Non-physical Factors in Using Forest, Settlement, and Rice Field Utilization in South Konawe District, Indonesia

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Abstract. This study aims to assess the non-physical factors that influence land use that do not follow its designated function. This research is a survey conducted in 315 villages with a proportional random sample of 78 villages. The instrument used was an interview guide consisting of 13 questions, analyzed descriptively using percentages. The research results show that the function of the forest area used as non-forest, 92.3% of people know that the location is the forest area. The people's reason for developing rice fields is to increase agricultural production. People build settlements mainly because it is closed to agricultural locations by 61.5%. Land ownership statuses in used forest land are not in the form of ownership certificates. The impacts disaster experiences were 46.2% flood, 20.5% landslide, and 33.3% without disaster. The productivity of farmers who use non-rice fields is 100% below the national average. The productivity of farmers who use rice fields is 100% above the national average.

Keywords: non-physical land use, forest utilization factors, land use impact

1 Introduction

The environment plays an essential role in regional spatial planning, which includes the designation of protected forests, production forests, settlements, and rice fields. The environment in practice in the regions is included in the spatial plans. One of the spatial plan arrangements related to the environment determines the area of protected forest areas, limited production forests, permanent production forests, settlements, and rice fields. Regional planning following its designation is essential for the government and the people. According to [1], planning and development in an area is an attempt to manage land resources effectively to improve people's welfare and increase local revenue,

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not avoiding conservation efforts. Land use in regional planning and development efforts should be carried out to optimize existing land resources and obtain better regional planning without avoiding environmental sustainability [2].

The process of realizing better planning goals can not be separated from the physical aspect of spatial as a receptacle for planning to be prepared. In addition to physical aspects, non-physical aspects are essential, especially in studying geographical phenomena [3]. According to [4], in planning for an area, the physical aspect is one of the fundamental determinants of the activities that can be planned, in addition to consideration of non-physical aspects, such as social, economic, and law. According to [5], the physical condition of the land determines whether the land can be used as built-up, protected, or buffer land. According to the Decision of Agricultural Minister Number 387, year 1980 [6], the direction of land use functions is the basis for determining appropriate and permissible activities on a land by considering the physical aspect, divided into protected areas, buffer areas, cultivation areas, and built areas.

It is important to note and pay attention to the direction of land use functions based on an assessment of land characteristics as the basis for determining and regulating land use because determining the direction of land use functions following their designation can help maintain environmental quality, maximize the potential and use of space, and maintain its sustainability. According to Law Nu. 26/2007 [7], spatial planning is defined as the activities of planning, utilizing, and controlling the use of space.

Seeing the benefits of the direction of land use functions is essential to know the correct direction of land use functions to avoid misuse of land use that has the potential to damage the environment. Despite the facts and issues in the field, many violations occur in regional development. Many human activities in the use of space violate the provisions by using protected areas as built areas or others and have an impact such as uncontrolled erosion [8, 9]. This activity can be proven by the existence of global issues that occur in almost all parts of the World, such as the results of research from [10] that the use of land for housing needs has caused a lot of forest destruction, as happened in Uganda due to settlement construction. Uncontrolled, causing forest damage. The consequences that arise from the above problems are erosion, flood, drought, and landslides.

The problem of land conversion above also occurs in Indonesia, which can cause disasters. According to data [11], the destruction of lands and forests and deforestation rates in Indonesia continue to increase. Land destruction is not only used to meet economic needs and forest resources but also for various other land use activities. According to [12], many areas experience various natural disasters and environmental quality declines due to the misuse of buffer zones.

From the case examples above, it is known that land use that does not pay attention to the environment can cause disadvantages to humans, namely the occurrence of disasters and a decrease in land productivity. Land use planning and activities should still pay attention to the direction of the land use function, which is a reflection of the capacity of space as a planning receptacle that is carried out. Non-physical planning studies are also essential, as inappropriate land use has a positive or negative impact on management. Social studies from forest mapping can determine the motives of land use and the benefits and or losses [13, 14].

South Konawe District is one of the areas that has an essential influence in protecting the environment. This function is because the South Konawe District has steep slopes with undulating morphology in the form of hills, so environmental changes in the area will affect the surrounding area. South Konawe District has an environment that is vulnerable to activities that can affect land quality and productivity. Based on the importance of the South Konawe District area in protecting the surrounding environment and its natural condition, which is very vulnerable to environmental changes, it is essential to carry out land use activities following the physical and non-physical capabilities of the environment. Adjusting the direction of land use functions with land use is essential in terms of profits for areas following the designation or losses for areas not following the designations [15, 16].

Regional development should be carried out to optimize existing land resources and ensure environmental sustainability. The aim of restricted development is an area that experiences rapid growth in an area that has been designated as a protected forest, reduces the occurrence of increased activities, and increases the need for built spaces. The reduction in forest area for settlements and rice fields has several effects, such as reduced agricultural production and agricultural quality [11, 17].

