Marine Protected Areas and Marine Spatial Planning: Two Ecosystem-Based Approaches Beneficial for Rodrigues' Sustainable Management of Marine Resources

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Abstract:

Many islands of the Indian Ocean depend on the sea and the exploitation of marine resources for their socio-economic development. Rodrigues, an autonomous island of the Republic of Mauritius, has been pioneering and implementing measures to ensure the sustainable exploitation, use and management of marine resources within its waters. Those measures, which are founded on an ecosystem-based approach, promote the use of marine resources for economic development while at the same time ensure the protection of these resources.

This paper aims at conducting a Strength, Weakness, Opportunity and Threat (SWOT) analysis of two ecosystem-based approaches beneficial for Rodrigues. The paper will first examine the impacts of marine protected areas (MPAs), its legal framework and the extent to which MPAs have ensured the protection of the marine biodiversity in Rodrigues. The strengths, weaknesses, opportunities and threats of MPAs for Rodrigues will be presented. Marine Spatial Planning (MSP), a second ecosystem-based approach, will be studied. A SWOT analysis of MSP will be conducted so as to demonstrate how its application can further promote the sustainable use of marine resources for the economic development of Rodrigues.

The research method to be used to conduct this study will be a socio-legal analysis of secondary data on the two ecosystem-based approaches. Through this study, an evaluation of the impact and effectiveness of these approaches will be done. Recommendations, both legal and environmental, will be made to strengthen the implementation of these ecosystem-based approaches.

Keywords:

Rodrigues – Marine Spatial Planning – Ecosystem Based Approach – Marine Protected Areas

Résumé :

De nombreuses îles de l'océan Indien dépendent de la mer et de l'exploitation des ressources marines pour leur développement socio-économique. Rodrigues, une île autonome de la République de Maurice, a été pionnière et a mis en œuvre des mesures pour assurer l'exploitation, l'utilisation et la gestion durables des ressources marines dans ses eaux. Ces mesures, qui sont fondées sur une approche écosystémique, favorisent l'utilisation des ressources marines pour le développement économique tout en assurant la protection de ces ressources.

Cet article vise à mener une analyse des forces, des faiblesses, des opportunités et des menaces (SWOT) de deux approches écosystémiques bénéfiques pour Rodrigues. L'article examinera d'abord les impacts des aires marines protégées (AMP), son cadre juridique et la mesure dans laquelle les AMP ont assuré la protection de la biodiversité marine à Rodrigues. Les forces, les faiblesses, les opportunités et les menaces des AMP pour Rodrigues seront présentées. La planification spatiale marine (MSP), une deuxième approche écosystémique, sera étudiée. Une analyse SWOT de la PSM sera menée afin de démontrer comment son application peut promouvoir davantage l'utilisation durable des ressources marines pour le développement économique de Rodrigues.

La méthode de recherche à utiliser pour mener cette étude sera une analyse socio-juridique des données secondaires sur les deux approches écosystémiques. Grâce à cette étude, une évaluation de l'impact et de l'efficacité de ces approches sera effectuée. Des recommandations, à la fois juridiques et environnementales, seront formulées pour renforcer la mise en œuvre de ces approches écosystémiques.

Mots-clés :

Rodrigues – Planification Spatiale Marine – Approches écosystémiques – Aires Marines Protégées.

Citation method:

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Introduction

Located in the Indian Ocean, Rodrigues is an autonomous state of the Republic of Mauritius. Being constitutionally autonomous since 2002, Rodrigues has developed its own system of governance to manage its internal affairs.

The Rodrigues Regional Assembly, the Executive Council and the Court of Rodrigues act as the three branches of government for the island. Section 26 of the *Rodrigues Regional Assembly Act* (RRA) 2001 states that the elected members of the Rodrigues Regional Assembly can make laws and regulations for the island. The Executive Council, which consists of the Chief Commissioner, Deputy Chief Commissioner and seven Commissioners, represents the executive branch of Rodrigues. The powers and duties of the Executive Council are spelled out at Section 35 of the RRA Act 2001. The Court of Rodrigues has the jurisdiction to hear any civil or criminal case in the island. The jurisdiction of the Court of Rodrigues is regulated by the *Court of Rodrigues Jurisdiction Act* 1913.

As an autonomous state and having the structure and capacity to manage its own internal affairs, Rodrigues has taken the steps to develop and implement sustainable approaches to manage its own natural resources.

