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AN ENVIRONMENTAL INFORMATION SYSTEM FOR TANJUNG MULIA VILLAGE, MEDAN MUNICIPALITY, INDONESIA

JAYA ARJUNA

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JAYA ARJUNA

MASTER OF SCIENCE
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UPM

AN ENVIRONMENTAL INFORMATION SYSTEM FOR TANJUNG MULIA VILLAGE, MEDAN MUNICIPALITY, INDONESIA

By:

JAYA ARJUNA

Thesis Submitted in Fulfilment of the Requirements for
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UPM

That house of the hereafter
We shall give to those
Who intend not high-handedness
Or mischief on earth
And the End is (Best)
for the righteous

(Al Quran 28:83)

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AN ENVIRONMENTAL INFORMATION SYSTEM FOR

TANJUNG MULIA VILLAGE, MEDAN MUNICIPALITY, INDONESIA

BY

JAYA ARJUNA

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Chairman : Dr. Wan Nor Azmin Sulaiman

Faculty : Science and Environmental Studies

The residential area in any municipality is an area that ideally should pay special attention to the development of environmental management and pollution control. Most households in developing countries are located close to industrial activities and this may cause environmental problems such as water and air pollution. The government or the Local Authority may not be able to cope with this problem of pollution perhaps due to financial constraints and lack of technology and expertise. Moreover, law enforcement is mostly ineffective due to lack of knowledge on the part of officials involved in environmental management.

The objective of the study is to develop an Environmental Information System on human activities, location and sources of pollution in urban residential areas because such a study has not been previously undertaken. Decision makers will therefore be provided with an important tool that will furnish them with

complete and accurate information to help them plan and implement a programme for sustainable growth of the city.

The Indonesian Government has laid a valuable and solid foundation for a environmental information system through a system of land codes for tax collection. The land in cities has been given location codes in relation to the width and type of building; and width of each land unit. The linkage and relation between the tax administrative system and environmental management system constitutes the basic structure in the formulation of the environmental information system developed in this study. The Environmental Information System study consists of data collection, processing and analysis of data and data presentation. Data collection and organisation were based on the Environmental Audit Guidelines declared by the Indonesian Ministry of Environment in 1994. The concept of unit operation in a factory is applied to each land unit in the study area.

The system that was developed was implemented in the three Subvillages of Tanjung Mulia Village, Medan Municipality, Indonesia. The study covered 152 locations of land units. The parameters obtained in this study such as distribution of population and solid and liquid waste handling systems was analysed by a Geographic Information System (GIS) and the output is presented in thematic maps. This data may be useful for environmental management and pollution control and land development planning of the study area.

From the result, it is proposed that the Government draws up a list of industries that can be permitted in residential areas as products can now be linked to the pollutant type produced. The terminology of ***confidential data*** considered for the convenience of future data collection and implementation of EIS in any residential areas of any municipality in Indonesia should be clarified.

Abstrak tesis yang dikemukakan kepada Senat Universiti Pertanian Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains.

SISTEM MAKLUMAT ALAM SEKITAR KELURAHAN TANJUNG MULIA, KOTAMADYA MEDAN, INDONESIA

OLEH

JAYA ARJUNA

OGOS 1996

Pengerusi : Dr. Wan Nor Azmin Sulaiman

Fakulti Sains dan Pengajian Alam Sekitar

Pengurusan alam sekitar dan pengawalan pencemaran di kawasan kediaman bandarraya seharusnya mendapat perhatian khusus dalam aktiviti pembangunan. Pada ketika ini, banyak kawasan kediaman terletak berhampiran dengan kawasan perindustrian. Keadaan ini menyebabkan masyarakat di kawasan kediaman mengalami masalah persekitaran seperti terdedah pada kesan pencemaran air mahupun udara. Masalah pencemaran ini tidak dapat diatasi dengan sepenuhnya oleh pihak berkuasa akibat daripada kekurangan peruntukan, teknologi dan kepakaran. Penguatkuasaan kualiti alam sekitar mungkin juga tidak dapat dilaksanakan sepenuhnya kerana kurangnya pengetahuan yang berkenaan dengan pengurusan alam sekitar daripada kakitangan kerajaan yang terlibat.

Suatu kajian untuk membina sistem maklumat alam sekitar telah dijalankan. Matlamat daripada sistem maklumat ini adalah untuk mempermudahkan dan membantu pengurusan alam sekitar di sesuatu kawasan bandaraya sehingganya dapat dibangunkan sebuah bandaraya yang menjanjikan keselesaan secara berketerusan.

