Rabat, on May 26th, 2025

Concept note for the workshop:

"Presentation of the Project SENTINEL: Study and Examination of North and West Africa's Marine Diversity and Distribution under Climate Change and Overexploitation"

Casablanca, September 29th-30th and October 1st , 2025

I. Introduction

The oceans are one of the world's major reservoirs of biodiversity on Earth. Marine biodiversity provides many ecosystem services (provisioning services, regulating services, supporting services and cultural services) that are essential to the sustainability of the oceans and the proper functioning of the planet. Thus, marine biodiversity contributes to the productivity and resilience of marine ecosystems, particularly in the current global context of increasing impacts of human activities on the oceans: overfishing, climate change, invasive species, pollution and habitat destruction. In 2023, approximately 3.3 billion humans were depending on the oceans for at least 20% of their nutrition as animal-protein, and 37.6% of the global population was living within or near-coastal zones and these numbers will inevitably grow in the future due to the increase in the human population and seafood demand. In Africa, marine biodiversity is the basis of the economy and the source of protein for many countries with an access to the ocean. For example, in Morocco, the fisheries sector represents around 2.3% of the GDP and employs around 500 000 people. Moroccan fisheries generate an annual production of more than one million tons and represent 7% of total exports value.

Despite its crucial role in sustaining life on Earth, its economic importance and its necessity for human food safety, marine biodiversity knowledge, on one hand, has been limited over the years. Only about 242, 000 known valid marine species have been discovered so far, suggesting a potential of 1 to 2 million species still awaiting discovery. On the other hand, marine biodiversity loss has raised since the 1980s, facing numerous threats, such as climate change, agriculture, forestry, industry, urbanization, tourism, fisheries, aquaculture, introduction of invasive species and exploitation of energy and raw materials.

Thus, the United Nations has recognized the conservation and sustainable use of marine biodiversity, which have become a major global concern in the 2030 Agenda for Sustainable Development, as an essential aspect of the three pillars of Sustainable Development (specifically through Sustainable Development Goal 14). However, to be effective, marine biodiversity conservation plans should be based on a good knowledge of the existing marine species, their spatial distribution and abundance, their life history traits and the environmental parameters of the ecosystems they belong to. This involves rigorous and accurate identification of species, which can be challenging, and ecological monitoring of marine biodiversity. However, taxonomic expertise of marine species remains limited worldwide and especially in Africa for economic reasons, as well as scientific reasons. While numerous species discrimination tools are available, each has its distinct features and applications. The current state of species diversity description is predominantly based on anatomical and morphological characters, but the exclusive use of anatomy and morphology can lead to a massive underestimation of species diversity. Delimiting species boundaries using solely morphology is challenging due to multiple factors which include: 1) difficulties in identifying species presenting different morphology characters according to their life stage; 2) existence of cryptic species (i.e. organisms morphologically similar but unable to interbreed); 3) the occurrence of morphotypes and habitat diversity; and 4) taxonomical ambiguity caused by species lacking valuable morphological features. In addition, efforts for taxonomic identification are humbled by the requirement of high expertise and the declining number of trained taxonomists worldwide. The morphological approach according to the dichotomous keys of the FAO (Food and Agriculture Organization) represents the only method currently in force to identify commercial species in Morocco and other African countries. However, it was reported that over a third of the global fish catch between 1950-2002 lacked proper identification at the species level due to these limitations.

Over the last decades, the advent of molecular biology techniques and low sequencing prices have significantly improved species identification, thanks to DNA barcoding. This technique, based on the observation that an organism could be identified from a short-standardized DNA sequence (so called the DNA barcode), led to the construction of a Barcode of Life database (BOLD: https://www.boldsystems.org/) where each species is represented by a DNA barcode. This technique excels beyond traditional identification methods and can be applied to a wide range of issues. It is a reliable approach for identifying and discovering marine species; analyzing ambiguous life stages such as juvenile specimens; detecting alien and cryptic species; conducting biological monitoring; supporting conservation efforts and investigating fraudulent seafood products.

DNA barcoding, has helped to revitalize taxonomy by facilitating the identification of new species and to profoundly change our vision of biodiversity and species delimitation. Furthermore, the use of environmental DNA (eDNA) metabarcoding, has become an extremely popular tool for ecological monitoring of biodiversity, where traditional methods are often ineffective (underwater observations), destructive (experimental trawl fisheries), biased (collection with light traps) or require considerable financial and human investment. This technique relies on the detection of the presence of a species in an aquatic environment from its DNA traces alone.