Concerning the regulation and management of its marine resources, Rodrigues has implemented two ecosystem-based approaches, namely: marine protected areas (MPA) and marine spatial planning (MSP). According to the International Union for the Conservation of Nature (IUCN) marine protected areas are areas at sea which are reserved for conservation purposes[1]. Marine Spatial Planning is defined as the spatial and temporal allocation of marine space to the different uses and users of the sea in order to achieve ecological, economic and social objectives[2]. These two approaches have enabled Rodrigues to sustainably manage its marine resources and enhance the socio-economic development of the country.

The purpose of this paper is to examine how these two ecosystem-based approaches, marine protected areas and marine spatial planning, have been used by Rodrigues to manage its marine resources and gain economic benefits. A Strength, Weakness, Opportunity and Threat (SWOT) analysis of the two approaches will be carried out. Furthermore, the paper will look into the legal steps taken by Rodrigues to ensure the implementation and management of both

[1] URL (last visited 15 March 2023): https://www.iucn.org/resources/issues-brief/marine-protected-areas-and-climate-change#:~:text=Marine%20Protected%20Areas%20(MPAs)%20are,by%20exclusively%20no%2Dtake%20MPAs. –

[2] URL (last visited 15 March 2023): https://ioc.unesco.org/our-work/marine-spatial-planning

marine protected areas and marine spatial planning. The research method used to conduct this study is a socio-legal analysis of secondary data on the two ecosystem-based approaches.

I. Marine Protected Areas

The protection and conservation of marine resources have been a national as well as international concern. On an international level, several legal frameworks have been enacted to promote the protection and conservation of marine resources through marine protected areas. Target 14.5 of the Sustainable Development Goal 14 provides for the conservation of at least 10% of marine and coastal areas worldwide. Aichi Target 11 of the Convention on Biological Diversity provides that at least 10% of marine and coastal areas, having a diverse ecosystem and biodiversity, should be conserved and managed through protected areas.

Marine protected areas can be viewed as the optimal approach in the short- and long-term protection and conservation of marine resources. MPAs are designated marine or coastal areas, where human activities are either halted or limited, in order to preserve and protect the marine ecosystem. MPAs, also referred to as marine reserves or marine parks, can be categorized as such: closed or no take zones (where no activities are carried out in the designated zones), limited use zones (where only limited activities can take place in the designated zones) and multi-use zones (where different activities can take place in the designated zones. However, these activities are strictly regulated). The reasons behind the creation of these different categories of MPAs are: to protect marine biodiversity and ecosystem and allow human use of the sea for socio-economic purposes[3].

The creation of MPAs generates many benefits for the different users and stakeholders involved in the use and management of marine resources. From an environmental perspective, MPAs, especially no take zones or limited use zones, allow for the restoration and rejuvenation of many marine species[4]. As different forms of human activities are either prohibited or limited in these zones, the marine species present therein are not removed nor are their habitats destroyed. This in turn, allow the species to breed and restore their population. MPAs also allow for sustainable fishing as fishing is either limited in time (seasonal fishing) or limited in space (fishing in a particular location). This is beneficial as it

[3] S. JENTOFT – M. VAN SON TC – M. BJORKAN, "Marine protected areas: a governance system analysis", *Human Ecology*, 2007 Oct; 35:611-22.
[4] B.S. HALPERN, "The impact of marine reserves: do reserves work and does reserve size matter?". *Ecological Applications*, 2003, 13(sp1), pp.117-137.

decreases overfishing. From an economic perspective, MPAs are beneficial as they promote tourism and nautical activities in certain zones and encourages research.

Having the largest lagoon among the Mascarene islands, 13 km wide and extending over 240 km², the authorities in Rodrigues have taken the step to protect their marine resources by establishing marine protected areas. There are 10 marine protected areas in Rodrigues which are divided into the following categories: 5 fishing reserves, 4 marine reserves and one multiple use marine protected area. The objectives behind having these 10 marine protected areas are: to conserve the marine biodiversity, ensure fish stock rejuvenation, allow tourism and recreational activities and research and education purposes. It has to be noted that within the 10 MPAs extraction of resources can be done within some designated areas inside the MPA and with the authorization of the Commission for Agriculture, Environment, Forestry, Fisheries and Marine Parks[5]. No MPAs are exclusively no take zones.

