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Incorporating of geosciences framework for sustainable development at MSC

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Abstract: In this paper the opportunity is taken to explore some of the more important geological factors, which may significantly influence the land use planning. The concept of Environmentally Sensitive Area (ESA) is considered. In addition, Geological Sensitive Area (GSA) concept based on ESA is introduced. A conceptual framework towards developing a policy guideline for land use includes geoindicator analysis and integration of GSA is discussed.

Abstrak: Kertas ini membincangkan beberapa faktor geologi yang boleh membantu dalam perancangan guna tanah. Konsep Kawasan Sensitif Alam sekitar digunakan dalam analisis ini manakala konsep kawasan sensitif geologi diperkenalkan. Rangka kerja konsep ini digunakan dalam membangunkan garis panduan dan polisi untuk perancangan guna tanah.

INTRODUCTION

Sensible planning of land use and decision on planning applications relies on sound information. Much of these concern economic, social and environmental issues. Whilst the physical and chemical characteristics of ground material are relevant to land use, there is often a limited appreciation of this amongst decision makers. Collaboration between geoscientists and planners are needed to ensure that the right information is soughed and provided. In this context, the primary role of a geoscientist is to provide planners and engineers with sufficient information so as to enable them to develop the environment in harmony with nature. Indeed, a geoscientist can offer much useful information at all levels of planning and development from the initial identification of a social need to the construction the new town, that is required to satisfy that particular development need. Even after construction, further involvement is necessary, and may take any form be it advice on conservation, geohazard and mineral stock, monitoring, maintenance or remedial works.

Over recent years public concern regarding the alteration and degradation of the environment and depletion of natural resources has given use to greater awareness amongst the planning authorities, as to the adverse effects of discriminate and uninformed development and decision making. As a result, the incorporation of geological information into planning process should mean that proposal can be formulated which do not conflict with the present ground conditions.

MALAYSIA PLANNING PROCESS

Basically the development planning process of Malaysia Development Planning System (MDPS) reflect the fact that there are two sub-systems, namely the sectoral planning or vertical planning system and the inter-sectoral planning system. In addition both the 'top-down' and 'bottom-up' planning approaches are used in the identification and formulation of developments projects and programmes. It is this combination of two planning sub-systems and planning approach, which makes the

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Table 1. Geoscience concepts base on integrated ESA for landuse planning (modified from Ibrahim Komoo, 1998 and Rohayu *et al.*, 2001a, b).

Environment	Principal	Compdnent	Association	Geoindikator
Higly terrain ecosystem	Natural heritage value Geodiversity	Natural site/ geosites	Aesthetic appel, educational value, exemplary or rare feature and uniqueness.	• Description of geology and lanscape • Evaluation new proposed landscape • Conservation • Gazzete
		Man made site	Ex-mining land.	• Evaluation of cultural and historical site
	Life support systems Natural resources	Water resources	Surface water and groundwater.	• Pollution of surface and underground water • Subsidence because of underground water extraction • Drop down the quality of surface and underground water • Higher Ca and K in ground water
		Mineral and gases	Energy resources (coal, petroleum and gas), building material (sand & aggregates, limestone), industrial mineral (silica sand, dolomite) and metal (tin, aluminium and iron).	• Drop of surface stabilitation/slope stabilization • Slope morphology change • Change of erosion rate (higher)
Valley Ecosystem		Soil and land	Land reclemation and potential land for aggricultural.	• Drop of soil quality • Soil moistures change • Soil polution • Change of surface stabilisation
	Geohazard risk	Slope failure & land stabilization	Landsliding, settlement and subsidence. It depends on their rock and soil mass properties and structural.	• Erosion at slope higher than before • Surface and slope stabilisation change • Ecosystem stress and change • Morphology of slope change
		Degredation: erosion, sedimentation, flood	From natural and man made processes.	• Sedimentation can be found at slope base, river, pond and sea • Siltation at river downstream and retation pond • Higher erosion rate at surface • Stabilitation of surface lower than before • Developing flood plain • Change of river, coastal morphology
Coastal and island ecosystem		Man made stabilisation.	Assosiation with ex-mining and land with highly sensitive terrain or cut and fill slope.	• Soil erosion higher than before • Stabilisation of surface and slope drop down
		Industrial pollution	Waste disposal management.	• Contamination of soil higher than before • Drop down the quality of surface and ground water • Contamination of ground and surface water
		Natural pollution	Natural disposal such as leekage of ammonia gases.	• Contamination of land, air and water

development planning process in Malaysia unique, and effective. While the vertical planning process, allows for policy directives and guideline to cascade downwards, the bottom-up planning approach provides sufficient feedback and opportunities for views and needs from the grassroots to move upwards for consideration.

