

Discovering the socio-economic migrant performance on illegal logging activities for deforestation problem solving in Banyuasin Regency, South Sumatera (case study of Sungai Buring traditional village)

Dessy Adriani*, Erni Purbiyanti, M. Huanza, and Dini Damayanthi

Agribusiness Study Program, Faculty of Agriculture, Universitas Sriwijaya, Ogan Ilir Regency, South Sumatera, Indonesia

*Corresponding author's e-mail: dessyadriani@fp.unsri.ac.id

Received February 7th, 2023; revised April 4th, 2023; accepted April 14th, 2023

ABSTRACT

It is often excluded from the handling of illegal logging and deforestation is the release of the socio-economic aspects in problem solving deforestation and forestry development. The purpose of this study was to: 1. Identify the socio-economic characteristics of the migrant who become illegal loggers, 2. Analyze the amount of illegal loggers' income and its allocation to the consumption, and 3. Develop a strategy to overcome illegal logging and forest deforestation based on the socio-economic characteristics of the logger. The analysis showed that socio-economic conditions of the migrant who become illegal loggers illustrates that they are still a low level of education and have productive age. Income earned Rp 4,301,211.00/year/family, lower than the income of Rp 33,070,945.00/year/family after migrating. Income get from illegal logging are Rp 13.087.945/year/family. Average migrant allocates 60.81 % of its total income for consumption, and the remaining 39.19 % is allocated to farming and non-farming activities. This study suggests that there should be an increase in revenue breakthrough in the area of origin to be able to suppress the migration process becomes illegal loggers to other areas. Low income is the core problem of farmers to migrate. Required two basic designs: (1) social engineering with community and (2) technical engineering in the direction of the multiproduct and multifunctional forest benefits to overcome the problems of forestry in the long run.

Keywords:

Illegal logging, Migrant, Social economic

1. Introduction

Starting in the 1970s, Indonesia's forests entered a new phase, namely deforestation began to become a serious problem. The timber industry is indeed increased by 4,49% over the past two years [1]. Commercial logging has begun on a large scale. Illegal logging continues to lead to serious forest degradation. This condition is also followed by conversion to other forms of land use [2]. Quite a large Indonesian people depend on forests for their livelihood, at least around 153.158 person/year since 2018-2020 through shifting cultivation, hunting, logging and selling of wood and collecting non-timber forest products, for their own use or sale [3]. This condition of 'neglect' and 'need' is like an ambiguous attitude when people are faced with a two-bladed challenge.

The problem of illegal logging is predicted will continue increase in the future [4]. This is related to the rapid population growth, which often cannot be adequately anticipated by the carrying capacity of the region. This is mainly in terms of providing facilities and meeting the needs of the population, especially the fulfillment of food and clothing which forces part of the population, especially farm workers, to look for new sources of life, in



new places as well and forests are one of the places that are considered capable of accommodating these needs. The increasing number of small farmers as the main cause of deforestation [5,6]. At the same time, forests are common pool resources (CPR) that are vulnerable to over-exploitation. On the other hand, the owner or manager of the forest area is unable to prohibit other parties from enjoying the benefits (non-excludable), which is shown by the existence of community fields in forest areas, and the ongoing illegal logging and illegal harvesting of forest products [7].

Considering that the impact of illegal logging, located in several different places over time, is important, the political, demographic, social, economic and ecological mechanisms behind the occurrence of migration should be properly investigated; before policies can be developed to address migration in ways that conserve remaining tropical forests and support rural development. Rural migrant farmers will continue to be the dominant driver of tropical deforestation, as long as they have no other employment options. This points to the importance of data collection and analysis on migrant farming households, their migration history, demography, socio-economic characteristics, and their land-use practices [8,9].

What is often neglected in dealing with illegal logging and deforestation is the neglect of the socio-economic aspects in solving deforestation. So far, forestry research has focused more on technical and regional aspects and has not touched much on the socio-economic structure of loggers, especially migrant loggers. Based on the above background, it is necessary to analyze the socio-economic conditions of the migrant population who work as illegal loggers, so that the reasons for making illegal logging activities their main source of livelihood are known. In addition, it is also necessary to know the amount of income they receive from illegal logging activities and the allocation of income used for consumption and non-consumption. Efforts to deal with illegal logging can be prepared in detail, if the socio-economic factors of the population carrying out illegal logging activities can be identified.

