Forest conflict mitigation through coffee-based agroforestry provide secure habitat for Javan Slow Lorise in a lowland fragmented forest in Central Java, Indonesia

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Abstract. Java Island has experienced numbers of forest conflict. Consequently, it may contribute to the disturbance of the sustainability of its forest biodiversity and increasing number of local poverty surrounding the forest area. Agroforestry system is known as one of the strategies to mitigate the forest conflict. The system helps the farmers to increase agricultural production, social life, and ecological stability. Local community in Kemuning forest had been implementing coffee-based agroforestry system for a long time, as part of their main income. This system allowed farmers to access the forest through an intensive interaction between locals and its forest environment. This study aimed to understand the forest conflict mitigation through agroforestry practices in Kemuning forest better, which allegedly become a key factor for the sustainability of the presence of Javan slow loris. This study builds on the assumption that people frame conflicts on Kemuning forest according to their experiences, expectations, objectives and interests at a specific moment. The basis for our analytical framework is found in theories on framing. In doing so, the study uses the framing analysis theory to identify framing of the conflict by different involved stakeholders. Data were collected in 2018 - 2019 through several techniques such as in depth interview, field observation, and study literatures. Collected data were analyzed descriptively by discussing each finding with framing analysis theory. Findings revealed that conflict in Kemuning forest were triggered by three main issue/problem frames identified as the root causes of the conflicts which are forest security, unfulfill the signed contract, and an unequal benefit sharing from the coffee-based agroforestry sector. Other frames: identity, characterization, and conflict management frames were constructed in such a way to reinforce the issue/problem frames. This study also found that related to Javan slow loris habitat, this coffee-based agroforestry system is the appropriate land use management that provide secure habitat for the sustainability of the presence of the animal within Kemuning forest.

Keywords: Frame theory, cofee-based agroforestry, conflict, Kemuning forest, secure habitat
1. Introduction
The history of forestry in most of forest area in the world is often connected with conflict. In Asia, for example, it is recorded that 75% of forests are affected by conflict [1]. As response to this condition, researchers argue that the culture of forestry has become a culture of conflict [2]. It is also highlighted by the fact that there are nearly 500 million forest dependent people surrounding the forest area [3]. On the other hands, the forest is home to large numbers of flora and fauna that are not found elsewhere, for example, 59.6% of the vascular plant species found in Indonesia are unique to the country [4].

Java known as one of the most populated islands in Indonesia, which has a high biodiversity. However, Java is also subject to increasingly high rates of deforestation, forest conflict, poverty, and other impacts related to rapid population increases and industrializations. Research has confirmed that less than 9% of forest area remains, and yet most of the forest area left is located in the montane forest [5] [6]). Those problems especialy forest conflict also contribute to the threaten of the sustainability of its forest biodiversity in Java. Forest conversion for agriculture, illegal logging, encroachment, forest fires, and road development are the causes of deforestation and habitat fragmentation [7].

Agroforestry is one of the popular land management systems in Indonesia. This systems has been practiced by the Indonesian people for a long time and become an integral part of the sustainable land management [8]. Agroforestry system is known as one of the strategies to mitigate the forest conflict. The system helps the farmers to increase agricultural production, social life, and ecological stability of the forest [9]. Research confirms that agroforestry is able to properly maintain biodiversity, and it is essential for environmental conservation [10]. For instance, Mango-based agroforestry which has been practiced by the farmers since the 1990s, is a promising alternative and considered as a strategy to reduce poverty and improve livelihood security in Bangladesh [11]. Another research found that local wisdom and participation in the cultivation of home gardens through the agroforestry system approach is a key factor to the conservation of biodiversity on the island of Borneo [10].

One of the lowland tropical forest areas remained in Java as results from forest conversion is the Kemuning forest of Temanggung district, Central Java province, Indonesia. This forest area is also a natural habitat of Javan slow loris on the island [12]. Kemuning forest is a part of a production forest area managed by Indonesian State Forest Company (PERUM PERHUTANI) of Kedu Utara Unit Management. Coffee-based agroforestry has been implemented by Perum Perhutani with Collaborative Forest Management System (CBFM) in Kemuning Forest [13]. Research showed that Kemuning forest is a home to numbers of flora and fauna including a small population of Javan slow lorise that can be found within the Forest [14] [15].

This study aims to understand the forest conflict mitigation through coffee-based agroforestry practice in Kemuning forest better, which allegedly become a key factor for the sustainability of the presence of the Javan slow lorise on this area that still exist until now. We used framing theory which seems to be scarce in the study on forest conflict mitigation through coffee-based agroforestry.

