The Indigo Civilization

LIVE AND WORK ON THE OCEANS,

A SOLUTION TO TOMORROW'S ECOLOGICAL AND SOCIETAL CHALLENGES

Foundation project under the aegis of the <u>CNRS Foundation</u> Founding sponsor's summary, May 2023



FUTURE CHALLENGES FOR THE WORLD

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 km² 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: CO² emissions would increase by 35% in the countries with the highest population growth.

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





UNDER PRESSURE, DISCIPLINE OR FAITH TOWARDS A FEDERATIVE NARRATIVE, MEN CAN MOBILIZE, COOPERATE AND ACHIEVE INCREDIBLE THINGS.

In the fifth century, Venice was founded by refugees fleeing invaders, Ostrogoths and Lombards. The city, built on hostile marshy lands, became the capital of a maritime and commercial empire, which was the largest port of the Middle Ages after Constantinople.

In just 7 years, men managed to walk on the Moon and enthuse the whole world in 1969. Jules Verne, perceived as a visionary scientist, had anticipated these 104 years earlier.

Another illustration: according to a study published by The Lancet and the Imperial College of London in June 2022, about 20 million lives have been saved by Covid vaccines to date. These were put on the market just 18 months after the start of the pandemic.

WHAT SOLUTION?

HOW TO RECONCILE THE ECOLOGICAL AND SOCIO-ECONOMIC CHALLENGES OF TOMORROW, CONTRIBUTE TO ANTICIPATING FUTURE NATURAL AND SOCIETAL CHANGES, AND AVOID REPEATING MISTAKES MADE IN THE PAST?



LIVE AND THRIVE ON AND IN HARMONY WITH THE OCEANS

Our planet is 71% covered by seas and oceans. They regulate to more than 80% of the Earth's climate and generate 50% of our oxygen. Water accounts for 96% of the planet's biosphere volume.

Beyond the wonder or fear they arouse, the oceans have often been mistreated, overexploited, or underestimated as a huge future solution for humanity. In the future, it is highly likely that humans will have to exploit this oceanic potential to live or even survive. It will be crucial not to repeat the mistakes made on land through a global ecosystem approach.

The objective of the Civilisation Indigo project is to design, simulate and prototype a regenerative, socio-economically viable adaptation solution that meets the 8 following Sustainable Development Goals defined by the UN: shared, multi-use and inhabited floating marine ecosystems.



THE CONCEPT OF OFF-SHORE SMART CITY

Created by and for its citizens and workers, these small ocean cities must be non-invasive, quasi-autonomous, ecological or even regenerative?

Able to relieve pressure on land without altering the local marine ecosystem, they aim to produce food, fresh water and energy in a renewable way. Ports of the future and reinvented living spaces, they are proving to be a viable adaptation and resilience solution to serve local communities in the perspective of the consequences of climate change, such as rising sea levels.



Oceans to create harmonious and efficient solutions for the future, as an environmental and societal progress.

- Testing new flexible, restorative and adaptative models of living, habitat, work, and human-nature relations.
- Alleviating environmental and demographic pressure on land and at the coast by developing new energy and food resources in an ecological, renewable and autonomous manner.
- Understanding and protecting oceans by living smarter on and with them (exploration, remediation, monitoring)



Off-shore aquaculture and algaculture to feed the planet, help mitigate the soil, reduce intensive fishing and agriculture, and restore the environment.

- Off-shore farming is estimated at 15 billion tons of fish and shellfish, more than 100x the global consumption of seafood. Integrated multi-trophic aquaculture is proving to be a very promising sustainable solution.
- Algae make up only 11% of the biomass on Earth but produce 50% of our O2 and capture 5x more CO₂ than forests. Global potential of algae production is estimated at \$320 billion.



Marine Renewable Energies (MRE) to supplant fossil fuels and sustain human needs and progress.

- A major axis of innovation and technological maturation. Estimated at 2 million TWh/year, the technically or economically viable potential of MREs to date would be only a little more than 100,000 TWh/year.
- A powerful lever for sustainable growth: global electricity consumption in 2018 barely exceeded 23,000 TWh. To date, MREs account for no more than 0.05% of the world's renewable energy production.



Seawater to supply the land with fresh water and humanity with green and abundant energy.

- To date, more than 2 billion people live in water-stressed countries and suffer from lack of access to safe drinking water. On the other hand, between 300 million and 1 billion people will see their terrestrial environment flooded by rising waters or subsidence.
- Green technologies for desalination or hydrogen production from seawater exist and promise significant scale economies.



