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**Third Project Steering Committee  
Meeting for the WIOSAP Project and  
First Project Steering Committee meeting  
for the SAPPHIRE project**

*25-27 June 2019*

*Durban, South Africa*

**THIRD PSC MEETING FOR WIOSAP PROJECT: SESSION Vc -  
PROJECT PROPOSAL ON CORAL CULTURE FOR SMALL SCALE  
REEF REHABILITATION IN MAURITIUS**

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## **UNITED NATIONS ENVIRONMENT PROGRAMME**

### **WIOSAP FULL PROPOSALS TEMPLATE**

<b>Call title</b>	Implementation of the Strategic Action Programme for the protection of the Western Indian Ocean from land-based sources and activities (WIO-SAP)
<b>Participating countries</b>	Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa, Tanzania [and France (not project beneficiary)]
<b>Executing organization</b>	Nairobi Convention Secretariat
<b>Duration of demo projects</b>	2 years
<b>Stage of the call</b>	Full proposals
<b>Submission dateline</b>	5 <sup>th</sup> March 2019

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## INSTRUCTIONS

<b>Organisation Name</b>	Mauritius Oceanography Institute (MOI)
<b>Project Title</b>	Coral culture for small scale reef rehabilitation in Mauritius
<b>Address</b>	Avenue des Anchois, Morcellement de Chazal, Albion, Mauritius
<b>Website</b>	<a href="http://moi.govmu.org/">http://moi.govmu.org/</a>
<b>Contact Person</b>	<p>Name: MOOTHYEN PILLAY Ruby (Director)</p> <p>Telephone: 2060560</p> <p>Mobile phone: +230 57298808</p> <p>Email: rubykm@moi.intnet.mu</p> <p>Name: BACHA GIAN Suraj (Research Scientist)</p> <p>Telephone: 2060560</p> <p>Mobile phone: +230 57871611</p> <p>Email: sbachagian@moi.intnet.mu</p>
<b>Registration Details</b>	<p>Type of organisation: Parastatal body</p> <p>Country: Republic of Mauritius</p> <p>Year: Established in January 2000 by the proclamation of the MOI Act (Act No. 24 of 1999).</p>

### **Executive Summary:**

Over the past decade, the Mauritius Oceanography Institute (MOI) has successfully developed and optimised locally adapted techniques for culture of corals on-land and at sea for conservation purposes. Building on these results, the MOI recently initiated in 2017, a community based coral culture project in the Republic of Mauritius. This three-year project which falls under the budgetary measures aims at training and building capacity of coastal communities (including fishers) in coral culture and reef rehabilitation techniques. The project also coincides with the Government initiative of “*Promoting coral culture as an alternative livelihood for fisherman and coastal communities for conservation of marine biodiversity*”. Currently the project is implemented at four sites around the island, with approximately 110 community members benefiting from training under a “Coral Culture Training Programme”. The project which is expected to be completed by end 2020, will be extended until 2022 through acquisition of funding through the WIO-SAP grant. The 2-year extension of the project will be for implementation of project activities at three additional earmarked sites around Mauritius, with targeted training of additional 60 community members.

The project which will be an extension of MOI’s on-going community-based coral culture project will be implemented through the following actions:

- a) The setting up of a demo sea based coral farm for culture of selected resilient coral species and some selected locally rare/threatened species
- b) Training of the coastal communities on coral culture and reef restoration techniques
- c) Transplantation of farmed corals to coral gardens in view to restore reef ecosystem services
- d) The development of sensitisation programmes on the marine environment and coral farming programme

This project will fundamentally contribute to the on-going national reef rehabilitation initiative through the expansion of restoration efforts at additional sites. Besides, the project will be incorporated in the MOI’s reef rehabilitation programme thus ensuring its sustainability.

## I. BACKGROUND AND JUSTIFICATION<sup>1</sup>

Coral reefs are some of the most highly productive and biologically diverse ecosystems in the world. Although covering only 0.2% of the ocean floor, reefs are believed to support an estimated 25% of all marine life (Spalding *et al.*, 2001). Besides providing home as well as feeding and nursery grounds to a huge diversity of marine organisms, coral reefs offer invaluable resources to local communities around the world, serving as sources of food, jobs and livelihoods. Presently, over 100 countries are home to coral reefs and about 275 million (M) people worldwide benefit either directly and/or indirectly from these ecosystems (Burke *et al.*, 2011). Latest estimates from NOAA and WWF (2015), suggest that reefs provide close to US\$30 billion each year in terms of economic benefits and ecosystems services.

As an island, Mauritius is almost completely encircled by ~150 m of reefs enclosing a lagoon area of ~243 km<sup>2</sup>. It possesses a rich coastal zone consisting of near shore wetlands and mangroves, lagoon coral, fringing coral reef and all their associated marine life. In Mauritius, healthy coral reefs play a critical role in the socio-economic development of the island by significantly contributing for coastal protection, fisheries and tourism. As a Small Island Developing State (SIDS), Mauritius depends largely on resources from its coral reefs. Despite their importance, the Mauritian reefs, like other reefs worldwide, are under pressure from a combination of natural and human induced impacts such as climate change, predation and other anthropogenic disturbances. Besides, recurrent bleaching events (i.e. 1998, 2003, 2004, 2009 and 2016) with increasing intensities and severities, have also contributed to the significant decrease in live coral cover registered around the island over the past decade (i.e. from 50% in 2002 to around 20% in 2016) (GCRMN, 2017).

