

Role Of Stakeholders In The Development Of Food From The Forests: A Case Of Gunungkidul, Indonesia

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ABSTRACT

Population growth and climate change have triggered food crises in many countries. As a country with a large population with an average area of agricultural land ownership of fewer than 0.25 hectares, Indonesia needs a more progressive strategy in anticipating a food crisis. Additional food production from outside agricultural land is required to meet food self-sufficiency. This study aims to map the role of stakeholders in the development of food production from forests in marginal land areas. In-depth interviews were conducted to determine

each stakeholder's level of interest and influence. This paper identifies each stakeholder's relationship, the opportunities for collaboration, and the challenges faced using stakeholder analysis. The research used a case study in Gunungkidul Regency, Yogyakarta Province, one of Indonesia's marginal and food-insecure areas. The results showed that among the 13 identified stakeholders, the Forest Management Unit (FMU) of Yogyakarta Province and the Food Security and Extension Board (BKPP) of Yogyakarta Province are two stakeholders who act as key players, with a high level of interest and influence. The provincial government's role was dominant in developing food from the forest. Forest farmers, private forestry companies, and universities are less involved in the decision-making related to food security policies. The government at the district level also does not have sufficient budget and resources to maximize the development of food from the forest. However, the analysis results show that the potential for stakeholder collaboration is immense.

Keywords: Stakeholders, food security, food from forests, community forest.

Introduction

The trend of world population growth continues to increase from year to year. The increase in population will affect the demand for food, which is a basic human need (Alexander et al., 2015). FAO estimates that it is necessary to increase food production by around 70% since 2005 to meet the needs of 9.1 billion people worldwide by 2050. This need can be met, among others, by increasing crop intensity by expanding land for growing food crops (FAO, 2009). FAO also projects that an increase of 69 million ha of agricultural land is required between 2005 and 2050 (Alexandratos & Bruinsma, 2012).

On the other hand, land quality is declining, and land area for food crop production is decreasing because it is used for various other uses, such as housing and industrial. In the long term, this has the potential to disrupt food security. Food security is achieved when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO et al., 2015). Food security includes four general dimensions: availability, access, utilization, and stability, and two additional dimensions, agency, and sustainability (FAO et al., 2021b). Food security is a global issue (Pérez-Escamilla, 2017), and the second sustainable development goal (SDG) is "zero hunger", which includes ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture (United Nations, 2022). Food security problems can occur in areas that do not allow food crops to grow properly

due to dry soil, lack of water supply, and low rainfall (Kusumaningtyas et al., 2021). So other alternatives are needed to provide food, including utilizing forest areas as a food source. Forest is an area that is allocated to support the potential for increasing agricultural production (Andrieu et al., 2019) and sustains food security (Bahar et al., 2020; Gergel et al., 2020) because it is considered a space or reserve for further agricultural expansion or a resource that must be protected due to increase (Sunderland et al., 2013). Forests have an essential role in human life because forests can provide many products and services consumed by the community (Chamberlain et al., 2020). More than one billion people worldwide depend on forests and trees for their livelihoods and forest food for nutrition (Angelsen et al., 2014; Pimentel et al., 1997). Rural people living near the forest get a variety of foodstuffs from the forest (Penafiel, D.; Lachat, C.; Espinel, R.; van Damme, P.; Kolsteren, 2011), which is very important for people with low incomes (Ickowitz et al., 2014; Mollee et al., 2017; Nykänen et al., 2018). Porro, Lopez-Feldman, & Vela-Alvarado (2015) mention that forests provide ecosystem services for local food security, wild fruits, meat, shrubs, medicinal plants, and firewood sources.

Climate change and ongoing forest destruction allow many countries to face future food, energy, and water scarcity. This condition is exacerbated by the Covid-19 pandemic, where there is an increase in food insecurity. As many as 2.37 billion people did not have access to sufficient food in 2020, an increase of almost 320 million people compared to 2019 (FAO et al., 2021a). A decrease in forest area will harm the quality of food for local people because there is a significant positive relationship between the consumption of food from the forest and the consumption of more meat, poultry, and fish (Jendresen & Rasmussen, 2022).

