Towards an Ocean Economy: The First Steps

Volume I

August 2012

Mauritius Research Council

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PREFACE

The MRC was mandated in April 2012 by the High Level Project Monitoring Committee, under the Prime Minister's Office (PMO), to constitute a Multi-Institutional Task Force on the Ocean Economy. We are grateful to the following institutions who readily answered our invitation and shared their respective expertise with us in elaborating this report:

- Attorney General's Office
- Beach Authority
- Board of Investment
- Mauritius Ile Durable
- Mauritius Meteorological Services
- Mauritius Oceanography Institute
- Mauritius Ports Authority
- Mauritius Research Council
- Ministry of Environment and Sustainable Development
- Ministry of Fisheries
- Ministry of Housing and Lands
- Ministry of Tourism and Leisure
- Ministry of Tertiary Education, Science, Research & Technology
- Ministry of Public Infrastructure, National Development Unit, Land Transport & Shipping
- National Coast Guard
- Prime Minister's Office
- Rodrigues Regional Assembly
- University of Mauritius

We would also like to acknowledge the contribution of all the institutions which provided us with ocean-related information.

I wish to express my gratitude to the Chairman, Prof S Jugessur and Board Members of the MRC.

A special thank you goes to our colleagues from the Mauritian mission to the United Nations, in New York, for providing us with much more than just the adequate support required at the 13th Meeting of the United Nations' Open-ended Informal Consultative Process on Oceans and Law of the Sea from 29 May to 1 June 2012.

I would also like to take this opportunity to thank the MRC staff for their contributions to this report.

We are thus pleased to submit our report which channels both the drive and enthusiasm displayed by the institutions and individuals with whom we interacted to scale-up our national Ocean Economy and one day transform our country into an Ocean State.

Dr Arjoon Suddhoo
Executive Director
Mauritius Research Council
(Chairman of Task Force on Ocean Economy)

SUMMARY OF REPORT

The development of the Ocean Economy (OE) is one of the strongholds of the Government Programme 2012-2015. As the Mauritian Government focuses on the economic potential of marine resources around Mauritius to create a fully-fledged OE, care must be taken to make full use of new and existing Science, Technology & Innovation (STI) in order to ensure proper exploitation and management of these resources. In this context, the MRC was mandated in April 2012 by the High Level Project Monitoring Committee (HLPMC), under the Prime Minister's Office (PMO) to constitute a Multi-Institutional Task Force on the OE. The Terms of Reference (TOR), of this Task Force were the following:

- To prepare a comprehensive list of research work being carried out by type,
- To propose the way forward in the short and medium term with time-frame,
- To prepare a list of activities for projects to be implemented in the short-term, together with the actions required in terms of regulatory framework and policy decisions for implementation and;
- To identify the requirements in terms of technical assistance along with the Terms of Reference for the short-term projects.

Scope & Process

The process instigated for this exercise consisted of three phases. Phase One consisted in gathering information on the role played by STI in an OE as well as information on the Policy, Economic, Social, Technological, Environmental and Legal implications of an OE in Mauritius. Special attention was given to making Phase Two as inclusive as possible. Task Force meetings were organized, chaired and hosted by the MRC. Inputs were also received from Rodrigues and at the 13th Meeting of the United Nations' Open-ended Informal Consultative Process on Oceans and Law of the Sea, which was co-chaired by Mauritius. Phase Three comprised of a validation meeting at the PMO and a final meeting of the Task Force on OE.

Findings & Outcomes

The following section provides a summary of the major findings made by the MRC during the overall process to generate the present report.

1. Relevant STI infrastructure, human resources and policies are prime requirements for informed and sustainable Ocean policy and project development.
2. Most countries have developed an ecosystem management based ocean policy while ocean-related policies and projects are usually spearheaded by a high-level Multi-Agency body
3. Many countries are reaping the benefits of the fruits of the Ocean, as sources of wealth and job creation which contribute to their GDPs.
4. The following measures are emerging as global initiatives to exploit ocean resources and explore new avenues for the development of an Ocean Economy:

(a) Public/Private Partnerships
(b) Regulatory frameworks to remove trade barriers
(c) Greening of industrial sectors
(d) Technology Transfer/Innovation
(e) Multi-functional Co-management
(f) New Emerging Sectors

5. Private Sector participation and international partnerships are vital to capitalize on the commercial value of the ocean, including resources found in ocean beds.
6. There are no less than 28 institutions in Mauritius currently involved directly or indirectly in Ocean matters, demonstrating that: a) a considerable amount of work is being done in both the marine and maritime spheres and b) Mauritius does have a foundation in terms of human capacity and expertise which will have to be rationalised and consolidated in the wake of scaling up the Mauritian OE.
7. There is also some overlapping of responsibilities and duplication of work among the institutions dealing with ocean matters.
8. The main institutions undertaking research projects in the marine sector are the MOI, AFRC, the MRC and the UoM.
9. There is a significant number of short-term and long-term projects with high potential commercial and research value that have already been initiated by some institutions.
10. Twenty-three priority projects & Cluster Areas have been identified and a time-phased implementation Road Map has been developed as seen in the section titled the "way forward" of the present summary.
11. Mauritius has numerous legal instruments and is party to several relevant international conventions. The enacted laws mainly cover the access and uses of the continental shelf, maritime zones, shipping and vessel monitoring, the ports, fisheries and marine resources, the freeport, tourism, the coasts and beaches, marine protected areas and environmental protection.

Recommendations

The following are proposals for the creation of a stronger structure for the emerging Mauritian OE.

Efforts should focus on:

1. The rationalization and harmonization of the Mauritian ocean-related Legal Framework with a view to developing a "Mauritius Ocean Act" .
2. To set up in parallel, a Legal Task Force with a view to fast-tracking ocean-related business license awards and reviewing regulatory and enforcement mechanisms.

3. It was suggested that as the Ocean Economy evolves, Mauritius could eventually envisage the creation of a dedicated Ministry of Ocean Affairs in the long term in line with Government's vision of an Ocean State.
4. Setting up a Special Purpose Vehicle called "Ocean Business Development Company" (OBDC), by the Government to act as a catalyst to attract public and private venture capital funds.
5. The OBDC will prepare the TOR for the projects identified as having a high potential for commercialization and will be responsible for the launch of Calls for Proposals.
6. In order to speed-up the above recommendations and ensure timely implementation, an interim Inter-Agency Unit would be created under the aegis of the PMO.
7. The concept of an "Ocean Technology Incubator" could be adapted for different ocean-related sectors such health, food etc. This would be done with a view to attracting state of the art ocean technology, thereby enhancing technology transfer and FDI.
8. With a view to adopting the precautionary approach to any ocean development project, the Inter-Agency Unit will, on an annual basis, commission the MOI and other key stakeholders to produce regular ecosystem management reports.
9. A Corporate Ocean Responsibility Fiscal Scheme, or a similar funding mechanism borrowing from the Corporate Social Responsibility principle, could be set up to ensure the financial sustainability of this new structure, at least during the short to medium term.
10. As a result of extremely high socio-economic potential, appropriate financial and technical resources would need to be made available to implement the **Flagship project of the Mauritian Ocean Economy: Offshore Wind Farms**. It is important to note that this project could well lead to achieving Energy Security and reduce imports of fossil fuels leading to savings of some **Rs 31 Billion** every year for the Republic of Mauritius. The existence of a structure to support both local and international partnerships would however be of critical importance for the success of such a project.

Way Forward

However major threats to the implementation of the recommendations made were noted. We thus suggest that these be addressed by taking the following immediate actions in view of laying a stronger foundations for the Road Map on Ocean Development:

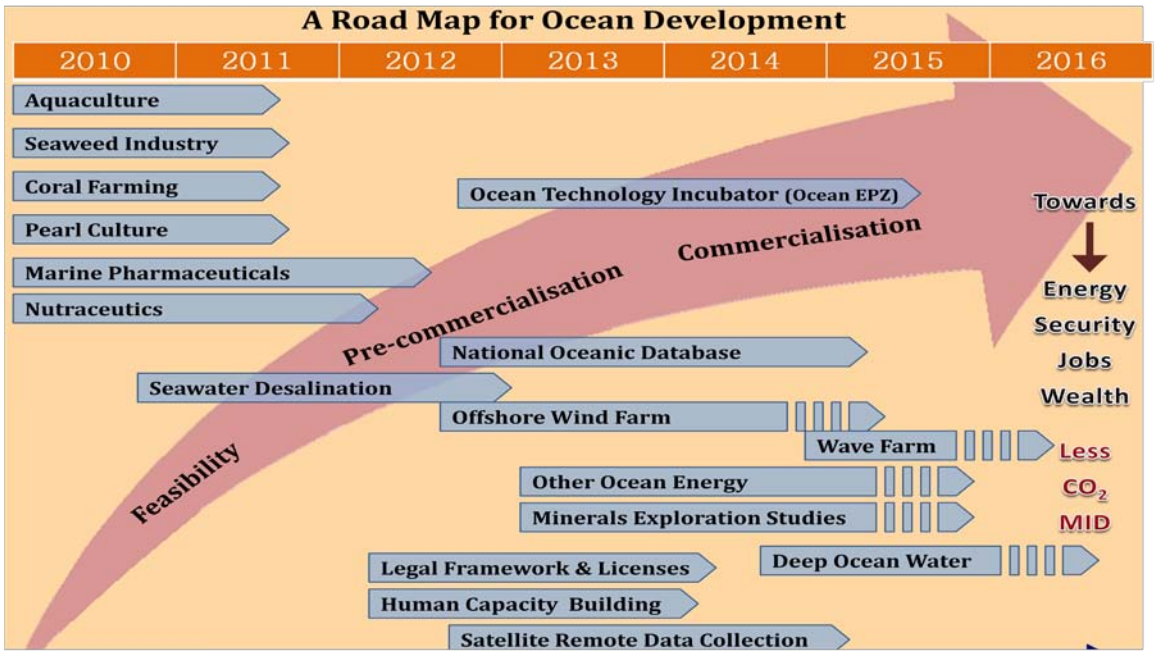
- to disseminate the findings of the report to a wider audience with a view to assessing the technical assistance required and obtain further contributions, inputs and views.
- setting up the following institutional actors/structure for improved stewardship within the next 12 months.

Institutional Pre-requisites towards the Mauritian Ocean Economy

- incentives would have to be worked out in detail to facilitate the implication of investors.
- drafting detailed TORs for each of the priority project identified.
- working out the legal framework as soon as possible and drafting policies at this very early stage to facilitate the implementation of projects.
- reinforcing coordinating and monitoring structures.
- assessing the social impact of each project in-depth and integrating such concerns in the exploitation and management of ocean resources.
- encouraging community and grass-root participation through mass sensitization in view of creating widespread ownership and fostering Ocean Citizenship.

