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## **Influences on the Successful Implementation of the Convention on Wetlands of International Importance (Ramsar) among Member Countries**

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INFLUENCES ON THE SUCCESSFUL IMPLEMENTATION OF THE CONVENTION ON  
WETLANDS OF INTERNATIONAL IMPORTANCE (RAMSAR) AMONG MEMBER  
COUNTRIES

A Thesis

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by  
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## ABSTRACT

Wetlands are very dynamic ecosystems and are featured all over the world's landscape. Recent studies suggested that wetlands are in continuous decline, both in quantity and quality and between 64-71% is the estimated global wetland loss in the 20<sup>th</sup> century (Davidson 2014; Gardner et al., 2015). Therefore, as wetland loss increases around the world, more effort to protect and restore wetland habitat, values, and services become crucial. For this reason, the Ramsar Convention was established four decades ago to highlight the severity of wetland loss and to produce guidelines that aim to guide Contracting Parties toward sustainable and efficient management of their wetlands natural resources. To date, 169 countries have signed the agreement and become Contracting Parties. The research questions addressed in this study are: Which Ramsar Member Countries are more able or willing to participate in the Convention and successfully implement its milestones or pillars? What factors account for variation in the level of commitment to the Ramsar Convention among Contracting Parties? What is the role of the Ramsar's Convention in protecting wetlands in urban sites? Using information available through the Ramsar Convention administration, more successful implementation at the sites level is indicated by three variables: the *number of years since entry into force* to the Ramsar Convention, the *number of designated sites*, and the *number of available management plans*, aggregated through Principal Components Analysis (PCA).

Next, Thirteen independent variables were selected to examine their relation to the dependent variable, level of policy development for wetlands protection at designated sites level. These independent variables were categorized as follows: socioeconomic attributes, environmental pressures, government type, and programmatic characteristics. Statistical analysis including bi-variate Correlation analysis, and multiple regression analysis were used to identify



key influences that play a role in the successful implementation of the Ramsar Convention among Member Countries and, thus, reduce wetland loss.

Overall, the findings suggest that the commitment to protect wetlands may be more easily achieved in countries with the government and societal infrastructure to better support human health and well-being. Countries with fewer elements of such infrastructure appear to face additional challenges in protecting wetlands.

## **CHAPTER 1: INTRODUCTION**

Ramsar Convention is the only global treaty that focuses on a single ecosystem: wetlands. Thus, it is important to understand and recognize the extent and rate of wetland loss or degradation worldwide. Globally, wetlands are in continuous decline, both in quantity and quality. Between 64-71% is the estimated global wetland loss (Davidson 2014; Gardner et al., 2015). Consequently, a shrinkage in wetland values and services provided to peoples appeared. Ramsar Convention through its objectives and guidelines provided to Member Countries and their policymakers strive to reverse the extent of wetland degradation which can't be achieved without immediate actions and support by Contracting Countries. Such immediate steps should emphasize the wise use of all wetlands through strengthening wetland assessment, monitoring and restoration efforts. Thus, the policy development at Ramsar sites level is a necessity.

The purpose of this study is to identify key influences that play a role in the successful implementation of the Convention on Wetlands of International Importance (Ramsar) among Member Countries and thus reduce wetland loss.

The first research question is to examine which Ramsar Member Countries are more able or willing to participate in the Convention and successfully implement its milestones or pillars. To better achieve the implementation of the Ramsar Convention, Member States have to develop, adopt and apply policies (management plans) for their individual wetland sites. Countries' awareness of wetland benefits and their recognition of the critical contribution of wetlands to human well-being, livelihoods, and people's health, as well as to biodiversity, are important outcomes that can be delivered only through maintaining and restore wetlands ecological character.

The second research question is to identify what factors account for variation in the level of commitment to Ramsar Convention among Contracting Parties.

The third research question focuses on the role of the Ramsar's Convention in protecting wetlands in urban sites by exploring if the level of urban development in Member Countries has an effect on its efforts on protecting wetlands in urban areas. To address these research questions, a number of dependent and independent variables are identified through literature review and will be explored and analyzed by conducting a multiple regression analysis.

### **1.1 History and Mission of Ramsar Convention**

The Convention on Wetlands or the Ramsar Convention is an intergovernmental treaty adopted on 2 February 1971 in Ramsar city in the Islamic Republic of Iran and entered into force in 1975 (Gardner et al., 2009; Ramsar Convention Secretariat 2013). The Ramsar Convention is the first of the modern global intergovernmental treaties on the conservation and sustainable use of natural resources. The step for Ramsar Convention establishment was to call for international attention regarding the vanishing of wetland habitats mainly because of the general lack of understanding about the importance of wetlands and their ecosystem values, functions, services and goods. Moreover, many wetlands lay across the boundaries of two countries or more and are dependent on the quality and quantity of the transboundary water supply between them. Thus, the existence of international framework that unifies all the efforts to understand, restore, and minimize wetland degradation was necessary to ensure continuous international discussion and cooperation toward mutual wetland welfares (Ramsar Convention Secretariat 2013).

The Ramsar Convention mission is “the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world” ([www.ramsar.org](http://www.ramsar.org); Ramsar Convention Secretariat 2013). The United Nations Educational Scientific and Cultural Organization

(UNESCO) is the official depositary agency for the Convention. The Ramsar Secretariat is the administrative body of the Convention and is housed in the headquarters of the International Union for Conservation of Nature (IUCN) in Gland, Switzerland, under the authority of the Conference of the Parties and the Standing Committee of the Convention (Ramsar Convention Secretariat 2013).

The Convention official name is “*The Convention on Wetlands of International Importance especially as Waterfowl Habitat*”. This name originated from the importance of conservation and wise use of wetlands primarily as habitat for waterbirds. Over the years, wetland conservation and wise use scope of implementation grows broadly to cover all aspects related to wetlands and their critical values and services for the well-being of human communities which is in fulfillment of the full scope of the Convention text. For this reason, the use of the shorter name “*Convention on Wetlands (Ramsar, Iran, 1971)*” is commonly used and completely appropriate (Ramsar Convention Secretariat 2013).

The Ramsar Convention approach in defining wetlands is broadly determined and under the text of the Convention wetlands are defined as: “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters” (Ramsar Convention Secretariat 2013:7). The Ramsar Convention definition of wetlands didn’t use some important wetland identification terminologies like watershed and river basin which in return didn’t reflect the essential ecological processes of the interlinkages between coastal and freshwater systems. However, this broad wording of the text provides the basis for the development of more detailed classification under domestic legislation and wetland management activities by each Contracting Party individually (Shine and de Klemm 1999).

Furthermore, Ramsar Convention acknowledged that for the purpose of preserving coherent sites to be included in the Ramsar List of Internationally important wetlands: “may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands” (Ramsar Convention Secretariat 2013:7). By which wetland major types are recognized as follows: (1) marine (coastal wetlands including coastal lagoons, rocky shores, and coral reefs); (2) estuarine (including deltas, tidal marshes, and mangrove swamps); (3) lacustrine (wetlands associated with lakes); (4) riverine (wetlands along rivers and streams); (5) palustrine (meaning “marshy” – marshes, swamps and bogs); and Human-made wetlands including fish and shrimp ponds, farm ponds, irrigated agricultural land, salt pans, reservoirs, gravel pits, sewage farms and canals (Ramsar Convention Secretariat 2013).

## **1.2 The “three pillars” and procedures of Ramsar Convention**

Under Ramsar Convention Member Countries have an obligation to conserve and wisely use “all its wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world”, and to implement the “*three pillars*” of the Convention:

- 1) to work towards the “wise use” of all its wetlands through national land-use planning, appropriate policies/strategies and legislation, management actions and public education (Trouwborst 2016; Gardner et al., 2009; Ramsar Convention Secretariat 2013);
- 2) to designate suitable wetlands for the List of Wetlands of International Importance (“Ramsar List”) and ensure their effective management (Gardner et al., 2009; Ramsar Convention Secretariat 2013);

- 3) to cooperate internationally concerning transboundary wetlands, shared wetland systems, shared species and development projects that may affect wetlands (Gardner et al., 2009; Ramsar Convention Secretariat 2013).

The first obligation places the concept of “wise use” as a “forerunner of, and compatible with, the notion of sustainable use or development” (Gardner et al., 2009). Contracting Parties can recognize this obligation through series of factors and they are “wetlands, people and human institutions; land and water use within and beyond national boundaries; different economic sectors; public and private actors, including non-governmental organizations; scientific, economic and legal disciplines; legal instruments at international, domestic and local level; and regulatory and incentive-based approaches to wetland management” (Shine and de Klemm 1999:xiii). Furthermore, to satisfy the obligation of wise use Member Countries should develop and adopt national wetland policies that include various implementation programs such as wetland inventories, monitoring, education, and research (Gardner et al., 2009).

The second pillar requires Ramsar Contracting Countries at the time of joining Ramsar Convention to designate at least one site to be included in the List of Wetlands of International Importance (the “Ramsar List”). This action by Member Countries showcases government’s commitment and recognition of wetland importance and their willingness to take all steps necessary to ensure the healthy status of their designated sites. According to Article 2.3 of the Convention text, “the inclusion of a wetland in the List does not prejudice the exclusive sovereign rights of the Contracting Party in whose territory the wetland is situated”( Ramsar Convention Secretariat 2013:50). The majority of Ramsar designated sites were selected on a voluntary basis. For that reason, “a Party may designate one Ramsar site or many” (Gardner et al., 2009:259). After the accession of the Convention, Member Countries are expected to extend

the area of already designated sites by designing additional suitable wetlands following the Convention's nine Criteria for identifying Wetlands of International Importance (Ramsar Convention Secretariat 2013). The first criteria characterize wetland types by how rare and unique they are at their biogeographical region. The following eight criteria's are biodiversity criteria. These standards emphasize Ramsar Convention goal on sustaining and restoring wetlands by focusing on sites diversity of ecological communities, waterbirds and fish species (Ramsar Convention Secretariat 2015c). Furthermore, Contracting Parties to the Convention are required to "promote the conservation of wetland..." whether included in the "Ramsar List" or not to enhance and provide adequate protection for these sites (Trouwborst 2015).

International cooperation is the third pillar of Ramsar Convention and Members are obligated to participate in Ramsar organizations. The "*Conference of the Contracting Parties*" or COP is of these organizations, and it is held every three years (Gardner et al., 2009). In the COP the Ramsar Convention views, text and priorities are developed and constructed taking into account world's changing perceptions and environmental trends. Additionally, in the COP Member Countries are part of the discussion, revision, adaptation, and promotion of the following: further development and implementation of Ramsar Convention, status of designated sites, technical and policy guidance for Contracting Parties affected wetlands cooperative activities, reports from international organizations, and the Convention's Secretariat budget for the following three years (Ramsar Convention Secretariat 2013).

As noted in the Ramsar Convention Manual 6<sup>th</sup> edition, "The Ramsar Convention is not a regulatory regime and has no punitive sanctions for violations of or defaulting upon treaty commitments – nevertheless, its terms do constitute a solemn treaty and are binding in international law in that sense" (Ramsar Convention Secretariat 2013:14).

### 1.3 The Ramsar Convention Today

As of February 2016, 169 Contracting Parties are listed under Ramsar Convention. More than 2,225 wetlands around the world have been designated as Ramsar sites of international importance (Figure 1), covering more than 214 million hectares (Ramsar Convention Secretariat 2016).

