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IMPACTS OF SURROUNDING LAND USES ON PAYA INDAH WETLAND SANCTUARY, SELANGOR, MALAYSIA: THE PERCEPTION OF PUBLIC AGENCIES

BY

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ABSTRACT

Land use and land cover change have become driving forces towards environmental change. Urbanization process and population growth are key players in land use change, and both compete in terms of demand for land and contribute to environmental problems. The study was carried out due to the rapid rate of urbanization that leads to changes in land use and encroachment of natural and environmentally sensitive areas. Paya Indah Wetland was selected due to its location in Selangor, which is the fastest growing state in terms of population, infrastructural development and rate of urbanization, and also its environmental potentials. This research was to identify the impacts of surrounding land uses on Paya Indah wetlands, where activities of land uses surrounding Paya Indah Wetland were identified and the level of impacts of these land uses on the wetland were also determined. The study used quantitative method of data collection, where questionnaire was used as the instrument. The study examined environmental impacts of land use activities on the wetland. The research tried to establish a connection between urbanization, activities of land uses and environmental problems. Some obstacles that act as barrier to planning and managing the wetland such as lack of skilled personnel and financial constrains among others were identified. Furthermore, the effectiveness of land use planning tools used in controlling development in the area were studied. Similarly, measures towards achieving sustainability of the wetlands were identified. The results obtained during the course of study showed that land use activities in the area have negative impacts on the wetland. Despite the efforts made in the planning practices which attempted to regulate land use activities, change and rate of development in the area, related problems due to the activities and the change still persist. The findings indicated a positive correlation of 0.350 between agricultural activities and reduction in vegetation, 0.377 between industrial activities and water pollution, and 0.449 between agricultural activities and land degradation. Similarly, the results indicated a correlation of 0.304 between rate of urbanization and land degradation, 0.301 between land degradation and improper management, and 0.344 between biodiversity extinction and economic pressure. The research revealed that agricultural activities; mining and industrial activities have contributed to water pollution and land degradation of the wetland. These are coupled with rapid rate of urbanization in the area, economic pressure and poor management. Planning tools such as land use zoning, planning permission and approval, and environmental impact assessment are the major tools used in controlling development in the area, however, the problem still persist. However, some recommendations were made based on the findings which can assist in achieving sustainability of the wetland.

ملخص البحث

اصبح استعمال الأراضي وتغير الغطاء الأرضي القوى الدافعة نحو التغير البيئي. فعملية التحضر والنمو السكاني هما المفتاحين اللاعبين في تغيير استعمال الأراضي ، وعلى حد سواء حيث يتنافسان من ناحية الطلب على الأراضي والاسهام في المشاكل البيئية. وقد أجريت هذه الدراسة بسبب المعدل السريع للتحضر الذي يؤدي إلى إحداث تغييرات في استخدام الأراضي وزحف المناطق الطبيعية والحساسة بيئيا. بايا انداه الارض الرطبه (Paya Indah Wetland) تم اختيارها نظراً لموقعها في ولاية سيلانجور ، والتي هي الولاية الأسرع نموا بماليزيا من حيث عدد السكان وتطور البنية التحتية ومعدل التحضر و كذلك إمكانياتها البيئية. هذا البحث قد حدد الآثار المترتبة على استخدامات الأراضي المحيطة بمنطقة الدراسة ، حيث حددت أنشطة استعمالات الأراضي المحيطة بمنطقة الدراسة ومستوى تأثيراتها . هذه الدراسه استخدمت الأسلوب الكمي لجمع البيانات ، حيث تم استخدام الاستبيان كأداة. و قد اختبرت الدراسة الآثار البيئية لأنشطة استعمال الأراضي في الارض الرطبة. وحاول البحث تأسيس اتصال بين التحضر وأنشطة استعمالات الأراضي والمشاكل البيئية. بعض العقبات التي تكون بمثابة حاجز لتخطيط وإدارة الأراضي الرطبة هي قلة العمالة الماهرة و القيود المالية وغيرها من العوامل التي تم تحديدها. وعلاوة على ذلك ، فقد تمت دراسة فعالية ادوات استعمال الأراضي المستخدمه في السيطره على التنميه بالمنطقة . وبالمثل ،التدابير من أجل تحقيق الاستدامة من الأراضي الرطبة التي تم تحديدها. النتائج التي تم الحصول عليها خلال الدراسة تبين أن انشطه استعمال الأراضي بالمنطقة لها آثار سلبية على الأرض الرطبة. وعلى الرغم من الجهود التي بذلت في ممارسات التخطيط التي حاولت تنظيم انشطه استعمالات الأراضي و تغير معدل التنمية في المنطقة والمشاكل وذات الصلة بسبب الأنشطة والتغيير لا تزال قائمة. النتائج أشارت الى وجود علاقة إيجابية تمثلت بـــ0.350 بين الأنشطة الزراعية والحد في الغطاء النباتي ، وبـــ 0.377 بين الأنشطة الصناعية و تلوث المياه ، وبـــ 0.449 بين الأنشطة الزراعية و تدهور الأراضي . وبالمثل ، أظهرت النتائج وجود علاقة تتمثل بـــ 0.304 بين معدل التحضر وتدهور الأراضي ، و بـــ0.301 بين تدهور الأرض وسوء الإدارة ، وبـــ 0344 وبين انقراض التنوع البيولوجي والضغط الاقتصادي. وكشفت الأبحاث أن الأنشطة الزراعية ، وانشطة التعدين والصناعية ساهمت في تلوث المياه وتدهور الأراضي لمنطقة الدراسة. وتقترن هذه مع معدل سرعة التحضر في المنطقة والضغوط الاقتصادية وسوء الإدارة. أدوات التخطيط مثل تقسيم استعمالات الأراضي رخصة التخطيط والموافقة عليها ، وتقييم التأثير البيئي هي الأدوات الرئيسية المستخدمة في التحكم في التنمية للمنطقة ، ومع ذلك ، فإن المشكلة لا تزال قائمة. ولذلك ، واستنادا الى نتائج الدراسة تم الادلاء ببعض التوصيات التي يمكن أن تساعد في تحقيق استدامة الأرض الرطبة.

