

**SOCIAL-ECONOMIC ASPECTS OF COASTAL COMMUNITY  
THAT INFLUENCE MANGROVE FOREST DEGRADATION  
IN SECANGGANG VILLAGE LANGKAT REGENCY**

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***Abstract***

*The objective of this study is to analyze social-economic aspects of coastal community that influence mangrove forest degradation. Analysis is conducted for coastal community members who earn their living thru mangrove tree cutting activities. Method used is multiple linear regression analysis.*

*The result shows that social factors (educational level, environmental knowledge level and cosmopolitan level) seem to have a significant effect on the degradation of mangrove forest. Increasing educational level and cosmopolitan level can reduce the level of mangrove deforestation. Economic factors (income and number of dependants) also have a significant role on the loss of mangrove forest. Thus, income improvement can reduce deforestation.*

*Implications of this study are: (1) in order to reduce degree of mangrove forest degradation, the coastal community should be released from their economic dependency to mangrove forest and should be given better access to other various income sources. (2) to increase awareness of the importance of role and function of mangrove forest thru elucidation (extensive service) or visualization of the effect of degradation caused by deforestation activity which do not concern the sustainability and continuity of mangrove forest. (3) to manage regulation and monitoring system by regency government to mangrove forest product industry.*

***Key words: coastal community, mangrove forest, other income alternatives***

***Abstrak***

*Penelitian ini bertujuan untuk menganalisis aspek sosial ekonomi masyarakat pesisir yang mempengaruhi kerusakan hutan mangrove. Analisis dilakukan pada masyarakat pesisir yang bermata pencaharian sebagai penebang hutan mangrove. Metoda analisis yang digunakan adalah Analisis Regresi Linier Berganda.*

*Hasil penelitian menunjukkan faktor sosial (tingkat pendidikan, tingkat pengetahuan lingkungan, dan tingkat kosmopolitan) berpengaruh nyata terhadap tingkat perambahan hutan mangrove. Peningkatan tingkat pendidikan dan tingkat kosmopolitan dapat menurunkan tingkat perambahan hutan mangrove. Faktor ekonomi (pendapatan dan jumlah tanggungan keluarga) berpengaruh nyata terhadap tingkat perambahan hutan mangrove. Peningkatan pendapatan dapat menurunkan tingkat perambahan hutan mangrove.*

*Implikasi dari penelitian ini adalah: (1) untuk mengurangi tingkat degradasi hutan mangrove, masyarakat harus dilepaskan dari ketergantungan ekonomi terhadap hutan*

*mangrove dan diberikan akses terhadap sumber pendapatan lain yang lebih beragam. (2) meningkatkan kesadaran akan pentingnya peran dan fungsi hutan mangrove melalui penyuluhan maupun visualisasi dampak-dampak kerusakan yang diakibatkan oleh perambahan yang tidak memperhatikan keberlangsungan dan keberlanjutan hutan mangrove. (3) Pemerintah Daerah perlu menata sistem regulasi dan pengawasan industri produk hutan mangrove.*

**Kata kunci:** masyarakat pesisir, hutan mangrove, mata pencaharian alternatif

## **1. Introduction**

Mangrove forest is plant vegetations that grow between tidal lines but can also grow in coastal reef of depositional environment on dead coral sediment covered with thin sand layer or mud deposition environment or in muddy coastal area. Mangrove forest is one of wet field ecosystems consisting of swamp, marsh, turf (peat moss) or watering, either naturally or artificially, permanently or temporarily, in flow thru or stagnated fresh, quite saline water including coastal area which does not exceed 6 metre depth in lowest astronomical tide. Mangrove forest has a rapid and flat vegetation, consisting of leafy plant species. Mangrove forest borders on the forest that mainly grow in alluvial soil of coastal area and around estuaries which are very much influenced by astronomical tides (Mawahib, 2007).

Mangrove forest habitat are plant growing areas which are always flooded during high astronomical tide and partially are not inundated with water during low astronomical tide. Mangrove forest is a buffering ecosystem between land and ocean that has a very significant role in maintaining its surrounding marine productivity. Mangrove forest has a very important role in keeping the energy and biotics lifecycle in coastal areas (Mawahib, 2007).

