

Identification of Status and Value of Mangrove Ecosystem for Muaragembong Sustainable Development

¹ HILWATI HINDERSAH, ² YULIA ASYIAWATI, ³ LELY SYIDDATUL AKLIYAH

^{1,2,3} Department of Urban and Regional Planning, Faculty of Engineering, Bandung Islamic University.
email: ¹ hilwati_hindersah@yahoo.com; ² yulia_asyiawati@yahoo.com; ³ ulil_sa@yahoo.com

Abstract. The existence of mangrove ecosystem in *Kecamatan* Muaragembong Bekasi Regency is in decline along with the rise of development that change mangrove forest into settlement and agricultural area. To achieve sustainable development, preserving the mangrove forest should be aligned with community economic development efforts. There is a need to identify the status and value of mangrove ecosystem as the first step to know the role of mangrove in supporting society's economy system. Using groundcheck survey method and unstructured interview, this research reveals condition of the mangrove ecosystem that has already damaged with the tree density status ranging from 59 – 145 trees/ha. It reveals that there are many valueable components of the benefit of mangrove forest ecosystem identified using travel cost method and the willingness to pay for the use benefit.

Keywords: ecosystem status, value, sustainable development.

Introduction

Changes in coastal and sea areas is caused by natural phenomena and also is highly affected by human activity. Coastal area is an area that has the highest pressure compare with land area. This occurred because of the increasing development activities in line with the function of coastal areas in developing settlement activity, aquaculture (fishpond), trade, port and other activities. These activities either directly or indirectly provide for changes on the coastal and natural resources including among others the mangrove ecosystem.

The existence of mangrove ecosystem in coastal areas in *Kecamatan* Muaragembong Bekasi Regency has currently been declined in line with the increasing population and development activities that convert the mangrove ecosystem from its protective function into cultivation functions. This has provided the implication on the quality of environment in *Kecamatan* Muaragembong, particularly in coastal areas, since the mangrove ecosystem has an essential function in keeping the environmental balance and its ability to raise the income of the people

in that coastal areas.

In line with the increasing number of population in Muaragembong, development activities are also raising to meet the needs of the community's livelihood. Meanwhile, the land availability for the activities in the coastal areas of Muaragembong is limited because most of the land area is the conservation areas as mangrove forest. This condition has triggered the community to utilize mangrove forest to become settlement as well as ponds for fishery cultivation. This condition has also reduced quantity and quality of the mangrove ecosystem in Muaragembong, that eventually resulted in the impairment of the mangrove ecosystem functions, with the impact of declining the quality of the environment and the income of the community in Muaragembong.

The condition of mangrove ecosystem is directly proportional to the quality of the environment and the income of the community in accordance with its mangrove ecosystem function. The deeper the declining quality of mangrove, the faster the declining income levels of the community, so that it can lead to poverty. Furthermore, the

Received: September 03, 2015, **Revision:** April 01, 2016, **Accepted:** June 20, 2016

Print ISSN: 0215-8175; **Online ISSN:** 2303-2499. Copyright©2016. Published by Pusat Penerbitan Universitas (P2U) LPPM Unisba
Accredited by Kemenristekdikti, No.040/P/2014, valid 18-02-2014 until 18-02-2019

poverty in coastal communities was caused by seasonal fluctuations of fish availability, limited quality of human resources, limited capital, lack of accessibility, and fish trading network that tends to be exploitative to fishermen as producer, the negative impact of modernization of fishery which has quickly and excessively exhausted the marine resources, and the limited opportunities for fishermen to diversify their source of income outside fishing in the sea (Sri Haryono, 2005: 119-120 in Zamzami, 2011: 114). Hence preserving mangrove ecosystem should be aligned with community economic development efforts. This is an indication that a challenge to reach sustainable development is the effort to resolve the conflict of interest between economic development and the efforts to preserve nature (Hindersah, 2013: 529).

This article aims to identify the status and value of the benefit of mangrove ecosystem as the first step to understand the role of mangrove ecosystem in supporting the economic system of the community in *Kecamatan Muaragembong*, Bekasi Regency. This preliminary study is expected to produce the rudimentary consideration to formulate strategies in utilizing and supervising mangrove land use so that its value is sustainable both economically and ecologically.

