

THE FARMER'S OPPORTUNITY IN PERFORMING LAND CONSERVATION IN THE TONDANO WATERSHED

Jan L L Lombok ⁽¹⁾
jan.lombock@hotmail.com

Mithel Kumajas ⁽²⁾
O. Esry H. Laoh ⁽³⁾

(1) Teaching Staff at UNIMA, Tondano, Indonesia
(2) Teaching Staff of Geography, Faculty of Social Science State University of
Manado.
(3) Teaching Staff of Environmental Economics, Faculty of Agriculture Sam
Ratulangi University.

Abstract

The problem of Tondano lake is very important for the environment but also because it provides the only hydro-electric source of the region. This work presents, in regard to the former problem a methodology to assess the best management of the land of this watershed.

Key words

Ecosystem; Environment; management; methodology; regional.

Résumé

Le lac de Tondano constitue la seule source de production hydro électrique de la région et l'aménagement de cette ressource vitale s'intègre dans un environnement à considérer. Le présent article présente une méthodologie en vue d'obtenir un compromis acceptable.

Mots clé

Ecosystème ; environnement ; management ; méthodologie ; régional.

THE FARMER'S OPPORTUNITY IN PERFORMING LAND CONSERVATION IN THE TONDANO WATERSHED

1. INTRODUCTION

The paradigm of man and nature relationship initially placed man outside of the ecosystem, whereas man is in nature, a part of nature and not separated from nature but as God's creation, which gives the external influence towards its environment. Man may be momentarily separated from the living environment for their unique way of life. As long as they are being separated from their living environment, it must be realized that this is only artificial, basically man is a unity with their nature.

Based on the view of man towards the nature there will emerge manifestations that man need to understand nature, because the destruction of nature will effect the destruction of man's life. Man need to learn to respect nature, in order to live along with nature (Zen, 1984). There are three systems involved in relation to man and nature: 1) imbalanced relationship between man and nature, 2) imbalanced relationship between production system, and 3) imbalance between the economic system and ecologic system. Haeruman (1987) stated that the interaction system between man and the environment is appropriate, what needs to be questioned is the how that interaction between the two should be performed so that they can grow and develop well.

Therefore the problem of interaction management between man and nature becomes a primary problem in preserving nature and the environment. Man and the environment is under one system, that are interdependent in order to do their functions. Both cannot stand alone and they become an inseparable unity. The current perspective placing man outside of an ecosystem has made man as if they

have been impacted from the degradation of a system. The natural resources management should give a significant use for the people's welfare, by keeping in mind the balance and preservation so that it can still be useful for the present and future generations. Man make use of the environment for their welfare through culture, technology and economy.

Man and the environment are parts that cannot be separated from one ecosystem, there is always a reciprocal relation between man and nature. The use of natural resources by man is the return flow towards the physical environment and man's environment, where man transforms the environment becoming natural sources that can give energy and material.

The relation between man and the environment is always done reciprocally, meaning that the better man's attitude and treatment towards their environment, the more liable that their environment will support their livelihood and to keep their existence.

The society man as living creatures hold an important role in the preservation and balance of the ecosystem. Man adapts and make a reciprocal relation with nature. Man should have the moral responsibility as living creatures with sense and capability.

This research has the objective to find out the factors influencing the farmer's opportunity in performing land conservation. This research was executed in the village of Noongan West Langowan Sub-district, Minahasa Regency. This village is estimated to be situated at 800 meters above sea level and is still a part of the protected forest of Mount Sopotan Minahasa Regency.

2. MAN AND THE ENVIRONMENT

Natural resources is an element of the environment that support man's life for the welfare of man for the present as well as the future. Because the amount is limited therefore its use should be in accordance to the environmental support ability by keeping in mind its balance and preservation so that the environmental quality can be increased.

The relationship between man and nature should always be reciprocal meaning that the better man's attitude and treatment towards the environment, the better the possibility for the environment to support their life and the continuity of their existence.

The role of the natural environment causes man and the society to develop a value system according to the environmental condition. Therefore nature and all that's in it is accepted as they are. However later in the life of the society occurs changes that is the addition of the number of people that cannot be prevented. The instinct for survival encourages the desire to reproduce and to continue life. This can only be made possible by the sensibility and good intentions man himself, who then invents science and technology. All this in turn causes a dynamic change that brings man and the society as if being in the flow of continuous change.

As living creatures man's life in adapting and making reciprocal relationship with nature should also look at other values. This is due to the fact that man has the moral responsibility as a creature with their environment to form a system known as the ecosystem.

Regarding the statements above, it can be concluded that actually man and the environment are in one system. Where each elements are interdependent to perform their functions. Both cannot stand alone, instead they are one unity as a whole that are inseparable.

The continuity of a lake greatly depends on the land above it that supplies water for the lake. If a lake is at the mouth of a river which is continuously fed with disposals from the upper end of the river then the lake cannot function accordingly. For the people living at the lower end of

the river, the custom to cultivate land will further induce the destruction of the lake.

Man is the most important factor in the success of the watershed management. If the people in the watershed area do not manage the land well and controlled it will induce the destruction of the watershed.

Man's attitude, in this case the society living in the watershed area, towards the importance of environmental preservation through land conservation is influenced by the internal factors as well as the external factors. The internal factor, among others is the social economy of the people, age, education, etc.

