



Land Use Changes in Kelantan River Basin, Malaysia

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Abstract: The massive development creates changes to the environment and becoming a root to make increase in disaster exposure to human being. The changes of land use function which is forest area previously shift to multiple land use such as urban, settlement and industry and all those are related to environmental quality indices. The changes in environmental quality are able to transform the natural system and finally turn out the risk. The modification and disruption to the natural ecosystem by development activities may change in balanced environmental dynamic system within four main components namely atmosphere, lithosphere, hydrosphere and biosphere. All components are basis for development that is important to environmental concerns all the time.

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Keywords: land use changes; river basin; floods; property damages

1. Introduction

The changes in land use and forest coverage show that there are some developments have happened in several areas in Kelantan River Basin. The changes of land use are starting point in increasing the level of vulnerability of the risk because land use changing in natural forest which is developed by human leading to generate environmental degradation and at the end affect human itself. There are many forms of natural disaster created by human for instance flood, mud flood, land slide, dry spell and flash flood. In the other words, according to Md. Anowar Hossain Bhuiyan et al. (2004), tremendous changes of land use may destruct environmental wellness and eventually disturb the human survival in the certain area. The disaster engages human has several levels specifically in relation to individual, community, society which is inhabit themselves into that area. If the risk merely disturbs individual or community, it is not a big problem, but it is becoming big problem if disaster sweeps up the whole society or becoming the national issues. Thus, this article is trying to looks the relationship between land use changes in Kelantan River Basin and the level of human exposure to flood disaster especially river basin inhabitants.

2. Methodology

The analysis of land use changes patterns is important because it can proof all activities doing by human within study area affect environmental quality. Land use changes analysis can be seen within 20 years period (1984-2004) which is, those years can be

divided into two scale times namely every 10 years. The analysis of land use changes using area and related to polygonal analysis. Actually, State of Kelantan comprises four subdrainage basins i.e. Kelantan River, Galas, Lebir and Pergau. In this regard, this article purposely looks into only Kelantan River since it has very fast development has occurred and flood always materializes associated to frequency and magnitude lately.

Kelantan River Basin experiences very high in development compared to others subdrainage in line with strategic location, soil richness, flattened or low-rise topography and good infrastructures. For example, in 1984, there are only several vegetations at small scale level are planted by farmer namely paddy, rubber and coconut tree. Societies or inhabitants remain reside in down stream of river and doing all kinds of activities that is settlement, industry, agriculture, business and so on. Inversely, in 1997, land use activity performs that agriculture sector becomes more and more important until nowadays (Amal Yahya Alshaikh, 2013). From 1997 until today, the area of up stream of river the vegetation covered by rubber and palm oil in massive scale commercially and took out the forest immensely. The year later, it was 2004, land use patterns has changed vastly by using technology. Forest area has becoming more shrinking giving a way to human and their development. The area of up stream more intrusive and human shifted the natural vegetation to commercial vegetation at big and small

scale of plantation. The changes patterns and land use areas in this drainage basin eventually directing affect the dwellers of drainage basin regime by many types of risks and disasters look like flood as such.

The total population of Kelantan Drainage Basin dramatically increase in every year for the reason that this basin has so many fantastic sources such as land fertility, infrastructure, economic poles located all

over the places and so forth. For Kelantan Drainage Basin itself, only several territories experience the flood specifically Kota Bharu, Pasir Mas, Tumpat, Tanah Merah, the whole Machang and the District of Bertam in Gua Musang. From the viewpoint, the total inhabitant faced the problem of flood in relation to Kelantan Drainage Basin is about 365, 939 people and might increase in year after (Table 1).

Table 1. Total population of districts and territories affected by flood in Kelantan Drainage Basin

Territory of Kota Bharu	Total population	Sub-total population for territory
District of Kota	21 824	86 725
District of Badang	30 237	
District of Pendek	15 570	
District of Salor	9 790	
District of Beta	9 305	
Territory of Tanah Merah		74 035
District of Kusial	46 737	
District of Ulu Kusial	27 298	
Territory of Pasir Mas		65 982
District of Bandar Pasir Mas	21 681	
District of Kangkong	16 488	
District of Chetok	12 576	
District of Kuala Lemal	10 753	
District of Kubang Sepat	14 484	
Territory of Tumpat		46 524
District of Wakaf Bharu	29 902	
District of Sungai Pinang	16 622	
Territory of Machang	77 762	77 762
Territory of Gua Musang	15 111	15 111
Total	365,939	

Source: DID (2005)

3. Results and Discussions

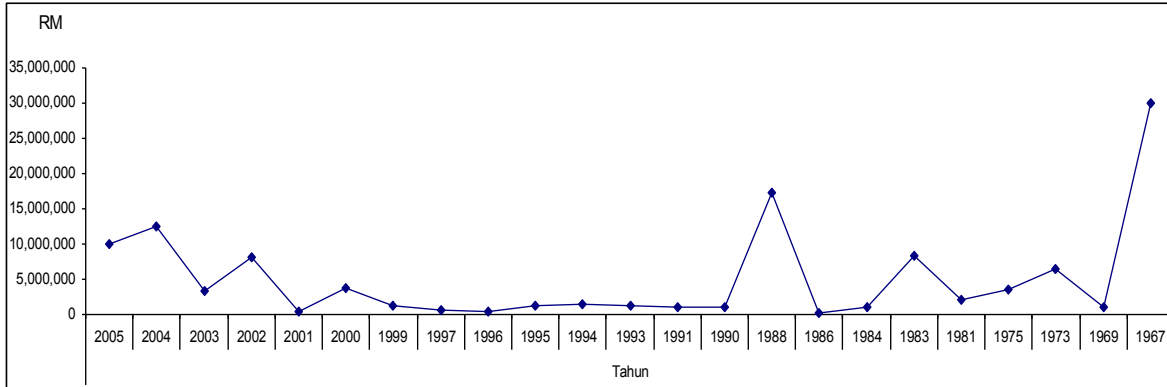
Human exposure to the disaster is a regular parameter regarding to their activities in risky areas such as flood area and high-rise area. According to Park (1983), there are many factors assist in increasing human exposure to the disaster for instance population boost. These factors quite related to increasing in population, welcoming building settlement and lastly human will conquer hilly and high-rise area for many agendas intentionally for agriculture and development to meet the need of survival. In the other hand, human as such creates the risk and disaster to them. In Malaysia, flood is a national agenda and situated in third place ranking on the list of Malaysia disaster issues which cause so many deadness and property ruins (Figure 1). Frequently flood disaster denotes that human vulnerability in certain area is associated to activities from the land use and is a picture of unsustainable land use within the Kelantan Drainage Basin.