To achieve this objective, data has been collected through the use of groundcheck survey and unstructured interview methods with the coastal communities Muaragembong to identify the condition of mangrove ecosystem and the value of mangrove ecosystem to the community in utilizing the mangrove. Variable used as indicators to undertake the identification is the area of mangrove ecosystem, the number of trees in a mangrove ecosystem, and utilization of mangrove ecosystem by the coastal communities of Muaragembong. The result of this identification of status and value of mangrove ecosystem can be used as the basis for consideration in preparing the direction of mangrove ecosystem management in the future in order to realize sustainable development in Muaragembong coastal areas.

The Definition of Coastal and Mangrove Ecosystems

There are many definitions of coastal region, such as that described by Kay and Alder (1999 in Asyiwati, 2010: 9) that coastal region or coastal zone is an unique

area, since the coastal region is a meeting place of land and sea in the context of the landscape. On the other hand, Dahuri et al. (2008: 6) explain that the coastal region is an area of transition between land and sea, in which the coast borders towards the land is an arbitrary distance from the mean high tide, and the borders towards the sea is the jurisdiction boundary of the territory or country.

Another definition of the coastal region explained that the coastal region is a system that consists of several sub-systems, including human resources, natural resources, artificial resources and capital resources, that unite and interact with each other. The coastal region is the region that has the potential of natural resources to be developed, so as to increase the community incomes. Therefore, in managing the coastal region, it is necessary to consider its integration and sustainability so that the existing resources (especially non-renewable) will not be extinct and to avoid the degradation.

As explained in the Law Number 27 of 2007 on the Management of Coastal Region and Small Islands, the coastal region is an area of transition between terrestrial and marine ecosystems that are affected by changes in the land and the sea, which has a diversity of coastal resources. The coastal resources consist of biological resources (including fish, coral reefs, seagrass beds, mangroves and other marine life); non-biological resources (including sand, sea, seabed mineral); artificial resources (including marine infrastructure associated with marine and fisheries); and environmental services (in the form of natural beauty, the sea floor, underwater installations related to marine and fisheries, and the ocean wave energy available in the coastal area).

There are varieties of human activities in the coastal region that provide direct and indirect impact the coastal region, either in the terrestrial environment or the aquatic environment (Chua, 2006: 468). From this definition, it can be concluded that the coastal region is a system that consists of terrestrial environment, aquatic environment (marine) and the social-economic activities subsystems. Each subsystem interacts with each other on a regular basis to achieve its purpose. The purpose of the interaction between subsystems found in the system of coastal region is the integrated management of the coastal region to achieve harmonious

and sustainable development of the coastal environment in the future. As described by Fauzi and Oxtavianus (2014: 43) that the concept of sustainable development is an improved quality of life adapted to the carrying capacity of the environment. In connection with this definition, the development of sustainable coastal region is a way to improve the quality of life adapted to the environmental carrying capacity of coastal region.

The mangrove ecosystem is one of the coastal ecosystem has an important role in maintaining the balance of marine environments. The ecological functions of mangrove ecosystems as described by Bengen (2004, in Asyiwati 2010: 13), include: (1) as the buffer of waves and wind storms, protector of coastal abrasion, mudguard and sediments trap transported by the flow of surface water; (2) as a producer of a large amount of detritus, mainly derived from the leaves and branches of mangrove loss. Most of the detritus can be used as a food ingredient for the detritus eaters, and the rest will be bacterially dissolved into nutrient minerals that play a role in the enrichment of the waters; and (3) as nursery ground, feeding ground and spawning ground of various marine organisms (fish, shrimp and shellfish) both living in the coastal and offshore. On the other side, the mangrove ecosystem has economic function, such as a backup of natural resource (raw material) to be processed into tradable commodities that could add to the welfare of local communities. As explained by Bengen (2004 in Asyiwati, 2010: 14), mangrove ecosystems have direct benefits and indirect benefits to human life. The immediate benefits of the mangrove ecosystem is its use for firewood, construction materials, materials for making charcoal, and can also be made for the pulp, whereas the indirect benefits of the mangrove ecosystem is the development of mangrove-tourism activities. Therefore, the existence of mangrove ecosystems in coastal region, in addition to the functioning as a buffer zone, it also has high economic value.

