

Coral culture for small scale reef rehabilitation in Mauritius

MINISTRY OF OCEAN ECONOMY, MARINE RESOURCES,
FISHERIES & SHIPPING
MAURITIUS OCEANOGRAPHY INSTITUTE



**MAURITIUS OCEANOGRAPHY
INSTITUTE**

Presented by: Bacha Gian Suraj,

Research Scientist, Biological Oceanography Unit

Implementing institution: MOI



Creation & main role of the MOI:

- The Mauritius Oceanography Institute (MOI), a parastatal body under the Ministry of Ocean Economy, Marine Resources, Fisheries and Shipping, was established in January 2000 by the proclamation of the MOI Act (Act No. 24 of 1999)
- The need to rationalize and coordinate research and development activities related to Oceanography was the motive for the setting up of the MOI
- The Institute also advises Government on the formulation and implementation of policies and programmes in respect to oceanography

MOI's Vision, Mission & Mandate:

- To become the center of excellence in oceanography in the Indian Ocean region
- To undertake oceanographic and coastal research and development for the sustainable management of resources in support of the ocean economy of the Republic of Mauritius
- Coordinate research and development activities related to Oceanography

MOI's role in the project:

- Lead agency, Coordinator and Implementing body

Implementing institution: MOI

MOI's complex:

Block C:

Biological Oceanography unit

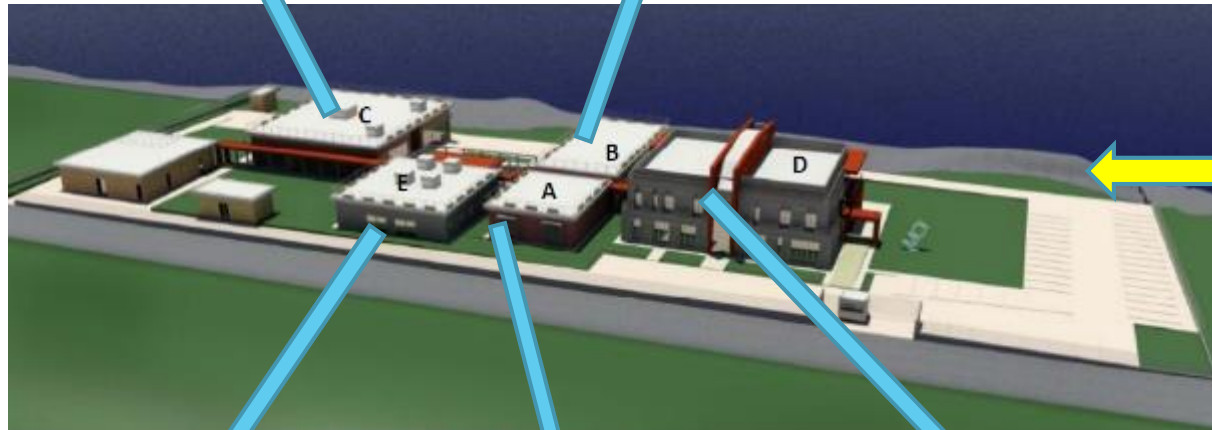
- (i) Molecular Biology lab
- (ii) Marine Biotechnology unit:
- (iii) Aquaculture unit

Block B:

Chemical Oceanography

- (i) Natural product chemistry lab
- (ii) Analytical chemistry lab

Marine Geology/ Geophysics units



Block E: Offices of the scientific & technical staff

Block A: Physical Oceanography unit

Block D: Administrative block

Houses the MOI lobby, a Documentation Centre, Boardroom, a Lecture Theatre & various offices (D, DD, Finance section, Administration/Human resource section & an IT section)

MOI fact sheet:

Location: SWIO, Mauritius, Albion

MOI complex area: 3ha.

