Analysis of Land Cover Change in Aik Berik Village Area Central Lombok Regency

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Article Info:	Abstract:
	Land cover change in tourismt areas is often an important issue related to the impact of human activities on the environment. This study aims to analyze land cover changes in the Aik Berik Village area, Central Lombok Regency, by utilizing remote sensing technology and Geographic Information System (GIS). Multitemporal satellite image data is used to identify types of land cover, such as forests, agricultural land, built land, and open land, over a period of time. Spatial analysis is carried out to determine the pattern of change and the factors that affect it. The purpose of the study was to determine the spatial data, factors, and impacts of land cover in the waterfall area of Aik Berik village, Central Lombok Regency. The results of the analysis showed that there was a significant change in land conversion, with the conversion of forest areas into plantations, rice fields, and built-up land. Despite this, most of the forest area has been preserved thanks to natural regeneration factors and community-based management. In addition, some plantation areas have changed their function to rice fields and built land, while savanna areas are relatively stable. These changes have the potential to affect the quality of ecosystems and the hydrological cycle of the region. The success of Aik Berik Village in maintaining forests and springs that are vital to the community shows the importance of sustainable and community-based land management.

INTRODUCTION

Land cover change is one of the important phenomena that reflects the interaction between human activities and environmental dynamics (Kesaulija et al., 2020). Land change can be the main indicator of the impact of economic development, population growth, and land use change (Alfino et al., 2023; Rachmad, 2024).

One of them is the potential of forests in Aik Berik Village, Central Lombok Regency, which has undergone significant changes in recent decades. Changes in land use patterns are one of the important aspects that occur in the Aik Berik forest area. In addition, the potential for natural tourism can be an attraction for regional development that can affect the pattern of land cover around. In addition, the forest area of Aik Berik Village is one of the strategic areas in the Rinjani Geopark which has important ecological, economic, and cultural values which are part of the geopark area that has been recognized by UNESCO (Hidayat & Husni, 2022), so that the forest area of Aik Berik Village has an important function for the sustainability of ecological functions such as regulating hydrological cycles, biodiversity conservation, and erosion control (Pratama & Rijanta, 2021). This is a challenge because an uncontrolled increase in tourism activities often triggers the conversion of

land from natural functions to build land (Muttaqin et al., 2023; Pratama & Rijanta, 2021). This phenomenon can threaten the sustainability of ecological functions, especially with the degradation of forest cover which functions as the main support of the ecosystem.On the other hand, forest management often faces a dilemma between the need for development and environmental preservation which affects land cover change.

This condition can cause land degradation which has an impact on decreasing environmental quality which results in the emergence of open, degraded, and critical lands resulting in erosion, flooding, drought, and potential conflicts of interest between tourism actors, the government, and local communities (Maulidasih et al., 2022). In this context, it is important to understand the patterns and dynamics of land cover change in Aik Berik Village. Analysis of land cover change can provide an overview of the intensity of change, the types of land cover affected, and the causative factors as a source of information that is an important basis in formulating sustainable management strategies.

Remote sensing technology and Geographic Information Systems (GIS) offer efficient methods for analyzing land cover changes (Astuty & Dimyati, 2024; Nugroho, 2020; Wadud et al., 2023). Multitemporal satellite imagery data, land cover changes can be accurately mapped on spatial and temporal scales (Husodo et al., 2021; Latue, 2023). This technology also allows the integration of field data with spatial analysis to understand the relationship between human activities and impacts on the environment (Lasaiba, 2024).

The land cover change that occurs in Aik Berik Village is not only a local environmental issue, but also part of a global problem. Changes in land use in this area can affect ecosystem services, such as the provision of clean water (Pobas et al., 2024), carbon sequestration (Markum et al., 2014, 2021; Psistaki et al., 2024; Rahman & Johari, 2023), and biodiversity protection (Jainuddin, 2023). Therefore, land cover analysis is a crucial first step in efforts to mitigate the negative impacts of development in this region. Furthermore, tourism areas that are managed sustainably can provide maximum economic benefits without sacrificing environmental functions. Ecotourism-based approaches and local community participation can

be an effective solution to maintain a balance between development and conservation (Muttaqin, 2021). Community participation is important in ensuring that the management of tourist areas does not only benefit certain parties and has a positive impact on the welfare of local residents. This research can contribute positively to the management of the forest area of Aik Berik Village, which is one of the important areas of the Rinjani Geopark (Hambali, 2024). Through the analysis of land cover changes, this study is expected to provide accurate data and information as a basis for policy making.