2. Materials and Methods
2.1. Analytical Framework Theory of Framing
In this case study we used the theory of framing to understand the forest conflict in Kemuning forest. Framing is something everybody use in the daily live. Framing has to do with making sense, interpreting, and giving meaning to what happens in the ongoing world [16]. This study builds on the assumption that people frame forest conflicts on Kemuning forest according to their experiences, expectations, objectives and interests at a specific moment. A frame combines multiple functions: 1 frame defines issues, 2 frames shape actions and influence preferences for how a dispute should be resolved, 3 frames are used to justify our actions and, 4 frames are used to mobilize others [17]. Such as early said the study will focus on the conflict in Kemuning forest using frame
theory. It is a social issue which a lot of different stakeholders are involved with different kind of perceptions about the policy of the Kemuning forest management. The theory of framing was used to get insight in the view of the different stakeholders, so frames of the stakeholders will be investigated to understand the conflict in Kemuning forest. In this study we use problem frames, identity frame, characterization frame and conflict management frame [17]. Those frames are the most important. The study can include more types of framing to take everything into account, but that means that the study increases in amount and time. The guarantee of a study into the deepness gets less. It is a trade-off between a study in deepness or a more complete, and broad study. Four frame theories that will be used are described as following:

Problem frames, problem frames are constructed to define what the problem is about, including causes and solutions. The problem, causes and solutions according each stakeholder can be determined by using this frame [17]. Identity frames, Identity frames give an answer to the question: Who am I? Individuals may answer this question in a variety of ways, depending on their membership in social groups and who they understand themselves to be [17]. Characterization frames, characterization frames are statements made by individuals or groups of how they understand someone else to be: Who are they?[17] Characterization frames arise from the attributions of blame and causality that we make about our experiences and about what others have done to shape our experiences [17]. Conflict Management Frames, Conflict management frames talk about how the conflict should be managed or dealt with. Depending on which of these frames the parties selected, they would use different strategies to deal with conflict. Keltner’s model is adopted to determine conflict management (Keltner, 1994). Keltner, (1994) provided a wide range of options for our classification of conflict management frames. There is a spectrum of six aspect of struggle that ranged from discussion at one end to fighting at the other (avoidance/passivity, fact finding, joint problem solving, authority decides based on expertise, struggle/sabotage/and violence, and other conflict management modes). The root cause of the the conflict in Kemuning forest could be investigated using this frame theories.

2.2. Study Site
The study was conducted in the Kemuning forest, Bejen District, Temanggung Regency, Central Java from February 2018 – April 2019. Geographically Kemuning forest is located at coordinates of 110 ° 5' 13.00" - 110 ° 7' 29.00" BT and 7 ° 8' 20.00" - 7 ° 7' 11.00" LS. It has an area of approximately ± 400 ha (Figure 1). There is an Enclave village called Desa Kemuning within the forest area, and most of the locals applied coffee-based agroforestry management through the Community Based Forest Management (CBFM) in the forest area. The CBFM is a collaborative scheme between Perum Perhutani and the Kemuning villagers.

The number of the residents in Kemuning Forest is currently 183 house hold and 566 people. Since Kemuning Village is an enclave village within the Kemuning forest, it causes limited of the land ownership. With the decrease in agricultural activities in this area, the economic and social viability of this village has become dependent heavily on coffee-based agroforestry within the forest area.
2.3. Research Methods

We have used different methods in this study. First, we will start with a literature study to get detailed information about the forest conflict, how did it started and how developed the conflict during time, efforts have been applied to reduce the forest conflict, which actors are involved, and how conflict mitigation through coffee-based agroforestry provide the habitat conservation for endangered primate especially the Javan slow lorise in Kemuning forest. This literature study provides a broad overall picture of the forest conflict and the recent condition of the coffee-based agroforestry system in the forest area. The information will be extracted from news reports, policy papers, and other documents related to the conflict.

Second, the study will focus on the actors who are involved by interviewing. Within the interview, It was 5 key players determined with combining a snowball sample system within those groups. [18] said that having identified one or two interviewers then we can ask them as a guide finding other relevant sample called snowball sample. The number of respondents to be interviewed in this study was not fixed in order to interview as many respondents as possible within each stakeholder group until a saturation point is reached [19]. The aim of the interview is to get answers on the questions that are formulated before the interview. Those interviews will be tape and transcribed.

For the data analysis section, several phases have been conducted. A qualitative data analysis was used in this research and presented in a narrative form. [20] argued that a qualitative approach has the potential to reveal the complexity of subjective views and is thus an appropriate approach to investigate the framing of the resource use conflicts. All interviews were transcribed into Indonesian language. The purpose of the interviews was to get answers on research questions mainly towards framing that people constructed and any possible solution to mitigate the conflict. The data obtained was tabulated and analyzed descriptively to explain the conflict phenomena existing in the field.
3. Results and discussions

3.1. Brief evaluation on efforts to reduce the forest conflict in Java.
This study discovered that in order to resolve the forest conflict throughout Java, all involved stakeholders have developed many methods. As the conflict has started since Dutch government up to now, this study exhibits the efforts that are being applied based on time line. The information is as following (Table 1):

| Periods       | Methods have been developed to mitigate the conflict |
|---------------|-----------------------------------------------------|
| before 1970   | Almost 30 years after Indonesian Independence Day, forest management in Java did not pay attention to the social aspects properly [21]. The forest degradation has still continued. |
| 1972-1984     | The MALU program (Mantri (rangers) with Lurah (the Village Head)) had been applied to increase the welfare of the community around the forest area [22]. However, this program failed to resolve local prosperity and forest degradation. |
| 1984-1986     | The concept of Social Forestry. This pilot project was carried out in 1986 covering areas scattered throughout Java with a total area of 3392.16 Ha [23]. |
| 1986-1999     | Based on the Director of Perhutani Decree No. 602 / MPTS / DIR / 1988 dated June 18, 1988 that Perhutani proposed the implementation of the Social Forestry Program [23]. This program failed to resolve local prosperity and forest degradation. |
| 1999-2001     | Based on the Director of Perhutani Decree No. 1837 / Kpts / Dir / 1996 dated December 26, 1996, Perhutani had implemented the PMDH-T (Integrated Forest Village Community Development) program [24]. This program failed because of reformation era in 1998. |
| 2001- up to now | Based on the Director of Perhutani Decree No.136/Kpts/DIR/2001, Perhutani has implemented a program known as Community-Based Forest Management (CBFM). One of the CBFM program implementation was the management of mixed patterns between forest plants and short-term (annual) crops under the forest stands, known as agroforestry system |

