Reconciling Conflict of Interest in the Management of Forest Restoration Ecosystem: A Strategy to Incorporate Different Interests of Stakeholders in the Utilization of Harapan Rainforest, Jambi, Indonesia

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Abstract: Harapan Rainforest is the only remaining lowland rainforest in the Sumatera Island, Indonesia, that the Ministry of Forestry has designated for the restoration of lowland rainforest ecosystems. In Harapan Rainforest, several stakeholders are interested in using the forest for several things. For example, the local community uses the forestland for their oil palm plantation, while PT REKI as forest manager uses forest for ecosystem restoration goals, causing a conflict of interest. This study analyzes the interest and influence of all-important stakeholders related to the utilization in the Harapan Rainforest. This study uses the stakeholder analysis method to analyze and categorize stakeholders’ different interests and influences in Harapan Rainforest utilization. The study found that three of eight stakeholders have a direct role in the utilization of the Harapan Rainforest. This study ends by giving an alternative strategy for considering policy options and a win-win solution that prioritizes all stakeholders’ interests. This study concludes that the utilization of the Harapan Rainforest should be conducted with multiple-use forest management both for production and rehabilitation.

Keywords: conflict resolution; forest policy; sustainable forest management

1. Introduction

Restoration of forest ecosystem policies in production forests is one of the government’s efforts to restore damaged production forests by involving the private sector. Ecosystem restoration is the process of restoring an ecosystem that has been degraded, damaged, or destroyed [1–3]. Ecosystem restoration aims to rebuild ecological integrity and improve community welfare [1–3]. By understanding the causes of the forest, ecosystem degradation is essential for initiating restoration activities [1]. Socio-economic conditions are an important key to forest ecosystem restoration [2].

Forest restoration activities in Indonesia have many obstacles. One obstacle to forest ecosystem restoration in Indonesia is the conflict of interest between the economy and forest ecology [4,5]. Sharma and Yonariza [6] stated that the conflict occurred because forest ecosystem restoration or forest rehabilitation policies were implemented in Indonesia did not consider local context and did not involve all stakeholders affected.
Nurrochmat, et al. [7] also stated that most of the conflict of interest on Indonesia’s forests occurs because of the local community’s needs around the forest for more land to generate higher income.

Several studies stated that collaborative forest management (CFM) is an effective bridge to achieving sustainable forest management [8–11]. CFM refers to the co-management of forest resources between government forestry agencies (in Indonesia, such as the Ministry of Forestry, regional Forestry Institutions, and other stakeholders, especially local communities around forests. Studies have found that CFM can reduce poverty and income inequality and forest conservation in various parts of the world [8]. Collaborative forest management also involves all stakeholders affected [10,11]. After CFM approaches were implemented in Asia regions such as India, Indonesia, China, Philippines, and Bhutan, the social capacity such as social capital, financial capital, and human resource are improved [8,12]. Improving social capacity and community welfare can lead to better forest management to restore forest ecosystems [2,8].

The multiple-use forest management (MUFM) approach also can be a good win-win solution to resolve the different interests between ecological, economic, and socio-cultural in forestry [13]. The MUFM approach aims to synergize various ecosystem benefits into a management program by characterizing and controlling forest ecosystems to achieve multiple objectives on sustainable forest management [14,15]. By considering CFM and MUFM approaches, sustainable forest management is increasingly possible.

According to Ribot and Peluso [16], rights to natural resources comprise de facto and de jure. According to the Ministry of Forestry Decree number SK.293/Menhut-II/2007 and number SK.327/Menhut-II/2010, Harapan Rainforest has been designated by the Ministry of Forestry for the restoration of lowland rainforest ecosystems with an ecosystem restoration scheme (IUPHHK-RE). The legal rights for Harapan Rainforest belong to the PT Restorasi Ekosistem Indonesia (PT REKI) as a forest manager. Harapan Rainforest is located in Jambi and South Sumatera, Indonesia, the only remaining lowland rainforest. Although PT REKI has formal control over Harapan Rainforest, local communities had used the forestland for oil palm plantations and harvesting timber long before PT REKI was granted a forest ecosystem restoration permit. The different interests between the local community and PT REKI have resulted in a conflict of interest. As a result, forest ecosystem restoration was not easily implemented due to the increasing demand for agricultural land by local communities around the forest with tiny lands, about less than one hectare per household [5,17]. Therefore, the conflict of interest must be reconciled so that forest ecosystem restoration can be appropriately conducted.

