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ILLEGAL ENROACHMENT IN THE COMMUNITY OF WATU ATA NATURAL RESERVE AREA, BAJAWA DISTRICT, NGADA DISTRICT

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ABSTRACT

The large number of people who occupy, control, and cultivate areas in conservation forest areas illegally, for subsistence or commercial purposes without paying attention to statutory regulations, is a problem in the Watu Ata Nature Reserve. Even though the government already has a social forestry program that collaborates with communities regarding forest management. This research aims to determine the location, and factors that influence the occurrence of illegal land use in the Watu Ata nature reserve area, Bajawa District, Ngada Regency. The sample used a spatial sample, namely locations of illegal land use and 60 squatter communities. This research method uses multiple regression analysis and spatial interpolation. The results of this research show that economic factors, social factors, and environmental factors influence the impact of encroachment. The low level of illegal occupation is in Langagedha Village and the high level is in Wawowae Village and Jawameze Village. Recommendations from this research are that Wawowae Village, with an area of 132.77 hectares in Wawowae Village can be used as a location for social forestry.

Keywords: *illegal encroachment; interpolation; watu ata*

INTRODUCTION

Bajawa District is the capital of Ngada Regency which has a Nature Reserve, namely the Watu Ata Nature Reserve. According to the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.76/Menlhk-Setjen/2015 Concerning the Criteria for Management Zones of Nature Reserves, Wildlife Sanctuaries, Grand Forest Parks and Nature Tourism Parks, Nature Reserves are Conservation of Nature Reserves which due to their natural conditions have unique characteristics or types of plants and/or plant diversity along with natural phenomena and ecosystems that require protection and preservation efforts so that their existence and development can take place naturally (Farizal et al., 2020). Based on the Letter of the Head of BPKH Region XIV Kupang Number S.313/BPKH.XIV-2/8. In 2014-2015, a review of the Provincial forest area was carried out by the integrated team of nature reserve areas that changed function, namely the function of a nature reserve with an area of 4,335.58 hectares as a protected forest function with an

area of 617.06 hectares with part of the function of a nature reserve with an area of 4,335.58 hectares (Dhaka et al., 2017). The Watu Ata nature reserve is administratively located in Ngada Regency where there are three sub-districts including Aimere sub-district which is located in Aimere Timur Village, Kaligejo Village, Heawea Village. In Bajawa Sub-district, it is located in Bajawa Village, Beiwali Village, Wawowae Village, Langagedha Village, Jawameze Village (Botha, 2018). Unprotected nature reserve areas can threaten biodiversity or key ecosystem services (Xu et al., 2017). Damage to the Watu Ata Nature Reserve area due to illegal development is feared that this area will one day have an impact. Various environmental issues such as forest and land fires, CO^2 emissions, decreased biodiversity, land conflicts, and so on are some of the impacts of illegal development in the area (Suwondo et al., 2018). Illegal development in the forest is the process of occupying, controlling, and cultivating areas in conservation forest areas illegally, for subsistence or commercial purposes, except for the management rights of "Customary Law Communities" or management rights that are legally granted by authorized officials for a certain period of time (Raharja et al., 2018).

The importance of community relations with the government in managing areas such as in social forestry management. Social forestry is a community-based forest policy that allows communities to manage part of the forest resources with predetermined guidelines (Feni, 2016). This is in line with research (Tjahjono, et al., 2021) Cooperation between the government and the community in forest management can be used as a solution to solving problems in forest management by other regions to achieve the main goal of preserving the benefits of forest functions in order to improve community welfare. It is necessary to take steps by offering solutions and alternatives to overcome the problems that occur in the Watu Ata nature reserve area, namely by utilizing remote sensing, namely by accessing Landsat imagery in making maps to mark the location of encroachment in the Watu Ata nature reserve area and providing input regarding the location of the area that can be used as a social forestry area with the community and government.

MATERIALS AND METHODS

The research location is in the Watu Ata Nature Reserve. The primary data of this study are the results of observations of conditions in the field and the results of questionnaires from the encroaching community in the area encountered during the study. The secondary data used are the boundaries of the Watu Ata Nature Reserve from the NTT Province BKSDA and data on the number of encroachment incidents in the Watu Ata Nature Reserve area. The sample of this study uses spatial samples and samples of encroaching communities in the area. The spatial sample here is the Watu Ata Nature Reserve area while the community sample uses accidental sampling found in the field while encroaching on the forest. Accidental sampling is the number of samples taken based on those encountered by the researcher (Hariputra et al., 2022). In this study, the researcher analyzed Landsat 9 imagery data then used a scoring method based on the number of incident levels in one year, the following is a division based on the level of incident:

Table 1. Classification of Level of Encroachment Events in One Year

Criteria	Number of Encroachment Incidents in One Year
Low	< 25 incidents in 1 year
Medium	25 - 50 incidents of encroachment in 1 year
High	> 50 incidents of encroachment in 1 year