3.2. Conflict in Kemuning forest past, till now and the emergence of conflict mitigation through coffee-based agroforestry.
Historically, Kemuning forest has been used by some Kemuning villagers as coffee-based agroforestry since the 1970s. This activity has been going on for a long time, but this activity was still hidden from Perhutani officers as this activity was still considered illegal by Perhutani. Therefore, coffee-based agroforestry in Kemuning forest did not carried out simultaneously by farmers but it was only applied by just a small group of people. If it was found by Perhutani officers it would be destroyed directly. However, this condition did not stop locals to cultivate the coffee plants since they were leaked of farm land to increase the family’s income as farmer was the main job for the Kemuning villagers.

In 1985, the coffee-based agroforestry which was originally an illegal status had been permitted by Perhutani officers. However, there was no written agreement as it was only in the form of hidden agreement between Mantri (Head of Forest Resort) and farmers. In 1990, coffee sharing of the result of coffee production was introduced in this activity. However, this did not have a written agreement on a legal matter at that time. The illegal coffee-based agroforestry in secret ways was practiced for a long time until the emergence of policy reform by the Perhutani that could accommodate this coffee-based agroforestry within Kemuning forest in 2001 (Based on the Director of Perhutani Decree No.136/Kpts/DIR/2001). Coffee-based agroforestry program has been applied in Kemuning forest area based on working agreement (Perjanjian Kerjasama) between perhutani and farmers no 15/059.9/PHBM/KDU/I date of 4 April 2006. This agreement was established in order to mitigate the forest conflict in Kemuning forest. Recently, after the forest conflict mitigation through coffee-based agroforestry has been implemented in Kemuning forest area, the forest conflict has been shifted from
restricted forest access conflict to become conflict on sharing of coffee-based agroforestry yields between Perhutani and the farmers called Taksasi.

3.3. Stakeholders involved within Forest Conflict in Kemuning Forest.

The stakeholders involved in this forest conflict in Kemuning forest can be defined by studying the literature data or reports made by Perhutani. There is also another way to describe the stakeholders which participated in this conflict by observing directly within the study site. There are not many actors that focus on forest conflict in Kemuning forest. We can observe two different stakeholders within this conflict. The main stakeholders focused on this conflict are Kemuning village Community, and Perhutani Officers.

3.4. Coffee-based agroforestry management and habitat conservation for endangered primates.

There are two different kinds of coffee-based agroforestry implemented by Perhutani in Kedu Utara Unit Management, which are coffee-based Agroforestry in production forest with clear cutting, and coffee-based agroforestry in natural forest area without cutting such as coffee-based agroforestry in Kemuning forest. In the forest management using coffee-based agroforestry system in natural forest, there is not much treatment done by Perhutani on the system, as logging and replanting activities do not implemented in this forest area. The main activities carried out were only to secure the forest area. Therefore, that the number of forest stands and function are not reduced. The involvement of Perum Perhutani is only in the process of estimating the results of the coffee-based agroforestry yield which will be used to determine the profit sharing called Taksasi.

Taksasi is the process of assessing the coffee-based agroforestry production on forest area as a basis for determining profit sharing between Perhutani and the community. The goal of Taksasi activity is to estimate the yield of coffee plants from each sharecrop. Based on the agreement, non-timber profit sharing is how many percentage of the agricultural yield have to give to locals and Perhutani in the form of annual crops and fruits which are cultivated on the forest land. It is stated in the agreement that the result of non-timber forest product would be 70:30, namely 70% for farmers involved in CBFM, and 30% for Perhutani in Kemuning forest area. This profit sharing system used for the basis of coffee-based agroforestry activities in Kemuning forest.

On the other hand, locals are quite active in cultivating coffee plants under the forest stands. For Kemuning villagers, Kemuning forest has important economic values because it can produce non forest product commodities such as coffee bean, fruits, etc. As a consequence of the economic potential of crop diversity in Kemuning forest, the economic revenue derived from the forest can be gained continuously and finally reducing the community poverty. There are times during the year in which big economic income can be gained by locals from the coffee-based agroforestry, such as during coffee harvest, and fruits harvest. Realizing that agroforestry is capable on producing economic income to local community, then routine maintenance of coffee-based agroforestry is performed by the farmers. Maintenance is often associated with cleaning disturbing shrubs, maintenance of local roads within the forest, cutting very dense canopy to get a good condition for the growing coffee, soil fertilize activity, monitoring the seeds of new plants and possibly collapsed old plants, taking care of dead or damaged plants and other activities. Maintenance is mainly done to help in increasing the coffee productivity within the forest area. Beside that, the villagers involved are obliged to protect and preserve forest resources for the continuity of its functions and benefits, adhere to technical and non-technical guidelines from Perhutani, maintaining forest security both in the location and surrounding areas, and draw up a work program (annual activity plan) approved by Perum Perhutani.