A Road Map for Ocean Development

The following Road Map for Ocean Development is based on the list of Priority Projects or Cluster Areas submitted by Task Force Member Institutions. It aims to provide the basis for a short to long-term perspective of the Ocean Economy.



A Road Map for Ocean Development

The Priority Projects suggested by member institutions were classified in three very distinct categories and developmental stages, namely: "Feasibility", "Pre-commercialization" and "Commercialization". These classifications determined their position along the time-scale, in addition to their potential economic impact, as seen in the above diagram. Besides having a high commercial potential, the projects selected could also play an important role in the expansion of the Energy and Security sectors and the creation of Jobs and Wealth. Moreover such projects will contribute to the reduction of carbon dioxide emissions and hence be in line with the "Maurice Ile Durable" (MID) vision.

Mauritius should thus envisage using its maritime space to set up Ocean Technology Incubators whereby projects dedicated to Marine Technology would not only grow and develop, but also allow for the formation of strategic business partnerships. Ideally, this will in turn enable Human Resources Capacity Building to take place while upgrades to our existing infrastructure are made. Such incubators would also provide opportunities for the sharing of Intellectual Property Rights.

Critical Success Factors

In essence, the present report shows that the expansion of the Ocean Economy is a much needed, timely, feasible and viable endeavour. The success of this endeavour will be ensured by the strong leadership and vision from where the concept "Ocean State" emanated, together with the enthusiasm displayed by all those who contributed to this report. The second critical success factor, that is, a clear Communication Strategy would consolidate this venture.

1.0 BACKGROUND

The development of the Ocean Economy (OE) is one of the strongholds of the Government Programme 2012-2015. This carefully thought out Strategy, could potentially become the driver of the national economy and take Mauritius to its next phase of economic expansion and prosperity. It is important to bear in mind that the recent extension of our EEZ to 2.4 million kilometres square did not happen by accident. This extension can be seen as the result of a series of initiatives which the Prime Minister's Office (PMO) initiated back in 1999, through the Mauritius Research Council (MRC), by creating the Mauritius Oceanography Institute (MOI) with a view to focus our attention and efforts on the Continental Shelf and Marine Resources of our Exclusive Economic Zone (EEZ).

The Ocean represents the next frontier of sustainable development as shown by the increasing number of oceanic projects initiated and supported in many parts of the world. Being over a 1000 times larger than our land mass, strategically located in the Indian Ocean, our maritime space can become our prime source of revenue as well as an almost unlimited source of Food, Energy, Health Products, Minerals, and Leisure, just to name a few sectors. However, the overall success of this bold Strategy demands a paradigm shift in our conventional approach to wealth creation and will require the democratization of the national economy for increased social equity. As it can be seen worldwide, Science, Technology and Innovation (STI) hold the key to unlocking the many promises of the Ocean.

From a historical perspective, scientific knowledge focusing on the oceans has existed for a long time thanks to the innovative technologies developed by dedicated researchers, therefore making STI an integral part of several ocean-related fields. At the global level, intensive research is currently being carried out on a number of ocean-related themes such as ocean currents, tidal waves, benthic habitats, marine flora & fauna; to discover yet other frontiers of the Seas. To date, over 18,000 structurally unique metabolites have been isolated from marine microbes; marine invertebrates (especially sponges and tunicates), and seaweeds. Many of them are highly bioactive compounds and can potentially be used in developing anti-cancer, anti-inflammatory, anti-viral and anti-aging drugs, as well as in cosmetic and skin protection products. As a result of these scientific discoveries, a considerable amount of biological, chemical, physical and geological oceanic data now exist, some of which are freely accessible. For instance the precise observational data required to monitor and properly manage our Oceans in relation to maritime commerce, safety at sea, weather and climate forecasts as well as its impacts, natural oceanic threats (e.g. cyclones and tsunamis), national security and ecosystem health, are all direct or indirect benefits of STI.

Moreover, there is a worldwide trend towards an increased reliance on lower-carbon fuels and the production of renewable energy. In this respect, the demand for electricity generated from the oceans' dynamic systems such as marine winds, currents, tides, and temperature gradients is increasing. For example, it is currently estimated that 75% of the energy requirements of Ireland can come from Wave Energy. On the other hand, mariculture is providing food and other marine products to nations of the world and millions of people obtain water from desalinated ocean water. Many more earn a living and raise their families through coastal activities such as tourism. Already seabed mining for poly-metallic nodules and hydrocarbons is an established economic sector in many countries such as France which is currently creating its "Chantier

Sous-marin". These initiatives are only selected examples of escalating technological innovation on a scale never seen before, as countries realize that the new OE will pave the way into the new era of socio-economic development. It is already estimated that the value of Marine Ecosystem services alone exceeds the world's Gross National Product (GNP), based on conventional economic appraisal.

It is also important to note that scientific observations allow for the identification and assessment of the debilitating impacts of human activity on the world's oceans. Some examples include: escalating pollution, poorly planned coastal development, global climate change, the sea level rise, warming and acidification of the oceans. Altogether, these phenomena call for even greater understanding and better management of the seas. *[For more detailed examples of the importance of STI in developing an OE please refer to Appendices 1, 2 & 3, respectively, in Volume 2]*

As will be seen in the next sections, the acquisition of key scientific information on oceans has helped many nations develop a sound and sustainable ocean governance structure which has in turn contributed to economic growth. Thus, Mauritius cannot remain disconnected from all these possibilities. However, as also observed internationally, for the Ocean to cater to our needs, we in return, must act responsibly. The global concern for managing oceanic resources responsibly appears to be the cornerstone of several international partnerships formed earlier this year in Singapore and in the United Kingdom. Led by institutions such as the World Bank and Commonwealth countries respectively, such initiatives attest to the importance given by the international community to scientifically-informed Ocean Governance as a means for sustainable oceanic development. *[For a succinct description of recent international partnerships, please refer to Appendix 4 in Volume 2].* In this light, such global initiatives and partnerships are also focusing on:

- innovative Public/Private Partnerships,
- regulatory frameworks to remove trade barriers,
- greening of industrial sectors,
- technology transfer/Innovation,
- multi-functional structures
- co-management, and
- new emerging sectors.

Thus Mauritius should carefully consider all these approaches when making its first steps towards an effective OE, and beyond.

1.1 Rationale

As the Mauritian Government focuses on the economic potential of marine resources around Mauritius to create a fully-fledged OE, care must be taken to make full use of new and existing scientific knowledge in order to ensure proper management of these resources. In this context, the MRC was mandated in April 2012 by the High Level Project Monitoring Committee (HLPMC), under the Prime Minister's Office (PMO) to constitute a Multi-institutional Task Force

on the OE. The Terms of Reference (TOR), of the Task Force chaired by Dr Arjoon Suddhoo, Executive Director of the MRC, were the following [As seen in Appendix 5]:

- To prepare a comprehensive list of research work being carried out by type,
- To propose the way forward in the short and medium term with time-frame,
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- To identify the requirements in terms of technical assistance along with the Terms of Reference for the short-term projects.

1.2 Scope

While rooted in the TOR, PESTEL analysis (here adapted to stand for: "Policy", "Economic", "Social", "Technological", "Environmental" and "Legal" dimensions) was used as the analytical framework to determine the scope of the present report. Combined with the TOR, this framework brought to light the underlying opportunities and challenges linked to the global expansion of the Mauritian OE.

1.3 Aim & Objectives

The general aim of this report is to suggest a Road Map to Government for scaling up the Mauritian OE. Hence the specific objectives are to:

- Establish the importance of STI within the global OE,
- Use international trends in Ocean Policy-making to support the recommendations made,
- Provide a comprehensive picture of the local marine research carried out in Mauritius,
- Draw a list of activities and projects with substantial returns in the short and medium term and;
- Suggest a regulatory framework as well as additional requirements for technical assistance, and resource allocation for the way forward.

2.0 PROCESS

The following section provides a brief overview of the highly participatory process which guided the elaboration of this report. As illustrated in Figure 1 the process consisted in three distinct phases.

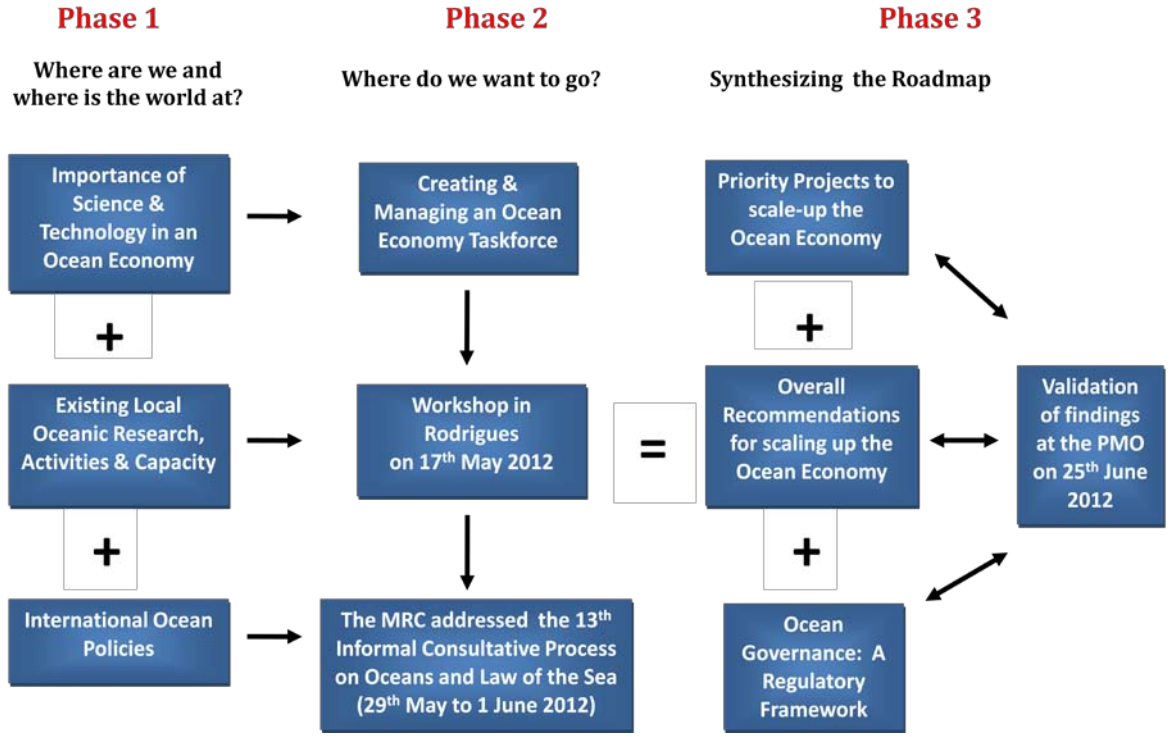

Figure 1: Phases 1, 2 & 3 of the Process for the elaboration of a Road Map for the Mauritian OE

2.1 Phase One

Phase one consisted in a series of preliminary desktop studies whereby information was gathered compiled and later discussed at the Task Force meetings to compare the local situation with recent international trends. These studies offered an overview of ocean-related research, activities and capacity in the Republic of Mauritius. They also provided insight into global ocean policies in some 28 countries as well. The current state of the Mauritian OE was investigated and additional literature reviews were also carried out by the MRC. Such reviews focused on the pre-requisites for and implications of OEs in both developed and developing countries across the world while including island states. Fields surveyed included the role of STI in developing the OE, Ocean Energy and Technologies and the Social, Economic, Environmental and Legal implications of expanding the Mauritian OE.