This research can be a recommendation for local governments, stakeholders, and communities in planning sustainable management to support the balance between development and environmental conservation. The purpose of the study was to determine the spatial data, factors, and impacts of land cover in the waterfall area of Aik Berik village, Central Lombok Regency.
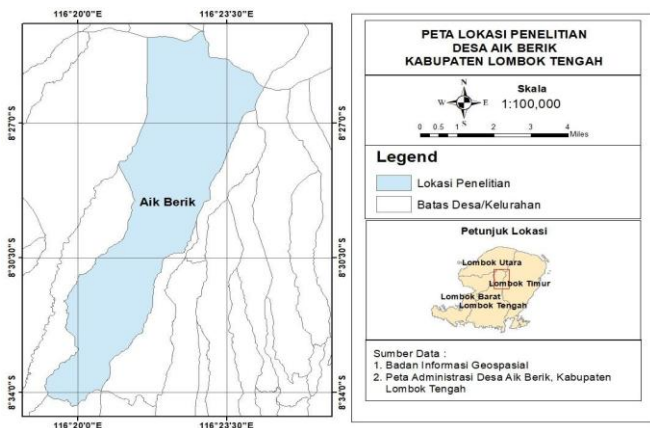
MATERIALS AND METHOD

Type of research

This study is a qualitative descriptive research aimed at analyzing and decrypting land cover changes in the Aik Berik forest area, Central Lombok from time to time. With this approach, researchers can present clear data on land cover changes that occur, both visually and textually. It also allows for the identification and explanation of specific types of land cover transitions, such as from forest to agricultural land, settlements, or shrubland. Moreover, this approach helps in understanding the spatial and temporal patterns of these changes, providing valuable insights into the landscape dynamics over the years. (Waruwu et al., 2025).

Time and Place of research

This research was carried out between November and December 2024 in the forest area of Aik Berik Village. Aik Berik Village is located in Central Lombok Regency and was selected as the study site due to its distinctive forest ecosystem and relevance to the research objectives. The area provides representative ecological features that support the investigation being conducted. Data collection and field observations were conducted throughout this period to ensure comprehensive

coverage of the study variables. The geographical position of the research location is presented in Figure 1.

Figure 1. Forest area of Aik Berik Village, Central Lombok Regency

Tools and Materials

The tools used in data processing use hardware and software. The software consists of ArcGIS 10.4, Google Earth, Microsoft Word. Meanwhile, the hardware used for field data collection is stationery, mobile phone cameras as documentation tools, laptops, and Gmaps Cameras. Meanwhile, the materials used are landsat images in 2004 and 2024, the Indonesian Terrain Map (RBI) of Central Lombok Regency, and the Administrative Map of Aik Berik Village (Mesthrige& Kaparaju, 2025.

Raster Data Working Procedure

Raster data is one of the approaches in GIS to represent the location component of geographic information that is grid-based. In this study, the raster data used is satellite images downloaded from the Google Earth application. Before downloading, the image data needs to be marked with a point at each corner of the image and the coordinates of the point are recorded to facilitate the georeferencing process. The image used consists of several satellite photos from a predetermined year. The downloaded image data is then entered into the ArcMap/ArcGis version 10.4 application for georeferencing.

Georefrencing

Georeferencing is the process of assigning a coordinate system to an image object (in this case raster data) by placing a tie point at a location where geographical coordination is known. This process must be carried out so that the image data has geographical coordinate points that correspond to its original location on the earth's surface. This georeferencing process is carried out by providing geographical coordinate points that have been previously recorded when downloading imagery from Google Earth (Sambolek & Ivasic-Kos, 2025).

Map Digitization

Digitization is made vector data from raster data or images that have been georeferenced before. This vector data can be points, lines, and polygons. In the study of land use change, data was used in the form of polygons that delineate a land use area. The vector data that will be created is in the form of delineation of the land use area of the aik berik area in shapefile format through images that have been entered in the previous ArcMap/ArcGis application. The digitization process is carried out by giving corner points around the Aik Berik area on the map according to the land use area. From this process, a land use area from the Aik Berik area will be formed. To digitize land use areas from different years, the same steps are carried out again as before. To facilitate the analysis process, each land use file is given a year code and stored in a different folder.