In response to this continuous reef degradation, the Mauritius Oceanography Institute (MOI) initiated a Coral Culture Project in 2008. The project was developed to study the feasibility of culturing corals in land- and sea- based nurseries. During implementation of the project, selected coral species (including fast growing species, bleaching resistant species/strains, rare threatened species and some ornamental species) were cultured in both nurseries. Most species grew well in both nurseries with results on coral growth rate comparable to growth rates recorded in other countries. Overall, the results from this study indicated that coral culture was possible for various species and these could be used for conservation initiatives (i.e. protection of local biodiversity and rehabilitation of degraded reef sites).

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- (1) Spalding, M.D., Ravilious, C., Green, E.P. (2001) *World Atlas of Coral Reefs*. Prepared by the UNEP-World Conservation Monitoring Centre. University of California Press, Berkeley, USA
  - (2) Burke L, Reytar K, Spalding M, Perry A (2011) *Reefs at risk revisited*. World Resources Institute, Washington, DC. 130p
  - (3) WWF Global (World Wide Fund for Nature) Last accessed: August 21, 2015 [http://wwf.panda.org/about\\_our\\_earth/blue\\_planet/coasts/coral\\_reefs/coral\\_importance](http://wwf.panda.org/about_our_earth/blue_planet/coasts/coral_reefs/coral_importance)
  - (4) Global Coral Reef Monitoring Network, *Coral reef status report for the Western Indian Ocean* (2017)

Building on these results, the MOI initiated in a Small Scale Reef Rehabilitation Programme in 2012. At three sites around the island, the “Coral Gardening Concept/Reef Gardening Technique” was adapted to local conditions for mass culture of selected coral species in locally-adapted multi-layered rope nurseries prior to transplantation to recipient reef sites either on natural substrates or on locally-adapted artificial reef rehabilitation modules (ARRMs). Approximately 11,000 small nursery-grown coral colonies were transplanted to recipient reef sites covering an area of 800m<sup>2</sup> during this trial phase. Most aqua-cultured species grew well in nurseries as well as after transplantation, with high coral survival rates (> 70%) recorded at rehabilitated sites. During this trial phase, the MOI has also been involved in transfer of acquired know-how to various stakeholders including the NGO ELI-Africa and volunteers from the local community. Such a project was implemented at Trou aux Biches and was funded through the GEF-SGP programme of the UNDP.

In 2017, the MOI in collaboration with the Albion Fisheries Research Centre, (AFRC), both under the aegis of the Ministry of Ocean Economy, Marine Resources, Fisheries and Shipping (MOEMRFS) initiated a “Community based coral culture project in the Republic of Mauritius”. This three year project aims at training and capacity building of coastal communities in coral culture and reef rehabilitation techniques hence providing additional skills to the communities. The project which coincides with the Government initiative of “*Promoting coral culture as an alternative livelihood for fisherman and coastal communities for conservation of marine biodiversity*”, is currently being implemented at four locations around the island. At these sites, awareness raising programmes are being undertaken for sensitisation of defined stakeholders, local communities and the public at large. Till date, a total of 110 participants comprising mainly coastal community members and fishers (i.e. 85% male and 15% female) have registered under a “Coral Culture Training Programme” (CCTP). These participants are currently being trained in set-up, maintenance, monitoring and management of DEMO sea-based coral farms and coral gardens. Training of CCTP-participants is through theoretical classroom courses and hands-on practical/field sessions at sea. Throughout the project, CCTP-participants are provided with the necessary course materials (i.e. booklets, flyers etc.) and field accessories (i.e. snorkeling sets, protective field equipment etc.). Apart from benefiting from a monthly stipend of \$40US, CCTP-participants are also provided with additional training in snorkelling, PADI-Emergency First Responder (EFR) and advanced training as eco-guides. By 2020, the expected outputs from this national project will be as follows:

- a) A trained work-force in the field of coral culture and reef rehabilitation (i.e. with > 100 CCTP-participants trained and at least 30 participants trained eco-guides)
- b) Provision of alternative livelihoods to fishers and coastal communities
- c) Restoration of reef ecosystem services through rehabilitation of degraded reef sites (i.e. 12,000 small coral colonies transplanted to coral gardens)
- d) Sensitisation of public at large (i.e. > 3000 members) on the importance of the marine environment including coral reef ecosystems.

From past experience gathered through successful implementation of coral culture projects and reef rehabilitation initiatives from 2008 to-date, for the WIOSAP project, the MOI proposes to undertake demo small scale reef rehabilitation at selected sites around the island through the implementation of the following actions:

- e) The setting up of a demo sea based coral farm and coral garden
- f) Training of the coastal communities on coral culture and reef restoration techniques
- g) The development of sensitisation programmes on the marine environment and coral farming programme

Based on an island-wide sensitisation survey undertaken in 2017, several locations have been earmarked as potential sites for implementing community-based coral restoration projects. Presently, reef restoration efforts are being implemented at four of the potential sites (namely La Gaulette, Quatre Soeurs, Bel Ombre and Grand Gaube from the West, East, South and North regions respectively) (Fig.1). However, additional reefs sites also require urgent need for restoration.

Through the proposed project, community-based coral rehabilitation efforts will be undertaken at three sites (i.e. primarily at coastal villages: Le Morne, Poudre D'Or and Bambous Virieux) (Fig.1). At these sites, resilient coral species and some selected locally rare/threatened species will be mass cultured in locally-adapted multi-layered rope nurseries prior to transplantation to recipient degraded reef sites. Farm and coral garden set-up, monitoring, maintenance and management will be undertaken by trained community members. The project will fundamentally contribute to the on-going national reef rehabilitation initiative through the expansion of restoration efforts at the three selected sites.

