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## THE ENVIRONMENTAL BEHAVIOR OF COMMUNITY AT UPSTREAM MAROS CATCHMENT AREA

Andi Nur Imran, Mulyadi, Nurlita Pertiwi, Bakhrani Rauf and Gufran Darma Dirawan

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The purpose of this study is to examine and to analyze the ecosystem knowledge, conservation knowledge, and pollution knowledge that have effect on the community attitudes in preserving the environment, toward the community behavior at the upstream Maros catchment area. This study used a quantitative approach and survey method with a questionnaire instrument. The instruments used were developed by researchers, including: questionnaire of environmental behavior and attitudes, test of knowledge ecosystems; conservation knowledge and pollution knowledge. The model that used for this study is Structural Equation Model to understand the relationship of all variables. The results show that the ecosystem knowledge variables (X1), conservation knowledge (X2), and pollution knowledge (X3) have direct and significant impact on environmental attitudes (X4). Moreover, the conservation knowledge variable (X2), pollution knowledge (X3), is also has direct and significant impact on people's behavior (Y). Meanwhile the ecosystem knowledge variables (X1) has no direct effect on the community behavior and no significant impact on environment aspect, it represents a significant value of  $p - \text{value} > 0.05$ .

**Keywords:** Environmental Behavior, Catchment Area

### 1. INTRODUCTION

Maros watershed that lies in the Maros region has considerable potential impact for development in the area both economically and ecologically. The ecology and economy potential is needed to manage exclusively by the government with involve the community in order to increase society welfare whose are stay in the Catchment Area (BP. DAS JW, 2010). Maros watershed area is 115,348.81 hectares consisting of catchment area Tanralili, TaboTabo, and Maros. The study area is located in the MarosSub catchment area which covers 66335.85 hectares, the area also covers Maros river that across the city of Maros and across the source of drinking water at "Lekopacking" area. Furthermore, the Maros catchment area lays about 20 km which has considerable potential for rice field, farming, and agriculture industry, where agriculture industry has not been well explored by the community, In addition, this area also have some other economic potentials that may improve in the future such as: Water Resource for transport and tourism. However this kind potential, have not yet introduce by Government to the Society because it does not has make a major contribution to the Government and the community income and improving social community welfare (BP DAS, 2001).

The degradation of Maros catchments area in upstream section has resulted in decreased water flow that provided fresh water sources for the community around

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*E-mail: nurimranforest@yahoo.com and gufrandarma@yahoo.com*

the catchment area, particularly in the area of agricultural and *Lekopaccing* as drinking water source for Makassar City. The fact also showed that the forest in Maros up stream catchment area section is generally has been convert into plantations and paddy fields , this kind situation is happen because of lack of community knowledge and government support in managing and protecting the area. It is also reveals that the conversion of forest and conversion of the land become rice field due to the economic pressure of the needs of community and the need for shelter or housing and fuel wood by taking wood from the forest. Those kind activity has resulted in degraded society attitudes in protecting the Catchment area and it become critical forest land, which has implications for the declining water discharge from Maros catchment area.

From all the fact above, the degradation of Maros Catchment area are hypothetically result of the lack of understanding and community knowledge, lack of community awareness and attitude in managing environmental sustainability. There is also an issues that cause of the ongoing environmental crisis in that area the tendency of the local community behavior that are not environmentally sound sourced from the mistakes of human behavior to the management perspective such as; throwing garbage in rivers, cut down trees and take the wood in the forest, river bank raise animals, build a house river bank. Therefore it can be synthesis that the environmental degradation in the Maros Catchment area caused by diminishing forest and various trends of human behavior or community activity. Environmental behavior of community who live in the catchment area could potentially be affected by the knowledge of ecosystems, conservation knowledge, community awareness and attitudes to maintain and preserving environment.

