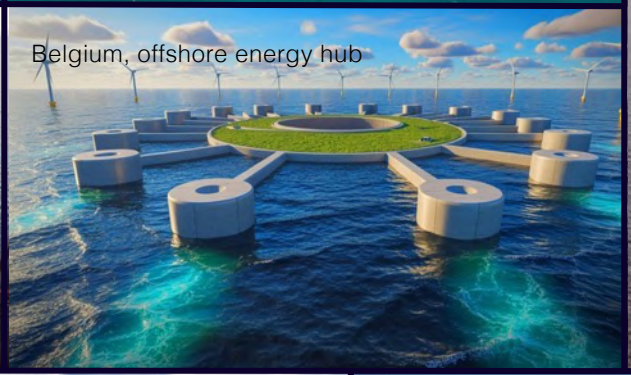
90% of the necessary science and engineering is available. How to combine them to create a Smart Offshore Ecosystem?

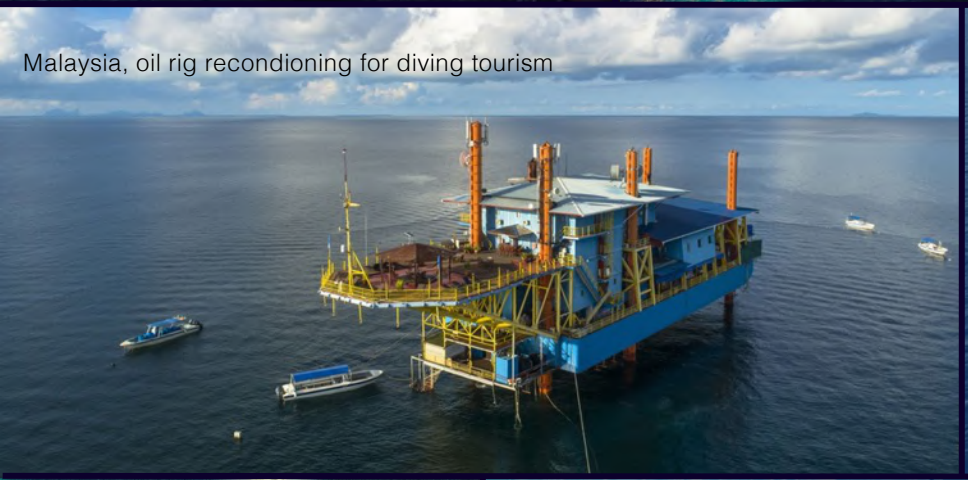

Panama, habitat


Maldives, Floating city


Danmark, Vindø Energy Island


Norway, Offshore Aquaculture


Belgium, offshore energy hub


Malaysia, oil rig recondioning for diving tourism


Spain, Canary Islands, PLOCAN


Maldives, Floating City


Dubai, The Reef project


Qatar, floating forest project


France, H_2 production

3.2 A WIDE ECOSYSTEM OF EMERGING AND MATURE SOLUTIONS

Responsible tourism

ICRT GLOBAL

wtm world responsible tourism awards

Responsible Tourism

Floating reef & mangrove

Reef Innovations

ARC Marine

Waterstudio.NL

FLOATING REEF

Deep sea energy storage

Fraunhofer IEE

SIZABLE

SWAC / OTEC

GLOBAL OTEC

MAKAI OCEAN ENGINEERING

MOL Mitsui O.S.K. Lines

AIRARO

DORIS

GEOCEAN

Other Renewable Marine Energies

SolarinBlue

NoviOcean

SOLARDUCK

weco

OCEAN HARVESTING

ENERGYMINER

Minesto

SEATWIRL

CorPower Ocean

WAVEPISTON

HydroQuest

WavEC

Offshore infrastructure

Waterstudio.NL

blue21

DEME OFFSHORE

MARIN

PLOCAN Plataforma Oceánica de Canarias

Hydrogene from sea water

Lhyfe

HOPE

Equatic

Genuine H2

Desalination

Waterise

OceanWell

FLOCEAN

ocean oasis

E-fuels from algae

ユーグレナ Euglena

Fuelgae

Marine biophilic materials

HOLCIM

ECONCRETE

Waste up/recycling

evac

SUEZ

WÄRTSILÄ

VEOLIA

Open Ocean Cultivation Blue carbon ecosystem

CLIMATE FOUNDATION

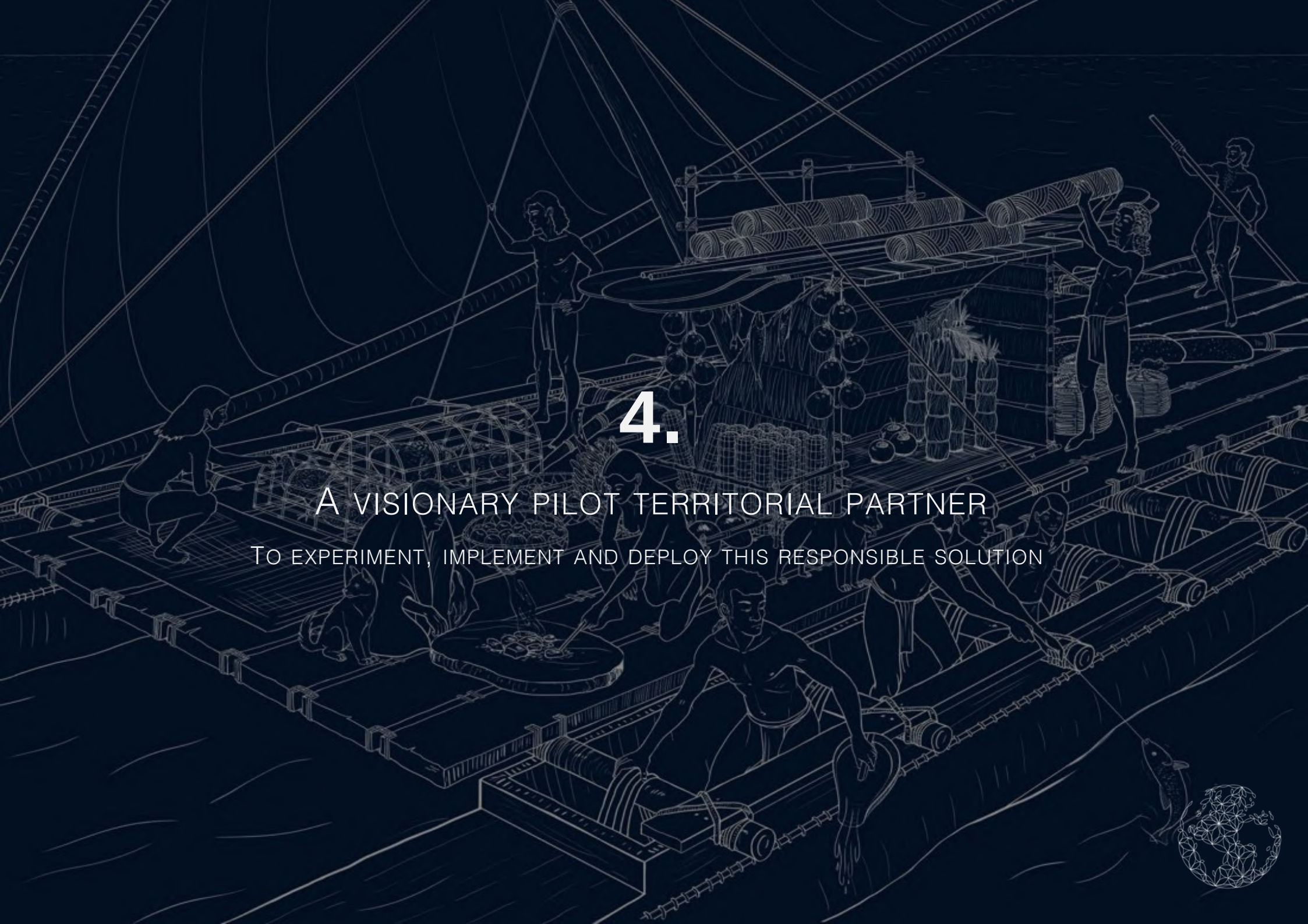
Underwater Gardens

PROVIDING OCEAN REGENERATIVE SOLUTIONS

nemo's garden

Ngā Punga o te Moana

CAWTHRON



4.

A visionary pilot territorial partner

To experiment, implement and deploy this responsible solution

4.1 Bora Bora, French Polynesia

First partner experimentation territory,
in accordance with the Memorandum of Understanding signed with the municipality of Bora Bora on the 25th of January 2025.

4.2 Challenges and assets of French Polynesia

Key challenges

Demographic slowdown and cultural resilience:
decrease in births and emigration of young people/talents.
(20% of 18-25 left the territory, in 5 years – ISPF, 2022)

Sustainable tourism transition:
reconciling ecological and socio-economic interests.

Structural trade deficit.

Energy, food and tourism dependence.

Carbon footprint / inhabitant:
60% higher than the world average.

Pollution and immediate environmental challenges:

- Degradation of terrestrial and marine ecosystems,
- Loss of biodiversity.

In 2100, 1/3 of the 118 islands of Polynesia would be uninhabitable due to rising sea levels (French CSE – 2025).

Key Strengths

Positive economic conditions(cf. IEOM 2024 report):
growth, inflation control and employment dynamism.

Profitable high-end touristic economy (+13% in, 2024).

Exceptional development potential conducive to the development of a blue economy whose current weight remains low:

- Environmental heritage,
- Vast maritime area (48% of the French EEZ),
- Diversity of natural resources.

Potentials of an offshore ecosystem-based blue economy (cf. Innovation Strategy 2030) :

- Eco-cultural tourism,
- Green logistics hub,
- Aquaculture,
- Marine renewable energies,
- Biotechnology,
- Research.

4.3 Making Polynesia a space for innovation

(Synergies with the 2030 Innovation strategy published in May 2022)

Activities	Priorities of the Polynesian Blue Economy strategy	Synergies Smart Offshore Ecosystem (/5)
Environment	Tackling marine pollution	4
	Monitoring, protecting and defending MPAs to preserve biodiversity	5
	Limiting anthropogenic pressures on coasts and reefs	5
Transport	Initiating the energy-efficient transition to alternative propulsion energies	5
	Encouraging the development of an eco-responsible shipbuilding industry	3
Aquaculture	Becoming a global benchmark in aquaculture	4
	Developing an offshore multi-trophic aquaculture sector	5
	Promoting artisanal aquaculture and fishing	5
Tourism	Be a model of eco-responsible tourism	4
	Becoming a showcase for cultural tourism	3
Logistics	Developing the attractiveness of Papeete's port	1
	Making Polynesia a decarbonized and sustainable logistics hub in the Pacific Ocean	5
Marine Energies	Developing MRE demonstrators to move towards energy autonomy	5
	Generate a trade surplus (electricity, H_2)	5
R&D	Strengthening a sector of excellence to better understand the ocean	4
	Be a major source of biotechnology valorisation	5
	Becoming a pilot territory for the bioeconomy	5

4.4 Bora Bora, a favourable experimentation area

Beyond the exceptional splendour of its landscapes and its reputation as a high-end tourist destination, this pioneering territory has gradually established itself, over the past twenty years, as a real living laboratory for sustainable development for small island territories.

Smart Offshore Ecosystem's research/action program is a continuation of the sustainable development actions carried out on the island and initially funded by the European Union as part of the IANOS / SWEET project:

- Onshore Phase 1 – Agri-Solar Installations (2025)
- Coastal Phase 2 – Ocean Thermal Energy and Green Hydrogen (2030)

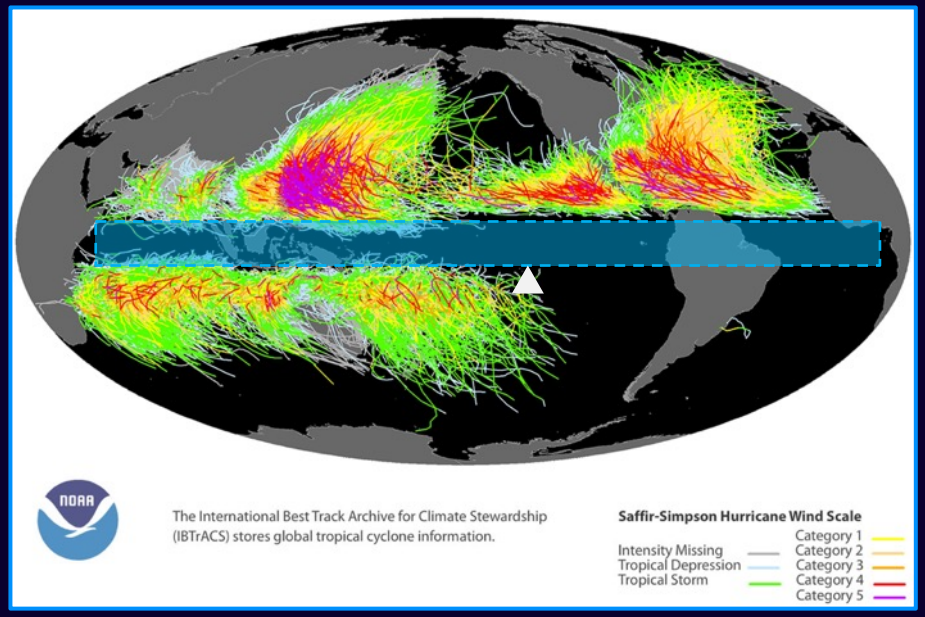
Bora Bora also illustrates the realities of many island territories, which are facing current and future environmental and socio-economic challenges, particularly in the face of climate change.

Finally, the Polynesian cultural heritage and the deep link that unites the People of the Sea to its ocean are assets to nourish and stimulate the collective imagination.