This study analyzes the interests and influences of all stakeholders involved in utilizing the Harapan Rainforest. This article continues in the following four sections. The Section 2 contains the theoretical background that provides the basic theory for investigation and analysis for this study. Section 3 addresses the methodology used to identify stakeholders, analyze data, and support conclusions. Section 4 presents the results of this study. Last, Section 5 concludes this article by restating the main findings and outlining a policy recommendation to drive cooperation and minimize competition among stakeholders in and around the Harapan Rainforest. This study aims to identify, categorize, map the networks of stakeholders involved, and provide the policy recommendation for the contestation in Harapan Rainforest. This study conducted stakeholders analysis was promoted by Reed, et al. [18].

2. Theoretical Background

Forests are not stand-alone resources, but forests are multidimensional resources [19,20], and there are many parties/stakeholders with various interests that must be considered [19,20]. Each stakeholder may have different and/or opposite interests [21,22]. In some cases, they may compete for their interests [22,23]. Some researchers suggest that policy implementation and outcomes analysis should understand the stakeholders’ roles [18,20]. A stakeholder
is a social entity such as a person or an organization that is affected by the existence of a policy or program [18] and sometimes “able to act on or exert influence on a decision” [24]. Power is defined as the capability to influence and exclude other stakeholders from realizing their influence or interest [25]. Each stakeholder has their interest and influence [18]. The influence level of stakeholders will affect their power [18]. Sources of power include personal and organizational power [4], and there are five sources of power: legitimate, reward, coercive, expert, and referent power [26].

Around 20,000 hectares of land in Harapan Rainforest, a restoration forest ecosystem managed by PT Restorasi Ekosistem Indonesia (PT REKI) has been encroached on by local communities and converted into oil palm plantations [27]. This situation causes a conflict between local communities and PT REKI, hindering the effectiveness and efficiency of forest ecosystem restoration. The local community has economic interests, whereas PT REKI has ecological interests. In this study, referring to [25], power is a stakeholder’s ability to influence others according to their interest in utilizing the Harapan Rainforest. This study assumes that the local community with economic interests competes with PT REKI who has ecological interests.

This study evaluates different interests of stakeholders in the utilization of the Harapan Rainforest. This study presumes that identifying, categorizing, and mapping stakeholders will support information for strengthening the policy process regarding different interests and influences of stakeholders toward Harapan Rainforest utilization. Knowing whom the stakeholders understand their role and power in utilizing Harapan Rainforest is important in incorporating different interests. To provide a summary illustration of important stakeholders, we use an interest-influence matrix referring to Reed, A, Dandy, Posthumus, Hubacek, Morris, Prell, Quinn and Stringer [18].

3. Methods

The methodology of this study refers to the previous study on stakeholder analysis guidelines [18,24,28]. According to Reed, A, Dandy, Posthumus, Hubacek, Morris, Prell, Quinn and Stringer [18], stakeholder analysis is a process that defines aspects of the social and natural phenomenon influenced by decisions and actions by individuals, groups, and organizations. Stakeholder analysis is a tool that can be used in the negotiation or learning process between stakeholders in solving common problems, and it is not a tool to create a negotiation platform [29]. Stakeholder analysis can facilitate a constructivist approach to stakeholder participation that requires multiple perspectives on the ‘truth’ by which reality is socially constructed [28,29]. The normative justification of the stakeholder analysis leads to instrumental results. The parties must be involved in the decision-making process and feel they have equal ownership of the process. The expected result is a transformation of relationships and mutual trust and understanding among the participants [18,28]. According to Reed, A, Dandy, Posthumus, Hubacek, Morris, Prell, Quinn and Stringer [18], generally, there are three steps to conduct stakeholder analysis. First, identifying the stakeholders. Second, categorizing the stakeholders. Last, investigating the relationship between the stakeholders. Figure 1 illustrates the study framework for this study.

The initial step of this study was to identify the stakeholders involved in the utilization of the Harapan Rainforest. Then, we categorize the stakeholders using the interest-influence matrix referring to Reed, A, Dandy, Posthumus, Hubacek, Morris, Prell, Quinn and Stringer [18]. Finally, these results of the previous steps are used as consideration for making a strategy to incorporate the different interests of stakeholders.