MOI building area: 3392m²

Scientific staff: 24

Administrative staff: 10

Supporting staff: 6



Project: Background & Justification

Mauritius Island: SIDS



Geomorphology	Location	20 ⁰ 17' S 57 ⁰ 33' E
	Land area	1,865 km ²
	Coastline	~ 322 km
Maritime Climate	Type	Mild tropical
	Temperature	20.4 °C - 24.7 °C
Coral reef	Reef size	150 km
	Lagoon size	243 km ²
	Reef type	Fringing / Patch / Barrier
	Biodiversity	159 species of hard corals 340 species of fish
Importance		Coastal protection Coastal fisheries Artisanal fisheries Tourism & Recreation (reef-related)

Project: Background & Justification

LOCAL THREATS

- Coastal development
- Increased recreational activities
- Eutrophication
- Erosion
- Sedimentation
- Pollution (nutrient enrichment (organic & inorganic cpds, heavy & trace metals)
- Reduced salinity
- Microbes incl. pathogens (coral diseases)
- Cyclones
- Fishing pressure (seine net fishing)
- Predator outbreaks

GLOBAL THREATS

- Ocean acidification
- Increased ocean temperatures
- Recurrent bleaching

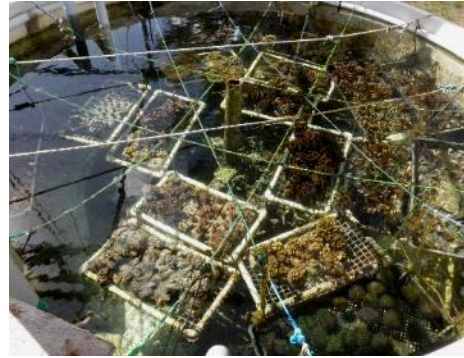
CONSEQUENCES

- Environmental impacts
 - Loss of coral cover (50% in 2000 to around 18% in 2018)
 - Loss of coral species (local extinction)
 - Changes in reef community
 - Loss of biodiversity
- Economic impacts
 - Decreased tourism appeal
 - “Flow-on” effects - fisheries
- Loss of ecosystem “services”
 - Subsistence
 - Recreational opportunities
 - Cultural significance
 - Shoreline protection (Flooding of low lying coastal habitations)

Project: Background & Justification

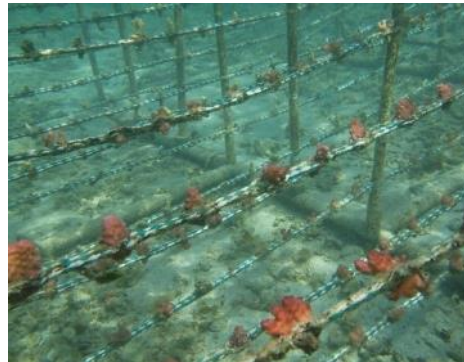
➤ 1st Phase (2008-2010) - *Ex situ* Land Based Coral Farming

- Develop techniques for culturing selected coral species *ex situ* for conservation of biodiversity and genetic diversity



➤ 2nd Phase (2011-2014) - Small scale reef rehabilitation

- Develop locally adapted techniques for mass coral culture for small scale reef rehabilitation



➤ Community Based Coral Culture in Mauritius (2017-2020)

- Training and capacity building of coastal communities in coral farming and reef rehabilitation techniques



Community Based Coral Culture in Mauritius

Awareness raising and site selection:

From September to December 2017, an awareness raising programme was undertaken island-wide for sensitisation of stakeholders, local communities and the public at large. Meetings and interviews with representatives of fishermen associations helped in the identification of sites for project implementation.



Registration of trainees under the CCTP:

In the early months of 2018, Inception workshops were undertaken at selected project implementation sites (namely Quatre Soeurs, La Gaulette, Bel Ombre and Grand Gaube). The main aim of these inception workshops were to identify potential candidates for enrolment under the CCTP. Presently, a total of 110 trainees have registered under the training programme.



Fact file: Registered trainees under the CCTP



Mean percentage (%) number of trainees registered under the CCTP at La Gaulette, Quatre Soeurs, Grand Gaube and Bel Ombre (n=20-34)

Training under the CCTP:

Since February 2018, registered participants have been trained (through classroom lectures and/or hands-on practical sessions) in the following:

(I) Coral biology, certification in snorkeling and Emergency First Response (EFR)