Using forest land as an additional source of food production can be an alternative solution in countries with limited agricultural land by choosing suitable crop commodities, such as local food. Local food sources are expected to support the fulfillment of the food needs of the Indonesian population, which ranks fourth in the world. The population growth of Indonesia in the last ten years has been relatively high, from 270,203,900 people in 2010 to 237,641,300 in 2020, with a population growth rate of 1.25%. (BPS, 2021).

Various parties' involvement will significantly affect local food development's success. The study by Agrawal et al. (2014) shows that stakeholders, land users, governments, civil society organizations, donors, and market players must meet the increasing global demand for food and forest products while conserving natural ecosystems. For this reason, multi-stakeholder collaborative efforts are needed to develop reliable and environmentally friendly agriculture (Sukara et al., 2020) because food governance systems are concerned with the processes and

constellations of actors that shape decision-making related to food production, distribution, and consumption (van Bers et al., 2016; Herens et al., 2022). The food system includes formal and informal actors, institutions, rules, norms, and processes that make up the food system. Various actors in the food system must work more effectively across sectors, borders, public and private areas, and space and time (Termeer et al., 2018).

Herens (2016) said that in the last few decades, the role of government in the governance of the food system has diminished and been replaced by the increasing role of corporations and civil society actors. This research focuses on the role of stakeholders in developing food crops from the forest. This paper presents the results of analyzing the actors that influence the design of forest food development policies through stakeholder mapping in the policy formulation process. The objectives of this paper are to 1) identify stakeholders, 2) make grouping and categorization stakeholders, and 3) analyze the relationship between stakeholders involved in formulating policies on forests as food sources. The relationship between stakeholders needs to be known to strengthen food governance and achieve one of the government policies to maintain the national food security chain.

Materials and Methods

Research Location

Stakeholder identification was carried out in 2018 in Yogyakarta Province. Gunungkidul Regency (Figure 1.) was chosen purposively as the research location because it is highly vulnerable to food insecurity. The entire area consists of mountains resulting from karst rock formations in the tertiary era, with mountain heights reaching 250-600 meters above sea level. In the Oldeman classification system, this area is included in the agro-climatic zone C, with dry months exceeding the number of wet months. The type of wood is dominated by teak. Plants resistant to drought include upland rice, cassava, corn, soybeans, nuts, tubers, and a few vegetables and fruit (Priantoro et al., 2015).



Figure 1. Research location

Data Collection and Analysis

The data were collected through in-depth interviews, observation, and the deepening of documents. In summary, the theory used, data analysis methods, data variables needed, and their data sources are presented in Table 1.

Table 1. Theory, data analysis methods, variables, and research data sources

Objective	Theoretical basis	Data analysis method	Variable	Data source
The identification of the actors involved and their influence and	Stakeholder category theory (Eden & Ackermann,	Stakeholder analysis (Bryson, 2004; Grimble, 1998; Hermans &	Actors involved in policy design	Ministry of Environment and Forestry, Provincial and District Forestry Services,

it's essential in designing policies for developing food from forests	1998; Reed et al., 2009) Stakeholder theory (Bryson, 2004; Eden & Ackermann, 1998; Friedman & Miles, 2006; Jakobsson et al., 2021))	Thiessen, 2008; Reed et al., 2009)	➤ Role of actors ➤ Interests of actors ➤ Influence of actors	➤ Provincial and Regency Development Planning Agency, NGO, academic, Forest management company/permit holder, Other key informants
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Research respondents are a group of stakeholders in the policy of developing food sources from forests in the Gunungkidul Regency which consists of seven elements of the government (provincial and district), communities, forestry extension workers, industry/companies, universities, and NGOs.