Land Area Analysis. After the land use data is completed, then the area of each land use area is calculated. This calculation is carried out to find out the area of each area and find out the difference in the area of land change every year. The area of each land use area is calculated in hectares (Ha). After all the data is known, the area is then calculated for land use changes in the predetermined year.

Overlay Data

The next process that must be done is data overlay. In this process, a two-dimensional matrix overlay process will be carried out, namely stacking two layers of land use data so that the parts that have changed can be seen. This data overlay is carried out to obtain visual data from previously calculated land use changes.

Data Collection Techniques

The data collected is in the form of primary data and secondary data. The primary data collected was in the form of data based on field observations

and interviews. While secondary data is all supporting information related to research such as maps.

Data Analysis

The data analysis in this study uses the help of the ArcMap/ArcGis version 10.4 application to digitally process the data that has been obtained.

RESULTS AND DISCUSSION

General Conditions of the Research Location

Aik Berik Village is a village located at an altitude of 445 meters above sea level which is divided into 14 hamlets. This village has a population of 7,750 people with a ratio of 3,695 people are male and 4,055 people are female (BPS Central Lombok & Diskominfo Central Lombok, 2019). Geographically, this village is located on the north side of Central Lombok Regency which is directly adjacent to tropical forests located on the southern slope of Mount Rinjani. The boundaries of Aik Berik Village are as follows.

The Aik Berik forest area is geographically bordered by several distinct regions. To the north, it is adjacent to the forest area of Mount Rinjani National Park (TNGR), a significant conservation zone. The southern boundary is marked by Teratak Village, while the eastern side is bordered by Setiling Village and Aik Bukak Village. On the western side, the forest area shares its border with Lantan Village. From this area, the largest proportion of land use patterns in Aik Berik Village are forests, plantations, savannas, built land, food crop agriculture and open land. The forest area of Aik Berik Village is 2,981.9 ha with a plantation land area of 1,390.4 ha. In the north of the Aik Berik Village area which is directly adjacent to Mount Rinjani there is a Savana with an area of 1,102.4 ha, while for the use of built land of 223.4 ha, then the use of land for rice fields and food crop agriculture is 208.4 ha. In the Aik Berik Village area, there is open land with an area of only 12.2 ha.

Aik Berik Village is located on the slope of one side of Mount Rinjani, causing Aik Berik Village to have natural conditions dominated by forest areas and have many waterfalls and small spring water sources which number up to 77 spring points (Saputra, 2021). Waterfalls in the Aik Berik village area include: Benang Setokel Waterfall, Benang Kelambu Waterfall, Janggot Tomb Waterfall, Sesere Waterfall, and Keliwun Waterfall.

The waterfall flow in Aik Berik Village, is used for agricultural irrigation and the others are used for drinking water managed by PDAM Central Lombok for the equitable distribution of clean water for Central Lombok, Central and South Lombok. This is in accordance with the statements from the results of interviews with 15 main respondents, namely the Rimba Lestari farmer group and several community members:

1. Based on the results of the respondents, the source of spring water is still sufficient for the daily needs of the community and has never experienced a drought. Even during the dry season, water availability is in normal conditions.
2. Based on interviews, the composition of the species that dominate in plantation areas in 2004 is relatively the same as in 2024, namely durian, mangosteen, avocado, banana, palm, jackfruit, empon-empon, bamboo, and ketak.

The natural conditions and spring water sources in Aik Berik Village that can be used as tourist attractions are Benang Setokel Waterfall, Benang Kelambu Waterfall and Keliwun Waterfall. The Central Lombok Government has made Aik Berik Village a clean water source area used by the Central Lombok Regional Drinking Water Company (PDAM) for the people of Praya City (Hadi, 2010). Aik Berik Village has natural natural conditions, has many types of plants and diverse fruits. There are several kinds of fruits in Aik Berik Village such as Bananas, Lombok Coffee, Chocolate, Mango, Papaya, Coconut, Durian, Panili, Jackfruit, Mangosteen produced from the garden. The people of Aik Berik Village mostly work as farmers and planters with an average level of education in junior high school and high school.