2.2 Phase Two

The identification of major stakeholders in ocean-related activities prompted Phase two and the subsequent creation of the Task Force. *[For a detailed list of member institutions please refer to Appendix 6 in Volume 2]* Special attention was given to making this particular phase as inclusive as possible. Two highly interactive Task Force meetings were organized, chaired and hosted by the MRC on Tuesday 7th and Monday 21st May. Mr Jean-Richard Payendee, the Commissioner for

Environment and Others from Rodrigues, participated in the discussions held during the second Task Force meeting. All Ministries, institutions and organisations kindly provided comprehensive information as well as project proposals as requested. Discussions of the preliminary findings made by the MRC with Task Force members led to a list of priority projects being drawn to scale-up the Mauritian OE, as seen in section 6. Projects focusing on fisheries and aquaculture, shipping and tourism were not part of the process since appropriate institutional bodies exist to tackle these issues. A workshop was also held in Rodrigues with Policy makers and relevant stakeholders on Thursday 17th May, during which relevant information was gathered and analyzed. The MRC received additional input at the 13th Meeting of the United Nations' Open-ended Informal Consultative Process on Oceans and Law of the Sea (29th May to 1st June 2012), co-chaired by Mauritius. The Executive Director of the MRC was invited to present a paper on Marine Renewable Energy for small island states during that high-level meeting. *[Please refer to appendices 7a & b in Volume 2, presentations made to the Task Force on the Ocean Economy]*

2.3 Phase Three

During Phase three findings made and additional input received were compiled, synthesized and later validated during a meeting with the HLPMC at the PMO. The information database that resulted from the exercise [Volume 2 of the present report] allowed a comprehensive "state-of-the-art" view of oceanic developments and from which implications for Mauritius could be derived.

A final Task Force meeting was held on the 5th of July 2012 during which the recommendations were adopted.

The sections that follow in the present Volume are thus selected extracts from this information database which has been instrumental in shaping the recommendations made to expand the Mauritian OE.

3.0 TOWARDS AN OCEAN ECONOMY IN THE REPUBLIC OF MAURITIUS: THE STARTING POINT

The following section gives an overview of the findings made by the MRC concerning the local OE. The first part of the section gives an overview of the state of the Mauritian OE. The second part shows the institutions involved in ocean-related research activities in the Republic of Mauritius.

3.1 The Mauritian Ocean Economy: A Preliminary Assessment

This preliminary assessment was carried out to estimate the current contribution of the OE to the national economy and subsequently establish its main drivers. The proxy data presented only provides a basic estimate of the current situation since the Mauritian OE is still relatively under-developed and therefore challenging to monitor objectively. The OE (Marine Economy) of Mauritius contributed Rs 32.7 billion (value added at basic prices) to the national economy in 2011; accounting for 11.5% of the total GDP. In 2005, it contributed Rs 21.6 billion to the economy and this contribution in absolute terms steadily increased. Figure 2 illustrates this trend. The growth in the marine economy increased at a lesser pace as compared to GDP over the period of 2005 to 2011. Over that same period the national GDP grew by 69.9% (at basic prices) as compared to a growth of 54.6% for the OE.

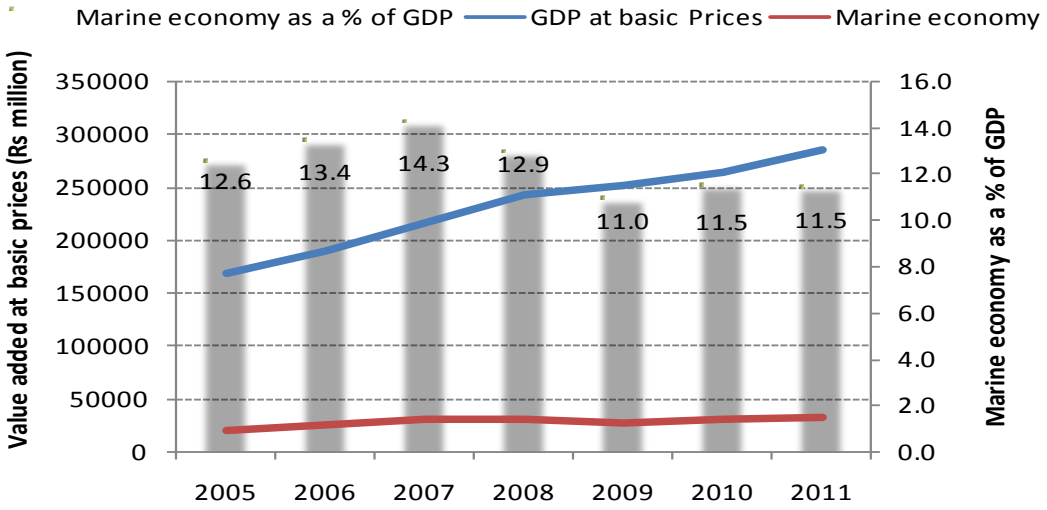

Figure 2: The evolution of the OE (marine) versus GDP for Mauritius from 2005 to 2011

Figure 3 illustrates the evolution in the contribution of the OE to the overall economy. It has ranged from 10.9% in 2009 to 14.3% in 2007. In 2011 the contribution of the OE to the overall economy was 11.5%.

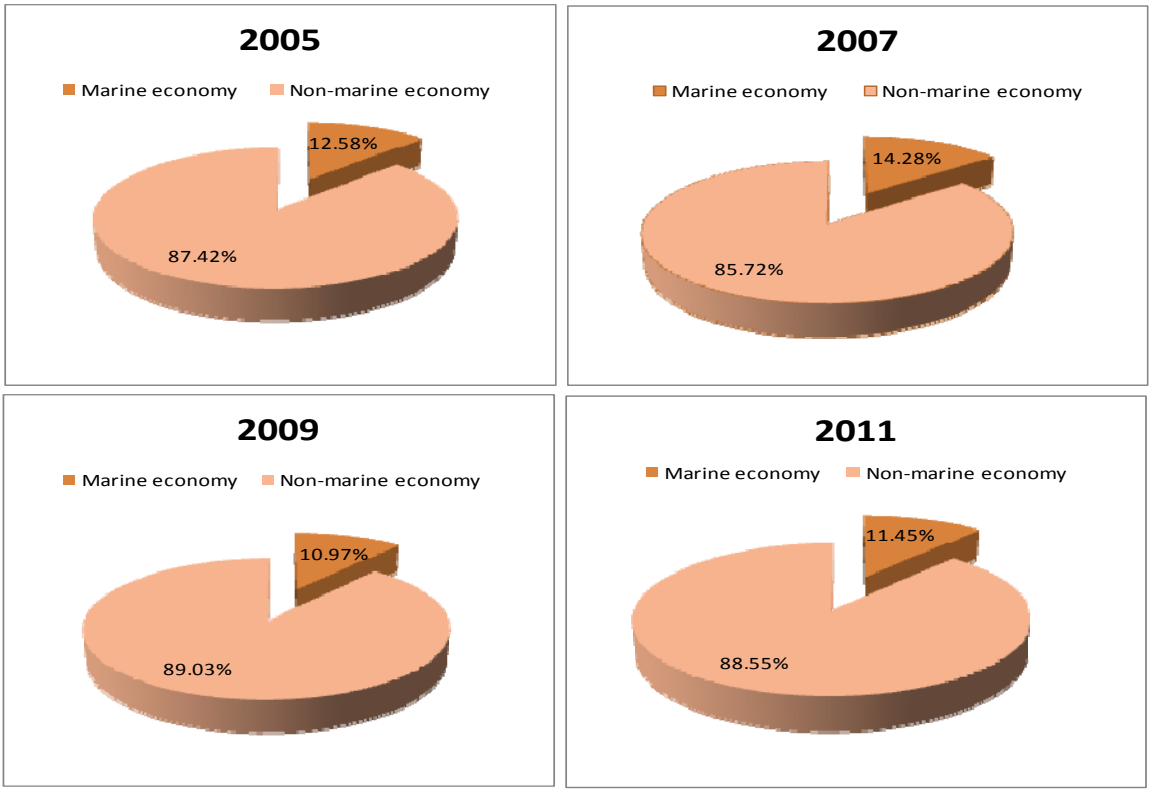

Figure 3: The evolution of the contribution of the OE (marine) to the overall Mauritian Economy (2005-2011)

Further analysis shows that tourism, sea transport & allied services, fisheries and seafood processing and freeport activities respectively contributed 73.5%, 11.4%, 9.5% and 4.4% of the total proportion constituted by the OE. These estimates show that significantly established industries within the Mauritian OE already exist. This preliminary assessment also hints at the need to consolidate and grow these established sectors by removing existing constraints to allow the Mauritian OE to develop and grow significantly. [*For a preliminary assessment of the contribution of Marine Economy to the Mauritian Economy please refer to Appendix 8]*

3.2 Ocean-related activities and projects in the Republic of Mauritius

A desktop study was carried out to survey and list all the different ocean-related activities and projects undertaken by local organizations. *[For a list of institutions involved directly or indirectly in the local OE, please refer to Appendix 9.]* The data was collected by requesting each of the institutions to submit a list of:

(a) current ocean-related projects and,

(b) proposed ocean-related projects for consideration.

As mentioned in Section 2.2 a consultative meeting was held in Rodrigues with policy makers and relevant stakeholders on 17th May 2012. The information generated during this meeting also contributed to this exercise.

