Disaster mitigation at drainage basin of Kuranji Padang City

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Disaster mitigation at drainage basin of Kuranji Padang City

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Abstract. Floods is flooding of effect of exit water groove river because big river debit sudden its accomodation energy, happened swiftly knock over areas which is debasement, in river basin and hollow. Flow debris or which is recognized with galodo have knock over river of Kuranji year 2012 in Padang city. Area is floods disaster are: 19 Sub-District in 7 district, and hard that is district of Pauh and district of Nanggalo. Governmental claim tired loss of Rp 263,9 Billion while Government of Provinsi West Sumatera appraise loss estimated by Fourty Billion Rupiah (Padang Ekspress 28 July 2012), with detail of damage house counted 878 unit, damage religious service house 15 unit, damage irrigation 12 unit, damage bridge 6 unit, damage school 2 unit, damage health post 1 unit. Result of calculation, by using rainfall of year 2003 until year 2015 with method Gumbel, Hasper and Wedwen, got high rainfall plan is 310,00 mm, and method Melchior and Hasper floods is 1125,86 m^3 / second. From result of study analyse at Citra map of correlation and image to parameters cause of floods, and use software Watershed Modelling System (WMS) this region have two class that is middle susceptance and low susceptance. Middle susceptance area is there are in middle river and downstream river, with inclination level off. Low susceptance area there is middle river. Area which have potency result the happening of floods is headwaters, because having keen ramp storey level (45 - 55%) and is hilly. For the mitigasi of floods disaster determined by three area evacuate that are: Sub-District Of Kelurahan Limau Manis District Of Pauh, Sub-District Of Surau Gadang District Of Nanggalo, and Sub-District Of Lambung Bukik District of Pauh, in the form of map.

1. Introduction

Forest Flood due to water runoff that flow out of the river because the river discharge was suddenly enlarged beyond capacity, it happens quickly struck areas of humility and in the valley of the rivers. With the increase of population that is increasingly rapidly brings impact to the increased needs of land and demand fulfilment services and urban infrastructure that can impact declining environmental quality such as environmental degradation and natural disasters. Floods of Bandang or which recognized with galodo have knock over Bar of Kuranji, according to Zahrul Umar on Tuesday the 24 July 2012 and Wednesday of[is 12 September 2012 at 16.30 WIB by leaving over sorrowful and uliginous circumstantial distress which very which mixed mud have house and his equipments. Government claim loss of floods effect of bandang Rp 263,9 Billion while Government of Provinsi West Sumatra appraise loss whereas estimated Fourty Billion Rupiah (Newspaper Padang Ekspress, 28 July 2012), with detail of damage house 878 unit, damage religious service house 15 unit, damage irrigation 12 unit, damage bridge 6 unit, damage school 2 unit, damage health post 1 unit. In general there are some factor causing the happening of floods. According to Sutopo and Van of Zuldam the factors is the condition of nature (regional geographical position, condition of toporafi, river geometry and

sedimentation), natural event (rainfall and the duration rain, tide, current return from especial river, river stream barrage effect of sliding, and sedimentation), and human being activity (floods plain area conducting, allotment of planology inappropriate floods plain, there is no management pattern him and development of floods plain, setlement river, drainage system which is not adequate, the limited action of mitigasi floods, lack of awareness of society alongside groove river, depilatory of forest headwaters, the limited conservancy effort. From field evaluation, damage of DAS river pate, upstream of Kuranji, with the happening of change of farm function, collapse natural barrage him and aqueduct. Though headwaters is functioning conservation area arrange river stream to middle and river downstream. From some research which have been by former researcher Nur Yuwono, Onrizal and of Raharjo, for the determination of floods susceptance area, parameter the happening of floods is : lack of drainage (diffusion irrigate based on ground type), level of inclination of bevel, changing of it farm function, rain intensity height, height settlement nearness and place woke up from river. By using map of image and correlation with parameter cause of floods and also use program of Argis X.1, will be made mitigasi in the form of band evacuate to society alongside Bar of Kuranji.

2. Literature Review

2.1 Strengthening Regulatory Legislation
In April 2007, two laws have been passed by the legislature, namely: ACT on disaster relief (Act No. 2/2007) and the ACT on Spatial (Act No. 2/2007) which is a revision of the previous ACT No. 24/1992. Laws and regulations are made given the vacuum of legal framework and laws and regulations pertaining to the handling of disaster risk must be paid dearly with the fall of casualties and enormous material losses

2.2 Public participation
Public participation is a process provided an opportunity for technical and broader authority to the community, so that the community is able to solve problems together. The Division of authority was conducted based on the level of community participation in such activities. Community participation (local wisdom) aims to find solutions to problems in a community, by opening up more opportunities for the public to contribute so that the implementation of activities running more effective, efficient, and sustainable.

