

# SHAPING A CIRCULAR BLUE ECONOMY IN MOROCCO



**PLANNING FOR ARTIFICIAL REEFS TO RESTORE MARINE ECOSYSTEM IN SMALL SCALE FISHERIES**

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# Our understanding of artificial reef ?

A deliberately submerged structures in order to create, protect or restore a marine ecosystem

These structures play the following important roles:

- **Physical protection of a place** ( Against the waves and illegal trawling )
- **Fish production**
- **Recreation** ( Diving and underwater photography )

## Artificial reef, an evolving marine environment management tool

Among the coastal development tools intended worldwide for the management and the restoration of marine environments and ecosystems, artificial reefs whose use was initiated in Japan in the 17<sup>th</sup> century as aggregating fish system.

From a spatial point of view, Artificial reefs sites may be very heterogeneous from one coastline to another, with a high degree of diversity both in the Mediterranean and in the Atlantic. These variations can be explained by divergent cultural relationships with the environment, notably in the management methods of the fishing areas such as morpho-geological differences of the coasts and differences in the orientations of the fisheries (inshore, offshore, monospecific, state of the stocks, species of fishery interest)

# Challenges

Difficulties for Marine Spatial Planning in general appear when we try to understand the social, economic, environmental and governance objectives of sustainable development with a political and legal vision. This is what quite often requires the carrying out of a public inquiry to better understand these imperatives and avoid objections or disagreements with and/or within stakeholders.

# Challenges

The development of Artificial reefs culture now and in the future is imperatively dependent on the palpable implementation of marine spatial planning that takes into account both the national and regional context. This planning allows the framing and management of areas suitable for the immersion of reefs structures

# Legal MSP framework for immersion of Artificial Reefs

In order to implement real marine spatial planning, there should be a solid national legal and regulatory framework that governs all planning, capable of ensuring the development and management of acceptable artificial reefs. Such a framework must guarantee the protection of rights and obligations, particularly those relating to coastal rights, and provide a clear definition of the roles and obligations of all stakeholders and users in order to minimize collisions, divergences and negative impacts.

# Cross-border cooperation

In general, MSP for the promotion of artificial reefs is generally perceived as being an exclusively national process, cross-border cooperation is also essential to ensure homogeneous and coordinated MSP strategies at the level of all coastal areas and marine / maritime regions.

This is one of the objectives expected by the WestMED initiative but also by the global MSP IOC UNESCO project. This requires cooperation on three levels, namely:

- The methodological level** (complementary and coherent methods, data sharing, sharing of experiences and approaches, matrix transfer of experiences),
- The strategic level** (common long, medium and short term vision)
- The level of implementation or execution** (planning of marine border zones and overlapping spaces, etc.).

**Why all these levels?** A significant number of issues and challenges can impact Artificial reefs projects such as maritime transport operations and safety, conservation and sustainable management of straddling fish stocks, protection of biodiversity and marine ecosystems, aliens species, the fight against marine pollution the IUU and harmful telluric effluents, the future development of offshore renewable energy such as wind turbines, etc.. **These elements may have a dimension which goes beyond the territory of the country and therefore require the adoption of a concerted regional approach.**

# Schematic presentation of an artificial reef

module clusters reconstituting a natural environment for juveniles benthic and pelagic fish

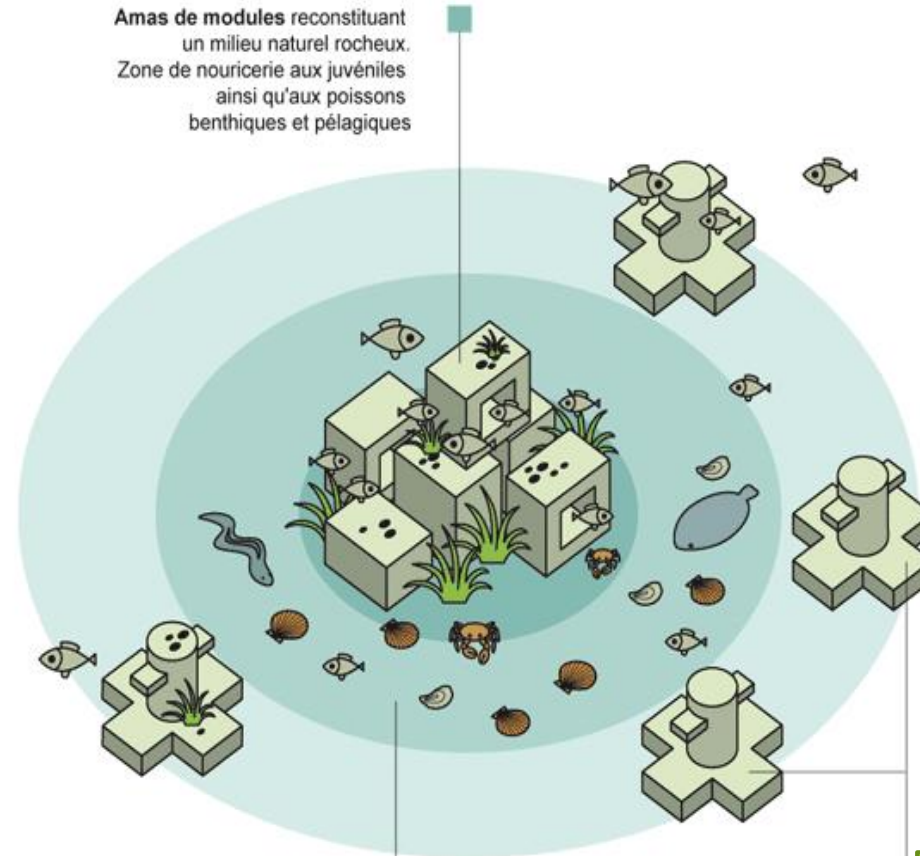
Amas de modules reconstituant un milieu naturel rocheux. Zone de nurserie aux juvéniles ainsi qu'aux poissons benthiques et pélagiques

Atraction

Concentration

Protection

Production



Increase of biomass, biodiversity and resource diversification

Espace inter récif

Récifs de protection empêchant l'utilisation d'engins tractés

Interecifal space

protection of reefs prohibiting towed equipment

# Attraction Function of marine animals by Artificial Reefs (AR)

- **Spawning ( Nursery )**: eg : octopus, squid, demersal fish
- **Nurturer** : ( food chain) phytoplankton , zooplankton, larvae / juvenile fish , pelagic fish , big fish
- **Shelter Place and refuge against predators** : invertebrate, shrimp , crab, scorpion fish, grouper , octopus
- **Rest place** : bream bass, turbot