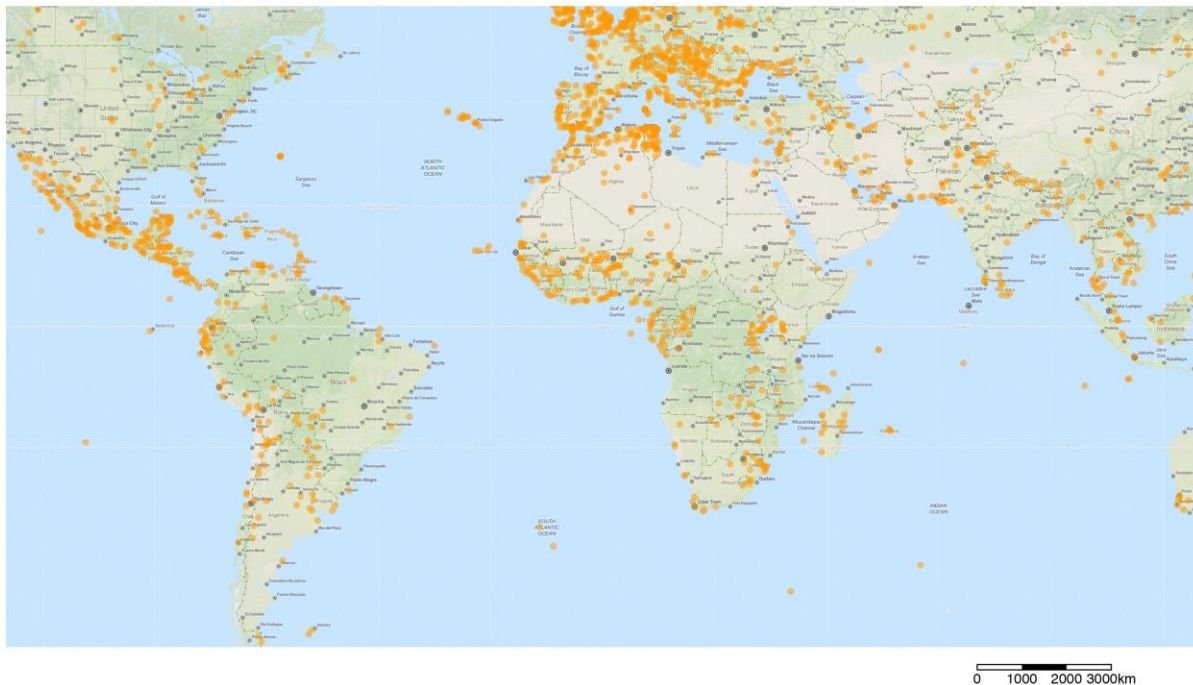


Figure 1: All published Ramsar Sites (rsis.ramsar.org 2016)

Ramsar Member Countries are categorized into six regions (Africa, Asia, Europe, Latin America and the Caribbean, North America, and Oceania) usually referred to as Ramsar regions. Based on this regionalization the operation of the Convention is structured, concerning “the structure of the Standing Committee, the organization of Secretariat staff and duties, and the ways in which Contracting Parties cooperate through regional representation and meetings” (Ramsar Convention Secretariat 2013:42).



This first chapter has presented an overview of the research questions and objectives along with a history of the Ramsar Convention and its mission. The next chapter presents related research concerning wetlands and the implementation aspects through the Ramsar Convention obligations to reduce wetland loss. Findings from these studies were used to help formulate the research questions and objectives, and identify indicators of effective implementation or commitment to the Ramsar Convention. The third chapter contains a detailed description of data selection methods that were used to acquire data related to successful implementation of the Convention and the statistical methods used to analyze the data. The fourth chapter presents the results of the analyses. The fifth chapter includes a discussion of the results, suggestions for future research, and a summary of findings. References, appendices with data used in the analyses follow the fifth chapter.

## **CHAPTER 2: RELATED RESEARCH**

### **2.1. Wetlands and their Services**

Wetlands are very dynamic ecosystems and are featured all over the world's landscape. Geographically it is widely distributed in upland and coastal areas. Moreover, wetlands are considered one of the most productive and diverse ecosystems (Rivera-Monroy et al., 2011). As well, wetlands are connected to other systems like rivers, lakes, and streams, and play an essential role in ensuring connectivity and sustainability of these systems through the services they provide. Keddy et al. (2009) acknowledged these ecosystem services and stated them as follows: (1) wetlands as recharge water supplies in northern glaciated prairies and storage for melted snow runoff. (2) Wetland as shoreline stabilizer because of their ability to retain sediments and thus reduce erosion. (3) Wetlands as purifiers that work to improve water quality and act to reduce risks associated with eutrophication. (4) Wetlands as carbon sinks through the process of carbon sequestration, this service has an important implication for global climate change. Between 400 and 500 gigatons (Gt) of carbons are stored in global peatlands. (5) Wetlands as flood control through their ability to store large amounts of water. (6) Wetlands as habitats for plant and various animal species. (7) Wetlands as the provider of consumer products to people like timber, fish, shellfish and other products including medicines. (8) "Wetlands are used for a broad range of consumptive and nonconsumptive recreational activities" (Keddy et al., 2009:40).

### **2.2 Wetland loss and degradation**

Wetlands in the world are subjected to many continuous changes, natural and based on human activities. The natural changes include processes like flooding, sea level rise, subsidence, erosion, siltation, and drought (Shine and de Klemm 1999). Changes based on human activities are characterized by changes in land use associated with increased grazing and agricultural

activities. Moreover, the increased canalization infrastructure development in coastal areas and river valleys such as dams, water diversions, levees, and canals are of these changes that have negative impacts on wetland ecosystems (Ramsar Convention Secretariat 2015b). “It is human activities that have significantly altered the rate and nature of wetland change particularly over the last century” (Shine and de Klemm 1999:13). Any destruction or degradation of wetlands water quality and quantity can have major effects on wetlands productivity and human health such effects include limited access to safe water, food production, economic development, and geopolitical stability (Keddy et al., 2009; Ramsar Convention Secretariat 2013) and consequently reduce the services provided by these ecosystems.

Wetland loss is defined as the conversion of wetlands because of human activities to non-wetland areas, whereas wetland degradation is characterized by the diminishing of wetland’s ecological functions as a result of human activities (Shine and de Klemm 1999). Between 64-71% is the estimated global wetland loss since 1900 (Davidson 2014; Gardner et al., 2015; Ramsar Convention Secretariat 2015b). Rivera-Monroy et al. (2011) suggested that as “space becomes more limited, and landscape fragmentation increases, competition over land area for development and related human activities will certainly limit management options/decisions related to the conservation and rehabilitation/restoration of wetland ecosystems, especially at large spatial scales” (Rivera-Monroy et al., 2011:185). So, as wetland loss increases around the world, more effort to protect and restore wetland habitat, values, and services become crucial. For this reason, Ramsar Convention was established four decades ago to highlight the severity of wetland loss and to produce guidelines that aim to guide Contracting Parties toward sustainable and effective management of their wetlands natural resources.

## **2.3 Implementation of Ramsar Convention's Pillars**

The implementation of the Ramsar Convention requires a strong political will and commitments. In addition to effective legal and institutional frameworks, to protect the interest of wetland user groups, especially the poor and vulnerable communities, against adverse impacts caused by human activities to the ecological processes. Decision makers must be fully aware of the risks of poor management of wetlands and know that polluted wetlands and degraded watershed are harmful to human health while well-managed wetlands provide clean water and support human health and livelihoods.

Member Countries of the Ramsar Convention are obligated to implement the wise use concept to sustain, promote, protect, and understand its processes and dynamics of wetlands to efficiently preserve its benefits for present and future generations. Wisely using and restoring wetlands is a complex and challenging process that requires joint efforts from national and international bodies (MacKay et al., 2009). Creating this balance of the efforts at national and international levels is important. This blend between the two levels could be achieved by enhancing the awareness aspects of wetland functions and values (Bowman 2002). The Ramsar Convention Secretariat through its comprehensive website, STRP (Scientific and Technical Review Panel), and CEPA (Communication, capacity building, Education, Participation and Awareness) programs contributed actively in the dissemination process of required information needed by Member Countries to better implement the Convention within their territories.

### **2.3.1 Implementation of Ramsar Convention at National Level**

The implementation of Ramsar Convention at the national level is one component to address the wise use concept and can be achieved through following these goals: site designation, National Wetland Policies and Institutions, Site Management, and Reports on Implementation (Bowman 2002). The first goal is site designation that greatly depend on the

officials' willingness to designate sites and commit to Ramsar obligations and activities. The first recommended step to Member Countries before site designation is to conduct a national wetland inventory. Wetland inventories serve as a baseline for measuring change in wetlands, for identifying functions and services, for locating wetlands, and for identifying priority sites for conservation. Wetland inventory planning and management enables comparisons among wetlands management techniques at different levels of government (Ramsar Convention Secretariat 2013).

The second goal for implementation at the national level is about developing National Wetland Policies or Strategies. Under the Ramsar Convention this task is considered as one of the highest priorities. Besides, the Convention provides guidelines to help assist this process and provides technical assistance to Contracting Parties when requested (Bowman 2002). The general objective of the development of a National Wetland Policy is to improve people's health and well-being and ensure harmony with wetland conservation and wise use goals.

The third goal for implementation at the national level is site management. Effective management is the key to implementing this goal successfully. Thus the development and adoption of effective management plans at site levels are extremely imperative. Bowman (2002) specified that sites lacking effective management are at risk, and their environmental quality is likely to decline. When national and regional programs were reviewed, it was found that Countries with stronger national programs were more active in implementing international Conventions. The opposite was found to be associated with Countries lacking or with weaker wetland protection programs - their participation in international agreements was very limited (La Peyre et al., 2001).

The final goal is to produce a Report on Implementation. Member Countries have a responsibility to report to the Convention on their progress in meeting their commitments to Ramsar. The instrument used for reporting is a National report that is produced every three years and submitted to the Conference of the Parties (COP) (Bowman 2002). Additionally, Parties are expected to report to the Ramsar Secretariat regarding threats compromising the ecological character of their designated sites and “to respond to the Secretariat’s inquiries about such reports received from third parties” (Ramsar Convention Secretariat 2013:16).

#### 2.3.2. Implementation of Ramsar Convention at International Level

The implementation of the Ramsar Convention at the international level could be achieved through the work of the “Conference of the Contracting Parties” or COP (Bowman 2002). The COP is “the policy-making organ of the Convention which adopts decisions (Resolutions and Recommendations)” (Ramsar Convention Secretariat 2013:33). In the COP the Ramsar Convention views, text and priorities are developed and constructed taking into account world’s changing perceptions and environmental trends. Government representatives from each Member Countries are allowed to vote on the COP documents. On the other hand, NGO’s (non-governmental organizations) are authorized to participate in the COP as non-voting observers. The COP meetings provide an opportunity to consider evolving environmental issues concerning wetland protection and provide Parties guidance for better implementation. The Ramsar Convention COPs have earned a reputation for being highly effective events through their roles in allowing active involvement of governmental, non-governmental and academic communities (Ramsar Convention Secretariat 2013).

#### **2.4 Factors influencing the implementation of the Ramsar Convention**

Several reports submitted to the Ramsar Convention by Contracting Parties have recognized some of the main factors or difficulties affecting proper implementation of the

Convention among the Member Countries. These influences are a combination of factors including the following (Ramsar Convention Secretariat 2015d):

1. Institutional issues and lack of recognition of the importance of wetlands by policy makers;
2. Lack of appropriate policies for wetland conservation;
3. Lack of information and awareness for effective preservation and management;
4. Difficulties in the coordination of efforts to align multiple constituencies (focal points, national agencies, site managers) in spite of shared visions and interests;
5. Insufficient resources for efficient management of Ramsar Sites;
6. Threats facing wetlands and Ramsar Sites;
7. Pressure on wetlands due to economic development and the lack of land- use planning; and
8. Climate Change /Climate Variability.

Since the participation in the Ramsar Convention is based on voluntary actions then the Countries commitment and compliance to the Convention obligations is an important factor in understanding the effectiveness of their efforts toward wetland protection. In some cases legislations are available but the poor enforcement of wetland conservation rules and standards is the problem. There are three main factors that may lead to for problems in enforcement. They are “the absence of proper monitoring and surveillance procedures which are necessary in many cases to identify violations; the absence of legally-backed rights to environmental information and participation in decision-making; and most fundamentally, the lack of political will and widespread public awareness of and support for the objectives and requirements of the legislation” (Shine and de Klemm 1999: 259). Koester (2012) as well recognized that compliance and enforcement are crucial and classified them as a chronic disease at five biodiversity-related treaties including Ramsar. This article concerned the general obligations of

Ramsar and the author noted that “for these obligations to become operational, guidance by means of COP-decision is needed. Such decisions are normally not legally binding. Accordingly, instances of non-compliance with decisions cannot be subjected to usual compliance procedures” (Koester 2012: 69). Koester concluded that treaties with general obligations are ineffective and will remain like that unless their duties are amended to clear and concrete requirements.

## **2.5 Strategies to strengthen the implementation of Ramsar Convention**

Strategies to strengthen Ramsar implementation in Member Countries can be achieved by working on minimizing the factors hampering the implementation at the first place. One of the main strategies is the increase of stakeholder involvement. Involvement of all stakeholders, including local communities, in designing and then implementing any sectoral management plan that may impact resource systems within the hydrological basin of wet areas, will be a critical asset for a successful management of wetlands (Ramsar Convention Secretariat 2013). Additionally, a positive step would be the enhancement of the capacities of local people whose livelihoods depend on the functioning of natural inland and coastal wetlands, to react and adapt to the global changes, and use wetland goods and services wisely. Moreover, increasing the restoration effort of the degraded wetlands to enhance their resilience to climate change could bring multiple benefits to the Member Countries.

Several studies have looked into the implementation aspects of Ramsar Convention in different countries. Sun, Zhigao, et al. (2015) recommended the following strategies for improvement of China’s coastal wetland conservation. First, exploring effective measures in response to major threatening factors affecting coastal wetland stabilization and they are coastal erosion, sea-level rise, and biological invasion. Second, improving the conservation and compensation systems for coastal wetlands. Third, strengthening wetland legislation and



management. Fourth, increasing funds for coastal wetland conservation and research. Fifth, strengthening coastal wetland education and international cooperation.

