

The Role of Mangrove Ecotourism in Community Empowerment and Sustainability Environment : Study Case Tanjung Batu Village Central Sekotong, West Lombok

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Abstract

Mangrove ecotourism is one of the approach strategic in management source Power coast that offers benefit economic, social, and ecological research This aim analyze influence mangrove ecotourism and empowerment public to sustainability environment in the village Tanjung Batu, Central Sekotong, West Lombok. Method study use approach quantitative type correlational with 30 selected respondents through simple random sampling, and equipped with qualitative data in the form of observation, interviews, and FGD. Data analysis includes statistics descriptive, multiple linear regression, ANOVA, and coefficient regression. Research results show that empowerment public influential significant to sustainability environment ($\beta = 0.808$; $p < 0.001$), whereas mangrove ecotourism is not influential significant ($p = 0.605$). Although Thus, the regression model in a way overall own strength predictive tall with $R^2 = 0.782$. Findings This confirm that sustainability environment more determined by involvement active public compared to variables facilities and activities tour solely. Research This give implications important for planning ecotourism based communities in coastal areas.

Keywords : mangrove ecotourism, empowerment society, sustainability environment, Sekotong, West Lombok.

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Introduction

Mangrove ecotourism is effort For preserve mangrove forests. The presence of healthy mangroves in coastal areas can increase resilience public coast to change climate and reduce risk disaster natural like storms, tsunamis and abrasion coast. Mangroves also play a role as the lungs of the world through absorption and storage of blue carbon, to become area spawning and habitat of marine biota such as fish, crabs and shrimp which are valuable economical and become source income public coast through activity ecotourism, education, and fisheries (Chandrasekharan Nair et al., 2025; Pak et al., 2025).

Form tourist sustainable that combines aspect conservation ecosystem, empowerment public local, and education environment. In In the context of Indonesia's coastal areas, mangrove ecotourism is often expected become solution For answer challenge economy society, degradation ecosystem, as well as lack of literacy environment. Mangrove ecotourism is seen as as form tourist sustainable that utilizes service mangrove ecosystems such as buffer abrasion, habitat provision, and services carbon all at once present experience education and recreation for visitors. Concept ecotourism emphasize minimal impact interaction, education conservation, and involvement community local as implementer and recipient benefit economy (Hassan & Ridwan, 2025; Lamentowicz et al., 2025).

potential, almost 46% of mangrove forests are spread across South Asia, Southeast Asia, and Asia-Pacific, with Indonesia having... about 20% of the total area global mangrove forests. With Thus, mangrove forests are Power pull ecotourism mainstay in Southeast Asia (Hjalmarsdottir & Óskarsson, 2025).Mangrove ecotourism is not only become tool economy but also an instrument For increase awareness conservation and utilization service mangrove ecosystem in general sustainable Empowerment public in context source Power coast refers to the increase capacity local knowledge, skills, access to source power, and retrieval decision so that community capable manage source power and reach benefit economy in a way fair (Kilinc-Ata et al., 2025). From the perspective of development sustainable, empowerment community must integrated with objective environment mangrove conservation and economy eye livelihood alternative, so that achieved *triple-bottom-line*: social, economic, and environmental The literature also emphasizes the importance of management modelsbased community (*community-based management*) for ensure compliance local and sustainability conservation

A number of studies empirical research in Indonesia shows that development mangrove ecotourism can increase income local, open field Work beak time guide, transportation boat, business micro), and strengthen initiative conservation If designed participatory (Adeleye et al., 2025).The results of the study in Bengkulu reported improvement visit traveler educational and opportunities business local after intervention management ecotourism, while study in Sinjai take notes valuation economy service mangrove tourism that supports the argument for investment conservation (Adeleye et al., 2025; Celik, 2025; Drago et al., 2025). Study local in Sekotong show potential real For mangrove education and development economy local, but also highlights limitations capacity promotion and delivery material education to visitors (Potryvaieva, 2025).