The proposal which falls under “Component A (Sustainable management of critical habitats)” of the Western Indian Ocean-Strategic Action Programme (WIO-SAP), will contribute to “Output A.1.3 (Key degraded critical coastal habitats restored and resilience increased)” through the rehabilitation of degraded coral reef sites with resilient species. The project which is partly an extension of MOI’s on-going community-based coral culture project will also comprise a technology-transfer component with the training of additional stakeholders (i.e. coastal communities, fishers, hoteliers, volunteers, students amongst others) on coral culture and reef rehabilitation techniques.

## II. PARTNERSHIPS

<b>Partner Name</b>	<b>Mandate</b>	<b>Role in the project</b>	<b>Resources partner will provide</b>
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



### III. OBJECTIVES

#### A. Overall objective

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

#### B. Immediate objectives

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

### IV. PROJECT IMPLEMENTATION AND MANAGEMENT PLAN

#### A. Expected project results and indicators

Expected outputs	Monitorable/Measurable Milestones
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 <sup>2</sup> 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

## B. Project activities and work plan

List of activities	Year 1												Year 2											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
<b>1 Sensitisation and awareness raising</b>																								
Awareness raising/sensitisation programme islandwide																								
Procurement of materials for sensitisation and training																								
<b>2 Registration of participants under the CCTP</b>																								
Registration workshops																								
<b>3 Set up, monitor, maintain and manage demo sea-based farms</b>																								
Procurement of materials for nursery construction																								
Construction of nursery units																								
Set up of nursery units/coral farms at sea																								
Farm maintenance and management																								
Coral growth and survival monitoring																								
<b>4 Restoration of degraded sites</b>																								
Procurement of materials for creation of coral gardens																								
Transplantation of nursery-grown corals to degraded sites																								
Creation of coral gardens																								
Coral gardens maintenance and management																								
Coral growth and survival monitoring																								
<b>5 Training of CCTP-participants as follows:</b>																								
Theoretical training (i.e. lectures and classroom courses)																								
Training in coral farm set up, management, monitoring & maintenance, coral pruning, coral propagation and creation of coral gardens																								
Training and certification in snorkelling &EFR																								
Formation of eco-guides																								
<b>6 Dissemination of results/findings</b>																								
Final report write-up																								

### C. Project Beneficiaries

Project beneficiaries include:

Project partners (incl. MOI, AFRC, NGO etc.)	<ul style="list-style-type: none"> <li>Increased visibility at the national and regional level</li> </ul>
Coastal communities: At least 45 coastal community members (50% male + 50% female)  10 eco-guide  2 boat operators per site	<ul style="list-style-type: none"> <li>Alternative livelihoods to trained coastal communities such that trained fishers/coastal communities could eventually offer coral culture/coral gardening services to various stakeholders e.g. hoteliers, the Real Estate Scheme (RES), the Integrated Resort Scheme (IRS) etc.</li> <li>Alternative source of income through paid visits to established sea-based farms or coral gardens (guided visits by eco-guides).</li> <li>Increased income to glass-bottom operators through increased trips to coral gardens</li> </ul>
WIO Region countries	<ul style="list-style-type: none"> <li>Lessons learnt, recommendations, case study from Mauritius in “community-based coral culture for alternative livelihoods”.</li> </ul>
Marine environment	<ul style="list-style-type: none"> <li>Degraded reef sites rehabilitated with aqua-cultured corals.</li> <li>Coral reef ecosystem services restored.</li> <li>General public sensitised (promotion of environmental stewardship among fishers and local communities).</li> </ul>

### D. Implementing agency management of project

*Already elaborated in Section II. “PARTNERSHIPS” of this document. Please refer to Page 5*

### V. PROJECT METHODOLOGY

**Site selection:** Based on an island-wide sensitisation survey undertaken in 2017, several locations have been earmarked as potential sites for implementing community-based coral restoration projects. Three sites, namely Le Morne, Poudre D’Or and Bambous Virieux have been selected for implementation of the proposed project (Fig.1). Apart from being coastal villages, lagoons from these three sites also require urgent need for restoration.

**Identification of suitable sites for demo farm set up and creation of coral gardens:** At each coastal villages, lagoons will be surveyed for their bathymetric profiles (depth eco-sounder), benthic topography (SCUBA diving/snorkeling, visual assessment, underwater photography) and physico-chemical properties (i.e. salinity, pH, turbidity, PAR, current pattern, temperature) including nutrient analyses (i.e. sample collection for nitrates, nitrites, phosphates, silicate, calcium levels amongst others). Sites will also be for presence/absence of coral predators, and approximate extent of free-space available for nursery set up/creation of coral gardens.

**Identification of sites with donor coral colonies:** For identification of sites with donor colonies, selected sites will be surveyed by SCUBA diving/snorkeling for visual identification of healthy coral colonies. Coral cover and species composition at those sites will be assessed through standard point intercept/line transect and video transect methods.

