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Diminishing Lagoon Services in the Era of Urbanization: A Case of Muni-Pomadze Lagoon in Ghana

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Abstract: The Muni lagoon is among the six internationally recognized coastal wetlands (Ramsar site) under the convention on wetlands because of the role it plays which promoting human livelihood development and the ecosystem. The period of urbanization has resulted in the encroachment of the lagoon leading to the decline of its services. This study investigates the diminishing lagoon services as a result of urbanization, using the Muni Pomandze lagoon as a case study. The study was largely qualitative and as a result, twenty respondents were selected mainly by purposive and snowball samplings. In-depth interviews and personal field observation were adopted to collect data for the study. The study observed that the lagoon provided numerous services to the communities in and around the catchment area of the lagoon. These services include fishing, agricultural activities, hunting expeditions, and breeding and nesting site for migratory birds. From the findings, it was indicated that in recent times, especially due to the emergence of urbanization, the lagoon has been encroached upon by estate developers and other human activities which have undermined the function of the lagoon. It is recommended that stakeholders such as the Municipal Assembly, and Planning Department should zone the catchment area of the lagoon to ensure estate developers are not allowed to encroach upon it. This will ensure that human activities are minimized in the area.

Keywords: Lagoon, Muni Pomandze, Urbanization, Yenku Forest, Encroachment, Ramsar

Introduction

Wetlands (lagoons) exist everywhere on the globe continents except Antarctica (Mitsch and Gosselink, 2000). The land mass of the earth's surface which is occupied by wetlands is not easy to determine. Many writers make assumptions based on the criterion used in quantifying the percent covered (Peck, 2000; Zedler and Kercher, 2005; Moore, 2008; Ramsar, 2011). For instance, (Mitsch and Gosselink, 2000) revealed that more than 5.7 million lands globally are covered by wetlands.

Several studies have been conducted on wetlands but very few of these ever attempt to define them. Due to the complex nature of wetlands, there is no common agreed international definition. However, most writers defined wetlands concerning certain components of hydrologic conditions (Zedler and Kercher, 2005; Moore, 2008). It is not surprising that researchers will have problems with defining wetlands (Zedler and Kercher, 2005; Ramsar, 2011). They prefer to mention the various wetlands ecosystem types rather than attempt a definition (Williams, 1993; Ntiamoa-Baidu and Gordon, 1991; Keddy, 2010; Prigent *et al*., 2001; World Wildlife Fund, 2004).

The ecosystem services provided by wetlands during time immemorial have been titillating in several spheres of human growth and development. For instance, Mc-Donnell and Pickett (1990) opine that lagoons reduce the harmful effects of pollutants by ensuring the safety of water bodies. This is done by reducing the chemical composition of the pollutants. Besides the toxin's immobilization, they also provide fertile land for agricultural activities, a nesting site for migratory birds and wildlife, trees for timber and fuel wood, recreational site, etc. for human benefits (Martinez, 2014).

Today, many of these wetlands are deteriorating due to the emergence of urbanization. The Muni Pomadze lagoon in Ghana is one of such wetlands which is under threat as a result of human activities. According to Amatekpor (1994), the lagoon and its catchment area have been considered the most exploited and degraded lagoon in the country despite the numerous services it provides to the surrounding communities and beyond. There has been a debate in recent times among scholars and government institutions as to whether the lagoon should be declared an endangered zone (Adu-Boahen *et al*., 2018). Several areas within the lagoon catchment have been drained and used for the cultivation of crops such as green pepper, okro, and tomatoes (Ntiamoa-Baidu and Gordon, 1991). These activities have reduced the quantity of water that flows into the wetland resulting in siltation (Ryan and Ntiamoa-Baidu, 1998a). Again, the catchment area of the wetland is inundated with human settlements which generate a large quantity of waste on daily basis and these pollutants end up in the wetland without any treatment. Human activities increase the metal influx which found its way into the wetland as a result of wind or water erosions thereby increasing the metal concentration in the area (Prigent *et al*., 2001). Continuous accumulation of these heavy metals ends up in a large quantity and pose serious health hazards to both human and animals.