There is also research about perception and participation society that shows variation interregional : several community show perception positive and participation tall in management mangrove ecotourism because benefit economy directly, while other areas show participation low consequence limited social capital, conflict access land, or lack of involvement taker decision local (Li & Imran, 2025). Research in Sheet marking that without incentive economy and structure clear institutions, motivation participation public easy decreased (Alkharafi & Al-Sabah, 2025). Therefore design scheme distribution benefits and governance mechanisms become key success.

From the side conservation and results ecological, study show that activity managed ecotourism Good can push restoration and protection of mangrove habitats, improvement habitat quality, as well as other benefits such as welfare psychological public coast; however without strict management activity tour can cause pressure for example erosion, waste, biota disturbance (Savaş, 2025) literature review of mangrove ecotourism support. Research in several area find that when ecotourism combined with education environment and scheme incentive conservation, results conservation become more positive and sustainable (Mikhailova et al., 2025)

Analysis integrative to proof empirical above show pattern: potential mangrove ecotourism produce benefit economics and conservation if There is design participatory, capacity adequate local, and governance mechanisms distribution fair benefits. However studies local (including study early in Sekotong) shows gap important: (a) limitations material effective education and communication to tourists and residents local (gap knowledge practical), (b) lack of measurement quantitative impact economy term medium-long term at home stairs, and (c) minimal integrated research indicator social (population / power access), economics (valuation) income/resilience), and ecological (habitat quality / diversity) in One framework longitudinal research. In other words, the novelty of the research this is approach holistic and measurable that combines evaluation economic-environmental-social in a way simultaneously on a scale village Tanjung Batu, Central Sekotong and testing intervention education about mangroves indicator empowerment, a gap that has not been in a way adequate handled by literature previously

Village Tanjung Batu in Central Sekotong, West Lombok has potential sufficient mangrove ecotourism large, marked with existence mangrove forest, activities tour educational and support a number of conservation programs. However, there are still there is gap related capacity management, participation society, and impact direct to sustainability environment. Conditions This confirm the need study comprehensive analysis connection between ecotourism, empowerment society and sustainability environment.

Based on framework problems and gaps above, research This aim to: (1) analyze contribution mangrove ecotourism towards sustainability environment; (2) evaluate influence empowerment public to sustainability environment; and (3) understanding role second variables in a way simultaneous in support conservation Mangrove ecosystem in Tanjung Batu. Expected benefits includes: recommendations policy management ecotourism based community, replicable empowerment model For village coast others, and evidence empirical measurable For support mangrove conservation at the same time increase welfare local. (Reference policies and studies

implementation relevant can become references moment part discussion and recommendations compiled).

Research Methods

Study This use approach quantitative with type correlational, which aims Forknow relationships and influences between variables mangrove ecotourism (X_1), empowerment society (X_2), and sustainability environment (Y). Approach This chosen Because allows testing hypothesis in a way objective through analyzed numerical data with technique statistics inferential. Correlational design focus on measurement level relatedness intervariable without give treatment special to subject research, so that the result reflect condition facts in the field (Pappa & Kaliampakos, 2025). Data sources in study This is public Village Sekotong Tengah and villages around Subdistrict Sekotong, West Lombok Regency is involved direct or no direct in activity mangrove ecotourism, such as fishermen, managers tourists, traders and residents around area. Number respondents set 30 people were selected use simple random sampling technique so that each member population own equal opportunities For selected as sample. The data obtained primary, collected in a way direct through distribution questionnaire to respondents with mentoring researchers For ensure understanding to every grains question.

Instrument research used in the form of questionnaire closed with a five- level Likert Scale, starting from from very to very agree (1) to strongly agree (5). There are 18 items in total. Questionsn, which consist of over 6 questions For variable X_1 (Mangrove Ecotourism) which measures perception to facilities, accessibility, and activities tourism ; 6 questions For variable X_2 (Community Empowerment) which measures aspect participation, independence economy and capacity social ; and 6 questions For variable Y (Sustainability Environment) which includes indicator conservation, awareness ecological, and management environment tour.