Mangrove forest is a complex and labil ecosystem, since it stays in the meeting point of marine and inland ecosystems. Mangrove forest is a natural resource that gives various benefits and wide impact from social, economic and ecology point of views. Generally, mangrove forest role for the community can be known from its dependent-dweller consisting of how many species of animal and trees including human being that live dependently to the surrounding mangrove forest. Mangrove habitat is a house for varied species of fishes, shrimp and other marine wildlives, and a habitat for varied birds, mammals, and reptiles. Direct benefit for coastal community from mangrove forest is timber that

people use for housing material, firewood, charcoal, pulp and others. Other than that, mangrove forest is the best “exporter” of useful organic matters to support aquatic organic biota conservation.

Mangrove forests are one of the primary features of coastal ecosystems throughout the tropical and subtropical regions of the world. Various kinds of fauna including shrimp, fishes, crabs, mollusks, mammals, reptiles, birds, insects and macro-organisms are found in mangroves ecosystem. People in mangrove communities have utilized mangrove ecosystems for their food resources, firewood, charcoal, timber, and other minor products (Sremongkontip, S., Yousif AH and Liza G. 1997)

Functions of mangroves are: (1) Environmental protection; (2) Nursery of the sea (3) Organic matter and carbon production; (4) Aesthetic; (5) Shelter for wildlife; (6) Pollution sink, mangroves absorb air and water pollution, especially organic waste; (7) Land builder, mangroves build land at the rate of about 7cm per year ; (8) Economic, as source of wood, timber, firewood and charcoal, nipa and alcohol, tan bark, poles and piles, propagules/seeds, crustaceans, mollusks and fishes (Melana, 2000)

Indonesia is one of countries that has the largest mangrove forest area in the world reaching 25% of the total of 18 million mangrove forest area in the world which is 4.5 million hectares or equals to 3.8% of the total Indonesian forest area. Despite its smaller size compared to inland forest, Indonesian government pays less attention to mangrove forest. Mangrove forest degradation is somewhat alike other inland forest condition in Indonesia. Uncontrolled environmental destruction has finished off mangrove habitat (Hariawan, 2006).

Approximately 11 million hectares of mangrove forest in Indonesia has been degraded ranging from medium degree to severe damaged condition even to totally vanishing. Degradation and loss of mangrove forest can be seen along Indonesian

coastline which is 81,000 km long. About 70% of its environment has been destroyed, among others are caused by abrasion, and coral ridge destruction. Based on a study conducted by Oceanography Study Center of LIPI in 9 coastal cities in Indonesia such as Jakarta and Surabaya, sea level has risen up to 0.5 mm per year or in 15 years reaches 90 mm (MacDougall, 1996).

Excessive deforestation, either inland or mangrove forest not only reduces water absorption area, abrasion, and other disasters such as erosion and flood but also disturbs air circulation through the production of oxygen and assimilation of carbon dioxide that human needs for life.

Mangrove forest degradation also happens in North Sumatra especially in Langkat Regency. Until 2003, around 3,111.7 hectares of Langkat Regency mangrove forest had been degraded. The degree of degraded mangrove forest in Langkat Regency is presented in Figure 1.