The geographic information system can perform an overlay analysis with scoring that results in the area of forests, rice fields, and built-up areas, in this case, in South Konawe District. The GIS matter can be disseminated in the school with the practicum method [18]. Research on mapping the dominant area functions focuses on making maps with physical factors, such as in research [11, 19, 20]. Social factors have also begun to be investigated, but not in too much detail, such as in research [13] that looked at the benefits of using forest land and research [14] that examined land use change in urban areas. This study aimed to determine the reasons or non-physical factors for land use activities that are not following their designation.

2 Method

This research utilized a survey method, covering the entire South Konawe area, with a population of 22 sub-districts and 315 villages. Samples were taken using proportional random sampling, calculated using the Slovin formula [21], resulting in a sample of 78 villages. The results of the sample calculations for each sub-district can be seen in the table 1 below.

Data on non-physical factors related to inappropriate use of land functions through instruments in the form of interview guidelines to village heads and or people representatives who were selected as samples. There are 13 questions that contain the identity of the respondent and the substance of the advantages and/or disadvantages of using land that is appropriate or not in accordance with its designation based on [6, 22, 23]. The existing data were then analyzed descriptively quantitative with percentages.

3 Result and Discussion

Research mapping the function of the area is obtained data on the effective area function. Table 2 shows the analysis results of the area functions.

Table 1. Proportional Sampling

Sub-district	Sum of Village	Proportional Sampling
Lalumbuu	15	4
Buke	12	3
Ranomeeto	12	3
Baito	7	2
Benua	7	2
Basala	8	2
Mowila	17	4
Ranomeeto Barat	9	2
Wolasi	5	1
Laeya	17	4
Palangga Selatan	9	2
Maramo Utara	8	2
Andolo	18	4
Angata	23	6
Kolono	27	7
Konda	18	4
Lainea	11	3
Landono	25	6
Laonti	20	5
Moramo	15	4
Panggala	16	4
Tinanggea	16	4
Amount	315	4

The results of the analysis of regional functions in South Konawe District, on the area of direction of regional functions based on an overlay analysis of the physical condition of the area, the effective area controlled by land use is based on the interpretation of ArcGIS imagery through the SAS Planet application. The difference is the result of subtracting the effective area from the direction area. The difference shows that the forest and settlement areas are still in accordance with the direction area because they have not exceeded. The difference in area functions indicates that there are significant deviations in the use of forest and settlement areas as rice fields. Article 27, paragraph 2, letter a of the South Konawe District Spatial Plan [22] also limits the rice field area to 23,662 hectares.

In some sub-districts, differences in the direction of the function of the area with the effective area also occur in forest areas that function as settlements. There are protected forest areas that are used as production forests and limited production forest areas that are used as production forests. According to [11], forest type degradation generally decreases the level of designation, as happened on the island of Sumatra from conservation forest and protection forest to production forest, from limited production forest to production forest.

Interviews were conducted in 78 selected villages in the 22 sub-districts as shown in the figure 1.

Table 2. Sum of Area Function Analysis Result

Function	Direction	Effective	Difference
Protected Forest	52563	52014	-549
Limited Production Forest	210466	179517	-30949
Production Forest	9986	8130	-1855
Settlement	133899	131325	-2574
Rice Area	13556	49485	35928