Data were analyzed using stakeholder analysis of the actors involved in the current policy formulation and those involved in future policy formulation at the national and local levels (research location). Stakeholder analysis is critical in natural resource management, where issues include: cross-cutting systems and stakeholder interests, multiple uses and users of the resource, multiple objectives, untraded products and services, and so on (Ivaylo Velichkov et al., 2009). Stakeholder analysis recognizes the various interest groups involved in natural resource utilization and conservation and provides tools to help identify and resolve trade-offs and conflicts of interest (Candrea & Bouriaud, 2009).

The stakeholder analysis was carried out following a series of analyzes conducted by Reed et al. (2009) which included: 1) identification of stakeholders, 2) grouping and categorizing stakeholders, and 3) investigation of the relationship between stakeholders. Reed et al. (2009) explained that strong actors would be 'main players', while weak actors would be 'marginal players'. Values of importance include 1) the level of involvement of the parties, 2) the support for policy design (roles), 3) the priority of activities in the main functions, 4) the benefits of development, and 5) the level of dependence on development. The influence values include: 1) ability to influence development policies, 2) access to human resources, 3) institutional capacity of human resources, 4) regulatory support, and 5) strengths of network and cooperation.

Table 2. Quantitative grouping of the interests and influence of stakeholders in the development of food from forests

Score	Value	Criteria	Remark
The Interests of the Stakeholders			
5	21-25	Very good	Very interested in food from forest development
4	16-20	Good	Interested in food from forest development
3	11-15	Sufficient	Sufficient interest in food from forest development
2	6-10	Less	Less interest in food from forest development
1	0-5	Very less	No interest in food from forest development
The influences of the Stakeholders			
5	21-25	Very good	Very influential in food from forest development
4	16-20	Good	Influential in food from forest development
3	11-15	Sufficient	Sufficient influence on food from forest development
2	6-10	Less	Less influential in food from forest development
1	0-5	Very less	No influence on food from forest development

Stakeholder analysis is carried out by explaining the results obtained in the interest-influence matrix of stakeholders on policies for developing food sources from forests in the Yogyakarta Province, especially Gunungkidul Regency. The results of determining the value of the indicators of interest and influence are combined to form coordinates and determine the position of the quadrant for each stakeholder. The class describes the role of each stakeholder, which is categorized as follows (Reed et al., 2009).

- i. Quadrant I; Key players are stakeholders who are active and have a high interest and influence on policies for developing food sources from forests
- ii. Quadrant II; Context setters are stakeholders with significant influence but low importance, so they can be a considerable risk to be monitored.
- iii. Quadrant III; Subjects are stakeholders with high interest but low influence, and although they support the activity, their capacity has a small impact. These stakeholders can increase their influence if they form cooperation with other stakeholders.
- iv. Quadrant IV; Crowds are stakeholders with little interest and little influence on the desired outcome and are considered to be included in decision-making.

The next stage is to explore the relationship between stakeholders descriptively and described in the actor-linkage matrix using keywords describing the relationship between the parties: conflict, complement each other, or work together. The connections are explained qualitatively to get a clear picture of the interrelationships between stakeholders who play a role in policies for developing food sources from forests in the Gunungkidul Regency area.

Result

Indonesia has significant water, energy, and food security resources, including oil, coal, natural gas, a high solar power potential, abundant water resources, and agricultural land. However, much attention has been paid to the level of security in Indonesia in terms of water, energy, and food and how these resources are not being managed optimally, resulting in scarcity situations (Purwanto et al., 2021). Indonesia ranked 71st out of 113 countries in terms of food security, trailing Southeast Asian countries such as Singapore, Malaysia, Thailand, and Vietnam (EIU, 2016).

The challenge of resource security is growing, particularly in countries with decentralized governance systems, such as Indonesia, where local government institutions have decisive authority over natural resources, planning, and land use (Purwanto et al., 2021). Quincieu (2015) emphasizes the importance of more prominent roles, responsibilities, programs, and policies among Indonesia's district, provincial, and central governments. Local governments play an essential role in determining whether or not national food security targets are met. As a result, the evaluation and development planning processes should be managed optimally at the regency (local) scale, where decision-making occurs, but within the context of nationally-set objectives.