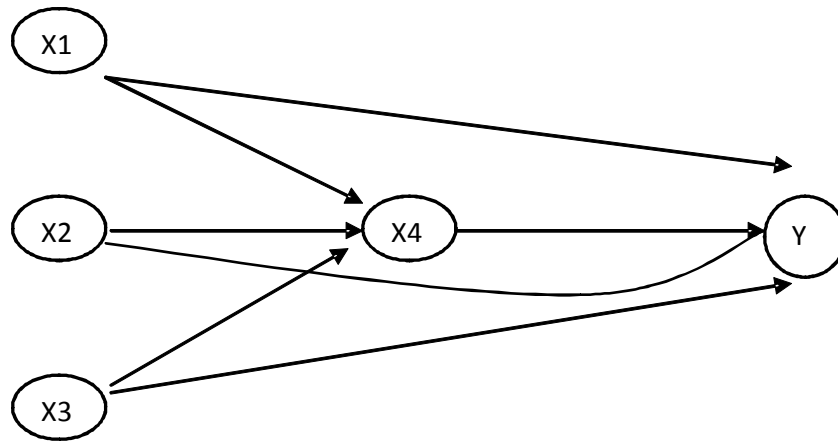
The formulation of the problem of this research can be stated; firstly, does ecosystem knowledge, conservation knowledge, and pollution knowledge have an effect on community attitudes in preserving the environment, Secondly, is all variables has an effect to community behavior in protecting and preserving the environment and natural resources in the region upstream part of Maros catchment area. This study aims to analyze the influence of knowledge ecosystems, conservation knowledge and pollution knowledge which in turn maintains the community attitude and also influence on environmental behavior of the community in managing their natural resource at upstream part of Maros catchment area Maros.

## **2. RESEARCH METHOD**

The type of this research is survey with the quantitative approach. This research was examine and to analyze the effect of all variables such as; ecosystem knowledge, conservation knowledge, pollution knowledge and community attitudes in protecting their environmental and also community behavior in managing their environment and the use of natural resources at the upstream region of Maros catchment area.

The sampling technique used in this study is proportional sampling method. The sample size is 200 head of the family, taken in proportionally from the area of the village in 6th District Tompobulu Maros.

In this research all the variables are considered homogeneous, where all the independent variables have a relationship directly or indirectly on the dependent variable, the indirect relationship occurs because there are variable between the independent variable (X4 / Environmental Attitude). The research design is:



**Figure 1:** The Relationships between variables

- Noted:  
 Y = The Community Environmental Behavior  
 X1 = Ecosystem Knowledge  
 X2 = Conservation Knowledge  
 X3 = Pollution Knowledge  
 X4 = Attitude Preserving the Environment

The analysis technique used in this study is a Structural Equation Model (SEM) operated through AMOS 4:01. The reason is because the use of SEM is a set of statistical techniques that allow the measurement of a relatively complex set of relationships between variables simultaneously. Modeling studies by using SEM allows researcher to answer the research questions and conceptual regressive modeling methods

**3. RESULTS AND DISCUSSION**

**Descriptive Analysis**

Descriptive analysis aims to describe the research variables through the interpretation of the frequency distribution of respondents as a whole, both in the

number of respondents (people), and the mean value of the grain of the existing questions on the knowledge ecosystem variables (X1), knowledge of conservation (X2), knowledge of pollution (X3), the attitude of maintaining the environment (X4), and ecological behavior (Y) were calculated cumulative question.

TABLE 1: FREQUENCY DISTRIBUTION DEPENDENT AND INDEPENDENT VARIABLES

	<i>Ecological knowledge</i>	<i>Conservation knowledge</i>	<i>Pollution Knowledge</i>	<i>attitudes</i>	<i>Community awareness</i>	<i>Community behavior</i>
N = Valid	200	200	200	200	200	200
Missing	0	0	0	0	0	0
Mean	7,81	7,2850	7,56	190,9850	173,3650	109,225
Standard Deviation	2,69448	2,3005	2,59036	8,07594	7,26261	8,23062
Minimum	3,00	4,00	4,00	179,00	163,00	97,00
Maximum	13,00	12,00	13,00	213,00	192,00	131,00

From the table 1 it can be explained that the average cumulative ecological knowledge response variables (X1) is 7.81 with a minimum value of 3.00 cumulative answer questions and answer questions cumulative maximum of 13.00. Average cumulative response of variable conservation knowledge (X2) is 7.2850 with minimum cumulative answer questions of 4 and a maximum value of cumulative answer questions 12. The average cumulative response of Pollution knowledge (X3) is 7.56 with the minimum value of the minimum cumulative answer to the question of 4.00 and a maximum cumulative value of 13.00 answer questions. Average cumulative response of the attitude of nurturing environment variable (X3) is 190.9850 with a minimum cumulative score of 179 and answer questions answer questions for maximum cumulative 213. While the average cumulative response of variable community environmental behavior (Y) is 109.225 with a minimum cumulative score of 97.00 and answer questions answer questions cumulative maximum of 131.00.