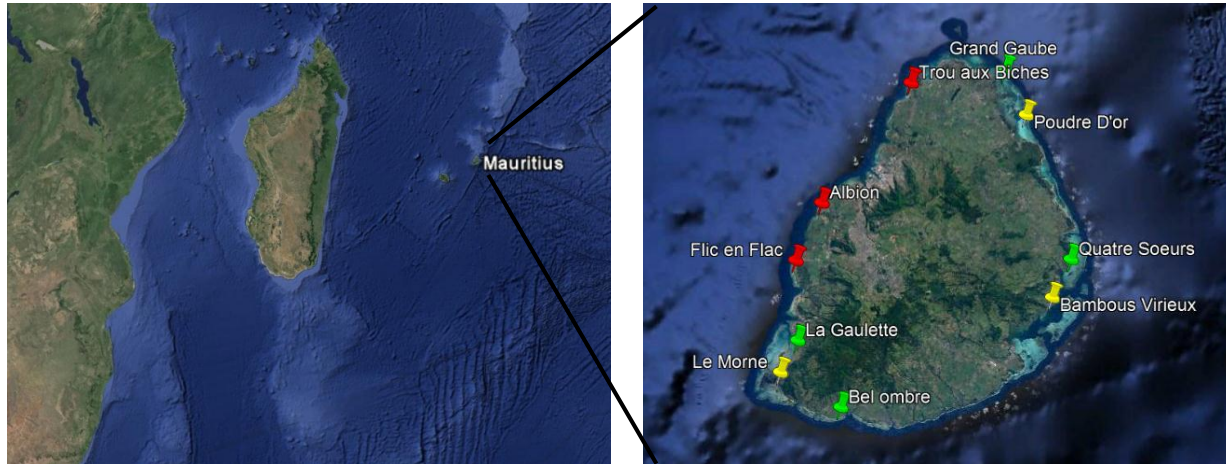


Figure 1: Satellite imagery showing Mauritius location and sites for coral reef restoration efforts, red place-marks representing MOI experimental sites (2008-2014), green place-marks representing sites where community-based reef rehabilitation is currently being implemented (2017-2020) and yellow place-marks representing selected earmarked coastal villages for implementation of the proposed project (Source: Google Earth 2016).

Coral culture and reef rehabilitation: Resilient coral species and some selected locally rare/threatened species will be mass cultured in locally-adapted multi-layered rope nurseries (Fig.2-3) prior to transplantation to recipient degraded reef sites/coral gardens (Fig.4). Farm and coral garden set-up, monitoring, maintenance and management will be undertaken by trained community members.

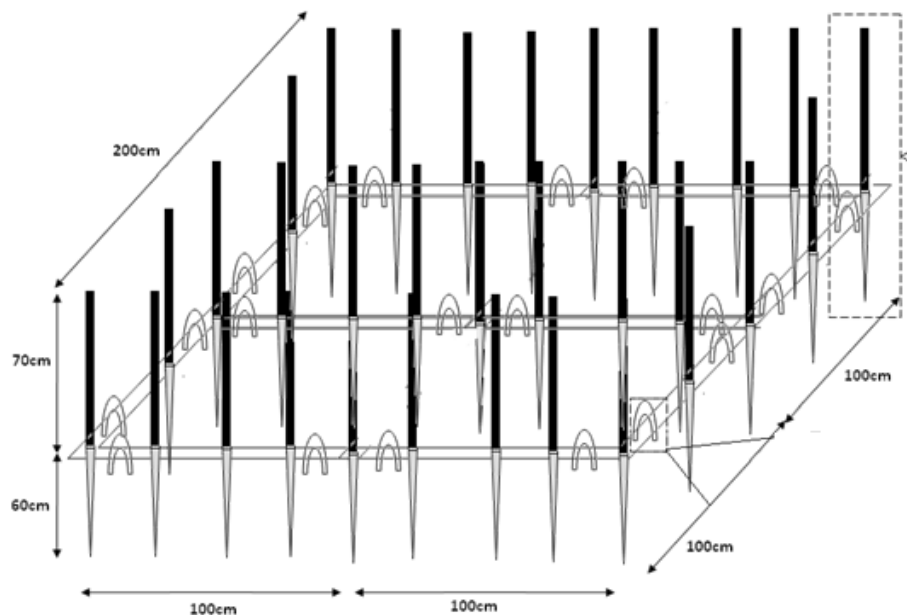


Figure 2: Diagrammatic representation of the MOI's multi-layered nursery type I constructed and deployed at the selected site for nursery set up



Figure 3: MOI's multi-layered nursery set up at Quatre Soeurs (2018)

MOI's designed multi-layered nursery covers an area of 4m<sup>2</sup>. It consists of 27 sharpened iron stakes of length 1.30 m moulded with concrete into PVC pipes of length 70 cm. These iron stakes are firmly anchored into the substrate at selected nursery sites. On these iron stakes, ski ropes of length 2.50 m are stretched uniformly on which fragments from selected coral species are attached. One nursery unit can hold approximately 800 coral fragments.

