# The Influence of Land Use Knowledge on Community Understanding of River Basin Ecosystems

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**Abstract.** The purpose of the study is to produce research on the Effect of Land Use on Community Understanding of the Ecosystem of the watershed. This type of research is quantitative. This research will be equipped with related questionnaires to extract land use data and community understanding related to the watershed in Nagari. Analysis using SPSS Version 24. The respondents were 108 households, namely people living around the watershed. The results of the study were: The effect of land use the knowledge on the understanding of communities related to watershed ecosystems seen from the constant (a) = 16.499 and beta = 0.736, with significance value = 0.000. Then the calculation value is Y = 16.499 + 0.736X. For the value of t count = 11.187 compared with t table approximately = 1.975, then Ho is rejected and Ha is accepted meaning significant. Land use knowledge significantly effect on people's understanding of watershed ecosystems. Significant value = 0.000, compared with 0.05, then sig value 0.000 < 0.05, then Ho is rejected and Ha is accepted means significant. It is proven that land use knowledge has a significant effect on people's understanding of watershed ecosystems.

## 1 Introduction

The land use of an area is non-permanent. The land has capabilities that can be utilized for various purposes. With the ability of land that can be applied for various purposes, the land is not limited to its use for a specific purpose. The form of land use can change in line with the development of human needs and culture. This change in land use patterns will give rise to a phenomenon where one land use is sacrificed for another use. The land struggle between urban and rural areas results in irregular land use change and environmental pollution and unbalanced village-urban development [1]. Land use is a complex and dynamic system, driven by natural and humanistic factors [2]. Natural factors, such as climate, slope, and soil type, have a significant influence on large-scale and long-term land use change [3]. The relatively stable nature factor is the main obstacle, in the use of land in the rural-urban suburbs, while the humanistic factor with more frequent changes is the main driver [4]. Population, economic development, industrial structure, and other factors have been shown to have an important impact on land use change [5]. For example, the use of land that was originally used as agricultural land changed to residential land.

In this case, it is said that agricultural land is sacrificed for other uses namely as residential land [6]. Careless land use or use will have an impact on the balance of the environment, especially the ecosystem of the river flow.

A watershed is an area bounded by natural boundaries, such as ridges or mountains, or rock boundaries, such as roads or embankments and rainwater falling in the region contributes flows to outlets [7]. A watershed is a unit of area/region/water system area that is formed naturally where water is caught from rainfall and will flow from the area/region/area towards rivers and tributaries [8].

A watershed is a complex mega system, namely physical systems, biological systems, and human systems. A landscape as commonly observed is a portion of a watershed (mega system). It is composed of different soil-vegetation associations according to topography, human activity, etc [9]. Planning interventions can repair damage in one of the subsystems that disrupt synchronization between systems in any boundary zone thereby disrupting the entire mega system [10]. A further step to increase development in an area is by planning a watershed as a socio-ecological mega system [11]. According to this view, the river basin mega system is composed of three main systems and several subsystems as shown [12]. The river basin mega system consists of three main systems and several other subsystems [13].

Watersheds have boundaries, on land they can become topographical boundaries, and in the oceans until the waters are influenced by the land. [14]. Each system and sub-sub-system in the watershed interact with each other, the role of each component and the relationship between components largely determine the quality of the watershed ecosystem. Disruption of one

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component of the ecosystem, felt by the other component with a chain impact. Ecosystem balance is guaranteed if the reciprocal conditions between components run well and optimally [14].

Fluctuations in river water discharge, which are very different in the rainy season and dry season, are a sign of the lack of functioning of the watershed. Watershed damage indicators can be characterized by changes in hydrological behavior, namely the high frequency of flood events (peak flow) and increased processes of erosion, sedimentation, and decreased water quality. [15]. Watershed management must be carried out optimally by sustainably utilizing natural resources [16].

Some of the previous studies related to this research include:
Local wisdom of Padang Pariaman people in managing "banned fish" in Nagari Sikucur. The results of this study are related to the local wisdom of the community in managing land and watersheds. There are several community policies such as not being allowed to use land on the river with a distance of 500m left and right of the river. Even if the land is privately owned or a people. Those who violate it will be ostracized by society. So that prohibited fish can be kept and prohibited from taking fish that are still small.

**Research questions**
The research questions are:
1. How is the use of land by the community?
2. How does land use knowledge affect people's understanding of watershed ecosystems?