Coffee-based agroforestry is a forest management system passed from one generation to the next in Kemuning village community. Coffee-based agroforestry in Kemuning forest is composed of a variety of species arranged in agroforestry systems with various plants aged tens and hundreds of years old, with diversity of plants and animals as this forest is a remained of lowland tropical forest. The coffee trees as the main crops are grown primarily to meet the dominant family income of Kemuning villagers, while fruit trees such as Banana, Petai, Durian, Jengkol etc are utilized in the daily need purposes. Crops are made to grow under the forest stands. In terms of vertical structure, the diversity of plants in Kemuning forest forms layers as seen likely the same with tropical forests. At the top layer are the higher plants forming a canopy. Under the canopy layer is a medium-sized plants such as the fruit trees forming under canopy, and the coffee trees are at the bottom layer of the forest. Research reported that in the mamar agroforestry community in Timor it had a high flora diversity of 112 species, consisting of 33 species (29%) for seedlings and
saplings and 79 species (71%) for upper plants with categories starting from pole level to tree level [25]. The upper plants consisted of 20 species (25%) are plants that produce fruits and 59 species (75%) are woody plants [25].

The vegetation structure of Kemuning forest is still similar to tropical forest as it is a remained lowland tropical forest in Java island. The fundamental difference is only in the social and economic value. Compared with tropical forests, Kemuning forest is different in terms of that non-forest product commodities can be sustained, utilized, and harvested from time to time as coffee productivity yield annually. Economic interests and values are one of the many aspects to be taken into account when planting crops in agroforestry systems in developing countries especially in Java, Indonesia.

The existence of hundreds years of old natural forest composition within Kemuning agroforestry system provides for the conservation of large and tall trees which are very strategic for biodiversity conservation especially for endangered primate. Study confirmed that local wisdom and agroforestry approach is a key factor to the conservation of biodiversity [10]. This condition is very crucial and can be an important aspects in nature conservation in Kemuning forest. Coffee-based agroforestry is a form of sustainable environmental management by Kemuning village community.

Previous study showed that there are many plants still exist, which have reach their climax in Kemuning forest. Many woody plants have reached their maturity. Plants such as *Artocarpus elasticus* Reinw ex. Blume (diameter reaches 105 – 126 cm), *Spondias pinnata* (L.f.) Kurz (diameter reaches 43 cm – 159 cm), *Litsea glutinosa* (Lour.) C.B. Rob (diameter reaches 37 cm – 62 cm) [26]. Some of woody plants are tall trees reaches up to more than 30 meter height in Kemuning forest. Compared to some similar forms of other agroforestry and home gardens in Java, coffee-based agroforestry in Kemuning forest has more complexity and higher endemic plant and animal where some of the plants and animals in Kemuning forest are endemic to Java island for example Javan slow loris (see table 2).

### Table 2. Trees species used by the Javan Slow Loris in Kemuning Forest

| Tree Species | Family       | Tree DBH (m) | Tree Heigh (m) |
|--------------|--------------|--------------|----------------|
| *Blumea balsamifera* Dc. | Asteraceae | 0.67         | 17             |
| *Spondias pinnata* (L.f.) Kurz | Anacardiaceae | 0.43 – 1.59  | 19 - 35        |
| *Aphananthe cuspidata* (Blume) Planch | Cannabaceae | 0.47 - 0.83  | 17 - 29        |
| *Terminalia bellirica* (Gaertn.) Roxb. | Combretaceae | 0.61         | 19             |
| *Dillenia obovata* (Blume) Hoogland | Dilleniaceae | 0.76         | 17             |
| Albizia chinensis Morr. | Fabaceae | 0.44         | 12             |
| *Vitex pubescens* Vahl | Lamiaceae | 0.73         | 21             |
| *Litsea velutina* (Blume) Hook.f | Lauraceae | 0.68         | 27             |
| *Litsea glutinosa* (Lour.) C.B. Rob. | Lauraceae | 0.37 - 0.62  | 17 - 18        |
| *Sterculia urceolata* Sm. | Malvaceae | 0.35 - 1.17  | 17 - 35        |
| *Dysoxylum gaudichaudianum* (Juss.) Miq. | Meliaceae | 0.14         | 8              |
| *Adenanthera microsperma* T. & B. | Mimosaceae | 0.76         | 20             |
| *Artocarpus elasticus* Reinw ex. Blume | Moraceae | 1.05 - 1.26  | 27 - 28        |
| *Ficus sandoica* Blume | Moraceae | 1.09         | 27             |
| *Ficus superba* Miq. | Moraceae | 0.86         | 22             |
| Bamboo | Poaceae | -            | 15             |
| *Nauclea subdita* (Korth.) Steud. | Rubiaceae | 1.02 - 1.32  | 17 - 28        |

Source: Sodik et al. [26]
The upper and medium sized forest canopy condition in Kemuning forest is rarely changes. Farmers keep those layer condition as coffee plantation is better grow up in such shade condition. Natural forest is also very important for Kemuning villagers since locals have belief that it is their water source. Those factors lead into a sustainable ecosystem of Kemuning forest without any changes in the structure of the existing natural vegetation layer condition. The results of the study by [27] showed that more than 70% of Mamar agroforestry were found with water source. These water sources can survive throughout the year, but most experience a slight decrease in discharge during the peak of the dry season [27].