While DNA barcoding has been a worldwide success and generated hundreds of studies, this approach has remained fairly limited in Africa, except in South Africa. Thus, BOLD includes very few DNA barcodes of marine species collected in African waters, including species with high commercial value. Furthermore, even if DNA barcodes of a species widely distributed outside of Africa were available for specimens collected elsewhere than in Africa, there is no guarantee that they correspond to African specimens. Therefore, there is a crucial need to establish a regional Western African reference bank of DNA Barcodes in order to investigate the marine biodiversity in African waters, to define the distribution boundaries of the species, to delimit the biogeographic regions within African waters, to set up conservation plans, to monitor the evolution of marine biodiversity and its distribution in the long term through eDNA surveys and to enable seafood products traceability and authentication.

In this global context and to address these issues, Dr. Jean Dominique Durand researcher at the Institut de Recherche et Développement (IRD, France) and coordinator of the West African Marine Fish DNA Barcoding International Research Network and Dr. Kenza Mokhtar-Jamaï, researcher and head of the laboratory of genetics at the Institut National de Recherche Halieutique (INRH, Morocco), have co-developed a collaborative project entitled: "**SENTINEL: Study and Examination of North and West Africa's Marine Diversity and Distribution under Climate Change and Overexploitation".**

ATLAFCO true his network RAFISMER will organize a workshop on September 29th to October 1st, 2025, in Casablanca, in order to present and discuss the project: "**SENTINEL: Study and Examination of North and West Africa's Marine Diversity and Distribution under Climate Change and Overexploitation"** with the scientists of the RAFISMER network and with potential funding partners.

II. The objectives of the workshop

The objectives of this workshop are: 1) to highlight the significance of the project for the West African countries and present its main objectives and expected outcomes; 2) to identify the countries interested in collaborating in the framework of this project and the scientists who will be involved; 3) to collect the specific needs, expectations and means of the countries; and 4) to discuss the project with potential funding partners.

III. Expected results of the workshop

- ✓ Growing awareness on marine biodiversity issues in Western African waters
- ✓ Adhesion of the scientists and Research Institutes of RAFISMER network to the project
- ✓ Initiating collaboration between African scientists in genetics field
- ✓ Finding funding partners

IV. Workshop conduct

The workshop will focus on the following areas:

1. Presentation of the global context, the objectives and outcomes of the project
2. DNA barcoding technique and state of the art in each West African country
3. eDNA metabarcoding needs for sampling and analyses for a global standardized approach
4. Means of each country in terms of genetics (laboratory, equipment, trained scientists…) and research vessels for scientific surveys
5. Training needs for African countries in terms of taxonomy, sampling and genetics analyses
6. Adjustments of the project if necessary
7. Requirements of the potential funding partners

V. Logistics :

The airfare and accommodation costs (hotel in Casablanca) of participants (*one per State member*) and guests are covered by ATLAFCO.

For any other information, please do contact the following persons:

1) **Scientific informations**

Dr. Mohammed NAJIH
Director General
RAFISMER Network chair
Institut National de Recherche Halieutique (INRH, Morocco)
m.najih@inrh.ma

Dr. Kenza Mokhtar-Jamaï,
researcher and head of the laboratory of genetics at the Institut National de Recherche Halieutique (INRH, Morocco)
mokhtarjamai@inrh.ma

Ms. Soukaina ZIZAH
Institut National de Recherche Halieutique (INRH, Morocco)
zizah@inrh.ma

2) **Finance and logistics (ATLAFCO/COMHAFAT)**

Mr. Mohammed HADDAD
Financial Director, ATLAFCO Executive secretariat
haddad.comhafat@gmail.com

Mr. Rachid REGRAGUI
Project manager, ATLAFCO Executive secretariat
regraguicomhafat@gmail.com

Mr. Abdennaji LAAMRICH
Head of the Cooperation Department, ATLAFCO Executive secretariat
laamrichmpmm@gail.com

Ms. Hayat ASSARA, Director assistant
ATLAFCO Executive secretariat

-

- Phone: +212 (0)651239304
- Email: hayat.comhafat@gmail.com
- secretariat.comhafat@gmail.com