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conform to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Urban and Regional Planning.

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M. Zainora Asmawi
Supervisor

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Urban and Regional Planning.

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Mansor Ibrahim
Dean, Kulliyyah of Architecture and Environmental Design

DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Hassan Abdulaziz

Signature……..... Date…….....

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DECLARATION OF COPYRIGHT AND AFFIRMATION OF FAIR USE OF UNPUBLISHED RESEARCH

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Affirmed by Hassan Abdulaziz

……. ……..
Signature Date

This research is dedicated to my beloved parents Hassan A. Modibbo and Fadimatu Hammanjoda Paris and my brothers and sisters and to the entire family in general.

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LIST OF ABBREVIATIONS

DEIAs	Detailed Environmental Impact Assessment
DOE	Department of Environment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EQA	Environmental Quality Act
GIS	Geographic Information System
IEM	Integrated Environmental Management
ISO	International Organization for Standardization
JPBD	State Town and Country Planning Department
LaPiS	Land Use Planning Intelligent Systems
LPA	Local Planning Authority
LUC	Land Use Change
MSC	Multimedia Super Corridor
NLC	National Land Code
NPP	National Physical Plan
NPPC	National Physical Planning Council
SEA	Strategic Environmental Assessment
SPSS	Statistical Package for Social Sciences
TCPA	Town and Country Planning Act
TCPD	Town and Country Planning Department
UN	United Nations
WWA	Wisconsin Wetlands Association
WWF	World Wide Fund for Nature

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Land use refers to the activities that take place on the land. It changes over time due to variation in human activities and needs over space and time. The threats faced by wetlands can be attributed to underprivileged in land use planning. It can be land use change or land use modification. Land use planning evolves due to the geometric increase in the world population and the need for more land to support human activities through the provision of basic needs such as housing, commercial area, administrative and other facilities. It is also due to the need for protection of the natural environment for the reason that human beings interaction with it is unhealthy and unsustainable. These basic needs could be achieved with land use planning tools such as zoning. Zoning is a planning tool which delineates areas where certain activities are allowed to take place and often specify details about the physical characteristics (Vince et al, 2005). It ensures proper presentation of various land uses in a manner that allows peaceful coexistence, and as well a mechanism used to ensure orderly growth, development and protect property values.

Wetlands are among the worlds' most important, at the same time the most threatened environmental resources due to their loss since industrial revolution (Best, Verhoeven and Wolff, 1993). They are characterized by dense vegetation, serve as habitat for both flora and fauna, and retain water throughout the year or most period of the year. They are associated with various functions such as hydrological function, provision of food for the surrounding inhabitants, medicinal value and also moderated

the local climate of the region. These resources are fragile in nature and cannot withstand other human activities. Even with the importance and functions attached to wetlands, they are among the most threatened environmental resources.

Despite the importance of wetlands to both the local and global communities such as moderation of climate, a key factor in hydrological cycle, reduction of flood intensity, recharging of ground water, habitat for various flora and fauna and recreational areas for the local communities. They are being threatened by various urbanization process and various human activities. These raised the issue of the need for conservation and wise use of wetlands to achieve sustainability.