#### **Assumption Testing Results of Structural Equation Model**

Univariate normality assumption was tested with the help of software AMOS 6. Jika CR Univariate absolute value of data is less than 5% i.e. 1.96 Z, then the univariate normal assumptions are met, otherwise if the value of CR Multivariate data is greater than 1.96 then the univariate normal assumption is not met, meaning that the data not normal. The following test results show the majority of the absolute value of CR <1.96, the univariate normality assumptions are met.

It is shown that there is no CR values that are outside the  $\pm 2.58$  so it can be concluded that the data closer to a normal distribution. The multivariate value is 0.031 which is the coefficient of multivariate kurtosis with the critical value of 0.093 which is close above + 2.58. It is proved that the multivariate data can be regarded as a normal distribution in univariate and multivariate analyzes.

TABLE 2: NORMALITY ANALYSIS FOR EACH VARIABLE

<i>Variabel</i>	<i>Min.</i>	<i>Max.</i>	<i>Skew</i>	<i>c.r.</i>	<i>Kurtosis</i>	<i>c.r.</i>
SL3	70.000	87.000	.550	3.141	.618	1.765
SL2	53.000	64.000	.973	5.561	-.277	-.793
SL1	50.000	63.000	.163	.932	-1.252	-2.579
PP3	1.000	4.000	.123	.703	-1.277	-1.650
PP2	2.000	4.000	.638	3.644	-.961	-1.747
PP1	1.000	5.000	.582	3.325	-.386	-1.102
PK3	2.000	5.000	.808	4.620	-.694	-1.982
PK1	.000	5.000	-.194	-1.107	-1.233	-2.522
PM3	9.000	16.000	-.091	-.518	-.922	-1.636
PM2	17.000	29.000	.414	2.366	-.509	-1.454
PE2	.000	5.000	.098	.559	-1.071	-2.060
PE1	.000	5.000	.253	1.446	-.436	-1.246
Multivariate					.093	.031

The analyses also measure the Goodness of Fit of SEM Modeling. This analysis is measure; Chi Square, norm chi-square, RMSEA, GFI, AGFI, CFI, NFI, IFI and RFI, it can be concluded that the model in this study stand in good fit model. More detail can be seen in the table below:

TABLE 3: SUMMARY OF GOODNESS OF FIT INDEX (GOF) RESEARCH

<i>Fit Index</i>	<i>Recomended Value</i>	<i>Value</i>
p-value	p-value >0.05	0.220
RMSEA	≤ 0.08	0.026
NFI	≥ 0.90	0.921
CFI	≥ 0.90	0.990
IFI	≥ 0.90	0.990
RFI	≥ 0.90	0.888
GFI	≥ 0.90	0.951
AGFI	≥ 0.90	0.920

**Inferential Analysis of Structural Model Analysis**

In the structural model is essentially hypothesis testing in this study. There are three types of effects will be presented in a structural model, the direct effect (Direct Effect), the indirect effect (Indirect Effects), and the total effect (Total Effect).

Hypothesis testing is done by testing the direct influence of Critical Ratio (CR) on each of the direct influence of the partial paths. If the value of CR > 1.96 or P value of <0.05, we can conclude there is a significant effect, otherwise if the value of CR <1.96 or P values > 0.05 then we can conclude there is no effect. The results of the full analysis, contained in the following table.

TABLE 4: REGRESSION WEIGHTS: (GROUP NUMBER 1 - DEFAULT MODEL)

<i>Direct Effect</i>	<i>Estimate</i>	<i>S.E.</i>	<i>C.R.</i>	<i>P</i>	<i>Label</i>
Attitude ← ecology knowledge.	.769	.088	8.726	***	par_1
Attitude ← conservation knowledge	-.287	.241	-1.194	.233	par_2
Attitude ← pollution knowledge	.508	.219	2.322	.020	par_3
Behavior ← ecology knowledge	-.075	.161	-.462	.644	par_7
Behavior ← conservation knowledge	.258	.072	3.568	***	par_8
Behavior ← pollution knowledge	.262	.053	4.918	***	par_9
Behavior ← Attitude	.340	.138	2.462	.014	par_10

TABLE 5: STANDARDIZED REGRESSION WEIGHTS:  
(GROUP NUMBER 1 - DEFAULT MODEL)