One of the forests that has been degraded as a result of illegal logging activities in South Sumatra is the Peat Swamp Production Forest in the Lalan Production Forest area located in Muara Merang Village, Musi Banyuasin Regency. In this area, many illegal logging activities are carried out by migrants who settle down and make settlements around the forest. Sungai Buring Traditional Village is one of the hamlets located in the Muara Merang Village area. Most of them are migrant residents whose activities are mostly utilizing forest products, both legally and illegally. The forest ecosystem consists of peat swamp forest, fresh water swamp forest and riparian forest. Various types of flora and fauna are found in this area. The population around the village is heterogeneous. Various tribes both from South Sumatra Province and from outside are here. Prior to the operation of Forest Concession Rights (*Hak Penguasaan Hutan/HPH*) in the late 1970s, the community generally worked to collect wood, catch fish, collect rattan and collect honey. Currently, they generally work as employees in palm oil companies. Illegal logging activities are still being carried out covertly. Illegal logging activities certainly need attention given their impact on forest destruction. So far, many programs have been developed to tackle illegal logging and deforestation. Various methods in developing and evaluating alternative forest management are carried out to reduce deforestation trends. One thing that needs to be

agreed is that, in most cases, the appropriate approach to managing forest resources in developing countries is community-based forest management, with consideration due to site-specific conservation and development requirements. However, the success of the program was again influenced by economic and social factors, including education, household income, poverty level and share of income from program [10]. In other words, socio-economic characteristics greatly influence the success of various programs to deal with illegal logging [9,11]. However, the research on the socio-economic characteristics of migrants who practice illegal logging has not been widely studied yet.

Based on this background, the objectives of this research are to: 1. Identify the socio-economic characteristics of the migrant who become illegal loggers, 2. Analyze the amount of loggers' income and its allocation to the consumption, and 3. Develop a strategy to overcome illegal logging and forest deforestation based on the socio-economic characteristics of the loggers.

2. Methods

This research was conducted in Muara Merang Village with migrant residents in Sungai Buring Village, Musi Banyuasin Regency, South Sumatra in 2021. The research method used was a case study method. Sampling method was the purposive sampling method which focused on a sample of 38 migrant households, which still have been doing illegal logging activities in 2021. The first objective will be answered using tabulation analysis which is described descriptively. The socio-economic conditions of the migrant population who become illegal loggers can be investigated by identifying directly in the field by conducting in-depth interviews with respondents who are residents who carry out illegal logging activities. The second objective was to calculate the income and consumption of forest loggers for migrant populations using a cost and benefit analysis. Furthermore, the third objective analyzed descriptively, that is in developing a strategy to overcome illegal logging based on the results of the previous analysis. To enrich the discussion, some related literature will be referred to further sharpen the discussion.

3. Results and Discussion

3.1. Socio-Economic Characteristics of Migrant Population Conducting Illegal Logging

3.1.1. Socio Characteristics

Based on Table 1, it can be seen that the average education level of the migrant population is only elementary school graduates, so it is very difficult for migrant to get decent jobs apart from illegal logging activities. Low education causes narrower job choices. When agricultural work can no longer be relied upon, the choice of Illegal Logging becomes a priority. The function of education is also considered as a function of social reproduction [10]. Individuals from the lower class who are unable to access higher education will only be positioned as lower class workers, unskilled workers with inhumane salaries. Conversely, the elite group will be able to achieve higher educational status, so that later they will be able to maintain their position in the world of work. When in the world of work, people from lower groups are also "forced" to adjust to the habitus of the employer group (which is dominant, educated and strong) [11]. Their age, which is still classified as

productive, is a supporting factor for them to engage in illegal logging. Based on Table 1, it can be seen that the population aged 30-40 years is the most dominant in logging activities, namely 55%. So it can be concluded that the average age of migrants who carry out logging activities is included in the productive age.

Farming activities in this Muara Merang village have less potential, because peatland conditions have a high level of acidity (pH), so it is quite difficult to make land for farming, especially for horticultural crops. Farming activities that have been started by residents in this village include rubber plantations and swallow cultivation, while other farming activities are quite difficult to implement. Non-farming activities carried out by migrant residents include opening motor boat repair shops and becoming motor boat drivers (see Table 1).