It is now a known fact that the lagoon is losing its catchment area to estate developers. According to Ryan and Attuqucayefio (2000a), encroachment of the lagoon by human settlers and estate developers not only impedes the services the lagoon provides but also exposes the area to flooding. Flooding has become a common phenomenon in the area in recent times. This results from the fact that the vegetation surrounding the lagoon catchment area has been cleared for human settlement.

It is important to note that the lagoon performs a traditional function by serving as a site for hunting the deer during the celebration of the Aboakyer festival which is performed by the people of Effutu. However, this important function is a threat as a result of the decline in the vegetative cover and forest patches (Collar *et al*., 1994, Ryan and Attuggefio, 2000b). Several studies been have conducted on the Muni lagoon. However, most of these studies focus on the community utilization of the lagoon (Hawthorne and Abu-Juam, 1995; Biney, 1995; Prigent *et al*., 2001). Research that tends to investigate the conservation of the lagoon is rather skewed to the various management practices without assessing the level of degradation resulting from human activities (Gyasi *et al*., 1995; Ryan and Ntiamoa-Baidu, (1998b; Ntiamoa-Baidu and Gordon, 1991; Adu-Boahen *et al*., 2018). It is important to note that the buffer zone of the lagoon has been taken over by both estate developers. If measures are not taken to avert this canker, it has the potential to limit the numerous ecosystem services that This study sought to investigate the level of encroachment on the Muni lagoon and how that could affect the ecosystem services it provides to the community and to further suggest policy recommendation in ensuring safe management of the lagoon.

Coastal Lagoon Management Practices: *Theoretical and Conceptual Perspectives*

The management of coastal lagoons has gained attention on the international and local fronts because they have become an important ecosystem for the growth of diverse economic activities (Adu-Boahen *et al*., 2018). With the increasing utilization of the lagoon for fishing, hunting expeditions, and tourism activities due to urbanization, it has become increasingly complicated to ensure sustainable management options for the lagoon due to the various end-users. As a result of this, some theoretical frameworks have been discussed to support the article.

Integrated Coastal Zone Management

Integrated coastal management is characterized by a conscious management process through which rational decisions are made concerning the conservation and sustainable use of coastal and ocean resources (Hawthome and Abu-juam, 1995). ICM as a process is described as being continuous and dynamic and is designed to ensure that all decisions and activities related to or affecting a country's coastal area are consistent. The decisions are also supportive of the agreed goals and objectives of the region and the nation at large.

Traditional Management Approaches of Coastal Lagoons in Ghana

Traditionally, coastal lagoon management has been vested in the owners of the lagoons. The owners are usually local clans, fetishes, or stools. The organizational framework of these societies is the kinship or family systems lineages and clans. At the various levels of the framework, specific rights and obligations dealing with issues like authority, control, adjudication of conflicts, inheritance, succession, and land ownership are vested in the members. At each of the organizational levels within the framework, there is a chief, usually hereditary in a lineage that functions as the custodian of resources or caretaker. Many of the traditional management policies are geared toward controlling resource use by placing limits on access, through the use of taboos and outright bans. For many years, this traditional approach has been sufficient to maintain the ecological integrity of the lagoon environment (Gordon, 1994; Ntiamoa-Baidu, 1991). With rising economic pressures, these areas are being exploited unsustainably and local fines and

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punishments are ignored or disregarded. From the above, the traditional management of coastal lagoons is made up of people whose lifestyles are interlinked with the coastal wetlands and whose activities directly affect the wetland ecosystem.

Materials and Methods

The Muni-Pomadze wetland is situated in the Central Region of Ghana. It is located within the Gomoa East District and Effutu Municipal both in the central region of the country. It is a closed estuarine which is located approximately 56 km southwest of Ghana's capital (Atampugre, 2010). The wetland share boundary in the north by the Yenku forest reserve established in 1937 to serve as a tourist site, in the south by the Atlantic Ocean, Mankwaafar Brounye and Boaku rivers to the west, and in the east by the river Ayensu and Pratu stream (Hawthorne and Abu-Juam, 1995).