In line with Hilhorst, et al. (2004), human vulnerability to flood is a combination of several dominant elements such as physical aspect, social, economic and natural environment. Physical aspect comprises the spatial that is used by human to meet the need of living because of population growth. The high demand in infrastructure development including school, road, housing, building and so on can leave their impacts to environment such as flood and at last the impacts can create the social problems for instance diseases, calamity, property damages and deadness. The analysis of vulnerability actually can shows that how people manage and use natural resources and how they know-how about disaster management issues especially in relation flood management.

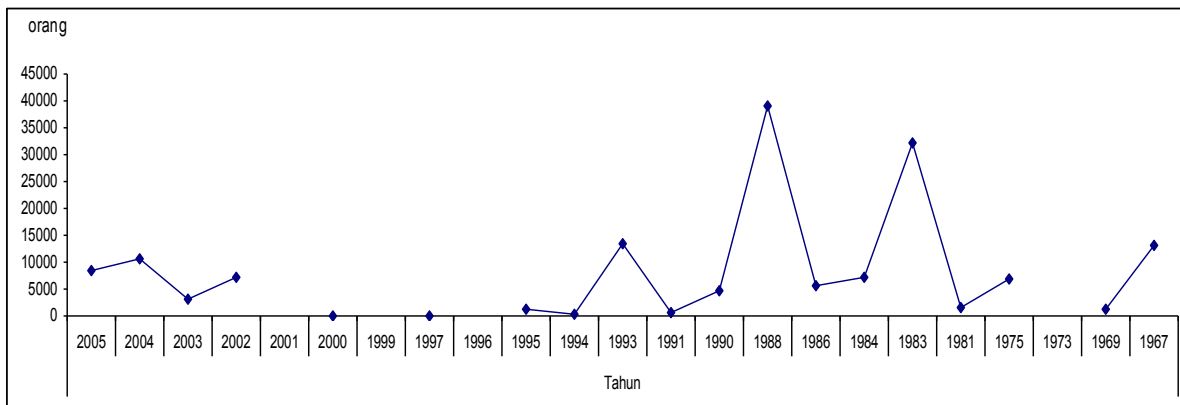
Whatever richness or economic wellness that society has today, can be destroyed by flood disaster if there is no suitable flood management. The most important thing is precaution and suitable action must be done by government to curb the number of flood

disaster. The way good idea is to promote wholistic environmental management which is compromise interrelation within government, society, non-government agency and private sector (Oladele, 2013). The wholistic point of view can be practiced everyday by society and implemented in policy action in line

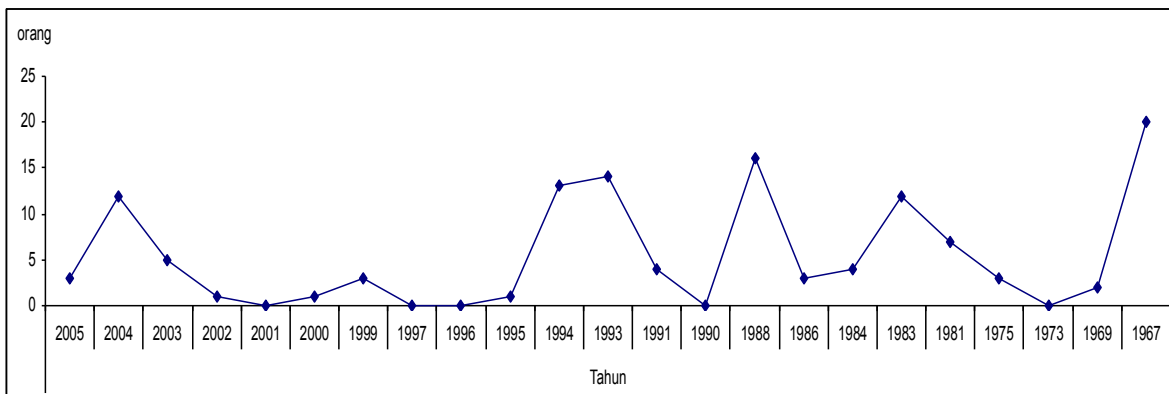
with Local Agenda 21 and National Environmental Policy in Malaysia or elsewhere (Nor Ashikin Mohamed Yusof, 2014). Lastly, the most important thing is participation and cooperation between mass and government and other components in above.



The evaluation of property damage caused by flood 2005-1967



Total flood victims resettlement 2005-1967



Total deadness caused by flood 2005-1967

Figure 1. The evaluations of damages, resettlement and deadness caused by flood in Kelantan Drainage Basin

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