# Project of artificial reefs immersion (dumping)

## Project Objectifs

- Reconstruction and rehabilitation of degraded marine habitats
- Protection of breeding against illegal trawling
- Preservation and strengthening of marine biodiversity
- rational exploitation of fishery resources and even ensure their renewal and sustainability
- Improved revenues within fishermen communities

# Selection criteria of the disposal of artificial reefs

- ◆ Sea ground nature : sandy , hard bottom , flat bottom
- ◆ Depth: 10-50 m
- ◆ Location: -be close to the rocky area -be close to the port and fishing village - existence of breeding Fishery
- ◆ Current: moderate speed
- ◆ Professional organization : good and functional

# Oceanographic and Environmental Research

- Development of a bathymetric map
- Development of a sedimentary facies map
- Measuring current and tide (dead and living water )
- Wildlife benthic evaluation -fauna and flora of the area-
- Measurements of the water quality of the area and
- the identification of potential sources of pollution

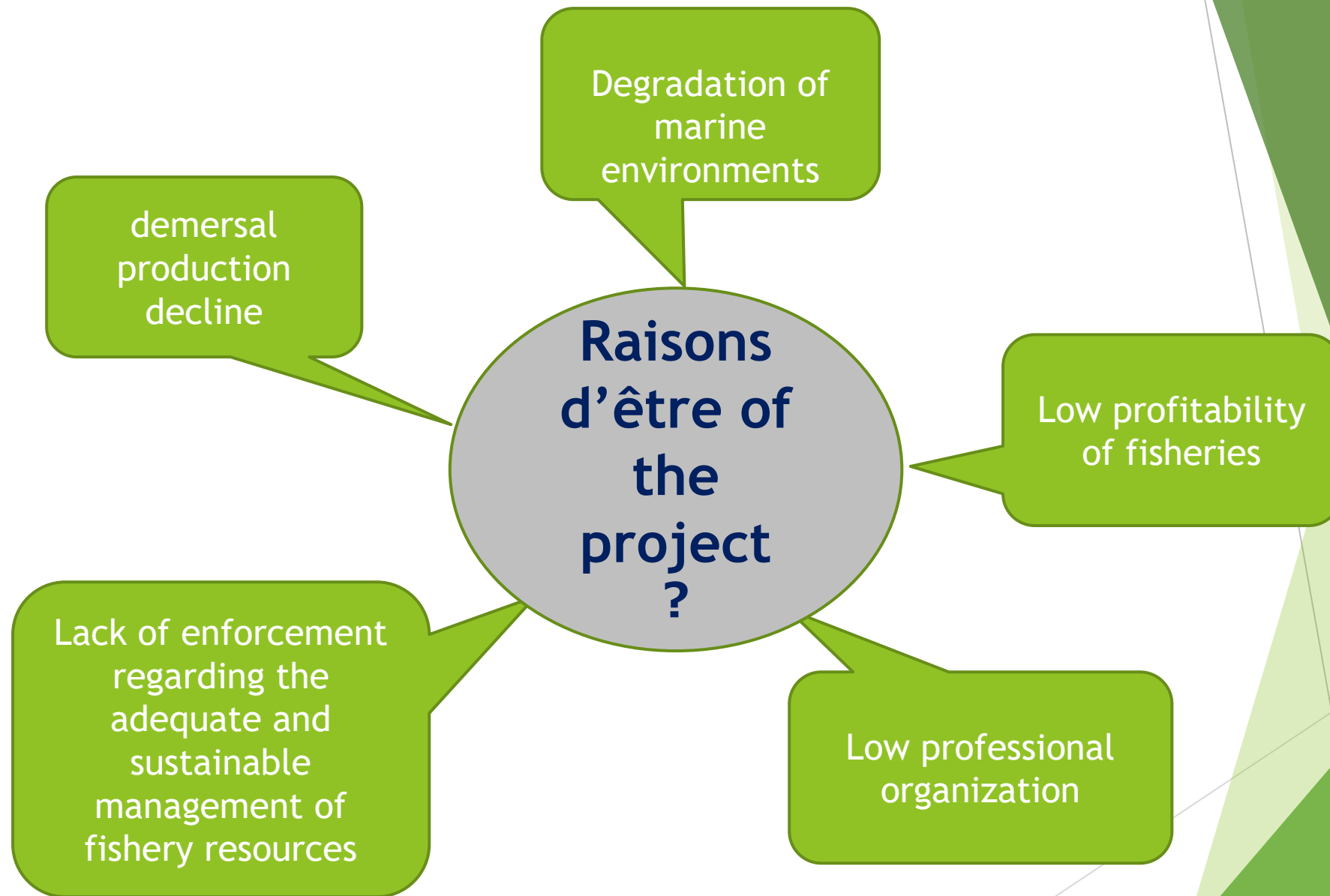
# Utilities of artificial reefs in the area of management of fishery resources

➤ Artificial reefs provide :

- Fisheries management means , solves conflicts between fishermen
- Enables the sharing of fishing space and living resources
- The improvement of the concept of federated fishermen

➤ Artificial reefs are used to support artisanal fisheries "small scale ", which favor more selective techniques (line Fishing, longline and pots )

➤ Artificial reefs are an integrated management tools within for the coastal strip and for most efficient coastal resources, with the establishment of marine protected areas. MPAs



# Keywords of the project

**Participative Approach**

**Artisanale Approach**

**Integrated management of fishing vilages**

# Artificial reefs types

## Anti - trawling Blocks



Octopus Habitat and Nursery



Octopus Juvenile Shelter

# Piles of gabions



# Enrichment block of production



## Anti trawling block for protection

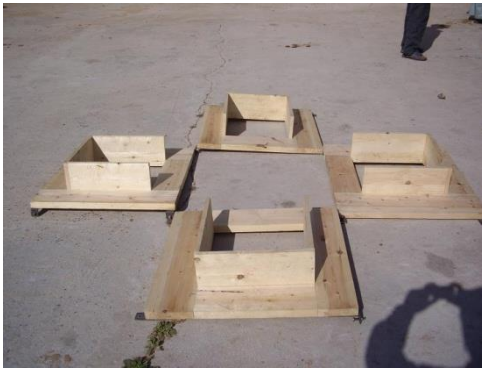


# Octopus pots



# Making production blocks

①



②



③



④



⑤



⑥



# Making anti trawling blocks

①



②



③-1.1



③-1.2



③-2.1



③-2.2



STORAGE AREA BEFORE LOADING



# Transport and immersion (dumping) of artificial reefs modules



**Results: Transfer of know-how in terms of unloading, transport, immersion and arrangement of artificial reefs**



## ANNOUNCEMENT





## AVIS AUX NAVIGATEURS

**Objet** : *Empoisonnement de la zone à immersion des récifs artificiels à Souria Kdima.*

**P.I** : - 1 Copie : Les coordonnées de la position des récifs sur carte  
 - 1 copie : Tableau des coordonnées de la position des récifs en latitude et longitude.