As seen in Figure 4, the desktop study has shown that, ocean-related activities and projects are being undertaken by 28 institutions, comprising of various governmental, parastatal as well as non-governmental organizations. *[Please refer to Appendices 10 & 11 in Volume II for more detailed descriptions of ocean-related activities/projects and the institutions which they are carried out by].*

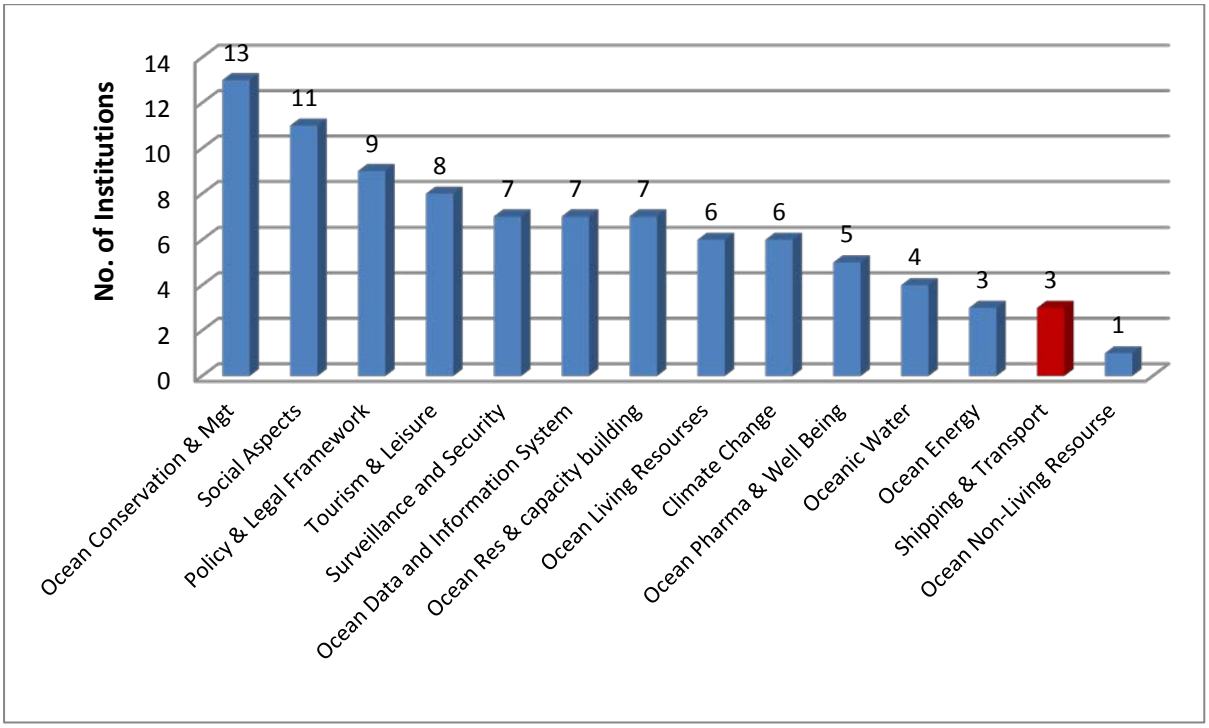

Figure 4: No. of Institutions involved in the identified themes

As shown in Figure 5, the scientific knowledge base and the human resource exist, to some extent, in the country to take the vision of OE forward. However the information gathered during this exercise suggests that only MOI, Albion Fisheries Research Institute (AFRC), University of Mauritius (UoM), University of Technology Mauritius (UTM), Mauritius Marine Training Academy (MMTA), Fisheries Training and Extension Centre (FiTECH) and MRC focus on the research, training and capacity building required to prepare the human capital for this new economic pillar. Among these, the Ministry of Fisheries, MRC and MOI appear to be more focused on applied research, as illustrated below.

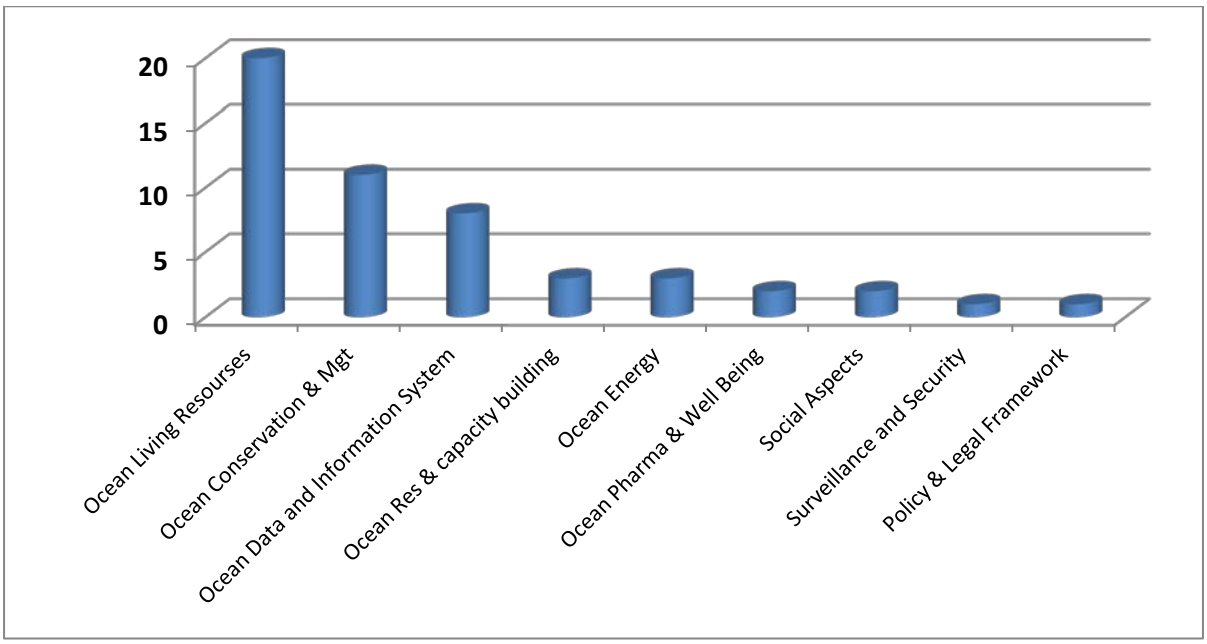

Figure 5: Research Projects/Programmes of Ministry of Fisheries, MOI and the MRC on identified themes

On the other hand, four faculties out of five at the UoM carried out undergraduate research on ocean-related matters. Upon closer examination the three most popular areas of research were found to be Marine Biochemistry, Marine Biology and Marine Pollution, as shown in Figure 6.

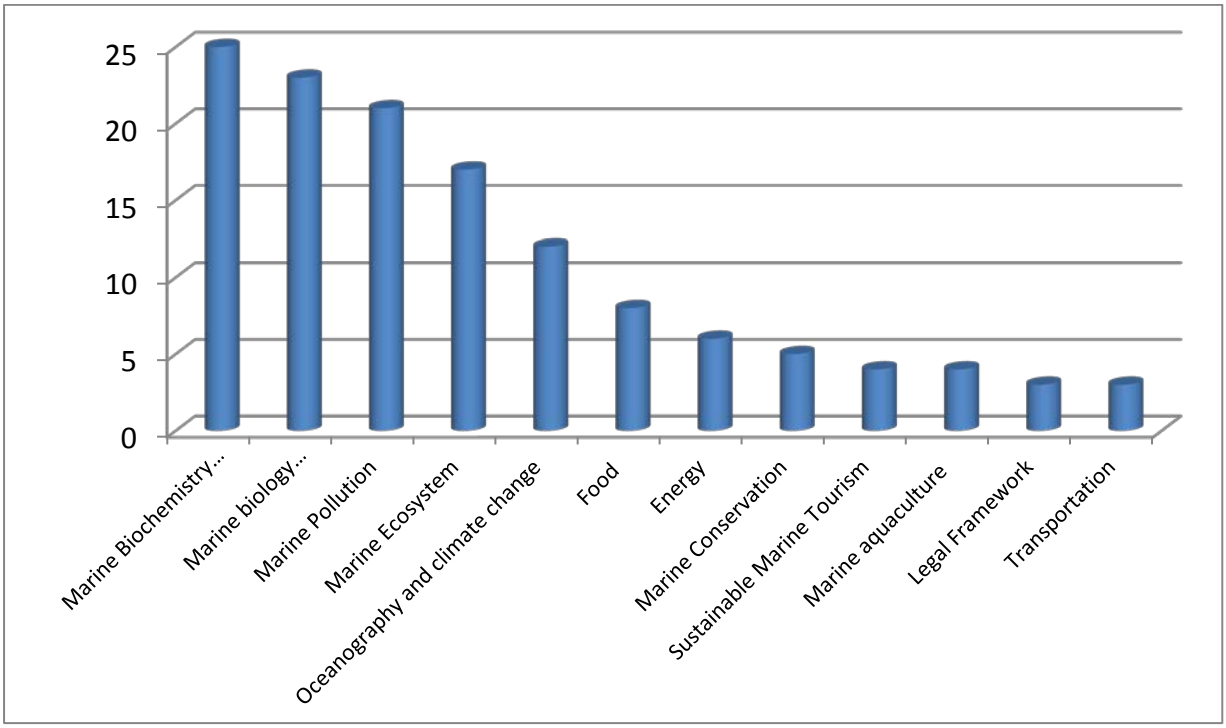

Figure 6: Theme-based Student projects at UoM (2000 to 2011)

In Rodrigues the Chief Commissioner's Office and the Commission for Environment and others is responsible for ocean and marine related projects and activities. A number of projects have been undertaken in collaboration with the United Nation's Food and Agriculture Organization (FAO), Ministry of Fisheries, Shoals Rodrigues, MRC and the UoM as can be seen in Figure 7.

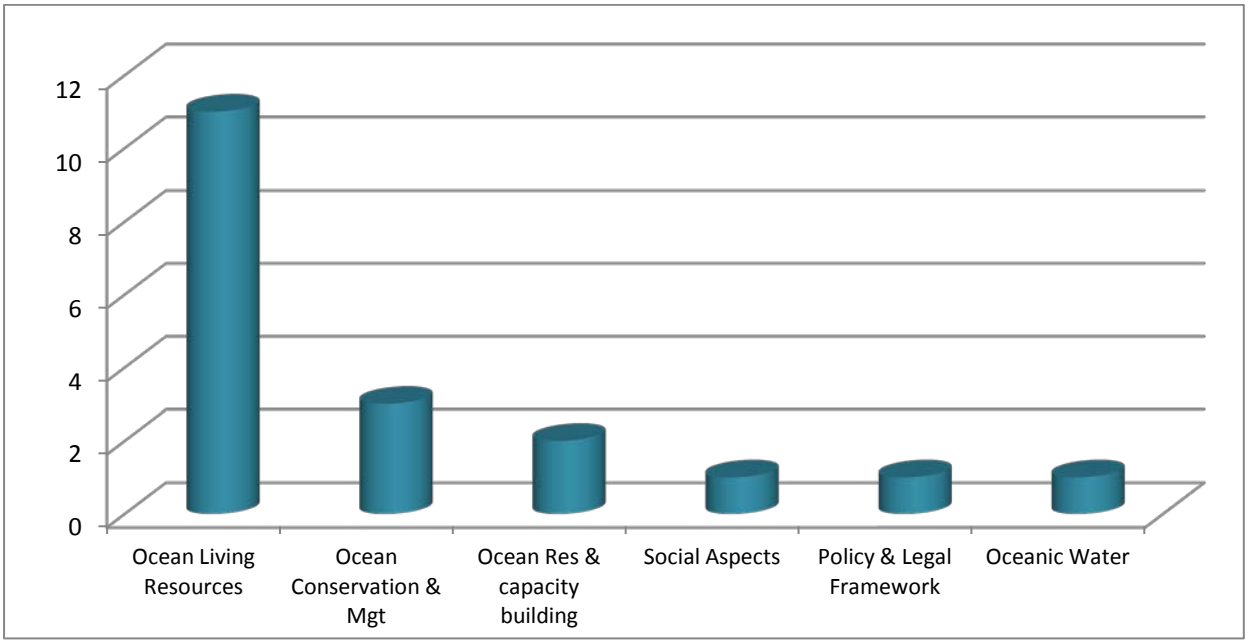

Figure 7: Recent Ocean-related projects in Rodrigues

Mapping institutions against types of projects and activities has clearly shown that a considerable amount of work has been done so far by local institutions, despite modest means. Yet, there is still a need to rethink the exploitation and management of the Ocean and marine resources in light of the proposed OE and to further develop the scientific knowledge base for creating business opportunities. Indeed, R&D institutes need to accelerate their research efforts towards fundamental and applied research. This will lead to commercialization and the involvement of the private sector. There is also the felt need to coordinate all the efforts by various institutions in a planned and integrated manner, while paying attention to capacity building. In this context, relevant stakeholders have to put in collaborative efforts, where the benefits are also shared by the team. Multidisciplinary, inter-institutional and international partnerships have to be formed. Intellectual Property Rights arising from ocean-related projects and activities also need to be protected, while benefits should be shared by participating institutions and nations.

