



ECONOMIC MOTIVATION OF FARMING PRACTICES AND THEIR POTENTIAL IMPACT ON THE FOREST ECOSYSTEM

A Case Study in Sungai Wain Protection Forest (SWPF), Indonesia

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Abstract

The existence of Sungai Wain Protection Forest (SWPF) area so far has given various benefit beside its function as conserved forest. Farming practices within the region can, in fact, contribute to households' main income as well as their secondary income. However, uncontrolled farming practices may negatively affect the function of the forest ecosystem. This study aimed to determine the economic motivation of farming activity practiced by the local community and its impact on the adjoining forest ecosystem. The research was conducted in the region of SWPF, East Kalimantan province. Approximately 90 farmer householders within the study area were chosen. The result of the study showed that higher motivation rate of farming activities affects the technique of farming, which in turn could cause increase in bare land. Results indicated that when a farming practice functions as main income for a certain household, the household has a tendency to grow seasonal crops. Such a situation will decrease the rate of soil quality. The application of agroforestry system within the region might be a solution for this existing problem.

Keywords: *economic motivation, farming practices, agroforestry application, ecosystem impact.*

Introduction

Sungai Wain Protection Forest (SWPF), with an area of 9,783 Ha, administratively lies within Balikpapan City of East Kalimantan,. Based on Local Regulation No. 11/2004, it is stated that SWPF, besides its main function to support livelihood, also has a conservation role for rare species of flora and fauna and their respective habitats. This area has also been supporting the lives of local communities within the last few years. Some food and building material resources can be extracted from the area, thus

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potentially contributing a significant economic value to the local community. However, the preliminary study on this issue showed that some values of the forest area are starting to decrease quantitatively and qualitatively as a result of lack of awareness of various stakeholders, especially local communities involved in forest preservation. The case was severely worsened by the high population growth rate within the region, estimated by the management agency (*badan pengelola*) of SWPF between 2006 and 2011 to have grown by as much as 36%. Such growth may indeed have had a significant negative effect on the protected forest area.

The recent condition of SWPF, as reported by the management agency, states that from the total of 9,783 Ha in the beginning, the remaining area of natural forest is now only 39% (3,841 Ha), while 41.6% (4,071 Ha) had been degraded by forest fire events in 1998 and 17.4% (1,703 Ha) was encroached upon and converted for other functions. Based on Local Regulation No. 11/2004, 1,100 Ha of this encroached area had its status changed into a utilization area for local community. Some exploitation activities that are being practiced by the community include cutting of the forest area for agricultural purposes, cutting trees for firewood and exploitation of non timber forest products (NTFP).

In fact, a forest can supply poor householders for firewood, medicine, food and raw material for house construction and, as such, can function as an 'emergency source' during difficult times (World Bank, 2009). For comparison, the contribution of forest protection for community income at Kandang village, Bengkulu near Bukit Daun Protection Forest area is 32% of the total income; while at Air Lanang village, Bengkulu, the figure is 52.5% (Senoaji, 2009). Buyinza (2010) states that based on his study at Mt. Elgon Forest Park Uganda, the forest contributes 55% of households' total income. This contribution value is obtained from medicinal vegetation, material for house construction, firewood, food for paddock, food for community, soil conservation, hunting, charcoal and timber. This means that the contribution of a forest on community livelihood may be significant.

The above examples show that forest land always gives an economic contribution to its surrounding communities, particularly for farmers. Similarly with the case within the SWPF region, while the area functions as a supporting zone for the environment, it cannot be separated from contributing to people lives. Assagaf (2004) states that the main objective of a farmer is providing his family's basic needs. But the interesting question is whether the economic contribution of the forest exists only to fulfill any insufficient income obtained from main income, or whether it becomes the main income and/or occupation. Simultaneously, if the level of economic motivation to farm is high or when such activity serves as the main source of income, it can possibly endanger the sustainability of the existing ecosystem.

Therefore, the objective of this research is: 1) knowing the level of economic motivation of local community's farming activity as part of households' income and its relationship with the type of farming system; 2) knowing the ecological effect resulting from farming activity practiced by local community. The answer(s) obtained from this study might be used as part of basic judgments in the development of a management program plan to sustain or, if possible, to increase community income, while at the same time guaranteeing environment sustainability.