**Il est porté à la connaissance des navigateurs que :**

*Dans le cadre de la coopération Maroc-japonaise en matière de la pêche maritime, le Département de la Pêche Maritime et l'Agence Japonaise de Coopération Internationale (JICA) ont lancé un projet expérimental d'immersion de récifs artificiels au large du village de pêche de Souria Kdima (Safi) avec une opération d'empoisonnement du site.*

*Pour des raisons de sécurité de la navigation maritime, et afin de préserver l'espace maritime choisi pour abriter ce projet, il a été décidé d'interdire la pêche et le mouillage dans ladite zone.*

*Pour toute information en ce sujet, contactez la Délégation des Pêches Maritimes de Safi  
 Tél : 05 24 62 2291 fax : 05 24 62 30 08.*

C/C pour information :

- Secrétariat Général du Département de la Pêche Maritime
- Wilaya de la Région Doukkala Abda
- DCAJ/DPMA/DIP/DFMPSP/DRHAG
- Gendarmerie Royale - Safi-
- Capitainerie Port de Safi
- Station Casa Radio
- Chambre des Pêches Maritimes de l'atlantique Nord
- Associations Professionnelles (pêche côtier et artisanale)
- Marine Marchande : Safi / Casa Blanca
- Direction de l'Équipement -Saf -
- Délégation des Pêches Maritimes -Essaouira -
- S/Délégation des Pêches Maritimes de Souria K'dima
- Coopérative des pêcheurs de Souria K'dima
- Caïdat de Souria K'dima .

NOTICE TO MARINERS

# Project management and monitoring

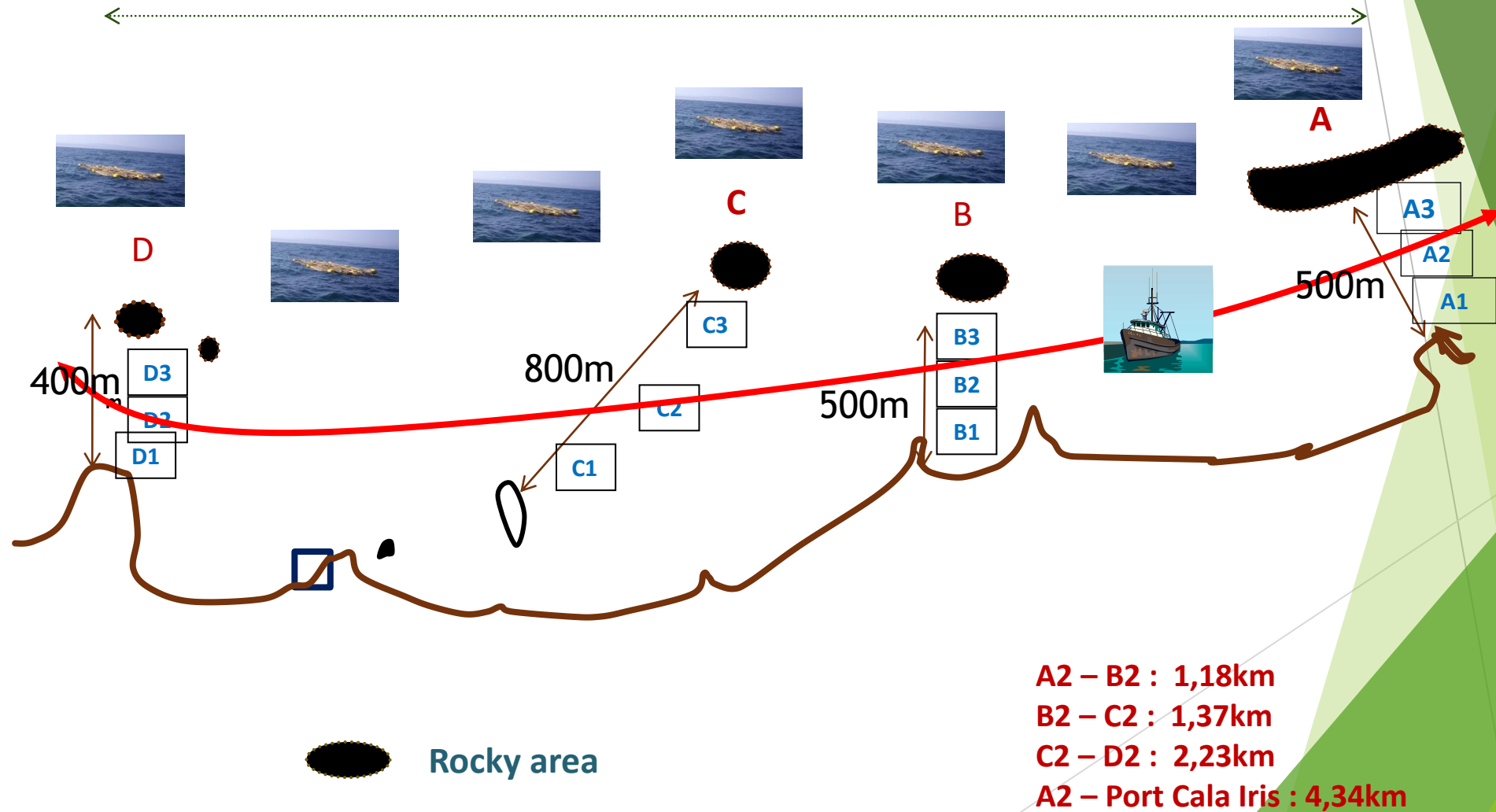
**By a Local Project Management and Monitoring Committee composed by the affected organisms**