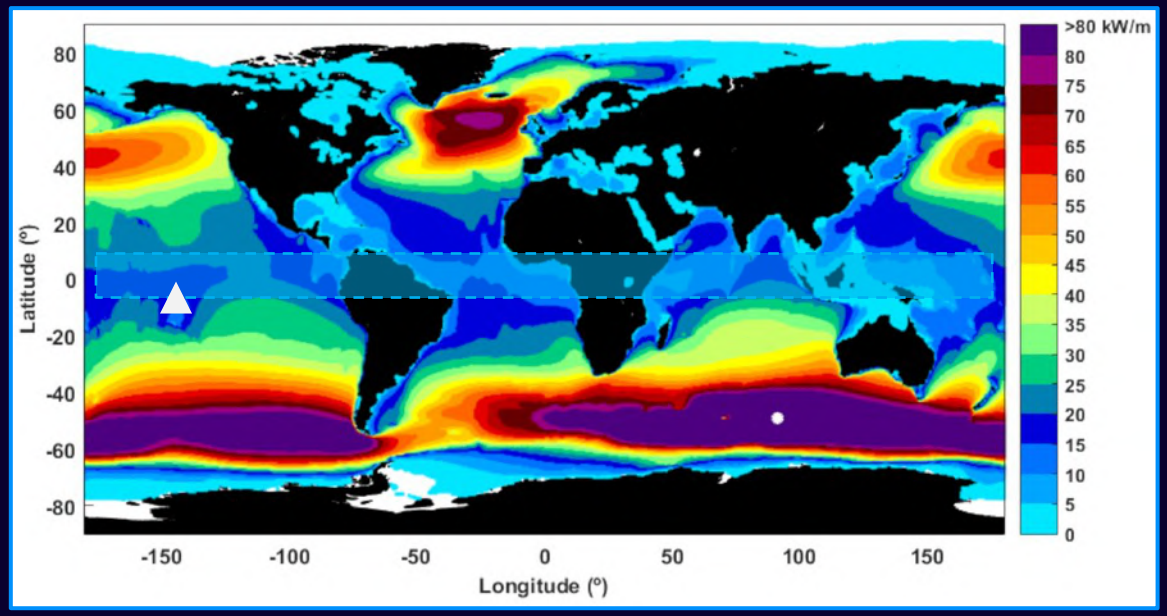
▶ State of the art of sustainable development solutions in Bora Bora

4.4 Bora Bora, a favourable experimentation area

Calm waters and favourable weather conditions to maximize viability and reliability and minimize risk and cost.
The cyclone risk in French Polynesia is almost zero in normal years, more important during El Nino years, with cyclones remaining confined to the west of the South Pacific and the Indian Ocean.



Tropical cyclone tracks since 1842 – NOAA data base



30-year average wave power (1989-2018) – ERA5 database

Particularly favourable theoretical experimentation area

4.5 The 4 pillars of sustainable development in Bora Bora.

Anticipate an ambitious long-term territorial vision to act better in the short term.

Photo credit: Grégoire le Bacon / TNH

▶ To watch the speech of Mr. Gaston Tong Sang, Mayor of Bora Bora

4.6 Sustainable objectives of the pilot of SOE in Bora Bora

Preserve
the natural heritage

Alleviating environmental pressure on coasts and lagoons

Fostering the thriving of life at sea: marine permaculture

Aiming for sustainable marine spatial planning

Ensuring the biophilic nature of all anthropogenic activities of the SOE

Financing its long-term adaptation (voluntary blue carbon markets)

Improve
the living environment of the community

Ensuring the socio-cultural resilience of the community

Experimenting a model of a future floating adaption habitat

Generating pride on belonging to the territory

Ensuring the well-being of the community (PERMA)

Giving future generations prospects for development

Favour
the economy and autonomy

Ensuring the region's food and energy autonomy

Generating a positive trade balance

Diversifying the local economy: valorisation of Polynesian materials and know-how.

(e.g. composites from coconut or basalt fibres, biotechnologies, scientific tourism)

Encouraging vocations and creating jobs for Polynesians

Become
an eco-exemplary community

Creating an exemplary laboratory of the future

Proposing a carbon-negative socio-economic development

Inspiring other territories threatened by sea level rise

(SIDS →15 million individuals, coastal population <10m →1 billion ind.*)

Developing and anchoring a biophilic consciousness

Sources: ISPF, UN, IPCC

4.7 Functional synergies of the SOE (1+1=3)

Transforming the constraints of vulnerable island and costal territories into opportunities

"Ocean thermal energy conversion (OTEC) is a technology to draw thermal energy from the deep ocean and convert it into electricity or commodities. This technology requires a temperature difference of 20°C between the warm surface water and cold deep water and, as such, is only feasible in certain areas of the world; the tropics are the best area for this technology.

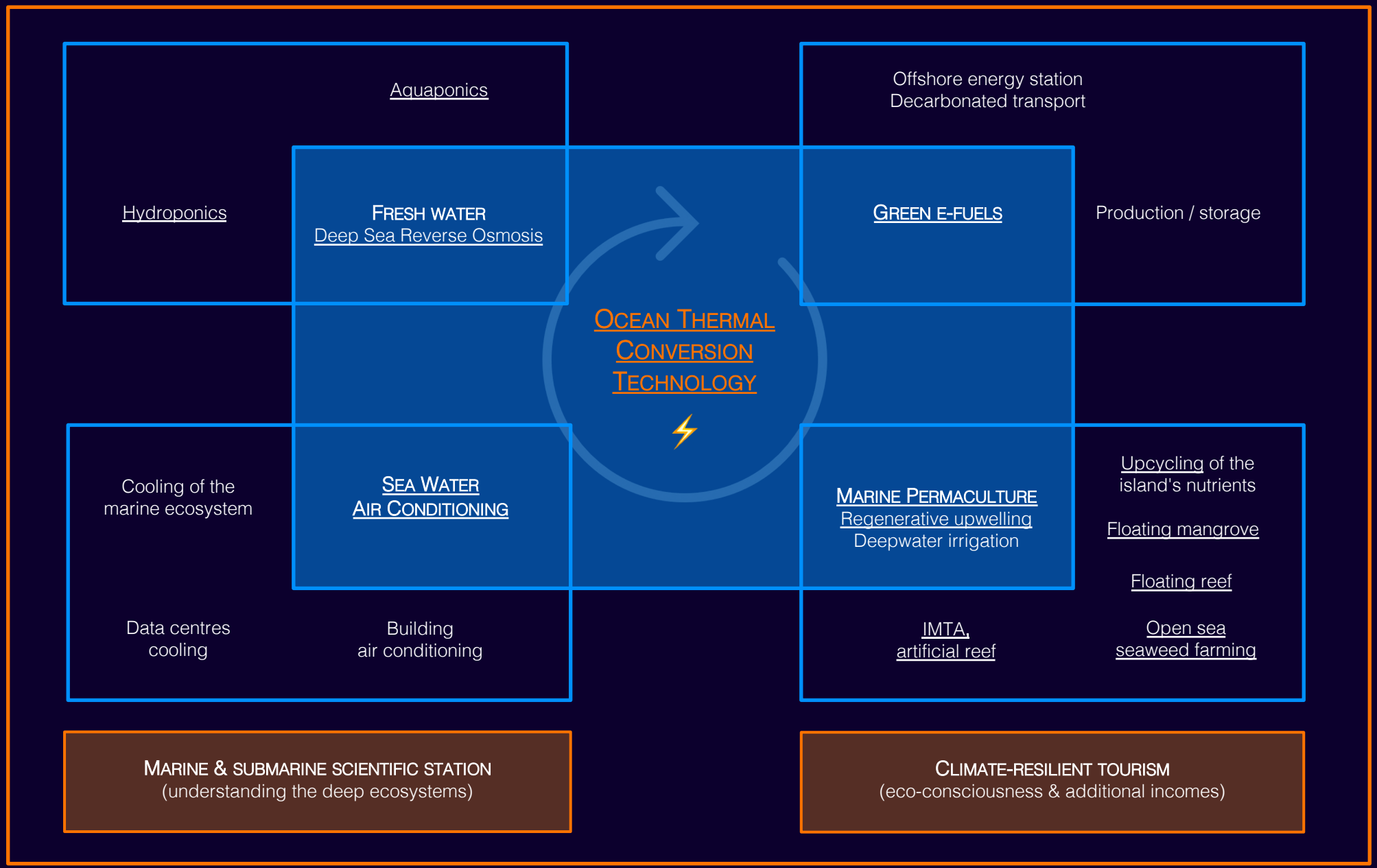
The key uses for OTEC are to generate electricity, desalinate water, provide heating and cooling, and support the cultivation of fish or other marine life for food.

(…) Given that approximately 40% of the global population lives within the tropical belt, this equates to over 3 billion people who could benefit from OTEC-generated power.

(…) Industry, academia and governments should develop prototype devices to withstand the marine environment through demonstration and testing facilities, research and innovation support, and enable technology support to reduce costs and improve performance".

International Energy Agency

4.7 Functional synergies of the SOE (1+1=3)



4.8 Inspirational design

Spatial and stylistic philosophy

This Preliminary Inspired Design (PID) presents a modular and floating research center that harmoniously unites Nature, technology, multiple synergistic marine co-activities.

Designed to conduct research in vulnerable and demanding aquatic environments, the PID must withstand tropical storms (▻ cat.2/3).

It consists of circular and very stable (⌀ 30m) tensioned anchor platforms, specially designed for deep waters (up to 1,500m) and inspired by the latest offshore innovations.

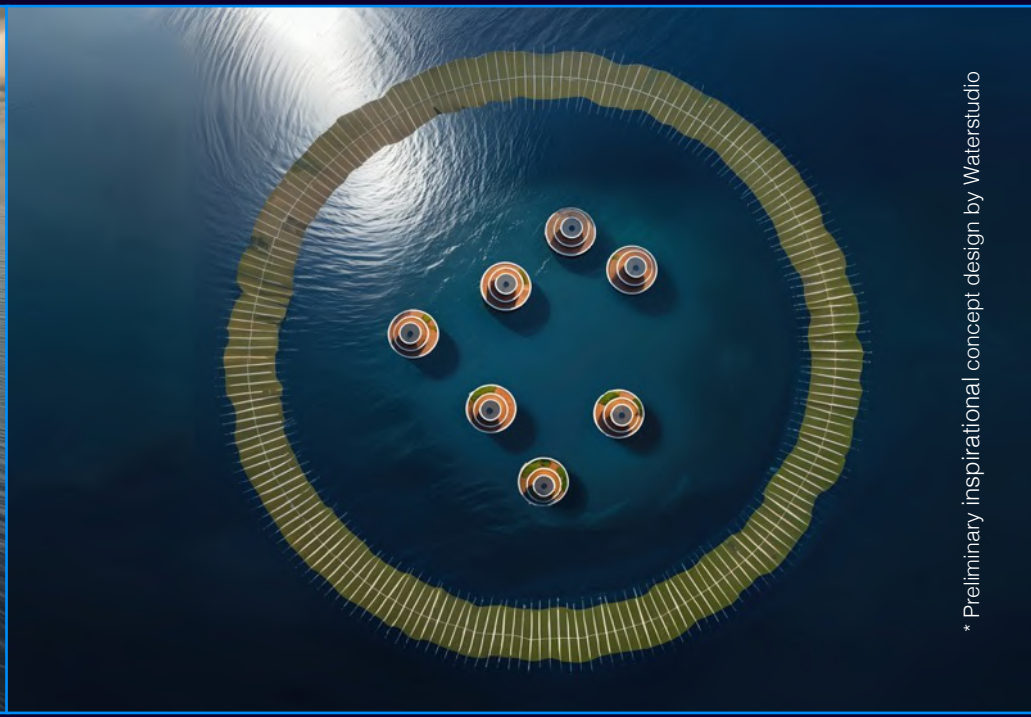
NOTE: the featured PID is a basis for inspiration and preliminary work. It is not intended to be a finished or functional version of SOE's project in Bora Bora.

Crédit : Waterstudio pour La Civilisation Indigo


Study area to be validated in
the Applied Research Phase
ø 150 m
16 km

Architectural & spatial philosophy*

Modular infrastructure - incremental - synergistic - integrated - beautiful



* Preliminary inspirational concept design by Waterstudio

Circular tensioned anchor platforms (⌀ 30m),
designed for deep water (up to 1,500m) and resistant to tropical storms (⊳ cat. 3) and 5m waves.

Biophilic philosophy*

Blue Carbon Ecosystem

Platforms surrounded by an ecosystem composed of mangroves floating on a network of upcycled wind turbine blades. This biophilic structure also aims to protect the Smart Offshore Ecosystem from the swell.

* Preliminary inspirational concept design by Waterstudio

BIOPHILIC PHILOSOPHY*

BLUE CARBON ECOSYSTEM

* Preliminary inspirational concept design by Waterstudio

The floating infrastructures of the Smart Offshore Ecosystem aim not only to be as minimally invasive as possible, but to be conducive to the development of a new marine trophic web and an artificial reef.

5.

A Franco-Polynesian research/action process serving Polynesian communities

5.1 A 3-PHASE DE-RISKED PROCESS

PHASE1

> 2026

Transdisciplinary applied research, modelling & simulation based on emerging and mature solutions and technologies

Expected TRL 6

Philanthropic Consortium
Budget: 2,86 M€

ECOLOGICAL, ECONOMIC, SOCIAL AND TECHNICAL VALIDATION OF THE MODEL

PHASE 2

> 2028/29

Pilot in a real environment (Bora Bora)
Experimentation & optimization

Expected TRL 9

Public-Private Consortium
Budget: according to Phase 1

FINALIZATION OF R&D & EXPERIMENT
PRACTICAL VALIDATION OF THE PILOT

PHASE 3

> 2035

Declination
Commercial deployment,
New Business Models

Public-Private Consortium
(EIG)

SERVING OTHER TERRITORIES
(SIDS + COASTAL CITIES)

5.2 An evolutive ecosystem that combines the strengths of non-profit and for-profit models

Non-profit model
Philanthropic consortium (sponsors)

Phase 1 (TRL 6)

To avoid conflicts of interest, to ensure the general interest and to get away from both technical and philosophical dogmas.

Benefits for sponsors:
- External and Internal Corporate Image (CSRD) .
- Tax-deductible philanthropic investment.
- Accessible and de-risked R&I.

For-profit model
Public/private consortia (investors)

Phases 2 (TRL9) & 3 (commercial deployment)

To develop new profitable markets and business models with a strong social and environmental impact.

Benefits for investors:
- Synergistic technical cooperation.
- SRI to prepare for the future of the company.
- Fair business models of the future.
- Access to new markets.

« Early Adopters »
The first sponsors may become the first investors

5.3 Phase 1 : main stakeholders of the project

The Indigo Civilization

French Association, law 1901
Official Bureau
Steering Committee
Honorary Members
Members (➢ 2025)

Territorial stakeholders

Municipality of Bora Bora
(MoU unanimously approved by the municipal council)
Civil Society of Bora Bora & Polynesia (➢2025)

Philanthropic Consortium

Sponsors (2026)
Patrons (2026)

Multidisciplinary research team

Scientific committee
Maritime Project Manager + action / research coordinators
Disciplinary sub-teams:

- Oceanography
- Renewable marine energies
- Marine biology
  Aquaculture
  Seaweed farming
- Mesology
  Society
- Engineering & Architecture
  Naval
- Legal
  Governance
  Insurance
- Pollution
  Waste
- Economic engineering and financial

5.4 Phase 1 : action research methodology

Orchestration and supervision over 36 months of a multidisciplinary research team composed of PhDs, laboratories and international experts.

Organizational principles	Main milestones
• Double Diamond process management, facilitating clarity, liberty and cocreation for a wide range of participants. • Design integration, making sure open-ended research finds its way to intentional development. • Minimum Viable Product, helping to keep a real-life prototype in focus.	• The stage 1 (Discover) unfolds the vision and objectives (Brief v1) in a multidisciplinary collection of scenarios, enabling everybody to learn from all the possible perspectives on the project. • The stage 2 (Define) brings the various scenarios together in an integrated multifunctional Smart Offshore Ecosystem (Brief v2). • The stage 3 (Develop) allows all specialists to develop their particular solution meeting the common purpose and objectives (Brief v2). • The stage 4 (Deliver) will bring all this together in an integrated functional design that is modelled simulated to check the environmental, technical, economic and social relevance of the SOE with stakeholders.