To conduct stakeholder analysis, this study collected data on the stakeholders involved, stakeholders’ interests, influences, motivations, perceptions, preferences toward Harapan Rainforest, and their relation with other stakeholders. Data collection and field observation were conducted from September to December 2021. We conducted interviews with eight key persons as representatives of each stakeholder, including PT REKI management, local community, the middleman in Harapan Rainforest, NGOs related, palm oil mill management, research institution (CRC-990/EFForTS), The Forestry Service of
Jambi Province, and Production Forest Management Center Reg. IV (BPHP). Data and information collected from the official documents, reports, and scientific articles were used to provide more evidence and strengthen the analysis.

Figure 1. Study framework.

3.1. Identifying the Stakeholders Involved

To identify the stakeholders involved in the management of the Harapan Rainforest, we conducted interviews with key persons. Interviews were conducted to identify the perceptions, preferences, interests, and influences of the stakeholders in the management of the Harapan Rainforest. We use snowball sampling with quota controlled for choosing the key person.

3.2. Categorizing the Stakeholder Using Interest-Influence Matrix

The interests and influence of stakeholders in utilizing Harapan Rainforest were analyzed through their motivation, perception, and preference toward Harapan Rainforest. Then, the stakeholders were classified based on their level of interest and influence, and the stakeholders were categorized based on their level of interest and influence within the interest-influence matrix (Figure 2). These stakeholders’ levels of interest and influence will be classified into four categories: key players, context setters, subjects, and the crowd [30,31]. The explanation of each of these stakeholder categories is as follows:

1. **Key players** are groups with high interest and influence so that they are actively involved in these activities. Most of the key players have high power in their network.
2. **Subjects** are a group with high interests but low influence. Usually, it cannot influence other stakeholders but can form alliances with other stakeholders. Generally, the subject is the form of marginal groups who want to be empowered by activities (projects).
3. **Context setters** are groups with low interest but strong power because they have high influence levels to create significant risks. Therefore, it must be managed and monitored properly.

4. **Crowds** are a group that has low interest and influence, so it does not need to be considered too detailed or involved. Nevertheless, groups that fall into this category can build power alliances to interfere with certain results in the Harapan Rainforest utilization.

The stakeholders’ interest level assessed by the following factors:

1. The need for the stakeholders to take advantage/utilize of Harapan Rainforest;
2. The motivation of the stakeholders to utilize Harapan Rainforest;
3. The urgency of stakeholders regarding Harapan Rainforest utilization.

The stakeholders’ influence level assessed by the following factors:

1. The level of participation of the stakeholders in the Harapan Rainforest governance;
2. Human resource, financial, and legal support;
3. Relationships with other stakeholders;

![Figure 2. Interest-influence matrix][1]

### 3.3. Investigating the Relationship between the Stakeholders

This study uses the social network analysis method to analyze stakeholder relationships. Social Network Analysis (SNA) can help identify stakeholders, identify stakeholder conflicts, and select representatives based on the structure of the network [18]. We choose the SNA method because SNA can capture different types of relationships (both positive and negative) compared with stakeholder links matrices. But also the strength of those relationships, and records this information in a quantitative form that makes it easy to summarize and analyze [18]. This study uses UCINET 6.717 and NetDraw 2.173 software to perform SNA. The criteria selected for social network analysis refer to Prell, et al. [32], including degree centrality, betweenness centrality, and eigenvector.

Degree centrality analysis is an analysis that shows the number of relationships an element has. Elements with a high degree have good connectivity in the network. Betweenness centrality shows stakeholder position as a “bridge” between a stakeholder and other stakeholders in a network. The stakeholder who acts as a bridge is very important because certain stakeholders cannot connect with other stakeholders without a bridge stakeholder. Eigenvector centrality is the analysis that measures the level of importance of a stakeholder.

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[1]: https://example.com/figure2.png
based on the connections it has in social networks. The eigenvector is used to identify the leader of the network.

4. Results and Discussion

4.1. Stakeholders Involved and Their Interests in the Utilization of Harapan Rainforest

This study found that there is three common interest in Harapan Rainforest. First stakeholders have an interest in conserving and protecting forests. Second stakeholders have an interest in utilizing forest land for oil palm cultivation to generate income. Last, the third stakeholders have an interest in forest policy and environmental justice enforcement. This study found eight (8) stakeholders involved in Harapan Rainforest. Table 1 shows stakeholders involved, key informants, and stakeholders’ interests in and around the Harapan Rainforest.