Study Site and Its Status History

The research was conducted in the SWPF Region. Administratively, this research site lies within the Sub-district of North Balikpapan and West Balikpapan, Balikpapan city of East Kalimantan province, Indonesia (Fig. 1). The study area is surrounded by an existing SWPF protection forest area with a high risk of deforestation and degradation due to high accessibility. On the other hand, SWPF functions to support the livelihood of local communities within the region and for Balikpapan in general.

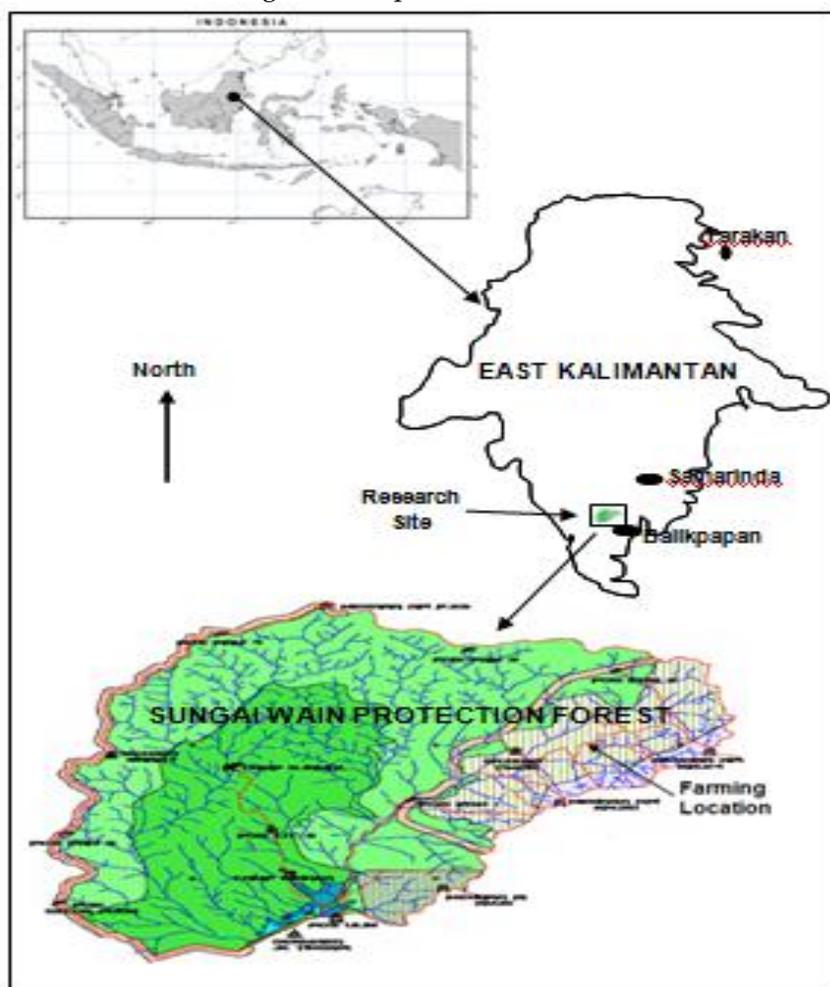
Historically, at the beginning SWPF was known as a closed protected forest (*hutan tertutup*) as declared by the King of Kutai in 1934 through Kutai Kingdom Government Regulation (*Surat Keputusan Pemerintah Kerajaan Kutai*) No 48/23-ZB-1934. It was redeclared by Indonesian Forestry Ministry Regulation No 118/Kpts-VI/1988, on the formulation of a group of forest areas which became Sungai Wain Protection Forest, with an area of 10.025 Ha. In 1993, some parts of the area that had been encroached upon were enclaved by District Forest Service Office (*Cabang Dinas Kehutanan-CDK*) of Balikpapan city as long as 500 metres along Samarinda-Balikpapan main road, resulting in area reduction to 9,783 Ha. This change was formally declared by Indonesian Forestry Ministry Regulation No. 416/Kpts-II/1995.

The sustainability of this protected area was progressively at higher risk due to population growth dominated by migration from Sulawesi (Celebes) and Java islands. Forms of encroachment on the SWPF area by local communities included building of new settlements, farming practices and exploitation of forest products. Forest fire has frequently also been a serious threat for SWPF forest lands, as had occurred in 1982 and 1998.