Table 1. Social characteristic of migrant with illegal logging activities

Characteristics	Percentage (%)
Origin	
Outside the Sungai Buring, but within the territory of the province of South Sumatra	90
Outside of the territory of the province of South Sumatra	10
Occupation Before	
Farmer	20
Farm Labourer	45
Non -farm Labourer	35
Education	
No school	25
Elementary School	45
Junior high school	15
Senior high school	15
Age	
< 30	20
30-40	55
>40	25
Farming and Non-Farming Activities	
Rubber Plantation	20
Swallow Farm	30
Speedboat Repair Shop	5
Grocery	30
Speedboat driver	15
Length of Being Illegal Logger	
< 10 Years	20
10-20 Years	35
> 20 Years	45

The result of in-depth interview shows that, they have carried out this illegal logging activity as a habit of their life, ever since they moved to live around the Buring River, around 1987. Limited job opportunities also made them decide to move from their previous residence. The choice of work they do in their area of origin is mostly as laborers in both

the agricultural and non-agricultural sectors, while the rest are farming on their own land. The low income from working in their area of origin causes loggers to look for other, more promising alternative jobs. The choice of work done is to become a logger in another area. Education is one of the potential assets possessed by humans, where education will exist when applied to real life, including in work. Many scientist stated educational level influences job selection [12]. The higher a person's level of education, the stronger the desire to do work with a high level of challenge .

Judging from the involvement of family members, almost all loggers involved family members. The loggers often take their sons who are just in their teens to participate in logging activities. In other words, this activity will have the same effect on their children to become loggers. This attitude is also known as imitation [12]. People imitate other people, especially if the other person is a strong and important person. One of the important sources that shape a person's attitude is the imitation of the attitudes of others through social learning. In other words, when the imitation process is successful, it will be difficult to abandon illegal loggers. This is also supported by the data in Table 1 where almost 45% have been illegal loggers for more than 20 years. That is, the imitation process was relatively successful. In other words, this logging activity will run for generations

3.1.2 Economic Characteristics

3.1.2.1. Before Migration

Most of them come from within South Sumatra Province. Many factors cause them to migrate from their previous origin. The biggest factor is the driving factor from the region of origin, namely poverty. The income of loggers in their previous origin is very low, Rp 4,301,211.00/year (See Table 2). This is related to the limited choice of their work. The limited choice of work is related to the low education of loggers in their area of origin. The population migration is caused more by driving factors in the area of origin than pull factors in the destination area [13].

3.1.2.2. After Migration

Illegal logging is the main activity carried out by migrants after migrating. The income from this activity is Rp 13,087,945/year/family. Since moving in the 1980s, in the last few years they have also started rubber and swallow farming. The cultivated rubber is smallholder rubber with a planting age of only 8-10 years. For swallow farming, the income earned is also uncertain, because it depends on the number of swallow populations that perch and make nests in the swallow house. In 1 year, the average production of swallow nests can reach 0.47 kg, with a selling price of Rp 12,000,000/kg and the average total income earned is Rp 5,640,000/year. In Kampung Sungai Buring there are two swallow houses, each of which is managed by three residents. For more details can be seen in Table 2.

Table 2 shows that, the average income per year is Rp 33,070,945/year/family with an average of 4 family members. The results of this study support many studies and studies of the factors that influence the decline of farmers due to low income. One of them is the difficulty in financing farming and the need for cash funds for living needs while waiting for the sale of crops, causing many farmers to look for other alternative sources of income,

for example by becoming illegal loggers, even though farmers still do not have a better bargaining position in the new job. So that, they migrate because of low income.

Table 2. Income before and after migration

Kind of Occupation	Income (Rp per year)	Percentage (%)
A. Before (Present Value of Income)		
1 On Farming		
Main on Farm	2,567,000.00	59.68
Farm Labourer	1,250,000.00	29.06
2 Non-Farming		0.00
Non-Farm Labourer	484,211.00	11.26
Total	4,301,211.00	100.00
B. After		
1 Farming		
Rubber Farming	6,723,000.00	20.33
Swallow Farming	5,640,000.00	17.05
Illegal Logging	13,087,945.00	39.58
Sub Total 1	25,450,945.00	
2 Non-Farming		
Speedboat Repair Shop	750,000.00	2.27
Groceries	2,520,000.00	7.62
Speedboat Driver	4,350,000.00	13.15
Sub Total	7,620,000.00	
Total	33,070,945.00	100.00

Likewise with the low productivity of small farmers as a consequence of various problems such as limited human resources for farmers, shrinking production area, inadequate production facilities and infrastructure needed for efficient farming, and various other problems. With regard to the migration process, deforestation is more related to out-migration of men to forest areas. Economic factors such as involvement in on-farm work, increasing resource scarcity (measured by high population density on farms and reduction in agricultural land) are more associated with male out-migration to rural areas. On the other hand, increasing resource scarcity, higher population densities and weaker migration networks are more associated with women migrating to urban areas. Thus, a vicious circle has been created in which pressure on land leads to deforestation in some or all of the agricultural forest areas and reduces the possibilities for further expansion of agricultural areas; out-migration is mainly male, occurs to other villages or forest areas (with women being more likely to choose urban destinations), and given continued population growth and pressure in new areas, new pressures promote further migration to the next rural destination and continued [10,13].