2.3 Flood mitigation Stakeholders
Stakeholder response to flooding is generally classified into three, namely: (a) a society gets the impact directly or indirectly due to flooding; (b) community groups or individuals who may give consideration or facilitation in flood mitigation, such as: consultants, experts, NGOs, and professionals in the field of flood; (c) decision/policy makers/decision makers, institutions/institutional authorities make decisions and legal basis, such as government agencies and water resources Council.

2.4 Solving
Solving the flood with the approach of non flood disaster mitigation in non phisik/non structural can be: spatial arrangement (land use arrangement) due to the occurrence of conversion of land into urban areas, intensive and continuous outreach involving community, NGOs. Making flood plain zoning, zoning-zoning arrangements, namely the utilization of space is differentiated according to the threat level because of the flood. So the flood plain zoning is effective instruments to avoid the occurrence in areas not yet awakened to the brakes on the occurrence of a change of function of the land according to law No. 25/2007 on Spatial and Act No. 7/2004 about Water Resources

2.5 Soil type
Alluvial soil is formed from the mud of the river that settles in the lowlands, it has fertile soil and is suitable for agricultural land. The soil is alluvial young who came from the results of the deposition.

Alluvial soil at Kuranji has widely 5,445.90 ha b. an area of 12,921.16 ha. Because suitable as agricultural land, then this soil type will cause the occurrence of floods.

2.6 Environmental change

With the ever increasing human population has led to increasingly sensitive environmental conditions. Change the function of the land very large influence on environmental changes that result in a decline in land cover. The longer the amount of vegetation on the wane, particularly in urban areas. From the results of the inverstigasi BPN Padang city, that of the years 2009 – 2012 land use changes such as table in the following:

Table 1. Land use change

No	Land use	Area Land (Ha)		Land Use Change (Ha)
		2009	2012	
1	Residential	176,84	327,55	150,71
2	Area Rain Waters	399,55	289,74	109,81
3	Gardens Mixed	972,06	1005,29	33,23
4	Moor Forest	2,50	3,65	1,15
5	Shrubs	75,52	58,27	17,25
6	Similar	7,62	6,87	0,75
7	The Others	116,78	59,5	57,28
Amount		1.750,87	1.750,87	378,18

Are land cover vegetation that grows above the Earth's surface will cause the increasing surface flow (run off). Surface flow occurs when rainfall has exceeded infiltration rate of the soil. According to research in Onrizal (2005) DAS Ciwulan, deforestation led to the increase in surface flow of 624 mm/th. It's the new calculation performed on the area of forest is cut down where there are still lucrative land who could infiltrasi. Research of Lusi Utama, 2014, with the use of a map Image and the correlation with the parameter causes flooding, gained the flash flooding potential at Kuranji WATERSHED. Based on the results of the analysis of the parameters of the flood areas there are Kuranji Rods obtained two (2) classes of vulnerabilities and vulnerabilities middle are vulnerabilities that is low. There is a flood-prone area in the middle and downstream areas, with the slope of the slopes. Are areas that could potentially lead to the occurrence of floods is upstream, because it had a sharp level and hilly. The vast pool of skoring value based and the level of insecurity area turns Kuranji flood is an area in the vulnerabilities middle. Of the 15 villages there are three wards that low levels of vulnerabilitieswhich means it is safe from the dangers of flooding, Lambung Bukik, Surau Gadang and Limau Manis, but easily the occurrence of landslides, since the slope a sharp slope. 12 the village is an area of vulnerability middle, that means the sloped area is relatively flat, sharp, and altitude as a function of the land.

3. Methods

Using a map image and map study of vulnerability to flooding along the Kuranji, program ARGIS x. 1 and Watershed Modelling System (WMS) , is expected to come by the evacuation line and place the temporary shelter. A temporary shelter was planned in areas closer to the location of the floods, but have height, so that people can be evacuated. Besides conducting cooperation between communities and Government in reducing the risk of flooding. These activities are based on the parameters of the cause of the flooding is like making a well infiltrasi, normalization of river rock material, giving the building permission by the rules. In addition need to flood control planning buildings such as making buildings and building control sediments. Besides made containing booklet pocket and band evacuate and also orders how society make provision against floods According to Sosrodarsono count dimension of river used formula of Manning, that is :

$$Q=V.A \quad (1)$$

$$V= \text{velocity and } A = \text{area river} \quad (2)$$

According to Van of Te Chow, factors influencing coefficient value of Manning, are: crudity of surface , channel Trase and irregularity of channel. With the theory Gumbel, Hasper and Wedwen can calculated rainfall and flood debit used the Hasper and Melchior theory.