BLUEREVOLUTION.org

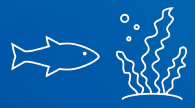
Christiaan Weiler & Rutger de Graaf (Floating Future consortium)

5.5 Phase 1 : 8 priority disciplinary pillars

Transdisciplinary applied research structure.

Oceanography
Marine biology

Marine renewable energies



Marine permaculture
Seaweed cultivation
Aquaculture
(IMTA)

Pollution
Waste

Naval
Engineering &
Architecture

Legal
Governance
Insurance

Economy
Economic
viability

Mesology
Society

Technical and scientific multidisciplinary team under validation in Polynesia and internationally: CNRS / CRIOBE, IFREMER Polynesia, University of French Polynesia, Polynésienne des Eaux, Waterstudio, Blue21, The ClimateStandards, SKEMA Business School

Converging divergent interests for a harmonious ecosystem solution

Multidisciplinary Research

Objectives of each discipline

Discipline	Question	Objectives
Mesology / Society	How can an SOE contribute to redefining a symbiotic human-Nature relationship, a true model of societal progress and a source of Polynesian pride?	• Ensure respect for Polynesian and local culture. • Engage and federate all Bora Bora stakeholders in the co-construction of the SOE model. • Define the sine qua non conditions for the acceptability, desirability and pride of the Bora Bora community regarding the SOE. ▶ To consult the details and KPIs of this Work Package

THECLIMATESTANDARDS

Damien Serre, Charlotte Heinzlef, Emmanuelle Thénot & Loïs Bastide (UPF)

Multidisciplinary Research

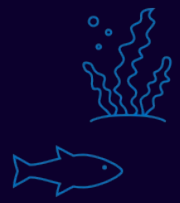
Objectives of each discipline

Discipline	Question	Objectives
Oceanography Marine Biology	Where can we envisage, beyond the lagoon, between Tupai and Bora Bora, the experimentation of a viable and biophilic SOE, given the synergistic objectives sought by its interdependent co-activities: science, energy, food, freshwater, tourism, biotechnologies?	• Spatial data collection, mapping and modelling: bathymetry, currents, waves, winds, water temperatures, biodiversity (25 km2). • Define the best study location to ensure the safety, sustainability and efficiency of the ecosystem and its co-activities given maritime, climatic and environmental constraints. • Create a floating artificial reef (blue carbon), in sustainable synergy with the other co-activities. • Ensure the biophilic nature of all SOE co-activities. ▶ To consult the details of the WP Oceanography & Marine Biology

CRIOBE UAR3278

Multidisciplinary Research

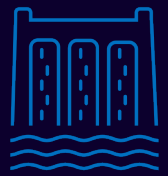
Objectives of each discipline



Discipline	Question	Objectives
Marine permaculture Integrated Multitrophic Aquaculture Seaweed cultivation	How can a new trophic web, a true circular ecosystem (IMTA) be created considering the environmental context and the SOE's envisioned co-activities, particularly in the energy sector, and how?	• Contribute to ensure the food self-sufficiency of the SOE in the short term, and then of the island of Bora Bora. • Deploy profitable, sustainable, mastered and integrated techniques to reach a larger scale to help feed coastal populations at a minimum. • Develop virtuous synergies with other activities. ▶ To consult the details and KPIs of this Work Package

Multidisciplinary Research

Objectives of each discipline



Discipline	Question	Objectives
Naval Engineering and Architecture	How can we design, model and simulate a modular, safe, biophilic, attractive and multi-purpose floating maritime infrastructure that is cost-effective and located offshore given environmental and socio-cultural constraints?	• Develop a SOE pilot project that is agile and modular enough to allow different co-activities to be hosted and interacting. • Define the required technical solutions: bathymetry, waves and swell, currents, winds and tropical storms, seakeeping, safety and stability, anchoring, longevity and maintenance. • Technically model and evaluate the feasibility and costs of such scalable infrastructures. • Design an integrated beautiful and harmonious architectural project, capable of generating positive emotional valence and pride. ▶ To consult the details and KPIs of this Work Package

Waterstudio.NL

Koen Olthius

blue21

Rutger de Graaf

Multidisciplinary Research

Objectives of each discipline

Discipline	Question	Objectives
Renewable Marine Energies	How can reliable synergies be developed and made reliable from deep-sea water: how can Ocean Thermal Energy (OTEC) be the starting point for a cascade of co-activities such as: production of e-fuel (H_2) + fresh water + promotion of a thriving biodiversity around the SOE?	• Ensure the energy self-sufficiency of the SOE in the short term, then the island of Bora Bora in the mid-term. • Deploy profitable, sustainable and integrated techniques to scale up to help provide coastal populations with energy and other benefits. • Develop virtuous synergies with other activities. ▶ To consult the details and KPIs of this Work Package

Franck Lucas (University of French Polynesia)
Associate Professor, HDR – Energy and Process Engineering

Multidisciplinary Research

Objectives of each discipline

Discipline	Question	Objectives
Pollutions Waste management	How can the SOE be 0 pollution and recover its waste and the nutrients produced on the island of Bora Bora?	• Anticipate and prevent any pollution related to marine and submarine infrastructure, and to the anthropogenic activities of the SOE: solid, liquid, gaseous, noise. • Value the nutrients produced by the SOE and the island of Bora Bora to feed the natural ecosystem of the SOE. ▶ To consult the details and KPIs of this Work Package

Polynésienne des Eaux

Vincent Sturny

Multidisciplinary Research

Objectives of each discipline

Discipline	Question	Objectives
Legal (governance, insurance)	What certification, legal framework and governance can be envisioned for this shared infrastructure in Bora Bora?	• Design the necessary marine / maritime legal framework to ensure especially a proper insurability of the SOE. • Describe the management style and the organizational framework to be established. • Identify the roles and responsibilities of the multiple actors in order to ensure the proper functioning, sustainability and insurability of the SOE. ▶ To consult the details and KPIs of this Work Package

skema BUSINESS SCHOOL

Olivier Lasmoles

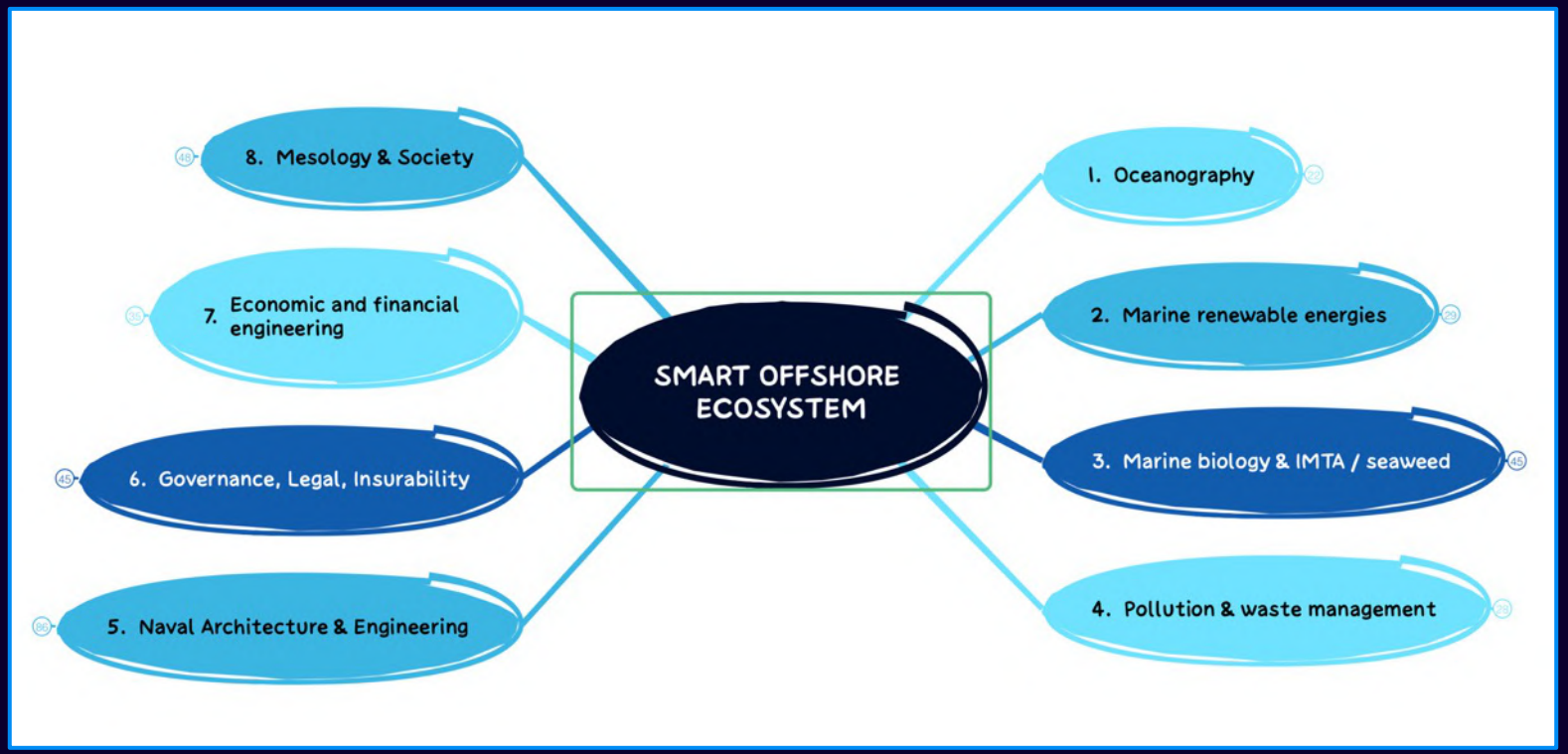
Multidisciplinary Research

Objectives of each discipline

Discipline	Question	Objectives
Economic engineering and financial (economic viability)	How can the SOE be profitable in the medium term and benefit all its stakeholders?	• Setting up a shared, viable and synergistic multiple business model. • Ensure global economic performance of the SOE in the long-term. • Transform a multifunctional economic and scientific hub into an attractive model for all economic stakeholders: local community, investors, operators, tourists… ▶ To consult the details and KPIs of this Work Package

Multidisciplinary Research

Project mapping



▶ To enlarge and consult the details of the project map
(password: BoraBora)

5.6 Phase 1 : expected outcome (TRL 6)

By featuring digital simulation tools or physical demonstrators, the Phase 1 of the project aims to reassure and convince local public authorities, and civil and economic stakeholders, as well as investors of the relevance of prototyping the designed Smart Offshore Ecosystems (Phase 2).

Architectural simulation

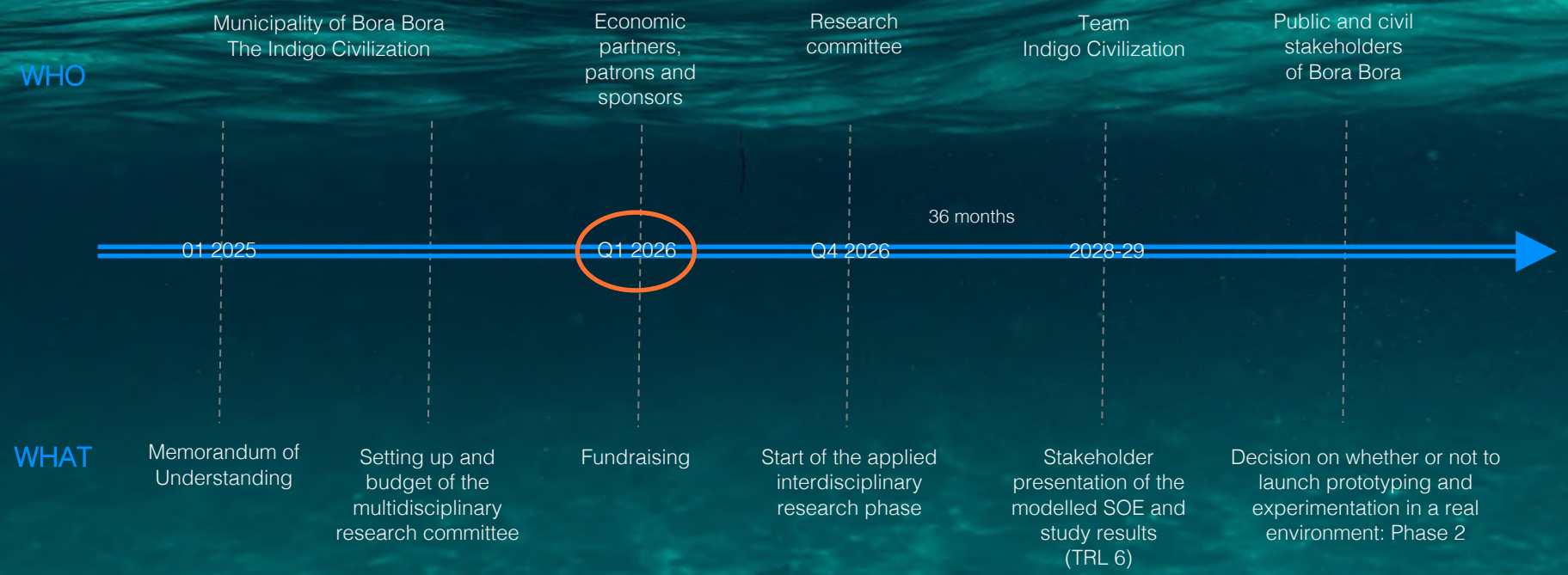
Technical simulation

Environmental simulation

Economical simulation

1. Design of the SOE pilot: space planning, 2D plan, 3D modeling, virtual tour.
2. Natural harmony report assessing the theoretical positive, neutral and negative impacts of the SOE on its marine environment.
3. Social acceptance report showing the perception of the SOE by local stakeholders and community.
4. Economic report assessing the theoretical viability of the SOE and potential future profitable business models enabled by a shared infrastructure.
5. Technical report: feasibility, cost estimate, roadmap in the perspective of the in-situ experimentation of the SOE pilot.
6. Balance of benefits and risks.