Pointe La Gueule to Pointe Venus, Anse Quitor, Baie Topaze, Manioc to Pointe La Gueule and Grande Passe are the five fishing reserves in Rodrigues. They were established by the 1984 Fisheries (Reserved Areas) (Rodrigues) Regulations. Within the fisheries reserves, fishing is allowed. However, it has been noted that, to the exception of patrols and control by the Fisheries Protection Services, there are no formal management within the fishing reserves[6].

The four marine reserves in Rodrigues are: Riviere Banane, Anse aux Anglais, Grand Bassin and Passe Demie. They were established in 2007 by the Rodrigues Regional Assembly (Fisheries and Marine Resources: Marine Reserves) Regulations. The reserves cover approximately 10% of Rodrigues' lagoon.

Under Section 3 of the Regulation, fishing is prohibited within the reserve unless an authorization has been granted by the relevant authorities. However, different forms of fishing such as: hook and line, basket trap and seine net fishing are still done in the reserves and a non-optimal management of the marine reserves have been observed[7].

[5]URL (last visited 17 March 2023): http://nairobiconvention.org/clearinghouse/sites/default/files/MPA%20Outlook_Republic%20of%20Mauritius.pdf –

[6] *Idem.*

[7] E.R. HARDMAN – J.M. GREEN – M.S. DESIRE – S. PERRINE, "Movement of sonically tagged bluespine unicornfish, Naso unicornis, in relation to marine reserve boundaries in Rodrigues, western Indian Ocean", *Aquat. Conserv. Mar. Freshw. Ecosyst.*, 2010, 20, 357-361.

The South East Marine Protected Area (SEMPA) covers an area of 43 km² and is the largest marine protected area of the Republic of Mauritius. The SEMPA is the only marine protected area in Rodrigues and Mauritius to have its own legislative framework which is the Rodrigues Regional Assembly (Fisheries and Marine Resources –The South East Marine Protected Area (SEMPA)) Regulations 2011.

The SEMPA was created and is managed through a participatory approach. Section 3 of the SEMPA Regulations 2011 states that the SEMPA shall be managed through the principle of co-management. This means that the local communities in Rodrigues as well as the local authorities should work together to management activities within the SEMPA.

Section 4 of the SEMPA Regulation divides this MPA into three zones, each having a specific purpose. The purpose of the Conservation Zone is to conserve the marine biodiversity therein and extraction of marine resources can be done only for research purposes. Within the Multiple Use Zone, fishing is permitted using legal methods which the Regulations provide. Another zone which is provided by the Regulation is the Multiple Use Zone (Seasonally Closed). This zones within the SEMPA are opened and closed over a period of time to allow for fishing to take place. This is commonly used for the fishing of octopuses[8].

The creation of these 10 marine protected areas is a reflection of the long-term aim of the authorities in Rodrigues to protect and conserve their marine environment. In line with that, the following Strength, Weakness, Opportunities and Threats with regards to the MPAs can be identified:

– **Strength.** The different MPAs across the island have helped different populations of marine species to recover. The most notable example is the case of octopus. The management of the SEMPA and the seasonal fishing of octopus across the island, has reduced the decline of the species and helped in its rejuvenation[9]. Moreover, Rodrigues is the only Mascarene Island to have a regulation which was specifically enacted to regulate the largest marine protected area for the Republic of Mauritius. Adopting a participatory approach, this legislation gives the Rodrigues Regional Assembly as well as the competent authorities the capacity to co-manage the SEMPA with local communities[10]. This ensures an element of transparency in decision making and management of the area.

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[8] URL (last Accessed 20 March 2023): https://blueventures.org/wp-content/uploads/2021/03/Jhangeer-Khan_et_al_2015_Managing_Octopus_Fisheries_Through_Seasonal_Closures_Rodrigues.pdf

[9] *Idem*

[10] SEMPA Regulations 2011, Section 2.

– **Weakness:** The main weakness identified in the management of the MPAs in Rodrigues is the low control of activities in fishing reserves.

– **Opportunities:** The opportunities that the MPAs represent for Rodrigues can be categorized as ecological opportunities and educational opportunities. From an ecological perspective, the MPAs allow for the restoration of the marine ecosystem. It ensures the rejuvenation and protection of different marine species. From an educational perspective, the MPAs in Rodrigues allows for further research to be conducted in order to better ensure the protection of the environment while at the same time developing mechanisms to ensure the socio-economic development of local communities in the country.