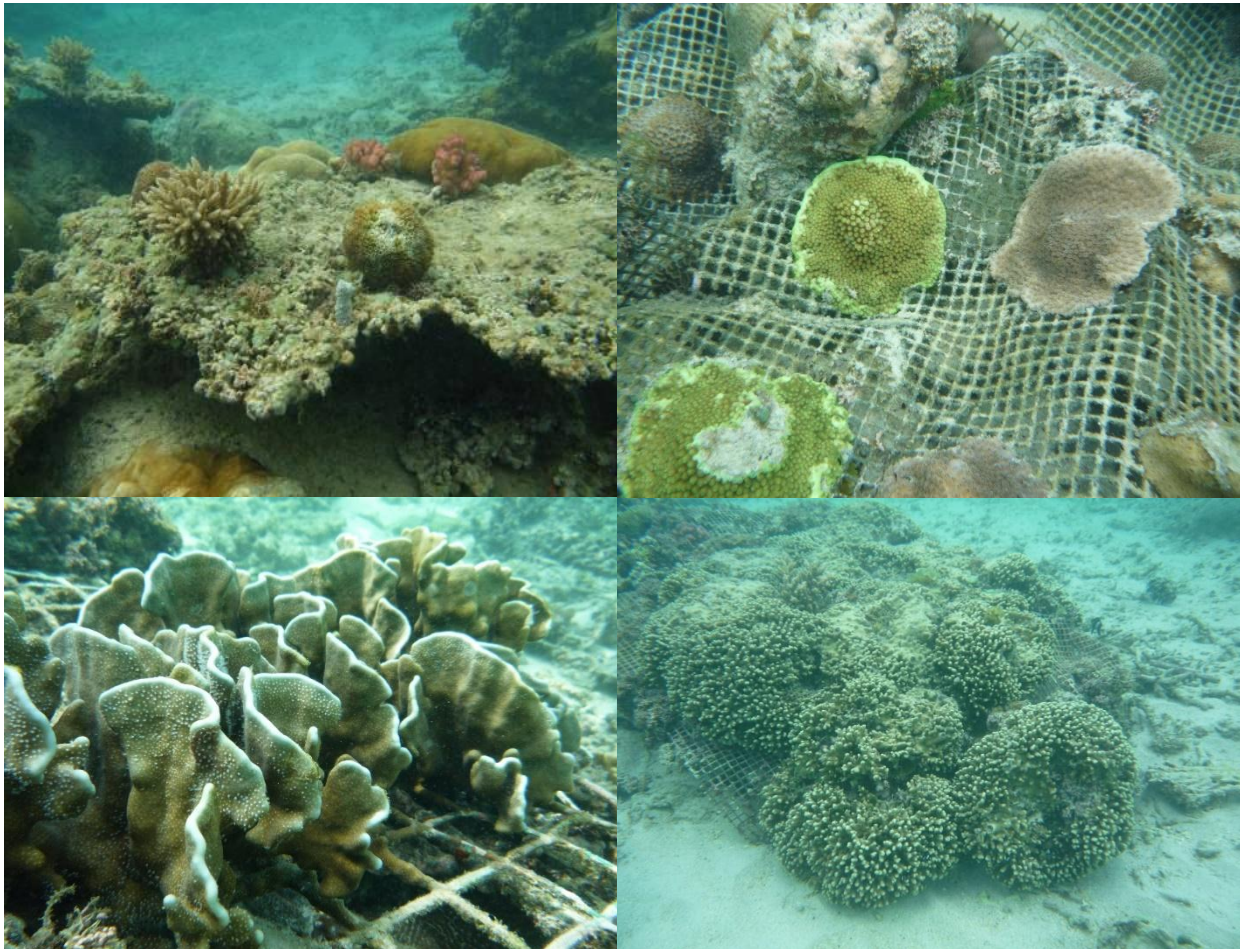


Figure 4: MOI's experimental coral gardens set up at Albion (2014)

For rehabilitation of degraded sites (i.e. creation of coral gardens), nursery-grown corals will be transplanted to both natural and artificial substrates. Natural substrates include dead tabular coral skeleton whereas artificial substrates include plastic nets. Locally adapted artificial reef rehabilitation modules (ARRMs), designed and tested by MOI will be used for the transplantation of nursery grown corals. ARRM (Fig.5) are built from dead tabular coral skeletons and rubble stacked under a plastic net and anchored on the sea floor using U-shaped iron bars. Depending on species under culture in the multi-layered rope nurseries, different rope lengths will be cut off and tied to the plastic nets on ARRM using plastic cable ties.

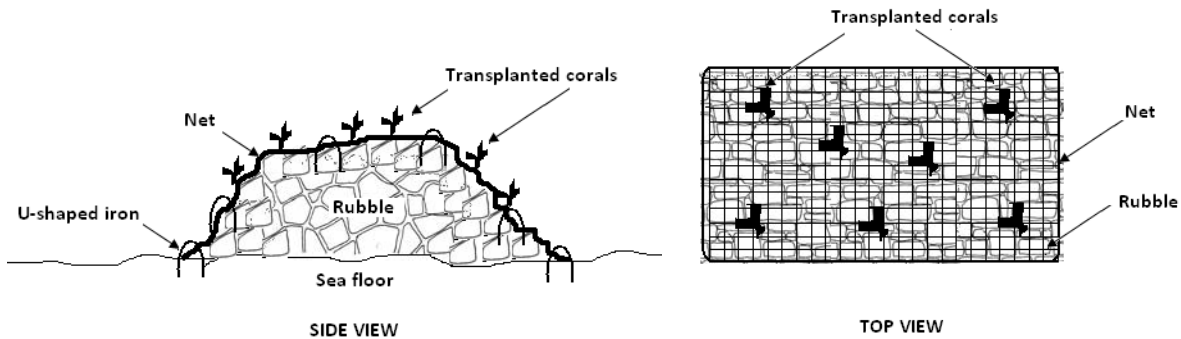


Figure 5: Diagrammatic representation of the MOI's locally adapted ARRM

Corals under culture in nurseries and after transplantation to coral gardens will be monitored for their survival rates on a monthly basis. Selected coral fragments (tagged with a unique code) will also be monitored for their growth rates. Digital photography and Image analysis software (Scion Image Alpha 4.0.3.2) will be used to calculate the linear extension (mm/year) of tagged coral fragments (Moothien Pillay *et al.*, 2012)

Training of participants: At each site, approximately 20 participants will be registered under a “Coral Culture Training Programme” (CCTP). These participants will be trained in construction and set up of demo sea-based coral farms for culture selected coral species, creation of demo coral gardens, maintenance, management and monitoring of culture farms and coral gardens. Besides, trainees will benefit from basic training in snorkeling and EFR, and advanced training as eco-guides. Throughout the project, trainees will be provided with the necessary equipment which include booklets for classroom lectures, and snorkeling/protective equipment for undertaking sea-based activities. Trainees will also be covered under a suitable an insurance policy. CCTP trainees will be involved in the project up to a maximum of 2-days per month, which may include lecture classes (at village halls and community centres) and field sessions at earmarked lagoon sites (i.e. at demo farms and coral gardens).