5.7 Phase 1 : timeline



5.8 Phase 1 : provisional budget

Funds required: € 2,86 million*
89% of which is dedicated to applied research and simulation

NOTA

Benevolent value of the contribution to initiate the project: **390 K€** (2023-25)

Provisional budget	Year 1	Year 2	Year 3	Subtotal
Team meetings & closing conference Phase 1	20 000 €	20 000 €	30 000 €	**70 000 €**
Travel & operating expenses	35 000 €	35 000 €	50 000 €	**120 000 €**
Multidisciplinary Research & Innovation	685 000 €	820 000 €	960 000 €	**2 465 000 €**
Cartography & modelling of a 25 km2 marine area at Tupai	*300 000 €*	*- €*	*- €*	***300 000 €***
Marine Engineering + technical simulation (Hydromec+)	*30 000 €*	*50 000 €*	*120 000 €*	***200 000 €***
Naval architecture + 3D simulation	*50 000 €*	*50 000 €*	*100 000 €*	***200 000 €***
Oceanography + environmental impact survey	*75 000 €*	*125 000 €*	*150 000 €*	***350 000 €***
IMTA / algoculture + demonstrator	*150 000 €*	*150 000 €*	*150 000 €*	***450 000 €***
Marine energies (OTEC, H2, H2O) + demonstrator	*100 000 €*	*125 000 €*	*125 000 €*	***350 000 €***
Pollutions / rubbish / up-recycling + demonstrator	*80 000 €*	*110 000 €*	*110 000 €*	***300 000 €***
Mesology / Philosophy / Society	*40 000 €*	*40 000 €*	*70 000 €*	***150 000 €***
Financial and economic engineering and simulation	*5 000 €*	*15 000 €*	*30 000 €*	***50 000 €***
Governance / Legal	*10 000 €*	*10 000 €*	*30 000 €*	***50 000 €***
Action Research Methodology – Floating Future	*20 000 €*	*20 000 €*	*25 000 €*	***65 000 €***
Project coordinator (freelance - 25h/month)	30 000 €	30 000 €	40 000 €	**100 000 €**
Administration, PR, partners/patrons' relations	35 000 €	35 000 €	35 000 €	**105 000 €**
TOTAL (excluding volunteer expertise)	**980 000 €**	**815 000 €**	**1 065 000 €**	**2 860 000 €**

* Amount deductible from taxes, depending on the country (ex. 60% in France i.e a net global amount of 1.144 K€)

5.9 Phase 1 : Key success factors

Social membership and a de-risked approach

1. **Social acceptance / adherence** : we want the public authorities, the economic and socio-cultural actors of Bora Bora and Polynesia to take ownership of this ambitious innovation project for their future generations. In addition, it seems fundamental to us to obtain the support and even the social enthusiasm of Polynesians, including children and adolescents, who are particularly concerned by this plausible future.

2. **De-risked approach**: to reassure and engage Bora Bora's stakeholders, we advocate a very gradual approach in 3 complementary steps:

    - Theoretical applied research and simulation: zero risk,
    - Experimentation in a real environment: low risk because of a small-scale prototype,
    - Possible deployment: low risk because solutions proven over the long term.

The objective of each step is to raise awareness and engage Polynesian society, small and little and without hurting.

6.

The Indigo Civilization

Project owner French NGO

New European Bauhaus
beautiful | sustainable | together

To consult our Code of Conduct and our Status

What sustainable development model should be considered?

Towards a strong to very strong sustainability (Boutaud)

Techno-economic approach

Philosophy: "no environmental protection, no social protection without a strong economic base »

Priority: economic
Target: short-term

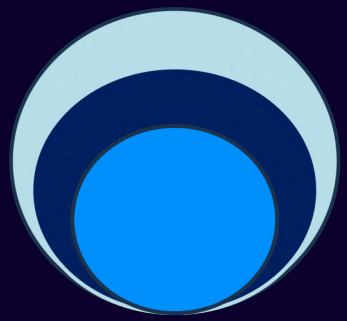
Weak sustainability

Consensus approach

Philosophy: "Reconciling environmental protection, social equity and economic growth »

Priority: balance
Target: medium term

Strong Sustainability



Ecosystem approach

Philosophy: "no sustainability of the human system without taking into account the capacities of the ecological support"

Priority: ecological
Target: long-term

Very strong sustainability

economy social ecology

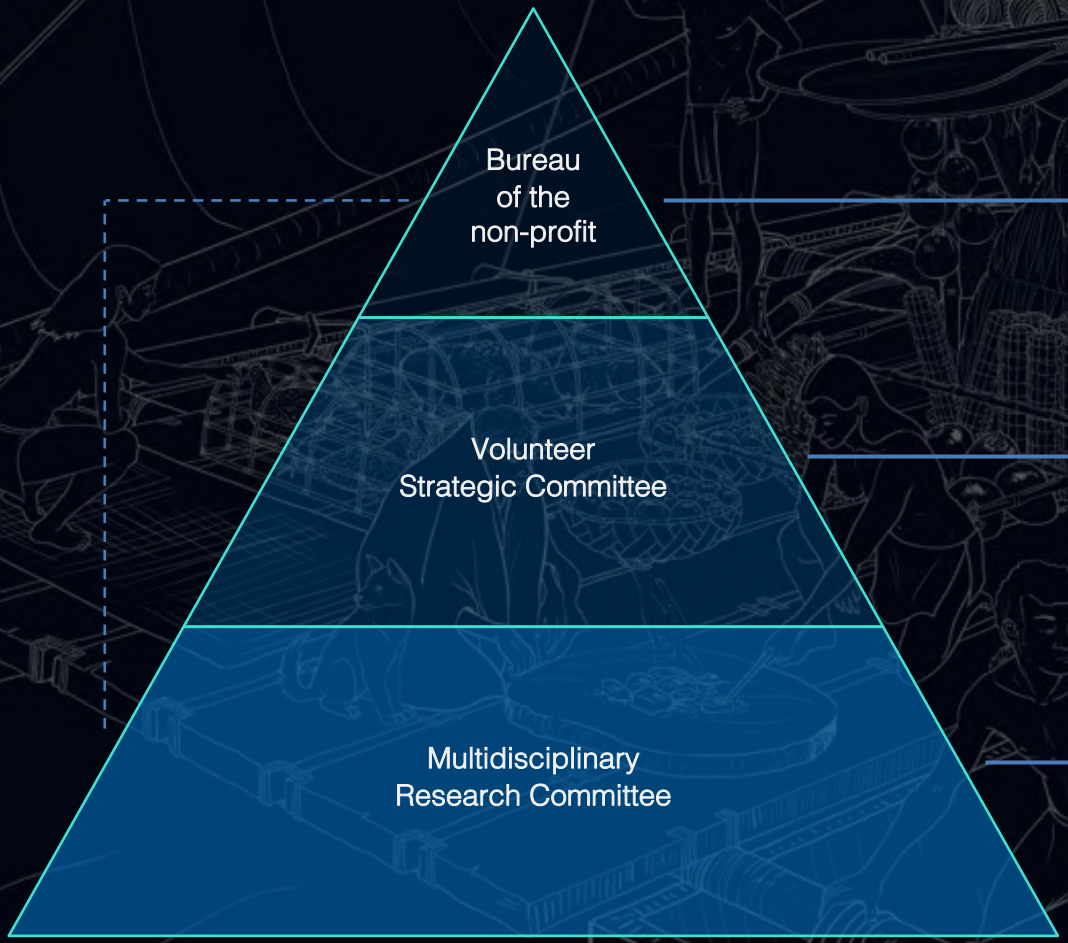
TRANSFORMING CHALLENGES IN OPPORTUNITIES

Our cutting-edge solution, Smart Offshore Ecosystem, aims to anticipate the long-term adaptation of small maritime and island territories that are often considered non-priority but particularly threatened by the future consequences of climate change, such as rising sea levels.

On average, 96.5% of these territories are the ocean, and represent a third of all maritime Exclusive Economic Zones in the world. This exceptional natural heritage is an opportunity to experiment with bold marine solutions that meet their current and future challenges.

As a pioneer of a new human-nature relationship, these territories could prefigure a sustainable and symbiotic blue economy, meeting 9 Sustainable Development Goals defined by the UN.

Our non-profit governance



Administration
Dissemination
Communication, investors' relationship
Transversal management of maritime projects
Stakeholder of the steering committee with Bora Bora
Orchestration of the Research Committee

Policy Recommendations
Skills sponsorship
Networking

Multidisciplinary research
Co-construction (TRL 6)

Founding member, Bureau

Frédéric Pons

President

Frédéric Pons, the founder and President of The Indigo Civilization, a non-profit, public-interest organisation, is a French philanthropist and entrepreneur with over 25 years of experience in marketing, strategy, and executive management. Throughout his career, he has successfully developed and launched innovative projects for prominent international brands across diverse multicultural environments.

After a pivotal moment in his life, Frédéric chose to redirect his focus and dedicate himself to a higher purpose, channelling his efforts into a pioneering cause that serves the greater good of all life on Earth. A lifelong admirer of the sea and its mysteries, Frédéric's mission now centres on bringing to fruition the study, experimentation, and deployment of sustainable, desirable, viable and generative Smart Offshore Ecosystems.

To learn how to live in symbiosis with and on the oceans…

Our Strategic Advisor

Jacques Rougerie

For more than 30 years, Jacques Rougerie has based his work on biomimetic, bio-inspired, resilient and sustainable architecture. In this spirit, he has built underwater habitats and laboratories, sea centres, ships with transparent hulls, underwater museums, floating village projects, and a base and a lunar village.

As a child, on the distant beaches of Africa, his friends built tree houses. He wanted to build them under the sea or in space, and become an explorer of the future. Fascinated by Jules Verne's novels, "20000 Leagues Under the Sea" and the voyage "From the Earth to the Moon" and later by the exploit of Gagarin and Commander Cousteau developing the world's first underwater habitat in the same year, Jacques Rougerie saw his destiny transformed by these two great space and oceanic adventures.

"There were no real architectural and technical references to build these new oceanic living environments. It was therefore essential for me to work with a multidisciplinary team and to be inspired by the genius of Leonardo da Vinci who told his students: "Go and take your lessons in nature, that's where our future lies." Because since the beginning of the world, 3,800 million years ago, nature has been drawing the most beautiful shapes, the most elegant curves and making the best materials. It is this biomorphic approach that is at the origin of my creations."

Founding member, Bureau

Guillaume Vichot

Vice-President

Guillaume Vichot is a naval engineer who graduated from ENSTA, IHEDN and AUDENCIA and specializing in maritime projects and contracts management. With a robust background in marine and naval project management, particularly with Naval Group, he has gained extensive expertise in this field. As Managing partner of Oppy International, a marine project accelerator, he develops and manages complex projects for international clients, guiding them from design and industrialization to end-user satisfaction.

In his role, he ensures adherence to Quality-Cost-Delivery objectives and orchestrates a range of interfaces, including Design, Production, QHSE, Purchasing, Supply chain, Customer relationship, End-Users and Local authorities management. Through this, he effectively manages multidisciplinary and multicultural teams, ensuring seamless collaboration across diverse participants.

Founding member, Bureau

Sophie Hoehlinger

General Secretary

Sophie Hoehlinger is an executive with a rich educational background and extensive experience in the pharmaceutical and healthcare industries. She holds a European Board Diploma from ECODA and a Board of Director Certificate (climate and biodiversity option) from Sciences Po Paris, both obtained in 2024. Her academic journey began with a bachelor's in biology from Louis Pasteur University, and she has further honed her skills through executive programs at Vlerick Business School, INSEAD, IESE Business School.

Sophie's key strengths lie in P&L management, business strategy, digital transformation, and team empowerment. She is known for her collaborative leadership style, strategic finesse, and ability to simplify complex situations. Passionate about bridging tradition and innovation, Sophie is dedicated to driving long-term success through diversified human capital. As a biophile diver, Sophie considers the oceans as the most obvious ally of humankind.

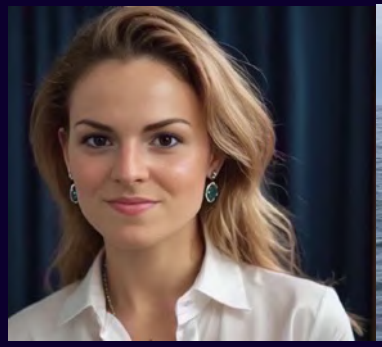
Our Heart patron

Emma-Claire Fierce

Artist, explorer and top athlete, Emma-Claire embodies the values of creativity, generosity, integrity and audacity advocated by The Indigo Civilization. She is the first French woman to swim across the Oceans7, a marathon swimming challenge consisting of seven iconic open water channel crossings.

Known for her outstanding contributions to extreme swimming and sports science, she has been officially recognized as an Ocean Expert by UNESCO. This prestigious recognition highlights her expertise in ocean studies and her commitment to advancing the scientific understanding of human adaptation to extreme environments.

“The Indigo Civilization is not a project—it is more. It is beyond us all. It is a cultural and civilizational positive construction grounded in the values of unity, creativity, beauty, inclusion and transformation across nations and generations. It envisions a harmonious collaboration with the oceans and the richness of our biology”.



Strategic committee, honorary member

Rutger de Graaf

Global and adaptation floating habitat solutions

Rutger de Graaf is an engineer and an entrepreneur who is recognized as the world's leading expert on resilient urban floating solutions. A Dutchman, he is, among other things, the founder of Blue21, a consulting and high-tech company fully specialized in the development and application of climate-proof floating building technologies for housing, energy, logistics and food production in social and ecological impact projects in the Netherlands and abroad.

He participated in the EU-funded project Space@Sea and was recently appointed to the Busan Marine Smart City Task Force, a UN-supported project. He contributes to build and use floating infrastructure as new engines for South Korea's growth and as powerful levers to address climate change.

Strategic committee, honorary member

Koen Olthius
"Aquatecture" or Floating Architecture

Koen Olthuis (1971), co-founder of the famous Dutch architecture firm Waterstudio, studied architecture and industrial design at Delft University of Technology. Waterstudio has a compelling expertise in floating urbanism and has been chosen to build the floating island of the Maldives , currently under construction.

In 2007, he was chosen as No. 122 on Time Magazine's list of the most influential people in the world due to the growing global interest in water developments. In addition, the French magazine Terra Eco chose him in 2011 as one of the 100 green people who will change the world.

Strategic committee, honorary member

Camille Mazé - Lambrechts

Humanities and social sciences applied to the transformation towards sustainability

Camille Mazé – Lambrechts is a researcher in political science at the CNRS, a lecturer at Sciences Po and an associate researcher at the Overseas Chair. She directs the International Research Network APOLIMER (CNRS-INSHS) designed to put environmental humanities at the service of the sustainability of the marine environment and the societies that depend on it.

She leads fundamental and applied research projects in several overseas territories, particularly around issues related to global change, the scarcity of natural resources and the increase and acceleration of risks. Her research stays on the blue planet, a sensitivity for interdisciplinary analytical approaches and the search for solutions at the intersection of interfaces, along ecological continuums.

As an anthropologist specialized in the study of politics, she studies through a fine ethnography, the modes of regulation of natural environments by human societies to propose a recomposed political vision of dissociated interactions between humans and "Nature". It thus develops with the actors concerned, territorial governance models, recontextualized in the critical context of the Anthropocene where the ocean plays a key role.

Strategic committee, honorary member

Denis Lacroix

Ocean foresight

Denis Lacroix launched the prospective reflection at IFREMER in 2006 ((French Research Institute for Exploitation of the Sea). The collective work focuses on marine renewable energies, deep mineral resources, environmental scenarios for 2100, sea level rise, etc. Author and contributor of numerous books, he carries out training missions in foresight and strategic monitoring in 5 universities in France and Europe.