<i>Direct Effect</i>	<i>Estimate</i>
Attitude ← ecology knowledge.	.320
Attitude ← conservation knowledge	-.014
Attitude ← pollution knowledge	.191
Behavior ← ecology knowledge	-.041
Behavior ← conservation knowledge	.779
Behavior ← pollution knowledge	.141
Behavior ← Attitude	.356

From the table 5 it can be analyzed that the knowledge ecosystem variables (X1), conservation Knowledge (X2) and Pollution Knowledge (X3) have direct effect on Attitude Preserving Environment (X4). This is indicated by the significant value of p - value <0.05 level. This is indicated by the significant value of p - value <0.05 level. The Attitude preserving environment variable (X4) has significantly effect to Environmental Behavior (Y). This is indicated by the significant value of p - value <0.05 level. Meanwhile Conservation Knowledge (X2) and Knowledge Pollution (X3) also have direct and significant impact with Environmental Behavior (Y). This is also indicated by the significant value of p - value <0.05 level. Meanwhile Knowledge Ecosystem (X1) hasn't directly significant impact to Environmental Behavior (Y). This is indicated by the significant value of p - value > 0.05 level.

The magnitude of the effect of Ecosystem knowledge direct effect to attitude preserving environment variable of 0.591, and the environmental behavior of the people in the region in Maros catchment area 0,005, so it can be said that there are significant knowledge of the ecosystem to maintain environmental attitudes and environmental behavior in the Maros region upstream catchment area. Referring to the method category Guilford that the influence of the knowledge of the ecosystem to maintain the attitude of the environment including the category of relation moderate / medium, DAPT For more details see the following table:

TABEL 6: DIRECT EFFECT (GROUP NUMBER 1 – DEFAULT MODEL)

<i>Variabel</i>	<i>Ecological knowledge</i>	<i>Conservation knowledge</i>	<i>Pollution knowledge</i>	<i>attitude</i>	<i>Community awareness</i>
Attitudes	0,591	0,082	0,258	0,000	0,000
Behavior	0,005	0,067	0,069	0,116	0,051

From the table above, it can be said also that the magnitude of the effect of Conservation Knowledge variable to the attitude to preserving an environment variable that is equal to 0.082, and the environmental behavior of the community in the region Maros region upstream catchment area of 0.067, so it can be said that there are significant knowledge of environmental conservation to maintain the attitude and behavior environmentally sound of the Maros region upstream catchment area. Referring to the method category Guilford, the influence of knowledge on attitudes in preserving environment and environmental behavior is very loose relationship and categorized low. Meanwhile the magnitude of the effect of pollution knowledge effect knowledge the upstream part of the attitude to maintain an environment variable that is equal to 0.258, and the environmental behavior of the people in the region the Maros region upstream catchment area section of 0.069, so it can be said that there are significant knowledge of the pollution of the environment attitude, and behavior environmentally sound the Maros region upstream catchment area. Refers to the category of methods that the influence of pollution knowledge to the environment including maintaining attitude the relationship category is low, and the influence knowledge of environmental pollution on the behavior of the people in the region Maros upstream section include the category of very low. Furthermore, the influence of environmental variables maintaining attitudes towards environmental behavior is 0,116. Referring to the category method that maintains the attitude of the influence of the environment on the behavior of environmentally sound Maros region including the upper reaches in the category very low.

**4. DISCUSSION**

Based on the results of research that has been described, then the relationship between exogenous and endogenous variable illustrate the value of direct influence between variables. A direct relationship occurs when there intermediate variable. A direct relationship between the variables can be explained as follows:

**The effect of Human Knowledge Attitude to Preserve the Environment**

The results show that the knowledge ecosystem has positive and significant effect on the attitudes nurturing environment with  $\alpha = 5\%$  ( $p = 0.000$ ) with a coefficient of 0.769. This shows that the higher the knowledge ecosystem of the community,

the higher the attitude of the community to maintain an environment in the use of natural resources and the environment in the region the Marosregion upstream catchment area. Furthermore, The effect of ecological knowledge of the community against Environmental Behavior, The data results show that the knowledge ecosystem has not positive and not significant to the community-minded Behavior with  $\alpha = 5\%$  ( $p = 0.644$ ) with a coefficient of  $-0.075$ . This suggests that only a small influence on the ecosystem knowledge to the society environmental behavior the Maros upstream catchment area both in utilizing, maintaining and controlling the management and utilization the area.