Land Cover Classification

The classification process was carried out by remote sensing interpretation techniques using Landsat satellite images. The satellite imagery used for the classification is satellite image data for 2004 and 2024. Based on the results of image interpretation in the Aik Berik Village area, there are 6 classifications of land cover types, namely forests, plantations, rice fields, savannas, built land

and open land. Where the forest classification interpreted by satellite images is an area dominated by large trees and timber vegetation. Forests are land of more than 0.5 hectares with trees that are more than five meters tall and have a canopy cover of more than 10 percent. The classification of gardens in land cover refers to areas planted with cultivated plants and planted in a uniform or regular pattern in an area that is easily recognizable from satellite images (Kosasih, 2019). Savannah is a type of land cover consisting of a grassland ecosystem interspersed with scattered shrubs. In satellite images, the savanna has a distinctive color spectrum because it is dominated by grass and the presence of sparse trees (Li et al., 2025; Campos et al.,2025).

The remote sensing method uses satellite images to identify the classification of rice fields based on typical spectral reflectance patterns, especially when waterlogged or when rice grows. Rice fields have a distinctive pattern because the soil is made like blocks and planted with one type of crop such as rice. The classification of land cover with built-up land refers to the area that has been modified by human activities for residential, infrastructure, industrial and other purposes. Satellite images of built land have a unique spectral pattern that distinguishes it from natural land such as the roof surface of a house or a road that is highly reflective (Sampurno, 2016). The classification of open land is an area without significant vegetation cover where there is no dominant tree, shrub or grass cover. In the interpretation of the satellite image of the open land, it can be seen from the characteristic spectral reflections such as high reflections from the ground and rocks

Spatial Changes in Land Cover

The spatial map of land cover change in the Aik Berik Village area provides a visual description of the dynamics of land use in the area. Land cover changes can reflect the impact of human activities, such as forest land expansion, plantations, agriculture, open land, and built land (Fauzan & Syarief, 2024; Pratiwi et al., 2024). This spatial change can have a positive or negative impact on the

environment that depends on the process of managing an area by the community (Aldzahabi et al., 2024; Nadialita et al., 2023).

Spatial changes in land cover in the Aik Berik Village area, North Batukliang District over the last 20 years (2004-2024) can be seen through satellite imagery and the Geographic Information System (GIS). The area of forest cover in 2004 dominated Aik Berik Village with an area of 3015.94 ha, plantations of 1640.26 ha, and savanna of 1025.31 ha. In the same year, rice field land cover had the smallest amount of area (39.03 ha), followed by open land area (58.92 ha), and built land (146.85 ha). Different conditions will occur in 2024, there will be changes in land area, namely forest areas (2684.35 ha), plantations (1161.29 ha), savannas (932.26 ha), rice fields (20.39 ha), open land (0.15 ha) and built land (60.11 ha) (Table 1).

The results of the analysis show that the small area of rice fields in 2004 is due to community activities still focused on the management and utilization of plantations as a support for the economy (Yakin et al., 2019). This condition can be seen based on the granting of permits for area management rights to the community by the government since 1995 through Community Forest permits (HKm) and in 2001 the planting of forest areas with poly culture patterns with mahogany, rajo mas, sengon, teak and various types of fruit plants such as bananas, coffee, duren, cocoa, avocados, and jackfruit which are NTFP (Non-Timber Forest Products) commodities as a support the economy of the community of Aik Berik village (Al Qindy et al., 2024; Sudantha et al., 2019).

Furthermore, the use of forest areas and plantations by the community has implications for the low area of rice fields in 2004 which can also be caused by government support through the Minister of Forestry No. 35 of 2007 concerning Non-Timber Forest Products (NTFP) which can be used and sold by the community such as: honey, fruits, vegetables, and tree by-products such as leaves, sap, fruits, bark, or some plants that have special properties such as bamboo, rattan and so on (Al Qindy et al., 2024).

Table 1. Land cover area in Aik Berik village area in 2004 and 2024

It	Types of Land Use	Area (ha)		Wide Margin (ha)
		2004	2024	
1	Forest	3015,94	2684,35	331,59
2	Plantation	1640,26	1161,29	478,97
3	Savanna	1025,31	932,26	93,05
4	Paddy	39,03	20,39	18,64
5	Open land	58,92	0,15	58,77
6	Land built	146,85	60,11	86,74
	Total	5926,31	5926,31	1067,76

The condition is different in 2024 that there will be a spatial change in the land cover area of Aik Berik Village, which can be seen from the change in the area of forest area which in 2004 was 3015.94 ha and in 2024 it will be 2684.35 ha. The decline in the area of forest area of 331.59 ha over the last 20 years can be caused by the conversion of forests into plantation areas, this is indicated because since 2000 there has been a process of planting forest areas with the method of intercropping patterns (poly culture) between woody tree plants and fruit plants so that gradually it causes a change in planting patterns to become fruit production areas that are no longer plant centers wood (Pratama & Rijanta, 2021).

