



THE IMPLEMENTATION OF GIS BY
GOVERNMENT AGENCIES ON COASTAL
MANAGEMENT INITIATIVES IN SELANGOR

BY

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ABSTRACT

Globally, coastlines are undergoing rapid development and firm management policies have to be established. However, for any shore management to be effective, the policies need to be based on informed decision-making. GIS encourages the development and use of standards for coastal data definition, as well as collection and storage, which promote the compatibility of data and processing techniques between projects and departments, as well as ensuring the consistency of approach at any one site over time. The purpose of this research is to gather perceptions from the government agencies that have used GIS in managing coastal areas in Selangor. Two main divisions of coastal change analysis may be recognized: monitoring and simulation modelling. GIS modelling and the simulation of coastal phenomena are extremely valuable techniques for assessing the effectiveness and likely impacts of such intervention. Thus, a well-designed coastal area information system could be a significant decision support tool to aid the development of integrated and sustainable coastal resource management strategies. The aim of the research is to study the implementation of GIS by government agencies on coastal management initiatives in Selangor. The objectives of the research are to identify the present affiliation between coastal management and GIS at government agencies in Selangor coastal districts, to study the application of GIS and related spatial information technologies to local government staff and officials, to aid them in moving towards sustainable management of the coastal area in Selangor and to make recommendations to decision makers, planners and the general public that can be used to strengthen environmental policy and guide management decisions in the coastal areas of Selangor. Therefore, 83 samples have been obtained from government officers involved in coastal planning and management and GIS from selected offices throughout Selangor for further analysis by using Kruskal-Wallis test. Additionally, findings from semi-structured interviews evaluate the coastal management issues from relevant authorities. The study has found that there is a positive relationship between coastal management and GIS in Selangor, Government agencies have actively used GIS as part of the coastal management, Coastal management implementation has considered GIS as a tool of development for coastal area in Selangor, GIS for coastal decision-making and policy formulation, Use of spatial information in coastal management, An approach for supporting the suitability and implementation of a strategy for coastal management and GIS for coastal decision-making and policy formulation. The significance of the study is to improve integration between coastal management and GIS in Selangor coastal districts; the following recommendations are made: Elevating the Usage of coastal management and GIS application, Strengthening Coastal management and GIS executing power and Authorizing the Relationship between coastal management and GIS.

ملخص البحث

على الصعيد العالمي، تشهد السواحل تطورا سريعا ولا بد سياسات إدارة حازمة أن تنشأ. لكن، حتى تكون أي إدارة السواحل فعالة، تحتاج السياسات أن تقوم بناء على اتخاذ قرار واع بشأنها. تشجع نظم المعلومات الجغرافية (GIS) على تطوير واستخدام معايير لتعريف معلومات ساحلية، وجمعها، وتخزينها والتي يعزز توافق البيانات وتقنيات المعالجة بين المشاريع والدوائر، فضلا عن ضمان اتساق النهج في أي موقع واحد على مرور الزمان. والغرض من هذا البحث هو جمع تصور من الوكالات الحكومية التي تستخدم نظم المعلومات الجغرافية في إدارة المنطقة الساحلية في ولاية سلانجور. شعبتان رئيسيتان من تحليل التغير الساحلي قد يتم الاعتراف بها: الرصد وبناء نماذج المحاكاة. العرض والمحاكاة (GIS) للظواهر الساحلية هي تقنيات قيمة للغاية لتقييم الفعالية والآثار المحتملة لمثل هذا التدخل. وهكذا، جيد التصميم لنظام معلومات المناطق الساحلية يمكن أن تكون أداة دعم القرار الهامة لمساعدة في وضع استراتيجيات متكاملة ومستدامة لإدارة الموارد الساحلية. الهدف من هذا البحث هو دراسة تطبيق نظم المعلومات الجغرافية من قبل الوكالات الحكومية على مبادرات إدارة المناطق الساحلية في ولاية سلانجور. أهداف البحث هي تحديد الانتماء الحالي بين إدارة المناطق الساحلية ونظم المعلومات الجغرافية في الوكالات الحكومية في المناطق الساحلية ولاية سلانجور، لدراسة تطبيق نظم المعلومات الجغرافية وتكنولوجيا المعلومات المكانية المتعلقة بالموظفين الحكوميين المحليين والمسؤولين، لمساعدتهم في التحرك نحو الإدارة المستدامة للمنطقة الساحلية في ولاية سلانجور وتقديم توصيات لصناع القرار والمخططين وعامة الجمهور والتي يمكن استخدامها لتعزيز السياسات البيئية وتوجيه القرارات الإدارية في المنطقة الساحلية في ولاية سلانجور. لذلك، تم الحصول على 83 عينة من المسؤولين الحكوميين المعنيين بالتخطيط الساحلي والإدارة ونظم المعلومات الجغرافية من مكاتب مختارة في جميع أنحاء ولاية سلانجور لمزيد من التحليل باستخدام **Kruskal-Wallis test**. بالإضافة إلى ذلك، تقييم النتائج من مقابلة شبه منظمة لمشكلات إدارة المناطق الساحلية من الجهات ذات العلاقة. وقد وجدت الدراسة أن هناك علاقة إيجابية بين إدارة السواحل ونظم المعلومات الجغرافية في ولاية سلانجور، استخدمت وكالات الحكومة (GIS) بنشاط كجزء من إدارة المناطق الساحلية، تنفيذ الإدارة الساحلية قد اعتبر (GIS) ادوات التنمية في المناطق الساحلية بسلانجور، (GIS) لاتخاذ القرار الساحلي وصياغة السياسات، واستخدام المعلومات المكانية في إدارة المناطق الساحلية، النهج لدعم ملاءمة وتطبيق استراتيجية لإدارة المناطق الساحلية ونظم المعلومات الجغرافية لاتخاذ القرار وصياغة السياسات المتعلقة بالمناطق الساحلية. وأهمية هذه الدراسة هي تحسين التكامل بين إدارة المناطق الساحلية ونظم المعلومات الجغرافية في المناطق الساحلية ولاية سلانجور، توصل البحث الي التوصيات التالية: الارتقاء في استخدام الإدارة الساحلية وتطبيق نظم المعلومات الجغرافية، تعزيز الإدارة وتنفيذ السلطة لنظم المعلومات الجغرافية وتفويض العلاقة بين الإدارة الساحلية ونظم المعلومات الجغرافية.