## 2 Methodology

This type of research is descriptive quantitative, using percentage analysis and linear regression. The total population is the entire head of the family and a sample of 108 households residing around the watershed was taken. From the two research variables, we used questionnaires to assist in obtaining primary data from respondents. The analysis tool uses SPSS Version 24.

## 3 Result and Discussion

### 3.1 Land Use

From the land use data used by the community in this study in Nagari Sungai Sariak, among others:
1. Rice fields are planted 2 times a year more than people who plant 3 times a year.
2. Tegal or garden namely: coconut, betel nut, coffee, cloves, jengkol, sour, and others.
3. Fields or huma are cucumbers cassava, banana, corn, chili, beans, papaya, and others.
4. Public facilities, such as irrigation, roads, schools, and others

Details of land use can be seen in the table below:
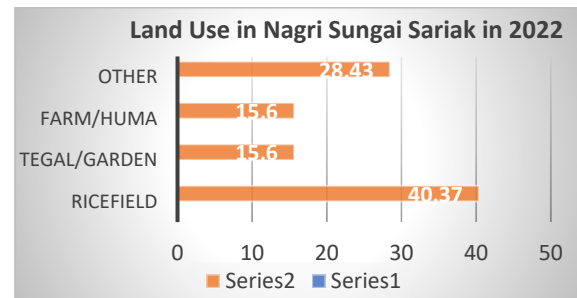


**Figure 1.** Land use by communities in Nagari Sungai Sariak in 2022

In Figure 1 above, it can be seen that the most land use is rice fields. This means that many people use the land for rice fields, to meet the basic food needs of the community. Ricefield is an agricultural business carried out on wet soils that require water for irrigation. Other land uses for irrigation, roads, schools, and other facilities [17].

Public knowledge regarding land use can be measured using a statement questionnaire. Of the 10 statements, there are 2 negative statements, useful to see the seriousness of the community in giving its statements said. Negative sound: Land used by the community does not influence watershed conditions. From this statement, many people know that the land used by the community influences watershed conditions, such as using excessive chemical fertilizers in the fields, and fields, the fertilizer will be washed away by water into the watershed and will have an impact on watershed users. This can be seen from the answers of 71.56% of respondents who disagree and strongly disagree. Because many communities depend on the watershed, they know that the wrong use of land will have an impact on the watershed.

Another negative sound: The participation and independence of communities in cultivating their land is an unimportant element in watershed management. From this statement, many people disagree and strongly disagree as much as 84.40%. According to their knowledge, the participation and independence of the community in cultivating their land is an important element in watershed management, because if there is no community participation and independence in cultivating their land properly, it will have an impact on watershed damage. The participation and prosperity that has been carried out by the community such as: planting mixed plants, planting perennials on land they own and adjacent to the watershed, and others.

While a positive statement, there is some high public knowledge, namely: the community as a watershed manager is closely related to the use of land for watershed sustainability, with respondents' answers agreeing and strongly agreeing 96.33%. For the statement of regulating land use efficiently is a management of water resources that must be considered and a statement for the success of community empowerment efforts in managing their land around the watershed, it is necessary to formulate a strategy, with the answers of the same respondents, namely 94.50% agree and strongly agree. For the statement that the

increase in population has spurred land use around the watershed and the statement of watershed damage is indicated by the increasing number of critical lands, erosion, floods, droughts, and landslides, with the answers of the same respondents 91.84% agreeing and strongly agreeing.

### 3.2 Community Understanding of watershed ecosystems

Of the 15 statements used to see the community's understanding of the watershed ecosystem, there are 3 negative statements, to see the seriousness of the community in giving their statements. A negative statement reads: the watershed ecosystem serves agricultural land only. From this statement, many people understand that the watershed ecosystem does not only function for agricultural land, but for farming, animal husbandry, and daily needs such as bathing, and washing. This can be seen from the answers of 84.40% of respondents who disagree and strongly disagree. People use rivers not only for agriculture, because farmers who need river water to water their crops and farmers of chickens, cows, and fish, need water for these businesses.

Another negative statement reads: The watershed is the last dumping ground for human activities, so the ecosystem is disturbed. From this statement, more people do not understand that this is a negative question. This can be seen from the respondents' answers, namely: 56.88% of the public agrees and strongly agrees. Based on the researchers' observations, there is a low public understanding of this statement, because: there are still people who defecate in the river, because they do not have toilets, and throw garbage in the form of leftovers when washing clothes or dishes into the river. What they throw away is not only organic residue but inorganic is also thrown into the river, in the form of plastic.