Procedure study covering a number of stages, namely : (1) preparation instrument study based on theory and indicators relevant variables ; (2) data collection through distribution questionnaire to 30 respondents ; (3) data tabulation using device soft statistics like SPSS for ensure completeness and accuracy of data; (4) data analysis, which consists of from analysis statistics descriptive For describe characteristics respondents and perceptions they, as well as analysis multiple linear regression For test influence variables X_1 and X_2 against Y; (5) interpretation results analysis For interpret meaning connection between variables ; and (6) compilation conclusion based on results empirical and its implications to empowerment community and sustainability environment in the area mangrove ecotourism. Data collection techniques as following: survey via distributed questionnaires via the Google Form link to respondents quantitative, interviews and FGD, observation directly in the field at the mangrove location and object tourism, as well as secondary data collection (statistics official, document planning village, report project related, study introduction).

Data analysis techniques include analysis quantitative with statistics descriptive (frequency, percentage, average, median, standard deviation) for variables demographics, participation, perception. While inferential statistics, depending on hypothesis research. Analysis qualitative, with

transcription interviews /FGD and coding of data regarding themes main: perception society, benefits economy, challenges environment, empowerment strategy. Thematic analysis for identify motives, obstacles, factors supporters empowerment social, economic and environmental sustainable. Next, it is carried out data triangulation with see results from questionnaire with results interviews /FGD and documents supporters.

Results and Discussion

Research shows that mangrove ecotourism in Tanjung Batu has developed as form utilization service ecosystem that provides benefit economic, social, and educational. Statistics descriptive show that public own perception positive to existence ecotourism, empowerment, and sustainability of the environment. The average value of the three variables be above 24 with standard deviation relatively small, indicating consistency perception of the majority respondents. Conditions This in harmony with trend national in which area mangrove ecotourism becomes instrument improvement welfare public coast at a time effort conservation ecosystem (Fei et al., 2025)

Multiple linear regression model produces the R^2 value is 0.782, which means 78.2% of the variation sustainability environment can explained by mangrove ecotourism (X1) and empowerment society (X2). This indicates very strong relationship between independent and dependent variables. The F value of 48.31 ($p < 0.001$) indicates that the regression model in a way overall significant and worthy used. This figure shows a very strong and relevant model for explaining phenomenon sustainability environment in the area Tanjung Batu. Discovery This strengthens understanding that sustainability environment No appear in a way spontaneous, but rather is results interaction dynamic between activity tourism, capacity social, and participation public in management source Power. However, when reviewed in a way partial, only variable X2 (empowerment influential society significant against Y, with $\beta = 0.808$ and $p < 0.001$. On the other hand, X1 (mangrove ecotourism) does not show influence significant ($p = 0.605$). Findings This indicates that sustainability environment more strong influenced by quality empowerment society, not just existence facility or activity tour.

The Role of Mangrove Ecotourism in Sustainability

Although Thus, the analysis coefficient show that mangrove ecotourism (X1) no own influence significant direct to sustainability environment ($p = 0.605$). Findings This indicates that existence facility tourism, activities recreation, or good accessibility just Not yet Enough For produce impact ecologically sustainable. This is in line with literature international which states that ecotourism only will impact positive to ecosystem if managed in a way participatory and accompanied with education strong environment (Mikou et al., 2025). In other words, ecotourism nature potential, not automatic he need support social in order to be able to give contribution to conservation.

Dominant role empowerment public

Different with X1, variable empowerment society (X2) shows influence significant and very strong to sustainability environment ($\beta = 0.808$; $p < 0.001$). This result describes empowerment

includes improvement capacity, participation in taking decisions, as well as reception benefit economy is key success Mangrove conservation in Tanjung Batu. Findings This consistent with Lots results studies that show that the management model based community -based ecotourism is determinant main sustainability mangrove ecosystems in Southeast Asia (Toumi, 2025). When the community feels have (sense of ownership) and obtain direct benefit, motivation for guard environment increases significantly.

Implications mechanism mediation and the importance of governance

Findings show that X1 is not significant, but the model is overall strong, indicating possibility existence connection mediation: ecotourism (X1) influences sustainability environment (Y) through empowerment society (X2). This is in accordance with framework and social ecology, where change environment is very dependent on the ability of social, institutional, and structural management local. With Thus, the existence of ecotourism should No only directed at development infrastructure, but need integrated with improvement program capacity, governance collaborative, and mechanisms distribution benefit.