Identification of Stakeholders Related to the Development of Food from Forests

Stakeholder Categories and Groups

There are thirteen (13) stakeholders involved in the development of food sources from forests in the Gunungkidul Regency, including 1) the Forest Management Unit (FMU) of Yogyakarta, 2) Forestry extension officers, 3) Forest Farmers Group (KTH) by taking samples of KTH Sedyo Rukun located in Panggang Village 1, Panggang District, Gunungkidul Regency 4) University represented by Faculty of Forestry Gadjah Mada University, 5) Food Security and Extension Board (BKPP) Yogyakarta Province, 6) Food Security Agency of Gunungkidul Regency, 7) Extension Agency of Gunungkidul Regency, 8) Development Planning Agency of Gunungkidul Regency, 9) Non-Governmental Organization (NGO) ARuPA (Volunteer

Alliance to Save Nature), 10) Private sector in forestry (PT Surya Silva Mataram), 11) Industrial Agency of Gunungkidul Regency, 12) Trade Agency of Gunungkidul Regency, 13) Food product processing industry in Gunungkidul Regency. Based on the scoring results, the matrix of the interest and influence of food sources from the forest development in Gunungkidul Regency can be seen in Table 3 and Figure 2.

Table 3. The interest and influence of developing forest plant food sources from forests in the Gunungkidul Regency area

No	Stakeholders	Interest	Influence	Quadrant	Category
Forest Management Unit (FMU)					
1.	of Yogyakarta Province	17	13	I	Key player
2.	Forestry extension officers	12	10	IV	Crowd
3.	Forest Farmers Group (KTH)	18	10	II	Subjects
4.	University	16	12	II	Subjects
Food Security and Extension					
5.	Board (BKPP) Yogyakarta Province	15	13	I	Key player
Food Security Agency of					
6.	Gunungkidul Regency	15	8	II	Subjects
Extension Agency of Gunungkidul					
7.	Regency	9	8	IV	Crowd
Development Planning Agency					
8.	of Gunungkidul Regency	9	8	IV	Crowd
Non-Governmental Organization					
9.	(NGO) Arupa	10	9	IV	Crowd
The private sector in forestry (PT					
10.	Surya Silva Mataram)	5	5	IV	Crowd
Industrial Agency of Gunungkidul					
11.	Regency	14	11	II	Subjects
Trade Agency of Gunungkidul					
12.	Regency	10	10	IV	Crowd
Food product processing industry					
13.	in Gunungkidul Regency	17	5	II	Subjects

Table 3 shows that the stakeholders who act as key players in food from forest development in Gunungkidul Regency are FMU Yogyakarta and BKPP Yogyakarta Province. These two stakeholders have significant influence because, organizationally, they are provincial and district government policymakers.