– **Threat**: If activities are not properly managed and controlled in MPAs, this can lead to activities such as illegal fishing, extraction and marine poaching.

II. Marine Spatial Planning

Marine Spatial Planning (MSP) provides for an ecosystem-based approach to sea use and management. It allows for all stakeholders involved in sea use and management to come up with an integrated approach that provides for the protection of the marine ecosystem while at the same time allows for the economic exploitation of marine resources in a sustainable manner[11].

The main purpose of MSP is to avoid conflict between the different users and uses of the sea. For years, there has been various practices at sea whereby: shipping activities, fishing and other forms of exploitation of marine resources were done in areas with high biodiversity. This created tensions among the users of the sea and negatively impacted the marine environment. The goal of MSP is to avoid overlapping of activities at sea that might create conflict and allocate 'where and when' human activities can be done at sea[12]. Hence MSP is the division of the sea in various sectors whereby each sector has a specific use and will not conflict with another user of the sea.

Being an ecosystem-based approach, the success of MSP rests upon the following principles: Adaptive, Strategic & Anticipatory and Integrated & Participatory. The common denominator among these principles is the role of MSP in encouraging the participation of all marine stakeholders in the planning, implementation, monitoring and evaluation process of the marine spatial plan.

[11] F. DOUVERE, *Marine spatial planning: Concepts, current practice and linkages to other management approaches* (Doctoral dissertation, Ghent University, 2010).
[12] *Idem.*

To designate its MPAs, Rodrigues has adopted marine spatial plan principles. Through consultations between the authorities and local communities, several areas were designated as protected ones[13]. During the planning, implementation, monitoring and evaluation stages of MSP, the Rodrigues local fishing communities were involved. When the MPAs were set up, it resolved various conflicts which existed among the different users of the sea. The nature of these conflicts was mainly geared towards when and where to fish and other commercial and recreational activities at sea. In addition to these, the effects of these activities on the marine environment were also an issue for concern. Through marine spatial planning and adopting a participatory approach, the conflicts were resolved with the creation of MPAs and the regulation of activities therein.

Marine Spatial Planning is an important approach to consider when managing activities at sea. Rodrigues has taken steps and principles of MSP to manage its marine environment. The following Strength, Weakness, Opportunities and Threats concerning the use of MSP in Rodrigues can be identified:

– **Strength:** Through MSP, Rodrigues adopted a holistic approach to the use and management of its marine resources. Human activities at sea have been aligned with the measures to ensure protection and conservation of the marine environment. This can be witnessed through the creation of the different MPAs.

– **Weakness:** For MSP to be effective, there must be an ongoing process of monitoring and evaluating of marine activities. Furthermore, there must be continuous research and actions taken to ensure the smooth implementation of marine spatial plans. One weakness, resides in the low amount of research on the importance of marine spatial planning for Rodrigues and how this ecosystem-based approach can be beneficial for the island.

– **Opportunities:** Marine Spatial Planning in Rodrigues can allow for further research and investment to be done in the maritime sector of the island. This can results in various socio-economic benefits for Rodrigues.

– **Threat:** The main threat to the smooth functioning of marine spatial plans to Rodrigues can be a lack of political will. It is important that further research be done on the importance of MSP for Rodrigues in order to demonstrate to policy makers the ecological and socio-economic advantages that it can reap.

[13] O. PASNIN – C. ATTWOOD – R. KLAUS, "Marine systematic conservation planning for Rodrigues Island, western Indian Ocean", *Ocean & Coastal Management*, 2016, 130, 213-220.

Conclusion

Many islands of the Indian Ocean depend on the sea and the exploitation of marine resources for their socio-economic development. Rodrigues, an autonomous island of the Republic of Mauritius, has been pioneering and implementing measures to ensure the sustainable exploitation, use and management of marine resources within its waters. Those measures, which are founded on an ecosystem-based approach, promote the use of marine resources for economic development while at the same time ensure the protection of these resources.

This research aimed at conducting a Strength, Weakness, Opportunity and Threat (SWOT) analysis of Marine Protected Areas and Marine Spatial Planning for Rodrigues. These two ecosystem-based approaches have allowed Rodrigues to ensure a balance between environmental protection of marine resources and human use of these resources.

As Rodrigues celebrates it autonomy, we need to applaud the country for all the measures and steps that it has taken for its economic, social and ecological advancement.