4. Results

4.1 Map of Routes for Evacuation and shelters

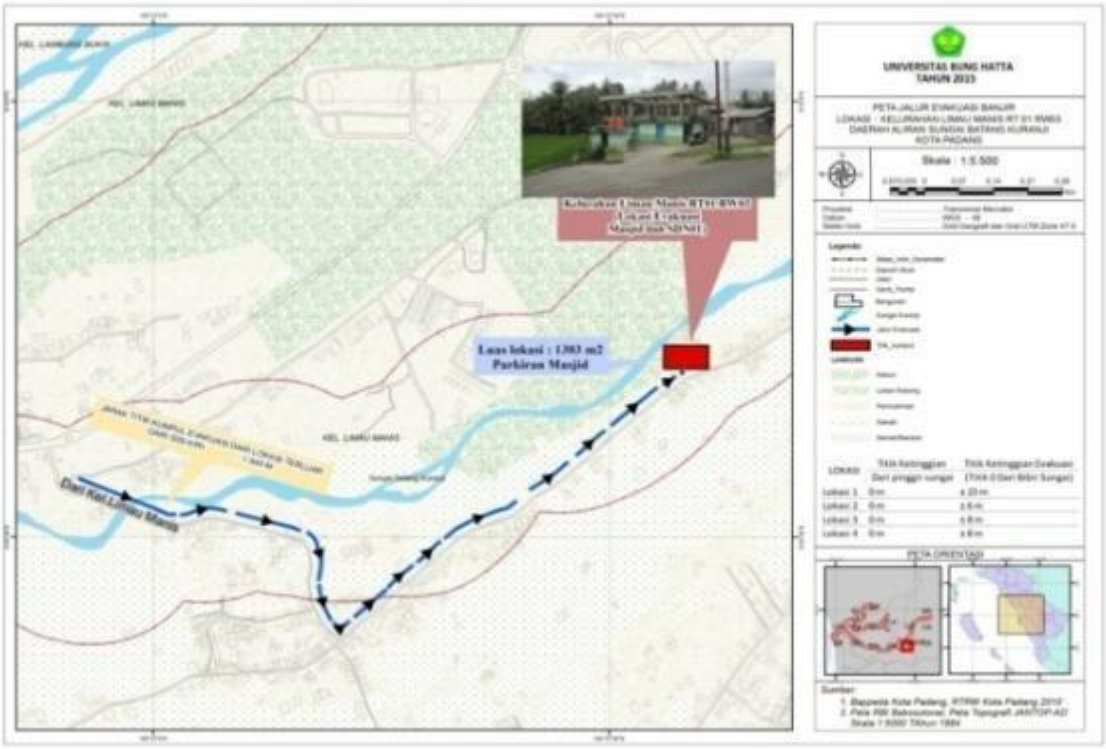

Figure 1. Map of Routes for Evacuationand Shelter Limau Manis

Figure 2. Map of routes for evacuation and Shelter Surau Gadang

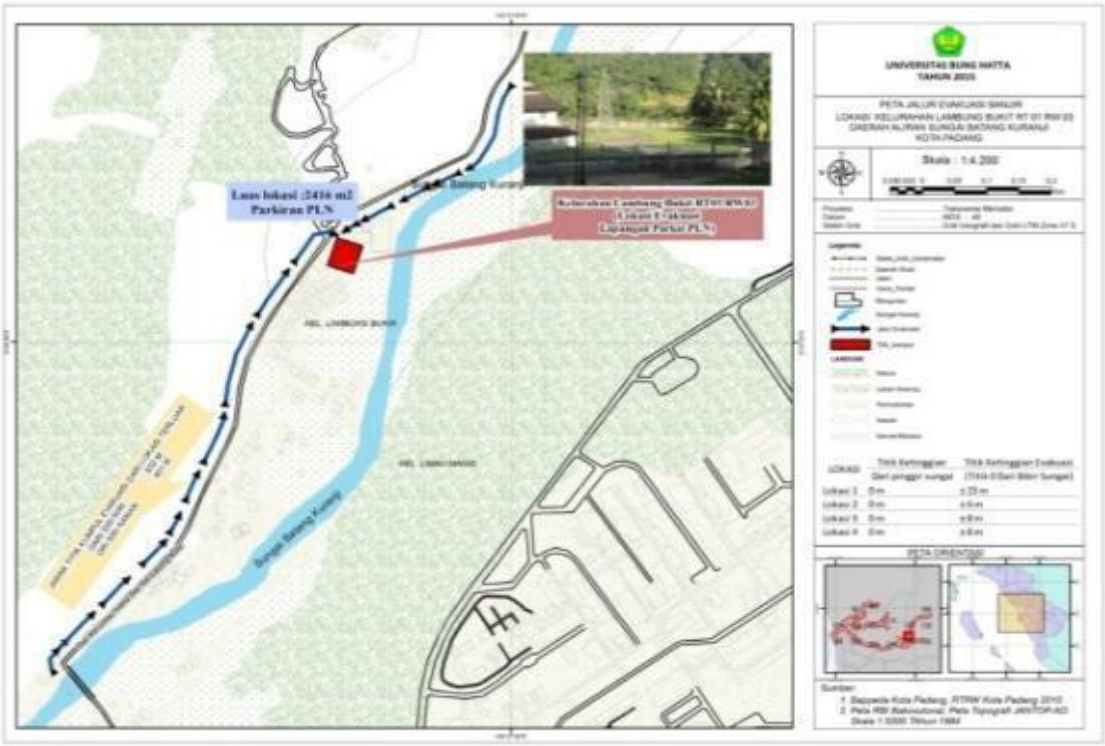

Figure 3. Map of routes for evacuationand shelter Lambung Bukik

4.2 Pocket book