The research is about the impacts of surrounding land uses on Paya Indah wetland sanctuary. Paya Indah Wetland is a valuable wetland in the state of Selangor and Malaysia in general. It offers various functions such as representation of the natural environment, base for ecotourism (which serves as a source of income for the state), habitat for wide variety of flora and fauna (including some endangered species) and supports education researches. Paya Indah wetland is one of the 1847 wetlands of international importance (Ramsar sites) according to Ramsar Convention (Othman, 2006).

This research is focused towards identifying and assessing the level of impacts of land-uses surrounding Paya Indah wetland. The problems associated with this wetland could be attributed to uncontrolled human activities, development and urbanization (which requires more space for provision of basic human needs such as residential, commercial, roads, and other infrastructural facilities) which could largely be attributed to explosive population growth, and economic expansion (or diversification). The study also identified the efforts of agencies involved in planning and environmental protection such as: Department of Wildlife and National Parks

which is the major agency in charge of the management of Paya Indah wetland, Kuala Langat municipal council, Sepang Municipal Council, Department of Town and Country Planning, Department of Environment (DOE) and Department of Forestry.

1.2 STATEMENT OF RESEARCH PROBLEM

i. Poor Water Quality

Water is a fundamental component of the environment, and its quality matters a lot either for industrial or domestic use. Water quality has been affected by various human activities such as industrial, commercial, agricultural and many others. The utilization of wetlands for storm water management resulted to various ecological problems, because urban runoff alone can alter water quality, affect the aquatic ecosystem and the soil itself (Azous and Horner, 2001). This exposes the wetland to various forms of danger and this can give rise to diseases that can affect the animal species.

According to Nik and Associates (1999), with the increase in urbanization rate in the Multimedia Super Corridor, Paya Indah wetland can suffer excess runoff due to rainstorm. This will indirectly affect the whole system of the wetland because the flora and fauna cannot survive on polluted water that contains toxic materials. Once these systems are affected, the hydrological processes can also be affected, and subsequently some of the fauna will be forced to move to favorable areas for survival, while flora will end up vanishing. Darci, Houser and Heidi (2000) state that one sixth of the world fresh water, one quarter of the wood harvest, two fifth of its material and energy flow is affected due to implementation of development projects. Providing buffer zones to separate the wetland from the neighboring land uses has been the major concern of environmental planners, but yet, this is not a mitigating measure.

The Ninth Malaysia Plan (2006-2010) reports that most of the rivers on the coast of Peninsular Malaysia (mainly downstream) were more polluted due to discharge from domestic sewage, agro-based industries/agriculture, run-offs, extensive land use/clearing and industrialization. Most of the discharge in the area flow into the wetland. According to Kuala Langat Local Plan (2020), pig breeding is considered as the major cause of water bodies' pollution in the district, and this can in one way or the other reaches the wetland through the hydrological network.

ii. Human Intervention

Human intervention through alteration and modification of land uses surrounding the wetlands, and also through displacement of wetland components such as vegetation, unsustainable fishing practices, hunting of wildlife within the wetlands. According to Nik and Associates (1999), agricultural activities and logging are among the major activities that affects the wetland. These activities result to irreversible damage to the natural ecosystem. People in the urban areas also generate waste of different forms, some of these wastes are disposed into water ways/drainages and flowing water, which are transported and deposited in larger water bodies and nearby wetlands. Paya Indah wetland sanctuary is still facing the problem of sand mining on the adjacent side of it. This will end up in leaving mines pits and degrade the land resources of both the surrounding and the wetland areas.

iii. Lack of Knowledge of Importance of Wetlands

Among the cause of wetland degradation is lack of detail knowledge of government agencies, planners, natural resource managers and wetland users about the importance of wetlands (Chandramohan and Bharathi, n. d.). Runoff from residential, commercial

and agricultural land uses is said to have effects on the wetlands as a result of pollutants and toxic waste deposition. The development of infrastructures on these fragile (wetlands) areas without preparation of environmental impact assessment report poses a great threat to the wetlands, and subsequent effects are also ignored. Location of non conforming land uses together also affects the quality of wetlands.

iv. Urbanization Process and Land-Use Change

Wetlands in urbanizing watersheds will inevitably be affected by urbanization. Kenneth (2009) states that urbanization and semi natural forest accounted for greater spatial extent of wetlands conversion and utilization. This is due to greater need for space which subsequently led to reduction in wetlands size. Sediment deposition by runoff from urban areas is deposited on the fertile soil of wetlands. This affects the rate of infiltration and hydrological functions. If measures are not taken, it will change wetland's topography, and may subsequently take over the wetlands, (Azous and Horner, 2001). According to the Seventh Malaysia Plan (1996-2000), the growth of urban centers has contributed to environmental pollution and land degradation. Agricultural activities is the dominant activity in the surrounding area, this can affect the wetland water quality and may also encroach the wetland area. The peat basin (Paya Indah and the adjacent forest reserve) has been subjected to number of piece meal economic development (Nik and Associates, 1999), where part of the area is undergoing changes in use from forest and wetland to buildings, roads pavements and parking.