The vegetation of the wetland falls within the coastal scrubs and grassland (Hall and Swaine, 1981). The eastern portion of the lagoon is dominated mainly by Avicenia with the drier areas comprised of grassland in which Imperata, cypenus, and panicum are the main species. It is estimated that about 53% of the catchment area of the lagoon is classified as natural vegetation, and 32.5% is agricultural land (Ryan and Ntiamoa-Baidu, 2000a). The lagoon is drained by two rivers which include; Aboaku and Pretu. According to Biney (1995), the lagoon has a barrier that opens up during the rainy season thereby exposing the wetland to the sea. According to Tumbulto and Bannerman (1995), human activities over the years around the catchment of the lagoon have caused an underground seepage of marine water into the lagoon.

Data Collection and Analysis

Twenty participants in four communities were randomly selected for the survey. In-depth interviews were conducted using an interview guide that was designed using the open and closed-ended approach. This instrument was used because the study was qualitative in nature. Apart from the in-depth interview guide, participant observation and documentary analysis were also used to corroborate responses to the interview questions. The data analysis was descriptive in nature.

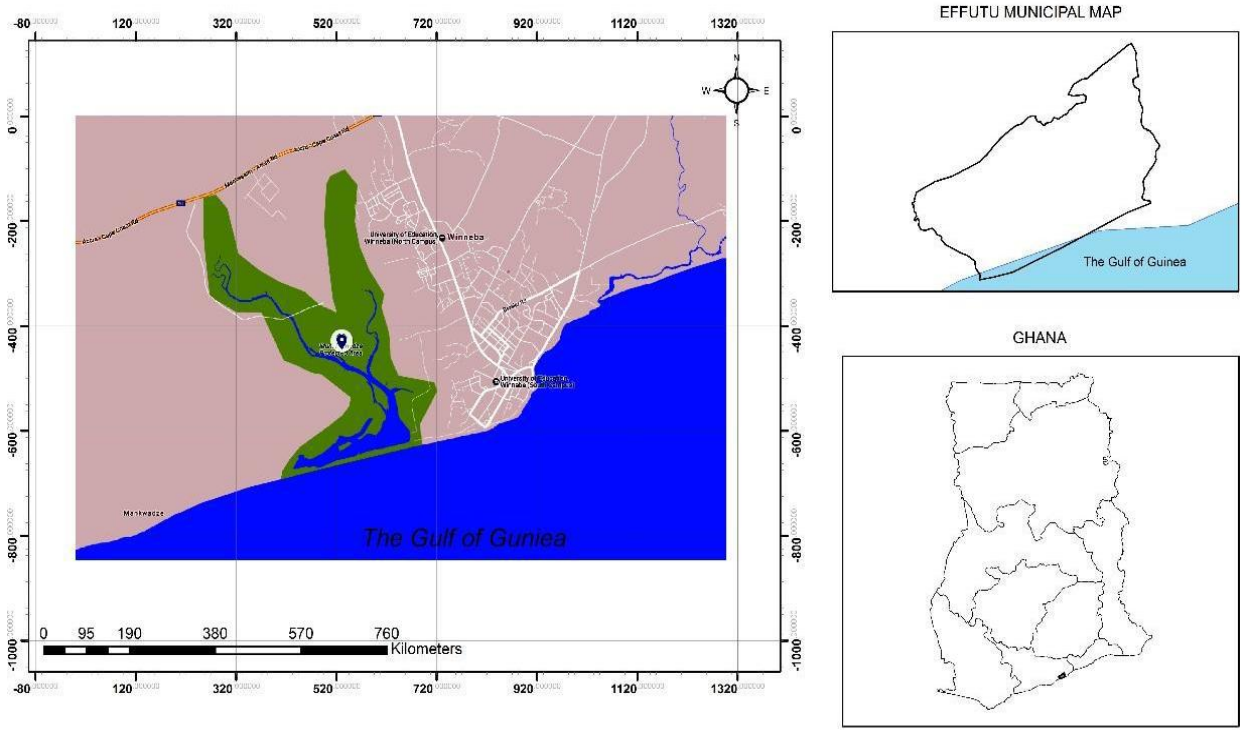

Fig. 1: Image of Muni lagoon and its catchment area

Results and Discussion

The Muni Pomandze lagoon is located along the coastal stretch of Ghana. Like any other lagoon, it provides numerous services to the surrounding communities to improve their livelihoods (Fig 1).

Lagoon Services

From the findings, it was revealed that most of the communities derived their source of livelihood from the lagoon. This according to the respondents was through the fishing activities which they undertake daily. The activity generates income for them which is used for their daily upkeep. Quite apart from the fishing activity, the most significant cultural activity which makes the people of Effutu unique from other tribes in Ghana is the celebration of their festival known as the Aboakyer. From the interview with the respondents, it was identified that the main area of hunting for the dear which is used for the sacrifice to the gods is the Yenku forest (sacred forest) located in the catchment area of the lagoon. The destructions of the lagoon vegetative cover for developmental purposes have resulted in the loss of habitats for some wild.