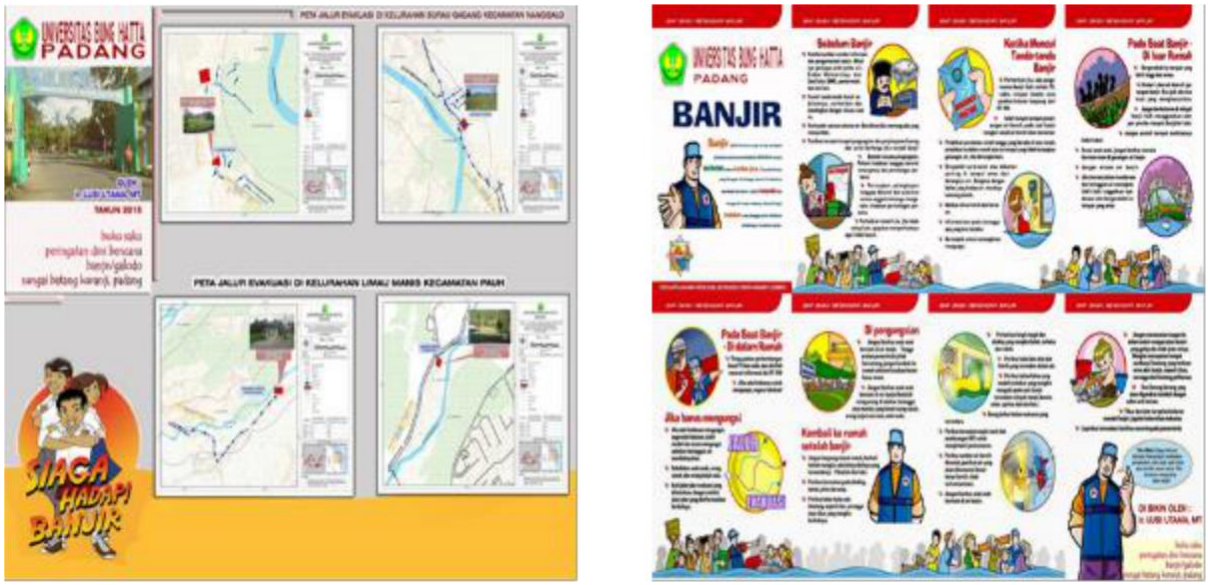

Figure 4. Pocket book: Ready to accept floods

4.3 From 3 station record-keeping of rainfall
Station Gunung Nago, Station Gunung Sarik and Batu Busuk Station , with daily rainfall data of year 2003 until year 2015, got maximum monthly rainfall 310 mm, floods debit 1125.86 m^3 / second

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