1.3 AIM AND OBJECTIVES OF THE RESEARCH

The aim of this research is to determine the impact of surrounding land uses on Paya Indah wetland.

The objectives are:

i. To identify the influence of surrounding land uses on Paya Indah wetland
ii. To identify the impacts/consequences of urban land uses on the wetland
iii. To identify the obstacles faced during the process of planning and managing the wetland
iv. To suggest/propose strategies for achieving sustainability of the wetland

1.4 RESEARCH QUESTIONS

The research seeks to provide answers to the following questions:

i. How do the surrounding land uses influence the wetland?
ii. What are the impacts/effects of surrounding development/land use change on the wetland?
iii. What are the consequences of urbanization/urban land uses on the wetland?
iv. What are the obstacles faced during the planning and management of the wetland?
v. What are the strategies to be adopted in order to conserve the wetland?

1.5 SCOPE OF STUDY

The scope of the study is the environmental aspects of Paya Indah wetland, which includes the aspect of water quality, urbanization trend and land use change in the

area. The current use of the wetland and the condition of the vegetation cover of the wetland were also studied.

The study also looked into the involvement and efforts of governmental departments that are interconnected with the planning, protection and management of the wetland such as the Department of Wildlife and National Parks, Department of Town and Country Planning (TCP), Department of Environment (DOE), Kuala Langat Municipal Council and Sepang Municipal Council.

The tools used by the above mentioned departments in controlling and regulating development, land use activities were also looked into. The obstacles faced in the process of planning and management of the wetland was also studied.

The surrounding land uses such as agricultural, sand mining, industrial and residential were the major land uses surrounding the wetland. Their impacts on the wetland are mostly water pollution, land degradation, reduction in vegetation, where the level of impacts was studied deeply. Most of the data for the study were fully dependent on these mentioned departments.

1.6. SIGNIFICANCE OF STUDY

1.6.1 Significance Towards Environment

The research can serve as a stepping stone towards achieving environmental sustainability through the protection of biodiversity especially the endangered species even with the greater need for land for physical development. It tries to strike a balance between environmental conservation and physical development. It can also enlighten the public on the need to protect the environmentally sensitive areas and wetlands are one of them. This can be achieved through the use of land use planning tools such as zoning. The study can also help in maintaining some natural processes

such as hydrological, moderation of climate, reduction of the intensity of some natural disasters and many others.

1.6.2 Significance Towards Planning

The research aims at revealing the measures to be taken in order to achieve the goal of planning; which is "ensuring physical development, economic development and environmental protection for a better living standard". The attainment of the three above mentioned target can pilot towards sustainable development, and meeting the requirement of Agenda 21. The research can also be additional information to the authorities and agencies involved in planning and management of the wetland, with the main focus on incorporating environmental elements into planning and proper land use planning to ensure sustainability and sustainable land use planning. This is due to the fact that wetlands are fragile environmental resource and is at the same time a land use that is associated with various functions.

Regulate removal of vegetation, draining and hydrologic modifications can prevent loss of wetlands (Chandramohan and Bharathi, n. d.). It will give more idea on uses that affects wetlands which will serve as a base for approval or rejection of any land use or change surrounding the wetland, or require mitigation measure as condition for approval.

1.6.3 Significance Towards Community

Identification of land uses that affects the wetland is vital as it serves as the bases for proper measures that will minimize the effects. This can ensure sustainable environment for the communities as the communities are the occupants of the environment. Protecting and conserving wetlands also protects the communities from

natural disasters that may force them to resettle or cause any harm to them or loss of properties. Protected and conserved wetlands present the communities the beauty of nature and they serve as tourism base where members of community come together, employment generation for the communities as people from far distant can visit the wetland where shopping and other forms of economic activities can take place.

1.6.4 Significance Towards Local Authority/Agencies

The findings of the study can provide the local authority with some land uses effects on wetland that the local authorities were not aware of, this can allow necessary measures to be taken by them in order to ensure sustainable future. This will further give them some ideas on how to monitor those effects. The study will also be a ground for introduction of more environmental and land use planning laws in order to strengthen the existing environmental and land use planning laws. It will also be a guide on how to monitor activities around wetlands to avoid negative impacts of the activities.

Furthermore, it will provide more data for proper planning, decision-making and implementation of laws and guidelines that will ensure sustainable wetlands. There is need for the local authorities to encourage local academic institutions to study wetlands and to communicate their findings. This will help in implementation of new wetlands anti-degradation policy or modify the existing policies and strategies. The findings of study may also be used to assist the management of the wetland in determining the viability of conserving the area in the long run.