Table 1. Stakeholders involved, key-informants, and interests of stakeholders in the utilization of Harapan Rainforest.

| No | Stakeholders                                      | Key-Informants                                                                 | Interests                                      |
|----|---------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------|
| 1  | PT Restorasi Ekosistem Indonesia (REKI)           | Coordinator of Community Partnership Division and Director Operations of PT REKI | Forest restoration and protection              |
| 2  | Local community (LCM)                            | Head of Bungin Mandiri Group, Berkah Jaya Group, Mekar Jaya Indah Group, Hijau Alam Lestari Group, Tani Jaya Group, Simpang Macan Luar Group, Tanding Group, Gelinding Group, Lamban Jernang Group. | Forest land for their livelihood              |
| 3  | Middleman/Toke (TKE)                             | Oil palm middleman, rubber middleman.                                        | Oil palm and rubber trade                      |
| 4  | PT Berkat Sawit Utama (BSU)                      | Coordinator of fresh fruit bunches trade                                      | Oil palm industry                             |
| 5  | Yayasan CAPPA Keadilan Ekologi (CAPPA)            | Head of CAPPA                                                                 | Social empowerment and ecological justice      |
| 6  | The Collaborative Research Center 990 (CRC)      | Head of CRC                                                                   | Research and innovations in tropical rainforest ecosystems |
| 7  | The Forestry Service of Jambi Province (DKJ)      | Head of Community Empowerment And Indigenous Forest Directorate              | Enforcement of forest regulations and increase in non-tax state revenues |
| 8  | Production Forest Management Center Reg. IV (BPHP)| Sub Directorate of BPHP                                                       | Enforcement of forest regulations and increase in non-tax state revenues |

PT Restorasi Ekosistem Indonesia (PT REKI) aims to restore the forest ecosystem, forest conservation, and encourage sustainable forest utilization through a forest ecosystem scheme (IUPHHK-RE). PT REKI is a collaboration led by Burung Indonesia, The Royal Society for the Protection of Birds and Birdlife International. The local community (LCM) is people who live inside Harapan Rainforest. They have big dependence on the forest. Most of their income is from forest utilization. They utilize forestland for their oil palm and a few of them also cultivate rubber to improve their income. Harapan Rainforest is directly adjacent to an oil palm company, namely PT Berkat Sawit Utama (BSU). BSU has an oil palm mill. BSU management doesn’t influence LCM to cultivate oil palm or sell the fresh fruit bunches.

There are three main groups of the local community (LCM) in the Harapan Rainforest, including the Migrant Group, Batin Sembilan Group, and Malay Group. Each group consists of several farmer groups and has its characteristic to utilize Harapan Rainforest [33]. Almost all Harapan Rainforest local communities have a high dependency on the forest. But, most of them utilize Harapan Rainforest forestland with oil palm cultivation. Migrant
and Malay groups utilize forestland to cultivate oil palm and a small amount of rubber. They sell oil palm fresh fruit bunches and rubber to Toke/middleman (TKE). Meanwhile, most Batin Sembilan people collect NTPFs, but after realizing the success of Migrant people who planted oil palms within the Harapan Rainforest, they also planted oil palms. PT REKI assists the Batin Sembilan people to cultivate rubber, so they don’t expand their oil palm in Harapan Rainforest.

Some farmer groups have been signed an MoU with PT REKI. PT REKI initiated the MoU to reduce deforestation within Harapan Rainforest. The MoU contains various agreements that have been mutually agreed upon. Farmer groups who signed the MoU benefited from PT REKI, including seeds and livestock procurement. In addition, PT REKI helps them legalize their forest utilization through social forestry with a forestry partnership scheme. Farmer groups who already get legalization will receive SK KULIN KK (Decree of Recognition and Protection of Forestry Partnership). Consequently, they get the right to manage a maximum of 5 hectares of forest land. Since some farmer groups get KULIN KK, their oil palm cultivation was legal. Both MoU and the forestry partnership scheme aim to reduce the deforestation of the Harapan Rainforest.