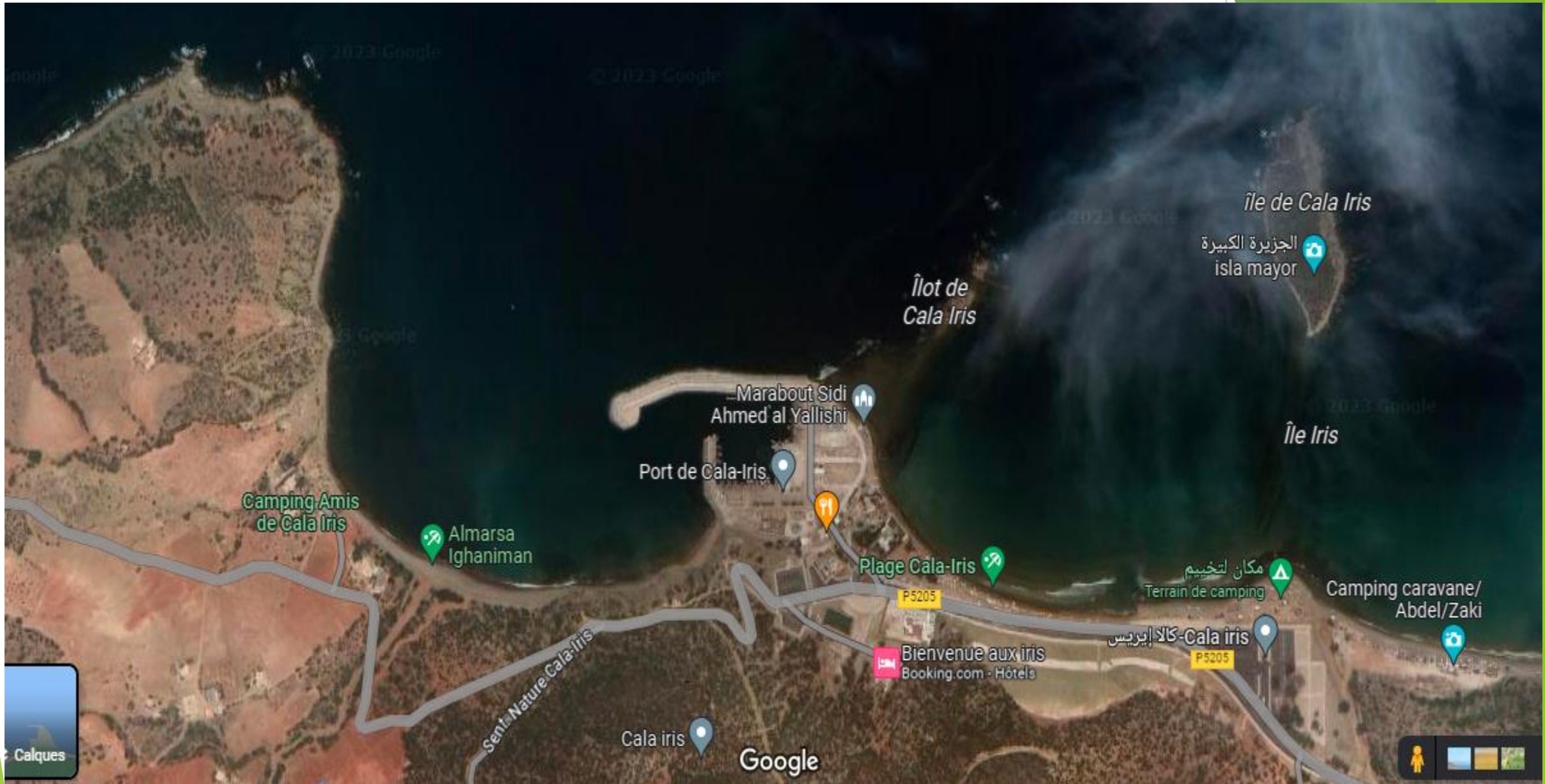
- The Department of marine Fisheries, - ONP, - ANP,
- Gendarmerie Maritime, - ITPM local, - ODCO, - AESVT
- Wilaya , - local Caida , - local municipality
- Cooperative of fishermen

**This committee is responsible for :**

- **Monitor the progress of the project;**
- **Participate in the development and application of texts for exploitation and management of fishery resources in the submerged reef zone;**
- **Take necessary measures when necessary.**