Melalui kegiatan pengumpulan cukai tanah dan cukai pintu, kerajaan Indonesia telah meletakkan asas yang kukuh bagi kegiatan pengurusan alam sekitar dan pengawalan pencemaran. Setiap satu lot tanah di bandaraya telah diberi kod lokasi yang dihubungkait dengan keluasan tanah, jenis dan keluasan bangunan yang didirikan di atas tanah tersebut. Kod lokasi ini digunakan sebagai asas bagi mengenal pasti pusat aktiviti, punca pencemaran dan juga jenis pencemar yang terhasil. Pengumpulan dan rekod data dijalankan mengikut panduan Audit Lingkungan yang dikuatkuasakan oleh Kerajaan Indonesia pada tahun 1994.

Percubaan penggunaan sistem maklumat alam sekitar telah dijalankan di tiga kawasan kediaman Kelurahan Tanjung Mulia, bandaraya Medan, Indonesia. Kajian ini melibatkan 152 lokasi lot tanah. Penganalisisan data telah dijalankan dengan menggunakan program "spread sheet" dan sistem maklumat geographis (GIS). Berdasarkan kepada keputusan kajian, dibina suatu sistem maklumat alam sekitar yang berupaya untuk menyokong pengurusan alam sekitar pada kawasan kediaman di bandaraya.

Melalui kajian ini adalah dicadangkan agar kerajaan dapat menyenaraikan jenis industri yang boleh beroperasi di sesuatu kawasan kediaman dan juga mengenalpasti jenis sisa cemaran yang mungkin dihasilkan oleh kilang-kilang tersebut. Di samping itu, pihak kerajaan juga perlu menyediakan suatu garis panduan mengenai definasi "data sulit" yang selalu menghalang kegiatan pengumpulan data sekunder. Garis panduan ini adalah penting agar aktiviti menjalankan kajian alam sekitar lebih selesa, terutamanya untuk dilaksanakan di mana-mana majlis perbandaran di Indonesia.

CHAPTER I

INTRODUCTION

Background

In some developing countries, change in the pattern of development from agrarian to industrial has contributed to changes in the distribution pattern of the population of these countries. Big cities developed more rapidly as a result of urbanisation and industrialisation. At the same time, several big cities nowadays are facing serious problems of environmental degradation due to mismanagement of industrial development. This is because industrial development is usually centred in big cities (Yang and Fu, 1986: Kasarda and Parnell, 1993).

Kasarda and Parnell (1993) pointed out that in 1950, 285 million people in the developing countries resided in urban areas. In 1990, this number increased to one and a half billion. According to the United Nations (Kasarda and Parnell, 1993), the population of the developing countries living in big cities by the year 2025 is expected to reach 4.4 billion or 61% of the world's population.

The increase in population density in big cities has created problems particularly those related to various aspects of life and which consequently may also influence the relationship among human dwellers or between human beings and nature. The World Declaration on Environment and Development that was signed

in Rio de Janeiro in 1992, does not specifically address the problem of environment in big cities. Chapter 15 of the Declaration only reminds each country to be aware and ready with data and technology to deal with the possibility of serious damage to environment, and to draw up sufficient counter measures.

The factories or enterprises located within the residential area of big cities may cause water and air pollution in the area. The government or the local authority may not be able to cope with the increasing problems of pollution, not only due to financial constraints, but also due to lack of technology and inadequate databases (natural resources and pollutant sources) and expertise. Moreover law enforcement is mostly ineffective due to the lack of knowledge on the part of officials involved in environmental management (Server, 1996).

In Indonesia, data related to management of environment and technology is difficult to obtain. Moreover accurate and precise data on trends in environmental conditions are not readily available. In Indonesia, Hadi (1993) stated that "estimation and feeling" are often used in development planning of Indonesia. Development of effective policies must be given top priority in order to adopt the right approach in environmental management particularly for pollution prevention and remedial measures. Findley (1993) has suggested that in order to evaluate and determine patterns of residential growth in big cities, accurate forecasts and data related to planned development must be considered.

In Indonesia, Medan is one of the big cities undergoing rapid urbanisation. In the early years the rapid development of Medan was mainly due to its economic and trading activities. As a dynamic centre of economic development in the

province of North Sumatra, Medan, a harbour city, has a "pull factor" for rapid urbanisation.