Another previous study also showed that Kemuning forest is a home of endangered primate species which is the Javan slow loris [26]. The study detected 33 loris encounters (32 solitaire, and 1 paired) (Figure 2). The distribution of the Javan slow loris in Kemuning forest was clustered in three different locations; in Kleter location with 26 individual encounters, Klangon with two individual encounters, and Limit with five encounters during the surveys. This existing nocturnal primate point out that Kemuning forest is still in a good forest condition for Javan slow lorise habitat. It is in line with a report pointed out that scholars argue that primate species among arboreal mammals are commonly selected to assess the forest condition as they rely on primary forest habitats and also have primary functions as predators, seed dispersers and ecosystem balance keepers [28].

![Figure 2. Javan slow lorise distribution Map in Kemuning Forest. Source: Sodik et al. [26].](image)

Another research recorded that some other species were also found within Kemuning forest such as Kubung (*Galeopterus variegatus*), Kukang Jawa (*Nycticebus javanicus*), Walangkopo (*Petinomys sp.*), Lutung Jawa (*Trachypithecus auratus*), Kucing Hutan/Blacan (*Felis bengalensis*), Kalong (*Pteropopidae*), Musang Luwak (*Paradoxurus hermaphroditus*), Elang Ular Bido (*Spilornis cheela*) dan Rangkong (*Aceros sundulates*) and some avian species [12] (Tabel 3.)
Table 3. Wildlife species live in the Kemuning forest

| No. | Local names       | Latin Names                      | No. | Local names       | Latin Names                      |
|-----|-------------------|----------------------------------|-----|-------------------|----------------------------------|
| 1.  | Lutung Jawa       | Trachypithecus auratus           | 18. | Bajing            | Callosciurus notatus             |
| 2.  | Kukang Jawa       | Nycticebus javanicus             | 19. | Celeng/Babi Hutan | Sus scrofa                      |
| 3.  | Jelarang          | Ratufa bicolor -                | 20. | Kampret/codot     | Pteropodidae                    |
| 4.  | Kendung           | Cynocephalus variegatus          | 21. | Kalong            | Pteropodidae                    |
| 5.  | Beluk             | Petaurista alborufus             | 22. | Beluk/Burung Hantu| Bubu sumatramus                 |
| 6.  | Walang kopoh      | Glaucomys Volans                 | 23. | Jenis-jenis       | Accipitridae                    |
| 7.  | Monyet            | Macaca fascicularis              | 24. | Anis Merah        | Turdus Citimus                  |
| 8.  | Trenggiling       | Manis javanica                   | 25. | Anis Kembang      | Zoothera Interpres              |
| 9.  | Landak            | Hystrix brachyuran               | 26. | Cucak Jenggot     | Alophoixus bres                 |
| 10. | Kancil            | Tragulus kanchil                 | 27. | Cucak Ijo         | Chloropsis sonnerati            |
| 11. | Kidang            | Muntiacus muntjak                | 28. | Katik (Punai)     | Treron vernans                  |
| 12. | Blacan            | Felis bengalensis                | 29. | Kenari            | Serimus Canaria                 |
| 13. | Musang Luwak      | Paradoxurus hermaproditus        | 30. | Rangkok           | Aceros undulates                |
| 14. | Musang Rase       | Viverrcula indica                | 31. | Pleci             | Zosteropidae                    |
| 15. | Musang Galing     | Paguma larvata                   | 32. | Talangan          | Megalaimidae                    |
| 16. | Garangan          | Herpestes javanicus              | 33. | Gelatik           | P. oryzivora                    |
| 17. | Tupai Tanah       | Lariscus insignis                | 34. | Biawak            | Varanidae                       |
|     |                   |                                  | 35. | Beberapa jenis ular| Pythonidae, Elapidae, etc       |

Source: Sodik et al. [12]

3.5. Perspective of Involved Stakeholders within the conflict in Kemuning forest.

In a particular conflict like forest conflict in Kemuning Forest, what is considered to be a problem is the meaning of problem frames. All of the involved stakeholders have their own perspective, interest, and opinion towards the main issues and causes of the conflict. Each of them has their own problem frames depending on their interest. As mentioned earlier, this conflict already exists for more than 40 years as it has started from the 1970s. Some stakeholders are involved during the whole process of this conflict.

3.5.1. Issue/problem frames. Issue or problem frames refers to what is regarded as a problem in a particular conflict. It sheds light on which aspects of the conflict are important to each party [17]. As already explained the conflicts has existed for nearly four decades now and it involved different stakeholders with varying interests. Consequently each stakeholder has own perception towards the root causes of this conflicts.

The findings from this study revealed that, generally the stakeholders identified three main issues as the root causes of the conflicts which are forest security, unfollow the signed contract, and an unequal benefit sharing from the coffee-based agroforestry sector. These three issues have formed the problem frames the conflict in Kemuning forest.