(II) Nursery construction

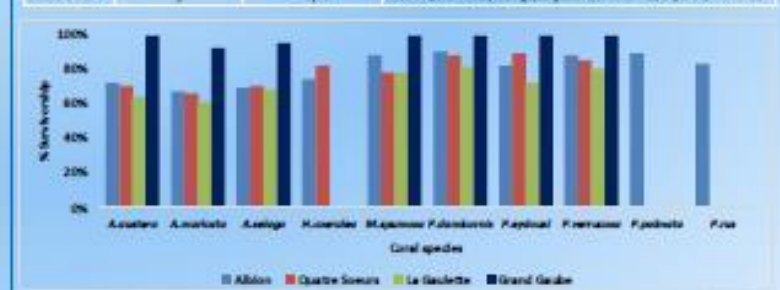


(III) Nursery set-up, monitoring, maintenance and management



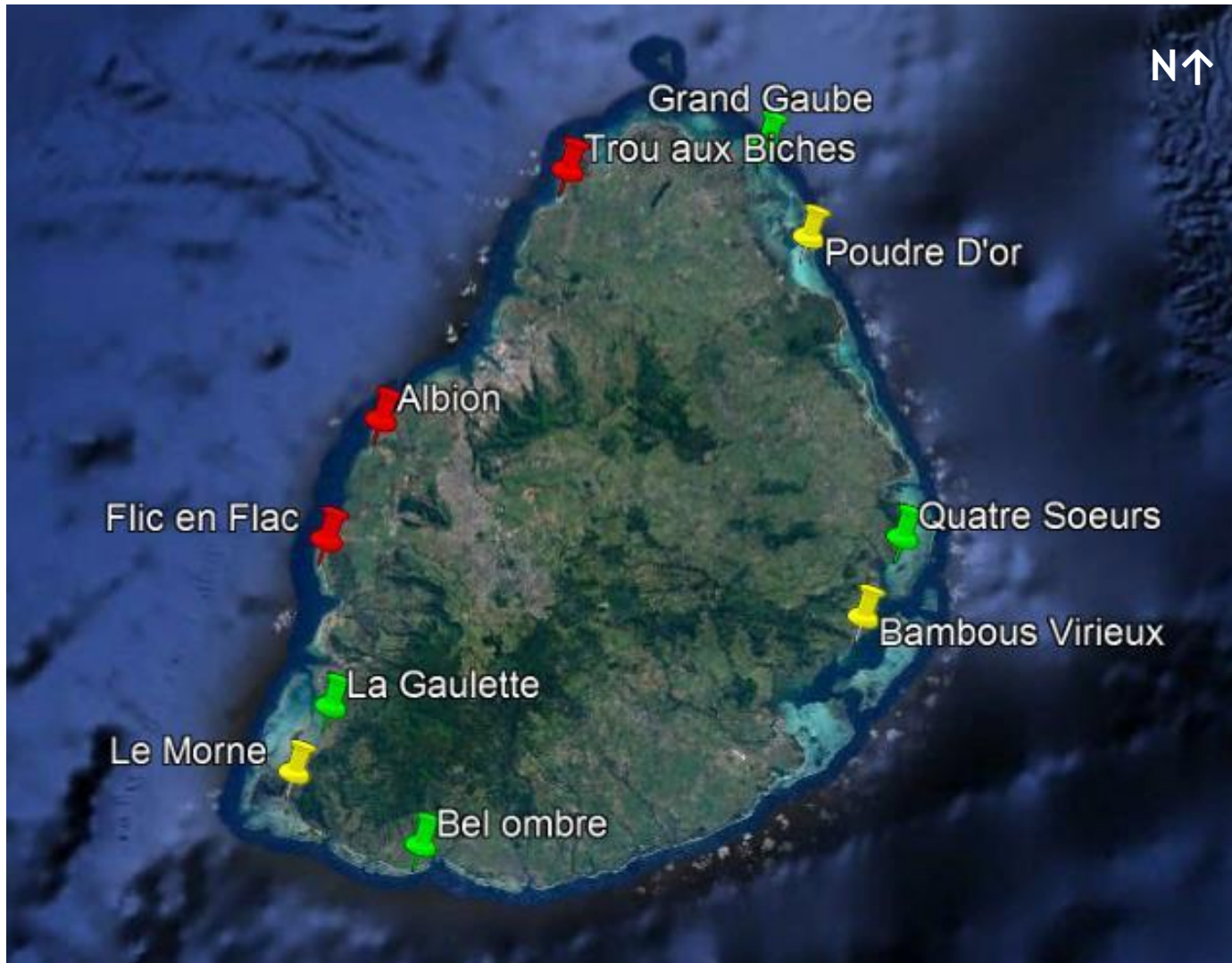
Fact file: Established "Demo coral farms"