3.1.3. Analysis of Illegal Logging Income Structure, Family Income and Consumption Expenditures

The production cost of illegal logging activities is the cost required by loggers in carrying out illegal logging activities. This fee is provided by the owner of the capital (*cukong*),

usually the owner of the sawmill, which is a loan. The loan must be paid when the logging activities have been completed. Table 3 shows that the total illegal logging production costs that must be incurred in one cutting period of 6 months is Rp 8,562,458. The average total revenue is Rp 47,826,294. Illegal logging income per person is Rp 6,543,973/6 months or Rp 13,087,945/year.

Table 3. Cost, revenue, and income from illegal logging

	Component	Amount
1	Revenue (Rp/group/6 month) Production 158.56 m ³ / 6 month group Price Rp 301,629/m ³	47,826,294
2	Cost (6 month)	8,562,458
3	Income per group (Rp/group/6 month)	39,263,836
4	Income per person (Rp/person/6 month)	6,543,973
5	Income per person (Rp/person/years) or Rp/family/years	13,087,945

Note: every group consist of 5 people

Table 4 shows that the total income earned by loggers per month is Rp. 33,070,945, with the largest percentage coming from illegal logging income, namely 39.58%. This is what makes the migrant population continue to make illegal logging activities their main livelihood, because their biggest income comes from this activity. The amount of dependence on illegal logging has an impact on the sustainability of forest resources. This research is in line with the previous studies, which stated that in essence the purpose of utilizing natural resources is to increase people's prosperity [4]. But achieving this goal carries the risk of polluting and destroying the natural environment and will stop sustainability. In reality, people's prosperity can be successfully increased positively but it can also not change from time to

Table 4. Structure of income, consumption of migrant and its allocation

	Component	Unit	Amount
1	Income	Rupiah/year	
	a. Illegal Logging		13,087,945.00
	b. Non-Illegal Logging		19,983,000.00
	Total		33,070,945.00
2	Consumption	Rupiah/year	
	a. Food		7,920,000.00
	b. Non-Food		5,040,000.00
	Total		12,960,000.00
3	Difference	Rupiah/year	
	a. Illegal Logging Income to Consumption		127,945.00
	b. Total Income to Consumption		20,110,945.00
4	Allocation of Consumption to Illegal Logging Income	%	99.02
5	Allocation of Consumption to Total Income	%	60.81

time as reflected in people's lives which are still perfunctory or even vice versa the prosperity decreases because technically loses or is harmed by natural resource market mechanisms outside their control [14,15]. Likewise, pollution and destruction of the natural environment may not occur, or even be controlled wisely so that the environment actually develops well. However, because of the rapid population growth, it is not uncommon for the struggle for resources to have reduced the quality and function of the environment.

Income allocation is an activity of budgeting funds from income used for a consumption or business activity. Table 4 shows that of the income from illegal logging, the average migrant population who works as illegal loggers allocates 99.02% of their income to meet their living needs, so that the remaining 0.98% is allocated for farming and non-farming activities. Meanwhile, when measured by total income (illegal logging income and non illegal logging income), the average migrant population allocates 60.81% of their income to fulfill their daily needs, and the remaining 39.19% is allocated for farming and non-farming activities.

In referring to the opinion of Sukwika et al. [14] and Ofoegbu et al. [15] states that the involvement of citizens in illegal logging activities is often explained as their lack of understanding of the losses that will be experienced in the long term, weak awareness, and lack of knowledge of the law (not yet literate), resistance or revenge against state domination in natural resource management. natural resources, low levels of education, poverty, and the strong lure of profit propagated by the timber barons [14,16]. In explanations like the above, citizens are placed more as "victims" of a larger system. They are often positioned as a group that does not have the knowledge and power to solve these forestry problems. Consequently, in handling the problem of illegal logging, it is necessary to "hand" other parties in solving it, especially the state.