Based on the reality of high risk, a commitment to hence forth sustain the region was declared at the Balikpapan Mayor's office on 15th March 2001. The recommendation was to formulate an independent management institution to manage this area. Thus the first step of formulating SWPF management agency was declared by the Balikpapan Mayoral Regulation No. 6/2001, followed by the declaration of Balikpapan Mayoral Regulation No. 188.45-123/2001 on 18th October 2001 about "organization structure of SWPF management agency"; in 2004 this was approved by the district level

parliament of Balikpapan. Local Government Regulation No.11/2004 concerning "SWPF management" also contributes to strengthening law/regulation in conducting the management activities of SWPF. However, this regulation is not strong enough in regulating the social-economic enhancement of the local community through the use of forest land. Accordingly, the Balikpapan city government had planned to change the status of SWPF to also serve as a community forestry (*hutan kemasyarakatan*) area, based on the Indonesian Forestry Ministry Regulation No. 129/Menhut-II/2011 on "decision of working location of community forestry area". Based on this regulation, the effort of increasing local community economic condition by utilizing the forest land of SWPF became clarified.

Figure 1. Map of Research Site



Source: Management Agency of SWPF (*Badan Pengelola HLSW*) (2011)

Methodology

The object of the research was the cluster of local communities living in the surrounding SWPF region. Field data were collected from December 2010 to May 2011. The number of samples (n) is decided using formulation of Parel *et al* (1973)³. It was finally determined that the number of samples (n) to be taken for this research would be 174 respondents (households) from the local community. However, a respondent in this study is defined as household that conducts farming practices. Therefore, a selection was made based on this definition which, in the end, totaled 90 householder respondents. These households are the ones having land for farming practices.

The collected field information consisted of primary and secondary data. Primary data were collected by interview with selected local community respondents together with direct observation of the biophysical condition of SWPF; while secondary data were collected from the management agency of SWPF and from the office of Karang Joang village, North Balikpapan Sub-district. Primary data also included direct field observation of the SWPF area which was then documented. Secondary data were collected through literature review from journals, research reports and websites.

Data analysis related to economic motivation was conducted by using descriptive statistical analysis. By this method, the tendency of economic motivation level was valued by the number of respondents that replied affirmatively about utilizing the SWPF area as source of revenue. The utilization of SWPF as source of revenue stated by respondents was then classified into three categories, namely:

- Income that was earned from SWPF and totally saved was classified as low level of economic motivation (scored: 1);
- Income that was earned from SWPF and aimed to fulfill the shortfall from other income was classified as medium level of economic motivation (scored: 2); and
- Income that was earned from SWPF as the main income is classified as high level of economic motivation (scored: 3).

To determine the relationship between economic motivation and land utilization system of SWPF area, cross-table analysis was used (Singarimbun, 1987). In this term, the farming systems are classified into the following 3 forms:

³Parel *et al.* (1973) states that the number of sample (n) could be decided by the following formulation:

$$n = \frac{NZ^2\sigma^2}{Nd^2 + Z^2\sigma^2}$$

Where:

n= Number of sample; σ^2 = Variance of population; N= Population; d^2 = Acceptable deviation of 5%; Z= Z value with level of significance of 5 %.

- First form: plantation in which <35% of land was planted by crops and the remaining extent was planted by annual plants;
- Second form: plantation in which 35-70% of land was planted by crops and the remaining is planted by annual plants; and
- Third form: plantation in which >70% of land was planted by crops with the remaining planted by annual plants.

Result and Discussion

As found in the field, the utilization of SWPF by local communities is divided into two different aspects; 1) direct collection of biological and ecological elements of the area, and 2) by farming practices.

1. Economic Motivation of Farmers and Its Causes

Economic motivation of a local community to conduct farming activities inside the SWPF area was caused by the pressure to fulfill their increasing needs for quality and quantity in life. The following table was an analysis of the rate of economic motivation of a local community in conducting its farming activity in the SWPF (Table 1)

Table 1. Analysis of Farmers Economic Motivation

Economic Motivation	Score (x)	Number of Respondent (f)	f (%)	f.x
Totally saved (Low)	1	6	7	6
Additional income (Middle)	2	14	15	28
Main income (High)	3	70	78	210
Total		90	100	244

Based on Table 1, the value of $\bar{X} = \frac{244}{90} = 2,71$. This value is close to score 3 or the percentage of respondent of 78% (Table 1). Therefore this analysis shows that economic motivation rate of farming entrepreneur is classified as high. Based on the research results, the farming practice by the local community is dominantly (78% of total respondents) to plant crops (seasonal plant) such as water melon (*Citrullus lanatus*), rice (*Oryza sativa*) and zalacca palm (*Salacca edulus*), all of which are planted monoculturally. This farming activity with a high economic motivation indicates that the effort of utilizing the SWPF area has reached the commercial rate that can be considered as the

main income for households. Related to this fact, Azeez *et al.* (2010) concludes from some research on villagers in Southern Nigeria, it was found that more than 40-60% of their total income was obtained from agricultural crops, more than 20-40% of their total income was obtained from tree crops and 0-20% was obtained from other forest products. This means the land utilization by villagers within those places has functioned as the source of main income. The relatively similar condition was found in local communities surrounding the SWPF.