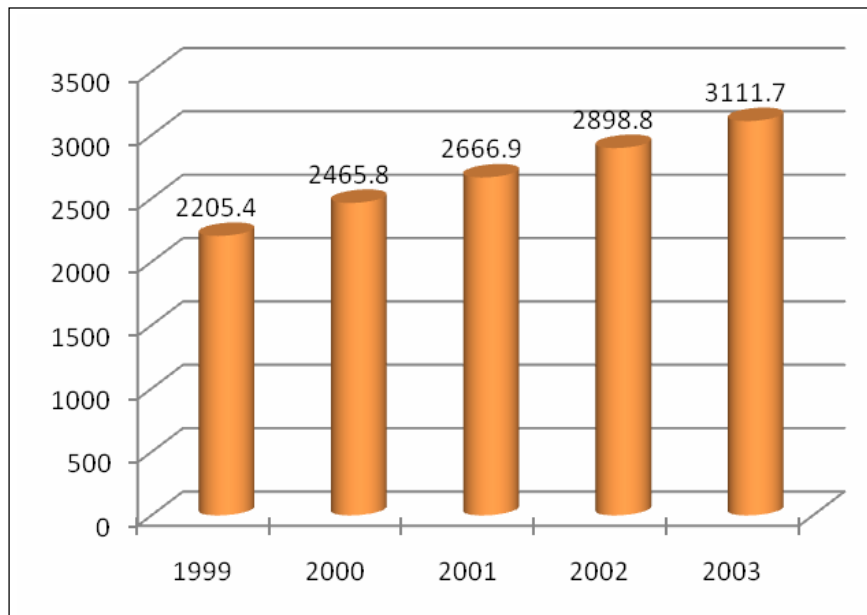
The major cause of mangrove forest degradation in Langkat Regency is the changing of mangrove forest to shrimp and milkfish ponds. This degradation needs to be rehabilitated. Rehabilitation and conservation will hopefully bring back the function of water circulation, prevent pollution and

marine intrusion, protect coastline regions from abrasion, avoid flooding, and conserve marine biota habitat.

Other cause of mangrove forest degradation is wood cutting. This activity makes mangrove forest degraded rapidly. This happens mainly for social economic purpose alone in fulfilling surrounding community needs. The social economic needs are figured out in terms of housing, furniture, tools for information, food for living and others.

Low earning and social economic condition significantly affect people to behave and make decision, either for themselves or for the environment around him. These problems make people exploit the nature. In addition to that, low life skill, high unemployment rate and lack of knowledge towards environment seem to be the pushing factor to exploit the nature. People try to earn a living in such an easy way.

The more people depend on mangrove forest area, the faster the degradation will be. Therefore, a study concerning the conservation should be done to find pushing factors why people overly exploit mangrove forest. Thru the factors, some significant preventive and conservative efforts will be made accordingly.



**Figure 1. Area of Degraded Mangrove Forest in Secanggang Sub-District, Langkat Regency**

Sumber: Langkat in Figures, 2003

## 2. Study Method

This study took place in Secanggang Village, Secanggang Sub-District, Langkat Regency. Determining this place is purposively considering that this village is one of regions with the largest mangrove forest area in Secanggang Sub-District and suffers from the highest degree of degradation as well.

Population is coastal community members who work as mangrove wood cutter consisting of 250 persons. Sample and measurement are made by using Simple Random Sampling with the number of samples at 30 respondents.

To see social factor influence (age, education level, environmental knowledge, and cosmopolitan level) and economic factor influence (income, and number of dependants) on mangrove forest clearing, Multiple Linear Regression Analysis is applied with the formula (Koutsoyiannis, 1977):

$$Y = a + b_1X_1 + b_2X_2 + \dots + i$$

where:

- Y = dependent variable
- X = independent variable
- a = intercept/constant
- b = regression coefficient
- i = error term

## 3. Study Findings

Low education level and lack of environmental knowledge of people living around mangrove forest have influenced their decision, where such decision tends to be aimed at short term economic circumstance or for a quick individual need alone.

Mangrove forest degradation happened in Desa Secanggang, in Langkat Regency is mainly caused by human activities in fulfilling their needs and to make a better living. Economic activity developing rapidly now in Secanggang village is a high demand on charcoal, therefore there are many new charcoal producers opened and the high increase for food stuff like shrimp. These all push the activity of mangrove tree cutting.

This mangrove tree cutting tends to the activity of mangrove forest over exploitation which will cause mangrove forest degradation that will finally destroy the whole coastal ecosystem. The effects of degraded mangrove forest directly experienced by the coastal community are flooding which comes at certain high tides, decreasing fish catch, and extinction of certain species of fish.

Coastal communities who conduct mangrove forest clearing are generally those who work as fishermen. The main reason for their destructive behavior is the low income earning from fishing. The income does not meet their family needs. Other than that, they have no other alternative skill to make money. Cutting down mangrove tree does not require specific skill, is quicker in getting money, and does not cost a lot. The wood can be used for house pile or firewood.