Awareness raising/sensitisation strategy: A sensitisation programme which is expected to be implemented during the whole duration of the project will include distribution of sensitisation materials (i.e. flyers and posters), delivery of talks/presentations in social welfare centres and schools, a short video clip on the project and dissemination of results during the celebration of World Ocean Day at MOI and through display of poster/video clip at WIOMSA symposia.

(1) Moothien Pillay R., Bacha Gian S., Bhojroo V. and Curpen S. (2012) *Adapting Coral Culture to Climate Change: The Mauritian Experience. Western Indian Ocean J. Mar. Sci. Vol. 10, No. 2, pp. 155-167, 2012*

## **VI. SUSTAINABILITY AND REPLICABILITY**

The project which will be an extension of MOI's on-going community-based coral culture project will fundamentally contribute to the national reef rehabilitation initiative through the expansion of restoration efforts at additional sites. Besides, the project will be incorporated in the MOI's reef rehabilitation programme which will ensure its sustainability. Through the formation of eco-guides and "coral gardeners", the trained fishers/coastal communities could set up cooperatives or offer coral culture/coral gardening consultancy services to various stakeholders including hotels. Likewise, NGOs in collaboration with trained "coral gardeners" could help in the formulation of project proposals for seeking further funding for implementation of reef rehabilitation initiatives at a small or even a large scale. Such a project could also have the potential for replication in the region as a community based project, with the possibility to tap-in external funding available on the regional and/or international level (i.e. the MASMA grants programme from WIOMSA, Green Climate Fund GCF fund within the framework of the UNFCCC, WIO-SAP funds under the Nairobi Convention, amongst others).

## **VII. PROJECT MONITORING AND EVALUATION**

Scientific projects at the MOI (i.e. may it be Government's funded project or externally funded projects) are regularly monitored, assessed and evaluated on a quarterly basis by the MOI's Board of Directors through the Research Advisory Council (RAC) committee. Quarterly progress reports are submitted to the MOI management for monitoring project operations to ensure that project-planned activities are achieved in a timely manner. Consequently, for proper project implementation, the proposed project will be monitored through the same mechanism at the MOI. This will ensure that activities occur as planned and that they remain directed towards stated objectives. Likewise, the assessment of the progress report by MOI's RAC committee will help in taking appropriate corrective actions if required.

## VIII. BUDGET

List of activities		Budget
<b>1</b>	<b>Sensitisation and awareness raising</b>	<b>3,900.00</b>
	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
<b>2</b>	<b>Registration of participants under the CCTP</b>	<b>In kind</b>
	Organisation of registration workshops	In kind
	Logistics (Transport of sensitisation materials, staff travel etc.)	In kind
<b>3</b>	<b>Set up, monitor, maintain and manage demo sea-based farms</b>	<b>9,600.00</b>
	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: (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)	In kind
	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
<b>4</b>	<b>Restoration of degraded sites</b>	<b>5,420.00</b>
	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
<b>5</b>	<b>Training of CCTP-participants as follows:</b>	<b>51,080.00</b>
	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
<b>6</b>	<b>Dissemination of results/findings</b>	<b>In kind</b>
	Final report write-up	In kind
	<b>TOTAL</b>	<b>70,000.00</b>



## Annex1: Work-plan

Task	Activity	Responsible	Year 1												Year 2											
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
<b>Overall objective:</b> To mitigate the impact of climate change on coastal communities by implementing coral reef restoration initiatives using selected resilient corals																										
Outcome 1.0		Ecosystem services restored at selected sites																								
Output 1.1		Area of degraded sites restored at each site																								
Activity 1.1.1	Procurement activities	MOI																								
Activity 1.1.2	Survey for identification of sites for farm set up, creation of coral gardens	MOI, AFRC, CCTP-trainees																								
Activity 1.1.3	Farm construction, set up, maintenance, management, monitoring	MOI, AFRC, CCTP-trainees																								
Activity 1.1.4	Creation of coral gardens	MOI, AFRC, CCTP-trainees																								
Activity 1.1.5	Coral growth and survival monitoring	MOI																								
Outcome 2.0		Knowledge gained and labour force in coral reef restoration created in Mauritius																								
Output 2.1		Number of community members trained at each site																								
Activity 2.1.1	Registration and inception workshops	MOI, AFRC, RFA																								
Activity 2.1.2	Procurement of materials for sensitisation and training	MOI																								
Activity 2.1.3	Theoretical training (classroom lectures)	MSSNSESD, MOI, AFRC																								
Activity 2.1.4	Practical/field sessions; training at sea	MOI, AFRC, NCG, FPS																								
Activity 2.1.5	Training in snorkeling/EFR	MOI, Dive centre																								
Activity 2.1.6	Formation of ecoguides	MOI, AFRC, NGOs																								
Outcome 3.0		Stewardship towards environmental awareness promoted among general public																								
Output 3.1		Number of people sensitised throughout the project																								
Activity 3.1.1	Awareness raising/sensitisation programme islandwide	MOI, AFRC, NGOs																								
Activity 3.1.2	Dissemination of results/findings	MOI, AFRC, NGOs																								