Forest security: This is the expressed concern by the community members. The communities are worried that Kemuning forest will be turned into production forest using clear cutting management by the Perhutani officers for the interest of the increasing perhutani income. The problem has been termed as “Kemuning forest as our water resource” and is a popular frame to mobilize community members to defend the forest against the Perhutani or other stakeholder:

“In the reformation era of the soeharto falling down, so many illegal logging activities have been massively occured throughout Java. Most of the forest area are cutting down illegally by people. Here, we protected the forest from illegal logging activities in that time as our forest is our water resource. If the forest dissappared, we cannot live in this village anymore. You could see in fact that kemuning forest is the natural forest area left now” (Source: interview with villager, 2018).

Another one added:
“We have a meeting with Perhutani officers in 2001, they have offered us to clear cutting down the forest and changing into production forest for better management of coffee-based agroforestry. However we are all did not agree with the Perhutani’s proposal as we know that forest is our water source. We have to protect Kemuning forest as natural forest.” (Source: Interview with villager, 2018). The village leader in Kemuning also uttered his worries on the forest security:

“Our forest is very important for our lives as water source, we are worried of the management of Kemuning forest being changed to agroforestry with clear cutting system. Thus we could not live here anymore as the natural disaster would frequently happened here such as landslide, flooding, and scarce of water source” (Source: Interview with villager, 2018).

an unequal benefit sharing from the coffee-based agroforestry sector. This is the expressed concern by the Perhutani Officers. Although Agroforestry within Kemuning forest is generating a lot of money, only small part of it goes back to Perhutani. It is stated in the agreement that the result of non-timber forest product would be 70:30, namely 70% for farmers involved in CBFM, and 30% for Perhutani. In fact, the proportion of the profit sharing is still made by the farmers where within the 30% portion of Perhutani there is a 10% portion of Lembaga Masyarakat Desa Hutan (local officers). From this proportion, even farmers still bargain it without considering the actual proportion of each party. In summary, community bargain the sharing proportion of the benefit from coffee-based agroforestry as little as possible giving to Perhutani. This is the main concern contributing to conflict in Kemuning forest:

“The locals have manage our forest areas for coffee plantations and they get a lot of money but what we are getting in return is very small, these agroforestry benefits are not shared equally, we are the losers” (Source: Interview with Perhutani officer, 2018). Another Perhutani officer adds the frame of an unequal benefit sharing by blaming locals as not paying all the required sharing revenues:

“Beside coffee, actually there are many fruit plants planted in the forest such as banana, legume and others. However, the fruit plants are not considered in benefits sharing. The plants should also be calculated in benefits sharing to Perhutani. I know they get a lot of money from the harvest of fruit plants annually. However, villagers do not want to consider the plants in benefits sharing” . (Source: Interview with Perhutani officer, 2018).

There is a problem in agroforestry benefits sharing. The local is taking bigger share and perhutani get very little as we also have to pay for tax of the land (Source: interview with Perhutani officer, 2018).

unfollow the signed contract. This the expressed concern by both community and Perhutani officers. Each of obligations in the agreement are not fully carried out by both parties. For example, the plan for forest resource management within the community in the Kemuning forest area has never been made by the community. While Perhutani activities emphasized only to make secured forest so that existing forest stands were not disturbed/reduced and forget about responsibility to help the community activities. This make the forest conflict still arised.

3.5.2. Identity frames. Identity frames capture how an individual conceives of herself and her membership in social groups. The identity frames used in this conflict are mostly those affirming the affiliations of the groups together. These are We/Ours-group frames. As the findings from this study reveals, the communities are identifying themselves as “a farmer who used the forest”, while Perhutani are identifying themselves as “owner of the forest”.

The interviews showed that all of the locals agree that their role in this conflict is as a farmer. They said that they live in this area and farming is the dominant job for communities. As farmer

“We have been stay here for a long time as farmers and coffee planting is our hereditary activity” (Source: Interview with villager, 2018). The same feeling is shared by another villager:

“Most of villagers of Kemuning village counts on yield of the Perhutani coffee agroforestry, as we have small amount of farming land” (Source: Interview with villager, 2018).
while Perhutani are identifying themselves as “owner of the forest”.
As owner of the forest
“Kemuning forest is owned by Perhutani which is managed for villagers so that they will have income” (Source: interview with Perhutani officer, 2018).
Another Perhutani officer adds:
“Legally, Kemuning forest is owned by Perhutani, we determine the direction of forest land management” (Source: interview with Perhutani officer, 2018).

3.5.3. Characterization frames. Characterization frames are reductionist labels, associating positive or negative characteristics with individuals or groups [29]. In forest conflict, the characterization frames used are those related to They/Them/Other -groups. The community members in Kemuning village are blaming the Perhutani by regarding them as bad people. The following excerpt shows this characterization frames:

Identifying as bad people
“yes, because we only use the land so we just comply what Perhutani officers are stated. For example, they get us to plant all of open areas, all cost is paid by villagers. Meanwhile Perhutani does not do anything, just order us. Actually we suffer much loss, but what we can do. We use Perhutani Land.” (Source: Interview with villager, 2018).
The same feeling is shared by another villager:
“All cost is paid by villagers within the management of coffee, while Perhutani is stated in helping this or that. However Perhutani never make it real” (Source: Interview with villager, 2018).
On the other hand the Perhutani officers argue that they are “innocent” people in which their existence in Kemuning forest is legal. They blame communities for not obeying the contracts signed and identifying as opportunistic person and also the local government for not giving attention to farmer who especially working on agroforestry in Kemuning forest.