However, this study found no significant difference between farmers who received KULIN KK and those who did not. Some farmers who did not get KULIN KK can still cultivate oil palm within Harapan Rainforest. Not a few of them expand their oil palm plantations within Harapan Rainforest. In addition, some people who get KULIN KK still expand their oil palm within Harapan Rainforest. But, there is no direct law enforcement in this situation. This situation triggers social jealousy of farmer groups who have received KULIN KK. As a result, the MoU signed did not implement properly.

Yayasan CAPPA Keadilan Ekologi (CAPPA) is a life environment non-governmental organization. CAPPA helps REKI assist Batin Sembilan Group in improving their farming skills and lives. CAPPA supports the forestry partnership program to reduce deforestation within Harapan Rainforest. The Collaborative Research Center 990 (CRC) is a research collaboration between Germany and Indonesia involving IPB University, Jambi University, Tadulako University, and Georg-August University of Goettingen. CRC has no direct relationship with Harapan Rainforest utilization, but CRC has a sample plot within Harapan Rainforest. This institution has an interest in conducting research within Harapan Rainforest.

The Forestry Service of Jambi Province (DKJ) is a local government institution with the field of work, including forest planning and utilization, forest protection and conservation, community empowerment, watershed management, and forest rehabilitation in Jambi Province. Most of the Harapan Rainforest area is included in the working area of DKJ. Production Forest Management Center Reg. IV, Jambi (BPHP) is a local government institution. DKJ and BPHP desire that the obligations of forest management activities can be carried out properly, such as the payment of PSDH and DR, by considering the management conditions in the Harapan Rainforest.

4.2. Power Positions of Stakeholders Related to Harapan Rainforest Utilization

This study measures “interest” and “power” using scores obtained from key informants’ interviews. Those scores ranged from negative three to three (not including zero) and are defined in Tables 2 and 3. The power positions of the stakeholders are evaluated through their interest and influence level in a four-quadrant matrix. Figure 3 indicates that PT Restorasi Ekosistem Indonesia (PT REKI), Local community (LCM), and Middleman/Toke (TKE) are “key players” in the utilization of the Harapan Rainforest. They have highest interest and strongest power in Harapan Rainforest utilization. Then, DKJ, BPHP, and CAPPA were categorized as “context setters”. They have high power but less interest in Harapan Rainforest utilization. CRC was categorized as “subjects”. CRC just has interest and less power in Harapan Rainforest Utilization. Last, BSU was categorized as a “crowd”. BSU has no interest and power in the utilization of the Harapan Rainforest. The power of each stakeholder can be seen in Table 4.
Figure 3. Power position of stakeholders related to the Harapan Rainforest utilization.

Table 2. Criteria for measuring interest level in the utilization of Harapan Rainforest.

| High Interest | Score | Low Interest | Score |
|---------------|-------|--------------|-------|
| Having interest in utilizing (TFPs, NTFPs, ES, area, etc.) Harapan Rainforest and having both capacity and authority | 3 | Having little interest in utilizing (TFPs, NTFPs, ES, area, etc.) Harapan Rainforest and having both capacity and authority | -1 |
| Having interest in utilizing (TFPs, NTFPs, ES, area, etc.) Harapan Rainforest and having capacity but not have authority | 2 | Having little interest in utilizing (TFPs, NTFPs, ES, area, etc.) Harapan Rainforest but not have the capacity and authority | -2 |
| Having interest in utilizing (TFPs, NTFPs, ES, area, etc.) Harapan Rainforest but not have the capacity and authority | 1 | Do not have any interest in utilizing Harapan Rainforest | -3 |

Table 3. Criteria for measuring power level in the utilization of Harapan Rainforest.

| High Influence | Score | Low Influence | Score |
|---------------|-------|---------------|-------|
| Having a direct influence on restoring or disturbing Harapan Rainforest and having the capacity to influence policy-making as well as authority | 3 | Having indirect influence on restoring or disturbing Harapan Rainforest and having the capacity to influence policy-making as well as authority | -1 |
Table 3. Cont.