Animals including the dear. The respondents indicated that most of these animals have either migrated or become extinct. According to the respondents, this has affected the celebration of the festival over the last few years. It is important to note that the celebration of the festival attracts people within and outside the country. This has brought about significant development to the municipality and by extension the country as a whole. The destruction of the vegetative cover, therefore, means that the tourism potential of the festival is under threat. The views of the respondents were corroborated by an interview with a 58-year fisherman in the area who noted that "The traditional council is planning of finding another alternative animal in place of the dear to be used for the sacrifice. It is not easy to hunt for the dears in this forest again. All the abodes of the dears have been cleared for building purposes".

Fig. 2: Lagoon serving as home to migratory birds Source**:** Adopted from Dadson (2012)

Also, the findings revealed that the lagoon serves as a feeding, breeding and roosting, and nesting abode for thousands of birds like migratory and resident species and water birds such as ferns waders, and herons. During a focus group discussion in Akosua village, the participants reported that the lagoon serves as home to many birds and mammals. According to them, the lagoon has a high diversity of animals of different kinds which breed and bring young ones of their kind. In their view, the lagoon serves as a protector for endangered species. Figure 2 shows several migratory birds in the basin of the lagoon.

Lagoon Encroachment

According to Collar *et al.*, (1994) encroachment of the wetland area is being threatened by human activities and geomorphology processes. The anthropogenic factors include; pressure from population growth, rapid rate of urbanization, mining, waste pollution, inappropriate farming practices, overgrazing, logging, etc. The natural threat to wetlands includes land degradation, desertification, and drought. From the study, it was observed that the catchment of the lagoon was heavily populated by human settlers. During an interview with the town and country planning officer in the municipality, he indicated that; "the lagoon catchment has been zoned and guided. However, in recent times, there are a lot of unapproved buildings sprinkling in the area we are not aware of how they acquire the land". The demand for accommodation is on the increase due to the expansion of the University of Education, Winneba faculties which calls for the intake of more students. These activities have destroyed the vegetative cover of the area. The destructions of the vegetative cover have led to the extinction of most wildlife including the dear which form a significant part of the celebration of the Aboakyer festival. In a focus discussion, a fifty-three years old man revealed that.

"These days, it is very difficult getting the deer for the celebration of our festival because all the forest patches which used to serve as a habitat for these animals have been destroyed by estate developers. For the past seven years now, it has not been easy for us to get the deer. If this phenomenon continues (encroachment of the lagoon), we have no option but to change our tradition:".