» The Indigo Civilization project is rich in visions for humans, as for nature, in close connection with the sea. Will we be able to replace the current military and economic thalassocracies with projects that value co-construction rather than competition, links rather than goods, trust rather than mistrust?

his project carries precisely the dynamics of a new alliance with the sea, so that this global common good also carries creative utopias. Young people also need a desirable future. Here is a concrete example: it invites us to take off. »

Strategic committee, honorary member

Damien Serre

Resilience strategies and applied sciences

Damien Serre is Prof., Associate Researcher at UVSQ-CEARC (cearc.fr) and CEO of TheClimateSandards Company and RESCUESolutions. He is leading R&D projects in the area of resilience to climate risks with a special focus on resilience assessment, critical infrastructure management, spatial decision support systems to optimize resilience of different types of hazard with a strong expertise on floods.

He chaired or co-chaired many international tracks or session in his area of expertise e.g. the EGU General Assembly in Vienna in 2009, 2010, 2017 and 2018 as well as FLOODRISK 2016 International Conference in Lyon in 2016 (Disaster risk and recovery session). He was editor of the Journal of Water and Climate Change (IWA) 2013-2021, is editor of the journal Urban Risk Studies (ISTE) and member of the Editorial Board of the Journal of Flood Risk Management (Wiley).

Strategic committee, honorary member

Lucca Stevenson

Youth Lead Ambassador

Lucca Gianni Figueiredo Stevenson is an International Relations graduate from PUC-SP with a focus on climate governance, global markets, and sustainable finance. He is the founder of Abaixando a Maré, an initiative dedicated to addressing the economic and policy impacts of rising sea levels through climate adaptation and international cooperation. Lucca has spoken at COP30 and engaged with Brazil's Ministry of Climate on policy recommendations related to sea level rise and coastal adaptation.

He has professional experience at the France–Brazil Chamber of Commerce, where he contributed to investment-oriented country reports, policy briefs, and high-level international engagements. He speaks Portuguese, English, French, and Spanish.

Strategic committee, honorary member

César Jung-Harada

Ocean multidisciplinary impact innovation

Cesar Jung - Harada is a French - Japanese designer, environmentalist, educator, and entrepreneur, passionate about ocean technology, impact innovation, and education based in Singapore.

Cesar is an Associate Professor of Design at the Singapore Institute of Technology and is currently a candidate Ph.D. in Design and Ocean Innovation at the CNAM (France), Director of MakerBay LTD (Hong Kong Makerspace), Scoutbots LTD (Ocean Robotic Startup). Cesar serves as a Trustee of the board of HBKU (Qatar), the Wyng Foundation (Hong Kong).

Cesar was a Researcher and Project Leader at MIT, and holds a master degree from the Royal College of Art (Design Interactions), and another Master Degree from the ENSAD Paris (Animation). Cesar regularly delivers workshops and keynotes at international conferences in places such as the UN, Harvard or TED. Lately Cesar has organised an exhibition in Singapore of his project of International Ocean Research Station.

Strategic committee, honorary member

Jack Dyer
Blue Economy & Finance Advisor

Dr Jack Dyer as a specialist climate change, development and blue/ocean economist, has over 10 years global/African consultancy, lecturing and entrepreneurship experience with a BSC Hons in Economics from the University of Kent, a Master of Commerce (Maritime Economics/Law) and PhD in climate change's impact on the future of Pacific and global blue economies/marine resources, ecosystems, communities and individuals.

His climate change, circular green and blue economy experience ranges from cruise and marine tourism to education, MSP, marine protected areas, natural disasters business, drones, ship repair, finance and psychology space economy, maritime law, ocean governance, logistics.

Dr Jack Dyer, has been involved in researching as an academic, researcher, lecturer, entrepreneur and consultant to improve the prospects in creating a sustainable and profitable; oceanic eco-conscious destiny for the future of the blue economy and Earth.

Strategic committee, honorary member

Simon Nummy

Sustainable design in constrained environments

Simon Nummy is a sustainable design consultant and architect with over 20 years of experience across large-scale commercial projects in Europe, Asia, Australia, and the Middle East. Specializing in sustainable design for transportation infrastructure, including metro systems, light rail, high-speed rail, bus networks, and marine projects.

Before joining NEOM, Simon spent over a decade in the Middle East working with 2oa.studio, ATKINS, and Mott MacDonald. Prior to that, he worked in Australia for HASSELL and COX Architects, contributing to a diverse range of projects, such as metro systems, sports stadia, industrial and research facilities, high-rise residential buildings, education campuses, and hospitality developments.

From 1995 to 1997, Simon worked with Ken Yeang in Kuala Lumpur, Malaysia, where he was involved in the concept design and development of bio-climatic high-rise and master planning projects. He was shortlisted for the LAGI 2014 competition with #HelioTweet and for LAGI 2019 with ANTHROPOCENE, which was exhibited at MASDAR. Simon also won the Seasteading Institute's 2015 competition with "Storm Makes Sense of Shelter", showcased at the V&A Museum in London as part of "The Future Starts Here: 100 Projects Shaping the World of Tomorrow."

Strategic committee, honorary member

César Ducruet

Transport, ports and logistics

César Ducruet, geographer, is senior researcher at the French National Centre for Scientific Research (CNRS). He is currently working at the EconomiX laboratory (Paris-Nanterre) on the local impact of contemporary maritime globalization. His research focuses on technological innovation, connectivity, employment, vulnerability, environment, and health issues in a port and port-city context. He is principal investigator of the ANR-funded research project "Maritime Globalization, Network Externalities and Transport Impacts on Cities" (MAGNETICS) (2023-2026).

César has been expert for various international organizations (OECD, World Bank, WHO) and works regularly with numerous partners in Asia (Korea Maritime Institute, JETRO, ASEM, Chinese Academy of Sciences, ECNU, Fudan University, Shanghai Maritime University). His publications include three edited volumes on Maritime Networks (2015), Shipping Data Analysis (2017), and Port Systems (2023) in the Routledge Studies in Transport Analysis. Two additional volumes are under preparation: “Port-Cities and Globalization since the 1950s” and “Healthy Port Cities: Mitigating Environment and Public Health Impacts of Ports and Shipping” (2025-2026).

He is also associate member of porteconomics.eu, scientific board member of SFLOG, GIS Axe Seine, GDR OMER, RETE Association, international advisory board member of PortCityFutures, and editorial board member of Journal of Transport Geography, Maritime Business Review, International Journal of Transport Economics, and Portus.

PARTNERS TO DATE

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skema BUSINESS SCHOOL

Commune de Bora Bora POPORA TO TATOU OIRE

Waterstudio.NL

Oppy.

BLUEREVOLUTION.org

APOLIMER

blue21

CLIMATE FOUNDATION

CRIOBE UAR3278

THECLIMATESTANDARDS

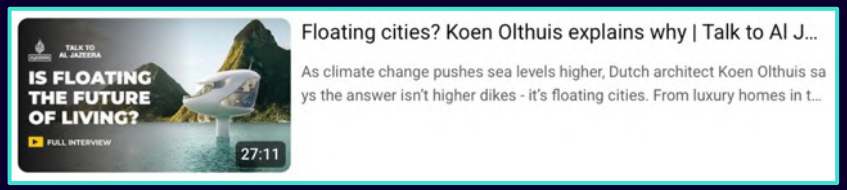
New European Bauhaus
beautiful | sustainable | together

Appendix 1

Recommended videos

We recommend four videos in which our members and supporters share their forward-looking vision and express themselves about the opportunity to consider a new cooperation between humans and the marine world.

Jacques Rougerie, Koen Olthius, Rutger de Graaf, Denis Lacroix et Frédéric Pons



https://youtu.be/gaXGMm_cMxc?si=RnW2pgD48vR8zrqO

https://youtu.be/yiOouuceXTc?si=zJjWoHyatqLydj1S

https://youtu.be/WM0C76KGbIA?si=iXRYTMT6-vyxwRkD

https://youtu.be/EQe4uLa7DBU?si=XPjqA0S-0YFSmbmh

Appendix 2

Examples of current offshore projects
none is a Smart Offshore Ecosystem

OBJECTIVE: SURVEILLANCE

13 km from the British coast, the Maunsell Forts were built in 1942 to guard the Thames estuary against enemy invasion. Abandoned by the British army since the late 1950s, this infrastructure has still been in place for more than 80 years. Up to more than 2,000 people lived simultaneously on these maritime installations.

❌ Single-functional infrastructure
✅ Resilient offshore infrastructure

OBJECTIVE: OCEANOGRAPHIC RESEARCH

16 km off the coast of Venice, the Acqua Alta Oceanographic Tower has been measuring waves and tides in the Adriatic Sea for 45 years.

http://www.deos.tudelft.nl/ers/tower.html

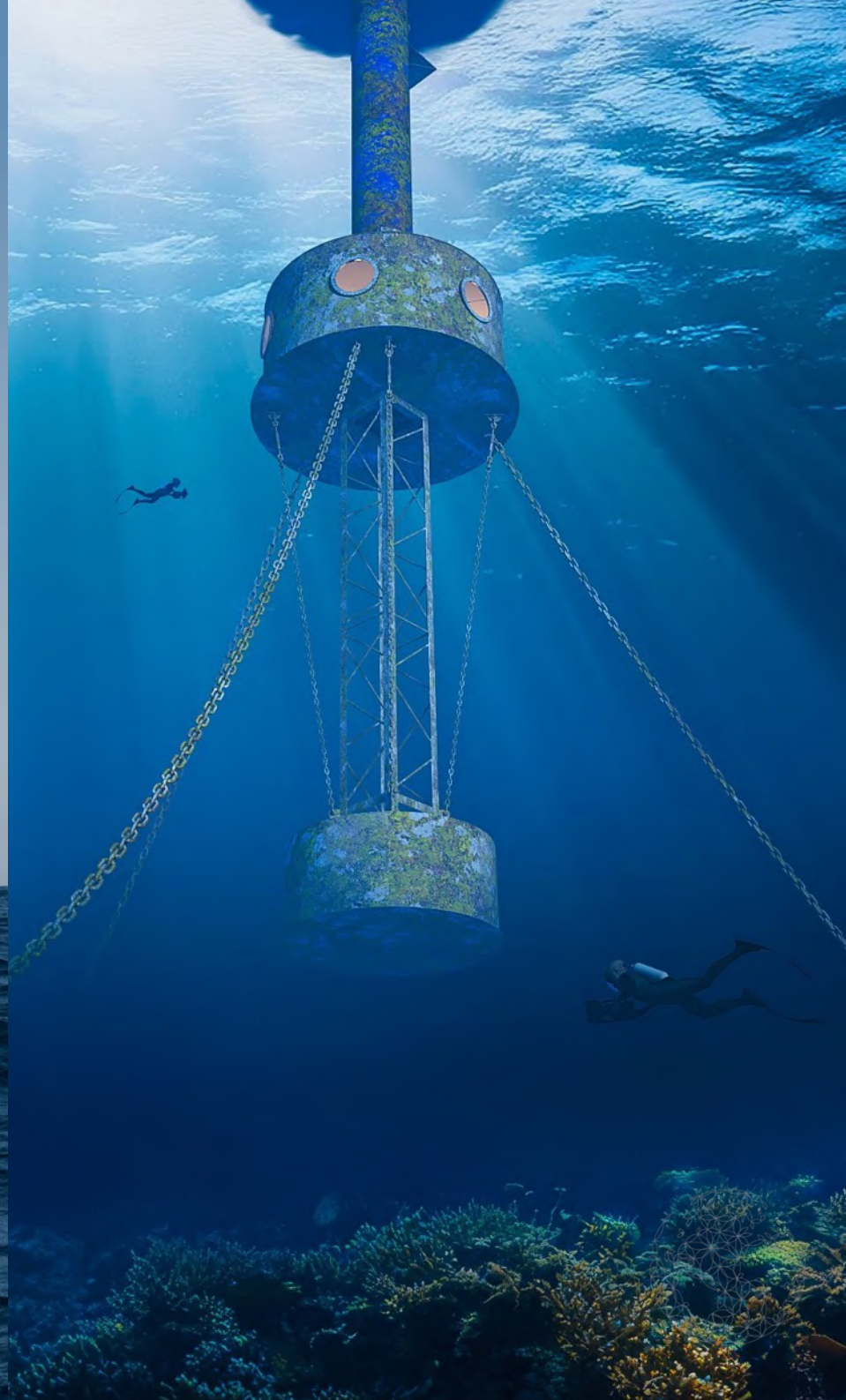
❌ Shallow Monofunctional Infrastructure (16m)
✅ Resilient offshore infrastructure

OBJECTIVE: INDIVIDUAL TEMPORARY HABITAT

In Panama, Ocean Builders creates and experiments eco-friendly high-tech floating homes (depth from 20 to 200m). Life above the waves: « at Ocean Builders we believe that true caring for the oceans requires one to actually live there ».

https://oceanbuilders.com

❌ High-end real estate project above all, limited local positive impact
✅ Small, biophilic smart offshore infrastructure



OBJECTIVE: MULTIDISCIPLINARY RESEARCH

In the Canary Islands, PLOCAN project aims to become a world-class testbed that helps accelerate the development of technologies and knowledge to conserve, regenerate and use marine renewable resources in an efficient and sustainable way, ensuring equitable prosperity for users and effective environmental protection.

https://plocan.eu/en

❌ Grounded infrastructure incompatible with great depths, non-biophilic
✅ Very interesting Atlantic Maritime Future Laboratory

OBJECTIVE: ECO-TOURISM

In Malaysia, Seaventures Dive has converted an oil rig for scuba diving activities. Disused platforms become rich artificial reefs, conducive to eco-responsible aquatic tourism: upcycling of existing infrastructures and qualitative economic activities of eco-tourism. Around 15,000 offshore platforms have been identified in the world...

https://seaventuresdive.com

❌ Single-use and ugly infrastructure
✅ Reconditioning of relevant platform into artificial reef

Objective: resilience and adaptation, inclusive accommodation

In March 2021, the Maldives formalized the start of construction of a floating city in the centre of an atoll not far from Malé. This country consists of 2000 islands and has an average altitude of 2m, is threatened by the inevitable rise in water levels in the twenty-first century.

Delivery: from 2027
https://maldivesfloatingcity.com/

❌ Not self-sufficient in energy and food, waste management?
✅ Climate change adaptation housing, integrated design

Photo credit: Dutch Docklands / Waterstudio

OBJECTIVE: FOOD PRODUCTION

SalMar, a major player in global aquaculture, is testing an offshore Smart Fish Farm in Norway, 8 kilometres from the coast. The company aims to create the world's most reliable and intelligent offshore farming operations, with the highest fish welfare requirements and a zero-emission value chain ambition.