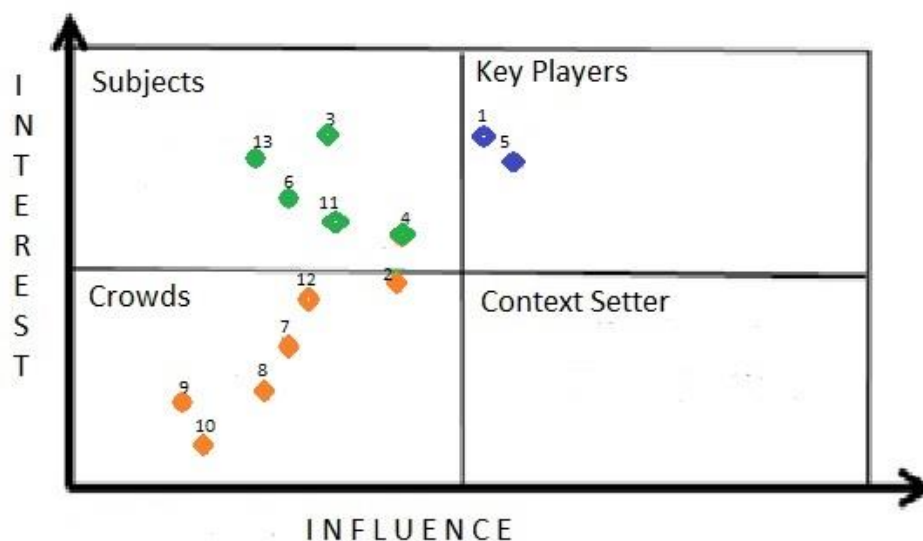


Figure 2. Matrix of the influence and interests of stakeholders in the development of food sources from forests in the Gunungkidul Regency area

FMU Yogyakarta is interested in forest management's sustainability in the province area. They also have significant influence because they have authority over forest land. Thus, other parties who will use forest resources must obtain their permit. The influence given can be in the form of rules and licenses, including sanctions for those who violate the laws they make. Meanwhile, BKPP Yogyakarta Province has a great interest in food sufficiency in Yogyakarta province. With their authority, they influence the agencies at the regency level to implement food security programs.

Six essential stakeholders are in the subject category, including the forest farmers group (KTH), universities, the Food Security Agency in Gunungkidul Regency, the Industrial Agency in Gunungkidul Regency, and the food processing industry in the Gunungkidul area. These stakeholders need involvement to participate in developing food from the forest. The participation of these stakeholders is possible by empowering and involving them at every stage of policy-making.

The crowds' stakeholders include forestry extension workers, the Extension Agency of Gunungkidul Regency, the Regional Development Planning Agency, NGOs, the private sector in the forestry sector, and the Trade Agency of Gunungkidul Regency. These stakeholders (crowd) are not subjects in developing food from the forest. However, they can be involved in the development of food from the forest policy making.

The matrix of importance and the effect of developing food from forests can change over time, and the impact of these changes needs to be considered (Reed et al., 2009). In addition, it is also possible for the emergence of food from forest development that has not been identified

in this study, related to the social dynamics that continue to develop in the research location.

Relationship between stakeholders

The actor linkages matrix method is used as conflict, complement, or cooperation to determine the relationship between stakeholders from data processing results using an interest-influence matrix (Figure 2). Between one stakeholder and another, there is a potential for a good relationship that is mutually supportive or contradictory. If there are differences in interest, there will be a conflict. Likewise, the potential for cooperation will occur if there are common interests. If only one party has good and other parties can support it without feeling disadvantaged, there will be potential for mutual complementarity. The relationship between stakeholders in the food from forest development in Gunungkidul Regency is presented in Table 4.

Table 4. Relationships between stakeholders in policy formulation

Stakeholder	Yogyakarta Provincial Government	Gunungkidul Regency Government	Forest Farmer Group	NGO	University	Private company/sector
Yogyakarta Provincial Government		1; 2; 3	1; 3	1; 2; 3	2; 3	2; 3
Gunungkidul Regency Government	1;2; 3		1; 3	1;2; 3	2; 3	2; 3
Forest Farmer Group	1; 3	1; 3		2; 3	3	2; 3
NGO	1; 2; 3	1;2; 3	2; 3		2; 3	1; 3
University	2; 3	2; 3	3	2; 3		2; 3
Private company/sector	2;3	2;3	2;3	1;3	2;3	

Remark: 1= potential conflict, 2= potential to complement each other, 3= potential to cooperate

Discussion

In general, the interests of government stakeholders (provincial and regional), communities, extension workers, academicians, NGOs, and the private sector are collaborating with developing food from forests. The main limiting factor is budget and human resources. The interview results show that food from the forest has not become one of the priority products in the food security program in Yogyakarta Province and Gunungkidul Regency. This condition can be seen in the absence of

government priority that includes food from the forest as a commodity in the regional food security program. It can also be seen from the limited budget allocated by the relevant agencies, particularly the agriculture and food security-related agency at the provincial and district levels. As for now, food from forests is still categorized as a minor product.