4.0 OVERVIEW OF GLOBAL OCEAN INITIATIVES: GUIDING PRINCIPLES

A desktop study on the management of ocean resources was also conducted in parallel. This particular exercise included reviewing the ocean-related policies of 28 countries, among which small island states, with the largest EEZ Zones, as well as global initiatives in the field of ocean management. [For a detailed list of countries and initiatives surveyed please refer to Appendix 12] Common elements were found when investigating and comparing the visions of various countries such as Japan, Portugal, China, the United States, Canada and New Zealand.

The respective visions of the countries examined were derived from a participatory policy process which usually includes stakeholders as for instance: the Private Sector Vulnerable Groups, Coastal Communities, Academia, NGOs as well as the general public. They were also found to share common objectives such as:

- Exercising & Protecting rights and jurisdiction
- Meeting International obligations
- Understanding and Protecting Biodiversity
- Creating jobs & attaining economic development
- Addressing Community Needs
- Gathering skills/Expertise
- Preserving marine resources as a heritage/set up of maritime culture
- Developing an Integrated Ocean Planning Framework

The approach used in most countries was based on **"integrated ecosystem-based planning and management",** which gives equal consideration to Society, the Environment and Economic Development. Much emphasis was also placed on the collaborative approach leading to synchronization of the ocean policies to other international, regional, national and sectoral policies.

One of the major trends also noted was that many countries have put in place a proper institutional framework and coordination mechanism. Generally the mechanism ensures dialogue and communication with both bottom-up and top-down approaches being adopted for decision making issues. Figure 8 illustrates the institutional framework that had been put in place in most countries. Thus the policy is generally owned by one "supreme" ministry and the implementation and monitoring will be ensured by **a high level multidisciplinary and multi-institutional body** which will be accountable to the Ministry owning the policy. To ensure the proper implementation of action plans and specific project reporting, mechanisms put in place include **technical committees, advisory groups or regional committees**, depending on the specificities of the projects.

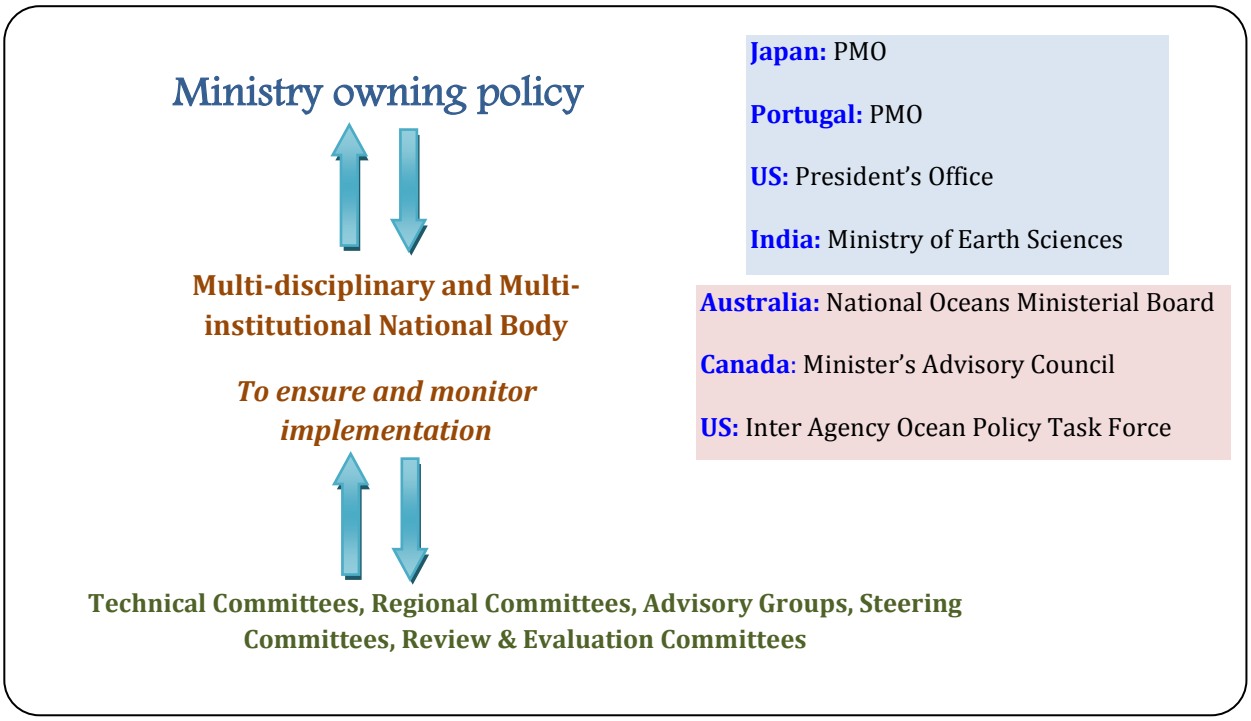

Figure 8: Trends in International Institutional Frameworks

This literature review also clearly showed that at the core of all ocean policies is a set of guiding principles, which are crucial for sustainable ocean governance as spelled out in the Lisbon's principles of ocean governance. Thus the major guiding principles to formulate a sustainable Ocean policy framework are summarised in figure 9.

Figure 9: Guiding Principles for Sustainable Ocean Governance Integrated, found in the Lisbon Principles for Sustainable Ocean Governance in 1999.

5.0 LEGAL IMPLICATIONS FOR THE MAURITIAN OCEAN ECONOMY

One of the major challenges in opening up new areas of economic development that are dependent on ocean-based resources is the access to natural resources. These can have a bearing on industrial production, energy security, seafood consumption and many other areas of maritime relevance. For the emerging ocean industry in Mauritius, this means that existing marine technologies will have to be brought in, adapted and developed further, to ensure that, in keeping with legal requirements, they are both economically and environmentally sustainable. In this context, a significant legislation for Mauritius is the United Nations Convention on the Law of the Sea (UNCLOS, 1982) which defines the rights of nations in accessing and using the world's oceans and establishes responsibilities for the management of marine natural resources. *[For an account of the many clauses of the UNCLOS please refer to Appendix 13]*

Mauritius already has a number of legal instruments and is party to several international conventions. The enacted laws cover the access and uses of the continental shelf, maritime zones, shipping and vessel monitoring, the ports, fisheries and marine resources, the freeport, tourism, the coasts and beaches, marine protected areas and environment protection. In terms of ocean-based resources exploration, however, the Mauritian offshore region is still in its infancy - in direct contrast to some countries which, over the past 50 years at least, have developed major industries in this area. The existing legal framework may need to be expanded to regulate and provide the means for monitoring the production or extraction, transport and the use of resources taken from the ocean in the wake of scaling-up the Mauritian OE.

6.0 LIST OF PRIORITY PROJECTS

As mentioned in Section 2.2, the following list of projects were drawn during Phase 2. Members of the Task Force on the Ocean Economy were asked to provide the MRC with a "wish-list" of projects which in their opinion could play a critical role in scaling-up the Mauritian OE. The 23 submissions received are shown in Table 1 and reflect a concern for high economic and commerical impact, in the short to medium terms. Figure 10 shows, in a prioritised manner, that living Resources and Marine Energy are deemed to be the most important for the country.
[A list of priority projects submitted by each member institution are found in Appendix 14]

No.	Project or Cluster	Comment
1	Policy, Legal Framework, IP & Licensing	
2	Scientific Oceanic Surveys	
3	Marine Resource Mapping & Computational modelling	
4	National Oceanic database	
5	Human Capacity Building	
6	Aquaculture	Ongoing
7	Seaweed Industry	Experimental Farm Stage
8	Coral Farming	Feasibility Stage
9	Pearl Culture	Feasibility Stage
10	Marine Nutraceutics (Marine Proteins, Fish Oil, Antioxidants, Immuno-polysaccharide, etc..)	
11	Marine Pharmaceutics & Marine Bio-technology	Long-term benefits
12	Sea Water Desalination	Ongoing
13	Ocean Renewable Energies	Pre-Feasibility Stage
14	Deep Ocean Water Applications - LBOI	
15	Ocean Technology Incubator	
16	Marine Hydrodynamics Laboratory	
17	Hydrocarbon/Mineral mapping & mining	
18	Satellite Remote data collection & analysis	
19	Surveillance & Security & ICT	
20	Marine Conservation & Education	Ongoing
21	Naval Architecture & Ship-Building & Harbour Engineering - Oceanic Vessel	
22	Ocean Business Incentives and International Partnerships	
23	Ocean Energy: Offshore Wind Farms	Advanced Feasibility Stage

Table 1: List of Priority Projects or "Cluster Areas" submitted by the Task Force on the OE

