Food security and Sustainable Forest Management (SFM) implementation at the Forest Management Unit (FMU) level: A case study in Salarom Taka, Nabawan, Sabah

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Abstract. The forest managed under Sustainable Forest Management (SFM) could contribute to food security, especially for vulnerable communities living in the forest's vicinity. This study was conducted to determine the local community's perception of the SFM implementation and food security in Salarom Taka, Nabawan. The interrelation between forest and community's food security was assessed based on the availability and utilisation of various food resources from four accessible areas: natural forest reserve, forest plantation, alienated land, and resources purchased from the market. The food resources are mainly available and accessible through purchasing, followed by alienated land, forest reserve and forest plantation. Forest contributions are significant, with most communities utilising forest resources for direct food consumption and using fuelwood for food processing. The community depends on the forest to intensify their agricultural production to sustain their food security. The community are less aware of the SFM implementation in their area, but agree with better access to clean water sources, health and education facilities, and more employment opportunities. The roles of forests are strengthened through SFM policy which ensures the forest is managed sustainably, enhancing economic and environmental values that could benefit current and future generations.

Keywords: Food security; local community; SFM Policy.

1. Introduction

Food security has been widely defined as "a state where people, at all times, have physical, social, economic access to sufficient, safe and nutritious food to meet the dietary need for an active and healthy life" [1]. These encompass the four significant pillars, namely food availability, accessibility, utilisation, and stability. Most people in rural areas rely on the forest as an alternative to secure their livelihood as the forest can maintain their healthy diet, secure food and nutrition, and be an income-generating source [2]. The communities' dependence on forest products could be caused by their limited access to the markets due to the poor infrastructure as they reside near a dense forest [3]. It is also reported that food security has become an alarming issue with regard to low productivity and poor purchasing power [2]. Thus, they enter the forest to obtain wild foods such as mushrooms, fruits and animals for meat [1]. Forest has been recognised to benefit rural communities in terms of generation of income, employment as well as satisfying their variety of dietary needs [4]. The roles of forest among the forest-dependent people are highly significant to food security because they obtain continuous supply from the ecosystem services. These are freshwater for agricultural production, habitat to foster biological synergy that allows the growth of crops and livestock, climate change mitigation, and extreme weather at the landscapes level [5]. A discourse highlighted that the Forest Management Unit (FMU) areas in Sabah are administered by the FMU holders that include the Sabah Forestry Department (SFD), the state's agency and the private sectors [6]. Implementing the forest management unit is important to initiate the
application of the SFM concept, which becomes a foundation to increase forest production yields while providing environmental protection and social benefits for the local communities [7]. Therefore, this study was carried out to identify the interrelation between forest and food security among the local community in Kampung Salarom Taka, Nabawan, Sabah and determine local communities’ perception of the SFM implementation and their food security.

The community of Salarom Taka originated from a village of Salarom inside the Pensiangan forest reserve, near the border of Kalimantan, Indonesia. Their previous village was hardly accessible by road since the logging activities inside the forest had ended; thus, they cruised along the Tagol River and walked across a dense forest to obtain their necessities and health services from the nearby town. They were completely dependent on forest resources to maintain their food security. Meanwhile, they faced the biggest challenge when a mother was about to give birth. They had no access to health care and depended on medical officers who flew to the village using the helicopter to provide medical support. Their migration to the resettlement area started in the early month of May in 2006 and temporarily lived inside the huts before they constructed longhouses completed in 2008. The relocation of this community to the resettlement area was initiated by the Sabah Forestry Department (SFD) due to the long-term efforts to conserve the forest reserve, ensure that the community can improve their livelihood, and eradicate poverty among the local community. The resettlement that gazetted as a native reserve has an area of 100 acres where 73 units of concrete houses were constructed in 2010, and they started to reside in the houses in 2012. The SFD funded about RM11.3 million derived from the Community Forestry Cess Fund to finance the project. After the movement of the community to the new resettlement area, most of them were involved in farming activities and now have better access to the economy, health and education and are less dependent on forest resources to sustain their livelihood.

2. Method and data analysis
This study was conducted in Kampung Salarom Taka, Nabawan, a resettlement area near the FMU 14, managed by a private company, licensed under the Sustainable Forest Management License Agreement (SFMLA). The resettlement consists of 73 families where the majority of them are from the Murut tribe. The study was conducted by distributing a questionnaire survey, and respondents were selected through convenience household sampling. A Focus Group Discussion (FGD) was also conducted where the community were categorised into three groups; men, women and youth aged 18 years old and above. Key informant interviews with the village chief and the district forestry officer were done to collect in-depth information on the resettlement project and the chronological history of the community migration from the forest reserve. The questionnaire survey was keyed in using Survey Monkey and analysed using IBM SPSS version 26 and Microsoft Excel 2016.

A total of 47 respondents who are the head or members of the household had participated in this study. Most of the respondents (53%) are male, and 96% are from the Murut tribe. About 45% of the respondents had received formal education in secondary school, and 75% were employed in a job that is not forest-related. In addition, 74% of the respondents had lived in the village for more than ten years since they moved from their previous village. About 35% of them, which was the highest percentage, can generate a monthly household income from RM500 to RM999, yet 28% could spend more than RM900 per month.