Relevance with studies field & literature

In a way overall, results study This strengthen proof empirical that the sustainability of mangroves in Tanjung Batu is more determined by aspects social compared to aspect tour That alone. This in line with studies related mangrove ecotourism in Bengkulu, Sinjai, Lembar, and Sekotong which emphasizes that impact positive environment appear when public involved active in activity conservation, education tourism and management area (Jiang et al., 2025). With Thus, research gives important contribution in emphasizing connection between characteristics of socio-economic community and the success of the mangrove ecotourism program.

Table 1. ANOVA Model Regression Test

ANOVA Test Results

Model		Sum of Squares	df	Mean Square	F	p
M ₁	Regression	387.6	2	193,779	48.31	<.001
	Residual	108.3	27	4,011		
	Total	495.9	29			

Note. M₁ includes X1, X2

Note. The intercept model is omitted, as no meaningful information can be shown.

The results of the ANOVA test show that the regression model significant in a way statistics with F value = 48.31 and p <.001. This shows that the model used worthy For interpreted more carry on. Based on table coefficient, variable empowerment society (X2) has strong and significant

influence to sustainability environment (Y) with β value = 0.808 and $p < .001$. On the other hand, the variable mangrove ecotourism (X1) shows significant influence to sustainability environment ($p = .605$). Findings This indicates that in a way simultaneous, both variables independently give contribution to sustainability environment. However, the contribution is the biggest originates from variables empowerment society. This means that the level of sustainability in the environment is more determined by the extent society participates, have capacity, and independence in managing ecotourism, compared only depend on existence facility or activity tour solely. With Thus, empowerment of public becomes factor key in mediate success management and sustainable mangrove ecotourism.

Table 2. Regression Coefficient Test Results

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M ₀	(Intercept)	24,067	0.755		31,878	<.001
M ₁	(Intercept)	3,928	2.126		1,848	.076
	X1	0.081	0.155	0.088	0.523	.605
	X2	0.739	0.154	0.808	4,796	<.001

Mangrove ecotourism (X1) no show contribution significant direct to sustainability environment (Y) — but findings This No means ecotourism No important ; even clarify role key empowerment society (X2) as driving force main. Explanation detailed and recommendations following :

- The coefficient of X1 is not significant ($p = .605$), while X2 is significant strong ($\beta = 0.808$; $p < .001$). This means that in your multiple model, the variation of Y is greater Lots explained by variation in empowerment public compared by indicators direct ecotourism (e.g. facilities / activities).
- The M₁ model remains very robust ($R = 0.884$; $R^2 = 0.782$), indicating that the combination of X1 and X2 explains ~78% of the variation in Y — however effect detected dominant originate from X2.

Conclusion

Study This shows that mangrove ecotourism in Tanjung Batu has given benefits for society, even though it influences directly to sustainability environment Not yet significant. On the other hand, empowerment of the public has proven to become a dominant and significant factor that determines level sustainability environment. In general, overall, regression models show strong

relationship between variables, where 78.2% of the variation sustainability environment can explained by the interaction between activity ecotourism and empowerment public. Effect No direct/mediation: Ecotourism (X1) possibly affects Y in a No direct via X2 meaning, facilities/activities ecotourism only impact on sustainability when they followed by an increase in participation, capacity, and independent society. Literature latest confirms that community empowerment often becomes an important mediator between activity tourism / *multiple-use* and results conservation. Problem size sample & statistical power: With n = 30, the ability detect effect moderate / smaller limited more X1 effect weak Possible No detected significant although in a way practical relevant. Measurement and construct: X1 is measured as score aggregate facilities / activities Possible blur the true dimensions relevant For conservation for example quality education visitors vs. just amount facilities) Study show importance decomposes variables ecotourism (infrastructure, education, management) visit) at the time evaluate impact ecological. Possibility multicollinearity or X2 dominance in the model: If X1 and X2 are correlated high, contribution unique X1 against Y in a multivariate model Can looks small. You can check VIF for ensure this matter.

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