The reduction of this forest area is also due to the Decree (SK) of the Regent of Central Lombok with Number 54 of 2013 that there is the production of Non-Timber Forest Products (HBBK) which is the leading commodity in Aik Berik village, including durian, palm, jackfruit, avocado, areca nut, empon-empon, bamboo and ketak which can affect the total area of the forest area which is decreasing (Dako et al., 2024). In addition, the conversion of forest land that is converted into plantation land is land that is adjacent to the settlement area, in contrast to the forest area located in the north of Aik Berik Village which is adjacent to Mount Rinjani National Park does not experience degradation of land cover area (Figure 2).

Similar to forest cover, over the past few years plantation areas have also experienced degradation of 241.98 ha, which in 2004 was 1640.26 ha and in 2024 it will be 1161.29 ha. On the other hand, several land covers have experienced an increase in the number of areas such as rice fields (135.72 ha), open land (4.24 ha), and built land (141.73 ha) during the last 20 years (2004-2024). The decrease in plantation land cover in 2024 can be caused by an increase in the area of rice fields which in 2004

covered an area of 135.72 ha which is the conversion of plantation land into rice fields. The addition of rice fields from the conversion of plantation land in Aik Berik Village is plantation land around the residential area to the south of Aik Berik Village.
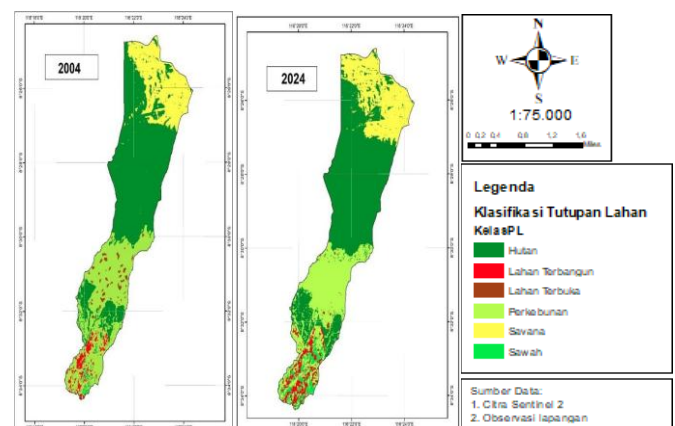

Figure 2. Spatial Forest Cover of Aik Berik Village, North Batukliang District, Central Lombok Regency

The conversion of plantation land into rice fields can be caused to support the community's daily food production and also the factor of abundant water availability to support the agricultural land production process which is also evidenced by the formation of the Aik Berik HKm management group carried out by the Forest Farmers Group which is a member of the Rimba Lestari Farmers Group consisting of 54 groups with as many members as 1,261 people (Tahir & Mustapa, 2025; Muttaqin, 2021). The second factor is the reduction of plantation area can be caused by the increase in the number of built land, yards or settlements. This condition has a correlation with the increase in the number of residents of Aik Berik Village who need land for housing, business activities that can support tourism activities.