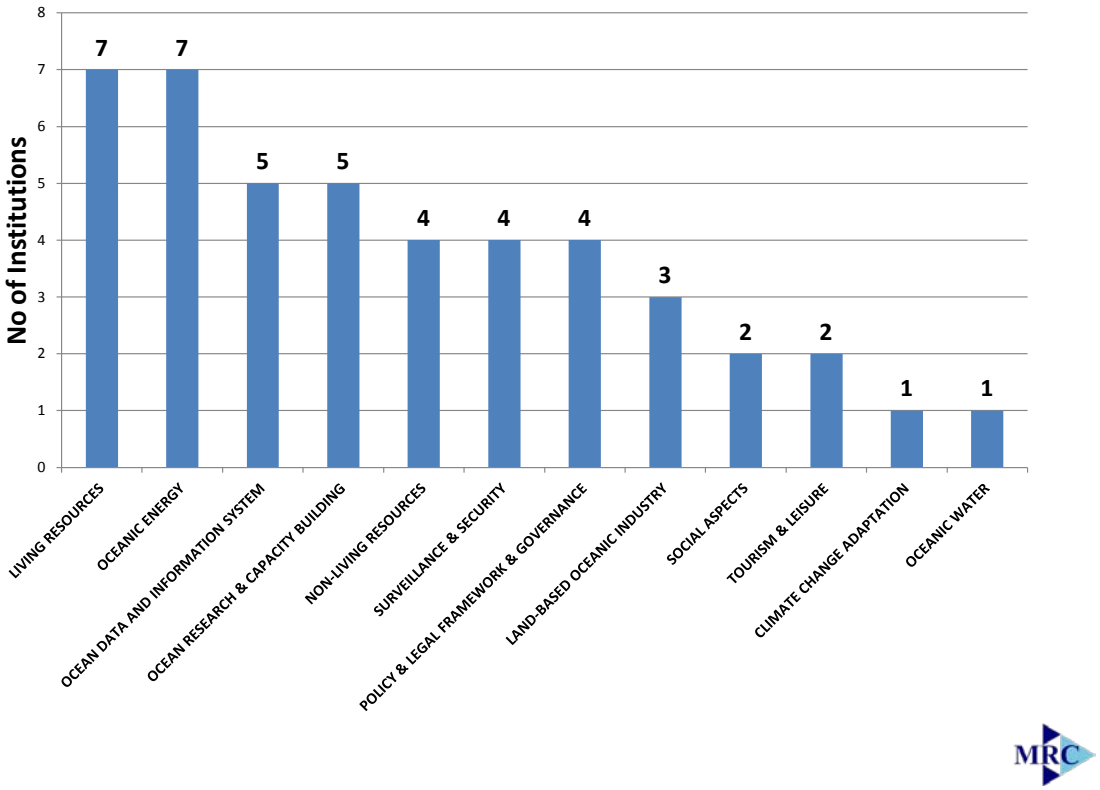

Figure 10: Priorities for Ocean Development

7.0 FINDINGS & OUTCOMES

The following section provides a summary of the major findings made by the Task Force during the overall process involved to generate the present report.

1. Relevant STI infrastructure, human capacity and policies are prime requirements for informed and sustainable Ocean policy and project development

2. Most countries have developed an ecosystem management based ocean policy and have a high-level Multi-Agency body for the spearheading of ocean-related policies and projects.

3. Many countries are reaping the benefits of the fruits of the Ocean, as sources of wealth and job creation, while contributing to their respective GDPs.

4. The following measures are emerging as global initiatives to exploit ocean resources and exploring new avenues to do so.
   (a) Public/Private Partnerships
   (b) Regulatory frameworks to remove trade barriers
   (c) Greening of industrial sectors
   (d) Technology Transfer/Innovation
   (e) Multi-functional Co-management
   (f) New Emerging Sectors

5. Private sector participation and international partnerships are vital to capitalize on the commercial value of the ocean, including the resources found in ocean beds.

6. There are no less than 28 institutions in Mauritius currently involved directly or indirectly in Ocean matters, demonstrating that a considerable amount of work is being done in the marine and maritime sphere. Thus Mauritius does have a foundation in terms of human capacity and expertise which will have to be maximized and expanded in the wake of scaling up the Mauritian OE.

7. The main institutions undertaking research projects in the marine sector were the MOI, AFRC and MRC and the UoM.

8. There is a significant number of short-term and long-term projects with high potential commercial and research value that have already been initiated by some institutions. Some 23 priority projects and initiatives have been identified and a time-phased implementation Road Map has been developed.

9. Mauritius has numerous legal instruments and is party to several relevant international conventions. The enacted laws mainly cover the access and uses of the continental shelf, maritime zones, shipping and vessel monitoring, the ports, fisheries and marine resources, the freeport, tourism, the coasts and beaches, marine protected areas and environmental protection.

7.1 Opportunities & Challenges

The following section provides a quick overview of the potential stumbling blocks during phases one and two of the process.

1. Mauritius needs more " Direction and Focus" to steer Ocean affairs.
2. There is a need to improve coordination in conducting multidisciplinary ocean-related matters, be it at policy or project levels.
3. There is a need to improve the infrastructural support, financial and human resources provision for the development of an ocean economy. This endeavour would necessitate developing various collaboration models with national, international and private entities, using a mix of co-management forms of governance and market-based tools, which appear to be relatively weak at this point in time.
4. There is currently no dedicated legal instrument for the development and/or management of the Ocean Economy, and "retro-fitting". Existing EEZ, Fisheries, marine, environmental, planning, onshore and foreshore legislations may not suffice for the emergence of an Ocean Economy. Detailed administrative regulations, guidelines and codes relating to various areas considered for development, are also lacking.
5. There are no specifically tailored mechanisms or packages to attract businesses, investors and other interested parties to develop the ocean. For example leases could be granted for the construction of long-term, permanent or semi-permanent structures (e.g. piers, wind farms, wave energy devices, etc.) Licenses could be granted for activities of a shorter duration and of a more temporary nature, and that would not entail exclusive rights. (e.g. tuna fishing, aquaculture farms, exploration, survey works, EIA activities, pipeline laying, research projects).
6. The actual full economic value of our present EEZ is unknown. There is a distinct need to evaluate the resources present within this specific area to offer different types of development packages to interested parties. These packages could respond to their interests in the near future, while ensuring adherence to all the guiding principles.
7. There is also a need for the systematic monitoring of our marine ecosystem to ensure the proper exploitation and management of our ocean resources

8.0 SETTING THE COURSE FOR THE OCEAN ECONOMY: A ROAD MAP

As seen in Section 7.0 Mauritius is NOT starting from scratch when attempting to scaling-up the Mauritian OE. It is important to highlight that both enthusiasm and interest levels were very high when exploring, together with Task Force members, ways to transform our existing OE. The resulting Road Map illustrated in Figure 11 was thus developed by:

1. Taking into account the list of priority projects mentioned in Section 6.0, the international and local context, as well as the potential challenges listed in the previous section.
2. Focusing on the expected end result and anticipating an approach towards Ocean Development based on improvements in:
   - Direction & Focus
   - Funding
   - Infrastructure and Know-how
   - Collaborative efforts and team work,
   - Multidisciplinarity
   - International Partnerships
   - Intellectual Property Rights
   - More commercialization and Private Sector involvement

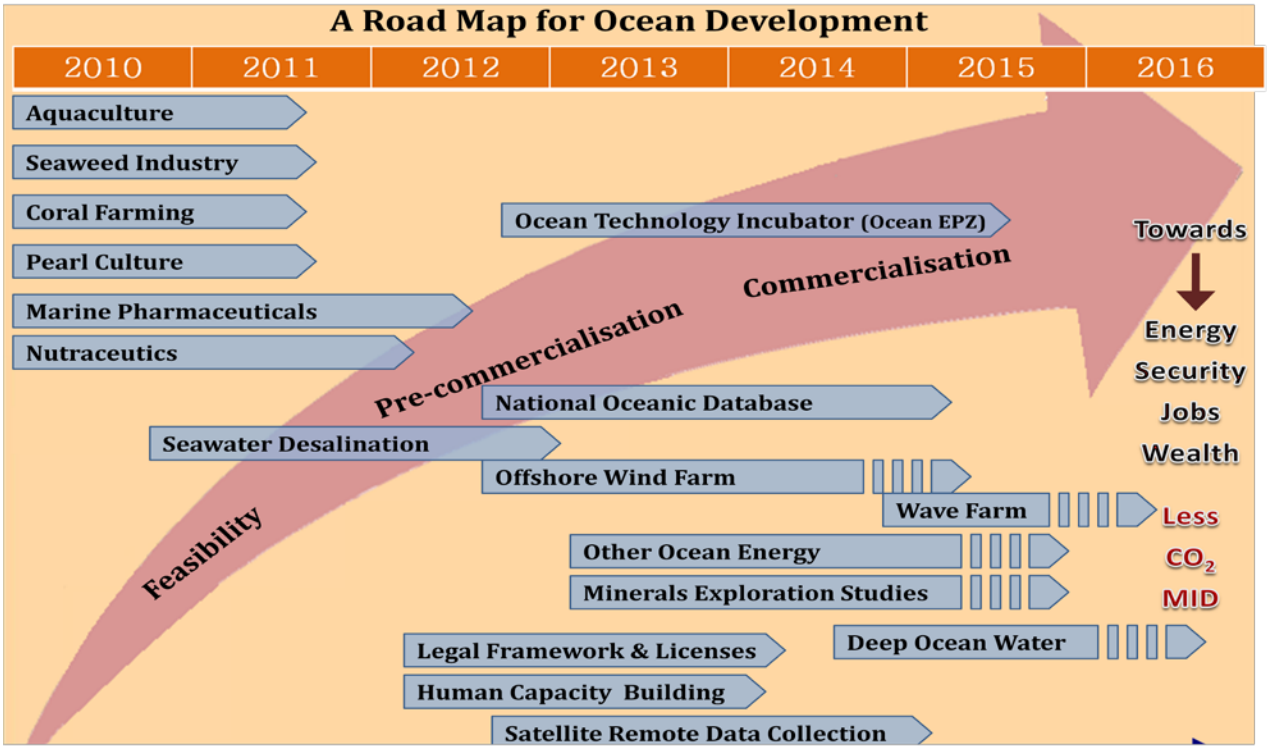

Figure 11: A Road Map for Mauritian Ocean Development

The ocean-related Projects or Cluster Areas suggested were found to be in three very distinct categories and developmental stages: "Feasibility", "Pre-commercialization" and "Commercialization". These classifications determined their position along the time-scale, in addition to their potential economic impact, as seen in Figure 11. Besides having a high

commercial potential the projects selected will also play an important role in the expansion of the Energy, & Security sectors and the creation of Jobs and Wealth. Moreover such projects will contribute to the reduction of Carbon dioxide emissions and hence be in line with the "Maurice Ile Durable" (MID) vision. Mauritius should thus envisage using its maritime space to set up Ocean Technology Incubators whereby projects dedicated to Marine Technology would not only grow and develop, but also allow for the formation of strategic business partnerships. Ideally, this will in turn enable Human Resources Capacity Building to take place while upgrades to our existing infrastructure are made and provide opportunities for the sharing of Intellectual Property Rights.

However major threats to the success of the projects selected were noted. It is believed that the absence of much needed structural attributes and initiatives should be addressed when considering long-term economic returns.