The economic value of Mangrove ecosystems can be assessed using several methods. One of the steps in analyzing the value of mangrove ecosystems is to identify the value of the existing benefits in the mangrove ecosystem. The method that can be used in identifying the value of mangrove ecosystem benefits is the cost of travel approach and the Contingent Valuation

Method (CVM) (Akliyah & Hindersah, 2014: 23). Travel Cost Method is done by conducting interviews with tourists to calculate their travel expenses incurred. This travel expenses incurred (Akliyah & Hindersah, 2014: 25) is almost the same as the other study conducted by Akliyah & Sundari (2006: 18), including: the cost of travel from home to the tourist attractions; the cost of lodging; the cost of local transportation (boat rental and *ojeg*); the cost of food consumption; the cost of merchandise (processed from mangrove trees and the fish catch); the cost of documentation; and fees and other costs during the tour.

The Characteristics of Coastal Region at Muaragembong Region

Coastal of Muaragembong, which has a boundary with the Java Sea, has an area of 122.90 km², includes 6 (six) villages, namely Pantai Bahagia, Pantai Bakti, Pantai Sederhana, Pantai Mekar, Pantai Jaya Sakti, and Pantai Harapan Jaya. The total population in Muaragembong District is increasing every year. This is in line with the development of the region. Total Population of Muaragembong District in 2010 is 35.503 people, while in 2011 the population is 37.358 people, implying an average population growth rate of 5.20% per annum (Bekasi Regency in Figures, 2012). This suggests that the growth of population in the study region is quite high, that was caused by high population growth who were coming from the surrounding area, since the coastal region is an open region. Fishermen from outside the area may stop and then settle down there.

Coastal resources owned by Muaragembong District are mangrove ecosystem, estuary (Asyiwati & Akliyah, 2014: 28) and oil and gas resources. The resource has a function and a very important role in maintaining the balance of Muaragembong Region. Natural resources that can be made the prime mover to support the economy of Muaragembong society is the biological resources such as fisheries resources.

Community's economic activities are dominated by the fisheries sector (capture fisheries / fisherman and aquaculture / fish farmers). Survey results (Hindersah et al., 2015: 91-92) shows that the type of fish resources found in the Jakarta Bay consist of large pelagic category (which include mackerel, tuna fish and swordfish); small

pelagic category (which include yellow tail fish, bloating, baronang fish, fish float, layur fish, kue fish, manung fish, kuro fish, song, anchovy fish, trevally fish, "golok-golok" fish, "pisang-pisang" fish, mullet); demersal category (which include red snapper, pomfret, rays, groupers); crustaceans category (shrimp); and molusca category (includes squid, cuttlefish). In addition, space of Muaragembong region are used for settlement, coastal border, protected forest (mangrove forests), production forest, industry and tourism. Most of the land is dominated by forest (mangrove forests) which spread along the coastal areas and Citarum River.

A research by Handayani (2006, in Asyiwati & Akliyah, 2014: 31) shows that the mangrove ecosystems area has decreased by 6.74% (data of 1992 and 2002 data). Based on the data of 2012, the mangrove ecosystems area in the Muaragembong Region is 822.24 ha, so that the average rate of area reduction of mangrove is 5.90% (in the period 1992-2012). The changes in the designation of mangrove ecosystem are dominated by aquaculture activities (fishpond). This can be seen from the extensive changes in the pond area which suggests the addition of extensive fishpond of 4.55% (data of 1992 and 2002 data). Meanwhile, from the year 2012 data, there has been an additional total area of 723.253 ha of pond area compared with 2002 data, which means an addition 17.60% of pond area (2002 data and the data of 2012). While the settlement area has increased to 3003.88 hectares in 2012, with the addition of an area of 8.76% of the total settlement in 2002. This indicates that there has been a shift in the use of mangrove forest that turned into aquaculture and settlements. Based on the results of groundcheck, it was found that almost 85% of the land area in the Muaragembong Region as an aquaculture. This gives a significant influence on the condition of mangrove ecosystems and environmental conditions in the region.

The diminishing area of mangrove ecosystems has resulted in bad mangrove ecosystem condition. Such a condition implied that there has been a change in mangrove ecosystem function, from ecological function to become an economic function. This has been one of the cause of decreasing ecological function of mangrove ecosystem, that have a negative impact on the environment of Muaragembong Coastal area (Asyiwati & Akliyah, 2014: 33).