Under testing
https://salmarakerocean.no

❌ Single-use (fish farming), industrial design
✅ Infrastructure resistant to one of the most dangerous seas

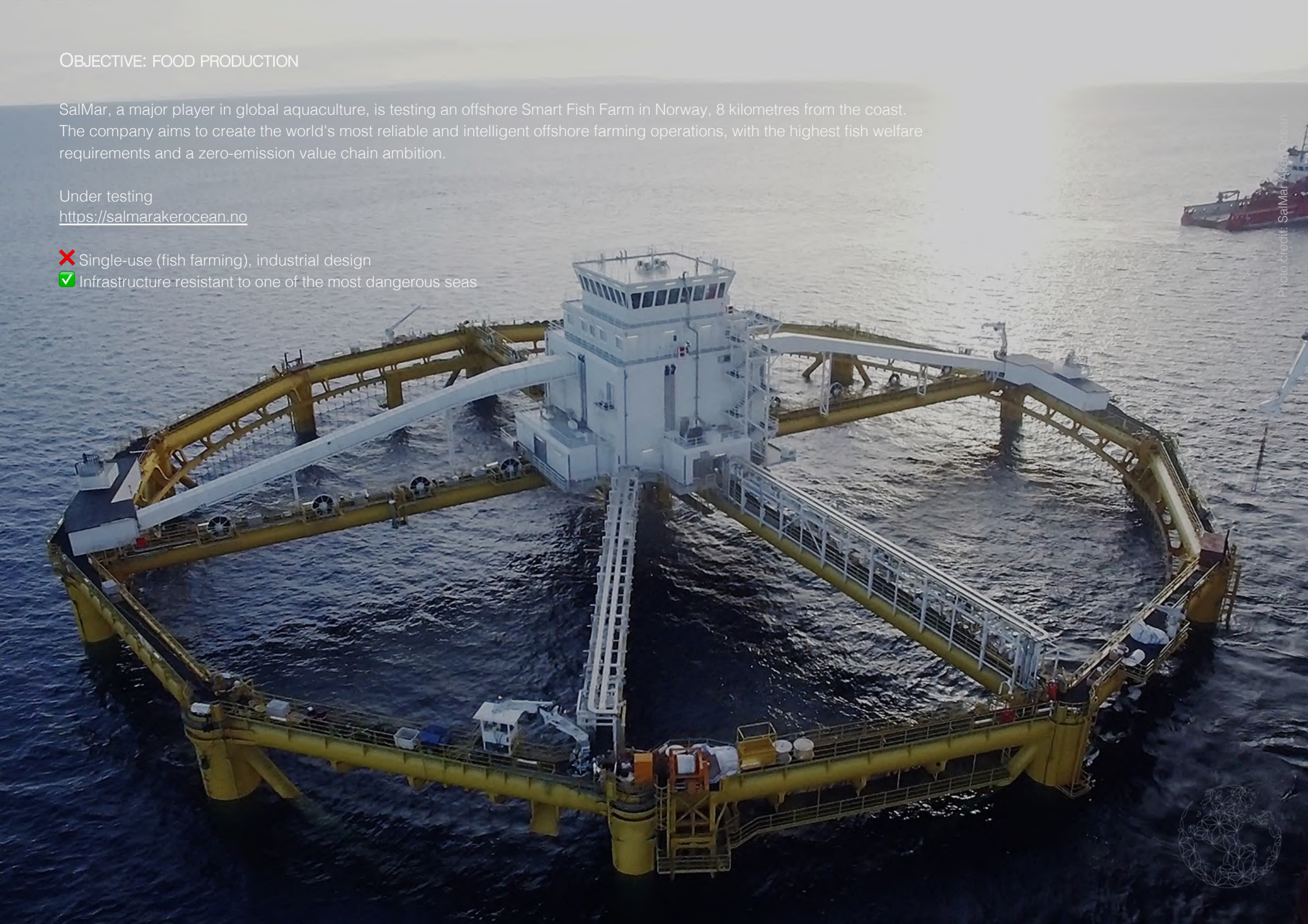


Photo credit: SalMar Aker Ocean

Photo credit: Elia

OBJECTIVE: PRODUCTION OF RENEWABLE ENERGIES

The Princess Elisabeth Island will be located almost 45 km off the Belgian coast and will be an extension of the electricity grid in the North Sea. It will connect wind farms from the sea to the mainland and create new connections with neighbouring countries.

Delivery : 2030
https://www.elia.be

❌ Single-use (energy) and non-biophilic industrial project
✅ Infrastructure resistant to one of the most dangerous seas

Objective: production of renewable energies

From 2030, Vindø will be the world's first floating artificial island to produce renewable hydrogen from offshore wind power on a large scale. Located a hundred kilometres from the coast, this 120,000 m2 structure will be close, in logistical terms, to offshore oil.

Delivery : 2030
https://www.windisland.dk

❌ Single-use (energy) and non-biophilic industrial project
✅ Open tough sea resilient infrastructure, human worker ecosystem

Photo credit: Vindø

Priority objective: extension of the city, high-end real estate

The future floating city Oceanix in Busan, South Korea, supported by the UN and presented at the World Economic Forum in May 2022, will be built in 2023 and will welcome 12,000 people on modular, mobile and self-sufficient floating platforms.

Delivery: from 2025
https://www.weforum.org/videos/floating-city-to-be-built-in-south-korea

❌ Luxury real estate project above all, no power or energy production
✅ Experimentation with sustainable solutions, adaptation coastal housing

Photo credit: Oceanix

PRIORITY OBJECTIVE: ECO-TOURISM

Dubai Reefs is a floating living laboratory project for supposed marine restoration and especially ecotourism.
The project aims to create more than 30,000 jobs in a green economy.

Delivery : 2030
https://urb.ae/projects/dubaireefs/

❌ Tourist vocation above all, real coastal ecological impact vs. anthropogenic activities?
✅ Biophilic project, non-invasive and floating infrastructure

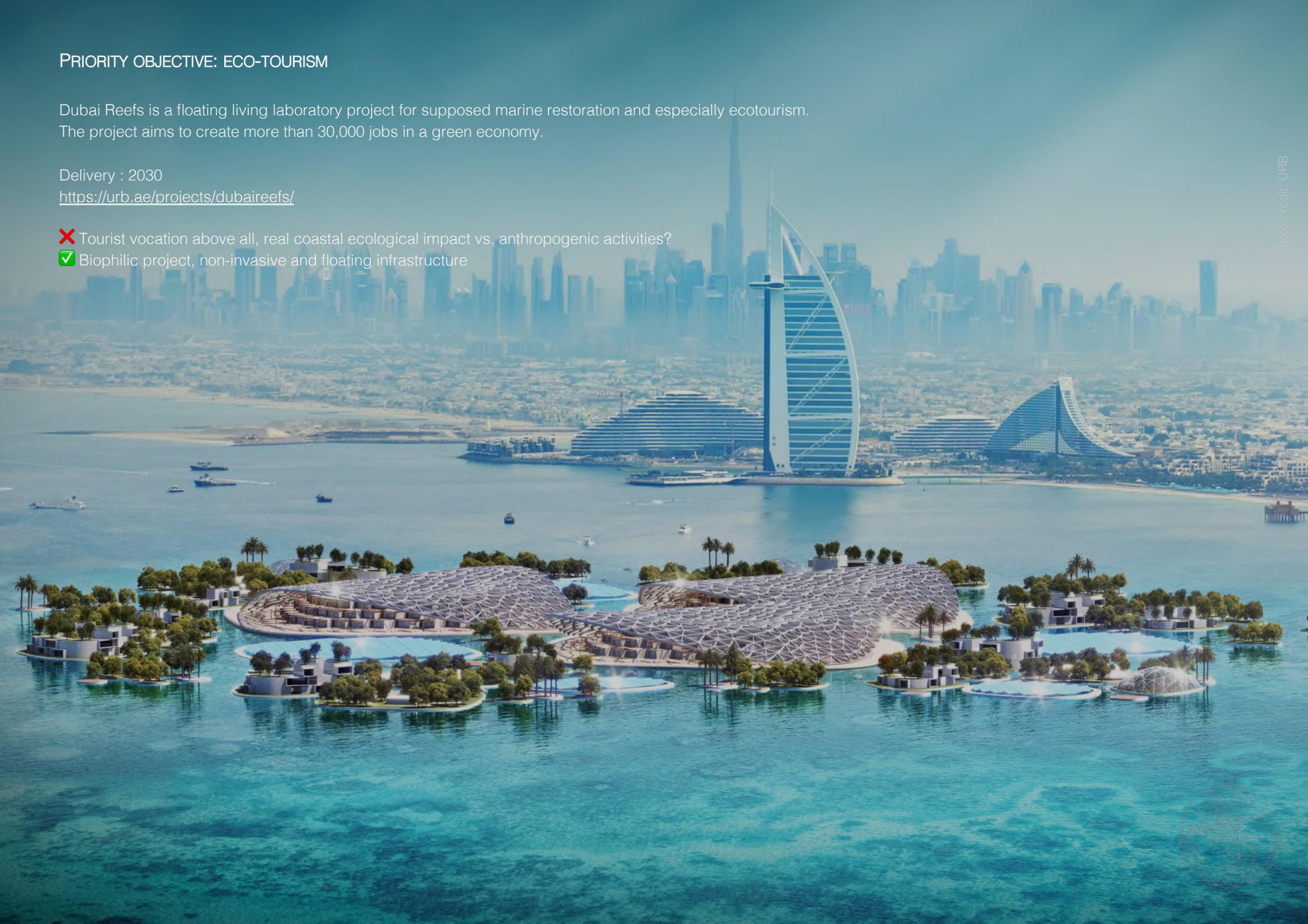


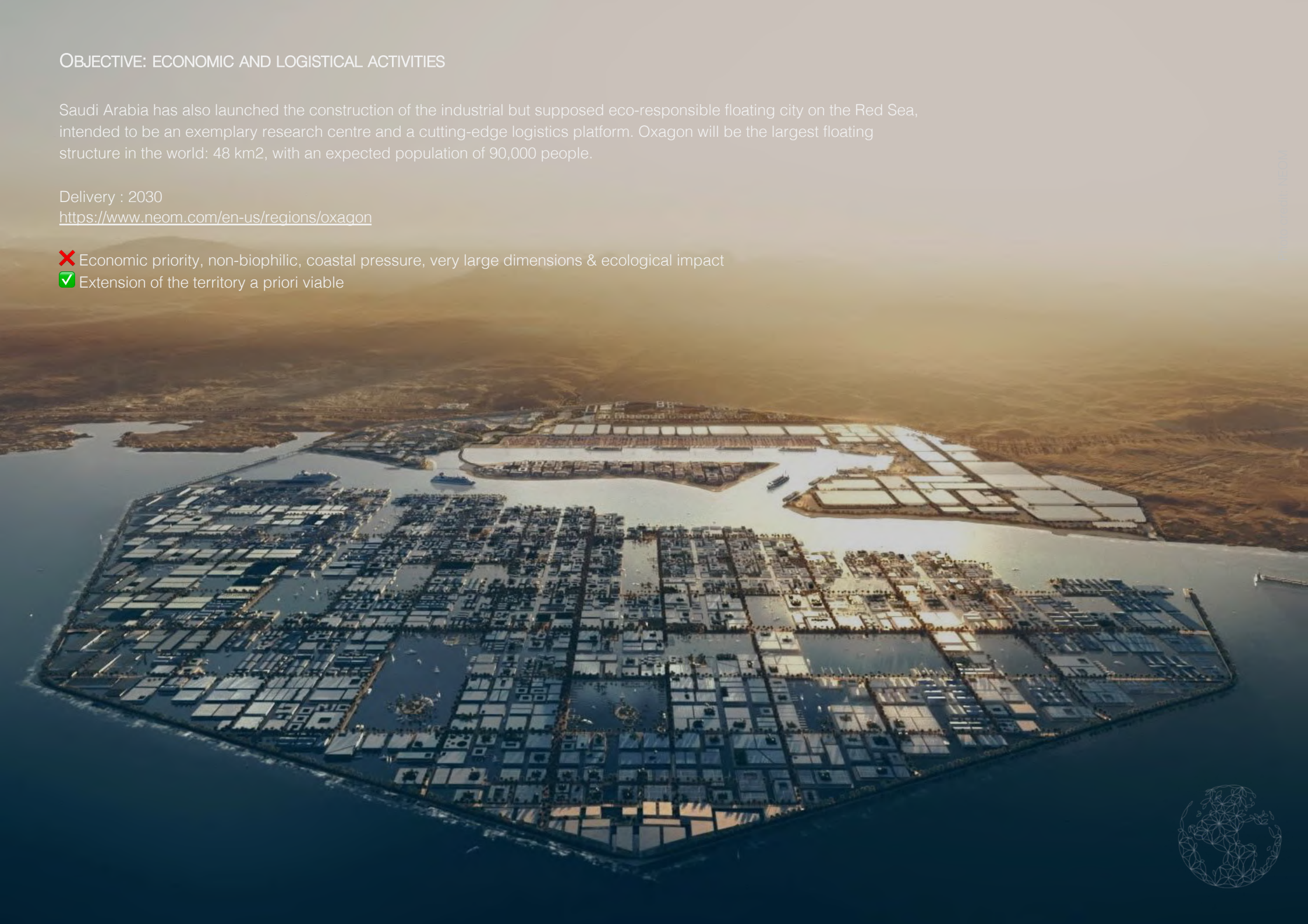
Photo credit: URB

Objective: economic and logistical activities

Saudi Arabia has also launched the construction of the industrial but supposed eco-responsible floating city on the Red Sea, intended to be an exemplary research centre and a cutting-edge logistics platform. Oxagon will be the largest floating structure in the world: 48 km2, with an expected population of 90,000 people.