Communities who conduct the mangrove tree cutting are mainly people who have been living in the region for decades. They cut trees using axe or big chopping knife. Mangrove tree species being cleared are varied, starting from black mangrove, mangrovia *lenggadai*, *mata buaya*, *nyirih* or *api-api*. After cutting, the wood then sold to charcoal producers, brokers, and some are used for their domestic purpose as firewood.

### 1). Social Factor Influence on Mangrove Forest Degradation at Study Site

Multiple regression analysis result on the influence of age, education level, environmental knowledge and cosmopolitan level towards mangrove tree cutting is shown in Table 1.

Multiple Linear Regression Model is derived as follows:

$$Y = 2.693 + 0.103 X_1 - 0.125 X_2 + 0.230 X_3 - 0.128 X_4$$

The result shows that age, education level, environmental knowledge, and cosmopolitan level simultaneously influence mangrove forest extraction at study site. This can be seen from value of  $F_{-count} (6.740) > F_{0.05; (4, 25)} (2.76)$ . Determination coefficient value ( $R^2$ ) is at 0.519, which means that at 51.90% of mangrove forest clearing value variation are characterized by variables of age, education level, environmental knowledge, and cosmopolitan level, and 48.10% are characterized by other variables which are presumably economic variables.

Partially, age variable has no significant influence on mangrove forest extraction at study site, as considered from value of  $t_{-count} (1.431) < t_{(0.05; 25)} = 1.706$ . Age variable does not significantly influence the clearing activity since either young or old fellow citizen does the mangrove tree cutting in the site.

Education level variable has a significant influence on mangrove tree cutting, as considered by the value of  $t_{-count} (2.425) > t_{(0.05; 25)} = 1.706$ . Regression coefficient value is derived at -0.125,

which means that every 1 year increase of education level will reduce mangrove tree cutting at 0.125 ha. The higher the education level one can get, the better his knowledge and viewpoint on environment will be. This will increase his awareness and care for environmental conservation. Thus, higher education level of the community members will reduce the mangrove tree cutting.

Environmental knowledge variable influences the mangrove tree cutting at the study site, as considered by the value of  $t_{\text{-count}} (3.507) > t_{(0.05;25)} = 1.706$ . Regression coefficient value derived at 0.230, which means that every 1 point increase of environmental knowledge will increase mangrove tree cutting at 0.230 ha.

Cosmopolitan level variable has a significant influence on mangrove tree cutting, as considered by the value of  $t_{\text{-count}} (-2.113) > t_{(0.05;25)} = 1.706$ . Regression coefficient value derived at -0.128, which means that for every 1 score increase of cosmopolitan level will reduce mangrove tree cutting at 0.128 ha. Cosmopolitan level is a level of openness towards new things.

## **2). Economic Factor Influence on Mangrove Tree Cutting at Study Site**

Multiple regression analysis result on income and number of dependants towards mangrove forest extraction is figured out in Table 2.

Multiple Linear Regression Model derived as follows:

$$Y = 3.9505 - 0.200 X_1 + 0.053 X_2$$

The result shows that income and number of dependants simultaneously influence mangrove tree cutting at study site as derived from the value of  $F_{\text{count}} (12.217) > F_{0.05;(4,25)} (3.35)$ . Determination coefficient value ( $R^2$ ) is at 0.475, which means that 47.5% of mangrove tree cutting value variation are characterized by income and number of dependant variables and 52.5% are characterized by other variables, including social variables as already explained.

Partially, income variable plays a significant role on mangrove tree cutting activity at study site. This is shown by the value of  $t_{\text{-count}} (-4.892) > t_{(0.05;25)} = 1.701$ . Regression coefficient value is at -0.200, which means that every Rp 1.000.000 increase of income will reduce mangrove tree cutting at 20 ha. The higher the income, the lower the mangrove tree cutting will be. This gives an explanation that basically whenever

people can earn their living from other sources, they will not do mangrove tree cutting. However, in fact, looking for other alternative livelihood is very difficult. Therefore, mangrove tree cutting is still happening.