| High Influence                                                                 | Score  | Low Influence                                                                 | Score |
|--------------------------------------------------------------------------------|--------|--------------------------------------------------------------------------------|-------|
| Having a direct influence on restoring or disturbing Harapan Rainforest and having the capacity to influence policy-making as well as authority | 3      | Having indirect influence on restoring or disturbing Harapan Rainforest and having the capacity to influence policy-making as well as authority | −1    |
| Having a direct influence on restoring or disturbing Harapan Rainforest, and having the capacity to influence policy but not have authority | 2      | Having indirect influence on restoring or disturbing Harapan Rainforest, but not having authority and capacity to influence policy-making | −2    |
| Having a direct influence on restoring or disturbing Harapan Rainforest, but not having capacity and authority | 1      | Do not have any influence on restoring or disturbing Harapan Rainforest and capacity to influence policy-making | −3    |

Table 4. Power category of the stakeholders.

| No | Stakeholders                                                                 | Power Category           |
|----|-----------------------------------------------------------------------------|--------------------------|
| 1  | PT Restorasi Ekosistem Indonesia (REKI)                                      | Legitimate               |
| 2  | Local community (LCM)                                                       | Reward                   |
| 3  | Middleman/Toke (TKE)                                                        | Reward, referent         |
| 4  | PT Berkat Sawit Utama (BSU)                                                  | Legitimate               |
| 5  | Yayasan CAPPA Keadilan Ekologi (CAPPA)                                       | Referent                 |
| 6  | The Collaborative Research Center 990 (CRC)                                 | Expert                   |
| 7  | The Forestry Service of Jambi Province (DKJ)                                 | Coercive, legitimate     |
| 8  | Production Forest Management Center Reg. IV (BPHP)                           | Coercive, legitimate     |

REKI, LCM, and TKE highly influence restoring or disturbing Harapan Rainforest. PT REKI and LCM have different approaches toward utilization in Harapan Rainforest. This study found that PT REKI is the stakeholder who has the biggest interest and power. PT REKI has high interest and legitimate power because they are interested in restoring the forest ecosystem as their “business” and have the legal rights and capacity to conduct it. Meanwhile, the local community (LCM) has high interest and reward power because they have oil palm plantations within the Harapan Rainforest area as their main income and reward power from the Middleman/Toke (TKE). Middleman/Toke (TKE) also has high economic interest and reward and referent power. LCM and TKE have a mutually beneficial relationship, so their interrelation is also high.

Local community (LCM) activities strongly influence the sustainability of the Harapan Rainforest ecosystem. Either directly or indirectly, their oil palm cultivation as if supported by middleman/Toke (TKE). The existence of middleman/Toke (TKE) encourages LCM to choose oil palm as their main livelihood. Ease of selling oil palm fresh fruit bunches enables LCM to choose that commodity for improving their welfare. Communication with LCM and TKE is so important to prevent the expansion of deforestation within the Harapan Rainforest.

As context setters, CAPPA, DKJ, and BPHP have different power. BPHP and DKJ, as local government institutions, have much higher legitimate and coercive power than other stakeholders in the policy process related to Harapan Rainforest utilization. They usually use their coercive power to implement the Harapan Rainforest programs. In contrast, CAPPA has big referent power but less legitimate and coercive power. CAPPA has low interest directly or indirectly toward Harapan Rainforest utilization. But, they influence the utilization of the Harapan Rainforest, especially to influence the local community. CAPPA has a closer relationship with the local community, especially with the Batin Sembilan.
people. Therefore, it has higher trust than PT REKI within the four sample farmer groups. CAPPA can be an agent to succeeding in the programs. They have the power to influence the local community to accept it.

The Collaborative Research Center 990 (CRC) is the only stakeholder labeled “subjects”. CRC is interested in forestry research, but it is only slightly interested. CRC also has no direct influence on restoring or disturbing Harapan Rainforest and policy making. But it can conduct some innovation from their research related to Harapan Rainforest utilization. Although CRC has no direct influence, this “subject” may strengthen other stakeholders when stakeholders collaborate or build a team with them.

PT Berkat Sawit Utama (BSU) is the only stakeholder labeled “crowd”. BSU has no direct or indirect interest related to Harapan Rainforest utilization. It also has no influence in policy making and restoring or disturbing Harapan Rainforest. However, BSU is consulted about a Harapan Rainforest program because the company has road access to the Harapan Rainforest area. BSU is interested in the oil palm industry. Some farmer groups who have been got KULIN KK can sell their oil palm fresh fruit bunches to BSU but still have to fulfill some requirements such as the standards of fresh fruit bunches. Oil palm trades should be through farmer groups.