#### **The effect of Conservation Knowledge against Attitude in Preserving the Environment Maros upstream catchment area.**

The results showed that Conservation knowledge have significant positive effect on the attitude of the community to maintain an environment with  $\alpha = 5\%$  ( $p = 0.233$ ) with a coefficient of  $-0.287$ . This suggests that only a small influence on the attitude to maintain conservation knowledge of the society at the Maros upstream catchment area to utilize and maintaining the forest and protecting the area from people from outside the area. Moreover, the effect of Conservation Knowledge of community Against Environmental Behavior of the community showed that knowledge Conservation has positive and significant impact on the Environmental Behavior of society with  $\alpha = 5\%$  ( $p = 0.000$ ) with a coefficient of  $0.258$ . This shows that the higher the knowledge society, the higher the Conservation Environmental Behavior Society in the form of utilizing, maintaining and controlling the environmental management in the Maros upstream catchment area.

#### **Effect Maintaining pollution knowledge against Attitude of the community in maintain the catchment area**

The result showed that pollution knowledge has a positive and significant impact on the attitude of society to maintain and preserving the area , this showed by looking at  $\alpha = 5\%$  ( $p = 0.020$ ) with a coefficient of  $0.508$ . The synthesis of the data can be stated that the higher the pollution knowledge of the communities, and the higher attitude of the community in protecting and maintain and also preserving the environment the Maros upstream catchment area. In addition, the effect of pollution knowledge Against Environmental Behavior Society is resulted that pollution knowledge also has positive and significant impact on local wisdom with  $\alpha = 5\%$  ( $p = 0.000$ ) with a coefficient of  $0.262$ . This result showed that the higher the pollution knowledge of the community, then the higher community behavior in protecting their Environment especially, the community behavior in using, maintaining and controlling the environment and the forest in the Maros upstream catchment area.



### **The influence of Maintaining Environmental Attitudes toward Environmental Behavior Community**

The result showed that the attitude of the community has positive and significant impact on the community environmental behavior with a value of  $\alpha = 5\%$  ( $p = 0.014$ ) with a coefficient of 0.340. This shows that the higher of the attitude of the community to maintain the area, then the higher community environmental behavior in using, maintaining and controlling the environment at the Maros upstream catchment area

### **5. CONCLUSIONS**

Data analysis and discussion of the results by looking at statistical calculations that are performed using SEM analysis which has been described previously, the obtained conclusions are as follows:

- 1) From the analysis it was found that the ecological knowledge, pollution knowledge has a positive direct effect and impact on the attitude of the community in protecting , preserving and maintain the environment the Maros upstream catchment area. While conservation knowledge no positive effect on the attitude of maintaining the environment. In addition, the level of contribution of the effect of each variable on attitudes maintain the environment successively from the highest to the lowest, namely; medium in the ecological knowledge, low in the pollution knowledge and very loose and very low in the conservation knowledge.
- 2) From the analysis it was also found that ecological knowledge, conservation knowledge and pollution knowledge have a positive direct effect on the community environmental behavior the Maros upstream catchment area. While the attitude of maintaining has also a positive environment directly affect to the community behavior to maintain their environment and the forest area the Maros upstream catchment area. Moreover, the level of contribution of each variable to the environmental behavior of the community in environmental management the Maros upstream catchment area is all of the variable effect is very loose or very low, which respectively influence from the highest to the lowest of the attitude to maintain the environment and also has an impact from the variables of pollution knowledge, conservation knowledge, and ecological knowledge.
- 3) From the results of the analysis showed that the variables of knowledge ecosystem, conservation knowledge, and knowledge pollution indirect effect on the environmental behavior of the upstream region of catchment area previously through the environment while maintaining the attitude of the level of contribution of each variable indirect effect on the environmental behavior of society catchment area upper of the effect is

very low which can be sorted in a row starting from the highest to the lowest namely ecosystem knowledge, knowledge of pollution and conservation knowledge.

- 4) Variables influence ecosystem knowledge, knowledge of conservation, pollution knowledge and attitude nurturing environment together influence environmental behavior in environmental management catchment area Maros region upstream part of the total effect 62.1%, so that there are other variables that contribute to influence the behavior of maintaining environmental conservation catchment area the upstream region of 37.9%, but other variables that do not include the variable is not research.

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