The Malaysian planning process is basically centralized in nature. Beginning from first and second Malaysia Plan the concern of sectoral system (Economic Growth) has undergone several conceptual and functional modifications that allow for increasing decentralization of power and decision making process. In the third Malaysia Plan there was social reconstruction which was integrated into planning system, and the first emphasis towards the environment mode. It called for increased information at a more localized level. The concepts sustainable development was introduced in Sixth and Seventh literate in the Malaysia Plan and will be implemented in Eight Malaysia Plan (2001–2005).

GEOSCIENCE INFORMATION FRAMEWORK

Environmentally Sensitive Area (ESA)

The concept of ESA initially evolved from the need to protect an area or a fragile ecosystem that was sensitive to the interference of man and the negative impacts of development. The concepts of ESA was first introduced in the United Kingdom through the Agriculture Act 1986 where certain environments of national interest were defined as ESA (MAFF, 1989).

In 1999, the state Government of Selangor with the support and consensus of the various technical departments attempted to harmonise various concepts and definitions relating to ESA, which could be implemented in line with the requirement of sustainable developments. The state also recognised the need to resolve the issue of overlapping sectoral ESA in order to ensure its practical implementation within the planning process. It was decided that this would be overcome by integrating the various sectoral ESA.

ESA consist of various elements and ecosystems with several environmental function including society well being. In categorising ESA, an integrated approach should be adopted with emphasis on sustainable development (Mohd, 2001). The policy adopted by the state Government of Selangor has laid out a framework with three categories. These are ESA of Heritage Value, ESA associated with Hazards and ESA that is important for Life Support Systems (Ibrahim Komoo, 1998). Evaluation of development impact should be placed with in the framework, and with this categorisation will be based on the value and overall framework of the environment system.

Geologically Sensitive Area (GSA)

Geological Sensitive Area is defined as an area, which required to control and administratively mitigate and have to conserve from physical development (Ibrahim Komoo, 1998). GSA can be divided based on geoindicator, which is revenue from ESA (Table 1). GSA of Heritage Value is defined as an area that has historical, cultural or scientific value. For example areas with high geological diversity, unique landscape and sites of importance for education and research.

GSA for Life Support Systems such as sources of clean waters (surface and underground water), natural resources (building material, energy & minerals), parks and recreational areas.

GSA associated with Hazards is defined as areas that are associated with high risks of natural or man-made hazards. Examples include areas with problematic ground conditions for infrastructure development, areas that are prone to flooding, landslides, subsidence and erosion. A majority of these sites require careful planning and detailed site investigation to avoid the occurrence of human induced hazards. Included in this category are industrial sites that may be potentially hazardous to the community, which have not been identified at present.

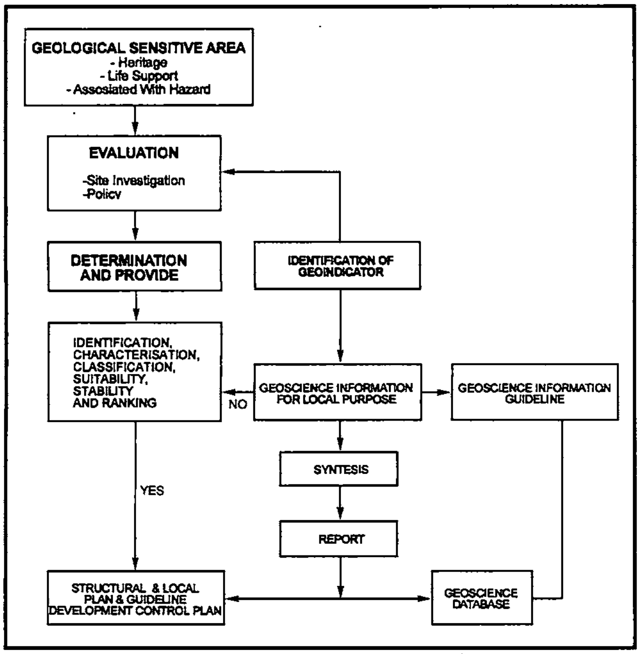

Figure 1. Method and procedure framework for integrated geologically sensitive area into planning process.