# Schematic arrangement of artificial reefs in Cala Iris fishing village





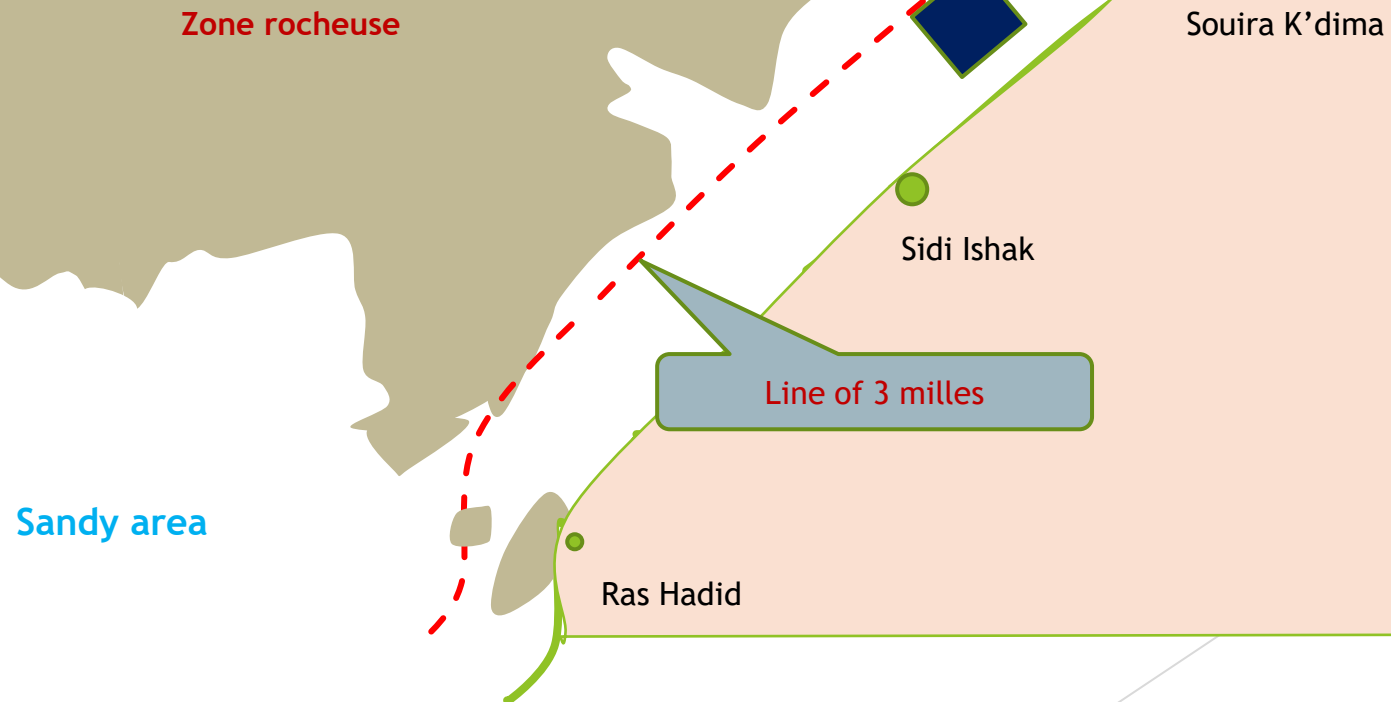
Calques

Google



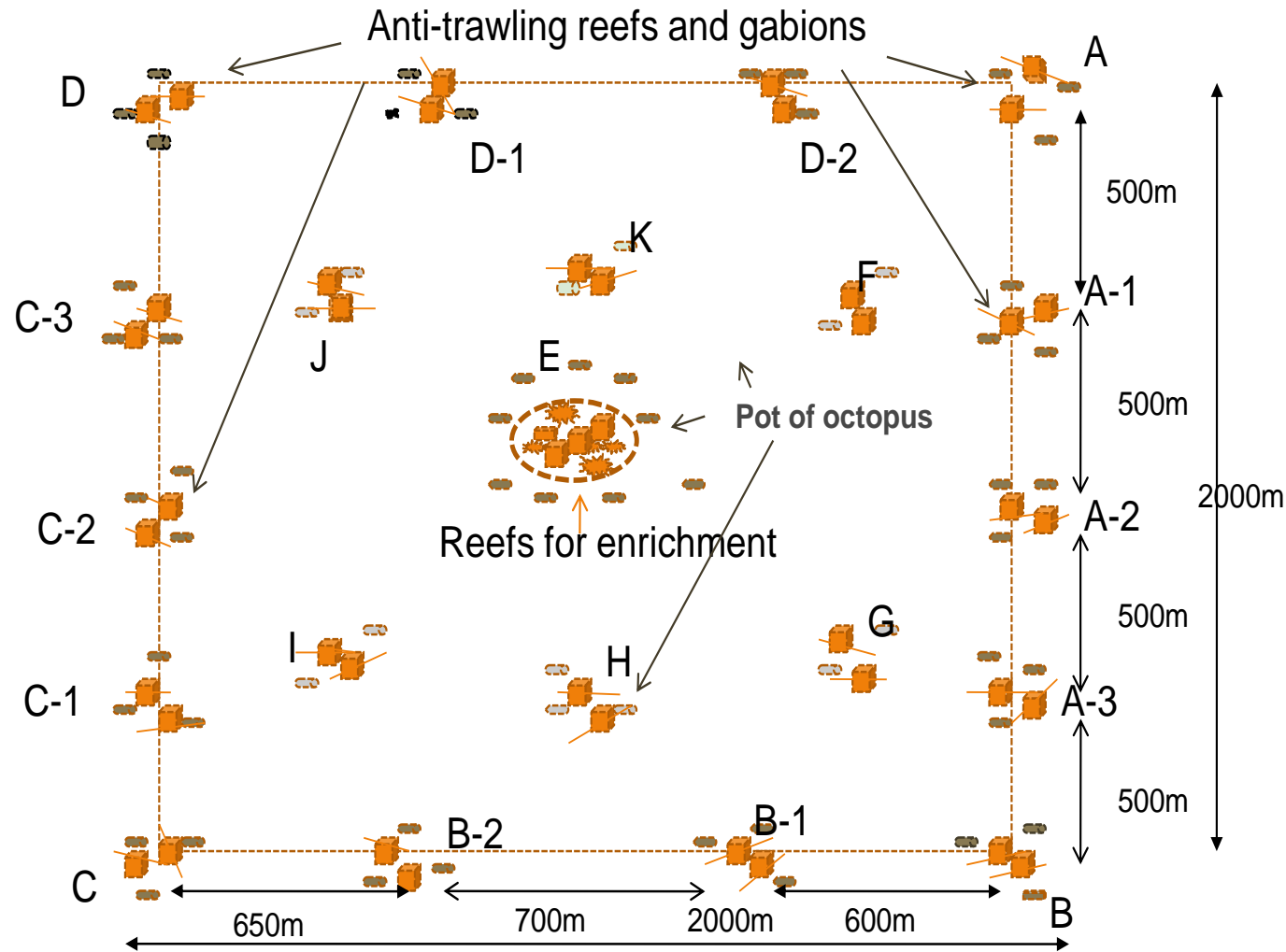
# Site of the dumping of artificial reefs on the atlantic ocean

Moroccan reference law  
trawling is prohibited within  
less than 3 nautical miles  
Dahir 1973-23 Nov 1973  
N° 1-73-255 formant règlement  
sur la pêche maritime-article  
15