Farming practices with a high rate of economic motivation are distinctly related to community characteristics, as highlighted by Bugis, Javanese and Banjarish in-migrants. Related to this situation, Sardjono *et al.* (1998) claim that people who live in conservation areas are usually in-migrants having high economic, commercial-oriented motivation; in other words, they do not live by just utilizing the forest land. This shows that the social system amongst local communities dominated by in-migrants has been affected by the development of Balikpapan City and its progressive proximity to the SWPF, resulting in people's increased motivation to upgrade their prosperity.

The above noted motivation is augmented as accessibility to the SWPF improves from Balikpapan to the area. Vayda and Sahur (1980) from the research in Loa Janan (at the northern direction of Balikpapan and SWPF) mention that the high population growth of pepper farmers in this place was affected by the development of the main Samarinda-Balikpapan road. In the beginning of 1976, Bugis farmers came from South Sulawesi to try upgrading their welfare. Indeed, the pepper plantation practiced by the community had successfully increased the community's welfare. This effect was normal, because Soemarwoto (2004) explains that the change to a system (including social system) amongst the community is a logical consequence of development.

It has been surmised that the economic motivation of farming practices in the SWPF region is caused by the high population growth, while opportunities for employment have become limited. As has been mentioned earlier, the population increased 36% from 2006 to 2011; so this condition has put significant pressure on SWPF's existence, for both the settlement as well as their farming practices location. Related to this issue, Sembiring *et al.* (1999) says that population growth, economic growth and industrialization put higher pressure on natural resources as a result of increased dependency on natural resources. Furthermore, Sardjono (2004) explained that there were two main factors causing overexploitation of forest resources: first, population growth leads to increased needs, without knowing how far such natural resources can fulfill those needs; second, the gradual increase of the quality of needs progress from primary needs at the beginning, to then secondary needs and later even tertiary needs (which, of course, may be quite subjective and

unlimited). Therefore, the above reasons back up the economic motivation in utilizing SWPF forest land.

Some conditions discussed previously should be responded to by local government by preparing opportunities for employment and entrepreneurship for local communities adjoining SWPF. This condition has an implication for utilizing the forest land of SWPF as an alternative solution to the problem. As the SWPF's capability in supporting the livelihood of local community has been limited, the local government ought to increase its focus to support the surrounding area.

The motivational tendency of protected forest utilization as discussed above is found also in some other places. For example, Kontesa's (2002) research in a protected forest in Rejang Lebong district, Bengkulu concluded that some factors causing community utilization of a protected area included not having land for farming, low income and limited opportunities for employment.

Furthermore, based on the result of her research in Seputuk village, Malinau district, Sari (2009) stated that motivation for intensive agriculture as practiced by the community there was related to the effort of preparing food for their families. Land utilization by the community was also affected by: (1) available land surrounding their settlement; (2) although some food was available from the forest area, they also needed food produced from agricultural land; (3) due to decrease in the quantity of forest products, harvest from their agricultural land had to be sold in addition to their other income. Similarly with Lestari (2006), she concluded that communities utilizing a protected area as agricultural land (substantially or commercially) within the region of Bontang the Protection Forest was an effort to fulfill livelihood needs of householders.

To conclude, economic pressure caused by population growth, limited opportunities for employment and entrepreneurship, as well as decrease of forest products usually utilized for food sources were factors causing a high economic motivation for farming practices in the protected forest area. Additionally, better accessibility and communication that was now available in the region also contribute to the high economic motivation.

2. Negative Impact on Ecosystem and Its Alternative Solution

The high population growth within the SWPF region becomes a serious threat to its existence. Simon (2001) in Senoaji (2010) concluded that the determining factor for forest ecosystem damage, for an agriculturist country in particular, is the population growth, as population growth will reduce the ratio of agricultural land ownership, while the increase in population will need more food, energy, timber and opportunity for employment. If the quantity of food production per extent of agricultural land could not be

increased, the need for food should be satisfied by enlarging agriculture land which, in the end, would require some forest land to be converted into agricultural area (Steinlin, 1988). Therefore, uncontrolled population growth, compounded by poorness, is the root of unwise forest resources utilization.