## Annex 2: Logical Framework

<b>Project title:</b> Coral culture for small scale reef rehabilitation in Mauritius				
<b>Project overall objective:</b> To mitigate the impact of climate change on coastal communities by implementing coral reef restoration initiatives using selected resilient corals				
Project Results	Outputs	Activities		Costs /output (US\$)
<b>Outcome 1.0:</b> Ecosystem services restored at selected sites	O.1.1 Area of degraded sites restored at each site	A.1.1.1	Procurement activities	15,020.00
		A.1.1.2	Survey for identification of sites for farm set up, creation of coral gardens	
		A.1.1.3	Farm construction, set up, maintenance, management, monitoring	
		A.1.1.4	Creation of coral gardens	
		A.1.1.5	Coral growth and survival monitoring	
<b>Outcome 2.0:</b> Knowledge gained and labour force in coral reef restoration created in Mauritius	O.2.1 Number of community members trained at each site	A.2.1.1	Registration and inception workshops	51,080.00
		A.2.1.2	Procurement of materials for sensitisation and training	
		A.2.1.3	Theoretical training (classroom lectures)	
		A.2.1.4	Practical/field sessions; training at sea	
		A.2.1.5	Training in snorkeling/EFR	
		A.2.1.6	Formation of ecoguides	
<b>Outcome 3.0:</b> Stewardship towards environmental awareness promoted among general public	O.3.1 Number of people sensitised throughout the project	A.3.1.1	Awareness raising/sensitisation programme islandwide	3,900.00
		A.3.1.2	Dissemination of results/findings	

### Annex 3: Project Monitoring Plan

<b>Project title:</b> Coral culture for small scale reef rehabilitation in Mauritius			
<b>Project overall objective:</b> To mitigate the impact of climate change on coastal communities by implementing coral reef restoration initiatives using selected resilient corals			
<b>Project Results</b>	<b>Indicator</b>	<b>Target/baseline</b>	<b>Method</b>
<b>Outcome 1.0:</b> Ecosystem services restored at selected sites	IND.1.1: Set up of demo farm at each site	Target: 1 demo farm comprising at least 3 nursery units (with approx. 2,500 coral fragments) at each earmarked site Baseline: No farm exists at earmarked sites	Culture of selected coral species in MOI's locally-adapted multi-layered rope nurseries for a period of 12-14 months
	IND.1.2: Area of degraded sites restored at each site	Target: At least 200 sq. m of degraded reef restored with approx. 1,750 nursery-grown corals at each site Baseline: No restoration efforts have been previously implemented at the earmarked sites	Creation of coral gardens through transplantation of nursery-grown coral colonies to either natural and/or artificial substrates (MOI's locally adapted ARRMs)  Note: With an expected coral survival rate of 70%, approx. 1,750 nursery-grown coral colonies will be available for transplantation at
<b>Outcome 2.0:</b> Knowledge gained and labour force in coral reef restoration created in Mauritius	IND.2.1: Number of community members trained at each site	Target: At least 15 participants registered under the CCTP and trained at each earmarked site Baseline: CCTP training has never been provided at the earmarked sites	Inception workshops for identification of potential trainees for registration under the CCTP.  Community members to register under the CCTP by signing an agreement form.
		Target: At least 25 training sessions (incl. classroom lectures and field/hands-on practicals) delivered at each earmarked site Baseline: 0 training sessions delivered at the earmarked sites	At least 10 classroom lectures and 15 practical/field sessions will be delivered at each earmarked site for training of CCTP-trainees in coral biology, coral pruning, nursery construction, set up, maintenance, management and monitoring, creation of coral gardens, maintenance, management and monitoring of coral gardens amongst others

### Annex 3: Project Monitoring Plan (continued)

<b>Project overall objective:</b> To mitigate the impact of climate change on coastal communities by implementing coral reef restoration initiatives using selected resilient corals			
<b>Project Results</b>	<b>Indicator</b>	<b>Target/baseline</b>	<b>Method</b>
<b>Outcome 2.0:</b> Knowledge gained and labour force in coral reef restoration created in Mauritius	IND.2.2: Number of ecoguides trained at each site	Target: Approx. 5 trainees from the CCTP trained as ecoguides at each earmarked site Baseline: No ecoguides exists at the earmarked sites	Based-on their educational background and communication skills, advance training will be provided to selected CCTP-trainees for their formation as ecoguides
	IND.2.3: Number of CCTP trainees trained in snorkeling and EFR	Target: All CCTP-trainees certified as Level 1 EFR life-savers Baseline: Community members yet to benefit from such training programmes	Training in snorkeling and EFR will be provided by a Professional Dive Instructor/Diving Centre.  The snorkeling and EFR training is mandatory under the CCTP and is a prerequisite for undertaking seabased activities
<b>Outcome 3.0:</b> Stewardship towards environmental awareness promoted among general public	IND.3.1: Number of people sensitised throughout the project	Target: At least 500 members from the general public sensitised on the importance of the marine environment including coral reef ecosystems at the earmarked sites Baseline: Reconnaissance surveys have previously been undertaken at the earmarked sites with an estimated 100 community members already sensitised	A sensitisation programme will be implemented during the whole duration of the project and will include: <ul style="list-style-type: none"> <li>• distribution of sensitisation materials (i.e. flyers and posters)</li> <li>• delivery of talks/presentations in social welfare centres and schools</li> <li>• production of a short video clip on the project</li> <li>• dissemination of results during the World Ocean Day at MOI</li> <li>• display of poster/video clip at WIOMSA symposia.</li> </ul>