Another study with recommendations to strengthen the Ramsar Convention in the United States was conducted by Gardner and Connolly (2007) based on a national survey of U.S Ramsar Sites. The authors suggested, a reordering of priorities within existing programs at different institutional levels starting from the federal government to site managers and local communities. They also suggested the following recommendations for strengthening Ramsar implementation in the U.S. First, the importance of continuous engagement of the U.S at the international level should be recognized. Second, there needs to be greater promotion of Ramsar sites designation. Third, funding needs to be maintained or increased to support environmental projects at Ramsar sites. Fourth, funding needs to be secured to support for restoration work within Ramsar sites. Finally, it would be helpful to update the nomination procedures for Ramsar sites selection to encourage additional sites designation in the U.S.

## CHAPTER 3: DATA SELECTION

### 3.1 Dependent Variable- Policy development for designated sites

There are a number of mechanisms to help Ramsar Contracting Parties implement the Ramsar Convention on Wetlands at the National level. These mechanisms include the formation of National Ramsar Committees, national wetland strategies/policies, and the establishment of management plans. This study's dependent variable represents the level of commitment and implementation efforts to the Ramsar Convention as indicated by degree of policy development at the sites level. The dependent variable, policy development for designated sites, involves three indicator variables: *the number of management plans*, *the number of designated sites*, and *the number of years since entry into force to Ramsar Convention*.

The variable *management plans* is the number of available management plans in each designated Ramsar site. Having more management plans at designated sites indicates a higher level of policy development for wetland protection. The data regarding this variable was obtained from the "Ramsar Convention Information Service" webpage (<https://rsis.ramsar.org/>). The *designated sites* indicator variable is the number of sites designated as Ramsar Sites of International Importance by Member Countries. The *years since entry* indicator variable is the number of years since the country's accession to the Ramsar Convention (APPENDIX A).

### 3.2 Independent Variables

Thirteen independent variables are examined to see how they relate to the level of policy development at the sites level (Table 1).

Table 1- Independent Variables

Variable	Variable Definition	Data source
<i><u>Dependent Variable</u></i>		
Policy Development for designated sites	Policy development at sites level among Ramsar Member Countries based on aggregation of these three variables by PCA: the number of management plans, the number of designated sites, and the number of years since entry.	Ramsar Convention website (2016)
<i><u>Socioeconomic attributes</u></i>		
Human Development Index	A summary measure of average achievement in the main dimensions of human development.	Human Development Reports- United Nations Development Programme (2015)
National poverty line	The percentage of the population living below poverty line.	Human Development Reports- United Nations Development Programme (2015)
Public health expenditure	The percentage of governments (central, local) spending on health.	Human Development Reports- United Nations Development Programme (2015)
<i><u>Environmental pressure</u></i>		
Population density rates	Midyear population divided by land area in square kilometers.	The World Bank (2014)
Annual Population growth rates	The rate (%) at which population is increasing or decreasing in a giving year.	United Nations Statistics Division (2012)
Urban population	The percentage of the total population in urban areas.	United Nations Statistics Division (2012)
Population affected by natural disasters	Average annual population per million people requiring immediate assistance during natural disasters.	Human Development Reports- United Nations Development Programme (2015)

(Table 1 continued)

Variable	Variable Definition	Data source
Natural Resource depletion	Monetary expression of energy, mineral and forest depletion, expressed as a percentage of gross national income (GNI).	Human Development Reports- United Nations Development Programme (2015)
Forest area	The percentage of land area that is forests.	Human Development Reports- United Nations Development Programme (2015)
<u>Government type</u>		
Regime type	The state of democracy worldwide expressed by regime type.	The Economist Intelligence Unit's Index of Democracy (2014)
<u>Programmatic Characteristics</u>		
Designated sites Total area	The total area of Ramsar designated sites in hectares.	Ramsar Convention website (2016)
National Wetland Policy	The existence of National Wetland Policy in Ramsar Member Countries.	Ramsar Convention National Reports to COP 12 (2015)
Language	The use of Ramsar official languages (English, Spanish, French) by Ramsar Member Countries.	Central Intelligence Agency, The World Factbook (2016)

These variables characterize important contextual conditions and attributes of the 169 Ramsar Member Countries and are categorized as follows: First, socioeconomic attributes of the nations which include the following: (1) *Human Development Index*, (2) *% of national poverty line*, and (3) *% of public health expenditures*. Second, indicators of Environmental pressures that include (1) *population density rates*, (2) *% of population growth rates*, (3) *% of urban population*, (4) *population affected by natural disasters*, (5) *% of natural resource depletion*, and (6) *% of forest area*. Third, Government regime type is ranked as follows respectively, 1= Full democracies, 2= Flawed democracies, 3= Hybrid regimes, and 4= Authoritarian regimes. Fourth,

Programmatic Characteristics obtained from Ramsar Convention database representing the current Member Countries at the Convention, and they are as follow: (1) *designated sites total area* in hectares, (2) *the existence of National Wetland Policy*, and (3) *Countries' official language* vs Ramsar official languages (English, Spanish, French). The selected variables represent a broad spectrum of factors that might influence the successful implantation of Ramsar Convention in Member Countries according to the Regional overview of the implementation of the Convention and its Strategic Plan at different Ramsar regions (Ramsar Convention Secretariat 2015d). It is useful to note that there are no prior studies that have examined each of these specific independent variables in the context of the Ramsar Convention.

### 3.2.1 Socioeconomic attributes

*The Human Development Index* (HDI) variable (Figure 2) “is a composite index focusing on three basic dimensions of human development: to lead a long and healthy life, measured by life expectancy at birth; the ability to acquire knowledge, measured by mean years of schooling and expected years of schooling; and capacity to achieve a decent standard of living, measured by gross national income per capita. The HDI has an upper limit of 1.0” (United Nations Development Programme 2015). This variable will broadly investigate the economic wealth of a country and its effect on environmental quality. La Peyre et al. (2001) provided an explanation regarding this question based on the hypothesis associated with the U-shaped environmental Kuznets curve (EKC). The EKC hypothesis advocates that initially, environmental quality will decrease with increasing per capita income and then increases as per capita income continuous to rise. It also suggested that at certain thresholds the increase in economic capital will result in improvements in environmental quality only if appropriate policy responses are made. “Evidence suggests that the EKC relationship may exist only for certain types of environmental degradation

(e.g., short-term and local impacts) rather than for environmental degradation that is more global, indirect, and has long-term impacts” (La Peyre et al., 2001: 862).

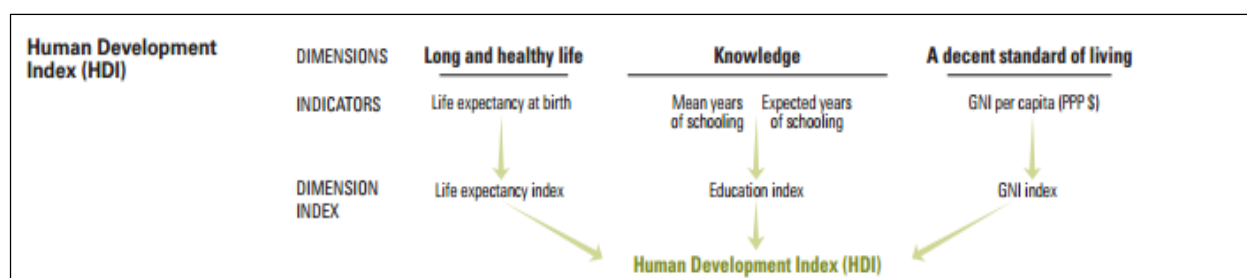


Figure 2: Human Development Index (HDI) and its Dimensions  
(<http://hdr.undp.org/en/content/human-development-index-hdi> 2016)

The *national poverty line* variable measures the percentage of the population living below the national poverty line from 2004 to 2014. This data is based on population-weighted subgroup and is gathered by countries authorities from household surveys. According to the Human Development Report 2015, worldwide about 795 million people suffered from chronic hunger between the year 2014 and 2016, 780 million of them were in developing countries. In contrast, 48% of the global wealth is owned by one percent of the world richest people. This means that countries with higher poverty rates are less likely to take actions to preserve its natural resources and biodiversity as their priorities are dedicated toward providing a better-living standard to the people.

The *public health expenditures* variable is a percentage of Gross Domestic Product (GDP) for the current and capital spending on health in 2013 by central and local governments. This measurement includes government’s budgets, social health insurance funds, and external borrowing and grants from nongovernmental organizations and international agencies. Sustaining health is a crucial element to ensure better living standards and safe environment. According to the Human Development Report 2015, globally in 2015, there was about 214

million recorded malaria cases resulted in 472,000 deaths. Malaria is a vector-borne disease that is prevalent in developing countries located in the subtropical and tropical areas. Its vast impacts on communities living there are associated with increased water pollution. Polluted water surfaces including wetlands create breeding grounds for malaria-carrying mosquitoes (Sheela et al., 2015).

### 3.2.2 Environmental pressure

The *population density rates* variable measures midyear population divided by land area in square kilometers for the year 2014. Population refers to all residents in the State except for unsettled groups or refugees. Land area relates to all inland water bodies including major rivers and lakes. The *% of annual population growth rate* variable is an estimated average for the period from 2010 to 2015 and refers to the rate at which the population is increasing or decreasing in a given year. The *% of urban population* variable directly measures the percentage of the total population in urban areas at the year 2012. The *population affected by natural disasters* variable measures the average annual number of people (expressed in per millions of individuals) requiring immediate assistance during a period of emergency as a result of a natural disaster. This measure accounts for displaced, evacuated, homeless and injured people. The *% of natural resource depletion* variable is a percentage of the sum of net forest depletion, energy depletion, and mineral depletion for 2013. The *% of forest area* variable measures the percentage of land area that are forests for the year 2013. These areas contain land with natural trees or planted trees, productive or not. This measurement excludes trees used in agricultural production systems and trees in urban parks and gardens. The above mentioned environmental pressures can have a direct effect on wetland sustainability and productivity if were not minimized. According to the Human Development Report 2015, about 1.3 billion people live on ecologically fragile land. Moreover, 40 % of world's population are affected by water scarcity. Conversely, if these

environmental pressures were reduced positive results could occur. The global net loss of forest dropped from an average of 8.3 million hectares a year to an average of 5.2 million hectares a year between 2000 and 2010 all due to countries contribution and effective restoration efforts including afforestation and natural expansion of forests (Human Development Report 2015).

### 3.2.3 Government type

The Government type variable is presented by the state of democracy worldwide expressed by regime type. Democracy is a form of government elected by the whole population or eligible member of a country. This data is obtained from the Democracy Index of 2014 which “is based on five categories: electoral process and pluralism; civil liberties; the functioning of government; political participation; and political culture. Based on their scores on a range of indicators within these categories, each country is then categorized as one of four types of regime: “full democracies”; “flawed democracies”; “hybrid regimes”; and “authoritarian regimes” (The Economist Intelligence Unit’s 2014: 1). Socio-economic stresses and other setbacks can affect countries performance and according to this report “Nations with a weak democratic tradition are, by default, vulnerable to setbacks” (The Economist Intelligence Unit’s 2014: 9) and their efforts toward environmental conservation (wetlands in particular) are minimized.

### 3.2.4 Programmatic Characteristics

The general category of Ramsar Convention programmatic characteristics is an attempt to measure the effort of wetland conservation by the activities recommended by Ramsar Convention and followed by Member Countries toward better implementation of the Convention.

The *designated sites total area* variable refers to the total area of Ramsar designated sites in hectares. The data regarding these variables was obtained from the “Ramsar Convention Information Service” (rsis.ramsar.org) and (Ramsar Convention Secretariat 2016).



The *National Wetland Policy* variable is categorical variable and measures the existence of National Wetland Policy in Ramsar Member Countries, and it was acquired following this rank respectively, 0= No National Wetland Policy, 1= National Wetland Policy is planned or under development, and 2= National Wetland Policy is in place or fully developed. The data regarding this variable came from Member Countries National Reports submitted as a requirement for COP 12. The data are missing for countries that didn't submit their National Reports for COP 12 was compensated from previous COPs 11 (Barbados, Czech Republic, Libya, Papua New Guinea, Saint Lucia, Sierra Leone, Venezuela, and Yemen) and 10 (Belize, Luxemburg, and Uzbekistan) correspondingly. A number of eight countries are still missing and they are Bahrain, Greece, Ireland, Jordan, Kuwait, Nicaragua, Syrian Arab Republic, and Turkey.

*Language* is another categorical variable and measures the use of Ramsar official languages including English, Spanish, and French by Ramsar Member Countries, where 0= Languages not employed by Ramsar and 1= Languages used by Ramsar. The reason behind the selection of this variable was because 69 countries out of the 169 Contracting Party uses languages other than Ramsar official languages and thus may challenge the implementation process of the Convention in these countries regarding the general understanding of Ramsar's requirements and the dissemination of its goals at the national level. The gathered data was obtained from the Central Intelligence Agency World's Factbook in the field of Languages, where languages are official, commonly used for most government and commercial purposes, and widely spoken or understood (Central Intelligence Agency 2016).