The third negative statement reads: the components that make up the watershed are different, independent of the state of the local area. From the results of the respondents' answers, many people already understand this statement, this can be seen from the answers of 82.57 respondents who answered disagree and strongly disagree. The community already understands that the components that make up the watershed are different, depending on the state of the local area.

For a positive statement, there is some high public understanding, namely: if the watershed ecosystem is well maintained, it can be used as a tourist attraction with its beauty and beauty, with the respondent's answer agreeing and strongly agreeing 99.08%. For a statement that a good watershed ecosystem will support the life of living things and the environment, respondents agreed and strongly agreed with 97.25%. Coordination Statement on upstream watershed management for the realization of the watershed ecosystem, with respondents' answers agreeing and strongly agreeing 96.33%. In essence, from the results of these positive respondents' answers, more people agree and strongly agree with a good watershed ecosystem.

Uji validity, from the statement and 30 respondents, uji validity then obtained the result of all valid items.

The table's R-value = 0.361, while the R-value is calculated using Pearson Product Moment there are 2 invalid questions because the R-value counts < the table R. The question is corrected and refined because the value is close to valid, so it can be used for research instruments.

While the reliability test uses Cronbach alpha. Jika questionnaire is reliable when the Cronbach alpha value > 0.6 [18]. From the calculation using SPSS Version 20, the reliability value of 0.872 > 0.60 can be obtained, then reliable. Normality Test using One-Sample Kolmogorov-Smirnov Test. For the normality value, the land use variable is not normal for the normality value, while the community's understanding of the watershed ecosystem is normal. Land use is 0.005 and community understanding of the watershed ecosystem is 0.834. The homogeneity test was performed using SPSS Version 20, with a result of 0.569, the result was homogeneous since the value was close to 0.60. The sig value of 0.377 from Table Anova is greater than alpha 0.005, meaning there is no significant difference between the variables.

### 3.3 The effect of land use on community understanding of watershed ecosystems

From the statistical descriptive table obtained 108 respondents, the average for land use knowledge variables = 31.81 and community understanding variables related to watershed ecosystems = 47.85. While the standard deviation for the variable X = 3.24 and the variable Y = 4.33.

In the table correlations can be obtained sig value (1-tailed) of 0.000, compared with the probability value, it turns out that if the probability value > sig (1-tailed), then variable X corresponds to Variable Y.

In the table, Model Summary obtained the value R = 0.736, with a coefficient of determination (R-square) = 0.541. This suggests that Y is influenced by X by 54.1%. While the influence other than X is (100% - 54.1% = 45.9%).

From the table, Anova obtained the result F count = 125.138 with a probability level sig of 0.000. Because the probability value < 0.05, this regression model can be used to predict people's understanding of watershed ecosystems.

From the Coefficients table, the constant (a) = 16.499 and beta = 0.736 are obtained, with a significance value = 0.000. Then the calculation value is $Y = 16.499 + 0.736X$. For the value of t count = 11.187 compared with t table approximately = 1.975, then Ho is rejected and Ha is accepted meaning significant. Land use knowledge significant effect on people's understanding of watershed ecosystems. Significant value = 0.000, compared with 0.05, then sig value 0.000 < 0.05, then Ho is rejected and Ha is accepted means significant. It is proven that land use knowledge has a significant effect on people's understanding of watershed ecosystems.

Associated forest damage has caused no water for their rice field and when heavy rains occur, the community face landslides and even floods damaging their agricultural fields [19].

## 4 Conclusion

The value of the calculation equation is $Y = 16.499 + 0.736X$. For the value of t count $= 11.187$ compared with t table approximately $= 1.975$, then Ho is rejected and Ha is accepted meaning significant. Land use knowledge significant effect on people's understanding of watershed ecosystems. Significant value $= 0.000$, compared with 0.05, then sig value $0.000 < 0.05$, then Ho is rejected and Ha is accepted means significant. It is proven that land use knowledge has a significant effect on people's understanding of watershed ecosystems.

## 5 Suggestions and Implications

The suggestion for this research is to be able to conduct guidance to the community related to watershed management so that the community understands and behaves friendly to the watershed. This study implies that researchers can understand people's behavior in managing watersheds. The research that we will conduct for the future is related to watershed management and its application by the community and becomes an input for teaching materials for students who take the Watershed Management course so that students can practice behavior that is friendly to the watershed and set an example to the community where they interact with the community who live around DAS.

## 6 Acknowledgment

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