In 1980, Medan had a population of 1.5 million. The rapid rate of urbanisation in Medan can be mainly attributed to the growth of industrialisation that was encouraged by the government. The Governor of North Sumatra Province in 1985 declared the concept of the Mebidang Metropolitan Area, a combination of Medan, Binjai and Deli Serdang (Figure 1). The Mebidang metropolitan area concept effectively enlarged the urban area to 744 ha. In the year 2000, the population of this metropolitan area is estimated to be 3,575,000. This concept anticipates an era of industrialisation and development in Mebidang, which will extend beyond Medan as the core city in the future. To avoid congestion, the government is planning to distribute the factories and housing for the workers along the corridors of Medan-Binjai, Medan-Belawan and also Medan-Tanjung Morawa (Figure 2).

Currently, Medan encapsulates some of the problems related to unplanned development and mismanagement. Based on a study " The Review of Urban Development Strategy for Mebidang Metropolitan Area" conducted by the Directorate of City and Regional Planning of Cipta Karya in 1993, the major problems faced can be summarised as follows:

(i) Inadequate correlation and continuity in city planning by city planners due to lack of understanding of the main objectives,

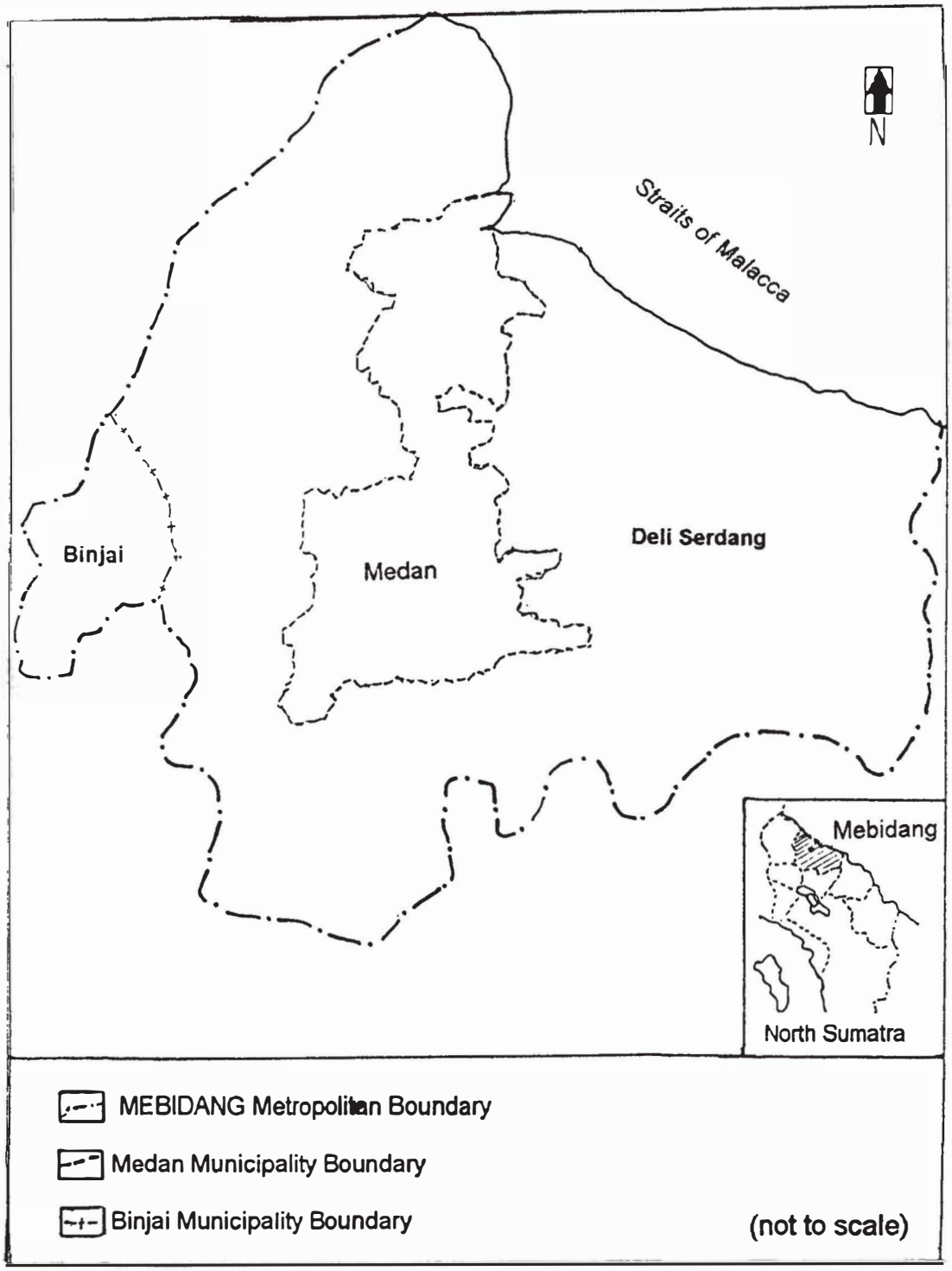

Figure 1 : Map of Medan-Binjai-Deli Serdang (MEBIDANG) Metropolitan Area

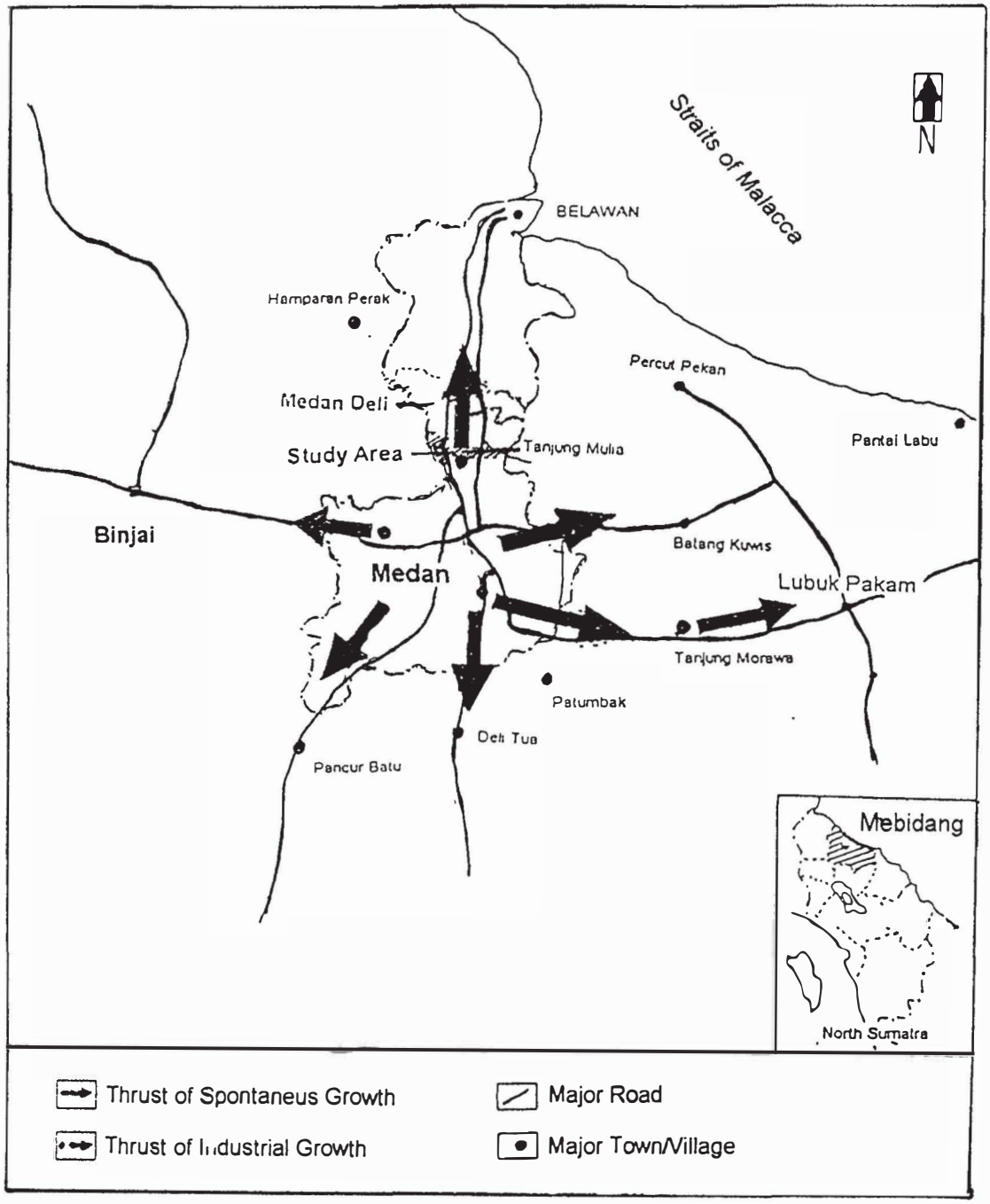

Figure 2 : Thrust of Industrial and Urban Area Growth of Medan Municipality