The relationship between the three main stakeholders, namely FMU Yogyakarta, the private sector in the forestry sector (PT Surya Sylva Mataram), and the forest farmer group, is realized in the social forestry cooperation program in the form of Community Forests (HKm). The community has the potential to both cooperate and conflict with the private sector. The potential for cooperation is more significant because of their shared interest in economic benefits. The community and the private sector work together to utilize land managed by the FMU Yogyakarta for social forestry activities. Potential conflicts can occur if one of the parties violates the cooperation agreement between all parties. This finding is supported by Lauditta & Siswoko (2020) stated that the main stakeholders in the management of Community Forests (Hkm) in Gunungkidul Regency were FMU Yogyakarta and the forest farmer group (KTH). These two parties play the most prominent role in this social forestry activity.

Forest farmer groups have little influence because they can only influence their members (Figure 2). On the other hand, social forestry activities are more influenced by other parties, including the FMU Yogyakarta and the private sector in forestry. However, according to Puspitasari (2017), with social forestry activities, farmers have several legal rights: access, utilization, management, prevention, and alignment rights. However, this is not accompanied by increased community access to forest resources.

The potential cooperation between FMU Yogyakarta and the community (through forest farmer groups) can be maintained through the SF program. The collaboration between stakeholders is essential to achieve the goal of optimizing forest land as a food source. According to Isdhiartanto et al. (2013), the facts influencing forest management's success in the FMU Yogyakarta area include community participation, communication, resource, bureaucratic structure, local leadership, and regional policy and historical forest management factors.

Stakeholder involvement in policy-making can be thought of in a variety of ways. Meaningful stakeholder engagement can be considered a way to improve inclusive decision-making, promote equity, enhance local decision-making, and generate social capital from an ethical standpoint. Stakeholder involvement can be viewed as a chance for a social process in which varied stakeholders share a common forum, learn about one other's values, reflect on their values, and build a shared vision and objectives. Dialogue can also help raise awareness, change attitudes, and influence behavior. Existing techniques consider stakeholder

involvement primarily from a managerial standpoint, occasionally from an ethical one, less frequently as a blend of the two, and seldom from a social learning standpoint (Mathur et al., 2008).

Each stakeholder must carry out their role without harming the other party. In this case, the common interest takes precedence. Commitment to an organization's aims and objectives is essential for successfully implementing relationship management or organizational improvements. This dedication must be extended to all stakeholders (Rowlinson & Cheung, 2008). Stakeholder groups naturally desire to influence implementation to meet their concerns and requirements (Olander & Landin, 2008), one of the keys to minimizing conflicts in communication and participation. Communication is carried out to unravel the complexity of information that can lead to bias (Robson et al., 2010).

Conclusion

Forests have the potential to be developed as a source of food. However, the results of this study indicate that in Yogyakarta Province and Gunungkidul Regency, food from the forest has not become a priority to be developed in the food security program. Even though supported by sufficient regulations, the human resources and budget allocated for developing food from the forest are still limited. The provincial-level government is a key player in food from forest development since it determines regional policies. The provincial government needs to involve other stakeholders in policy-making and implementation. The relationship between stakeholders in the formulation of forest development policies as a food source has the potential to cooperate and complement each other rather than the potential for conflict. This potency must be followed up by building collaboration between parties in the regional food security policy implementation.

Policy formulation must be followed up with supporting modalities for its development through funds, human resource capacity, and equipment. Each institution- government, community, university, business, NGO- can be further involved according to its role. Partnerships need to be built from the upstream sector to the downstream sector through plant cultivation, harvesting, processing, and marketing. Further research is required to identify various local food commodities that have the potential to be developed to realize food security in each region. The realization of regional food security will impact national and global food security.

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