Land Cover Overlay between 2004 and 2024

Based on the results of the spatial overlay of land cover in Aik Berik Village, North Batukliang District, Central Lombok Regency in 2004 and 2024, there are changes in land use transfer from various land type characteristics (Figure 3).
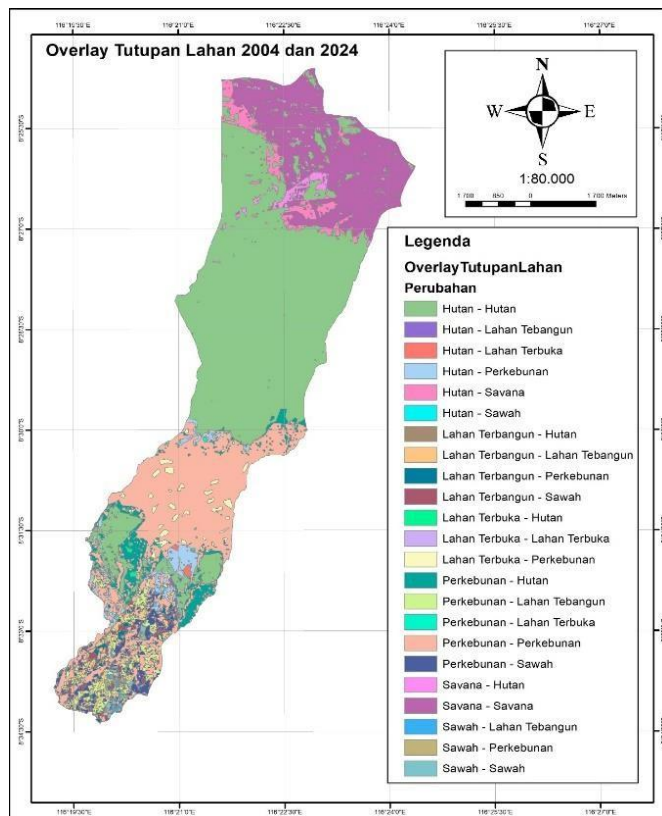
Figure 3. Land Cover Overlay between 2004 and 2024

Based on the results of the analysis in table 2, there was a significant change in land cover use between 2004 and 2024, which includes the transition of land use for agricultural purposes and infrastructure development. In 2004, the area of forest area was recorded at 3,015.94 ha, but in 2024, most of the forest area will be converted into various types of land such as plantations (138.70 ha), rice fields (4.23 ha), open land (7.63 ha), and built land (10.84 ha). This change is more influenced by community activities that expand agricultural areas, both for food crops and settlements. In addition, forests that turn into savannas are the dominant changes that are likely to be caused by natural factors such as forest fires or uncontrolled land management. On the other hand, the area of plantations in 2004 was (1,640.26 ha), and in 2024, (1,161.29 ha) is still used as plantations. Some plantations have changed their functions to rice fields (135.72 ha), open land (4.24 ha), and developed land (141.73 ha), while (197.28 ha) Plantations have been converted back into forests over time. This transition is largely influenced by natural factors, such as reduced intensity of land use for agriculture. Additionally, the neglect of unmanaged land has allowed for the natural regeneration of vegetation.

Table 2. Land Cover Overlay between 2004 and 2024

Land Use	Year 2004	Year 2024						Total (ha)
		Forest (ha)	Plantations (ha)	Savana (ha)	Rice fields (ha)	Open land (ha)	Land built (ha)	
Forest	3015,94	2684,35	138,70	170,19	4,23	7,63	10,84	3015,94
Plantation	1640,26	197,28	1161,29	-	135,72	4,24	141,73	1640,26
Savanna	1025,31	93,05	-	932,26	-	-	-	1025,31
Paddy	39,03	-	7,89	-	20,39	-	10,75	39,03
Open land	58,92	6,90	51,87	-	-	0,15	-	58,92
Land built	146,85	0,09	38,53	-	48,12	-	60,11	146,85
Total	**5926,31**	**2981,67**	**1398,28**	**1102,45**	**208,46**	**12,02**	**223,43**	**5926,31**

In 2004, the area of savannas was recorded (1,025.31 ha), and in 2024, most of the savanna (932.26 ha) will remain savanna status. However, about (93.05 ha) of savannas are converted to forests, which are most likely influenced by natural processes or land management policies that support the restoration of forest ecosystems. The process of vegetation regeneration, in which reduced human

activity provides opportunities for forests to flourish, also plays a role in this change. The area of rice fields in 2004 reached (39.03 ha), but in 2024, part of the rice fields will be converted into plantations (7.89 ha) and built land (10.75 ha), while (20.39 ha) will continue to be used as rice fields. This change is in line with the community's need for land for agricultural, food and infrastructure

development. In addition, open land in 2004 was recorded (58.92 ha), but most of this open land was converted to plantations (51.87 ha) and forests (6.90 ha), with only (0.15 ha) remaining open land. These changes indicate significant land conversion, where previously unproductive land is now being used for agriculture or plantations, in response to the increasing need for agricultural commodities and ecosystem conservation.

Overall, there has been a conversion of land into various types of land cover that depend on the community's land needs as a support for the economy. Especially in the Aik Berik protected forest area, there are Benang Stokel and Benang Kelambu waterfalls which are tourist areas that can potentially convert land for the construction of tourist facilities.