Research result on land utilization by farmers in the SWPF region shows that the rate of economic motivation affects the techniques used by farming entrepreneurs. When farmers are highly economically motivated to practice farming, they tend to focus on planting more seasonal crops than annual ones; whereas with low economic motivation, they tend to plant more annual than seasonal crops. This phenomenon is explored through field observation analysis using three categories of farming techniques practiced by local communities. Through this analysis, it can be seen that farming practice has a relationship to the level of economic motivation (Table 2).

Tabel 2. Table of Relationship between Economic Motivation and the Form of Farming Practices of Local Community

Economic Motivation	Form of Farming Based on Category of Percentage of Respondent Numbers			Total
	1 st Form	2 nd Form	3 rd Form	
Totally saved (low)	33	17	50	100
Fulfilling the lack of income (Middle)	0	36	64	100
Main income (High)	16	20	64	100
Total	14	22	63	100

Table 2 shows that 33% of respondents practicing farming of the first form was by low economic motivation; 36% of the second form was categorized as middle; and 64% of the third form of farming was categorized as high. The distribution of relative frequency value increases from the first through to the third, thus showing that the higher the economic motivation of the community in practicing farming, the more open their farming form seems to be. In other words, if farming be the main income for the farmer, this would indicate that the planting of seasonal crops will be dominant. Consequently, this means that more land would be required, while the extent of SWPF that can be occupied by the farmer remains limited.

The condition as discussed above has a tendency to give significant negative impact on soil quality, which is an important ecosystem component. If this threat is not anticipated through management of plant composition (i.e. the proportion between seasonal and annual crops) which are ecologically feasible, it might negatively affect ecosystem sustainability and thereby threaten SWPF management. It seems that the solution for this is by managing the proportion of the plantings between seasonal and annual plants.

Ecologically, planting annual plants (woody plants) may refine the structure and texture of the soil. In a report of Agroforestry: application of ecological principles in Metamorfofa (Wednesday, September 3, 2008) it claims that the benefit of planting annual (woody) crops of *taungya* system functions as a source of organic matter, preventing the invasion of weeds, refinement of soil porosity, adding Nitrogen from the air, minimalizing pest and disease, keeping micro climate stable and preventing erosion. The existence of trees in the environment ensures that the fertilization cycle will run efficiently, thus supporting the quality of land productivity by fertilization of micro-organisms of the soil (Bismark dan Sawitri, 2007).

Figure 2. Open (left) and Grass Area (*Imperata cylindrica*) (right) that potentially becomes critical land



Land condition that was covered by coarse grass (*Imperata cylindrica*) (Fig. 2 right) result if an open area (Fig. 2 left) is not planted with trees. Such condition is commonly found in rice plantations (*Oryza sativa*) (Fig. 3 left) and/or gardens planted with water melon (*Citrullus lanatus*) (Fig. 3 right). A piece of land that had been previously planted or used for farming practices, but then left unmanaged, usually occurs if the farmer especially young farmers, found a new job outside from farming which is more promising in

terms of income such as accepted as an officer in a company, working in a construction, and services sector.

Figure 3. Rice Plantation (*Oryza sativa*) (left) and Water Melon (*Citrullus lanatus*) (right) that are planted monoculturally



In the long run, a monocultural plantation system (Fig. 3) practiced by a community with high economic motivation in the arable zone of SWPF may threaten the environment and contribute to transformation into critical land (Fig. 2). Based on the report of the SWPF Management Agency (2011), the extent of land that was categorised as critical land is about 1,400 Ha. From that total, only 300 Ha have been rehabilitated by planting trees, there remaining 1,100 Ha critical land that has not been rehabilitated nor planted by trees. Critical land without any treatment (e.g. rehabilitation) may cause erosion and the rapid loss of fertilizer; such a situation should be avoided when practicing farming. In the Report of Working Group “Conceptual Framework Millennium Ecosystem Assessment” (2001), it was stated that about 40% of agricultural land has experienced degradation in the recent half millenium caused by erosion, salinisation, compaction, fertilizer eradication, pollution and urbanisation.