#### Annex 4: Budget

No.	Category	Quantity	Unit Cost (US\$)	Total Cost (US\$)	WIOSAP Support	Co-financing	
1	Personnel	1 Research Scientist	440/month	9,240.00		MOI In-kind	
		1 Associate Research Scientist	300/month	6,300.00		MOI In-kind	
		1 Technical Assistant	214/month	4,494.00		MOI In-kind	
		45 CCTP-trainees (at least 15 trainees per site)		26,460.00	26,460.00		
		1 staff from AFRC	300/month	6,300.00		AFRC In-kind	
		2 staff from NGO	200/month	8,400.00		NGO In-kind	
2	Equipment	MOI equipment for undertaking field surveys		30,000.00		MOI In-kind	
		MOI lab equipment (incl. automated nutrient analyzer, reagents and consumables) for undertaking nutrient analyses		58,000.00		MOI In-kind	
		MOI diving/snorkeling equipment for 3 staff		7,300.00		MOI In-kind	
		Snorkeling equipment for CCTP-trainees		8,600.00	8,600.00		
		MOI underwater camera for digital photography and video clip		1,000.00		MOI In-kind	
		MOI offices		2,000.00		MOI In-kind	
		MOI laptop, projector and screen for classroom lectures		7,400.00		MOI In-kind	
3	Operating costs	Procurement of sensitisation and classroom materials (i.e. flyers, booklets etc.)		3,900.00	3,900.00		
		Insurance cover for CCTP trainees		2,850.00	2,850.00		
		Design of booklets and flyers		1,450.00		MOI In-kind	
		Preparation of classroom materials including powerpoint presentations		1,000.00		MOI In-kind	
		Venue for classroom lectures	200/month	4,200.00		MSSNSESD In-kind	
		Electricity cost	10/month	210.00		MSSNSESD In-kind	
		Additional cost for inception workshops which may include refreshments		260.00		MOI In-kind	
4	Contract Services	Procurement of materials for farm set up/creation of coral gardens		4,200.00	4,200.00		
		Procurement of services for training of CCTP-trainees in snorkeling/EFR		4,350.00	4,350.00		
5	Travel	Logistics for boat facility		10,820.00	10,820.00		
		Mileage/fuel cost for 3 MOI staff	255/month	5,355.00		MOI In-kind	
		Mileage/fuel cost 1 AFRC staff	85/month	1,785.00		AFRC In-kind	
		Mileage/fuel cost 2 NGO staff	210/month		8,820.00		
		Fuel cost for MOI van	170/month	3,570.00		MOI In-kind	
			<b>TOTAL</b>	<b>219,444.00</b>	<b>70,000.00</b>		

## Annex 4.1: Budget justification

No.	Category	Quantity	Justification
1	Personnel	1 Research Scientist	Will be involved in all activities of the project including training of CCTP-trainees, set up of demo farms, creation of coral gardens, deliver talks/classroom lectures, sensitisation programmes, field surveys and field activities amongst others
		1 Associate Research Scientist	
		1 Technical Assistant	
		1 staff from AFRC	
		2 staff from NGO	
2	Equipment	At least 45 CCTP-trainees	Will be involved in awareness raising and sensitisation programmes
		MOI equipment for undertaking field surveys	Main beneficiaries of the CCTP and will be involved in most activities of the project
		MOI lab equipment (incl. automated nutrient analyzer, reagents and consumables) for undertaking nutrient analyses	MOI equipment which will be used throughout the project will include:
		MOI diving/snorkeling equipment for 3 staff	• field equipment for undertaking field surveys for identification of suitable sites for farm set up
		MOI underwater camera for digital photography and video clip	• lab equipment for undertaking water analyses
		MOI offices	• office equipment for preparation of classroom and sensitisation materials
		MOI laptop, projector and screen for classroom lectures	• laptop, projector and screen for delivery of classroom lectures
Snorkeling equipment for CCTP-trainees	• snorkeling equipment for undertaking field/sea-based activities		
3	Operating costs	Snorkeling equipment required for CCTP-trainees to undertake sea-based activities	Snorkeling equipment required for CCTP-trainees to undertake sea-based activities
		Procurement of sensitisation and classroom materials (i.e. flyers, booklets etc.)	Tools/materials required classroom lectures and for awareness raising
		Design of booklets and flyers	
		Preparation of classroom materials including powerpoint presentations	
		Insurance cover for CCTP trainees	Insurance cover for undertaking field/sea-based activities by CCTP-trainees
		Venue for classroom lectures	For undertaking inception and registration workshops as well as classroom lectures, powerpoint presentations and sensitisation of community members and general public at large
Electricity cost			
4	Contract Services	Additional cost for inception workshops which may include refreshments	
		Procurement of materials for farm set up/creation of coral gardens	Raw materials required for construction of demo farms and creation of coral gardens
5	Travel	Procurement of services for training of CCTP-trainees in snorkeling/EFR	The snorkeling and EFR training is mandatory under the CCTP and is a prerequisite for undertaking seabased activities
		Logistics for boat facility	Logistics, travel and transport which include boat facility/boat rent (i.e. registered pleasure crafts, as per the Tourism Authority Act 2006 rules and regulations governed by the Mauritius Tourism Authority) for undertaking sea-based activities which include farm/coral garden set up, maintenance, management and monitoring
		Mileage for 3 MOI staff	
		Mileage for 1 AFRC staff	
		Mileage for 2 NGO staff	
Fuel cost for MOI van			