Site	No. of nursery units	No. of coral fragments	Coral species under culture
Abblon	3	~3000	<i>Acropora aculeata</i> , <i>A. muricata</i> , <i>A. latitans</i> , <i>Heliopora coralloides</i> , <i>Mitopus spicatus</i> , <i>Pocillopora damicornis</i> , <i>Porolithothamnion</i> , <i>Porolithothamnion</i> , <i>Porolithothamnion</i> , <i>Porolithothamnion</i> , <i>Porolithothamnion</i> , <i>Porolithothamnion</i>
La Gaulette	3	~1400	<i>Acropora</i> , <i>A. muricata</i> , <i>A. latitans</i> , <i>Magnussonia</i> , <i>Pocillopora</i> , <i>Porolithothamnion</i>
Quatre Soeurs	3	~1600	<i>Acropora</i> , <i>A. muricata</i> , <i>A. latitans</i> , <i>Magnussonia</i> , <i>Pocillopora</i> , <i>Porolithothamnion</i> , <i>Porolithothamnion</i>
Grand Gaube	3	~1400	<i>Acropora</i> , <i>A. muricata</i> , <i>A. latitans</i> , <i>Magnussonia</i> , <i>Pocillopora</i> , <i>Porolithothamnion</i>



Mean percentage (%) survivorship for nursery-grown corals at Abblon, La Gaulette, Quatre Soeurs and Grand Gaube (Data from Oct-17 to Feb-19 for Abblon, Mar-18 to Mar-19 for La Gaulette and Quatre Soeurs, and May-19 for Grand Gaube) (n=200-800) (Demo farm at Bel Ombre will be set up in Jul-19)

Proposed Project



Red: MOI experimental sites (2008-2014)

Green: Community-based reef rehabilitation is currently being implemented (2017-2020)

Yellow: Earmarked coastal villages for implementation of the proposed project

Location and sites for coral reef restoration efforts in Mauritius

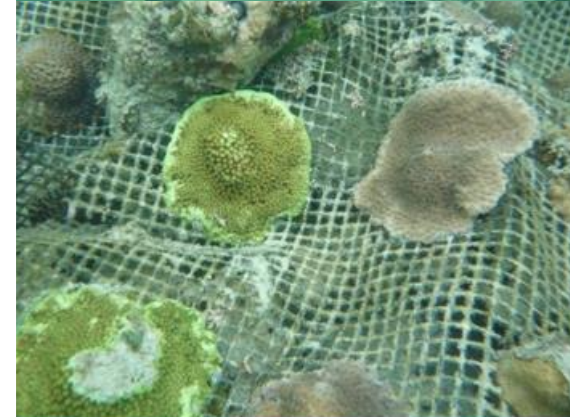
Proposed Project

Overall objective:

- To mitigate the impact of climate change on coastal communities by implementing coral reef restoration initiatives using selected resilient corals

Immediate objectives:

- To set-up of sea-based demonstration farms for culture of selected resilient corals for rehabilitation of degraded reef sites
- To train stakeholders and coastal communities in coral culture and reef rehabilitation techniques hence providing additional skills to the communities
- To strengthen environmental awareness of the community, to emphasize the significance and conservation aspects of corals and coral reefs



Project Partners



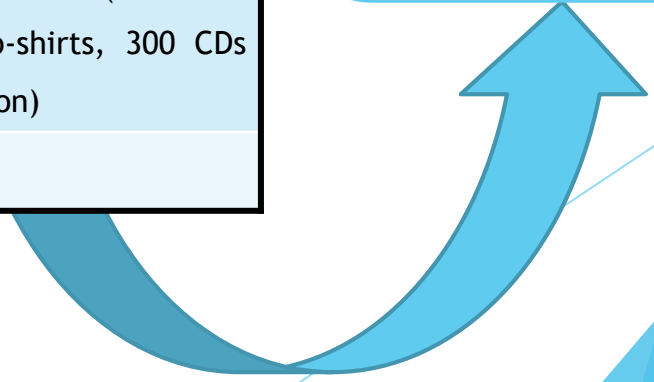
<u>Partner Name</u>	<u>Mandate</u>	<u>Role in the project</u>	<u>Resources partner will provide</u>
MOI	Coordinate research and development activities related to Oceanography	Lead agency Coordinator Implementing body	Human resource Technical expertise Training to stakeholders Sensitisation programme
AFRC	Undertake applied research, development and management activities related to fisheries	Collaborator	Human resource Technical expertise
NGOs	Mandate will depend on type and location of NGOs	Collaborator Liaison between project partners and coastal communities	Support during training and sensitisation programme
Ministry of Social Security, National Solidarity and Environment and Sustainable Development (MSSNSESD)	Promote and enhance social protection and national solidarity	Support	Venue for classroom lectures
National Coast Guards (NCG)	Surveillance and safeguard of the EEZ territorial waters of Mauritius and provide assistance to all seafarers of the nation	Support	Assistance during field sessions
Fisheries Protection Service (FPS)	Control fishing activities in the EEZ territorial waters of Mauritius.	Support	Assistance during field sessions
Registered Fishermen Associations (RFA) (site-specific)	Ensure welfare of registered fishermen and their families	Support	Liaison between project partners and fishers