Historically, the group of farmers that have been practicing monoculture plantation system within the SWPF area had previously been a group of land encroachers. This group, as had been previously discussed, originated from Sulawesi (the Bugis), Java (the Javanese) and from South Kalimantan (the Banjaris). In interviews with some community leaders within the region, they explained that this group of farmers do not have the local wisdom of necessary care for the environment needed to keep the SWPF region vibrant. Thus, this reality in the field predicates the need for stronger regulations and/or policies for land management, particularly for local communities with high economic motivation. The *taungya* system may be a good alternative that

can be practiced in the region. As Widiyanto *et al.*(2003) explained, the application of *taungya* system may be a good alternative in the effort to keep natural-physical characteristic of upper soil closely similar with forested land. Natural physical characteristic of soil is required in supporting the growth of plans and vegetation.

Based on the superiority of the *taungya* agroforestry plantation system, it would be wise to recommend to the local community groups in SWPF the adoption of this system. However, the right proportion of seasonal and annual crops should be taken into account in the application of agroforestry. That is to satisfy the objective of protected forest management and communities' economic as well. Nair (1973), in Budiadi (1999), explains that pressure resulting from interaction between trees and other components in agroforestry is dependent upon species characteristic, plantation density and spatial composition, as well as tree management. It is further noted that trees with wide crown and root growth will quickly have a negative effect on seasonal plants; thus manipulating density spatial composition is probably a good solution for this problem.

The application of agroforestry plantation system as has been discussed above probably faces constraints because, as Wiersum (1981), in Andayani (2005), discuss, although the agroforestry plantation system has ecological, political, social and economic benefits, there remains the question as to whether the farmers could easily accept it. Also Suharjito *et al.* (2003) mentioned that the agroforestry system can be easily accepted and developed since its benefits outweigh those of other systems. This aspect includes risk calculation, its flexibility for gender, compatibility with local culture and other entrepreneurship aspects.

However, the root issue is that farmers have been practicing shifting cultivation prior to the prevailing plantation system that is, when they were still forest encroachers. This background can be used as a reason for the SWPF Management Body to convince the farmers to adopt agroforestry in their plantation areas, if this system has been chosen to be applied. Hopefully, by adopting the agroforestry system, the degradation rate of SWPF region can be minimised.

Conclusions

Farming practices being conducted by the local communities has a high economic motivation and high potential impact on ecosystem. Such behavior is caused by the poverty of dominant householders of the local communities. When the opportunity for employment and entrepreneurship is limited, the local community chooses farming practices as the alternative. Thus, income obtained from farming practices in the SWPF region is the main income for the local community.

Unfortunately, the above condition found in SWPF region has an implication of adverse plantation techniques being practiced by the farmers, resulting in possible degradation of the ecosystem's quality. When farming practices with high economic motivation are conducted, there is a tendency for farmers to dominantly plant seasonal crops rather than annual ones (trees); moreover, in some cases there are no trees at all planted in their cultivation land. Such conditions potentially threaten the ecosystem of SWPF forest land, in particular its soil quality. Indication of the threat is shown by the existence of some open cultivation areas that potentially become degraded critical land in the future.

These serious threats open an opportunity for the farmers to apply the agroforestry system, especially for those with high economic motivation. While some experts appreciate this system, there still remain constraints in its application, particularly for farmers that do not like the agroforestry system, because applying this system or combining the seasonal crops with annual crops is believed by the farmers to reduce the space for seasonal crops in their cultivated land. However, since the function of SWPF is to support sustainable livelihood, the application of agroforestry might be a wise alternative anticipating the fast degradation of land.

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References

- Andayani, W. 2005. *Ekonomi Agroforestri (Economy of Agroforestry)*. DEBUT Press, Jogjakarta. p. 113
- Anon. 2008. *Agroforestry: application of ecological principles dalam Metamorfosa* (Wednesday, September 3, 2008). <http://myjourneys-tommo.blogspot.com/2008/09/agro-forestry-application-of-ecological.html>.
- Anon. 2009. *Pengelolaan Hutan Bagi Semua (Forest Management for All)*. Indonesia Policy Briefs. Indonesia Expanding Horizons. p. 4. <http://siteresources.worldbank.org/INTINDONESIA/Resources/Publication/280016-1106130305439/617331-1110769011447/810296-1110769073153/forest.pdf>.
- Anon. 2001. *Ekosistem dan Kesejahteraan Manusia: Suatu Kerangka Pikir Untuk Penilaian (Ecosystem and Human Prosperity: A Brain Framework for*