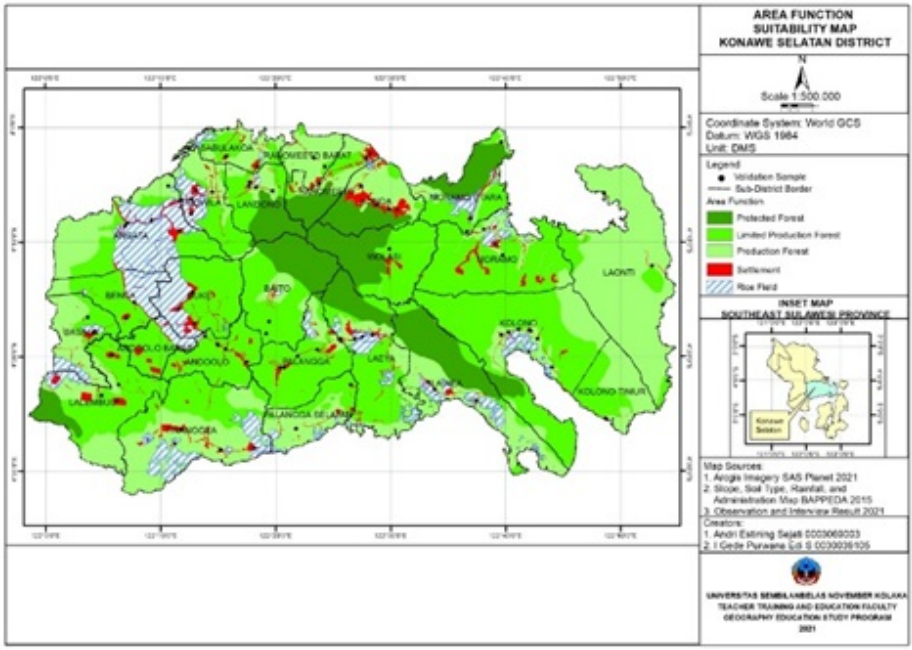

Fig. 1. Interview Subject in The Non-physical Factor in Using Area Function

The functions of the forest area are used as rice fields and settlements. Of the people users, 92.3% know that the location is the forest area. 7.7% of the people did not know that the area was a forest function. People are known because of boundary marking and monitoring from the forest police in that area. People who do not know because they think the area is hereditary from their parents. The unique thing is that the people know it, but they still use it for other purposes other than forest functions. The precise boundaries of forest areas are essential for people to know, but more is needed to reduce land degradation due to the desire to manage larger communities [13, 17]. The people of Ilhabela Island, Brazil, know the boundaries of the conservation area and do not use it for personal gain, including fallen trees [24].

The main reason people build rice fields in areas that should be forest areas is to increase agricultural production by 100%. Generally, in transmigration areas, there is still a lot of land clearing. In mathematical logic, the wider the agricultural land, the

more crop production [25]. Management of forest land for purposes other than forest has an income motive for the perpetrators [14].

The main reason for the people to build settlements in an area that should be a forest area is the factor close to the agricultural location, 61.5%. The economic factor is not being able to buy land by 38.5%. The location of rice fields close to farmers' settlements makes it easier to manage [26]. Settlements that do not own land and use land that is common from generation to generation are economic motives, as is the case in Cuttack, India and Northern Ontario, Canada [27, 28].

The status of land ownership for people who use the land for forest functions is Erfpacht at 39.7%, D Boundary at 25.6%, Communal Bezit at 19.2%, and have no evidence of 15.4%. The status of land ownership, which was a forest area, varied. In the South Konawe District, it was dominant in Erfpacht or use rights for both plantations and rice fields. Use rights in the sense of not being able to sell land to other people as in the practice of using Soeharto's Hill, as well as in the forest area of Pattaneteang Village, Bantaeng District, intensive management is called intensive land [2, 29]. Other uses are on communal bezit or government land, which is the right of the village, usually used as an honorarium for village officials or used by the people for their economy [2]. A relatively strong form of certificate is given by villages and sub-districts related to land ownership in the form of a D boundary in the context of public services [30], which can be traded but risk overlapping. The weakest is that they do not have any evidence of management or ownership or are known to be informal or illegal [19, 31, 32].

The impacts felt by the people during their stay or activities in forest areas for rice fields and settlements related to the disaster were 46.2% flood, 20.5% landslide, and 33.3% did not feel the disaster. The Bengawan Solo border area, as an improper land used for agriculture, is at significant risk of being affected by river overflow [26]. Floods can also occur on forest land that functions as an absorption area and are disturbed due to the conversion of non-forest functions, especially during heavy rains [33, 34]. Landslides in forest areas that have minimal vegetation are also common [35].

The average national rice productivity [36] is 2.6 tons/hectare, and Southeast Sulawesi Province is 2.02 tons/hectare. The yield of farmers who use non-rice fields for rice fields is entirely or 100% below the national or provincial average, with a range of 1-2 tons/hectare. This shows that using land that is not in accordance with its function impacts low quality or productivity [1]. Slope factors, rainfall and soil with certain minerals affect agricultural productivity [37].

The yields of farmers who use rice fields according to their designation are entirely or 100% above the national average, with a range of 6-24.5 tons/hectare. This shows that using land according to its function impacts optimal quality or productivity; this effort is also classified as environmental conservation [15, 38].

4 Conclusion

This study shows significant non-compliance with land use designations in South Konawe, with forest areas used as rice fields and settlements. The main reason people build rice fields in areas that should be forest areas is to increase agricultural production by 100%. The main reason for the people to build settlements in an area that should be a

forest area is the factor close to the agricultural location. Land ownership status for people who use land for forest functions is Erfpacht at 39.7% and D Boundary at 25.6%. The impacts felt by the people during their stay or activities in forest areas for rice fields and settlements related to the disaster were 46.2% flood and 20.5% landslide. The yield of farmers who use non-rice fields for rice fields is entirely below the national or provincial average, with a range of 1-2 tons/hectare. The yields of farmers who use rice fields according to their designation are for rice fields entirely above the national average with a range of 6-24.5 tons/hectare.

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