### **3.3 Methods**

As mentioned earlier, no previous study has examined the potential influence of these specific contextual factors and attributes on implementation of the Ramsar Convention.

However, the selection of the dependent and independent variables used in this study was based on the model presented in a similar earlier study by La Peyre et al. (2001) where they explained the variation in national wetland programs by the direct and indirect influences from the surrounding social, economic, political, and environmental characteristics.

This analysis was conducted using the SPSS version 22 statistical software package. The analyses conducted include the bi-variate Pearson Correlation Matrix, Principal Component Analysis (PCA), and multiple regression analysis. The Pearson correlation coefficient “is a measure of the strength and direction of association that exists between two variables measured on at least an interval scale” (Pearson's 2013). I used the Pearson Correlation Analysis to identify potentially high degrees of correlation between independent variables, prior to the multiple regression analysis. Independent variables that were found to have a correlation coefficient value ranging from 0.680- 0.700 and higher were not included together in the subsequent multiple regression analysis. A correlation coefficient value of .700 or higher suggests a strong uphill or downhill (positive or negative) linear relationship (Rumsey 2011).

In order to create the dependent variable indicating commitment to the Ramsar Convention, I used Principal Components Analysis (PCA) to aggregate three variables that reflect level of policy activity or development. They are: the *number of management plans*, the *number of designated sites*, and the *number of years since entry* into force to the Ramsar Convention. The PCA confirmed that these three variables can be aggregated to indicate commitment to the Ramsar Convention, and the Factor Score was retained and served as the dependent variable in the subsequent statistical analysis.

Next, multiple regression analysis was conducted to determine which of the thirteen independent variables account for variation in level of commitment to Ramsar Convention. The

multiple regression analysis is used to explain relationships among variables and the effect that the independent variables have on the dependent variable (Field 2013).

## CHAPTER 4: RESULTS

### 4.1 Principal Component Analysis

The *policy development for designated sites* dependent variable is the factor score that reflects the three variables retained after PCA based on the criteria described above. The common dimension, component or factor on to which these three variables loaded explained 75.7% of the variation in the observed data (Figure 3). The component matrix (Figure 4) shows which indicator variables can be sorted into the same component. This common factor indicates level of policy development for designated sites in this case. This component consist of the *number of years since entry into force* to Ramsar Convention ( $r=.713$ ), the *number of designated sites* ( $r=.951$ ), and the *number of available management plans* ( $r=.926$ ). These indicator variables showed a positive correlation with each other suggesting a strong underlying dimensions that led to the formation of this study dependent variable.

#### Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.271	75.713	75.713	2.271	75.713	75.713
2	.638	21.267	96.980			
3	.091	3.020	100.000			

Extraction Method: Principal Component Analysis.

Figure 3: PCA Results for Total Explained Variance

#### Component Matrix<sup>a</sup>

	Component
	1
Years since entry into force	.713
# of designated sites	.951
# of management plans	.926

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Figure 4: PCA Results for Component Matrix

The *total area of Ramsar designated sites* and the *existence of national wetland policy* variables are also linked to Ramsar Convention implementation process and were tested using PCA along with the above mentioned indicator variables. The results of this test didn't show a strong underlying common dimension and indicated that these two variables are not closely correlated with the other three, thus they were not used to create this dependent variable.

The data presented in (Table 2) show the factor score from the PCA of the three variables used to compute the dependent variable, "policy development for designated sites". A factor score is interpreted as a standard deviation, with higher positive score or 1.5 for example indicating that country is 1.5 standard deviations above the mean of all Member Countries in the three variables aggregated to create the factor score (Field 2013). The results present a general trend suggesting that the majority of Member Countries in the Ramsar Convention located at the top of the Table 2 have higher number of years ranging from 40-20 years since entry into force, which are associated with higher development of management plans and higher number of designated sites, and are more likely to show higher implementation potential at the national level. The opposite is true for new Member Countries to the Convention located at the tail of Table 2.

This PCA analysis was used to create the dependent variable, which when sorted in descending order answers the first research question of this study that is which Member Countries have a higher level of policy development to protect wetlands at sites level. It is logical that the three variables used to create the dependent variable are highly correlated with each other and indicate overall commitment to the Ramsar Convention goals. Member Countries with higher policy development at sites level are willing to participate in the Ramsar Convention and successfully implement its site designation pillar. Based on the results shown in (Figure 5;

Table 2) 31.9% of Countries had a positive mean value and the other 67.9% of the Countries were represented negatively below the mean value. This result suggests that about one third of the Ramsar Members have participated and implemented Ramsar second obligation at sites level successfully despite the variation of their positive mean values obtained from the PCA and summarized in Table 2. Values of the three variables used to construct the factor score used to indicate level of policy development for designated sites also are listed in Table 2.

According to the values shown in Table 2; Figure 5, the United Kingdom was ranked the highest with a factor score of (7.44) above the mean value, whereas Kuwait came last and its score was the lowest (-1.07). This suggest that U.K having listed 170 sites and other Member Countries have gone far beyond the minimum obligation of designating one Ramsar site. Most of U.K's sites are of relatively small size.

Table 2- Ranking of Member Countries based on Factor Score for Ramsar Policy Development at sites level

#	Country Name	Policy Development for designated sites	Number of years since entry into force (2015)	Number of designated sites	Number of Available Management Plans
1	United Kingdom	7.43752	39	170	144
2	Mexico	3.96699	29	142	51
3	Sweden	3.04165	40	66	58
4	Australia	2.65545	40	65	45
5	Spain	2.47234	33	74	40
6	Japan	2.07247	35	50	40
7	Norway	1.96774	40	63	22
8	Finland	1.95273	40	49	31
9	Italy	1.94897	38	52	31
10	France	1.54708	29	44	32
11	China	1.5154	23	49	34
12	Netherlands	1.4154	35	54	14
13	United States of America	1.40353	29	38	31
14	Canada	1.36847	34	37	25
15	Germany	1.26674	39	34	18

(Table 2 continued)

#	Country Name	Policy Development for designated sites	Number of years since entry into force (2015)	Number of designated sites	Number of Available Management Plans
16	Denmark	1.26539	37	43	14
17	Algeria	1.18746	31	50	13
18	Portugal	1.05555	34	31	18
19	Tunisia	1.02191	34	41	10
20	South Africa	1.01035	40	22	16
21	Hungary	0.88092	36	29	11
22	Ireland	0.80659	30	45	4
23	Russian Federation	0.80359	38	35	2
24	India	0.73114	33	26	11
25	Austria	0.69923	32	23	13
26	Ukraine	0.674	24	33	14
27	Islamic Republic of Iran	0.62535	40	24	1
28	Greece	0.61034	40	10	10
29	Switzerland	0.59885	39	11	10
30	Morocco	0.58474	35	24	5
31	Pakistan	0.58324	39	19	4
32	Poland	0.46296	37	13	6
33	Chile	0.45553	34	13	9
34	Bulgaria	0.42948	39	11	4
35	New Zealand	0.36161	39	6	5
36	Romania	0.29201	24	19	10
37	Argentina	0.29073	23	22	9
38	Belarus	0.25477	24	20	8
39	Czech Republic	0.24741	22	14	14
40	Ecuador	0.24456	24	18	9
41	Senegal	0.22699	38	5	2
42	Iceland	0.2155	37	6	2
43	Belgium	0.16865	29	9	7
44	Estonia	0.16145	21	17	10
45	Niger	0.13915	28	12	5
46	Jordan	0.12188	38	1	1
47	Peru	0.11775	23	13	9
48	Uganda	0.10844	27	12	5
49	Costa Rica	0.09853	23	12	9
50	Slovakia	0.07803	22	14	8

(Table 2 continued)

#	Country Name	Policy Development for designated sites	Number of years since entry into force (2015)	Number of designated sites	Number of Available Management Plans
51	Burkina Faso	0.07646	25	15	4
52	Bolivia	0.05604	25	11	6
53	Republic of Korea	0.03329	18	21	6
54	Ghana	0.02135	27	6	6
55	Mauritania	-0.0047	32	4	1
56	Nepal	-0.01469	27	10	2
57	Brazil	-0.01686	22	12	6
58	Guinea	-0.02467	22	16	3
59	Venezuela	-0.0261	27	5	5
60	Viet Nam	-0.02737	26	8	4
61	Gabon	-0.03143	28	9	1
62	Turkey	-0.06559	21	14	4
63	Serbia	-0.08105	23	10	4
64	Uruguay	-0.08286	31	3	0
65	Zambia	-0.08879	24	8	4
66	Mali	-0.0993	28	4	2
67	Thailand	-0.10373	17	14	7
68	Chad	-0.12475	25	6	3
69	Sri Lanka	-0.12475	25	6	3
70	Egypt	-0.13	27	4	2
71	Honduras	-0.13098	22	9	4
72	Guatemala	-0.13376	25	7	2
73	Lithuania	-0.14119	22	7	5
74	Suriname	-0.152	30	1	0
75	Kenya	-0.15298	25	6	2
76	Indonesia	-0.16694	23	7	3
77	Panama	-0.1722	25	5	2
78	Guinea-Bissau	-0.19142	25	4	2
79	Malta	-0.19915	26	2	2
80	Croatia	-0.20291	24	5	2
81	Philippines	-0.21935	21	6	4
82	Latvia	-0.22183	20	6	5
83	Congo	-0.23587	17	13	3
84	Cote D'Ivoire	-0.28076	19	6	4
85	Nicaragua	-0.28204	18	9	3
86	Slovenia	-0.2978	24	3	0



(Table 2 continued)

#	Country Name	Policy Development for designated sites	Number of years since entry into force (2015)	Number of designated sites	Number of Available Management Plans
87	Bosnia and Herzegovina	-0.30028	23	3	1
88	Armenia	-0.30276	22	3	2
89	Liechtenstein	-0.30801	24	1	1
90	The Former Yugoslav Republic of Macedonia	-0.31702	24	2	0
91	Bangladesh	-0.3195	23	2	1
92	Papua New Guinea	-0.32198	22	2	2
93	Madagascar	-0.32423	16	10	3
94	Mongolia	-0.33076	17	11	1
95	Trinidad and Tobago	-0.33099	22	3	1
96	Malaysia	-0.33474	20	6	1
97	El Salvador	-0.35366	16	7	4
98	Paraguay	-0.36297	20	6	0
99	Colombia	-0.37041	17	6	3
100	Albania	-0.37566	19	4	2
101	Namibia	-0.38219	20	5	0
102	Nigeria	-0.39466	14	11	2
103	Democratic Republic of Congo	-0.39488	19	3	2
104	Togo	-0.40141	20	4	0
105	Comoros	-0.42063	20	3	0
106	Gambia	-0.42559	18	3	2
107	Jamaica	-0.43707	17	4	2
108	Cambodia	-0.43955	16	4	3
109	Israel	-0.44481	18	2	2
110	Georgia	-0.47304	18	2	1
111	Belize	-0.47551	17	2	2
112	Kazakhstan	-0.4852	8	10	6
113	Cuba	-0.49076	14	6	2
114	Botswana	-0.49226	18	1	1
115	Malawi	-0.49226	18	1	1
116	Monaco	-0.49226	18	1	1
117	Lebanon	-0.49601	16	4	1
118	Benin	-0.49849	15	4	2

(Table 2 continued)

#	Country Name	Policy Development for designated sites	Number of years since entry into force (2015)	Number of designated sites	Number of Available Management Plans
119	United Republic of Tanzania	-0.49849	15	4	2
120	Luxembourg	-0.50374	17	2	1
121	Bahamas	-0.52049	18	1	0
122	Bahrain	-0.53197	17	2	0
123	Liberia	-0.54316	12	5	3
124	Republic of Moldova	-0.54594	15	3	1
125	Syrian Arab Republic	-0.55119	17	1	0
126	Burundi	-0.5599	13	4	2
127	Tajikistan	-0.56643	14	5	0
128	Mauritius	-0.57664	14	3	1
129	Libya	-0.59339	15	2	0
130	Saint Lucia	-0.59834	13	2	2
131	Kyrgyz Republic	-0.60983	12	3	2
132	Sierra Leone	-0.61261	15	1	0
133	Cyprus	-0.61508	14	1	1
134	Dominican Republic	-0.61636	13	4	0
135	Azerbaijan	-0.62409	14	2	0
136	Cameroon	-0.62507	9	7	2
137	United Arab Emirates	-0.63776	8	5	4
138	Uzbekistan	-0.6548	13	2	0
139	Equatorial Guinea	-0.66629	12	3	0
140	Seychelles	-0.67124	10	3	2
141	Palau	-0.6765	12	1	1
142	Marshall Islands	-0.68798	11	2	1
143	Sudan	-0.69947	10	3	1
144	Djibouti	-0.70473	12	1	0
145	Cabe Verde	-0.70848	10	4	0
146	Mozambique	-0.71621	11	2	0
147	Lesotho	-0.73543	11	1	0
148	Samoa	-0.73791	10	1	1
149	Central African Republic	-0.7494	9	2	1