Identifying as opportunistic person
“We have agreed propotion of the sharing income of the agroforestry stated in the Letter of Agreement. In the Taxation period, local tried to steal the profit of agroforestry income by telling the lie of the number of the benefit of the agroforestry yields. We have know about it but they always bargain in their own intereset” (Source: interview with Perhutani officer, 2018).
Another one added:
“Rich people here usually do not want to cultivate coffee, but they tend to purchase coffee plants which are in good condition. The activity of buying and selling of agroforestry land is not hidden anymore. Although this activity violates The letter of agreement” (Source: interview with Perhutani officer, 2018).

To sum up, it is interesting that the respondents do not want to change Kemuning forest into clear cutting coffee-based agroforestry mangement. Eventhough, it will provide more benefit from coffe productivity in Kemuning forest area. Changing the diversity of plants within Kemuning forest into
clear cutting coffee-based agroforestry means that they have to clear cut all the trees in the forest. Locals believe that it will result in numerous natural disasters such as landslide, flooding, drought and etc. By preserving Kemuning forest area with rich biodiversity leads to the protection of numerous living creatures especially for Javan slow loris and the village would get protection from natural disaster.

Kemuning forest can still survive up to now possibly because several important factors and conditions, among others including: (1) community belief that Kemuning natural forest is their water source, (2) Kemuning forest area provides an important income to the local people who seek to plant a variety of crops through coffee-based agroforestry to meet their daily life, (3) The choice of the local people to plant crops under the forest stands without cutting the trees provide a good habitat for plants and animals and also preserve the biodiversity within the forest area, and (4) the diverse needs that can be met by utilizing the forest area in such wise manners through coffee-based agroforestry. The wisdom of the community is one of key factor for the recent existence of Kemuning natural forest and its natural biodiversity.

4. Conclusion
Kemuning forest is a remained natural lowland tropical forest in Java that applied coffee-based agroforestry system within the forest. Thus, this coffee-based agroforestry system is a kind of conflict mitigation tool done by Perhutani where the existence of the natural forest condition is still preserved. Kemuning forest has a diverse collection of plants that set up the upper storey, middle storey, and lower storey layers. Therefore, this natural forest condition provide a good habitat for many plants and animals in which some of them is endemic species of Java island especially the Javan slow loris. The diversity and complexity of Kemuning forest give positive contribution to the preservation of its natural biodiversity. Kemuning forest has also a diversity of plants, animals, and ecological stability systems that benefit the daily life for the local community. The benefits from Kemuning forest caused local people to preserve the existence of the natural forest area passionately based on local community participation.

In addition, the interview result revealed that the conflict in Kemuning forest were triggered by three main issue/problem frames identified as the root causes of the conflicts which are forest security, unfollow the signed contract, and an unequal benefit sharing from the agroforestry sector. Other frames such as identity, characterization, conflict management frames were constructed in such a way to reinforce the issue/problem frames.

References
[1] Yasmi, Y., Kelley, L., Enters, T., (2010). Conflict over Forests and Land in Asia: Impacts, Causes and Management. RECOFTC — The Center for People and Forests, Bangkok, Thailand. 36 pp.
[2] Burley, J., Seppälä, R., El-Lakany, H., Sayer, J., & Krott, M. (2001). Voicing interest and concerns: challenges for forest research. Forest Policy and Economic, 2, 79–88.
[3] World Bank, (2004). Sustaining Forests: A Development Strategy. The World Bank, Washington, DC.
[4] World Resource Institute, (2003). World Resources 2002–2004: Decisions for the Earth: Balance, Voice, and Power, United Nations Development Programme. United Nations Environment Programme. World Bank and World Resources Institute.
[5] Balen, S.V. 1999. Birds on Fragmented Islands Persistence in the Forests of Java and Bali. PhD Thesis. Wageningen University and Research Centre, The Netherlands, 175pp
[6] Reinhardt, K.D., Wirdateti & K.A.I. Nekaris, (2016). Climate-mediated activity of the Javan Slow Loris, *Nycticebus javanicus*. AIMS Environmental Science 3(2): 249–260. https://doi.org/10.3934/environsci.2016.2.249
[7] Supriatna, J., Dwiyahreni, A.A., Winarni, N., Mariati, S. and Margules, C., (2017).
Deforestation of primate habitat on Sumatra and adjacent islands, Indonesia. *Primate Conservation, 31*, pp.71-82.

[8] Mulyoutami, E., Rismawan, R., & Joshi, L. (2009). Local knowledge and management of *simpukng* (forest gardens) among the Dayak people in East Kalimantan, Indonesia. *Forest Ecology and Management, 257*(10), 2054-2061.

[9] Torres, B., Maza, O. J., Aguuirre, P., Hijojosa, L., & Günter, S. (2015). The contribution of traditional agroforestry to climate change adaptation in the Ecuadorian Amazon: The chakra system. In *Handbook of Climate Change Adaptation* (pp. 1973-1994). Verlag Berlin Heidelberg: Springer. http://doi.org/ 10.1007/978-3-642-38670-1_90.