Next, interpolation is carried out to determine the potential location that will be used as a social forestry area plan and multiple regression methods to determine the factors causing encroachment based on the results of filling out the questionnaire given to the forest encroacher community. According to Law Number 18 of 2013 concerning the Prevention and Eradication of Forest Destruction, there are 3 factors causing illegal development activities in forest areas, namely economic, social, and environmental factors (Pemerintah Republik Indonesia, 2013). The multiple regression formula used (Kurniawan, 2016):

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots\ldots + + \beta_n X_{n+e} \quad (1)$$

RESULTS AND DISCUSSION

Encroachment in the Watu Ata Nature Reserve

Human encroachment on ecosystems is a global threat, particularly in forest ecology, where increasing human resource demands continue to reduce the connectivity and sustainability of protected area networks (Watson et al., 2015). This illegal encroachment can lead to conflicts that have negative impacts on sustainable forest management and the livelihoods of local communities, especially resource-poor and landless communities, a problem that can worsen often at the expense of local forests and communities (Bhusal et al., 2019).

Based on encroachment data in 2023 with a total of 32 coordinate points taken in the Watu Ata Nature Reserve Area, Bajawa District, Ngada Regency together with the resort staff of the Conservation Section III Conservation Area III Bajawa District using GPS and image correction results, the location points of encroachment in the Watu Ata Nature Reserve area, Ngada Regency were produced.

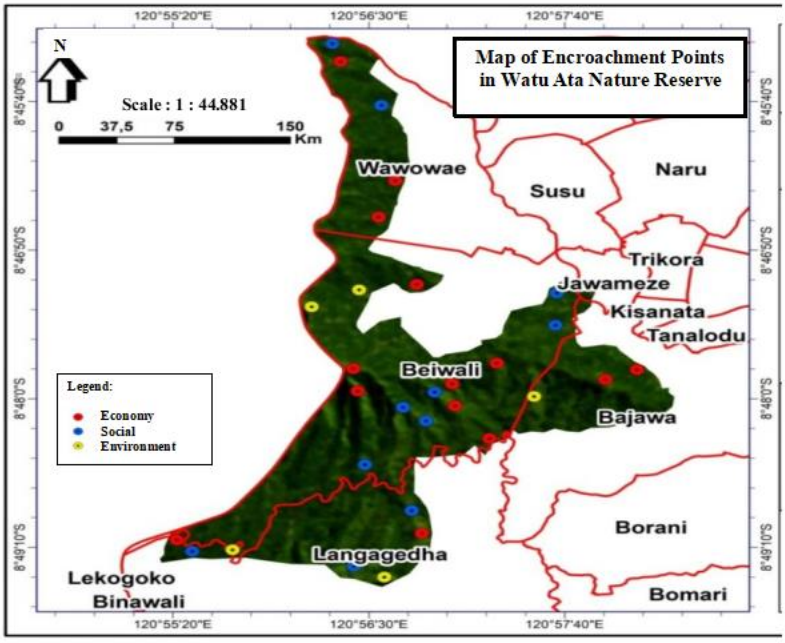

Figure 1. Map of Encroachment Points in Watu Ata

Based on **Figure 1**, from the existing encroachment points, there are many factors that cause encroachment, such as economic factors, social factors, and

environmental factors. In the economic factor there are 17 points in the social factor there are 4 points and 10 points are included in the environment. Based on the map of points in **Figure 1** and the results of scoring and data processing, the following is a map of the level of encroachment in the Watu Ata Nature Reserve Area.

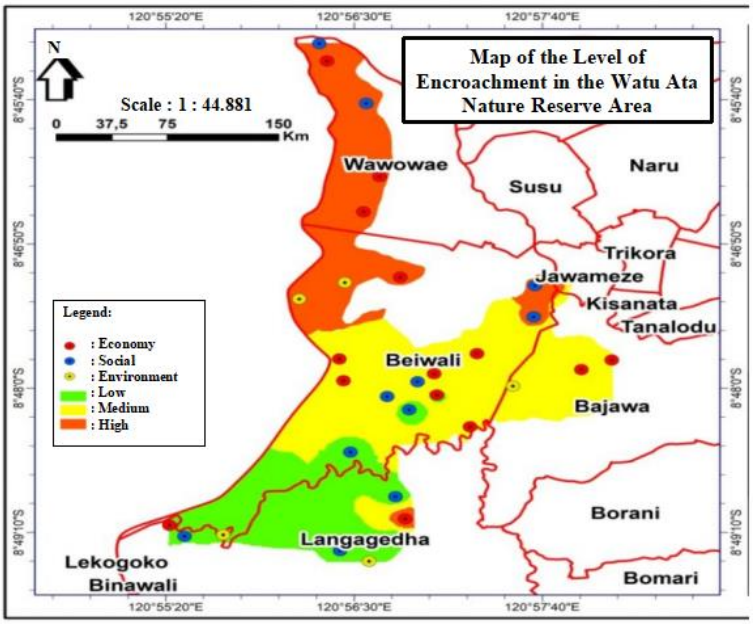

Figure 2. Map of Encroachment Points in Watu Ata

Based on **Figure 2**, low encroachment levels are colored green, low encroachment levels are colored yellow, and high encroachment levels are colored red. The following are the scoring results of the encroachment levels and encroachment area of the Watu Ata Nature Reserve Area.