Delivery : 2030
https://www.neom.com/en-us/regions/oxagon

❌ Economic priority, non-biophilic, coastal pressure, very large dimensions & ecological impact
✅ Extension of the territory a priori viable

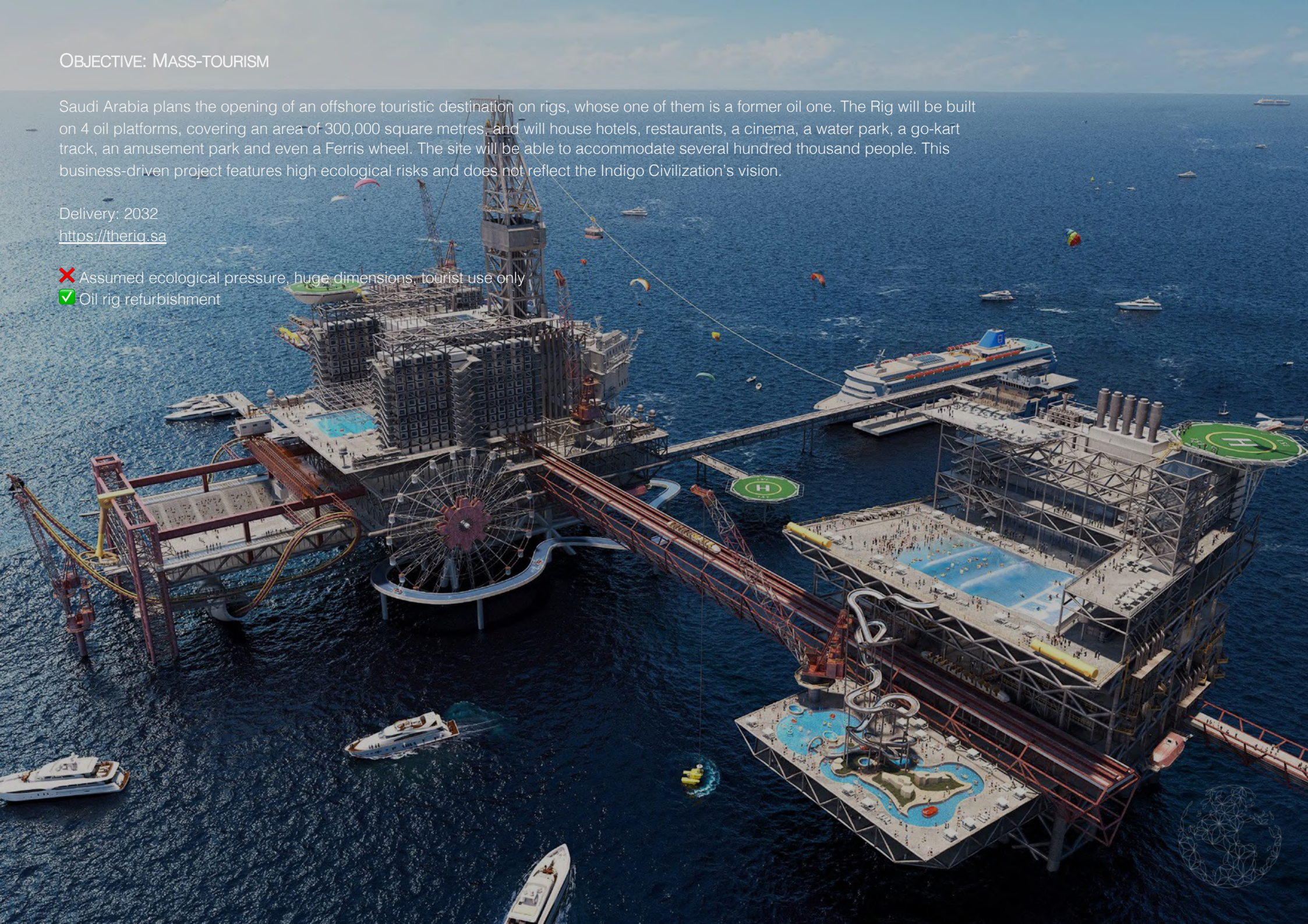


OBJECTIVE: MASS-TOURISM

Saudi Arabia plans the opening of an offshore touristic destination on rigs, whose one of them is a former oil one. The Rig will be built on 4 oil platforms, covering an area of 300,000 square metres, and will house hotels, restaurants, a cinema, a water park, a go-kart track, an amusement park and even a Ferris wheel. The site will be able to accommodate several hundred thousand people. This business-driven project features high ecological risks and does not reflect the Indigo Civilization's vision.

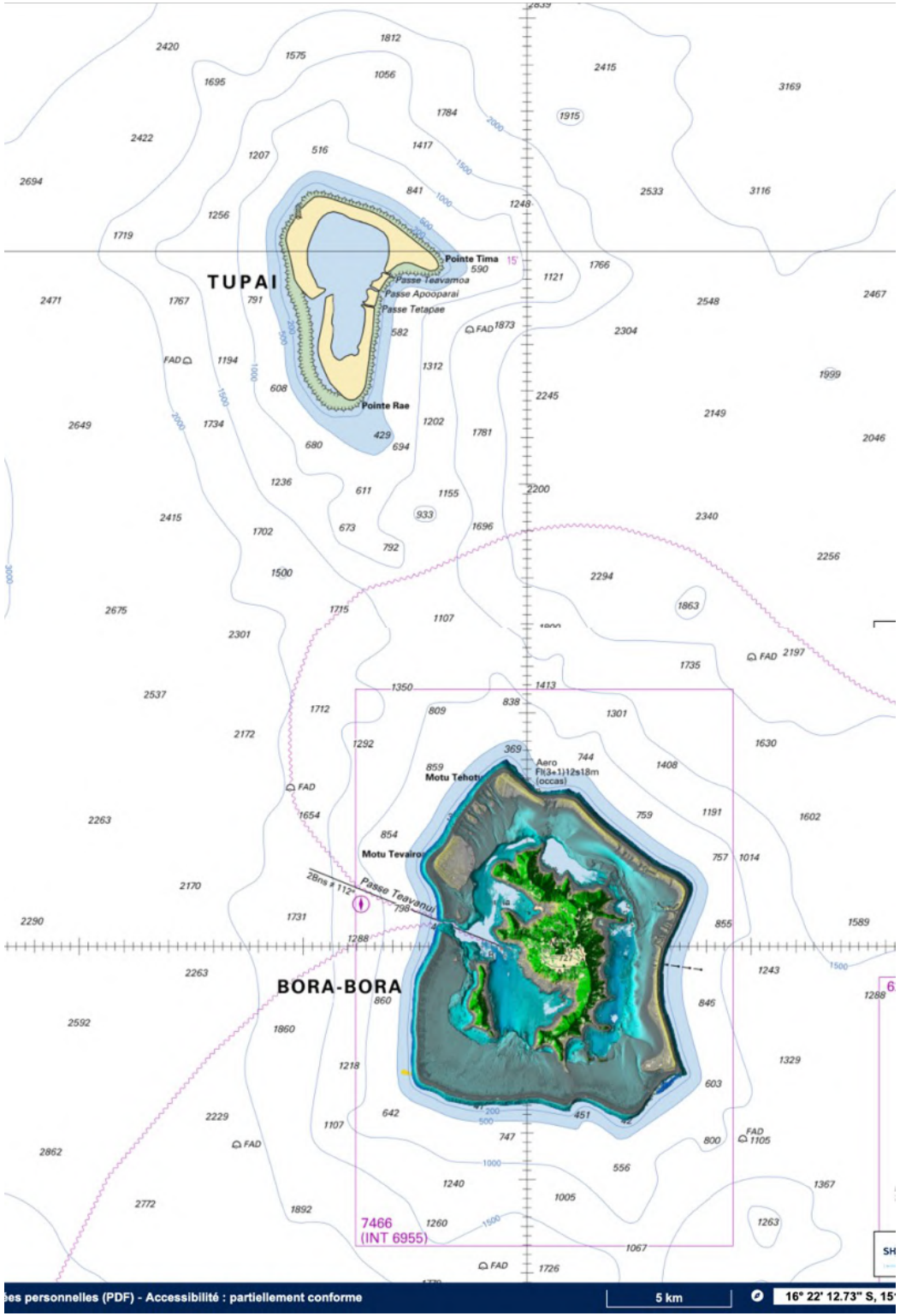
Delivery: 2032
https://therig.sa

❌ Assumed ecological pressure, huge dimensions, tourist use only
✅ Oil rig refurbishment

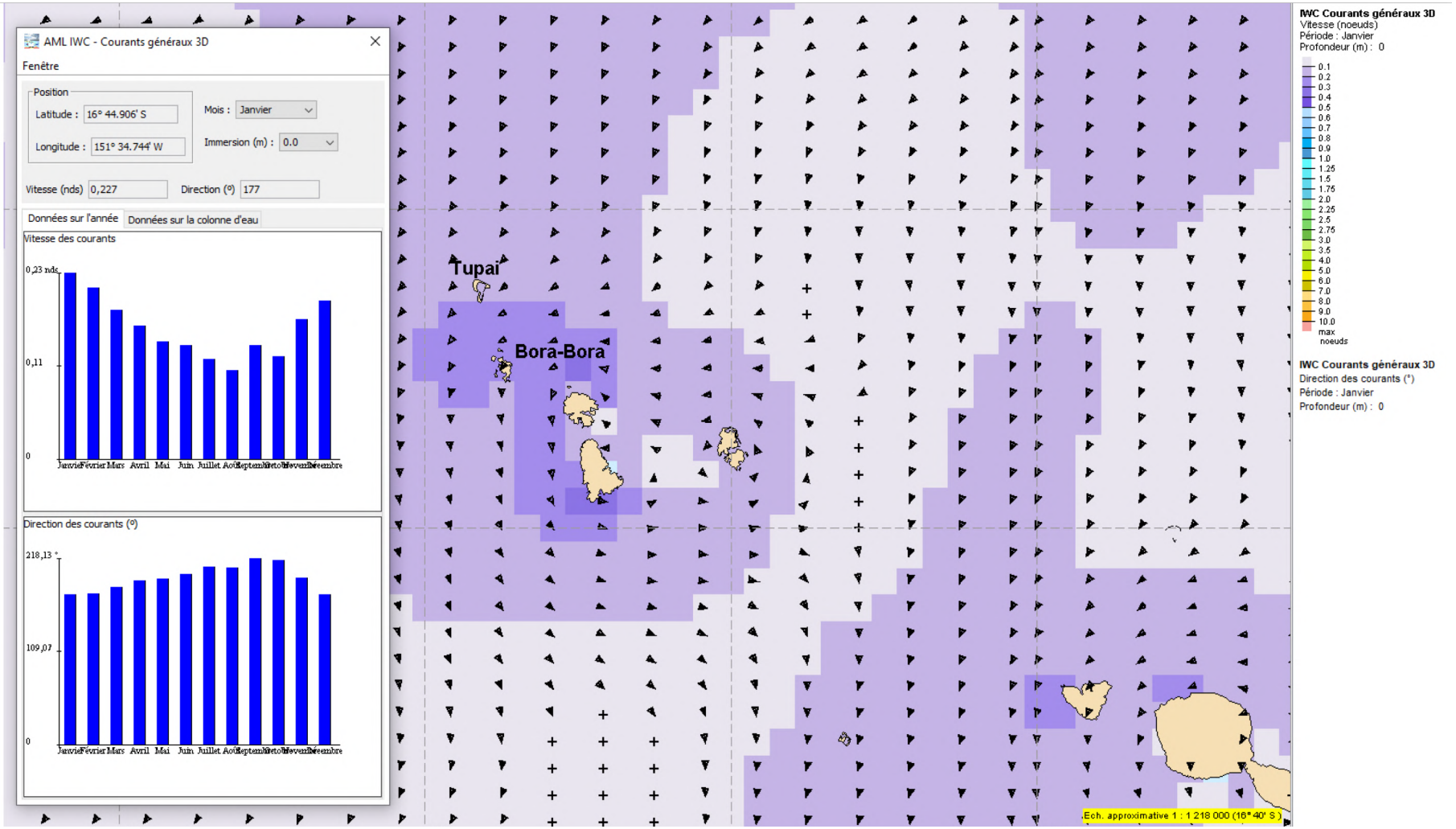


APPENDIX 3

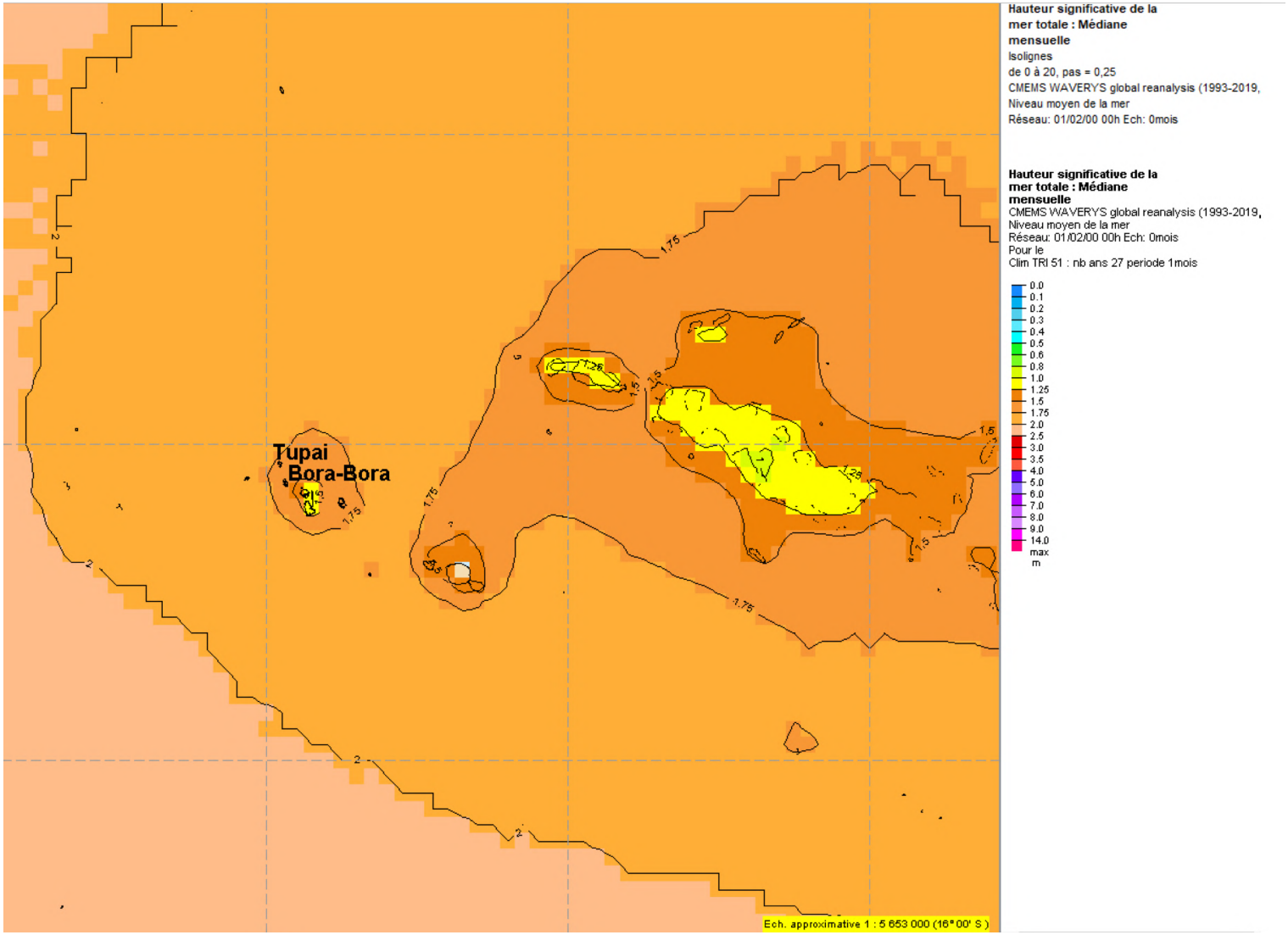
PRELIMINARY DATA FROM SHOM


TUPAI
Pointe Tima
Passe Teavamoa
Passe Apooparai
Passe Tetapae
Pointe Rae
Aero
Fl(3+1)12s18m
(occas)
Motu Tehotu
Motu Tevairo
Passe Teavanui
28ns # 112
BORA-BORA
7466
(INT 6955)
FAD
5 km
16° 22' 12.73" S, 15