Number of dependants variable influences mangrove tree cutting activity at study site. This can be inferred from the value of  $t_{\text{-count}} (1.958) > t_{(0.05;25)} = 1.701$ . Regression coefficient value is at 0.053, which means that every 1 person increase of number of dependant variable will increase the level of mangrove tree cutting at 0.053 ha. The higher number of dependants, the higher living cost to be spent. This pushes people to find extra money and the easiest way for them is mangrove tree cutting. Therefore, the higher the number of dependants, the higher mangrove tree cutting will be.

## **3). Problems Faced in Handling Deforestation and Tree Cutting**

Main problem of massive mangrove tree cutting at study site is the low income earning from fishing. Thus, surrounding communities depend their lives on mangrove wood trading. This activity has been conducted for generations, so the people feel lazy to find other alternative jobs. Moreover, mangrove tree cutting is the easiest way of making money. Other than that, mangrove wood can also be used as firewood to save some money from buying fuel.

Besides that, many charcoal producers located close to mangrove forest also contributed to deforestation. People can easily sell the mangrove wood they have already cut down.

Mangrove tree cutting or deforestation was not only conducted by the people who live around the mangrove forest, but also by other people from outside the village who changed mangrove forest to ponds, either natural pond or intensive pond. Other than that, mangrove forest was also converted to oil palm plantation and settlement. The conversion accelerates a rapid growth of population and increases consumers' demand of food stuff.

This condition is different from mangrove forest degradation condition in Thailand, which is determined by the presence of private industries not by surrounding communities (Sremongkontip, S., Yousif AH and Liza G. 1997).

In Pakistan, mangrove are suffered by poor management practices in a long time period. Previous studies show that not only poor but rich people are

involved in exploiting mangroves. The government has failed to eradicate poverty in mangrove areas. Moreover, forest management approaches and laws are heavily tilted in favour of income generation and don't consider social and economic conditions of the communities (Saeed, 2003).

#### **4. Conclusions**

- 1) Social factors (education level, environmental knowledge, and cosmopolitan level) significantly influence mangrove forest degradation. Increasing education level and cosmopolitan level can reduce mangrove forest degradation.
- 2) Economic factors (income and number of dependants) significantly influence mangrove forest degradation. Increasing household income can reduce mangrove deforestation.

#### **5. Implication**

- 1) To reduce degree of mangrove forest

degradation, coastal community should be released from their economic dependence to mangrove forest and should be given any access to other various income sources. No alternative income earning makes people economically rely more on mangrove forest. This problem significantly accelerates mangrove forest degradation.

- 2) Awareness on the importance of mangrove forest role and function should be increased continuously thru elucidation with the focus on visualization of the effect if they do not care about mangrove forest conservation and sustainability.
- 3) Regency government contributes to mangrove forest degradation. This can be inferred from the license given to charcoal producer establishment. Therefore, regulation and monitoring from regency government to such mangrove forest product industries should be improved and upgraded.

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**Appendix**

**Table 1. Analysis Result on the Influence of Age, Education Level, Environment Knowledge, and Cosmopolitan Level towards Mangrove Deforestation**

<b>Variable</b>	<b>Coefficient</b>	<b>t</b>	<b>Note</b>
x <sub>1</sub> (age)	0.103	1.431	not significant
x <sub>2</sub> (level of education)	-0.125	-2.425	significant
x <sub>3</sub> (environmental knowledge)	0.230	3.507	Significant
x <sub>4</sub> (level of cosmopolitan)	-0.128	-2.113	Significant
Intercept = 2.693			
R <sup>2</sup> = 0.519			
t <sub>(0.05;25)</sub> = 1.706			
F <sub>-count</sub> = 6.740			
F <sub>0.05;(4,25)</sub> = 2.76			

*Sources : Primary Data Analysis*

**Table 2. Analysis Result on the Influence of Income and Number of Dependants towards Mangrove Deforestation**

<b>Variable</b>	<b>Coefficient</b>	<b>t</b>	<b>Note</b>
x <sub>1</sub> (income)	-0.200	-4.892	significant
x <sub>2</sub> (number of family member)	0.053	1.958	significant
Intercept = 3.9505			
R <sup>2</sup> = 0.475			
t <sub>(0.05;25)</sub> = 1.701			
F <sub>-count</sub> = 12.217			
F <sub>0.05;(2,25)</sub> = 3.35			

*Sources : Primary Data Analysis*