- Evaluation*). Laporan Kelompok Kerja (Report of Working Group). "Conceptual Framework Millennium Ecosystem Assessment". p. 42 http://www.kehati.or.id/pdf/SummaryMA_INDONESIA.pdf.
- Assagaf, D. 2004. *Peluang Peningkatan Pendapatan Petani: Analisis Manfaat dan Biaya serta Resiko (Opportunity for Increasing Farmers Income: Analysis of cost, benefit and risk)*. Institut Pertanian Bogor (IPB) (Bogor Agriculture Intitute, Bogor). p. 20
- Azeez, I.O., O.S. Ikponmwonba, L. Popoola and T.O. Amusa. 2010. *Land Use Activities Among Forest Environments` Dwellers In Edo State, Nigeria: Implications for Livelihood and Sustainable Forest Management*. International Journal of Social Forestry (IJSF), Volume 3, Number 2, December 2010. Center for Social Forestry, Mulawarman University, Samarinda. p. 175
- Badan Pengelola Hutan Lindung Sungai Wain. 2006. *Laporan Final Pengelolaan Hutan Lindung Sungai Wain (Final Report of Management of Sungai Wain Protection Forest)*. Management Agency of Sungai Wain Protection Forest. Balikpapan. p. 6
- Bismark, M. dan R. Sawitri. 2007. *Pengembangan dan Pengelolaan Daerah Penyangga Kawasan Konservasi (Development and Management of Buffer Zone of Conservation Area)*. Prosiding Ekspose Hasil-hasil Penelitian (Proceeding of Researches Expose) , 2007. p. 11. www.dephut.go.id/files/bismark_reny.pdf
- Budiadi. 1999. *Kajian Penurunan Lebar Efektif Jalur Pertanian (Plong) pada Pola Tanaman Mr Tangen (Study on Reducing Effective Wide of Transect in Plantation Pattern MrTangen)*. Jurnal Hutan Rakyat (Community Forest Journal) Vol.1 No.1 Th.1999. Pusat Kajian Hutan Rakyat Jurusan Manajemen Hutan Fakultas Kehutanan (Centre of Community Forest Study, Forest Management Department, Forestry Faculty) UGM, Yogyakarta. p. 13
- Buyinza, M. 2010. Ecological and Socio-Economic Contribution of Mt. Elgon Forest Park, Eastern Uganda. Jurnal Ilmu Kehutanan (Journal of Forestry Science) Volume IV No.1-January 2010. Fakultas Kehutanan (Forestry Faculty) UGM (GadjahMada University), Yogyakarta. p. 9
- Kontesa, E. 2002. *Perjanjian Sorong untuk Harmoni Kehidupan Masyarakat Perambah Hutan di Kabupaten Rejang Lebong, Bengkulu (Sorong Agreement for Lives Harmony of Forest Encroacher Communities in District RejangLebong, Bengkulu)*. Jurnal Penelitian (Research Journal) UNIB, Vol.VIII, No 3, November 2002. <http://rejang-lebong.blogspot.com/2008/02/perjanjian-sorong-untuk-harmoni.html>
- Lestari, W. 2006. *Kajian Praktek-praktek Pemanfaatan Lahan oleh Masyarakat di Sekitar Kawasan Hutan Lindung Bontang (HLB) (Study on Land Utilization Practices by Surrounding Communities in The Region of Bontang Protection Forest)*. Skripsi Program Sarjana pada Jurusan Manajemen Hutan