APPROVAL PAGE

I certify that I have supervised and 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 Science (Built Environment)

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DECLARATION

I hereby declare that this thesis is the result of my own investigation, 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.

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LIST OF ABBREVIATIONS

ANOVA	Analysis Of Variance
CAD	Computer Aided
CM	Coastal Management
COMA	Coastal and Marine Geography Specialty Group
COSMO	Coastal zone Simulation Model
CZM	Coastal Zone Management
DANCED	Danish Cooperation for Environment and Development
DBKL	Dewan Bandaraya Kuala Lumpur
DBMS	Database Management System
DEGIS	Darul Ehsan Geographical Information System
DEM	Digital Elevation Model
df	Degree of Freedom
DID	Department of Irrigation & Drainage
DOC	Development Opportunity & Constraints
DOE	Department of Environment
DSS	Decision Support Systems
EIA	Environmental Impact Assessment
EU	European Union
Forestry	Department of Forestry
GDP	Gross Domestic Product
GEF	Global Environment Facility
GII	Geographical Information Infrastructure

GIS	Geographical Information System
GPS	Geographical Positioning System
ICM	Integrated Coastal Management
ICZM	Integrated Coastal Zone Management
IMO	International Maritime Organization
IRS	India Remote Sensing
JKKK	Jawatankuasa Kemajuan & Keselamatan Kampung
JPBD	Jabatan Perancang Bandar dan Desa
LIS	Land Information System
LISS	Linear Imaging Self-Scanning
LUAS	Lembaga Urus Air Selangor
MaCGDI	Malaysian Centre for Geospatial Data Infrastructure
MBSA	Majlis Bandaraya Shah Alam
MDKL	Majlis Daerah Kuala Langat
MDKS	Majlis Daerah Kuala Selangor
MDSB	Majlis Daerah Sabak Bernam
MIS	Management Information Systems
MISGEO	Meta Information System
MPK	Majlis Perbandaran Klang
MPPJ	Majlis Perbandaran Petaling Jaya
MPSp	Majlis Perbandaran Sepang
MyGDI	Malaysian Geospatial Data Infrastructure
MyLIIS	Malaysian Land Integrated Information Services
NAARM	National Academy of Agricultural Research Management

NGDC	National Geospatial Data Centre
NOAA	National Oceanic and Atmospheric Administration
NPP	National Physical Plan
NPPII	National Physical Plan II
OPPS	Outline Perspective Plan Sabah
PEMSEA	Partnership in Environmental Management for the Seas of East Asia
PFR	Permanent Forest Reserved
PRA	Participatory Rural Appraisal
PU	Planning Unit
QSAR	Quantitative Structure–Activity Relationship
RamCo	Rapid Assessment Module for Coastal Zones
RFZPPN	Rancangan Fizikal Zon Persisiran Pantai Negara
RIAM	Rapid Impact Assessment Matrix
RISK	Research Institute for Knowledge Systems
RS	Remote Sensing
RWS	Rijkswaterstaat
SAMPAK	Special Area Management of the Pak Phanang
SDI	Spatial Data Infrastructure
SDSS	Spatial Decision Support System
SHO-MAN	SHOreline MANagement
SPSS	Statistical Package for the Social Sciences
TCP	Town and Country Planning
TCPD	Town and Country Planning Department
TRPD	Town and Regional Planning Department