(Table 2 continued)

#	Country Name	Policy Development for designated sites	Number of years since entry into force (2015)	Number of designated sites	Number of Available Management Plans
150	Antigua and Barbuda	-0.76614	10	1	0
151	Fiji	-0.76614	10	1	0
152	Myanmar	-0.76614	10	1	0
153	Barbados	-0.76862	9	1	1
154	Iraq	-0.77237	7	4	1
155	Montenegro	-0.77763	9	2	0
156	Rwanda	-0.77763	9	2	0
157	Sao Tome and Principe	-0.79685	9	1	0
158	Zimbabwe	-0.81179	2	7	3
159	Andorra	-0.85796	3	3	3
160	Yemen	-0.85826	7	1	0
161	Turkmenistan	-0.88897	6	1	0
162	Lao People's Democratic Republic	-0.90046	5	2	0
163	Bhutan	-0.93364	3	2	1
164	Grenada	-0.95286	3	1	1
165	Swaziland	-0.97336	2	3	0
166	Kiribati	-1.0118	2	1	0
167	Oman	-1.0118	2	1	0
168	South Sudan	-1.0118	2	1	0
169	Kuwait	-1.07321	0	1	0

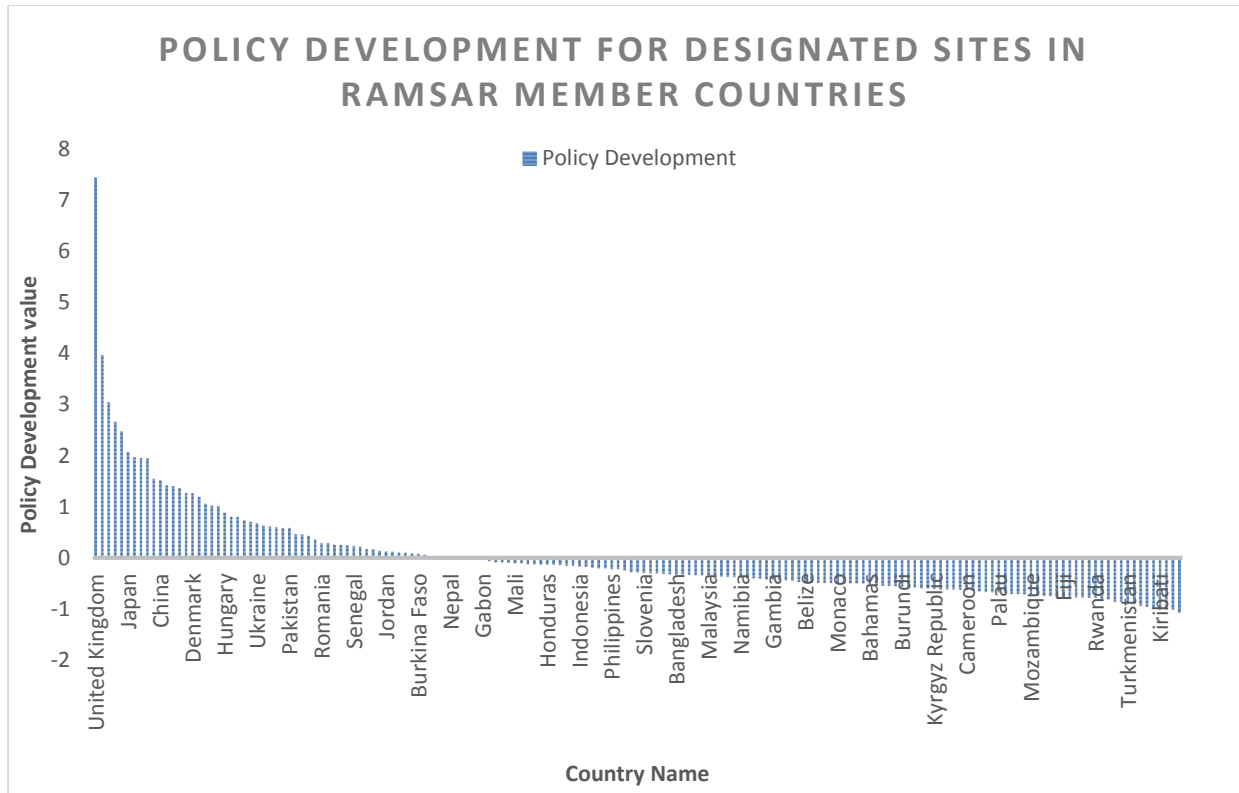


Figure 5: Policy Development for designated sites in Ramsar Member Countries

#### 4.2 Multiple Regression Analysis

Prior to conducting Multiple Regression Analysis, the independent variables were tested for potentially high levels of correlation using Pearson Correlation Coefficient analysis (APPENDIX C). The *Human Development Index* independent variable displayed a significantly positive correlated value of ( $r=.682^{**}$ ) with the % of *urban population* independent variable. The *HDI* independent variable also displayed significant negative correlated values with two additional independent variables and they are the *annual % of population growth* ( $r=-.706^{**}$ ) and the % of the *national poverty line* ( $r=-.785^{**}$ ). As stated in the methods section, independent variables that have a Pearson correlation coefficient value ranging from 0.680- 0.700 and higher will be considered too highly correlated to be used together in the multiple regression model. No other independent variables were found to be highly correlated, and thus were retained for inclusion in the multiple regression analysis.

According to the above results obtained from the Pearson Correlation analysis, the test to identify what factors account for variation in the level of commitment to Ramsar Convention among Member Countries (the second research question) was conducted by computing two multiple regression models.

Model (1) investigates the potential influence of the following independent variables (*Democracy Index, total Ramsar sites area, % of natural resource depletion, % of forest area, population affected by natural disasters, % of public health expenditures, languages used by Ramsar Convention, and developed national wetland policy*) when the *HDI* variable is available and the variables that were found to be significantly correlated with it were excluded from the test. They are the *% of urban population, annual % of population growth, and % of the national poverty line*. Alternatively, model (2) used the same independent variables used in model (1) with the exception that *HDI* was excluded and the variables correlated with it were included in the test. The reason behind this separation of variables and the formation of two models is to avoid multicollinearity/ high linear relationship between highly correlated variables (Field 2013). The collinearity condition index value for model (1) is 25.56 and model (2) is 19.8 respectively. Since these values are below 30 then the result confirm that these models are trustworthy and didn't create collinearity.

The multiple regression model (1) with all four predictors produced an Adjusted  $R^2$  of .360,  $F(10, 129) = 8.814$ ,  $p < .001$  (Figures 6, 7). On the other hand model (2) with the same predictors produced  $R^2 = .340$ ,  $F(12, 122) = 6.754$ ,  $p < .001$  (Figures 8, 9). The adjusted R square value for model (1) of .360 means that this model accounts for 36% of the variance of the dependent variable, the policy development for designated sites achieved. And the second model yielded an adjusted R square value of .340 (Figure 8) and accounts for 34% of the variance of the

dependent variable and policy development for designated sites is achieved. The ANOVA figure for both models approves that these results are highly significant, with calculated p values of less than .001.

Model (1) Summary <sup>b</sup>									
Model (1)	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.637 <sup>a</sup>	.406	.360	.83509990	.406	8.814	10	129	.000

a. Predictors: (Constant), YesNWP, Population affected by natural disasters 2005-2014, Total sites area in ha, Forest area (% of land area) 2013, Ramsar used Languages, Public Health Expenditure (% of GDP) 2013, Population Density 2014, Natural resource depletion (% of GNI) 2013 , HDI value , Democracy Index2014 (Overall Score)

b. Dependent Variable: Policy Development

Figure 6: Regression results for Model (1)

ANOVA <sup>a</sup>						
Model (1)		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	61.467	10	6.147	8.814	.000 <sup>b</sup>
	Residual	89.964	129	.697		
	Total	151.431	139			

a. Dependent Variable: Policy Development

b. Predictors: (Constant), YesNWP, Population affected by natural disasters 2005-2014, Total sites area in ha, Forest area (% of land area) 2013, Ramsar Languages, Public Health Expenditure (% of GDP) 2013, Population Density 2014, Natural resource depletion (% of GNI) 2013 , HDI value , Democracy Index 2014 (Overall Score)

Figure 7: ANOVA results for Model (1)

Model (2) Summary <sup>b</sup>									
Model (2)	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.632 <sup>a</sup>	.399	.340	.85568832	.399	6.754	12	122	.000

a. Predictors: (Constant), (%) National poverty line 2004-2014, Forest area (% of land area) 2013, Population Density2014, Public Health Expenditure (% of GDP) 2013, YesNWP, Ramsar Languages, Total sites area in ha, Population affected by natural disasters 2005-2014, Natural resource depletion (% of GNI) 2013 , Urban Population (2012), Population Growth (annual %) 2010-2015, Democracy Index2014 (Overall Score)

b. Dependent Variable: Ramsar Policy Development

Figure 8: Regression results for Model (2)

ANOVA <sup>a</sup>						
Model (2)		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	59.342	12	4.945	6.754	.000 <sup>b</sup>
	Residual	89.329	122	.732		
	Total	148.671	134			
a. Dependent Variable: Policy Development						
b. Predictors: (Constant), (%) National poverty line 2004-2014, Forest area (% of land area) 2013, Population Density 2014, Public Health Expenditure (% of GDP) 2013, YesNWP, Ramsar Languages, Total sites area in ha, Population affected by natural disasters 2005-2014, Natural resource depletion (% of GNI) 2013 , Urban Population (2012), Population Growth (annual %) 2010-2015, Democracy Index 2014 (Overall Score)						

Figure 9: ANOVA results for Model (2)

The regression coefficients (Figure 10) for model (1) indicated that four independent variables the *total site area* ( $p=.000$ ), the *availability of national wetland policy* ( $p=.000$ ), *HDI* value ( $p=.010$ ), and % of *public health expenditures* ( $p=.052$ ) are positively and significantly associated with the dependent variable. This indicates that those Members with higher scores on these variables have implemented the second pillar of the Convention. Similarly, the results summarized in (Figure 10) for the first model indicate that the following independent variables the *Democracy Index* ( $p=.548$ ), the *population density rate* ( $p=.948$ ), % of *natural resource depletion* ( $p=.400$ ), % of *forest area* ( $p=.588$ ), *population affected by natural disasters* ( $p=.423$ ), *languages used by Ramsar* ( $p=.312$ ) did not contribute to the level of policy development for wetlands protection at sites level.

Coefficients <sup>a</sup>						
Model (1)		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.193	.496		-4.419	.000
	HDI value	1.829	.700	.277	2.614	.010
	Democracy Index 2014 (Overall Score)	.035	.059	.071	.603	.548
	Total sites area in ha	9.984E-08	.000	.274	3.764	.000
	Population Density 2014	-3.173E-05	.000	-.005	-.065	.948
	Natural resource depletion (% of GNI) 2013	-.007	.008	-.071	-.844	.400
	Forest area (% of land area) 2013	-.002	.003	-.040	-.543	.588
	Population affected by natural disasters 2005-2014	-3.183E-06	.000	-.062	-.804	.423
	Public Health Expenditure (% of GDP) 2013	.067	.034	.165	1.965	.052
	Ramsar Languages	.165	.163	.078	1.015	.312
	YesNWP	.594	.155	.285	3.842	.000

a. Dependent Variable: Policy Development

Figure 10: Regression Coefficients for Model (1)

These regression coefficients findings for model (1) are somewhat surprising because they contradict earlier research regarding how these independent variables may influence Ramsar Member Countries' ability to successfully implement the convention. For example, according to The Economist Intelligence Unit's (2014:9), "Nations with a weak democratic tradition are, by default, vulnerable to setbacks" and their efforts toward environmental conservation (wetlands in particular) are minimized because their institutional and organizational complexity (Mauerhofer et al., 2015). From the above results the government-type independent variable was not found to have an influence on the level of policy development at the sites level. Another example is related to the above mentioned environmental pressures (the *population density rate*, % of *natural resource depletion*, % of *forest area*, *population affected by natural disasters*) which can have a direct effect on wetland sustainability and productivity if were not minimized. According to the Human Development Report 2015, about 1.3 billion people live on ecologically fragile



land. Furthermore, 40 % of world's population are affected by water scarcity. Same as the first variable, the environmental pressure variables did not have an influence on the level of policy development at the sites level. Also, the official language spoken by residents of Member Countries was not found to be significantly associated with the dependent variable. About 40% of countries out of the 169 Contracting Party use languages other than Ramsar official languages (English, French, and Spanish), and thus may face some challenges in understanding Ramsar's requirements and the dissemination of its goals at the national level.