Hence the recommendations listed in the next section came from looking at the current state of Ocean Governance in Mauritius as well as the need to re-engineer the structure in place to create a more solid base for the Mauritian OE. These recommendations were thus made based on the following principles:

- Authority & Accountability
- Coordination
- Avoiding Duplication
- Multidisciplinarity
- Variable Geometry Representation
- Centralization (One-stop shop)
- Scientifically/Evidence-based Informed policies
- International Partnerships
- Wealth & Job Creation
- Equity & Democratization of the Ocean Space
- Multi-Nationals, Private companies and local SME's
- Intellectual Property Rights issues
- Academic & Applied Research
- Financially Sustainable
- Self-Monitoring

8.1 Overall Recommendations to implement the Road Map

The following are proposals for the creation of a stronger structure for the emerging Mauritian OE through more focused efforts and the democratisation of that part of the national economy:

1. The rationalization and harmonization of the Mauritian Ocean-related legal framework with a view to developing a "Mauritius Ocean Act". The aim of this Act will be to make provision for the Government's general policies for the ocean/marine space. It would also introduce a new ocean spatial planning system, and would provide the framework for licensing developments in the ocean environment, for mechanisms to protect natural resources

including marine conservation zones and for the management of marine fisheries, amongst others.

2. To set up in parallel, a legal Task Force with a view to fast-track ocean-related business license awards and reviewing the regulatory and enforcement mechanisms
3. It was suggested that as the Ocean Economy evolves, Mauritius could eventually envisage the creation of a dedicated Ministry of Ocean Affairs in the long term in line with Government's vision of an Ocean State.
4. Setting up a Special Purpose Vehicle called Ocean Business Development Company (OBDC), by the Government. This entity would act as a catalyst to attract public and private venture capital funds for investment in ocean-based commercial activities. A suggested approach is the Public Private Partnership (PPP) model for investment.
5. The OBDC will prepare the TOR for the projects identified as high potential for commercialization and to launch Calls for Proposals
6. In order to speed-up the above recommendations and ensure timely implementation, an interim Inter-Agency Unit would be created under the aegis of the PMO.
7. The concept of an "Ocean Technology Incubator" could be adapted for different ocean-related sectors such health, food etc. This would be done with a view to attracting state of the art ocean technology, thereby enhancing technology transfer and FDI.
8. With a view to adopting the precautionary approach to any Ocean Development project the Inter-Agency Unit will, on an annual basis, commission the MOI and other key stakeholders, to produce management reports on the following:
   (a) State of our Coast
   (b) State of the Lagoon
   (c) State of our Corals
   (d) State of our Open Seas
   (e) State of our Sea Beds
   (f) State of the Ocean Economy

   The latter would require the assessment of the future contribution of the Ocean Economy to the overall Mauritian economy. In this particular case Statistics Mauritius would be mandated to collect, disaggregate, compile and publish statistics pertaining to the ocean economy using appropriate classifications. When taken together, these reports would allow for Adaptive Management, that is, enable the use of a systemic approach to reduce uncertainty over time.
9. Last, but not least, a Corporate Ocean Responsibility Fiscal Scheme, or a similar funding mechanism borrowing from the Corporate Social Responsibility principle, could be set up to ensure the sustainability of this new structure. This would ease initial governmental investment at least during the short to medium term.

9.0 WAY FORWARD

9.1 Immediate Actions Required

The following immediate actions are proposed:

- to disseminate the findings of the report to a wider audience with a view to assessing the technical assistance required and further contributions, inputs and views
- setting up the following institutional actors/structure for improved stewardship within the next 12 months as illustrated in Figure 12.

Figure 12: Institutional Pre-requisites towards the Mauritian Ocean Economy

- incentives will have to be worked out in details to facilitate the implication of investors
- detailed TORs for each priority project will have to be drafted
- working out the Legal framework as soon as possible and drafting policies at this very early stage to facilitate implementation of projects
- reinforcing coordinating and monitoring structures
- assessing the Social impact of each project more in-depth and integrating such concerns in the exploitation and management of ocean resources
- encouraging community and grass-roots participation through mass sensitization in view of creating widespread ownership and fostering Ocean Citizenship

It is strongly believed that the critical success factors should include:

- ❑ A Champion
- ❑ A clear CommunicationStrategy

9.2 Laying the Foundation for Good Ocean Governance

As mentioned in the previous section, since time is of the essence for the implementation of the recommendations, an interim Inter-Agency Unit can be created under the aegis of the PMO. Suggested members of this new entity would be the Ministry of Finance and Economic Development (MoFED), MRC, MOI, SLO, Board of Investment (BOI), Joint Economic Council (JEC) and Enterprise Mauritius (EM). Their collective role would be to ensure the inclusion of the private sector, foreign investment and Marketing as well as STI in shaping the future structure

for Ocean Governance, on the onset. As illustrated in Figure 13, the Inter-Agency Unit will have four main functions until the proposed new Ministry of Ocean Affairs is set up:

1. Receiving Unsolicited Proposals (this route would ease the participation of the private sector)
2. Launching call for proposals based on the list of approved priority projects
3. Commission and oversee studies to assess needs in terms of:
   (a) the national legal framework
   (b) Marine Energy
   (c) Economic valuation of Marine Resources
   (d) Environmental Impact Assessment
4. Drafting Policies based on scientific information gathered through regular surveys, mapping, monitoring and evaluation exercises.

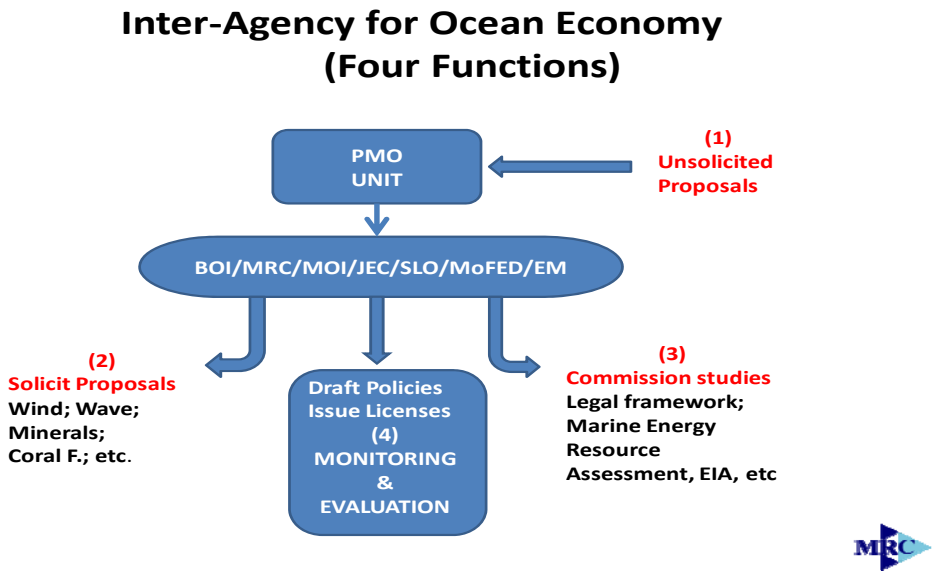

Figure 13: Inter-Agency Unit for OE

9.3 From Knowledge Management to Wealth Creation

In practical terms and when taking a top-down approach to the system mentioned above, the structure will rely on the conversion of the close interaction and collaboration between Science (Applied Research and Academia) and the major Policy and Decision making institution of the land (the PMO). As further illustrated in Figure 14, this relationship will be conducive to an economic space where ocean technologies will thrive with the help of Technology transfer, innovation and Industry.

This will translate into institutions such as, MOI, UoM, AFRC and Meteorological Services (MMS), providing data and policy inputs to a special project implementation unit within the PMO who would, through interactions with the Inter-Agency Unit for the OE, decide on the course of action for the:

1. Prioritization and implementation of ocean-related projects,
2. Development of schemes to promote Public Private Partnerships, and
3. Elaboration of relevant policies.

Working in close partnership with organisations ranging from the Ministry of Environment and Sustainable Development to NGOs, and in collaboration with foreign investors/technical experts, the Inter-Agency Unit for the OE would oversee and advise actors in this space of the Mauritian Economy. Matters which could be taken up by this Inter-Agency Unit would include projects, activities, international partnerships and initiatives for the sustainable development of clusters such as Ocean for Food, Ocean for Energy, Ocean for Health, Ocean for Water, etc

All these projects, activities, partnerships and initiatives would in turn generate a wealth of information and Intellectual Property Rights. This information will be stored in a National Oceanic Knowledge database managed by the institutions mentioned earlier, such as the MOI, UoM, AFRC and MMS. Besides being a rich source of knowledge for further scientific endeavours, this database will also be the source of:

- Information derived from regular and systematic monitoring efforts to establish the State of our Ocean in view of communicating these findings to the Project Implementation Unit within the PMO
- Information on Intellectual Property Rights as well as inputs for Ocean Policy & Governance for the PMO, to guide the evolution of ocean-related activities and their commercial applications
- Intellectual Property Rights information for current and potential investors in ocean-related projects/activities and initiatives with commercial potential
- Recent and high-quality data for researchers (academics and students, on a case-to-case basis) wishing to undertake research on ocean-related matters
- Information for the general public to learn more about Mauritian Ocean Development

When taken together, all these outputs would enable Adaptive management, that is, enable the use of a systemic approach to reduce uncertainty over time.

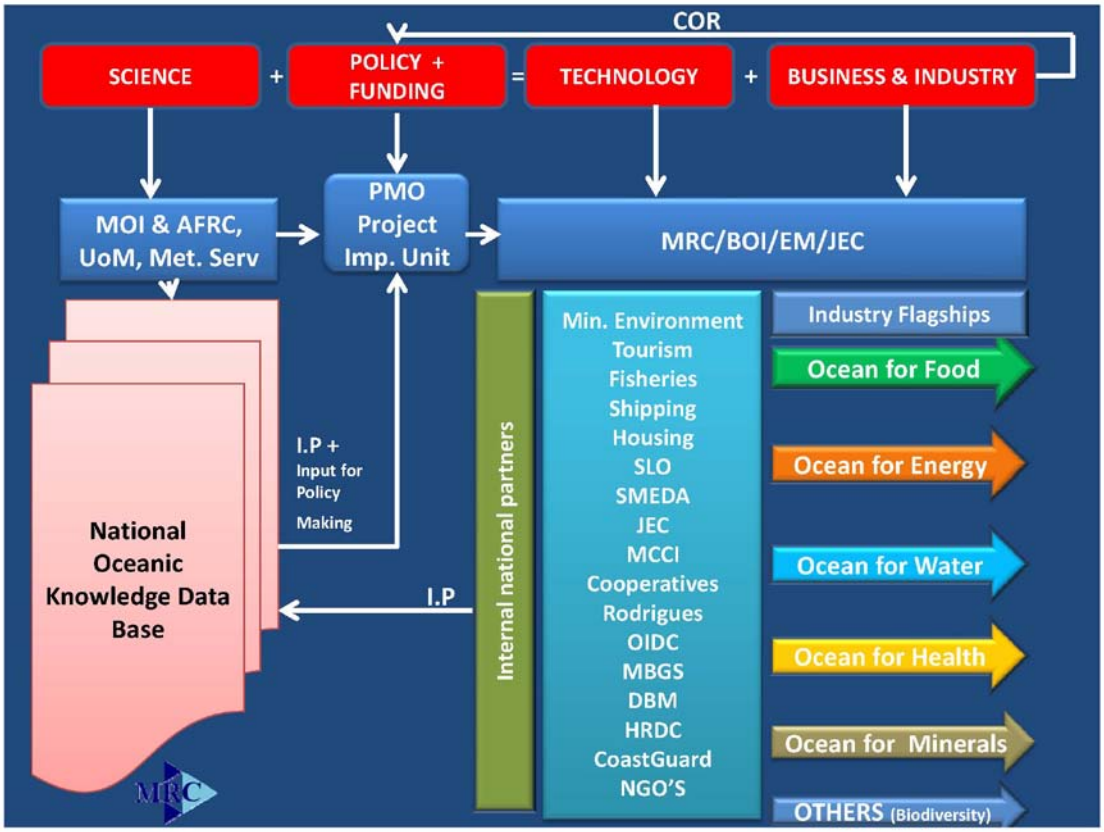

Figure 14: A model for effective Ocean Governance within the new OE in Mauritius

Besides allowing scientists to play a more significant role in contributing to policy-making, this model would also encourage this group, as shown previously in Figure 11, to bridge the gap between the experimental and commercial phases of projects developed institutionally or by individuals. Scientists could thus also derive benefits through licensing and technical consulting.