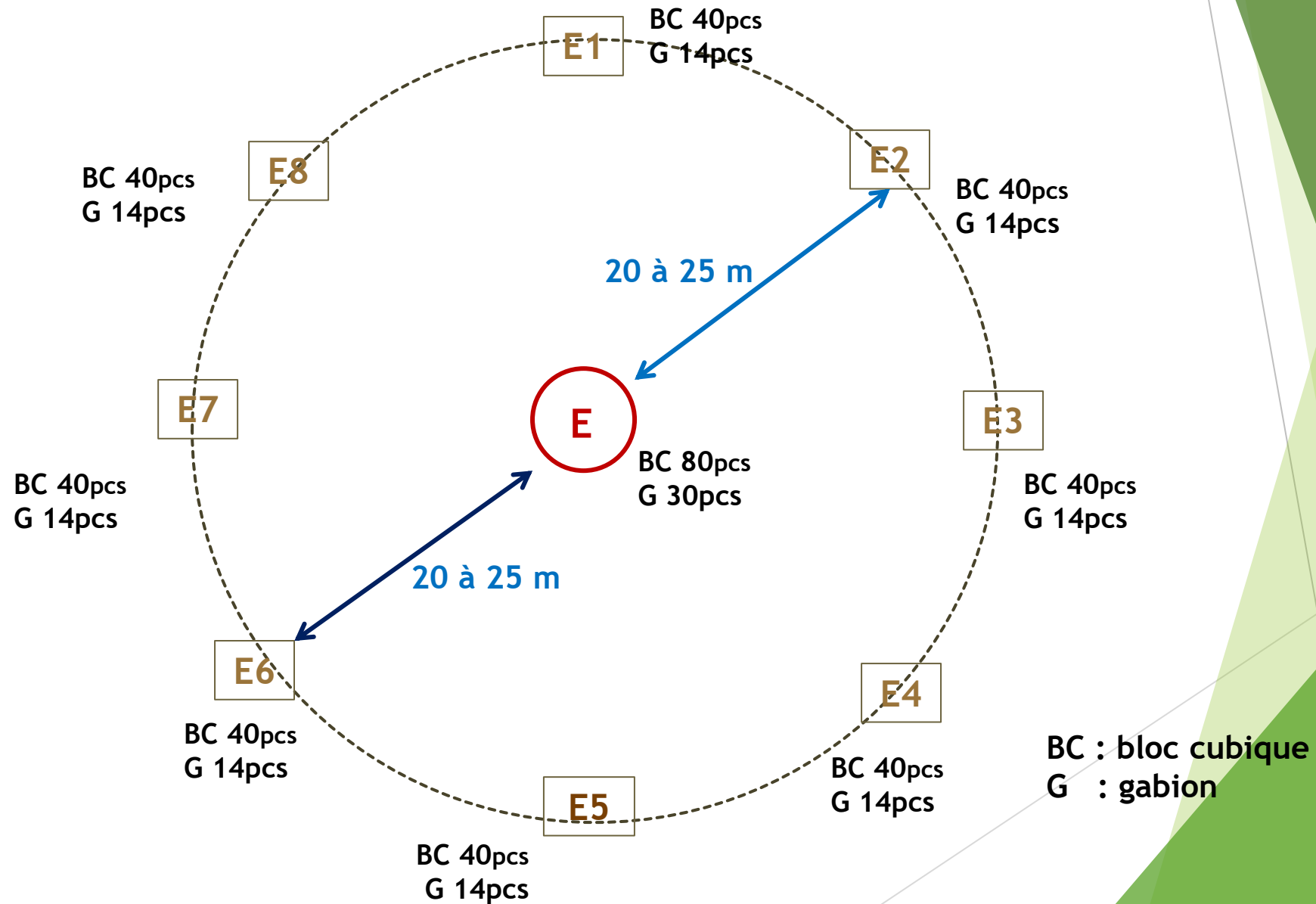




# Block installation diagram of artificial reefs



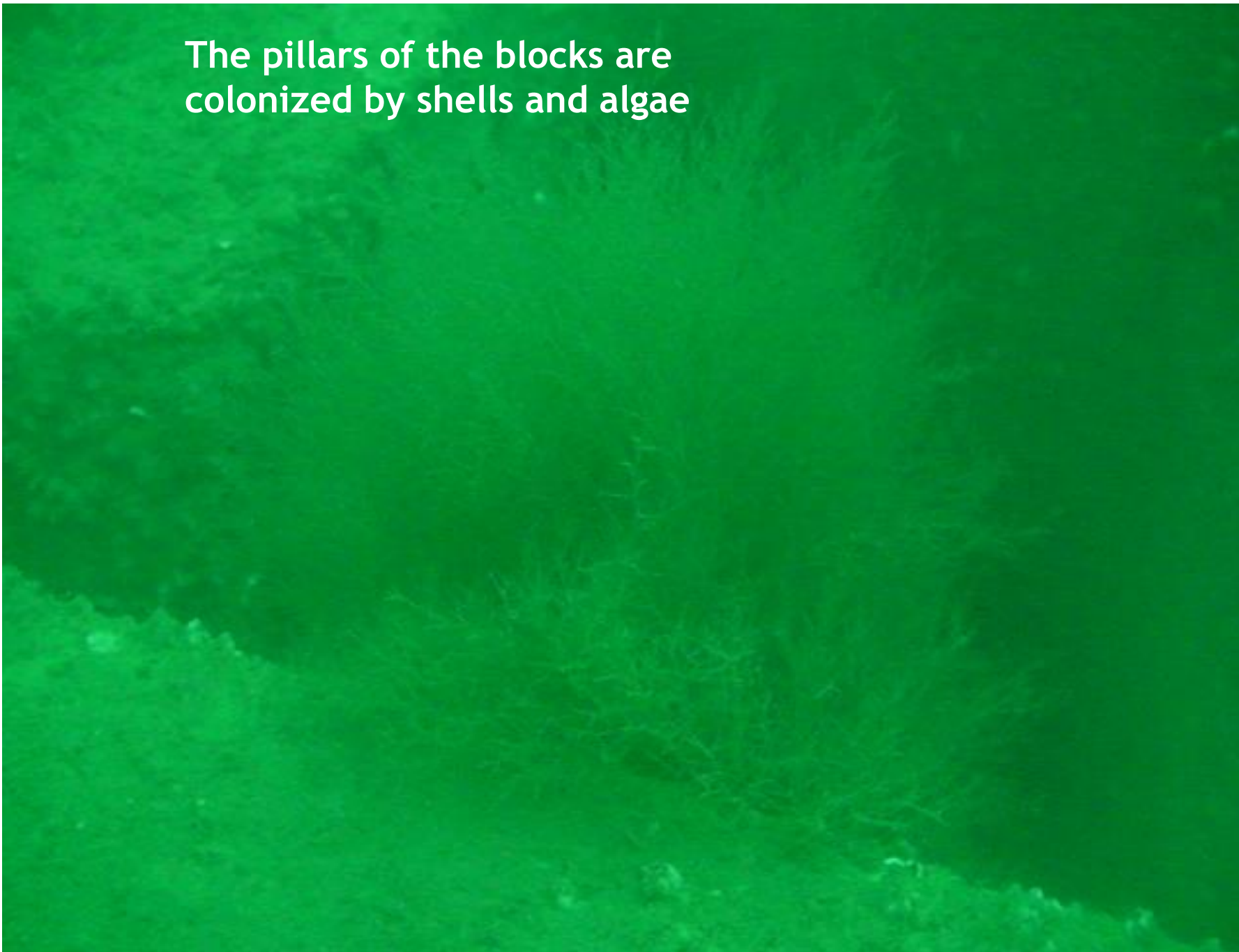
# Central layout diagram of artificial reefs



