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厦门大学

硕 士 学 位 论 文

关于喀麦隆大西洋海岸水生物种入侵的政策构想

Policy Formulation Regarding Invasive Aquatic Species on the Atlantic Coast of Cameroon

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Table of Contents

摘要

水生入侵生物（Invasive Aquatic Species, IAS）会对海洋生态系统造成巨大威胁，而人类活动是引起水生入侵生物发生的主要诱因。造成水生生物入侵的因素众多，如航运、海水养殖、观赏性鱼类贸易等。作为海洋污染的一种类型，水生入侵生物对环境的影响是不可逆转的。本文旨在分类阐述喀麦隆沿岸水生入侵生物的类型，对海洋环境的影响及其不同矢量和路径。本文选取了喀麦隆沿岸至少三种水生入侵生物进行研究和分析，分别是：水葫芦、斑节对虾和水椰，发现都对环境产生了负面影响。论文分析了相关团体、机构和政府部门为应对水生入侵生物带来的环境威胁所采取的措施与行动，剖析了目前管理部门所面临的管理瓶颈，并为喀麦隆海岸治理驯化物种带来的环境危害提出建议。论文对政策能否成为防止海洋环境遭受水生入侵生物侵害的有效管理工具进行了阐述。通过对有关水生入侵生物的所有国际公约和部分国家的国内立法进行综述，运用定量分析方法收集相关数据，运用假设-演绎方法进行分析，选取喀麦隆大西洋海岸的杜阿拉市（Douala）、林贝市（Limbe）和克里比市（Kribi）作为研究区域，本文认为极有必要出台有效的管理政策以抑制水生入侵生物的传播。同时，加强公众对水生入侵生物对喀麦隆海洋生态环境带来的危险的认识也十分必要。

关键词：水生生物入侵、政策制定、喀麦隆大西洋海岸

Abstract

Exotic aquatic species are a threat to the marine ecosystem. Human activities are the main reasons behind their intrusions. Multiple vectors are responsible for this dissemination. Amongst them are shipping, aquaculture, ornamental and aquarium trade etc. Invasive Aquatic Species (IAS) which is one kind of marine pollution has irreversible impacts. The objective of this paper is to provide an overview of the types of Invasive Aquatic Species on the coast of Cameroon, their effects on the marine environment as well as their various vectors or pathways. The work identifies at least three IAS along the coast of Cameroon: Water Hyacinth, Tiger Prawns and Nypa Palms. All these three species bring negative environmental impacts. The paper analyzes the initiatives that have been employed by concerned groups, agencies and ministries to address the threats of IAS. It looks at the management constraints faced and try to prescribe reasonable suggestions that could help save the Cameroon coast from the harm of naturalized species. The work attempts to answer the universal question of whether policies can be an effective tool to devoid the marine world from Invasive Aquatic Species (IAS). This research reviews all relevant international conventions and domestic legislations of some countries. A quantitative research method is used to collect data and a hypothetic-deductive approach is also employed. The scope of the research area is the Atlantic Coast of Cameroon covering the cities of Douala, Kribi and Limbe. The paper argues that there is a strong need for effective policies to curb the spread of IAS and at the same time raise awareness on the dangers of IAS on the Cameroon marine ecosystem.

Keywords: Invasive aquatic species, Policy formulation, Atlantic coast of Cameroon

List of Figures

List of Tables

List of Acronyms

IRAD	Institute de Recherche Agronomique et de Développement
IASNMAP	Invasive Aquatic Species National Management Action Plan
IAS	Invasive Aquatic Species
EEZ	Exclusive Economic Zone
NIC	National Institute of Cartography
NGO	Non-Governmental Organization
CIG	City Information Group
IUCN	International Union for Conservation of Nature
GCLME	Guinea Current Large Marine Ecosystem
UNEP	United Nation Environmental Program
CBD	Convention on Biological Diversity
WWF	World Wildlife Fund
NACA	Network of Aquaculture Centers in Asia-Pacific
FAO	Food and Agricultural Organization
NTF	National Task Force
NP	National Policy
NSF	National Strategic Framework
AP	Auditing Programme
UNCLOS	United Nations Convention on the Law of the Sea
EPA	Environmental Protection Agency
BWM	Ballast Water Management
LA	Lead Agency

Chapter 1 General Introduction and Background

1.1 Introduction

As defined by Munyaradzi and Jennifer[1], invasive Aquatic Species are native species of a particular region, but have invaded an area outside their native range either intentionally or unintentionally, threatening the whole ecosystem. There are so many definitions of IAS but almost all of the definitions make mention of negative environmental impacts.

About one-third of the surface of the earth is covered by water. These water bodies range from semi-enclosed, enclosed seas, open oceans, estuaries, rivers, lakes and coastal areas. They serve as a means of transportation for people as well as merchandise. Approximately, 90% of the world's goods are transported on the ocean (Tamelander et al., 2010). Unfortunately this transport system has turned out to be a form of pollution with drastic repercussions. This type of transportation has polluted the marine milieu with unwanted species. This pollution affects and transforms the environment and the population.