Table 2. Level of Encroachment and Area of Encroachment of Watu Ata

No	Criteria	Area (Ha)
1	Low Encroachment Rate	320,552
2	Medium Encroachment Rate	578,184
3	High Encroachment Rate	340,361

Source: Research Results, 2023

Based on **Table 2**, it is known that the high level of encroachment has an area of 340,361 hectares and occurs most in Wawowae Village. The largest area is at the moderate level of encroachment, which means that in one year there are 25-50 cases of incidents at that point.

Factors Causing Encroachment on the Watu Ata Nature Reserve

The results of the multicollinearity test related to the encroachment factor of the Watu Ata Nature Reserve area show that all tolerance values are above 0.100 and all VIT values are below 10.00, so it is said that there are no symptoms of multicollinearity in the study. In the subsequent heteroscedasticity test results, it shows that the points are spread above and below the number 0 on the Y axis, it can be concluded that there are no symptoms of heteroscedasticity in the study. Furthermore, in the partial T test:

Table 3. Partial T-Test

Coefficients[a]

Mo	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.204	.400		27.979	.000
	Economy Factor	-.368	.080	-.537	-4.600	.000
	Social Factor	-.135	.060	-.269	-2.253	.028
	Environmental Factor	.272	.043	.578	6.273	.000

a. Dependent Variable: Encroachment of Watu Ata

From the data processing in **Table 3** shows the sig value of the economic factor (X1) 0.000 <0.05 with a T value of 0.-4.600 so it can be interpreted that the economic factor variable (X1) has an effect on encroachment (Y). The sig value of the social factor is 0.028 <0.05 with a T value of 0.-2.253 so it can be interpreted that the social factor variable (X2) has an effect on encroachment Y. The sig value of the environmental factor is 0.00 <0.05 with a T value of 6.237 so it can be interpreted that the environmental factor variable (X3) has an effect on encroachment.

Table 4. Coefficient of Determination

Model Summary

M	Model	R	R Square	A	djusted R Square	Std. Error of the Estimate
1		.769[a]	.591		.569	.67934

Based on the **Table 4,** the R Square value is 0.591, meaning that the influence of variables X1, X2, X3 as a stimulus on the variable is 59.1%. Based

on the analysis of multiple linear regression data, the economic factor (X1) influences the impact of encroachment (Y), namely in meeting daily living needs, the encroaching community relies on agricultural products, namely from the Nature Reserve area.

From the results of multiple linear regression analysis, social factors (X2) influence encroachment (Y), namely low education levels and increasing population. The community living around the Watu Ata Nature Reserve area is 55% at the elementary school graduate level. Seeing the problem of low levels of community education, it affects the community's understanding of the consequences felt by the community in the future due to encroachment, which is relatively low. Some encroaching communities assume that the wood that has been planted is their own and they are free to cut it down. Low levels of education also make it difficult for people to get jobs outside the area. This makes people only rely on the Watu Ata Nature Reserve as a livelihood by farming by opening new land or encroachment. Other social factors include road access in the area that connects one village to another, namely Beiwali Village and Langagedha Village and the connecting road between Bajawa and Aimere Timur Districts. In the Watu Ata Nature Reserve area, there is also an area that is used as a place for spiritual tourism located in Beiwali Village.

Environmental factors (X3) also affect the impact of encroachment (Y), namely land limitations, high soil fertility levels. High soil fertility levels, and land limitations cause encroachment activities around the Watu Ata Nature Reserve area. Based on the results of interviews with the community, the reason for opening land in the area is due to the high soil fertility level which is suitable for planting coffee, vegetables, spices, cloves, and other plants. In addition to the factors above, there are other factors that affect encroachment in the area, namely the limited number of supervisors where the supervisors in the area only consist of five people and one forestry police who is also the head of the resort, so there are still obstacles in supervising the Watu Ata Nature Reserve area. Based on the results of multiple linear regression tests, economic factors, social factors, and environmental factors affect encroachment in the Watu Ata Nature

Reserve area with a stimulant value of 51.9%.

CONCLUSIONS

The low level of encroachment has an area of 320,552 hectares, the medium level of encroachment has an area of 578,184 hectares, the high level of encroachment is found in an area of 340,361 hectares. From the results of the interpolation, the high level of encroachment is found in the Watu Ata Nature Reserve area located in Wawowae Village with an area of 132.77 hectares. Based on the multiple regression test, the values of economic factors, social factors and environmental factors influence encroachment. The economic factors that influence encroachment are the people who live around the nature reserve area, in meeting the economic needs of the community, they only rely on the agricultural sector. From the social factors that influence encroachment, namely the increasing population and the low level of education of the community. From the environmental factors that influence encroachment, namely limited land and high soil fertility. The location of illegal encroachment in Wawowae Village can be used as a location for social forestry because social forestry is a solution to territorial problems and a catalyst for community economic development.

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