Non-invasive and shared floating infrastructures to host interdependent pioneer communities with incremental synergic functions and benefits.

- Climate change alone could force more than 300 million people worldwide to migrate by 2050: rising sea levels, water stress, extreme weather events. In the long term, floating cities are an opportunity for a frugal, inclusive, value-creating but redistributive societal model.
- The efficiency, productivity and interoperability of the actors of inhabited ecosystems are reinforced by their spatial proximity, at sea: research, various professional and social functions, etc.



- Supervised and financed by a French foundation project created under the aegis of the CNRS Foundation. The CNRS is the largest public research organization in Europe.
- Led by a multidisciplinary team of researchers and experts among the most renowned in the world about floating solutions, oceans, marine ecology, blue circular economy, sociology, philosophy...
- Following EU-funded studies under Horizon program: Tropos, Space@Sea and United.

THE INDIGO CIVILIZATION PROJECT, 3 COMPLEMENTARY PHASES

\rightarrow Phase 1 - 2023 – Research, modelling and simulation (Indigo OceanLab)

Indigo Civilization foundation is a non-profit under the aegis of the CNRS¹ Foundation, focused on independent non-dogmatic modelling and the design of small-scale and virtual prototypes of floating non-invasive and sustainable, versatile and inhabited marine ecosystems. By 2026, its objective is to demonstrate to future public and private actors the potential, technical feasibility, viability and holistic relevance of prototypes. <u>Deliverables</u>: modelling, design and simulation of regenerative, economically viable and inclusive inhabited floating adaptation solutions.

<u>NOTA</u>: It is not just about creating new offshore economic production complexes, but about learning how to live, work and thrive on the oceans while protecting them, and without repeating the mistakes made by man on land. It is a matter of developing an opportune context to re-establish the sacred link between Nature and Man, his well-being, science and economy.

\rightarrow Phase 2 - 2026 - In situ prototyping & test – Pathway to excellence

Private-public consortium focused on in situ prototyping, testing and the constant optimization process: waters of France and partner territories such as SIDS. Thanks to the vastness and variety of its maritime domain, France benefits from a unique territory for experimentation to inspire innovation. Creation of a collaborative chain of excellence, mutually profitable and generating progress for Nature and Humanity. <u>Deliverables</u>: 3 to 9 complementary prototypes according to the models validated in phase 1.

Companies of mixed economies or temporary territorial concessions dedicated to the international deployment of proven models on a larger scale, in all territories likely to be interested in viable and declinable solutions tested by the Indigo Civilization Project.

AN EVOLUTIVE ECOSYSTEM THAT COMBINES THE STRENGTHS OF NON-PROFIT AND PROFIT MODELS

3 phases to prepare the emergence of a new relationship between Man and Ocean, and new fair, profitable and redistributive economic models for all stakeholders; terrestrial populations and Indigo citizens, natural ecosystems, and investors.



THE RESEARCH OBJECTIVES OF THE INDIGO CIVILIZATION FOUNDATION

PHASES 1 & 2 Research & Simulation **3** categories of prototypes for experimentation, optimisation and deployment on a larger scale, in configurations with complementary local specificities: considered solutions between Hi-Tech and Low-Tech.

3 complementary location choices: water, climate, biodiversity, renewable resources, communities, socio-economic context.

3 interdependent and synergistic priority functions: sustainable food & energy, inclusive lifestyle / habitat.

3 inseparable imperatives: ecological protection/restoration, positive economic balance, societal progress.

Know more about the whole vision, project and operating model: https://vu.fr/LCUp



PROTOTYPES SUCH AS OCEAN INNOVATION STATIONS

HABITAT

Adaptability, resilience, Human-Nature relationship

RESEARCH & DEVELOPMENT

Drivers of long-term progress. for humanity and all living beings, exemplarity and field of excellence

ECONOMIC PARADIGM / GOVERNANCE

Geo-political stability, justice, employment, income redistribution, circular economy

ENVIRONMENTAL VALUATION & PROTECTION

Ecological monitoring, oceanic and climate regeneration, biodiversity, negative carbon footprint.

AUTONOMY / RELIEF & SUPPORT OF THE LANDS

Energy and food autonomy + positive balance, creation of renewable values





SIGNIFICANT LONG-TERM SCALABILITY



PERSPECTIVES 2100

50 million people live in floating ecosystems, the Indigo Citizens. Each has a negative carbon footprint and contributes an average of 50 people in the world of food and renewable energy, 2.5 billion people.