The brain behind this is the modernization of the shipping industry. Wooden ships have been substituted with ships constructed of steel and mobilized by engines thus increasing the speed of travel. The outcome of this has been the dissemination of IAS beyond their national jurisdiction. A study carried out in 2003 posits that around ten thousand diverse species are conveyed between bio-geographic regions (Bax et al., 2003). These species are either cysts, pores, larvae, eggs or even adults. Another study suggests that around 700 species are spread each day around the world through ballast water (Tamelander et al., 2010). A study undertaken by Sandlund et al. (2001) finalizes that in every nine weeks an alien marine species invades a new environment somewhere in the world. The conclusions of these authors signify that more and more organisms are swept around the world than used to be centuries before. This also portray that no country is exempted from these invaders. It is acknowledged that some of these species die because they are too fragile to endure long journeys, those that remain are unable to fall in love with the environmental conditions at their new location. In some situations when environmental conditions become favorable some species fail to establish. Those that are fortunate to establish sometimes break down and become non-invasive. But are capable to invade after a very long period of time. (Bax et al., 2003).

The pathways for the spread of IAS have multiplied, from ballast water, to aquaculture, to aquarium and ornamental trade and other minor pathways. With an increase of these vectors the rate at which Invasive Aquatic Species (IAS) are establishing in marine ecosystems is increasing at an increasing rate.

[1] http://www.unep.org/DEWA/Africa/docs/en/aeo-2/chapters/aeo-2_ch10_INVASIVE_ALIEN_SPECIES.pdf accessed on 16th of April 2015

We believe the world is looking at the threats of these invaders as if it is a fiction. This threat is moving faster than efforts to address it. Unlike other environmental problems Invasive Aquatic Species (IAS) are likely to be serious, persist and disastrous. Exotic species can result in ecological, economic, social, political and health impacts. In 2005, the Millennium Ecosystem Assessment anticipated that the side effects of IAS in the future will grow in intensity especially in continental shelf and littoral areas[2]. This prediction puts Cameroon at a high risk and is a reminder to the government that, the country should not be subjected to a future that is beyond their capacity to fix. There is an urgent call for the development of a national strategy.

Cameroon with an open coastline of 402 km[3] lies in the Atlantic Ocean and stretches from the Gulf of Guinea. There are several ports along the coastline. These are the Douala, Kribi and Limbe ports. The Douala handles more than 95% of the Cameroon's international trade and harbors more than 80% of Cameroon's industries (Ngoran and Xue, 2014). Shipping plays a very important role for the development of Cameroon's economy. The productivity in this area has helped in development and also facilitated human settlement along the coast. The Atlantic Ocean has served as a route for transportation in Cameroon for both people and merchandise. Therefore, Cameroon like any other coastal state is not spared from the threats of exotic species.

Thus, there is need for a national strategy to handle this problem. Threats from non-native species are urgent and growing and would ultimately define the contours of this century more dramatically than any other issue. They can create and modify a habitat. They are capable to eat or outnumber native fauna and flora and lead to their extinction. Furthermore they can act as disease vectors. They can as well affect Marine Protected Areas (MPA), coastal management like fishing and marine mammal conservation. Another reason for a cry for national strategy is that management efforts of IAS are not covered in national legislation. If they are, they are not comprehensive, inclusive and specific enough. As a responsible developing country, Cameroon should make greater efforts to address IAS threats.

1.1.1 Problem Statement

The search to preserve the marine world from various forms of pollution has been the subject of most academic debate. Cameroon has a coastline on the Atlantic Ocean which stretches 402 km from the Gulf of Guinea[4]. The coast is blessed with natural wonders, unlimited access to fishing, swimming, ecosystems and shipping. Due to the open nature of the coast it then has the potential risk of harboring IAS. This heritage is

[2] www.unep.org/maweb/documents/document.766.aspx.pdf accessed 10th of April 2015
[3] SESRTCIC data, 2006

therefore threatened and this jeopardizes recreation and the delicate ecological order. It is time for the government of Cameroon to take this threat seriously. Sadly enough non indigenous species are brought about by human activities and are plaguing the coast of Cameroon and have become an imminent threat. These alien species represent an increasing global change and present efforts to mitigate them, though successful in some locations and situations are not regulating the general problem. This failure has been the result of weak and/or lack of policies, inadequate research, and dearth of management funding as well as loopholes in scientific knowledge. Continuous lack of policies targeting all the vectors of this spread only go further in aggravating the economic, socio-political and health impacts of the population. This implies that IAS poses a serious and escalating threat on the Atlantic coast of Cameroon and requires urgent action.

There is need for coherent policies to address this set back. Acknowledging that alien species have been extensively studied, no empirical scientific data exist on the invaders of Cameroon. Research is being carried out worldwide on the impacts, causes, management of exotic aquatic species but there is limited understanding of how strict policies could help curb the threats of these alien species. The question this thesis seeks to answer is: Can policies serve as a tool to mitigate the spread of IAS?

1.1.2 Objectives

The Atlantic coast of Cameroon is at risk. Unwanted species have invaded this beautiful environment and the consequences are alarming. For this reason and many other reasons already outlined above, the objectives of this work are the following:

1. Identify Alien Aquatic Species on the Atlantic coast of Cameroon.
2. Outline the different vectors of Invasive Aquatic Species.
3. Portray the impacts of IAS on the Atlantic coast of Cameroon.
4. Examine the management efforts and constraints faced.
5. Emphasize on the formulation of policies as a tool to mitigate unwanted species

1.1.3 Research Questions

A number of questions are designed to lead towards a better understanding of IAS on the coast of Cameroon. The following are the research questions that guide this work:

1. What are the Invasive Aquatic Species on the coast of Cameroon?
2. What are the different vectors or pathways for these species?
3. What are the environmental impacts of Alien Aquatic Species on the coast of Cameroon?