4.3. Stakeholders Network in the Utilization of Harapan Rainforest

Using the social network analysis (SNA) approach, this study identifies stakeholders’ interrelation. Figure 4 show stakeholders’ network in the utilization of the Harapan Rainforest. Blue nodes are context setters, red nodes are key players, yellow nodes are subjects, and green nodes are crowds. Different line thicknesses indicate differences in the closeness of the relationship among stakeholders.

![Figure 4. Network of stakeholders in Harapan Rainforest.](image)

As per Table 5, this study found that REKI is the central stakeholder of the network because it has the biggest out-degree and n degree value. Appropriate with Table 5, REKI has the power to spread information to other stakeholders on the network. REKI also has relationships with important stakeholders (BPHP, DKJ, and CAPPA) in the network because they have the biggest eigenvector value (see Table 6). PT REKI also becomes a “bridge” that plays as intermediaries in connecting various stakeholders in the network of Harapan Rainforest contestation (see Table 7).

Based on that result, REKI can connect with other stakeholders. Thus can be a privilege to lead better management in Harapan Rainforest. PT REKI has a good connection with BPHP and DKJ as the local government institutions to have the power in the policy-making of Harapan Rainforest management. PT REKI can make a partnership with CRC to provide some innovations about sustainable forest management that can harmonize
forest rehabilitation and oil palm production. PT REKI also can make a partnership with CAPPA to encourage the local community to prevent or even stop the expansion of oil palm cultivation within the Harapan Rainforest.

Table 5. Degree centrality of the network.

| Stakeholders | Degree Centrality Value | Out Degree | In Degree |
|--------------|-------------------------|------------|-----------|
| REKI         | 25.000                  | 0.714      | 26.000    |
| LCM          | 23.000                  | 0.657      | 20.000    |
| TKE          | 11.000                  | 0.314      | 6.000     |
| DKJ          | 19.000                  | 0.543      | 19.000    |
| BPHP         | 19.000                  | 0.514      | 20.000    |
| CAPPA        | 20.000                  | 0.571      | 17.000    |
| CRC          | 12.000                  | 0.343      | 12.000    |
| BSU          | 1.000                   | 0.029      | 9.000     |

Table 6. Eigenvector centrality of the network.

| Stakeholders | Eigenvector Value |
|--------------|-------------------|
| REKI         | 0.478             |
| LCM          | 0.388             |
| TKE          | 0.155             |
| DKJ          | 0.394             |
| BPHP         | 0.414             |
| CAPPA        | 0.429             |
| CRC          | 0.266             |
| BSU          | 0.124             |

Table 7. Betweenness centrality of the network.

| Stakeholders | Betweenness Centrality Value |
|--------------|-----------------------------|
| REKI         | 12.500                      |
| LCM          | 6.500                       |
| BPHP         | 0.500                       |
| DKJ          | 0.500                       |
| TKE          | 0.000                       |
| CAPPA        | 0.000                       |
| CRC          | 0.000                       |
| BSU          | 0.000                       |

4.4. Promoting the Best Strategy for Sustainable Forest Management in Harapan Rainforest

Different alternative approaches may emerge and can assist in formulating strategies that consolidate the interests of various stakeholders in the utilization of the Harapan rainforest. By considering the existing condition and referring to the strategies of forest development policy [34], multiple-use forest management [13], and collaborative forest management [8–11] this study considers three approaches to determine a strategy to incorporate different stakeholders’ interests in utilizing the Harapan Rainforest. First, consider choosing an alternative strategy with the lowest rejection. Second, consider the local context dan existing condition. Last, it considers an alternative strategy supported by most stakeholders and allows for synergies.

Figure 5 illustrates the policy strategy of Harapan Rainforest management. We categorize stakeholders’ interests in the Harapan Rainforest into objects and activities. Two categories for comprising “objects” are “forestry” and “non-forestry” commodity. Then,
“activities” are dichotomized into “restoration” and “utilization” (Figure 5). These stakeholders are conceived as opposing or supporting the sustainable forest management of the Harapan Rainforest. This theory applies to stakeholders in and around Harapan Rainforest.