6 months later



The pillars of the blocks are colonized by shells and algae



Knife shells and hulleaten by  
octopus



BIOHUTS AS TOOL FOR  
RESTORING MARINE  
ECOSYSTEMS IN PORTS

Blue ports initiative



# Nature and objectifs of the project

## Project specifics :

- Establishment of an additional income generating activity
- Project coupled with the immersion of artificial reefs project
- Strong involvement of the beneficiary community

## Key objectives:

- Contribution to the development of aquaculture
- Diversification of fishing activities
- Improved income of fishermen
- Introduction to new production valuation techniques
- Introduction to marketing processes
- Reconstruction of marine ecosystems

# The stakeholders and involved parties

- ▶ The DONORS
- ▶ The Department of Marine Fisheries
- ▶ Cala Iris Fishermen's Cooperative
- ▶ The National Institute of Fisheries Research
- ▶ The National Office for Fishing ONP
- ▶ The National Agency for the Development of Aquaculture
- ▶ The National Office for Food Security
- ▶ Local authorities Etc...

§ All these parties work in joint committee



# THE MARITIME SPACE

The maritime space in Morocco includes several overlapping activities, such as:

Fishing areas

Aquaculture areas

Tourist areas

Areas for exploration, exploitation and extraction of oil, gas, minerals and aggregates;

Maritime routes and maritime traffic flows;

Submarine pipelines and cables;

Nature conservation sites “Marine Protected Areas”,

Marine cultural heritage;

Military zones

The scientific research, ...

**-Artificial Reefs and  
Artisanal mussels farming  
and valuating for Small  
scale fishermen-**

I

**AN  
INTEGRATED PROJECTS GENERATING REVENUES  
FOR THE BENEFIT  
OF FISHERMEN COOPERATIVE**

**What we have to know as Approach?**



# SITE OF THE PROJECT



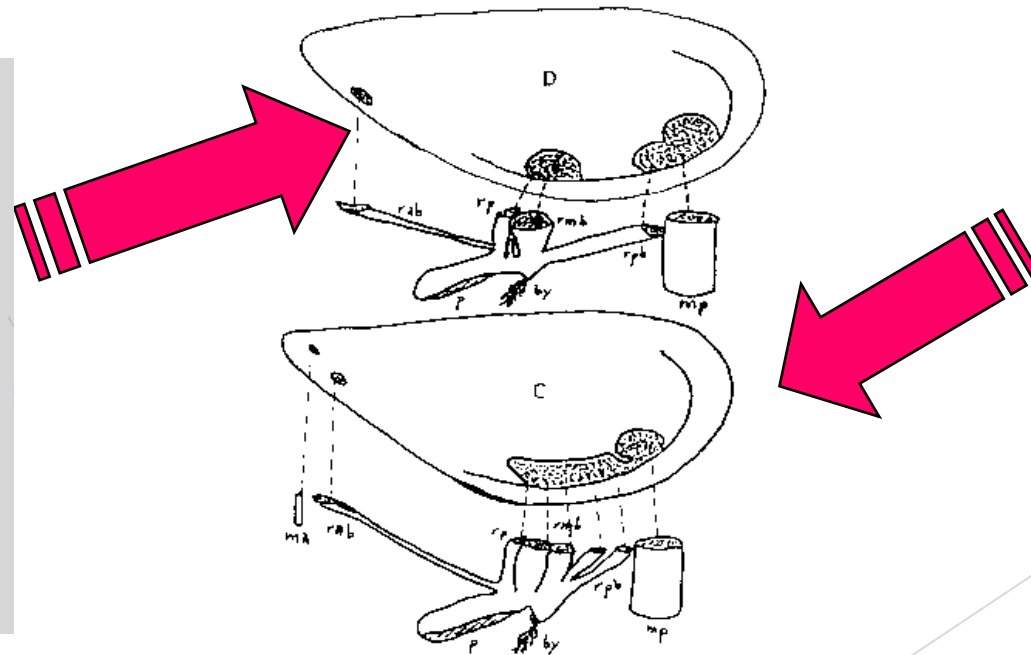
*Farming zone*

# TARGETED SPECIES

The two natural species existing in the area of cala iris :

**Africaine mussel**  
*Perna perna*

**Mediterranean mussel**  
*Mytilus galloprovincialis*



## ADDING VALUE COMPONENT



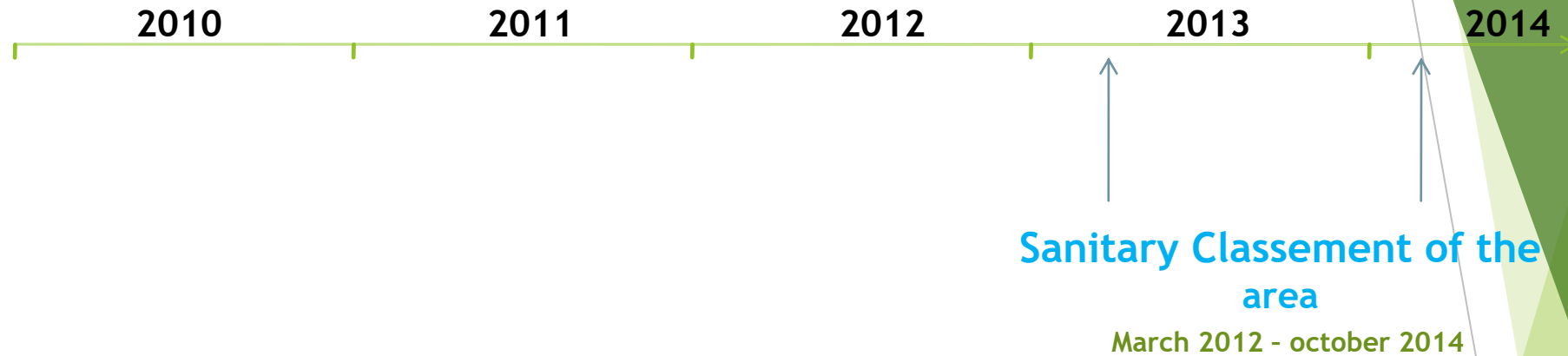
A facility was built and meets the standards and requirements, including:

- Respect for the forward march as principle ,
- Molds for baking equipment ,
- decortication , drying, packing and vacuum packaging
- Local storage      - Health and sanitary measures .