3.1.4. Strategies for Overcoming Illegal Logging and Forest Deforestation Based on Socio-Economic Characteristics of Loggers

This research shows that there must be a breakthrough in increasing income in the area of origin to be able to suppress the migration process to become illegal loggers to other areas. Low income is the core problem for farmers to migrate. This research shows that there is a link between poverty in the region of origin and migration, Illegal logging and deforestation. However, also found a correlation between forest loss and increased industrial agricultural exports and urban population growth, while also finding no correlation with rural population growth. In order to accurately assess the impact of village-to-village and small-scale farming migration on deforestation it is important to use migration data, or at least use measures of rural population growth, but only at scales small enough to reveal migration to external forest frontier areas [17]. This research provides further evidence that humans and natural systems cannot be treated independently. On the other hand, changes in migration activities can be of great significance for suppressing deforestation and ecological restoration. Therefore, the substantial changes in rural life are driven by a combination of economic development as a pull factor and local conditions as a push factor, causing shifts in the economic behavior of rural households including out-migration to suppress deforestation as also stated by Ofoegbu et al. [15].

According to research result, it is necessary to develop the following socio-economic components:

1. It is necessary to provide guidance and understanding to migrant populations who carry out illegal logging activities on the importance of the existence of forests as guardians of the balance of natural ecosystems and for future generations to come.
2. Guidance is needed to increase farm and non-farm income, for example through counseling on crop cultivation techniques on narrow land, product marketing, business diversification, entrepreneurship.
3. Provision of strict legal sanctions for migrant populations who are still carrying out illegal logging activities and also for all illegal logging networks without exception.
4. To minimize the level of illegal logging, it is necessary to carry out an inspection of the permits for the sawmill industry located around the site, which include legal sources of raw materials or not, the number of ribbon machines and circle machines used according to the permit or not. If the violation is proven, the sawmill operating permit must be immediately revoked, because illegal logging practices cannot work if there is no sawmill industry.
5. Two fundamental designs are needed, namely (1) social engineering (getting together with citizens as a group), and technical engineering (towards multiproducts and multifunctionality of forest benefits to overcome forestry problems in the long term.

Recognition and incorporation of local institutions in the formulation of forest policies is very important to realize sustainable forest management because local institutions have great potential for collective action and meet the characteristics of sustainable forest management [20]. Joint forest management activities between the government and local (customary) communities are a solution to the problem of non excludability and property rights [14,17]. Sustainable forest management by management institutions involving local collective action can be successful through the application of the following principles: existence of management rules based on local community norms and prioritizing the physical, social and economic functions of forests for local communities; the existence of a management organization that has the authority to give awards and sanctions and is recognized and respected by the community; location-specific arrangements; the rules of the game are made in a participatory manner; the existence of economic incentives for owners and users; the existence of sustainable use control instruments; conflict resolution through negotiations to reach an agreement. This solution is inline with with the previous studies, which stated by Arif et al. [19] and Boonstra et al. [20].

4. Conclusion

The socio-economic conditions of the migrant population who become illegal loggers (illegal loggers) illustrate that their level of education is still low (graduated elementary school), is of productive age (30-40 years), has been working as illegal loggers for a long time (>20 years) and is declining -hereditary, and previously most worked as farm-labourers. The income earned in the area of origin is Rp 4,301,211.00/year/family, lower than the income after migrating, which is Rp 33,070,945.00/year/family. Income derived from illegal logging activities is Rp 13,087,945/year/family. The migrant allocates 60.81% of

their total income to meet their daily needs, and the remaining 39.19% is allocated for farming and non-farming activities.

This research shows that there must be a breakthrough in increasing income in the area of origin to be able to suppress the migration process to become illegal loggers to other areas by social engineering and technical engineering. This research provides further evidence that humans and natural systems cannot be treated independently. On the other hand, changes in migration activities may be of great significance for suppressing deforestation and ecological restoration. Substantial changes in rural life are driven by a combination of economic development as a pull factor and local conditions as a push factor, causing shifts in the economic behavior of rural households including out-migration in order to suppress deforestation.

Acknowledgements

The authors would like to thank all research teams for the extraordinary research collaboration and thank the respondents, extension workers, and related government officials at the research location. The author also gives high appreciation to students as enumerators who assist in the process of collecting, tabulating, and analyzing research data. The author hopes that this research will be of practical and academic use for the advancement of the urban fisheries sector in the city of Palembang.