The regression coefficients (Figure 11) for model (2) indicated that three independent variables the *total site area* ( $p=.001$ ) and the *availability of national wetland policy* ( $p=.000$ ), and the % of *public health expenditures* ( $p=.082$ ) are positively and significantly associated with the dependent variable, indicating that those with higher scores on these variables are better able to achieve higher levels of commitment to the Ramsar Convention. Likewise, the data in (Figure 11) for the second model proposed that the following independent variables the *population density rate* ( $p=.978$ ), % of *natural resource depletion* ( $p=.553$ ), % of *forest area* ( $p=.364$ ), *population affected by natural disasters* ( $p=.262$ ), *languages used by Ramsar* ( $p=.719$ ), % of *population growth* ( $p=.939$ ), and % of *national poverty line* ( $p=.775$ ) did not contribute to this multiple regression model. However, the *Democracy Index* ( $p=.136$ ) and % of *urban population* ( $p=.152$ ) are trending toward statistical significance in this analysis.

Coefficients <sup>a</sup>						
Model (2)		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.505	.459		-3.275	.001
	Democracy Index 2014 (Overall Score)	.091	.061	.184	1.503	.136
	Total sites area in ha	9.448E-08	.000	.258	3.303	.001
	Population Density 2014	1.386E-05	.001	.002	.027	.978
	Natural resource depletion (% of GNI) 2013	-.006	.010	-.055	-.595	.553
	Forest area (% of land area) 2013	-.003	.004	-.069	-.911	.364
	Population affected by natural disasters 2005-2014	-5.147E-06	.000	-.097	-1.127	.262
	Public Health Expenditure (% of GDP) 2013	.063	.036	.155	1.751	.082
	Ramsar Languages	.069	.191	.032	.361	.719
	YesNWP	.600	.165	.286	3.630	.000
	Population Growth (annual %) 2010-2015	.009	.123	.009	.076	.939
	Urban Population (2012) (%) National poverty line 2004-2014	.007	.005	.150	1.442	.152
		-.001	.005	-.029	-.286	.775

a. Dependent Variable: Policy Development

Figure 11: Regression results for Model (2)

The results from both models identified four independent variables accounting for roughly 34% of the variation in the level of participation or implementation of Member Countries in the Ramsar Convention. They are the *total site area*, the *availability of national wetland policy*, *HDI* value, and the % of *public health expenditures*. However, two independent variables from model (2) are trending toward statistical significance in this analysis and they are the *Democracy Index* and % of *urban population*.

The *total site area* independent variable presented a positive and significant association with the dependent variable. The *designated sites total area* variable refers to the total area of Ramsar designated sites in hectares. It is not a measure of the number of Ramsar sites within a Member Country. In other words, more wetlands area under management was found to be associated with higher overall wetlands protection efforts. Figure (12) summarizes Ramsar sites

number and area by region. This figure shows that there is variation among Member Countries and their regions in terms of the numbers of sites and the overall area under protection. Some countries have many more sites under protection than others, but the sites are smaller.

According to the Ramsar Convention Secretariat (2010) “National Wetland Policy is a key feature envisaged in the implementation of the wise use concept of the Ramsar Convention”. Suggesting that more development of NWP among Parties represent higher levels of commitment to the Ramsar Convention. This is because the process of NWP development involves a multilevel institutional participatory approach for capturing ideas, consensus building, and commitments toward the wise use of wetlands, accounting for key challenges and opportunities for achievement of this goal.

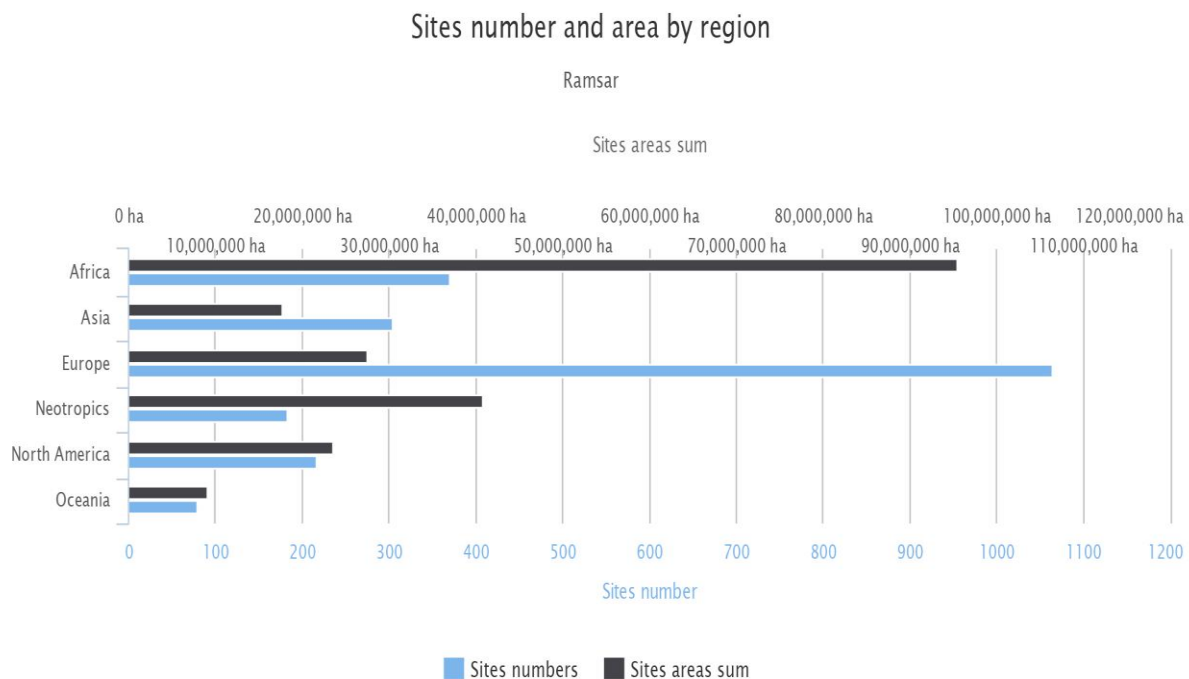


Figure 12: Ramsar sites number and area by region (rsis.ramsar.org 2016)

The % of *public health expenditures*, both Sheela et al. (2015) and Horwitz and Finlayson (2011) recognized the impacts imposed by wetlands on human health. Wetlands are a source for vector-borne diseases like malaria. Horwitz and Finlayson (2011) explained the relationship between wetland ecosystems and human well-being and suggested that this linkage between the two could be achieved through the implementation of the wise use concept where the ecosystem services and values are maintained for the long-term at sites level. The sustainability of wetland ecosystem services was used to explain the direct relationship between human health and the ecological character of wetlands. The authors stated “the links between broad categories of ecosystem services and the components of human well-being can be mediated by socioeconomic factors, and the strength of the links and the extent of the mediation can vary, depending on the type of ecosystem and the geographical region” (Horwitz and Finlayson 2011:682).

The socioeconomic factors or attributes in this study were presented under three independent variables and they are the *Human Development Index* (HDI) value, % of *national poverty line*, and the % of *public health expenditures*. *Public health expenditures* was found to have a positive and significant association with commitment to the second pillar of the Ramsar Convention. The higher a Country’s spending on public health, the higher level of policy development for designated sites for wetlands. The link is not surprising given that protecting wetlands could help to minimize human health risks associated with exposure to mosquitos in polluted wetlands. Also the *HDI* variable was found to be significantly associated with higher wetlands protection policy development. Overall, these findings suggest that the commitment to protect wetlands may be more easily achieved in countries with the government and societal infrastructure to better support human health and well-being. Countries with fewer elements of such infrastructure appear to face additional challenges in protecting wetlands.

The third research question focuses on the role of the Ramsar Convention in protecting wetlands in urban sites. Urbanization is a global phenomenon that expresses the level of development according to human settlements in the region. The United Nations World Urbanization Prospects states that “Globally, more people live in urban areas than in rural areas, with 54 per cent of the world’s population residing in urban areas in 2014. In 1950, 30 per cent of the world’s population was urban, and by 2050, 66 per cent of the world’s population is projected to be urban” (United Nation 2014:1). The report also stated that “as the world continues to urbanize, sustainable development challenges will be increasingly concentrated in cities, particularly in the lower-middle- income countries where the pace of urbanization is fastest. Integrated policies to improve the lives of both urban and rural dwellers are needed” (United Nation 2014:1). McInnes (2013) explored the link between wetlands and human settlements and stated that this relationship is very old since “the dawn of civilization” and an example of that is the establishment of the Mesopotamia earliest cities and their dependent on the benefits provided by wetlands of the Tigris and the Euphrates. The forms of attraction for human settlements and economic activities are the cause of wetland degradation and they are linked to water and natural resources associated with wetlands. Furthermore, Water resources pressures linked to wetland degradation are the results from continuous contamination and abstraction between surface and groundwater. The article also recognizes the direct and indirect impacts of urbanization on the environment in general and wetlands in particular. “The extent of urbanization not only results in direct habitat loss, but also generates additional pressures on existing biodiversity. The prevalence of invasive species which may spread out from urban areas, out-competing native biota, and the increased demand on peri-urban agriculture to support the growing urban population can frequently accelerate negative impacts on biodiversity” (McInnes

2013:4). Moreover, the negative impacts of urbanization on the environment are varying on their scales and are linked to continuous unplanned expansion and mismanagement of urban areas. As a result of the continuous expansion of urbanization around the world and their direct and indirect impacts on wetlands. Ramsar Convention is the international body that is addressing the effects of urbanization on wetland ecosystems and their services they provide to sustain biodiversity and human well-Being. McInnes (2013) acknowledged the relevance of the “wise use” of wetlands concept in supporting the essential water and food requirements of urban areas and it is a useful tool to minimize wetland loss and degradation.

The results of the statistical analyses conducted in this study found no clear link between urbanization and the dependent variable, policy development for the protection of designated sites. However, the Ramsar Convention seems to have worked forward and recognized the importance of protecting wetlands in urbanized sites and published a series of resolutions in its last three COPs. The Ramsar COP10 Resolution X.27 titled “Wetlands and Urbanization” recognized the issues related to urban development and how Member Countries should act to implement the wise use concept to ensure better protection for Ramsar sites located in urban and peri-urban areas (Ramsar Convention Secretariat 2008). (See APPENDIX D) Next, the Ramsar COP11 Resolution XI.11 explored the general principles for the planning and management of urban and peri-urban wetlands and provided Contracting Parties with recommendations and guidelines to better manage and maintain the ecological character of wetlands designated and included in the “Ramsar List” (Ramsar Convention Secretariat 2012). Later, the Ramsar COP12 Resolution XII.10 used the earlier resolutions as bases to promote the “Wetland City Accreditation of the Ramsar Convention”, wherein Member Countries have to consider the significance of impacts of urbanization on wetlands and recognize the importance of maintaining

biodiversity and the quality of urban life in urban and peri-urban wetlands. The “Wetland City accreditation of the Ramsar Convention can assist cities, Contracting Parties and stakeholders in promoting awareness and attracting support for the wise use and conservation of wetlands and other sustainable development initiatives” (Ramsar Convention Secretariat 2015e:2).

These recent Resolutions show that the Ramsar Convention recognizes the severity of the impacts from urbanization on wetlands and provide Member Countries suitable tools to address, promote and manage their urban wetlands. Protection of urban wetlands can be achieved through the implementation of the main concept of the Convention - the “wise use” of wetlands - and the promotion of education and public awareness regarding wetland conservation.

## **CHAPTER 5: CONCLUSIONS**

The Ramsar Convention is unique and it remains the only global treaty that focuses on protecting a particular type of ecosystem, wetlands. Wetlands are very important for their ecological processes, values, and services provided to biodiversity, systems, and human communities. Thus, the broad objectives of the Ramsar Convention are to reduce wetland loss and ensure their sustainability. The Ramsar Convention generally does not specify a particular method for its implementation, except for the obligation of designating at least one site to the List of Wetlands of International Importance. The implementation of the Ramsar Convention requires a strong political will and commitments. In addition to effective legal and institutional frameworks, to protect the interest of wetland user groups, especially the poor and vulnerable communities, against adverse impacts caused by human activities to the ecological processes. Decision makers must be fully aware of the risks of poor management of wetlands and know that polluted wetlands and degraded watershed are harmful to human health while well-managed wetlands provide clean water and support human health and livelihoods.

This study used bi-variate Correlation analysis, principal component analysis (PCA), and multiple regression analysis to identify key influences that play a role in the successful implementation of the Ramsar Convention among Member Countries and thus reduce wetland loss and to answer the following questions: Which Ramsar Member Countries are more able or willing to participate in the Convention and successfully implement its milestones or pillars? What factors account for variation in the level of commitment to Ramsar Convention among Contracting Parties? What is role of the Ramsar's Convention in protecting wetlands in urban sites?