Impact of Land Cover Change

Land cover changes in Aik Berik affect various environmental and social aspects. Based on map analysis, the changes that occurred in the Aik Berik area showed various impacts, both on the ecosystem, hydrology, and community welfare. Understanding these impacts is important to support sustainable and mitigation of environmental risks. Impact on the ecosystem

Based on the land cover map, the Aik Berik forest area has a significant impact on the balance of the local ecosystem. In the land cover map for 2004-2024, there is a reduction in the area of forest areas into agricultural and residential land. Thus, this is suspected to have an impact on the ecosystem, namely changes in land function reducing natural habitats for various species. According to Surni et al (2015), habitat loss caused by unsustainable agricultural and forest management is the biggest cause of biodiversity loss. The increase in population causes an increase in the needs that must be met. The land available for plant and animal life is getting narrower because it is used for residential areas, cleared to be used as agricultural land or used as industrial land.

Changes in land use also cause significant habitat fragmentation. This is one of the main impacts of natural habitat loss and biodiversity loss. Habitat fragmentation makes forests, which previously had large and connected areas, become divided into smaller blocks, thereby reducing the

function of forests as habitats for various species of plants and wildlife (Bennett and Saunders. 2010). This is certainly very threatening to the flora and fauna species that depend on the habitat.

Impact on Hydrology

Land change is one of the critical factors that affect components in hydrology (Ozturk & Acaravci, 2013). Changes in forest land in the Aik Berik area have a significant impact on hydrological conditions, especially those related to the existence of springs. Land conversion that reduces vegetation cover not only reduces the ability of soil to absorb water (infiltration), but can also contribute to climate change due to the reduction of forest cover as a carbon sink (Kurniawan et al, 2022; Kurniawan et al., 2024). In addition, the impacts of climate change, such as erratic rainfall patterns, can exacerbate the decline in the number and quality of springs in the region (Putri et al, 2024).

Based on the results of field observations and interviews, people in the area still depend on springs for their daily activities and do not use PDAM. This dependence makes them very vulnerable if the quality and quantity of spring water continue to decrease due to land change and hydrological changes. If conditions like this continue without a policy to control land use change, then the availability of water in the Aik Berik area can be disrupted. This fact is in line with the opinion of Mir et al 2025 who stated that one of the direct environmental impacts of land use change, including forests, is the degradation of water resources, both in quantity and quality.

Social and Economic Impact

Based on the land change map from 2004 – 2024, there has been a change in the most dominant forest function, namely agricultural land. The change in the Aik Berik area has a significant social and economic impact on the community. The conversion of forests into agricultural land provides economic opportunities in the form of expanding the area for farming and the development of residential infrastructure. Based on the results of the interviews, the dominant species composition in rice fields is such as rice, while in plantation areas are durian, mangosteen, avocado, banana, palm, jackfruit, empon-empon, bamboo, and ketak.

This contributes to an increase in family income. However, this poses a challenge to the environment. Land conversion causes forests to lose the vegetation that lives in them. Declining vegetation can affect biodiversity (Hamidun and Baderan, 2014). The loss of vegetation causes the land to be damaged, resulting in a decrease in its function as erosion control, water retention, nutrient cycling, carbon retention, and microclimate regulation (Kete et al, 2023). The conversion of forest areas into agricultural land is able to have a positive impact on the community, especially in meeting the needs of life. However, this activity can also have a bad impact, if it is carried out continuously and without paying attention to ecological aspects (Wulandari et al., 2020).

CONCLUSION

The conclusion of the study on spatial changes in land cover in the protected forest area of Aik Berik Village shows a decrease in the area of forest areas that have been converted to plantations, especially after the implementation of NTFP planting by Community Forest (HKm) groups. However, these changes are not very significant to the overall forest area, which is still maintained in considerable numbers. In addition, the conversion of plantation areas into rice fields and built land in the southern part of the village, near residential areas, also remains under control. This success shows the efforts of Aik Berik Village in preserving protected forests, which are essential for hydrological functions and the provision of springs for the community.

Village communities manage to maintain a balance between economic needs and the conservation of natural resources, ensuring the sustainability of ecosystems that support their social and economic lives.

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AUTHOR CONTRIBUTIONS
All authors collaborated in conducting each stage of the research and manuscript writing.

CONFLICTS OF INTEREST
The authors declare no conflicts of interest.

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