From 2012 data, it was found that the total of population by educational level is dominated by people who finished primary and junior high school, while the population who have high school education is very small. This indicates that the level of quality of human resources in Muaragembong Region is categorized as low. Meanwhile, the total population by occupation of Muaragembong Region is dominated by fishpond farmers and fishermen of 6978 people (49.85%), as farmers are 2,233 people (15.95%), as traders are 1,480 people (10.57%), as the industrial workers are 423 people (3.02%), as the freight services are 349 people (2.49%), as civil servants, military / police and pensioners are 183 people (1.31%), as employees are 1,498 people (10.70%), and as self-employed are 854 people (6.10%). From these conditions it can be concluded that the community's economic activity in Muaragembong region highly dependent on fisheries sector both capture fisheries as well as aquaculture.

The Identification of Mangrove Ecosystem Status

Subdistrict Muaragembong – a coastal region located in the northern part of Bekasi District – has mangrove ecosystems which function as a protected forest as outlined in the Space Pattern Plan contained in Spatial Plan Document (RTRW) of Bekasi District Year 2009-2029. This has been extremely supportive on ecological function of mangrove ecosystems. In addition, mangrove ecosystem also has economic functions in that mangrove ecosystem can be utilized to produce raw materials for pharmaceutical industry, as producer of foodstuffs such as fish, shrimp, clams, crabs, as well as a place for recreation and travel (Bengen 2004 in Asyiwati & Akliyah, 2014: 28).

Based on a study conducted by Forestian (2011: 30) on the Estimation of Biomass and the Density of Mangrove Vegetation using Landsat ETM+ (a study in the protected forest and the permanent production forest in Muaragembong, Bekasi District), the mangrove ecosystems existed in Sub-district Muaragembong consists of 23 types dominated by Api-api (*Avicennia* spp.), Bakau (*Rhizophora* spp.), Pedada (*Sonneratia caseolaris*). While the associated mangrove forests consist of 13 species dominated by Bintan (*Cerbera odollam*), Kiser (*Fimbristylis verruginea*) and Ketapang (*Terminalia catapp*). The type of vegetation

found in Muara Tawar Air consists of 11 types dominated by Kiser (*Fimbristylis verruginea*) and Nipah (*Nypha fruticans*).

Based on secondary data, there are as many as 158 types of birds found in the Protected Forest Areas of Ujung Karawang – Muaragembong. Of these number of types, 7 species are endemic and 6 types of protected groups under IUCN criteria. Raja Udang Biru *Alcedo coerulescens* and Layang-layang Batu *Hirundo tahitica* are found in significant number along the Citarum River and Bungin River. In the northern part of the beach, there are several species of water birds, including Kuntul Perak (*Egretta intermedia*), Kuntul Kecil (*Egretta garzetta*), and Cangak Abu (*Ardea cinerea*). Seabirds, such as Cilakang Christmas (*Fregata andrewsi*) and Dara-sea (greater crested tern and small Dara-sea) which are migrant bird species, are found around the coast. While Pecuk-Padi-Hitam (Black Cormorant Rice-bird) are found in fishing platform in the middle of the sea. There are 15 species of mammals which are dominated by Long Tailed Macaques (*Macaca fascicularis*) and Surili (*Presbitis cristata*). There are six types of reptiles, three species of them are included in the CITES Appendix, among other forest Tortoise and Lizard (*Varanus salvator*). Types of fish that are found in mangrove areas are Blodok fish (*Periophtalmus* sp.) (Timdu 2005 in Forestian, 2011: 26). In addition, there are also a number of fauna such as butterflies, mosquitoes, gnats, and mangrove crabs.

Based on the observations and the results of studies conducted by Forestian (2011: 35) on Mangrove ecosystem conditions in the Sub-district Muaragembong, there had been a decrease in the density of mangroves from 55.78 % in 2001 to 8.43% in 2010. The results of recent survey (Hindersah et al., 2014: 86), the existing condition of mangrove tree density for each village can be seen in Table 1 below.

Table 1
Mangrove Tree Density
in Muaragembong

No.	Observation Location	Mangrove tree density (tree/ha)
1	Harapan Jaya Beach	1450
2	Bahagia Beach	187
3	Sederhana Beach	617
4	Mekar Beach	675
5	Jayasakti Beach	1251
6	Bakti Beach	59

Source : Hindersah et al., 2014: 86

Based on the observation and analysis conducted with reference to the Decree of the Minister of the Environment No. 201 of 2004 on Standard Criteria and Guidelines for Determining Mangrove Damage, the status of mangrove ecosystems in this area falls within the criteria of bad status, with tree density ranging between 59-1450 trees /hectare.