[10] Rahu, A. A., Hidayat, K., Ariyadi, M., & Hakim, L. (2014). Management of Kaleka (traditional gardens) in Dayak community in Kapuas, Central Kalimantan. *International Journal of Science and Research, 3*(3), 205-210.

[11] Rahman, S. A., Imam, M. H., Snelder, D. J., & Sunderland, T. (2012). Agroforestry for livelihood security in agrarian landscapes of the Padma floodplain in Bangladesh. *Small-scale Forestry, 11*(4), 529-538. http://doi.org/ 10.1007/s11842-012-9198-y.

[12] Sodik, M., Pudyatmoko, S., Yuwono, P., & Imron, M. (2019). Okupansi Kukang Jawa (Necticebus javanicus E. Geoffroy 1812) di Hutan Tropis Dataran Rendah di Kemuning, Bejen, Temanggung, Jawa Tengah Occupancy of Javan Slow Loris (Nycticebus javanicus E. Geoffroy 1812) in Kemuning Tropical Low Land Forest, Bejen, Temanggung, Central Java. Jurnal Ilmu Kehutanan 13: 15-27

[13] Ahmad, S.H., (2017). Conservation Initiative In the Community-Based Forest Management System In Kemuning Village, Bejen Subdistrict, Temanggung Regency. Undergraduate Thesis, Faculty of Forestry, Universitas Gadjah Mada. Yogyakarta, 120pp.

[14] Siregar, F.A.H. (2014). Hubungan Antara Aktivitas Manusia Terhadap Distribusi Kukang Java (Necticebus javanicus) Pada Fragmen Hutan Di Temanggung [Relationship Between Human Activity on The Distribution of Javan Slow Loris (Nycticebus javanicus) In Forest Fragment of Temanggung]. Undergraduate Thesis, Faculty of Forestry. Universitas Gadjah Mada, Yogyakarta, 58pp.

[15] Krisanti, A.K., T. Widiyani & M.A. Imron , (2017). Species diversity and population distribution of arboreal mammals in Kemuning Forest, Temanggung, Central Java, Indonesia. *Biodiversitas 18*(3): 1190– 1195. https://doi.org/10.13057/biodiv/d180342

[16] Aarts, Noelle and Maartje van Lieshout. (2006). “Street Corner Conflicts - Shifting Frames in Different Relational Contexts.” Pp. 1–14 in *Paper for the 19th IACM Conference Montreal, June 2006*.

[17] Gray, B. (2003). Framing of Environmental Disputes, In: Lewicki R.J., Gray B., Elliot M. (Eds.), Making Sense of Intractable Environmental Conflicts: Frames and Cases, (p. 11-34). Washington, DC: Island Press.

[18] Atkinson, Paul and Martyn Hammersley. (2007). *Ethnography: Principles in Practice.*

[19] Vaus, de David. (2001). *Research Design in Social Research.* SAGE Publi. SAGE Publication.

[20] Miles, M. B. and A. M. Huberman. (1994). *Qualitative Data Analysis, 2nd Edition.* California: Sage, Thousand Oaks.

[21] Simon, H. (1999). Pengelolaan Hutan Bersama Masyarakat: Teori Dan Aplikasi Pada Hutan Jati Di Jawa. ogjakarta: Bigraf Publishing.

[22] Djokonomo, D. 1986. “Penguasaan Teritorial Oleh Jajaran Perum Perhutani.”

[23] Kartasubrata, J. and D. Suharjito. (1989). “Prosiding Seminar Hasil Penelitian Perhutanan Sosial Di Jawa.” in *Sage, Thousand Oaks.*

[24] Perhutani, Perum. (1999). *Petunjuk Pelaksanaan Tim Pembinaan Masyarakat Desa Hutan Terpadu.* Pemerintah Propinsi Daerah Tingkat I Jawa Timur: Pemerintah Propinsi Daerah Tingkat I Jawa Timur.

[25] Njurumana, G.N., (2009). Pola Pengelompokan Komunitas Mamar di Timor. Thesis pada
Program Pasca Sarjana, Fakultas Kehutanan Universitas Gadjah Mada, Yogyakarta

[26] Sodik, M., Pudyatmoko, S., Yuwono, P., & Imron, M. (2019). Resource selection by Javan Slow Loris Nycticebus jawanicus E. Geoffroy, 1812 (Mammalia: Primates: Lorisidae) in a lowland fragmented forest in Central Java, Indonesia. *Journal of Threatened Taxa, 11*(6), 13667-13679. https://doi.org/10.11609/jott.4781.11.6.13667-13679.

[27] Njurumana, G. N., (2006). Pendekatan Rehabilitasi Lahan Kritis Melalui Pengembangan Mamar (Studi Kasus Mamar di Kabupaten TTS). Prosiding Sosialisasi Hasil Hasil Penelitian dan pengembangan Kehutanan. Pusat Penelitian dan Pengembangan Hutan dan Konservasi Alam. 14 Februari 2006. Kupang

[28] Kays, R. & A. Alisson (2001). Arboreal tropical forest vertebrates: current knowledge and research trends. *Plant Ecology* **153**: 109–120.

[29] Shmueli D., Elliott M. and Kaufman S. (2006). Frame Changes and the Management of Intractable Conflicts. Conflict Resoultion Quarterly, vol. **24**, no. 2, Winter 2006 © Wiley Periodicals, Inc. 207 and the Association for Conflict Resolution