Tropical Wetland Journal
Journal homepage: twj.ulm.ac.id | Published by Postgraduate Program - Lambung Mangkurat University | e-ISSN: 2654-279X

Original article
DOI 10.20527/twj.v8i1.109

Economic Value of Environmental Services of Swamp Land Ecosystem (A Case Study in the Hulu Sungai Utara Regency, Kalimantan Selatan)

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Received: 02 June 2017; Accepted: 18 July 2022; Published: 27 July 2022

ABSTRACT

About 22,000 hectares are planned to be converted to oil palm plantations by the local government. However, this area has been the source of livelihood for the Banjar people for generations. This economic-environmental services valuation was carried out using a total valuation approach. Previous studies have shown that swamps have economic benefits as a source of water for rice farming (Oryza sativa), timber (Melaleuca cajuputi), fisheries, handicraft crops (Eleocharis dulcis), and for drinking water. They also have ecological benefits in biological functions such as fish feed and breeding grounds, Galam (Melaleuca leucadendron) breeding, water storage, carbonate stocks, and biodiversity value. The total economic value was 21.3 million IDR per ha, with a ratio of the economic value of 7.15% and the value of ecosystem services (ecological) of 92.85%.

Keywords: environmental services, valuation, wetlands.

1. Introduction

Since 2011 the Provincial Government of South Kalimantan has planned and granted permits for developing palm oil plantations of approximately 217,270 hectares in swampland. Of the total area, around 22,000 hectares are developed in the Hulu Sungai Utara Regency swamps by two large private companies (PBS). The area are Banjang, Danau Panggang, Paminggir, and Babirik Districts (Hamdani, 2016). On the other hand, swamplands have both economic and ecological functions. It provides an extensive environmental service to the surrounding natural life (Nautiyal & Nidamanuri, 2012; Noor, 2007; Swinton et al., 2006).

Indonesian Agency for Agricultural Research and Development, Ministry of Agriculture, stated that the swamplands in Kalimantan are 12.3 million or approximately 37% of the total national swampland area, 994,423 ha of them are located in South Kalimantan Province. Swampland is an important natural resource (Roy et al., 2012). Swampland occupies an intermediate position between land and water. It is always inundated throughout the year or for a certain period of time; inundation is relatively shallow and was formed due to obstructed drainage. Swamplands can be distinguished from lakes. Lake puddles are generally deeper and not vegetated except floating aquatic plants. Swamps are generally overgrown with shrub vegetation in herbs and water plants such as Daffodils, water grass, Purun (Lepironia articulata), and Pandan (Pandanus spp.); or trees with a height of more than 5 m and with tight crowns such as Meranti Rawa (Shorea spp.), Jelutung (Dyera costulata), Ramin (Gonystylus), and Gelam (Melaleuca leucadendra). Swamplands dominated by shrubs are often referred to as non-forest swamps, while those with tall trees are often called forest swamps.

For local governments, plantation development is expected to have an economic impact and improve the surrounding community's welfare. However, on the other hand, changes in swamps' function are expected to cause potential problems, both environmental, social, economic, and cultural.

(Pearce et al., 1990; Tietenberg, 2002) stated that natural resources and the environment have direct use values that can be calculated using traditional calculation methods, indirect use values, future values, and non-consumptive benefit values. Therefore, the economic valuation of natural and environmental resources, especially in swampland ecosystems, is important as a whole because it will reveal the total economic value of these resources. Economic valuation is important because it is a technical instrument that can be used to calculate both direct and indirect economic benefits. An assessment of an area will assist policymakers in taking decisions related to land management and utilization.

This study aimed to determine the total swampland ecosystem's economic value in Hulu Sungai Utara Regency before it is converted into oil palm plantations.

2. Materials and Methods

The data collected were primary and secondary data from field observations and literature studies. The number of samples taken was 70 people using purposive sampling, consisting of rice farmers, fish catchers, Purun artisans, and wood collectors. The key figures were the community and several experts who were interviewed using a questionnaire guide. To the economic valuation method was used to determine the economic value of swamps' environmental services, namely the direct use value, the indirect use value, the option value, and the value of the swamps existence. Some of the direct economic values identified include rice crops, fisheries (catch and beje), Galam wood, Purun plants, and water for the household. The indirect economic value (indirect use-value) was estimated based on swamps' biological value, water storage and recycling, and carbon storage. The formula for the total economic value of swamps is as follows (Georgiou et al., 1997).

TEV = (DUV+IUV+OP) + (BV)

where:

TEV = total economic value

DUV =direct use value

IUV = indirect use value

OP = option value, dan

BP = bequest value

Direct benefit valuation was carried out using market and cost-based valuation techniques. However, if the existing natural resource commodities are not for sale, other valuation techniques can be used, such as the contingent valuation method.

Indirect benefit/use-value is the value/benefit obtained indirectly from the natural resources of the swamp area, which consists of functional benefits from ecological processes that continuously provide roles to the community and the surrounding ecosystem. For example, an intact swamp forest continuously provides protection/control against flooding and drought or the role of swamps in maintaining the sustainability of fishery resources.