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MISSION AND VALUES OF THE INDIGO CIVILIZATION PROJECT

OUR MISSION IS TO CONTRIBUTE TO THE EMERGENCE OF A SUSTAINABLE AND HARMONIOUS ECO-SOCIETAL MODEL WITH THE OCEAN AS ITS CORE AND HOST.

We are convinced that the positive future of our planet and all its living beings depends on the progress and elevation of humanity. The concept of the Indigo Civilization is a bold, optimistic and humanistic vision: to live and develop on and under the seas to protect, flourish and enrich all living things on the planet in a sustainable and harmonious way. In line with Europe's Horizon 2030 programme, this long-term project is the illustration of a noble ambition, beyond political, social, ideological or generational divisions.

How do we combine many existing solutions to deliver congruent, viable global solutions? How can we anticipate the future of Humanity in an inclusive manner, for all, rich and poor?

\rightarrow Our philosophy encompasses core values:

integrity, harmony, discipline, progress, curiosity, open-mindedness, courage and respect for all living beings.



THE FIRST COMMITTED ADVISORY EXPERTS

TO DATE, THE PROJECT INDIGO CIVILIZATION MOBILIZES INTERNATIONAL AND COMPLEMENTARY EXPERTS INCLUDING...

- → Rutger de Graaf / Blue21 & Blue Revolution Foundation, Global and Adaptive Floating solutions
- \rightarrow <u>César Ducruet</u> / <u>CNRS</u> <u>Economix</u>, maritime economics, ports and logistics flows
- → <u>César Jung-Harada</u> / <u>Singapore Institute of Technology</u>, multidisciplinary Ocean Impact Innovation, Marine Renewable Energy
- → Damien Serre / Mayane, Resilience Strategies and Applied Science
- > Pierre Erwes / BioMarine & Seventure Circular blue economy
- Hélène Artaud / Muséum National d'Histoire Naturelle de Paris, maritime anthropologist
- → <u>Frédéric Pons</u>, The Indigo Civilization Project, marketing, teaching and fundraising

Learn more about the team to date and its future organization : https://vu.fr/LCUp

A CUTTING-EDGE COLLABORATIVE ECOSYSTEM

We want to unite academic experts, public or private scientific organisations, start-ups, international groups and patrons, all driven by a new paradigm of social, economic and environmental profit.



WHAT IF YOU BECAME OUR FOUNDING PATRON?...

THE AURA OF AN AMBITIOUS IMPACTFUL PROJECT

Associate your identity and organization with a noble forward-thinking cause and to one of the most incredible human achievements (as a natural or legal person).

C. L. L. L. L.

PREPARING FUTURE REGENERATIVE BUSINESS MODELS

Have a strong impact, shape the future of our world and our society. Join a socio-economic and ecological project, served by Nature, science, philosophy and innovation.

FINANCIAL OR SKILLS SPONSORSHIP

Benefit from a secure plan as part of an asset management strategy: The payments made result in a tax reduction equal to France to 60% of the amount paid or the actual cost of making resources available (up to 100% in some countries).

> We want to raise 750 K€ over our first 18 months of activity, and 5.500 K€ over the first 3 years

▶ Learn more about our future needs: <u>https://vu.fr/LCUp</u>

THE FIRST DELIVERABLES OF THE PHASE 1

ON THE SHORT TERM, WE NEED 20 TO 40 K€ TO MAKE ONE PHD CREATES A WHITE PAPER COMPILING THE FOLLOWING KEY COMPONENTS

Our Vision: why do we need to investigate such a topic? And for whom?

- Global knowledge about sustainable adaptation and resilient off-shore floating solutions, High-Tech and Low-Tech:
 - Food, integrated multi-trophic aquaculture, algal farming, aquaponics, desalination
 - Marine renewable energies
 - Habitat, aquatecture, construction and potential relevant biomaterials
 - Circular blue economy (upcycling, recycling)
 - Transport and logistics
- Key maritime anthropological knowledge: what kinds of communities and cultures can emerge?
- Recommendations about the future categories of prototypes basis of the future research & innovation survey of each prototype
 - What social / societal environment, opportunities and threats?
 - What environmental ecosystems, opportunities and threats?
 - What recommended locations and what local societal contexts?

CONTRIBUTE TO THE EMERGENCE OF AN ECO-SOCIETAL MODEL OF PROGRESS

"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? This 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. »

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Denis Lacroix, futurist at IFREMER (French Research Institute for the Exploitation of the Sea)

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Indigo Civilization the ocean dwellers