The celebration of the festival has provided significant benefits to the Effutu people over the years. These benefits arise from the tourism potential it offered for both local and international people. The alteration of the festival tradition would not only lose its significance but would also deprive the country of the revenue generated annually from the celebration of the festival.

Agricultural Activities

Besides the increasing rate of illegal buildings in the area, the destruction of the vegetation for farming activities is also prevalent in the area. During the field

observation, farmers were busy clearing the land to plant their crops without regard to any sustainable farming practices. Areas that were once forested were cleared and crops planted. During an in-depth interview with a 45 years old woman in Akosua village, she indicated that "these farming activities have resulted in frequent bush burning in the area. The farming activities required the use of fire as the shortest` means to achieving the desired result". Again, during a group discussion in Pomadze, the participants revealed that the types of weeds that grow in the catchment area of the lagoon are difficult to weed unless they are burned.

The result of the fires is that farmers don't always use more sophisticated approaches like creating fire belts. Most of the time, farmers used simple material branches of trees and other plants and essentially abandoned the fire to burn out of control. Figure 3 shows a bush fire that has destroyed the plant along the lagoon embankments.

Once the plants are burnt, the lagoon is exposed to direct rays of the sun thus increasing the rate of evaporation and erosion. This confirms what Natiamoa-Baidu and Gordon (1991), Ryan and Ntiamoa-Baidu (1998ab), and Amatekpor (1994) said in their reports that the rate of evaporation and erosion activities is rampant in the area.

Also, grazing by domestic animals such as goats, sheep, and cattle is a daily practice in the lagoon catchment area. During the field observation, cattle were seen grazing every day. The grazing by the animal tends to destroy the vegetative cover and expose the area to all kinds of erosion. This confirms what Gyasi *et al.* (1995) stated in their work that the influx of animals rearing in the lagoon catchment area leaves much to be desired as it is contributing greatly to the degradation of the lagoon.

Pollution and Health Implications

The pollution of the lagoon was also analyzed to ascertain the level of the deposition of pollutants into the lagoon and its catchment area. From the study, the participants indicated that various forms of pollutants were discharged into the lagoon due to urbanization. According to the participants, the pollutants are made up of metals, garbage, pesticide, weedicide, etc. These pollutants are discharged into the lagoon through human activities and during runoff (see Eshun, 2011). These pollutants have polluted the lagoon and made the water unsafe for human and aquatic lives. In an interview with a middle age man in Mankoadze, he retorted that the pollution of the lagoon has brought about the emergence of water-borne diseases resulting from its usage by humans and animals. For instance, during an in-depth interview with a 47-year-old fisherman in Akosua Village, he opined that "because of the high level of waste which has been deposited into the lagoon, the water has become toxic making it difficult for fish to survive". He went further to explain that, most of the fishes which are caught in the lagoon usually have a black spot on their skins which can be poisonous for human consumption. The current study was not able to verify this point since the study lack the capacity in that area. Future research is therefore needed in this area to ascertain the veracity of the point. However, the point was cleared, that, the pollution of the lagoon tends to bring about the outbreak of diseases in the surrounding communities since their sources of food supplies especially protein come from the lagoon (Amatekpor, 1994). A study by Eshun (2011) provides similar findings in the Fosu lagoon when he indicated that, the foodstuff and fishes obtained within the lagoon and its catchment area contain some quantity of metal which are harmful to the health of consumers. For instance, Eshun (2011) revealed in his study that the presence of lead and cadmium in the fish poses health hazards to its consumers since these two metals are of no nutritional value and also have the tendency to bioaccumulate in consumers.