The Identification of Mangrove Ecosystem Benefits Value

As described by Bengen (2004 in Asyiwati, 2010: 14), the mangrove ecosystem has high economic value in supporting the public economy of coastal areas. Based on the interviews with the community and direct observation in Muaragembong, it was found that mangrove ecosystems are exploited for firewood, and raw materials for the manufacture of chips, syrups, *dodol*, various snacks such as dried dumplings, as well as to produce shuttlecock for playing badminton.

According to Akliyah & Hindersah (2014: 24), the method of analysis used to assess the mangrove ecosystem in Muaragembong coastal areas is the CVM method, undertaken by conducting interviews with local fishermen/ community, asking them of their willingness to pay the benefits of mangrove ecosystem in the region. The components that can be assessed include, among others (Akliyah & Hindersah, 2014: 25-26): (1) The willingness to pay the benefit of mangrove ecosystem as the fish spawning place in the waters, mainland protection from wave abrasion, mainland protection from the wind blow, the filter of sea water intrusion into the land, as well as heavy metal content that is harmful to life; (2) The willingness to pay the functions of mangroves as spawning and fishing place; (3) The willingness to pay the value of the ecosystem as a drag abrasion (balancing environment); (4) The willingness to pay for the mangrove trees that can produce fruit that can be processed into a variety of different preparations such as syrups, chips, *dodol*, snacks such as dumplings dry (see Figure 3); (5) The willingness to pay the benefits of mangrove trees as charcoal and fuelwood (see Figure 4); (6) The willingness to pay the benefits of mangrove trees as one of the main ingredients to make a shuttlecock used in badminton; (7) The willingness to pay the benefits of mangrove ecosystems that serve as wildlife ecological habitat (*langur*); (8) The willingness to pay the benefits of mangrove ecosystems as providers of building materials

(wood).



Picture 3. *Vidada* Fruit



Picture 4. *Mangrove Stems*

(Source: Akliyah & Hindersah, 2014: 26)

The above variables can be used as the basis for determining the initial cost offered to the respondents (community/fisherman) for their willingness to pay for the value of mangrove ecosystem benefits they enjoy.

How much the public is willing to pay so that they remain willing to manage and maintain the mangrove ecosystem they are utilizing is the magnitude of the value of ecosystem benefits (Akliyah & Hindersah, 2014: 26).

Conclusions

Mangrove ecosystem has a strategic significance both ecologically and economically in support of community life in coastal areas. The use of mangrove ecosystem which do not consider the environment balance, will have a negative impact on the environment and the social economic condition of the community. The identification result of mangrove ecosystem status in Muaragembong coastal areas concludes that

the mangrove ecosystem condition is bad with rare to moderate condition, with the range of tree density between 59 and 1450 tree /ha. It causes environmental problems namely abrasion and flooding, and reduces the quality and quantity of fisheries production (catch fishery and aquaculture /ponds culture). This condition is allegedly affected by land use change, which in this area there are a lot of fishponds community land.

On the other hand, mangrove ecosystem is the ecosystem that has high economic value in support of improving society economy. Based on the identification, mangrove ecosystem in Muaragembong coastal areas is used for firewood, material raw for making chips, syrup, *dodol*, various snacks as dry *onde-onde*, for making shuttlecock used for badminton sport.

Looking at the status and value of the benefits of mangrove ecosystem that was found in Muaragembong coastal regions, it is a need to study the mangrove ecosystem management, so that sustainable development can be achieved, which can improve the society welfare. Direct efforts is to conduct mangrove ecosystem rehabilitation through replanting mangrove trees. This certainly need to be supported by participation of local communities and local governments. Stakeholders outside Muaragembong area can be invited to participate restoring the existence of mangrove forest to function as conservation areas.