### final results :

a total of 1,150 meters of channels we had on 10 hectares a mature production estimated at 15 kg / linear meter / semester

# COMPONENT MARKETING



- Building a product purification unit
- Impact study
- The final product safety tests - Determination of cost - Packaging design
- Development of a marketing strategy
- Prospecting of local, national markets for export

**A PRESIDENT OF THE COOPERATIVE WHO BELIEVES**

**.. AND PROMISING RESULTS**





**A well appetizing mussel dish**

IPGRs can be an effective response to recovery and / or enhancement of livelihood systems and food security and sustainability of a resource since income is a fundamental dimension of these systems.

No universal recipe for the establishment of such a program exists. We must assess the adequacy of program status and adapt activities to the specific characteristics of the context.

Income generating programs do not always represent a relevant alternative to the most vulnerable population.

Motivation and participation of the people involved in the project are prerequisites for any type of IPGRs program.

## CONSIDERATIONS TO INITIATE THE IPGRs

Resources or property to which families or individuals have access, they control or own and with which they carry out production processes, participate in the labor market or use for trade with other families or individuals. They can be classified as follows :

- Natural capital: consists of natural resources such as land, water and other biological resources;
- Physical capital includes items that have been created through the production process, such as infrastructure (roads, bridges) and machinery;
- Human capital: the skills and ability to work in a family or individual unit;
- Financial capital: the household's access to money, which can be via savings or credit;
- Social Capital: reciprocal attitude within the community between households or individuals, based on trust built through social ties
- Volunteering and willingness to change habits.

# FISHING VILLAGES AND LANDING POINTS

## The Department Of Marine Fisheries: Strategic axes



**Preservation of fishery resources**



**Development, modernization and upgrading of the sector**



**Socio-professional promotion**



**Scientific Research**

# Small Scale Fisheries

- Floating device: Fishing Canoes of 2 - 5 GRT
- Time at sea: less than 24 hours
- Driving power : 15-25HP
- Fishing Area : 5 Miles
- Fishing techniques: hand line, longline, tremail, floating net and jig that aim to be selective
- Fishing contributions: High quality noble species
- Purpose of contributions: Final consumption - Catering - Export  
Highly social activity
- Artisanal fishing is characterized by contrasts
- Artisanal fishing sailors are exposed to insecurity : **Distress, Sea events, Disappearance at sea,**
- Ignorance, illiteracy, anarchy, poverty and adventures, Disorganization, The exodus and illegal immigration, Failure to comply with health conditions



**An activity that is practiced in precarious conditions**

# National Coastal Development Program

PNAL

Integrate artisanal fishing into its economic and social fabric, by:

- Setting up reception infrastructure Improving
- living and working conditions Stability,
- organization and security



VDP (FV) and PDA (MLP) construction program

## Halieutis Strategy

<https://unctad.org/system/files/non-official-document/ditc-ted-20102015-NGER-Morocco-ENEV-52.pdf>

- 3 axes
- 5 ideas
- 16 projects

# National Coastal Development Program

Factors determining the choice of a VDP or PDA

the social

The economic

The preservation of the resources

# The limits of VDP and PDA

## 1-Absence of common definitions of PDA/VDP

- Technical definition
- Administrative definition
- Legal definition

## 2-Legal\_frame of the Project

## 3-Impact on the environment

- Condemnation of beaches
- Limitation of sea view
- Risk of destruction in the event of a strong storm
- Modification of marine current regimes
- Sliding and destabilization of land (during earthworks)
- Brakes on the flow of external water
- Risk of water and soil pollution
- Dredging (influences the marine environment)
- Water table
- Food chain
- Increased traffic and air pollution
- Operationalization

# Achievements

- The Department has identified more than 70 artisanal fishing sites on the Moroccan coast.

35

- Projets achieved (7 VDPs et 28 PDAs)

05

- Projects in progress or nearly achieved

17

- Projects currently being studied

# Achieved Projects

## VDPs



• VDP FNIDEQ



• VDP CHMAALA



• VDP CALA IRIS



• VDP IMESSOUANE



• VDP SIDI HSSAIN



• VDP SOUIRIA KDIMA

# Achieved Projects

## PDA's



• PDA KAA SRASS



• PDA MARTIL



• PDA MY BOUSELHAM



• PDA BOUZNIKA



• PDA IMMI OUADDAR



• PDA SIDI BOULFDAIL

# The marine protected areas and the artificial reefs

The MPAs established in Morocco are category VI “Protected Areas for the management of natural resources” of the IUCN. These are marine protected areas managed primarily for the sustainable use of natural ecosystems.

# A FAVORABLE CONTEXT FOR MOROCCO'S COMMITMENT TOWARDS A SUSTAINABLE AND RESILIENT BLUE ECONOMY

## *The Constitution*

The 2011 Constitution stipulated in article 31, equal access for citizens to water and a healthy environment; as well as sustainable development.

## *Framework law 99-12*

Initiatives driven by Royal Guidance in the throne speeches of 2009 and 2010 made it possible to develop a National Charter for the environment and sustainable development, formalized through framework law 99-12 which constitutes a real policy reference. public in matters of sustainable development.

## *NSDS*

The National Sustainable Development Strategy, adopted by the Council of Ministers in June 2017, completed and strengthened the legislative framework in favor of sustainable development. The implementation of the SNDD must be integrated into all sectoral strategies. Among these main objectives: the protection of biodiversity and the encouragement of the green economy.

## *National Integrated Coastal Management Plan (NICMP)*

The *NICMP* was developed in April 2017 by the Sustainable Development Secretariat and aims, among other things, to determine the directions and objectives to be achieved in terms of protection, development and conservation of the coastline, taking into account the national policy of territorial planning, economic and social development objectives and the provisions of the aforementioned law. The *NICMP* will make it possible to draw up a road map which could contribute to the realization of the integrated development of the Blue Economy sectors.



THANK YOU