Expected results

<u>Expected outputs</u>	<u>Monitorable/Measurable Milestones</u>
Established sea-based farms	One (1) DEMO coral farm established at each site, with each farm comprising three (3) nursery units harbouring a total of 2500 aquacultured resilient coral nubbins per site
Trained work-force in the field of coral culture and reef rehabilitation	15 participants trained at each project implementation site
Trained eco-guides	At least 3 trained eco-guides per site
Restoration of reef ecosystem services through rehabilitation of degraded reef sites.	At least 200m ² of degraded reefs rehabilitated at each site
Sensitisation of public at large and promotion of environmental stewardship among fishers and local communities.	At least 1000 members of the public sensitised about the project Availability of sensitisation materials (i.e. 1000 flyers, 100 booklets, 100 polo-shirts, 300 CDs with movie on Reef Rehabilitation)
Dissemination of results	Final Project Report

Trained work-force for Mauritius

- ✓ On-going activities:
Training of trainers
- ✓ Future initiatives:
AFB-UNDP funded Coral Restoration Mau-Sey collaborative Project (10M USD)



Project's Budget

List of activities		Budget
1	Sensitisation and awareness raising	3,900.00
	Awareness raising/sensitisation programme islandwide (in collaboration with NGOs)	In kind
	Logistics (Transport of sensitisation materials, staff travel etc.)	In kind
	Procurement of materials for sensitisation for training (i.e. booklets, flyers, polo-shirts etc.)	3,900.00
2	Registration of participants under the CCTP	In kind
	Organisation of registration workshops	In kind
	Logistics (Transport of sensitisation materials, staff travel etc.)	In kind
3	Set up, monitor, maintain and manage demo sea-based farms	9,600.00
	Procurement of materials for nursery construction (3 coral farms comprising 12 nursery units for culture of 12,000 coral nubbins)	2,800.00
	Construction of nursery units (12 units)	In kind
	Site selection for farm set-up:	In kind
	(i) Lagoon survey for physico-chemical parameters (bathymetric survey, current, water quality analyses amongst others)	
	(ii) Benthic surveys for identification of donor colonies (identification of resilient species)	
	Set up of nursery units/coral farms at sea (incl. logistics, boat rental)	1,300.00
	Farm maintenance and management (incl. logistics, boat rental)	5,500.00
	Coral growth and survival monitoring	In kind
4	Restoration of degraded sites	5,420.00
	Procurement of materials for creation of coral gardens	1,400.00
	Transplantation of nursery-grown corals (incl. logistics, boat rental)	1,300.00
	Coral gardens maintenance and management (incl. logistics, boat rental)	2,720.00
	Coral growth and survival monitoring	In kind
5	Training of CCTP-participants as follows:	51,080.00
	Theoretical training (i.e. lectures and classroom courses)	In kind
	Training in coral farm set up, management, monitoring & maintenance, coral pruning, coral propagation and creation of coral gardens	In kind
	Certification in snorkelling	4,350.00
	Snorkeling equipment for participants	8,600.00
	Stipend for registered participants (@\$28US/month) for 45 participants for 21 months	26,460.00
	Logistic costs for 2 staff from NGO to deliver classes, talks and training for 21 months	8,820.00
	Insurance cover for registered participants (60 participants for 21 months)	2,850.00
	Formation of eco-guides	In kind
6	Dissemination of results/findings	In kind
	Final report write-up	
TOTAL		70,000.00

The background of the slide is a vibrant underwater scene of a coral reef. The water is clear and blue, with sunlight filtering through. The reef is covered in various types of coral, including yellow and orange branching corals. A large school of silver fish is swimming in the middle ground, and a single yellow-striped fish is visible in the foreground on the left.

THANK YOU