Social/Cultural Impact of the Degradation of the Lagoon

The social significance of lagoons to the local environment has been given prominent in recent years. From the study, it was observed that the Yenku forest reserve which provides a habitat for several animals including deer is situated in the lagoon catchment area. However, with the increasing rate of degradation of the Ramsar site, this traditional service provided by the lagoon has dwindled over the years. During the field visit, the periphery of the forest was cleared for construction purposes. Private and estate developers' buildings were seen scattered around the catchment area. The forest patches which once served as a habitat for these wild animals were cleared and buildings put up. In an interview with an elderly man in the Mankoadze, he espoused that, the celebration of the Aboakyer festival is under threat of extinction. He went further to explain that, the deer used for the sacrifice cannot be replaced with a different animal. Therefore, the destruction of the forest means that these already endangered species may become extinct and the celebration of the festival would be in limbo. This confirms Ryan and Attuquayefio's (2000b) assertion that various animals in the area have decreased, as several animals have witnessed a drastic increase in numbers. It is important to state that, the Aboakyer festival draws people from far and near to the celebration. The state and the local community derived some financial benefits from these tourists. The effects of the destruction of the lagoon will significantly affect the local and international celebration of the festival and denied the state and the people of Effutu some financial benefits annually.

Fig. 3: Bushfire around the lagoon Source: Adopted from Dadson (2012)

Conclusion

Inappropriate human activities over the years have resulted in a decline in the services provided by the lagoon. The period of urbanization has witnessed a significant increase in human activities in the catchment area of the lagoon. Effective management of the lagoon is therefore necessary for ensuring its effective utilization and management. The Coastal Zone Indicative Management Plan (CZIMP) which is responsible for the management of coastal lagoons in Ghana has not lived up to expectations so far as coastal resource management is a concern. Laws concerning the utilization of coastal resources are weakly enforced and in areas where attempts are being made to enforce them, the people do not want to compile with the authorities to ensure the effectiveness of these laws.

It is recommended that the traditional leaders and government institutions should train task forces who will undertake a regular visit to the lagoon to check its utilization and perpetrators brought to book to serve as a deterrent to others.

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Author's Contributions

This work was carried out in collaboration between the two authors. Author JAA designed the study and performed the literature review. Authors JAA and ED collected the data from the field. Author JAA performed the analysis and wrote the first draft of the manuscript. Author ED did the proof writing of the manuscript. All authors read and approved the final manuscript.

Ethics

This research maintained high integrity, transparency and quality throughout the study. While seeking for information from the respondents, permission was obtained first before interrogating any respondent. In addition, informed consent of the respondents was sought first. The study maintained high level of anonymity and confidentiality of the respondents and their names did not appear anywhere whatsoever. Participation in the study by respondents were voluntary as they were not coerced to take part in the study.

Reference

Adu-Boahen, K., Dadson, I. Y., & Atubiga, J. A. (2018). Customary practices and wetland management in Ghana: A case of Muni Lagoon Ramsar site in the Central Region. *KNUST Journal of Geography and Development. l (2)*, *1*.

Amatekpor, J. K. (1994). Ghana Coastal Wetlands Management Project: Environmental baseline studies on Muni-Pomadze Ramsar site-soil, landuse, and land degradation. *Department of Game and Wildlife, Government of Ghana. Document No. GW/A*, *285*.

Atampugre, G (2010). Thesis submitted to the Department of Geography and Regional Planning of the Faculty of social sciences, University of cape coast, in partial fulfillment of the requirement for the award of master of Philosophy Degree in Geography. 47

Biney, C. A. (1995). Limnology of Muni-Pomadze Ramsar Site. *Unpublished report to Ghana Game and Wildlife Department of the Forestry Commission*.

Collar, N. J., Crosby, M. J., & Stattersfield, A. J. (1994). *Birds to watch 2*: *The world list of threatened birds* (Vol. 4). Cambridge, UK: BirdLife International.

Eshun, B. F. (2011). Distribution of heavy metals in the Fosu Lagoon Cape Coast. *School of Graduate Studies, Kwame Nkrumah University of Science and Technology, Kumasi*.

Gordon, C. (1994). Reconnaissance Report on Aquatic Ecology. *Ghana Coastal Wetland Management Project. Department of Game and Wildlife, Government of Ghana*.