- Fakultas Kehutanan Universitas Mulawarman, Samarinda (Sub Thesis of Bachelor Study Program of Forestry Faculty, Mulawarman University, Samarinda) . p. 83
- Parel, C.P., G.C. Caldito, P.L. Ferrer, G.G. De Guzman, C.S. Sinsioco, and R.H. Tan. 1973. *Sampling Design and Procedures*. The Agricultural Development Council, Quezon City. p. 53
- Pemerintah Daerah Kota Balikpapan (Local Government of Balikpapan City). 2004. *Peraturan Daerah (PERDA) Hutan Lindung Sungai Wain No. 11 Tahun 2004 (Regional Regulation of Sungai Wain Protection Forest No 11 Year 2004)*, Balikpapan. p. 21
- Sardjono, M.A., M. Sutisna, T. Sudarmadji, and Rujehan. 1998. *Interdependensi Sosial-ekonomi Masyarakat dengan Pembangunan Kehutanan dan Tekanannya Terhadap Sumberdaya Hutan di Kalimantan Timur. Kerjasama Penelitian antara Balai Penelitian Kehutanan (BPK) Samarinda dengan Fakultas Kehutanan Unmul (Interdependency of Community Socio-economy Development and Its Pressure on Forest Resources in East Kalimantan. Cooperative Research between Forestry Research Bureau Samarinda and Forestry Faculty of Mulawarman University, Samarinda)* Samarinda. p. 121
- Sardjono, M.A. 2004. *Mosaik Sosiologis Kehutanan: Masyarakat Lokal, Politik dan Kelestarian Sumberdaya (Sociologic Mozaic of Forestry: Local Community, Politic and Sustainability of Resources)*. DEBUT Press, Yogyakarta. p. 300
- Sari, E.N.N. 2009. *Changes in Communities Land-Use Patterns and Forest Concessionaires: A Study in East Kalimantan*. International Journal of Social Forestry (IJSF), Volume 2, Number 2, December 2009. Center for Social Forestry, Mulawarman University, Samarinda. p. 196.
- Sembiring., F. Husbani., A.M. Arif., F. Ifalerina., F. Hanif. 1999. *Kajian Hukum dan Kebijakan Pengelolaan Kawasan Konservasi di Indonesia (Study on Law and Regulation of Conservation Region Management in Indonesia)*. NRM Program. p. 195
- Senoaji, G. 2009. *Kontribusi Hutan Lindung terhadap Pendapatan Masyarakat Desa di Sekitarnya: Studi Kasus di Desa Air Lanang Bengkulu (Protection Forest Contribution to The Income of Surrounding Villagers)*. Jurnal Manusia dan Lingkungan (Journal of Human and Environment) Volume 16 No.1 March 2009. Pusat Studi Lingkungan Hidup Universitas Gadjah Mada (Center for Environmental Research of Gadjah Mada University), Yogyakarta.
- Senoaji, G. 2010. *Studi Kesesuaian Lahan untuk Penentuan Kawasan Lindung di Hutan Lindung Konak Kabupaten Kepahiang Propinsi Bengkulu (Feasibility Study of Land in Determining Protection Area in Protection Forest of Konak, District Kepahiang, Province of Bengkulu)*. Jurnal Ilmu Kehutanan (Journal

- of Forestry Science) Volume IV No.1 – January 2010. Fakultas Kehutanan UGM (Forestry Faculty of GadjahMada University), Yogyakarta. p. 55
- Singarimbun, M., dan S. Effendi. 1987. *Metode Penelitian Survei. Lembaga Penelitian, Pendidikan dan Penerangan Ekonomi dan Sosial (LP3ES) (Survey Research Methodology. Research Institution, Education and Extension of Social and Economy)*, Yogyakarta. p. 336
- Soekartawi. 1995. *Analisis Usahatani (Agriculture Entrepreneur Analysis)*. Penerbit (Publisher) UI Press (Indonesia University Press), Jakarta.
- Soemarwoto, O. 2004. *Ekologi Lingkungan Hidup dan Pembangunan (Ecology of Environment and Development)*. Djambatan, Jakarta. p. 302
- Steinlin, H. 1988. *Menuju Kelestarian Hutan (Heading to Forest Sustainability)*. Seri Studi Pertanian Kerjasama Jerman dan Indonesia (Serial Study of Agriculture, cooperation project between Germany and Indonesia). Yayasan Obor Indonesia (Obor Agency Publisher), Jakarta.
- Suharjito D., L. Sundawati, Suyanto, dan S.R. Utami. 2003. *Aspek Sosial Ekonomi dan Budaya Agroforestri (Socio-economy and Culture Aspects of Agroforestry)*. Bahan Ajaran Agroforestri (Material of Agroforestry lecture) 5. World Agroforestry Centre (ICRAF), Bogor. p. 29
- Vayda, A.P and A. Sahur. 1980. *Forest Clearing and Pepper Farming By Bugis Migrants in East Kalimantan: Antecedents and Impact*. p. 97
[http://cip.cornell.edu/DPubS?service=Repository&version=1.0&verb=D
isseminate&view=body&content-type=pdf_1&handle=seap.indo/
1107006617#](http://cip.cornell.edu/DPubS?service=Repository&version=1.0&verb=Disseminate&view=body&content-type=pdf_1&handle=seap.indo/1107006617#)
- Widianto, K. Hairiah, D. Suharjito, dan M.A. Sardjono. 2003. *Fungsi dan Peran Agroforestri (Function of Agroforestry)*. Bahan Ajaran Agroforestri (Material for Agroforestry lecture) 3. World Agroforestry Centre (ICRAF), Bogor. p. 37