References

- Akliyah, Lely S. & Sundari, Eva S. (2006). *Penilaian Valuasi Ekonomi Taman Hutan Raya (Tahura) Ir. H. Juanda Kota Bandung Dengan Metode Biaya Perjalanan*, Laporan Penelitian, LPPM Unisba, Bandung.
- Akliyah, Lely S. & Hindersah, Hilwati. (2014). *Konsep Valuasi Ekonomi Ekosistem Mangrove di Kecamatan Muaragembong Kabupaten Bekasi dengan Metode Biaya Perjalanan dan Metode CVM, Buku 2: Pengembangan Wilayah dan Kota Berkelanjutan*, hal.20-27. *Prosiding Seminar Nasional Fakultas Teknik Universitas Islam Bandung: Menciptakan Nilai Tambah dalam Pembangunan Berkelanjutan*, 22 Mei 2014, Unisba, Bandung.
- Asyiwati, Yulia. (2010). *Analisis Status Ekosistem Pesisir Bagi Penyusunan Rencana Tata Ruang Wilayah Pesisir di Kawasan Teluk Kota Ambon*, Disertasi, Institut Pertanian Bogor, Bogor.

- Asyiwati, Yulia & Akliyah, Lely S. (2014). *Identifikasi Dampak Perubahan Fungsi Ekosistem Pesisir Terhadap Lingkungan Di Wilayah Pesisir Kecamatan Muaragembong, Buku 2: Pengembangan Wilayah dan Kota Berkelanjutan*, hal.28-33. *Prosiding Seminar Nasional Fakultas Teknik Universitas Islam Bandung: Menciptakan Nilai Tambah dalam Pembangunan Berkelanjutan*, 22 Mei 2014, Unisba, Bandung.
- Badan Pusat Statistik Kabupaten Bekasi. (2012). *Kecamatan Muaragembong Dalam Angka Tahun 2012*.
- Chua, TE. (2006). *The Dynamic of Integrated Coastal Management : Practical Applications in the Sustainable Coastal Development in East Asia*, p. 460-472, Global Environment Facility/UNDP/PEMSEA, Quezone City.
- Dahuri, R., Rais, J., & Sitepu, MJ. (2008). 'Pengelolaan Sumberdaya Wilayah Pesisir dan Lautan Secara Terpadu', Pradnya Paramita, Jakarta.
- Fauzi, A., & Oxtavianus, A. (2014). *Pengukuran Pembangunan Berkelanjutan di Indonesia*. *Mimbar* Volume 30. No. 1 Juni 2014: 42-52.
- Forestian, O. (2011). *Estimasi Biomassa dan Kerapatan Vegetasi Mangrove Menggunakan Data Landsat ETM+ (Studi di Hutan Lindung dan Hutan Produksi Tetap Muaragembong, Kabupaten Bekasi Provinsi Jawa Barat)*, Skripsi, Institut Pertanian Bogor, Bogor.
- Hindersah, Hilwati. (2013). *Islamic Concept of Sustainable Development in The River Estuary, International Conference Proceeding: Redefining the Concept of Islamic Architecture and Built Environment, International Conference on Architecture & Built Environment*, pp. 529-539, 7th & 8th November 2013, KAED, IIUM & Putrajaya, Malaysia.
- Hindersah, Hilwati., Asyiwati, Yulia., & Akliyah, Lely S. (2014). *Peranan Ekosistem Mangrove Dalam Mendukung Sistem Perekonomian Di Kecamatan Muaragembong Kabupaten Bekasi*. Laporan Akhir Penelitian Tahap I, Hibah Bersaing Dikti, Universitas Islam Bandung.
- Hindersah, Hilwati., Asyiwati, Yulia., & Akliyah, Lely S. (2015). *Peranan Ekosistem Mangrove Dalam Mendukung Sistem Perekonomian Di Kecamatan Muaragembong Kabupaten Bekasi*. Laporan Kemajuan Penelitian Tahap II, Hibah Bersaing Dikti, Universitas Islam Bandung.
- Keputusan Menteri Negara Lingkungan Hidup Nomor 201 Tahun 2004 tentang *Kriteria Baku dan Pedoman Penentuan Kerusakan Mangrove*.
- Undang-undang Nomor 27 Tahun 2007 tentang *Pengelolaan Wilayah Pesisir dan Pulau-pulau Kecil*. Departemen kelautan dan Perikanan, Jakarta.
- Zamzami, Lucky. (2011). *Pemberdayaan Ekonomi Masyarakat Pesisir di Nagari Ampiang Perak, Sumatera Barat*. *Mimbar*, Volume XXVII. No. 1: 113-125.