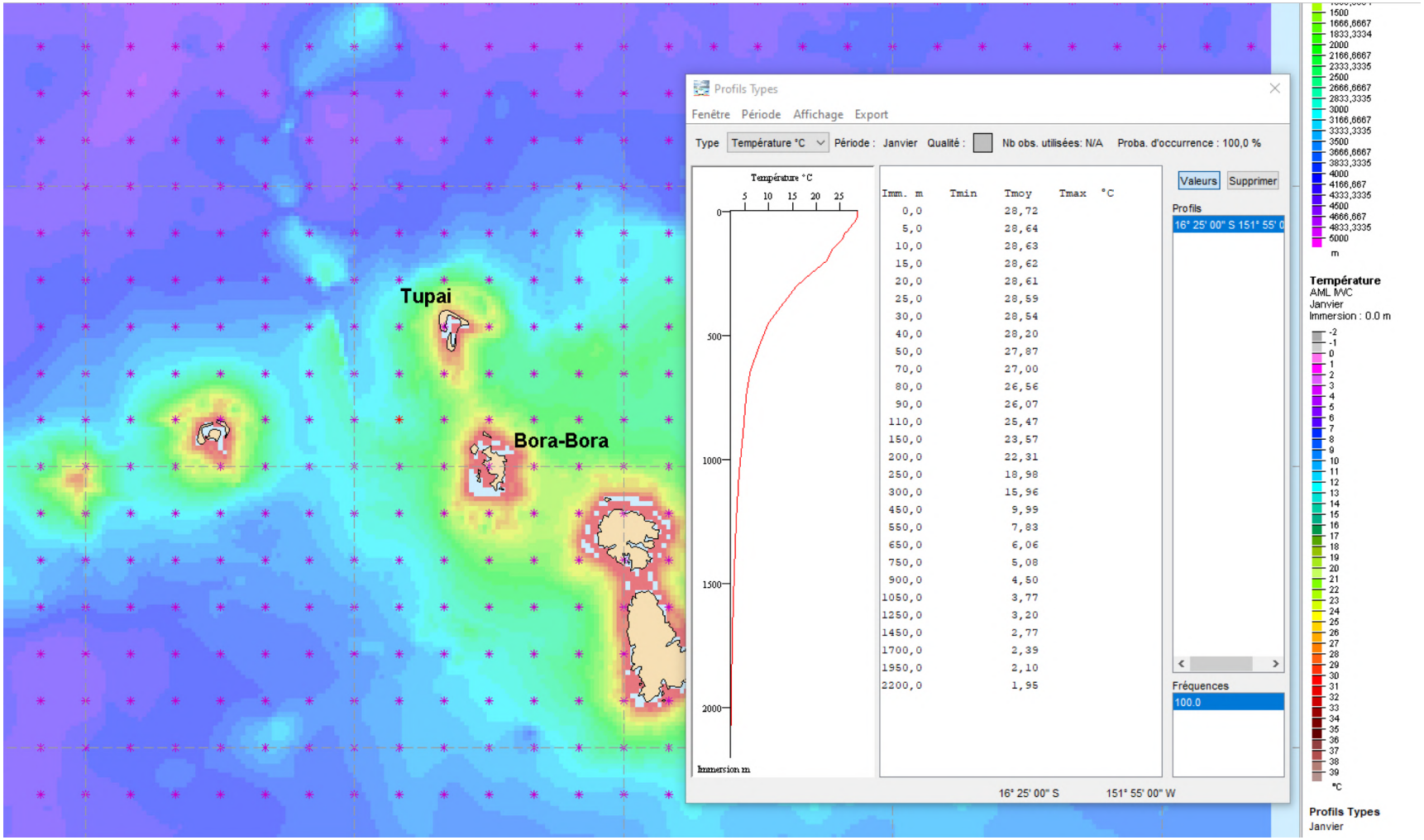
Currents

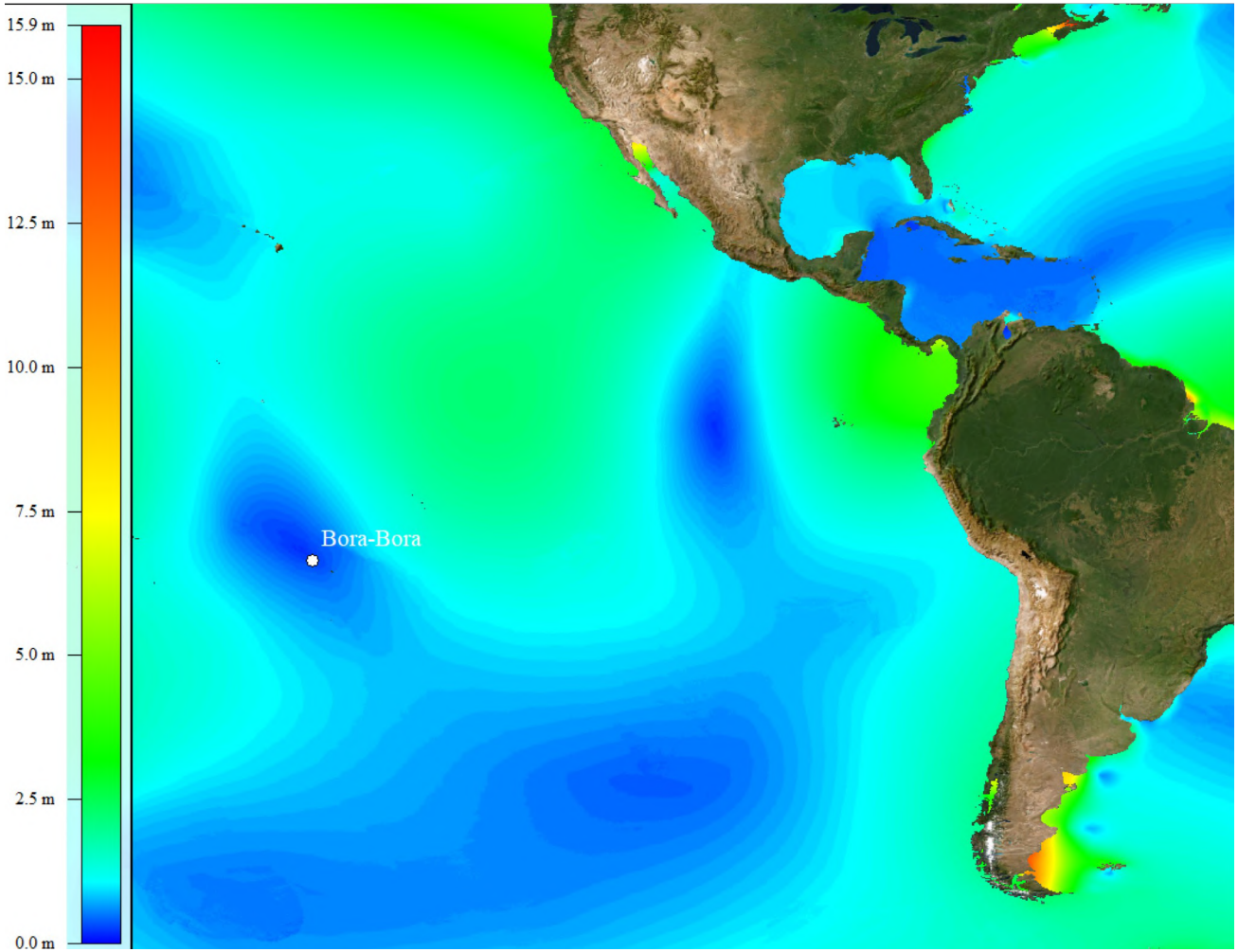

AML IWC - Courants généraux 3D
Fenêtre
Position
Latitude : 16° 44.906' S
Longitude : 151° 34.744' W
Mois : Janvier
Immersion (m) : 0.0
Vitesse (nds) 0,227
Direction (°) 177
Données sur l'année
Données sur la colonne d'eau
Vitesse des courants
0,23 nds
0,11
0
Janvier Février Mars Avril Mai Juin Juillet Août Septembre Octobre Novembre Décembre
Direction des courants (°)
218,13 °
109,07
0
Janvier Février Mars Avril Mai Juin Juillet Août Septembre Octobre Novembre Décembre
Tupai
Bora-Bora
Ech. approximative 1 : 1 218 000 (16° 40' S)
IWC Courants généraux 3D
Vitesse (noeuds)
Période : Janvier
Profondeur (m) : 0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.25
1.5
1.75
2.0
2.25
2.5
2.75
3.0
3.5
4.0
5.0
6.0
7.0
8.0
9.0
10.0
max
noeuds
IWC Courants généraux 3D
Direction des courants (°)
Période : Janvier
Profondeur (m) : 0

Swell

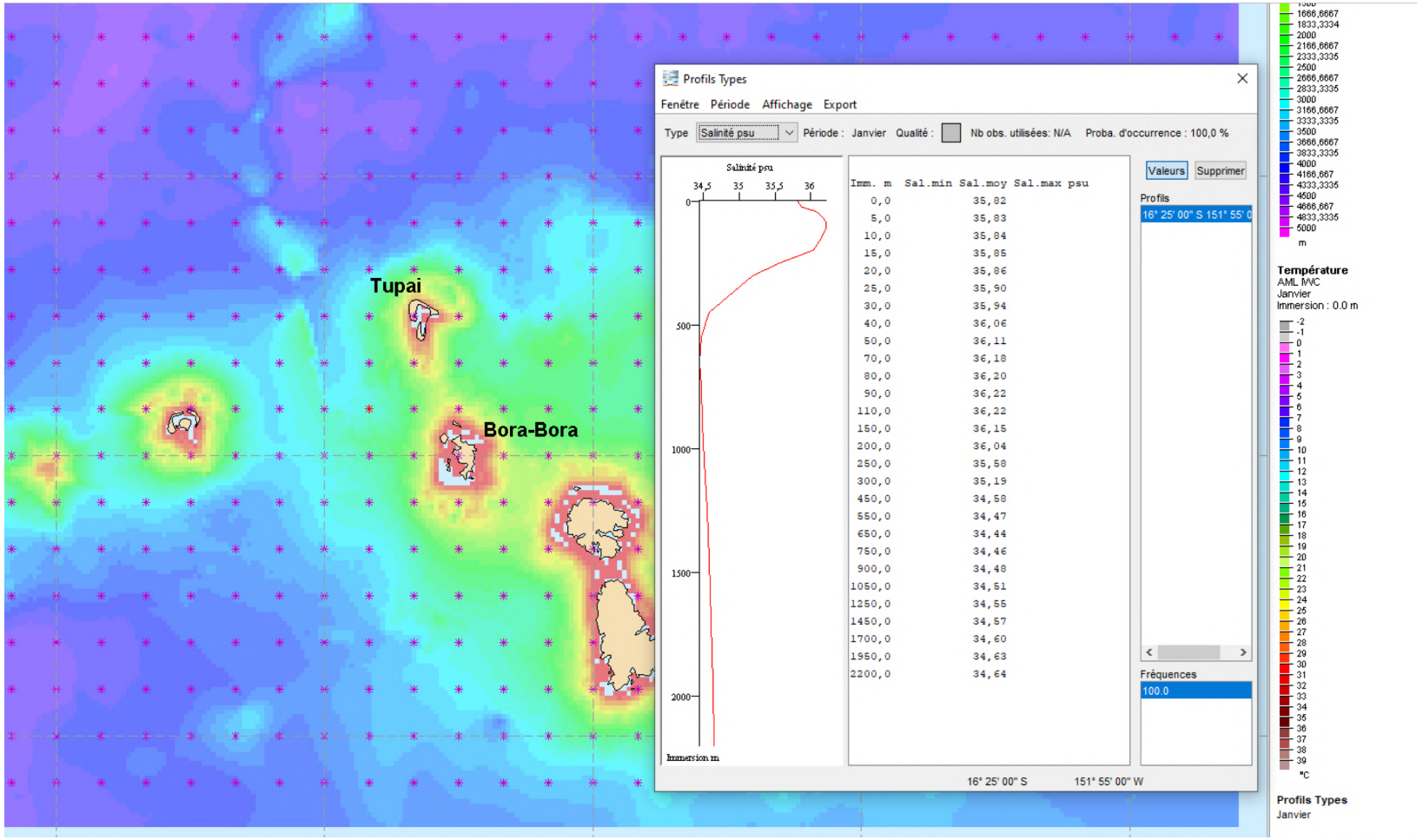

Tupai
Bora-Bora
Ech. approximative 1 : 5 653 000 (16° 00' S)
Hauteur significative de la mer totale : Médiane mensuelle
Isolignes
de 0 à 20, pas = 0,25
CMEMS WAVERYS global reanalysis (1993-2019,
Niveau moyen de la mer
Réseau: 01/02/00 00h Ech: 0mois
Hauteur significative de la mer totale : Médiane mensuelle
CMEMS WAVERYS global reanalysis (1993-2019,
Niveau moyen de la mer
Réseau: 01/02/00 00h Ech: 0mois
Pour le
Clim TRI 51 : nb ans 27 periode 1mois
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.8
1.0
1.25
1.5
1.75
2.0
2.5
3.0
3.5
4.0
5.0
6.0
7.0
8.0
9.0
14.0
max
m

Temperature




15.9 m
15.0 m
12.5 m
10.0 m
7.5 m
5.0 m
2.5 m
0.0 m
Bora-Bora

SALINITY


Tupai
Bora-Bora
Profils Types
Fenêtre Période Affichage Export
Type Salinité psu Période : Janvier Qualité : Nb obs. utilisées: N/A Proba. d'occurrence : 100,0 %
Salinité psu
34,5 35 35,5 36
0 500 1000 1500 2000
Immersion m
Imm. m Sal.min Sal.moy Sal.max psu
0,0 35,82
5,0 35,83
10,0 35,84
15,0 35,85
20,0 35,86
25,0 35,90
30,0 35,94
40,0 36,06
50,0 36,11
70,0 36,18
80,0 36,20
90,0 36,22
110,0 36,22
150,0 36,15
200,0 36,04
250,0 35,58
300,0 35,19
450,0 34,58
550,0 34,47
650,0 34,44
750,0 34,46
900,0 34,48
1050,0 34,51
1250,0 34,55
1450,0 34,57
1700,0 34,60
1950,0 34,63
2200,0 34,64
Valeurs Supprimer
Profils
16° 25' 00" S 151° 55' 0
Fréquences
100.0
16° 25' 00" S 151° 55' 00" W
1666,6667
1833,3334
2000
2166,6667
2333,3335
2500
2666,6667
2833,3335
3000
3166,6667
3333,3335
3500
3666,6667
3833,3335
4000
4166,667
4333,3335
4500
4666,667
4833,3335
5000
m
Température
AML IWC
Janvier
Immersion : 0.0 m
-2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
°C
Profils Types
Janvier

Appendix 4

Frequent Asked Questions