UNDP	United Nations Development Program
UPEN	Unit Perancang Ekonomi Negeri
USGS	United States Geological Survey
ZIA	Zon Industri Akuakultur

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

The coastal area is considered one of the most complex areas to be handled by traditional planning system. In managing coastal areas, there must be integrated coastal management between various related agencies, technically and physically (FAO, 2006). Nowadays, Geographic Information System (GIS) is becoming a utility for analysing the dynamics of the coastal areas. Among the frequent users of GIS whose works relate to the coastal areas are engineers and land managers. Both are concerned with the spatial and time distribution of coastal changes like landslides and sediment drift whilst identifying possible causes and consequences. In order to record coastal behaviour, assessing the time frame is very important. It must be gathered by doing a multi-temporal study where large quantities of data from various types and sources are collected for a better description of the coastal behaviour. Therefore, a reliable inventory describing the type, activity and definition of landslides are needed before any analysis takes place (Duman et al., 2005). What needs to be noted is that management of the coastal area depends on the coastal manager's ability to acknowledge and comprehend the complexity of natural coastal processes. Modelling coastal processes requires the ability to combine both spatial and non-spatial information from multiple datasets. GIS has the ability to integrate physical, ecological, socio-economic, and hazards information, which makes it among the best assessment tools to support management efforts in the coastal area. Through GIS' practises, coastal managers are able to model vulnerability to coastal erosion, sea-level rise and other

threats so that decision makers have the necessary tools to protect local communities and effectively manage coastal natural resources (Baron et al., 2009). In short, the topic of this chapter includes background of research, problem statement, research aim, goal and objectives, research questions, scope, significance of study and limitations.

1.2 RESEARCH BACKGROUND

In this research, Geographical Information System (GIS) applications and coastal management are two key topics, being subject matters. This section elaborates on GIS application that may be used in implementing coastal management, and it continues to describe current coastal management's practice.

First, the sub-chapter 1.2.1 (Coastal Management in Selangor) describes the current coastal management's practice, which includes the coastal management's theories, application and chronological events that relate to coastal management. This is to extract and illustrate the current practice of coastal management in Selangor. Works and achievements in managing the coastal area are also identified. Theories regarding GIS applications in coastal management are explained in sub chapter 1.2.2. In explaining the principles of GIS applications, theories, application and chronological events relating to GIS will be further elaborated in greater detail. This is to posit that the GIS have been recognised as applications that are used by developed and developing countries all over the world with regards to coastal management. Moreover, the use of various and different applications in GIS has made the management of coastal areas an easier task.

1.2.1 Coastal Management in Selangor

Malaysia has indirectly introduced coastal management in the year 1957 through the Federal system, which consists of three levels of Government: federal, state and local. Coastal management in Malaysia was established to manage and protect coastal areas from various threats such as coastal pollution, coastal erosion, over-exploitation of fishery resources and deforestation of mangrove forests, etc. (Nasuchon, 2009). Malaysia was rapidly developing the Integrated Coastal Zone Management (ICZM) in between the years 1980 and 1996. The implementation of ICZM was introduced to Peninsular Malaysia and Sabah in 1996. The project was funded by the Danish Cooperation for Environment and Development (DANCED) and the State Government of Sabah. The project's aim was to prepare an ICZM system for Sabah, Sarawak and Pulau Pinang (M. Zainora A. 2010). Furthermore, in line with the efforts towards improving the quality of the global environment and the implementation of Agenda 21 in the Declaration of Rio de Janeiro in 2001, The International Maritime Organization (IMO) established a Regional Office in Manila, Philippines under the Partnership in Environmental Management for the Seas of East Asia (PEMSEA) to plan, develop and implement the Integrated Coastal Management (ICM) in line with the needs and capabilities of local, national and regional agencies. The program was implemented through The United Nations Development Program (UNDP) with funding and support from The Global Environment Facility (GEF). In the context of Malaysia, Port Klang and its coastal waters were chosen as a 'National Demonstration Site' under the PEMSEA program. This plan was adopted by the Selangor State Government on the 8th of August 2007 and was gazetted on 10th September 2009. This project was run by the Lembaga Urus Air Selangor (LUAS). In short, there are coastal management initiatives in Selangor that were initiated by LUAS. This research aims to identify any