Existence values and inherited values such as swamp area resources in swamp wood, Galam, which are left uncut, culture, etc. The existence of swamps has a vital role, especially in the relationship as a buffer for food security and the culture of the people who have been managing swamplands for generations.

3. Results and Discussion

The results of economic calculations of the direct use value, indirect use-value, option value, and the swamp ecosystem's total economic value are presented in Table 1. Rice is one of the important commodities in the swamp farming system. In dry season, especially during the long dry season, lowland swamps in several areas of Babirik and Amuntai Tengah districts are mostly cultivated for secondary crops and horticulture. Rice is one of the most cultivated commodities in the swamp farming system of this region. Rice cultivation by farmers in swamps has been carried out from generation to generation and is well mastered, and the results are even better than other commodities. Besides that, rice is a daily staple food whose availability is essential to maintain security. Rice is also considered as having a value in social and religious life. Galam, economically, is a raw materials provider for various living necessities

for local communities (firewood, siring for soil support, a livelihood source for residents). It is also used as raw material for industry and trading commodities with high economic value. Usually, people use it as construction wood, piles, and charcoal. Galam wood also ecologically functions as a source of water reserves. Swamp forests can absorb and store excess water from the surrounding area and will release water reserves. Furthermore, it also functions to absorb CO2, produce O2, a source of vegetable and animal foodstuffs, and environmental services (ecotourism).

Table 1. Percentage of Total Economic-Ecological Value of Swamp Ecosystem in Hulu Sungai Utara District

Description	Per (Million Rp)	%
Economic Value		
a. Direct Use Value	1.53	7.15
Ecological Value		
a. Indirect Use Value (IUV)	19.45	91.18
b. Option Value (OV)	0.17	0.83
c. Presence Value (EV)	0.18	0.84

Capture fisheries activities still dominate fisheries. Purun (Eleocharis dulcis) is a weed that grows and develops in muddy tidal marshlands. Purun is used as raw material for handicrafts such as mats, fans, bags, sandals, and souvenirs (Afriyanda et al., 2016). Moreover, Purun is used as animal feed, especially for swamp buffalo (Afriyanda et al., 2016). The study of S. (Asikin & Thamrin, 2012) found that the presence of Purun plants around the rice planting area is crucial because it trap f white rice stemborer (Tryporyza innotata). These pests prefer to lay their eggs on Purun rather than rice, and the Purun extract has the potential as an attractant. Swamps also function as water catchment areas, water storage, flood control, and water supply for agriculture, industry, transportation, and household.

The economic value of swamps that provide direct benefits is only IDR 1,525,440 per hectare or around 7.15%, namely economic benefits from rice farming, timber harvesting, fishing activities, harvesting Purun for crafts, and as a source of household water. Meanwhile, the value of environmental services from swamps in this area is Rp 19,806,750 or 91.18%, namely: contribution of biological functions (rearing, spawning, and feeding), water storage & recycling function, carbon storage function, and a source of biodiversity. This figure shows that the ecological value or environmental services projected (indirect use-value) is greater than the economic value (direct use-value).

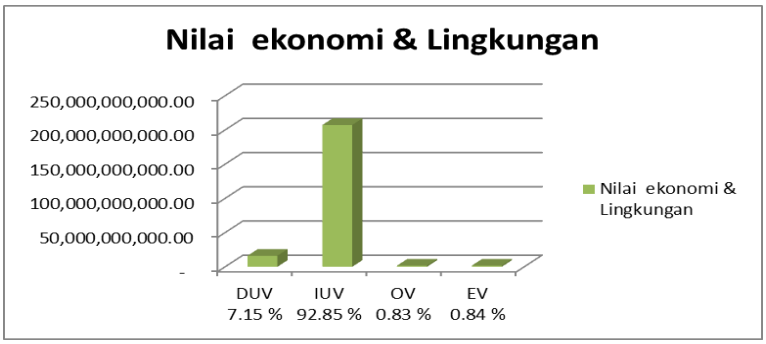

Figure 1. Percentage of economic value and environmental services for swamps in HSU Regency

If the plan to change the function of swampland into other functions is really carried out, by changing the existing pattern, there will be an impoverishment of the people around the area because the direct benefits that have been obtained will be lost. This will also have a major impact on ecological values (indirect benefit/use), such as loss/extinction of biodiversity and disruption of other ecological functions.

4. Conclusions

The conclusions of the study of the economic value-environmental services of the swamps in the Hulu Sungai Utara Regency are as follows. First, the total economic-ecological value of the swamp ecology system is Rp 213,321,900,000 per year or Rp 21,232,190 per ha per year (USD 1,633 per ha per year), with a ratio of the economic value of 7.15% to the ecological value of 92.85%. Therefore, the plan to convert swamp ecosystems to other functions will not only eliminate the economic value that has been

enjoyed by the surrounding community but will also provide greater losses in the form of loss of ecological value or environmental services.

This figure also reflects a real price for the swamp ecosystem and a real cost that must be invested to conservation the swamp ecosystem. In other words, this figure represents the cost that must be taken into account in developing oil palm plantations in the area.

Acknowledgments

The total economic value of swamps is expected to receive recognition in regional and national wetland assessment strategies, natural resource and government management, economic policies and strategies, and development procedures.

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