As per Figure 5, three stakeholders are interested in utilizing forests. Two of the three stakeholders are interested in utilizing the Harapan Rainforest, and the other one is interested in utilizing oil palm outside the Harapan Rainforest area. The local community (LCM) is interested in utilizing Harapan Rainforest forestland. They use forestland to cultivate oil palm (non-forestry commodity) and rubber (forestry commodity). LCM was directly influenced by Toke/middleman (TKE) to choose oil palm and rubber because the TKE only traded oil palm fresh fruit bunches and rubber. Due to the easing market, the Toke/middleman (TKE) choose those commodities. Then, PT Berkat Sawit Utama (BSU) is interested in utilizing oil palm in its plantation outside the Harapan Rainforest area. Thus, LCM and TKE are the most influenced in the disturbing Harapan Rainforest.

Next, the five remaining stakeholders are interested in the rehabilitation of the Harapan Rainforest. Both CRC, REKI, BPHP, DJ, and CAPPA are interested in restoring forest ecosystems and reducing oil palm expansion within the Hutan Harapan area. PT REKI is the most interested in forest restoration of the Harapan Rainforest. BPHP and DKJ, as local government institutions, are also interested in forest restoration of the Harapan Rainforest. They also want increased non-tax revenues for the government from the Harapan Rainforest management, such as from PSDH, DR, etc.

Although each stakeholder has a different interest and aim, all stakeholders have a common interest in increasing income opportunities. This situation indicates that stakeholders will support the strategy to generate more income while promoting better participation in the Harapan Rainforest management. Referring to the situation of the Harapan Rainforest, this study suggests promoting oil palm agroforestry in Harapan Rainforest management.
Oil palm agroforestry will be implemented in the Harapan Rainforest area, which was converted into oil palm by the local community (LCM). Several studies were found that oil palm agroforestry has a higher income per hectare than oil palm monoculture [33,35,36], resulting from crop diversification through land management, with the opportunity for a rise in associated income [33,35–37].

To implement this strategy, several things should be considered. First, synergizing a management plan and community empowerment. The management plan should be involved all stakeholders. It is not easy to consolidate the oil palm agroforestry strategy to the different institutions. Thus, building common ground between stakeholders is important for further cooperation. Second, due to the diversity of ethnic groups, it is required to employ various strategies to establish oil palm agroforestry in the Harapan Rainforest. Migrants with improved knowledge and abilities for modern agriculture will find it easier to adopt oil palm agroforestry.

In contrast to migrant communities, indigenous Malay and Batin Sembilan people typically continue to practice traditional agriculture, with some even engaging in shifting agriculture. Thus, technical assistance and socio-cultural approaches are required to improve indigenous people’s opportunities for oil palm agroforestry. The last step could be to improve the access market of forestry commodities. If the benefit of forestry commodity is greater than oil palm commodity, it might reduce or even stop the oil palm expansion within the Harapan Rainforest. The strong competitiveness market of forestry commodity will influence the local community to conduct oil palm agroforestry.

![Figure 6. Policy strategy to incorporate different interests in the utilization of Harapan Rainforest.](image)

5. Concluding Remarks

As the remaining lowland rainforest in Sumatera, Indonesia, the Harapan Rainforest provides much ecological and economic benefit specifically to local stakeholders. Nevertheless, the Harapan Rainforest ecosystem has been threatened due to different and even contradictory interests of its’ stakeholders involved. This study found three stakeholders are the key players who have direct roles in Harapan Rainforest utilization. In contrast, the other five stakeholders play indirect roles. One of the biggest threats to the Harapan Rainforest ecosystem is the local community’s forest conversion into oil palm. Strict law enforcement is one option for addressing this threat. But, given the complexity of forest ecosystem restoration problems in the Harapan Rainforest, influenced by socio-culture and economic factors, successful implementation is improbable. Therefore, it is necessary to provide a proper strategy as a win-win solution to reconcile different interests and encourage cooperation between stakeholders.
This study proposes a policy strategy promoting oil palm agroforestry to reconcile ecological and economic interest in the Harapan Rainforest. To implement this strategy, it is important to build common ground between PT REKI (REKI), local community (LCM), and toke/middleman (TKE) toward the oil palm agroforestry program as a win-win solution in the Harapan Rainforest. It is also important to consolidate the management plan with The Forestry Service of Jambi Province (DKJ) and Production Forest Management Center Reg. IV (BPHP) as a local government organization. To ensure the successful implementation of oil palm agroforestry, CAPPA can assist the local community.

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