Gyasi, E., Agyepong, G. T., Ardayfio-Schandorf, E., Enu-Kwesi, L., Nabila, J. S., & Owusu-Bennoah, E. (1995). Production pressure and environmental change in the forest-savanna zone of Southern Ghana. *Global environmental change*, *5*(4), 355-366.

Hall, J. B., & Swaine, M. D. (1981). Geobotany-Distribution and Ecology of Vascular Plants in a Tropical Rainforest Forest Vegetation in Ghana. *Dr. W. Junk Publishers. The Hague*, 382.

Hawthorne, W., & Abu-Juam, M. (1995). *Forest protection in Ghana: With particular reference to vegetation and plant species* (Vol. 15). IUCN. ISBN-10: 9782831702612.

Keddy, P. A. (2010). *Wetland ecology*: *principles and conservation*. Cambridge university press.

Martinez, E., M. (2014). The functional assessment of wetlands. *Unpublished PhD Thesis submitted to the University State of Michigan*, USA.

Mc-Donnell, M.I & Pichett, S.T.A (1990). Ecosystem structure and function along urban-rural gradients. *Ecology*, 71(4), 1232-1237.

Mitsch, W. J., & Gosselink, J. G. (2000). Wetlands john wiley & sons. *Inc., New York, New York*.

Moore. P. D (2008). Wetlands: Revised edition Bang Hermitage (*Facts on File, Inc*), New Yolk, 270p

Ntiamoa-Baidu, Y. (1991). Conservation of coastal lagoons in Ghana: The traditional approach. *Landscape and Urban Planning*, *20*(1-3), 41-46. DOI.org/10.1016/0169-2046(91)90089-5

Ntiamoa-Baidu, Y., & Gordon, C. (1991). Coastal Wetlands Management Plans: Ghana Environmental protection council and world bank. *Ghana Environmental Resource Management Project* (*GERMP*) *Report, Accra*.

Peck, D. (2000). Wetland values and functions. Ramsar Convention on wetland. *Ramsar convention on Bureau*. Gland Switzerland.

Prigent, C., Matthews, E., Aires, F., & Rossow, W. B. (2001). Remote sensing of global wetland dynamics with multiple satellite data sets. *Geophysical Research Letters*, *28*(24), 4631-4634. DOI/abs/10.1029/2001GL013263

Ramsar, (2011). The Ramsar Manual, Ramsar and its Mission, Brief History. http//www.ramsra.org/cda/en/ramsar – March 11 / main / ramsar / 1% 5E25044 4000 0 last ascessed march 31, 2011

Ryan, J. M., & Ntiamoa-Baidu, Y. (1998a). Studies on the terrestrial fauna of coastal Ramsar sites, Ghana. *Report submitted to the Coastal Wetlands Management Project, Ghana Wildlife Department, Accra, Ghana*.

Ryan, J. M., & Attuquayefio, D. (2000a). Mammal fauna of the Muni-Pomadze Ramsar site, Ghana. *Biodiversity & Conservation*, *9*(4), 541-560. https://link.springer.com/article/10.1023/A:1008964000018.

Ryan, T. M. & Ntiamoa-Baidu, Y. (ed) (1998b). *Studies on the terrestrial fauna of the coastal Wetlands project.*

Ryan, J. M., & Ntiamoa-Baidu, Y. (2000b). Biodiversity and ecology of coastal wetlands in Ghana. http://ugspace.ug.edu.gh/handle/123456789/28085

Tumbulto. J. W., & Bannerman, R. R (1995). Hydrology: The Muni-Pomadze Ramsar site. CWMP-GWD, ACCRA-GHANA.

Williams, M. (1993). *Wetlands: A threatened landscape*. https://agris.fao.org/agris-search/search.do?recordID=GB19950071295

World Wild Life Funds. (2004). The economic value of the world`s wetlands.

Zedler, J. B., & Kercher, S. (2005). Wetland resources: Status, trends, ecosystem services and restorability. *Annu. Rev. Environ. Resour.*, *30*, 39-74.