In this study, thirteen independent variables were selected to examine their relation to the dependent variable, policy development for designated sites. These independent variables were categorized as follows: socioeconomic attributes, environmental pressures, government type, and programmatic characteristics. All of these variables have been either known to or hypothesized to influence Countries commitment to Ramsar Convention obligations.

The finding from PCA resulted in the creation of a common factor that indicates level of policy development for designated sites and consist of the following indicator variables *number of years since entry into force* to Ramsar Convention, the *number of designated sites*, and the *number of available management plans*. These indicator variables showed a positive correlation with each other suggesting a strong underlying dimensions that explained 75.7% of the variation in the observed data and led to the formation of this study dependent variable. This PCA analysis when sorted in descending order answers the first research question of this study. Suggesting that Member Countries with higher policy development for designated sites are willing to participate in the Ramsar Convention and successfully implement its pillars. The top five Member Countries are the United Kingdom, Mexico, Sweden, Australia, and Spain. And the bottom five include Swaziland, Kiribati, Oman, South Sudan, and Kuwait. This result suggests that about one third of the Ramsar Members have participated and implemented Ramsar second obligation successfully at sites level despite the variation of their positive mean values obtained from the PCA. The variation in the level of commitment to the Convention by Member Countries observed from this result might be explained by answering the second research question. The Pearson correlation analysis was used to test the independent variables for potentially high levels of correlation. Four independent variables showed high significant correlation values and possibly created multicollinearity issues. For that reason, to answer this question two multiple regression models

were produced. The regression coefficients for model (1) indicated that four independent variables out of the ten included, the *total site area* ( $p=.000$ ), the *availability of national wetland policy* ( $p=.000$ ), *HDI* value ( $p=.010$ ), and % of *public health expenditures* ( $p=.052$ ) are positively and significantly associated with the dependent variable, indicating that these attributes or conditions may influence the level of commitment to the Ramsar Convention among Member Countries. Likewise, model (2) regression results indicated that only three independent variables out of the twelve included, the *total site area* ( $p=.001$ ) and the *availability of national wetland policy* ( $p=.000$ ), and the % of *public health expenditures* ( $p=.082$ ) are positively and significantly associated with the dependent variable, indicating that those with higher scores on these variables may be better able to achieve higher levels of commitment to the Ramsar Convention. However, *Democracy Index* ( $p=.136$ ) and % of *urban population* ( $p=.152$ ) are trending toward statistical significance in this analysis.

The results from both models identified four independent variables accounting for roughly 34% of the variation in the level of participation or implementation of Member Countries in the Ramsar Convention. They are the *total site area*, the *availability of national wetland policy*, *HDI* value, and the % of *public health expenditures*. These findings suggest that the commitment to protect wetlands may be more easily achieved in countries with the government and societal infrastructure to better support human health and well-being. Countries with fewer elements of such infrastructure appear to face additional challenges in protecting wetlands. This finding raising an important question for administrators of Ramsar; are there additional outreach programs or provisions of technical support that may help countries with lower *HDI* scores protect their wetlands resources.

The results of this study reflect on some of the influences on the successful implementation of Ramsar Convention and Contracting Parties commitment toward the Convention general obligations. Several prior studies and national reports to the Convention by Member Countries highlighted some of these influences factors associated with governance issues inside each individual country, funding issues, information limitation and dissemination issues, lack of experts and resources, socioeconomic stresses and environmental pressures that contribute to more degraded wetlands within Ramsar designated sites. The Convention also through these national reports suggested some strategies to strengthen Ramsar implementation in Member Countries by working on minimizing the factors hampering the implementation at the first place. One of the main strategies is the increase of stakeholder involvement in designing and then implementing management plans that may impact resource systems within the designated site. Additionally, steps need to be taken to increase the restoration effort of the degraded wetlands to enhance their resilience to climate change, which in return could bring multiple benefits to the Member Countries.

The results from the regression models yield insight into some key factors that account for variation in the level of commitment to Ramsar Convention among Contracting Parties. But it did not addresses directly the potential influences of continued social and economic development in urbanized areas. The United Nations World Urbanization Prospects states that “Globally, more people live in urban areas than in rural areas, with 54 per cent of the world’s population residing in urban areas in 2014. In 1950, 30 per cent of the world’s population was urban, and by 2050, 66 per cent of the world’s population is projected to be urban” (United Nation 2014:1). Pressures from economic development are often linked to wetland loss and degradation (La Peyre et al., 2001). The examination of the Ramsar’s Convention role in protecting urbanized wetlands

indicated that the Convention includes a strong recognition of urbanized areas and their impacts on wetlands ecosystem services and offers tools to encourage sustainable protection of these areas. The Ramsar Convention started to focus on the issues of urbanization by adopting COP10 Resolution X.27 on Wetlands and Urbanization in 2008. Furthermore, the principles for the planning and management of urban and peri-urban wetlands were introduced to Contracting Parties through COP11 Resolution XI.11 to better manage and maintain the ecological character of designated wetlands under Ramsar Convention. Additionally, COP12 Resolution XII.10 on “Wetland City accreditation of the Ramsar Convention” announced the importance of the accreditation of Ramsar wetland cities in urban areas and their assistance “in promoting awareness and attracting support for the wise use and conservation of wetlands and other sustainable development initiatives” (Ramsar Convention Secretariat 2015e: 2).

Finally, Ramsar Convention holds the possibility of bringing increased positive attention to the wetlands in the world. The designation of sites under “Ramsar List” would elevate this effort to the global level. Through listing, millions of hectares of wetlands could potentially be rewarded with increased attention from the scientific, public, and government communities, all committed to conserving and using these areas for the benefit of biodiversity and communities. Accounting for influences affecting the successful implementation of the convention at the national level is important and prioritizing actions to reduce wetland loss and its impacts on wetland ecological character and communities depending on it should come first when addressing this issue to policy makers.

### **5.1 Suggestions for Future Research**

The task that made this research difficult was to find significant data without major missing values with which to run an analysis. Different independent variables may have brought an interesting view to this research. For example, if data related to Inequality adjusted HDI

value, the Income Inequality (Gini coefficient), the research and development expenditure, and public expenditure on education were available for the majority of the 169 Ramsar Contracting Parties, then the analysis might have yielded additional insights into why some Member Countries are better able or more willing to implement the Ramsar Convention goals. Moreover, although the analysis didn't find that an association between government type or regime type and the dependent variable, several studies and Member Countries National reports have discussed the potential influence of this variable on the overall commitment toward successful implementation. For this reason, it would be appropriate to include this variable in future studies for further analysis.

Furthermore, this research did not examine those policies and activities that may be planned or under development by Member Countries. For example, some Member Countries may have wetlands protection efforts under development, such as management plans, national wetland policies/strategies, and national wetland inventories. Another example of a useful, related activity is the participation of Parties in the World Wetlands Day, held on the second day of February each year. A future study could expand the analysis presented here by adding these additional activities as indicators of the level of commitment and participation in the Convention and the successful implementation of its pillars. Another future research approach could look into the correlation between the overall trends in wetlands degradation and the specific designated wetland sites within Ramsar Member Country.

This analysis has yielded useful insights based on readily available data about the Member Countries and the extent to which they have taken steps to implement the key tenets of the Ramsar Convention at the wetlands site levels. The findings shed light on the conditions under which Member Countries may be more willing and/or able to take steps to protect their

wetlands and, thus, provides valuable information to the Ramsar Secretariat, and more generally to natural resource planners and researchers interested in the implementation of international environmental agreements.

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## APPENDIX A: CONTRACTING PARTIES TO THE RAMSAR CONVENTION

05/09/2015

<b>Number of Contracting Parties: 169 Country</b>	<b>Entry into force</b>
Albania	29.02.96
Algeria	04.03.84
Andorra	23.11.12
Antigua and Barbuda	02.10.05
Argentina	04.09.92
Armenia	06.11.93
Australia	21.12.75
Austria	16.04.83
Azerbaijan	21.05.01
Bahamas	07.06.97
Bahrain	27.02.98
Bangladesh	21.09.92
Barbados	12.04.06
Belarus	25.08.91
Belgium	04.07.86
Belize	22.08.98
Benin	24.05.00
Bhutan	07.09.12
Bolivia	27.10.90
Bosnia and Herzegovina	01.03.92
Botswana	09.04.97
Brazil	24.09.93
Bulgaria	24.01.76
Burkina Faso	27.10.90
Burundi	05.10.02
Cambodia	23.10.99
Cameroon	20.07.06
Canada	15.05.81
Cabo Verde	18.11.05
Central African Republic	05.04.06
Chad	13.10.90
Chile	27.11.81
China	31.07.92
Colombia	18.10.98
Comoros	09.06.95
Congo	18.10.98
Costa Rica	27.04.92
Côte d'Ivoire	27.06.96
Croatia	25.06.91
Cuba	12.08.01
Cyprus	11.11.01
Czech Republic	01.01.93

Democratic Republic of Congo	18.05.96
Denmark	02.01.78
Djibouti	22.03.03
Dominican Republic	15.09.02
Ecuador	07.01.91
Egypt	09.09.88
El Salvador	22.05.99
Equatorial Guinea	02.10.03
Estonia	29.07.94
Fiji	11.08.06
Finland	21.12.75
France	01.12.86
Gabon	30.04.87
Gambia	16.01.97
Georgia	07.06.97
Germany	26.06.76
Ghana	22.06.88
Greece	21.12.75
Grenada	22.09.12
Guatemala	26.10.90
Guinea	18.03.93
Guinea-Bissau	14.05.90
Honduras	23.10.93
Hungary	11.08.79
Iceland	02.04.78
India	01.02.82
Indonesia	08.08.92
Iran, Islamic Republic of	21.12.75
Iraq	17.02.08
Ireland	15.03.85
Israel	12.03.97
Italy	14.04.77
Jamaica	07.02.98
Japan	17.10.80
Jordan	10.05.77
Kazakhstan	02.05.07
Kenya	05.10.90
Kiribati	03.08.13
Kuwait	05.09.15
Kyrgyz Republic	12.03.03
Lao People's Democratic Republic	28.09.10
Latvia	25.11.95
Lebanon	16.08.99
Lesotho	01.11.04
Liberia	02.11.03
Libya	05.08.00

Liechtenstein	06.12.91
Lithuania	20.12.93
Luxembourg	15.08.98
Madagascar	25.01.99
Malawi	14.03.97
Malaysia	10.03.95
Mali	25.09.87
Malta	30.01.89
Marshall Islands	13.11.04
Mauritania	22.02.83
Mauritius	30.09.01
Mexico	04.11.86
Monaco	20.12.97
Mongolia	08.04.98
Montenegro	03.06.06
Morocco	20.10.80
Mozambique	03.12.04
Myanmar	17.03.05
Namibia	23.12.95
Nepal	17.04.88
Netherlands	23.09.80
New Zealand	13.12.76
Nicaragua	30.11.97
Niger	30.08.87
Nigeria	02.02.01
Norway	21.12.75
Oman	19.08.13
Pakistan	23.11.76
Palau	18.02.03
Panama	26.11.90
Papua New Guinea	16.07.93
Paraguay	07.10.95
Peru	30.03.92
Philippines	08.11.94
Poland	22.03.78
Portugal	24.03.81
Republic of Korea	28.07.97
Republic of Moldova	20.10.00
Romania	21.09.91
Russian Federation	11.02.77
Rwanda	01.04.06
Saint Lucia	19.06.02
Samoa	06.02.05
Sao Tome and Principe	21.12.06
Senegal	11.11.77
Serbia	27.04.92

Seychelles	22.03.05
Sierra Leone	13.04.00
Slovakia	01.01.93
Slovenia	25.06.91
South Africa	21.12.75
South Sudan	10.10.13
Spain	04.09.82
Sri Lanka	15.10.90
Sudan	07.05.05
Suriname	22.11.85
Swaziland	15/06/13
Sweden	21.12.75
Switzerland	16.05.76
Syrian Arab Republic	05.07.98
Tajikistan	18.11.01
Thailand	13.09.98
The former Yugoslav Republic of Macedonia	08.09.91
Togo	04.11.95
Trinidad & Tobago	21.04.93
Tunisia	24.03.81
Turkey	13.11.94
Turkmenistan	03.07.09
Uganda	04.07.88
Ukraine	01.12.91
United Arab Emirates	29.12.07
United Kingdom	05.05.76
United Republic of Tanzania	13.08.00
United States of America	18.12.86
Uruguay	22.09.84
Uzbekistan	08.02.02
Venezuela	23.11.88
Viet Nam	20.01.89
Yemen	08.02.08
Zambia	28.12.91
Zimbabwe	03.05.13