INTERGRATED INFORMATION SYSTEM

The integrated GSA defines as an area containing various ecosystems that play an important role in ensuring the well being of the environment as well as society, which has to be controlled and mitigated administratively and conserve. Three group of GSA are identified and these are GSA of Heritage Value, GSA associated with Hazards and GSA for Live Support Systems. GSA evaluation is council out to determine and provide the theoretical and systematic framework for the identification, characterisation, classification, suitability, stability and ranking of integration GSA information into planning process (Fig. 1).

The concept of Areas of Controlled Development is an administrative measure that was introduced in the Concepts and Guideline Plan for MSC and structure plan of several districts in Selangor (JPBD, 1997a, b; KNSDE, 1999). In this concept, an area is divided into three main zones based on its physical and environmental characteristics as well as the types of development allowed. It is further detailed to three categories, that are restricted development zone, buffer zone and conservation zones (Table 2).

CONCLUDING REMARKS

The development of an integration framework incorporating both the GSA concept and information system would be the best option for effective land use planning process in Malaysia. This would allow for an integrated approach and accompanied by training and guidance to good practices, to ensure best use of urban resources whilst minimising risks to development and identifying optimum cost solution, not just for the short term, but for the future. This is not a one-way process. It is equally important for geoscientists to understand the priorities and pressures of urban planning and the constraints on what planners can achieve. It demands collaboration and coordination.

Table 2. Interpretation GSA from integrated ESA for landuse planning (modified from KNSDE 1999).

Principal	Geoindicator	Geological Sensitive Area
Natural Heritage Value Geodiversity	• Description of geology and landscape • Evaluation new proposed landscape • Conservation • Gazette	Conservation area and restricted planning.
	• Evaluation of cultural and site historical	
Life Support Systems Natural resources	• Pollution of surface and underground water • Subsidence because of underground water extraction • Drop down the quality of surface and underground water • Higher Ca and K in ground water	Areas of controlled and area which can enhance the socio-economic.
	• Drop of surface stabilization/slope stabilization • Slope morphology change • Change of erosion rate (higher)	
	• Drop of soil quality • Soil moisture change • Soil pollution • Change of surface stabilization	
Geohazard risk	• Erosion at slope higher than before • Surface and slope stabilization change • Ecosystem stress and change • Morphology of slope change	Areas of controlled development and area of non-or minimize development.
	• Sedimentation can be found at slope base, river, pond and sea • Siltation at river downstream and retention pond • Higher erosion rate at surface • Stabilization of surface lower than before • Developing flood plain • Change of river, coastal morphology	
	• Soil erosion higher than before • Stabilisation of surface and slope drop down	
	• Contamination of soil higher than before • Drop down the quality of surface and ground water • Contamination of ground and surface water	
	• Contamination of land, air and water	

REFERENCES

IBRAHIM KOMOO, 1998. Kawasan Sensitif Alam Sekitar Selangor. Dialog Kawasan Sensitif Alam Sekitar Negeri Selangor. 14 Mei 1998, JPBD Negeri Selangor, Shah Alam, Selangor.

JPBD SEMENANJUNG, 1997a. Physical Development Plan, Multimedia Super Corridor, Cyberjaya.

JPBD Semenanjung, 1997b. Physical Planning Guidelines for the MSC Volume 1–8.

KNSDE, 1999. Strategi Pembangunan Mampan dan Agenda 21 Selangor: Kawasan Sensitif Alam Sekitar, Institut Alam Sekitar dan Pembangunan (LESTARI), Bangi.

MAFF, 1989. Environmentally Sensitive Areas: First Annual Report as required Under Section 18(8) of the Agriculture Act 198, Ministry of Agriculture, Fisheries and Food, London.

MOHD. NORDIN HASSAN, 2001. Malaysian Country Approach to Sustainable Development. Paper presented at the First Conference of the Science Council of Asia. "The Urgent Need for Asian Sustainability". Central Grow Plaza Hotel, Bangkok, 8–12 May 2001.

ROHAYU C. OMAR, IBRAHIM KOMOO, DAN HALIMATON HASHIM, 2001a. Pembandaran Mampan: Pendekatan Pengunaan Informasi Geosains dalam Perancangan Gunatanah. Proceeding of Annual Geological Conference, 2–3 Jun, Pulau Pangkor, Perak.

ROHAYU C. OMAR, IBRAHIM KOMOO, DAN HALIMATON HASHIM, 2001b. Interaksi Antara Kerja Kejuruteraan dan Persekitaran Geologi: Kajian Kes Di Koridor Raya Multimedia. Simposium Penyelidikan Ekosistem Lembangan Langat II (SPELL II), 5–6 Jun, Universiti Kebangsaan Malaysia.