3. LINEAR PROBABILITY MODEL

The analysis used is the Linear Probability Model. This Linear Probability Model assessed by using the Ordinary Least Square, and the equation is:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i}$$

Where: Y_i = The farmer's opportunity in performing land conservation by making

terracing.

X_{1i} = Land area owned (Ha)

X_{2i} = Income rate (Rp/year)

X_{3i} = Formal education (Elementary, Secondary, High School, Univ.)

X_{4i} = Age (years)

X_{5i} = Type of plant cultivated (annual crops and yearly crops)

Then this model is reviewed for other bound changes that is:

- The opportunity of the farmer for land conservation by planting lamtoro and kaliandra (Y_{2i})
- The opportunity of the farmer to make drainage basin (Y_{3i})

The determination co efficiency obtained from the three equation each are: 86,7 percent, 78,9 percent and 91,8 percent. Then the prediction for the opportunity of the farmer for land conservation can be seen in table 1.

Table 1. The Result of the Factor Assessment Influencing the Farmer's Opportunity in Performing Land Conservation at the Lower End of the Tondano Watershed.

Changer	Y _{1i}		Y _{2i}		Y _{3i}	
	Regression Coefficiency	Significance	Regression Coefficiency	Significance	Regression Coefficiency	Significance
Constant	1,253	0,0000	1,4541	0,0000	2,3125	0,0000
Land Area	-0,0217	0,0571	0,0312	0,0117	-0,0114	0,0115
Income	7,54E-8	0,3127	6,64E-8	0,4313	8,09E-8	0,2514
Age	-0,0063	0,0911	-0,0054	0,2134	0,0912	0,2221
Education	2,6103	0,0809	3,1252	0,0651	2,5417	0,1038
Type of Plant	1,2140	0,0224	-1,3471	0,2130	1,0863	0,1356

The result of the research in Table 1 shows that the land area ($\alpha = 5,71\%$), Age ($\alpha = 9,11\%$), education ($\alpha = 8,09\%$) and type of plant cultivated ($\alpha = 2,24\%$) influence the opportunity of the farmer for land conservation by making terracing. The land area (X_{1i}) has a negative regression co-efficiency which indicates that farmers owning large land areas, are relatively not concerned for making terraces. However for planting lamtoro and kaliandra, the farmers with large areas of land are more concerned ($\alpha = 1,17\%$). It is further noted that the farmers in this group are actually less concerned in making absorption basin.

The farmer's formal education influences the farmer's opportunity for land conservation by terracing, as well as planting lamtoro and kaliandra trees ($\alpha = 6,51\%$) and making absorption basin ($\alpha = 10,38\%$). The higher their formal education, the more the opportunity for them to do land conservation.

The age of the farmer has a opposite contrast with the opportunity for land conservation by terracing and planting trees. This illustration indicates that the younger farmers are more capable in doing land conservation by terracing and planting trees. This occurs because the majority of farmers make their own terracing. Age has a direct comparison with the farmer's opportunity for land conservation by terracing.

Farmers planting annual plants (corn, peanuts, etc.) are more concerned in doing land conservation by making terraces ($\alpha = 2,24\%$) and making absorption basins ($\alpha = 13,56\%$). Those farmer feel the use of

making terraces for the annual crops, as compared to the farmers planting the yearly crops such as clove.

4. CONCLUSION

In this research the factors that influence the farmers in deciding their choice in doing land conservation are affected by: land area, income, formal education, age and type of plant cultivated.

The availability of resources (income) for the farmers is a must in doing land conservation, in this case planting lamtoro and kaliandra. Resources (land area and income) do not encourage the farmers to perform land conservation by making terraces and absorption basins.

The farmers owning large land areas are relatively less concerned in performing land conservation compared to those farmers with smaller lands.

5. BIBLIOGRAPHY

Fomby, T.B., R.C. Hill and S.R. Johnson. Advanced Econometric Methods. Springer-Verlag, New York, USA.

Hufschmidt, M. David James. Anton D. Meister. B.T. Bower and John Dixon. 1986. Environmental, natural Systems, and Development On Economics Valuation Guide. The John Hopkins University Press.

Kartasubrata. J. 1986. Partisipasi Masyarakat dalam Pengembangan dan Pemanfaatan Hutan di Jawa (Dissertation). Fakultas Pascasarjana IPB Bogor.

Kumajas, M. 1992. Morfokonservasi Daerah Tangkapan Hujan Danau Tondano (Thesis). Program Pascasarjana Universitas Gajah Mada. Yogyakarta.

Laoh, O.E.H dan N.M. Benu. 2002. Peluang Petani untuk Melakukan Konservasi Lahan (Kasus di Desa Rurukan dan Temboan Kecamatan Tomohon Tengah). Eugenia 8 (4): 282-289 (journal). Fakultas Pertanian Universitas Sam Ratulangi Manado.

Laoh, E.O.H. 2001. Interaksi Aktifitas Pembangunan Ekonomi dengan Pelestarian Ekosistem Danau. Kasus Danau Tondano, Sulawesi Utara (Dissertation). Institut Pertanian Bogor. Bogor.

Pusat Penyuluhan Kehutanan Departemen Kehutanan. 1996. Penyuluhan Pembangunan Kehutanan. DEpartemen Kehutanan. Jakarta.