Finally, one of the key features of this model would be the introduction of a Corporate Ocean Responsibility (COR) Fiscal Scheme. This fiscal scheme would apply to the wealth generated via ocean-related projects and activities in the different ocean sectors listed in Figure 14, as approved by the PMO. As mentioned previously in Section 8.1, borrowing from the Corporate Social Responsibility principle, this scheme would be set up to ensure the sustainability of the proposed overall structure. This could ease initial governmental investment during the short to medium term.

9.4 The Mauritius Ocean Flagship Project - Offshore Wind Farms in Mauritius & Rodrigues

Of the many projects that can be initiated through the OBDC, the one that offers the best economic, social and environmental value, both in the short and long-terms, is the proposal to create Offshore Wind Farms in the waters of Mauritius and Rodrigues. Such Wind Farms would enable the generation of clean and renewable electricity.

Preliminary computational simulations of offshore wind farms by the MRC on the East far Coast, South far Coast and the West far Coast, of Mauritius using satellite data, show that the offshore

winds of Mauritius have potentially substantial amount of clean renewable energy that can be exploited. In general, offshore wind farms are richer in energy than land-based winds and offshore farms do not require premium land space.

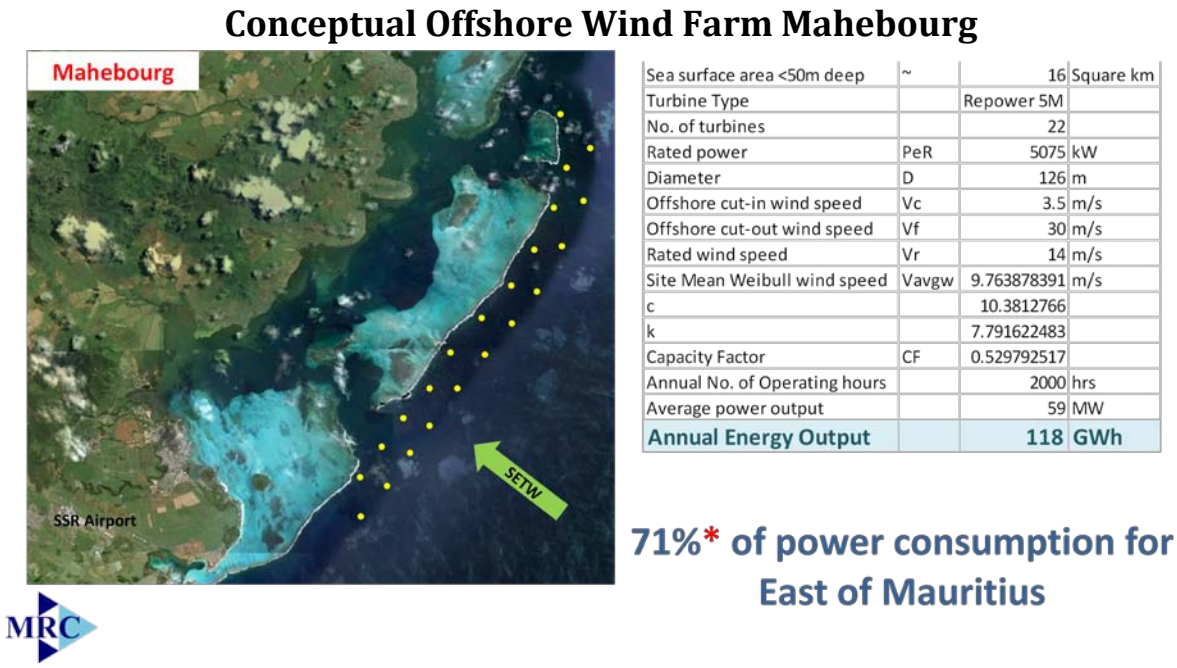

Figure 15 : Conceptual Offshore Wind Farm in Mahebourg

As seen in Figure 16, computational simulations were also carried out for Rodrigues. The offshore winds in Rodrigues are equally very rich and can provide the entire island with clean renewable power, over time. Indeed, excess energy can be used for desalination of sea water, as well as for providing electricity. In the long run, even hydrogen could be generated to fuel vehicles on the island via fuel cells.

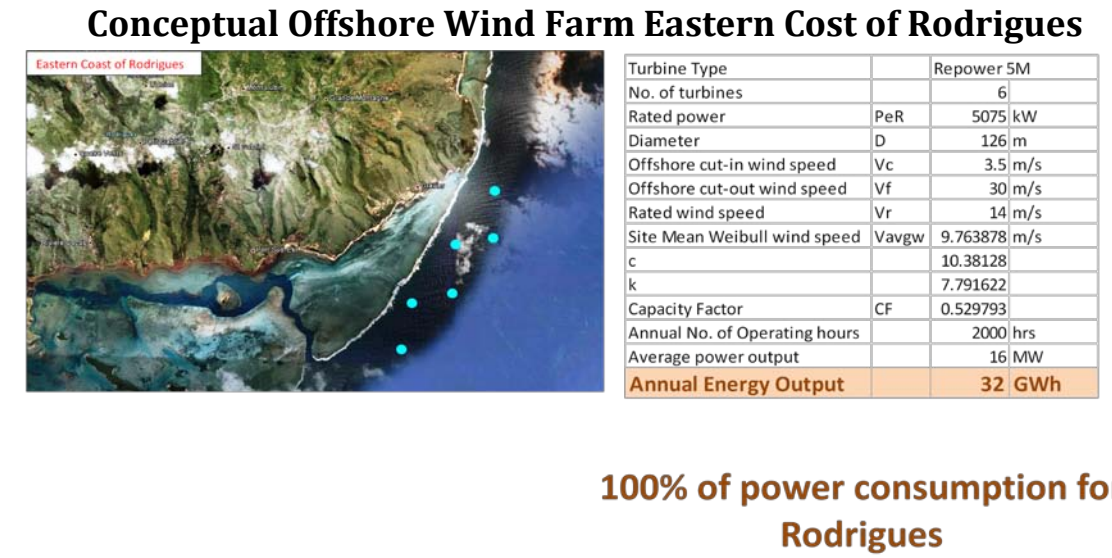

Figure 16 : Conceptual Offshore Wind Farm on the Eastern Coast of Rodrigues

Using a phased approach, offshore wind farms (and other forms of marine renewable energy, such as wave energy) can lead Mauritius and Rodrigues to becoming almost entirely independent from imported fossil fuel in the years to come, thereby saving the country **about Rs 31 billion every year,** while conforming to the Maurice Ile Durable (MID) vision. Achieving Energy security for both islands is a distinct possibility. Offshore wind farms are successfully being operated in a plethora of countries with the United Kingdom being a leader in this field.

It is therefore recommended that the OBDC, with technical support from the MRC and other concerned institutions, be given the necessary resources to invite potential local and international partners in developing further the offshore wind farms project in both Mauritius and Rodrigues.

10.0 CONCLUDING THOUGHTS: GENESIS OF AN OCEAN ECONOMY VIA OCEAN CITIZENSHIP

As argued throughout this report, the development of an OE presents an unprecedented set of opportunities and challenges for extending the socio-economic development of our country. Indeed an ocean-oriented development strategy resting on the consolidation of existing activities and further diversification will lead to more employment, entrepreneurial, leisure, educational and cultural opportunities. Employment creation and entrepreneurial opportunities are undoubtedly the main ways in which individuals and their households can benefit from the development of an ocean economy. As such, marine industries will potentially have a significant role to play in future economic and employment growth. The diversity of jobs open to both men and women, as seen in ocean economies around the world, irrespective of educational attainment, appears to further substantiate this point of view. Furthermore, the potential source of "Green jobs" which it represents would also be a further reason for Mauritius to invest in Ocean Energy. [As can be seen in Appendix 3]

Aside from strong political leadership, it is now widely acknowledged in development practice that in order for projects with a very strong social dimension to succeed, the community needs to be well versed with the initiative and how it will impact upon them. Thus the active involvement of the community in designing and shaping the projects that concern and affect them should also seek to promote ownership at all levels and should be considered when expanding the Mauritian Ocean Economy. Such developments should not be at the detriment of traditional coastal communities which are widely acknowledged to be over-represented among the poorer sections of our society. Building on and further developing existing capabilities of the present human capital who are traditionally earning their living from coastal and marine activities can empower this socio-economic group to take an active part in this sector and lead to pro-poor development. In fact, economic, environmental, social and cultural aspirations can and should be integrated in planning and managing ocean resources. From this perspective the promotion of sustainable development can result in achieving the environmental and quality of life objectives for coastal communities by granting a pollution- free environment, as well as the protection and conservation of the coastal and marine heritage. Hence great care should be taken so that developments do not conflict with the preservation of local, natural and cultural heritage but instead complement and uphold these assets.

Finally, a very high level of national ownership is required for Mauritius to grow from having a modest OE to one day becoming a full-fledged Ocean State. Such a critical and lasting change in mindset will require mass sensitization on the role and implications of **Collective and Individual Ocean Citizenship**, through the educational system, the mass media and NGOs. It is also important to note that for everything to fall into place, future generations need to be educated and trained to ensure a pool of human resources with a wide variety of skills and talents to manoeuvre in this new economic sector. [For more details on the social implications of an OE please refer to Appendix 15]

A good starting point towards the Mauritian Ocean Economy would be forming the strategic business partnerships needed for this endeavour to take off. Since **time is of the essence** to bring the government's vision to life, laying the foundations for such a promising future resides in the actions taken today.