References

1. BPS. Statistik Indonesia 2023. Badan Pusat Statistik; 2023. 780 p.
2. Folke C, Carpenter S, Elmqvist T, Gunderson L, Holling CS, Walker B. Resilience and sustainable development: building adaptive capacity in a world of transformations. *AMBIO: A J. of the Human Environment*. 2002;31(5):437–40.
3. BPS. Jumlah tenaga kerja industri besar dan sedang menurut sub sektor [KBLI] 2020 (Orang), 2018-2020 [Internet]. Badan Pusat Statistik; 2020 [cited 2023 May 16]. Available from: <https://www.bps.go.id/indicator/9/730/1/jumlah-tenaga-kerja-industri-besar-dan-sedang-menurut-sub-sektor-kbli-2009-.html>
4. Sudrajat D. Problems of illegal logging cases in Indonesia from the view of criminal law. *Legal Brief*. 2022;11(1):82–9.
5. Barbier EB, Bockstael N, Burgess JC, Strand I. The timber trade and tropical deforestation in Indonesia. *LEEC Paper DP 93-01*. London Environmental Economics Centre. 1993.
6. Fraser AI. Social, economic and political aspect of forest clearance and land-use planning in Indonesia. In: Maloney BK, editor. *Human Activities and the Tropical Rainforest*. Dordrecht: Springer; 1998.
7. Torres-Rojo JM. Illegal logging and the productivity trap of timber production in Mexico. *Forests*. 2021;12(7):838.
8. Piabuo SM, Minang PA, Tieguhong CJ, Foundjem-Tita D, Nghobuoche F. Illegal logging, governance effectiveness and carbon dioxide emission in the timber-producing countries of Congo Basin and Asia. *Environment, Development, and Sustainability*. 2021;23:14176–196.
9. Ranselengo FR. Legal analysis for mangrove illegal logging in Sangkub area. *Estudiante Law Journal*. 2020;2(1):88–101.

10. Astuti EW, Hidayat A, Nurrochmat DR. Community forest scheme: Measuring impact in livelihood case study Lombok Tengah Regency, West Nusa Tenggara Province. *Jurnal Manajemen Hutan Tropika*. 2020;26(1):52-8.
11. Dekiawati ES. Law enforcement on illegal logging in Indonesia: Problems and challenges in present and the future. *Indonesian Journal of Environmental Law and Sustainable Development*. 2022;1(1):47-68.
12. Cabbage FW, Davis RR, Paredes DR, Mollenhauer R, Elsin YK, Frey GE, et al. Community forestry enterprises in Mexico: Sustainability and competitiveness. *Journal of Sustainable Forestry*. 2015;34:623-50.
13. Adriani D. Keragaan pasar kerja pertanian-non pertanian dan migrasi desa-kota: Telaah periode krisis ekonomi. *SOCA*. 2006;6(1):1-4.
14. Sukwika T, Darusman D, Kusmana C, Nurrochmat DR. Policy scenarios for managing of sustainability private-forests in Bogor Regency. *Journal of Natural Resources and Environmental Management*. 2018;8(2):207-15.
15. Ofoegbu C., Chirwa PW, Francis J, Babalola FD. Socio-economic factors influencing household dependence on forests and its implication for forest-based climate change interventions. *Southern Forests: A Journal of Forest Science*. 2017;79(2):109-16.
16. Adri. Kontestasi politik identitas dalam fenomena illegal logging di perbatasan Indonesia-Malaysia Studi di Kecamatan Badau dan Lanjak, Kabupaten Kapuas Hulu, Provinsi Kalimantan Barat. *Journal Communication Spectrum*. 2011;1(1):75-90.
17. Torres-Rojo JM, Moreno-Sánchez R, Mendoza-Briseño MA. Sustainable Forest Management in Mexico. *Curr. For. Rep*. 2016;2:93-105.
18. Wang C, Yang Y, Zhang Y. Economic development, rural livelihoods, and ecological restoration: Evidence from China. *AMBIO*. 2011;40:78-87.
19. Arif LOK, Taufik Y, Abadi M. The empowered village community development model South Konawe Regency coastal region (study of the underdeveloped village of the coastal region of South Konawe Regency). *Anjoro: International Journal of Agriculture and Business*. 2020;1(2):37-44.
20. Boonstra WJ, de Boer FW. The historical dynamics of social-ecological traps. *AMBIO*. 2014;43:260-74.