3. Results

3.1 Forest and food security (availability, accessibility and utilisation)
Figure 1 shows the list of 17 forest resources. The respondents were asked to give the availability rating average in four different areas: the natural forest reserve, forest plantation, alienated land, and resources purchased from outside or the market. The order from most accessible to least accessible areas ranked by the community was purchased from outside, followed by sources from the alienated land, forest reserve, and forest plantation area.
Meanwhile, the community ranked the utilisation pattern of forest resources based on a very high significance level to the least significant level of utilisation. The community highly utilised forest resources for direct food consumption (40%). On the other hand, 54% of them are utilising firewood for food processing and boiling. The movement of the community to the resettlement area has allowed them to venture into agriculture activities where 92% of them are involved in subsistence farming, 47% in wet paddy plantation and 64% in hill paddy plantation as they were given an acre of land for cultivation by the government. They can also participate in selling their products, as now they have better access to

**Figure 1.** Rating average of available resources in four accessible areas.
Note: 0=Never, 1= very rare, 2= rare, 3=moderate, 4=frequent, 5=very frequent.
the market, which contributes to their food security. Though most communities are least dependent on forest resources, they utilise the forest function through ecosystem services for agriculture production, especially for protecting water catchment and supply, increased soil fertility, and local climate regulation.

3.2 General perception of the SFM implementation and food security

It was found that only 23% of respondents had knowledge or were familiar with the SFM terms. They were less aware of the implementation of SFM in their surroundings, which had changed their way of living. After migrating to the current resettlement area, they have access to water sources as one compartment of the FMU area had been allocated for the local community water catchment area, despite the restriction on entering the forest to collect resources and hunting activities. Apart from having better access to healthcare, education and economy, the movement of the local community from their previous settlement area and living nearer to SFM had given them more chances for employment to raise their standard of living, including their food security.

4. Discussion

The degree of availability of 17 listed resources accessible from the forest was rated almost never to a rare level which distinguished that the community were partially dependent and restricted to entering the forest for resources gathering. The restriction to enter the forest is imposed by the government to control the access through the imposition of policy tools to ensure the protection and conservation of the area [8]. Even though the forest is meant to be conserved, it should meet the present communities and future generations' social, economic, ecological, cultural, and spiritual needs. For that reason, the SFMLA conserved one part of the forest compartment as a water catchment area to supply water to the community for their daily use. The community previously resided inside the forest reserve, where they depended solely on their surroundings and traditional knowledge in food processing to sustain their food security. For example, they processed cassava root into flour, wild boar fat into cooking oil, and salt extracted from natural springs found in the forest. Firewood has become critically important for food processing and preservation. A study stated that vulnerable families who depend on traditional biofuel might consume raw or half-cooked meals that could be toxic and eat rot foods since they cannot refrigerate them [9]. Subsequently, there would be a time when they skip their meals, thus causing less nutritious foods due to the scarcity of firewood. The stability, quality, and amount of food taken by the community had been indirectly affected by the supplies of firewood which are important for the preservation of food, such as smoking and drying [1].

The remoteness of forested areas made it difficult for forest-dependent people to access the markets, government services, low employment opportunities, and least income generation [10]. Previously, the community practised a coping strategy through food exchanging with neighbours to gather a variety of nutritious food resources to feed their families. The initiative by the SFD to resettle the community in a new resettlement area had been a success in improving their livelihood. They can now sell their agricultural crops in the market to increase their purchasing power, indirectly contributing to their food security. The long community association with the forest may spark a sense of belonging, and there is a need to achieve mutual agreement between both parties. The government will face a challenge, either to support the livelihood of the forest-dependent communities or to provide an alternative to reduce their dependency on the forest [11]. The SFD respected the community's rights and provided them with a house and an acre of land for crop cultivation for those who agreed to move to the new resettlement. Forest contribute to food security through its ecosystem services, water for agriculture production, habitat for biological synergy and climate change mitigation [5]. The function of the forest to protect its ecosystem services had indirectly contributed to the community food security needs by intensifying their agriculture production.

Sustainable Forest Management (SFM) aims to maintain and enhance the economic, social and environmental value of multiple types of forests to benefit the present and future generations. There was only a small scale of the Salaram Taka community that knew SFM. However, they believe that the forest should be well managed since it has many contributions to the life of humans and animals. These include providing food for direct consumption, protecting soil and water, agricultural activities, income
generation, and local climate regulation, which they had long experienced since their days of residing inside the forest area. A study found that there are more than 20,000 people living within the forest are extremely vulnerable with no access to facilities [12]. Their rights should be taken into account if the SFM is implemented in that particular forest. The SFD has introduced the community forestry project through the housing for those affected indigenous people in the new resettlement area and enabled the conservation and restoration of the forest area. The community is not involved in the forest plantation program, but the resettlement project has induced active participation of various stakeholders through the resettlement project. These include the personnel from SFD and other government agencies such as the Malaysian Public Work Department (JKR), the Department of Irrigation and Drainage, the Sabah Electricity Sdn Bhd (SESB), the District office, the local community as well as the SFMLA holder. These have been to ensure that the migrated community could access the basic facilities and improve their livelihood.

5. Conclusion
The community of Salarom Taka relied wholly on forest resources in their previous village. After they moved to the new resettlement, they became partially dependent on forest resources except for basic amenities such as water and forest ecosystem services for agriculture intensification that could indirectly contribute to their food security. Presently, they are dependent mostly on resources accessible outside the forest as they now have better access to economic activities and improved livelihood. The community was less aware of the implementation of SFM. Still, they believed that the forest roles were strengthening. This model ensures the forest is managed sustainably and enhances economic, social, and environmental values, benefitting current and future generations. The forest function in providing various benefits to improve food security is no longer as high as when they lived in their old resettlement in the remote area inside the forest reserve. Through the SFM policy, the government could improve people's livelihood by engaging in social forestry projects, consequently reducing the community's dependency on forest resources. In addition, a mutual agreement can be established between both the community and FMU holders to genuinely collaborate to enhance the protection and production functions of the forest.

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