## **APPENDIX B: THE RAMSAR SITES CRITERIA**

### **The nine criteria for identifying Wetlands of International Importance**

#### **Group A of the Criteria. Sites containing representative, rare or unique wetland types**

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

#### **Group B of the Criteria. Sites of international importance for conserving biological diversity**

##### ***Criteria based on species and ecological communities***

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

##### ***Specific criteria based on waterbirds***

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

##### ***Specific criteria based on fish***

Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

##### ***Specific criteria based on other taxa***

Criterion 9: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species

## APPENDIX C: PEARSON CORRELATION TABLE FOR INDEPENDENT VARIABLES

Correlations													
		HDI value	Democracy Index 2014, Overall Score	Population Growth (annual %) 2010-2015	Urban Population (2012)	Total Ramsar sites area in ha	Natural resource depletion (% of GNI) 2013	Forest area (% of land area) 2013	Population affected by natural disasters 2005-2014	(%) National poverty line 2004-2014	Public Health Expenditure (% of GDP) 2013	Official Languages vs Ramsar Languages	Existence of National Wetland Policy
HDI value	Pearson	1	.631**	-.706**	.682**	-.120	-.308**	.063	-.340**	-.785**	.352**	-.316**	.177*
	Sig. (2-tailed)		.000	.000	.000	.125	.000	.420	.000	.000	.000	.000	.025
	N	168	153	167	168	166	152	167	163	159	166	168	160
Democracy Index 2014, Overall Score	Pearson	.631**	1	-.468**	.468**	-.072	-.499**	.165*	-.215**	-.491**	.535**	-.017	.276**
	Sig. (2-tailed)	.000		.000	.000	.378	.000	.041	.008	.000	.000	.834	.001
	N	153	153	153	153	151	145	153	150	147	152	153	145
Population Growth (annual %) 2010-2015	Pearson	-.706**	-.468**	1	-.394**	.158*	.401**	-.119	.290**	.575**	-.269**	.440**	-.161*
	Sig. (2-tailed)	.000	.000		.000	.042	.000	.125	.000	.000	.000	.000	.042
	N	167	153	168	168	166	152	167	162	159	166	168	160
Urban Population (2012)	Pearson	.682**	.468**	-.394**	1	.037	-.147	.031	-.417**	-.515**	.276**	-.090	.091
	Sig. (2-tailed)	.000	.000	.000		.636	.070	.690	.000	.000	.000	.243	.249
	N	168	153	168	169	167	152	167	163	160	167	169	161
Total Ramsar sites area in ha	Pearson	-.120	-.072	.158*	.037	1	.233**	.064	.004	.226**	-.070	.161*	-.078
	Sig. (2-tailed)	.125	.378	.042	.636		.004	.416	.958	.004	.371	.037	.330
	N	166	151	166	167	167	150	165	161	158	165	167	159
Natural resource depletion (% of GNI) 2013	Pearson	-.308**	-.499**	.401**	-.147	.233**	1	.060	-.035	.256**	-.350**	.110	-.121
	Sig. (2-tailed)	.000	.000	.000	.070	.004		.466	.672	.002	.000	.176	.147
	N	152	145	152	152	150	152	152	150	145	151	152	145
Forest area (% of land area) 2013	Pearson	.063	.165*	-.119	.031	.064	.060	1	-.165*	-.047	.003	-.005	.053
	Sig. (2-tailed)	.420	.041	.125	.690	.416	.466		.036	.557	.972	.945	.510
	N	167	153	167	167	165	152	167	162	158	165	167	159
Population affected by natural disasters 2005-2014	Pearson	-.340**	-.215**	.290**	-.417**	.004	-.035	-.165*	1	.354**	-.076	.224**	-.043
	Sig. (2-tailed)	.000	.008	.000	.000	.958	.672	.036		.000	.339	.004	.598
	N	163	150	162	163	161	150	162	163	154	162	163	156
(% National poverty line 2004-2014	Pearson	-.785**	-.491**	.575**	-.515**	.226**	.256**	-.047	.354**	1	-.173*	.279**	-.179*
	Sig. (2-tailed)	.000	.000	.000	.000	.004	.002	.557	.000		.029	.000	.027
	N	159	147	159	160	158	145	158	154	160	158	160	152
Public Health Expenditure (% of GDP) 2013	Pearson	.352**	.535**	-.269**	.276**	-.070	-.350**	.003	-.076	-.173*	1	.022	.032
	Sig. (2-tailed)	.000	.000	.000	.000	.371	.000	.972	.339	.029		.774	.687
	N	166	152	166	167	165	151	165	162	158	167	167	159
Official Languages vs Ramsar Languages	Pearson	-.316**	-.017	.440**	-.090	.161*	.110	-.005	.224**	.279**	.022	1	-.046
	Sig. (2-tailed)	.000	.834	.000	.243	.037	.176	.945	.004	.000	.774		.566
	N	168	153	168	169	167	152	167	163	160	167	169	161
Existence of National Wetland Policy	Pearson	.177*	.276**	-.161*	.091	-.078	-.121	.053	-.043	-.179*	.032	-.046	1
	Sig. (2-tailed)	.025	.001	.042	.249	.330	.147	.510	.598	.027	.687	.566	
	N	160	145	160	161	159	145	159	156	152	159	161	161

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).



## APPENDIX D: COP10 RESOLUTION X.27- WETLANDS AND URBANIZATION

### Resolution X.27: Wetlands and urbanization

1. RECALLING the commitments made by Contracting Parties to achieving the wise use, as far as possible, of all wetlands in their territory and to maintaining the ecological character of designated Ramsar sites;
2. AWARE that since prehistoric times human settlements have been established near wetlands for reasons, *inter alia*, of trade and defence, that the world is becoming increasingly urbanized, and that over 50% of the global population now lives in urban environments;
3. NOTING that “urban wetlands” are those wetlands lying within the boundaries of cities, towns and other conurbations and that “peri-urban wetlands” are those wetlands located adjacent to an urban area between the suburbs and rural areas;
4. RECOGNIZING that wetlands in urban and peri-urban environments can deliver many important ecosystem services to people, such as wastewater treatment, and ALSO RECOGNIZING that urban green space is increasingly known to contribute to people’s physical and mental health and well-being, while ACKNOWLEDGING that urban wetlands can also be sources of diseases such as malaria;
5. FURTHER RECOGNIZING the important role that urban and peri-urban wetlands can play in communication, education, participation and awareness for urban communities about wetlands, as well as the value of establishing education and visitor centres in such places;
6. RECOGNIZING that urban and peri-urban wetlands perform important functions in the improvement of neighbouring community environments, and provide safety nets for the communities living in these areas, both through the buffering effect of wetlands in riverine and coastal areas and through the role of wetlands in reducing impacts associated with climate variability;
7. CONCERNED that many wetlands in urban and peri-urban environments are or are becoming degraded through encroachment of surrounding populations, pollution, poorly managed waste and infilling or other developments, and that these activities have diminished both the ecosystem services that urban wetlands can provide and the recognition of their value and importance by both decision-makers and urban communities;
8. ALSO CONCERNED that the spread of urbanization is leading to wetlands, including Ramsar sites, that were formerly in rural areas becoming increasingly urbanized, with consequent increased risk of their degradation through, for example, ecosystem fragmentation and exploitation;
9. RECOGNIZING the crucial role of capacity building in enabling local governments, including municipalities, to ensure the conservation and wise use of wetlands in urban and peri-urban areas under their jurisdiction;
10. AWARE that much of the increasing urbanization is occurring in coastal and downstream parts of river catchments and that the demand for water for human use in these areas is increasing, and CONCERNED that many river basins are already water-stressed because of the levels of upstream abstractions;
11. ALSO CONCERNED about the increasingly adverse impacts on wetlands of the consumption patterns of urban populations and the increasing demand from cities on the

Earth's wetland ecosystems for water and other natural resources and services provided by wetlands; and

12. AWARE of the Curitiba Declaration on Cities and Biodiversity, adopted in 2007 by a meeting of mayors and other senior representatives of host cities of meetings of the Conference of the Parties of the Convention on Biological Diversity (CBD), host cities of UN chapters, and cities that have specific strategies with regard to biodiversity, through which commitments to integrate biodiversity concerns into urban planning have been reaffirmed; and ALSO AWARE of Decision IX/28 of CBD COP9 (2008) on "Promoting engagement of cities and local authorities";

## THE CONFERENCE OF THE CONTRACTING PARTIES

13. URGES all Contracting Parties to pay due attention to the importance of their wetlands in urban and peri-urban environments and to take appropriate measures to conserve and protect these wetlands, while giving due consideration to different national circumstances in each case;
14. ALSO URGES all Contracting Parties to review the state of their urban and peri-urban wetlands and, where needed, to put in place schemes for their restoration and rehabilitation so that they can deliver their full range of ecosystem services to people and biodiversity;
15. FURTHER URGES Contracting Parties to formulate and implement their land-use planning and management so as to minimize further future impacts on urban wetlands and on those currently in peri-urban or rural situations that are vulnerable to urban encroachment, and ENCOURAGES Contracting Parties to provide the most valuable urban or peri-urban wetlands with appropriate conservation measures, with the intention of allowing as many people as possible to have access to areas with preserved high nature values and providing good opportunities for awareness raising, within sustainable limits;
16. EMPHASIZES the value of Ramsar site designations in the vicinity of urban centres as a key contribution to safeguarding important ecosystems against inappropriate urban encroachment;
17. INVITES the International Organization Partners, particularly those with national or local representation, to take pro-active steps, as far as possible, to facilitate the mobilisation of funding for technical support and capacity building for local authorities, in order to assist local authorities to advance the sustainable management of urban wetlands, and FURTHER INVITES the International Organization Partners to seek out opportunities for the development of partnership programmes between local authorities of different countries for urban wetland conservation, either directly or through the respective Ramsar Administrative Authorities;
18. URGES Contracting Parties to reaffirm the role of CEPA as an effective mechanism for raising awareness and involving communities in the sustainable management and conservation of urban and peri-urban wetlands;
19. ENCOURAGES Contracting Parties and others to establish wetland education and visitor facilities on urban and peri-urban wetlands, and particularly Ramsar sites in such locations, as a means of increasing urban community public awareness under the Convention's CEPA Programme 2009-2015 and, in view of the recreational, spiritual, and aesthetic dimensions of wetlands, as a means of supporting the health and well-being of people by facilitating access to such wetlands;

20. REQUESTS Contracting Parties and others that have established such education and visitor facilities to report to the Secretariat on their experiences and achievements so that they can be shared with other Parties that are developing such facilities, including through the Wetland Link International (WLI) mechanism;
21. ENCOURAGES local governments and elected officials, including the mayors of cities, particularly those that have hosted meetings of the Conference of the Contracting Parties to the Ramsar Convention and that have urban and peri-urban wetlands, to connect with the CBD initiative on cities and biodiversity;
22. ENCOURAGES Contracting Parties to involve municipalities in their planning processes and operational actions on wetland conservation and wise use in order to seek contributions from municipalities, including their physical planning departments, a) to assess the direct and indirect environmental impacts of urban areas on wetlands and b) to preserve or increase ecological functionality of urban and peri-urban wetlands and protect them from the negative impacts of the increasing urban consumption of wetland products and ecosystem services;
23. ENCOURAGES Contracting Parties to give recognition to local governments that exhibit exemplary management interventions, including wise use in urban and peri-urban wetlands, and to document best practices for dissemination;
24. INVITES Contracting Parties to seek ways to encourage public-private collaboration for advancing sustainable management of urban wetlands, in line with the principles for partnerships between the Ramsar Convention and the business sector as set out in Resolution X.12;
25. INVITES the Ramsar Secretariat to explore ways and means of establishing collaborative links with the UN human settlements programme (UN-HABITAT) concerning the promotion of social and environmental sustainability of towns and cities in relation to wetlands and water;
26. REQUESTS Contracting Parties, through their appointed Scientific and Technical Review Panel (STRP) National Focal Points, to advise the STRP on issues concerning urban and peri-urban wetlands that would benefit from additional scientific and technical guidance; and
27. REQUESTS the STRP to prepare guidelines for managing urban and peri-urban wetlands, in accordance with an ecosystem approach, taking into account issues such as climate change, ecosystem services, food production, human health and livelihoods.

## **VITA**

Aziza Saud Al Adhoobi, a native from Oman, received her bachelor's degree in Animal Science from the Sultan Qaboos University in Oman in 2006. Her first job was in 2007 at the Ministry of Heritage and Culture in Oman, where she worked as research assistance at the Omani Encyclopedia Project and was responsible for writing entries related to flora of Oman. From there in September 2008 she moved to the Ministry of Environment and Climate Affairs where she is currently employed as an environmental planner and her responsibilities varies between policy development, environmental conservation and environmental outreach programs. She enrolled in the environmental science graduate program at Louisiana State University in August 2014. She is a candidate to graduate with her master's degree in May 2016, Aziza is returning back to her current job in Oman to implement what she learned for several years before pursuing her doctoral studies.