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Local Ecology-Based Agroforestry Management: Building Effectiveness of Knowledge-Based Wetland Management

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ABSTRACT

One of the advantages and knowledge possessed by local communities in various parts of Indonesia is the use of local ecology-based agroforestry systems. This study uses a descriptive method with a qualitative approach and data triangulation analysis, the results of the study explain that the application of agroforestry systems developed by farmers in Indonesia has quite a lot of impact on various sectors of human life. life, in addition to bringing many benefits in the form of materials and crops. The use of agroforestry systems is also a local technology that has been passed down from generation to generation, and is very suitable for various plants and plants that live in various tropical forests in Indonesia, while several trials have been applied to agroforestry techniques that have been carried out. by the community includes land preparation, water management, soil fertility management and evaluation of crop yields, while local wisdom is the result of a learning process based on farmers' perceptions in managing the various advantages of available natural resources. in Indonesia country.

1. Introduction

Indonesia as the largest tropical country in the world, forests in Indonesia have a very important role in advancing various economic, socio-cultural and ecological aspects, this is certainly very decisive for the needs and food sources for some people in Indonesia. To reduce poverty, unemployment and inequality in the management of local forest area utilization in Indonesia, periodic Social Forestry activities are needed. These activities are carried out through providing legal access to local communities, including through the Community Forest (HKM) program on state forest lands of the Ministry of Environment. and Forestry. The purpose of the program is to further improve the welfare of the community through the optimal, fair and sustainable use of forest resources while maintaining the preservation of forest functions.

One technique that is often found and is still being carried out today in the development and management of community forest work areas is through the agroforestry system, agroforestry is a land use system that combines woody plants with non-woody plants or can also be with grass (pasture), sometimes there are components of livestock or other animals (bees, fish) so that ecological and economic interactions are formed between woody plants and other components and are managed according to the farming culture of the local community. Such as one of the fruit seed planting movements carried out in the Ciamis area of West Java with agroforestry techniques as an optimal land use method, where on that occasion the Ciamis Forest Management Unit with the Regional VII Forestry Service Branch and the Natural Resources Conservation Center (BKSDA)), which combines short and long rotational biological production systems (a combination of forestry production and other biological production) in a manner based on the principle of sustainability, simultaneously or sequentially, within the forest area or outside it, with the aim of achieving people's welfare (Agus et al., 2002; Martens et al., 2013; Kissinger et al., 2016).

Basically, farmers in Indonesia already have local knowledge of ecological techniques. This technique is an agricultural and forestry management that has been formed from generation to generation from their ancestors and developed over time, this local knowledge is in the form of farming and gardening experience and interacting with the environment, local knowledge possessed by farmers is dynamic, because it can be influenced by technology and External information includes research activities of scientists, counseling from various government agencies, experiences of farmers from other regions, and various information through various mass media. The superiority of local ecological knowledge and technology of people who live in and around wetlands, especially in tidal wetlands, which are mostly peat swamp lands in cultivating cultivated

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plants are so prominent, community involvement around forests can optimize forest land by implementing condition-based agroforestry socio-economic community, such as community preferences and adoption of agroforestry patterns (Lusiana et al., 2008; Schugren et al., 2010; Kohler et al., 2018).

Meanwhile, the definition of local wisdom, according to Keraf (2002) is all forms of knowledge, belief, understanding or insight as well as customs or ethics that guide human behavior in life in ecological communities. It was also explained that local/traditional wisdom does not only concern people's knowledge and understanding of humans and how good relations are between humans, but also concerns knowledge, understanding and customs about humans, nature and how relationships among the inhabitants of this ecological community should be built.

The application of the concept of agroforestry in wetlands and some tropical forest environments in Indonesia, is actually a concept that requires specific knowledge and technology considering the characteristics of the land, the factors and practices that play a role in its formation which are very complex and varied. applied must also be local specific by taking into account the characteristics of the environment, social aspects, economy, culture, traditions and wisdom of the local community. Local communities have a good understanding in terms of agroforestry knowledge and technology because they have lived in the same or similar environment for several generations and have inherited or accumulated knowledge and technology relevant to local natural conditions. They have learned a lot and produced complex, sophisticated and appropriate knowledge for local agricultural conditions.

In Indonesia, agroforestry techniques are often offered as a sustainable agricultural system, but in practice they often experience failures and obstacles, due to improper management and not paying attention to the surrounding environment, in order to increase the ability of local communities to manage agroforestry systems that are appropriate and sustainable. getting satisfactory results, at least it is necessary, some basic techniques to be able to analyze the problems that occur, including planning and implementing agroforestry activities, then monitoring and evaluating agroforestry activities, but it is not enough to stop there, of course, must be accompanied by work practices and processes which is run continuously.

The agroforestry system is expected to optimize land productivity so that the community can harvest the results continuously, depending on how much variety of species is combined in one field and the management system. The selection of plant species composition and management methods are very important in determining the success of this agroforestry system. One example of the agroforestry system that has been carried out in the Community Forest work area is expected to be able to restore forest functions as well as make a real contribution to increasing the income and welfare of farmers and surrounding communities. Farmers and the factors that influence the income of farmers who do agroforestry in the community forest work area, Pattimahu, Tanasale & Wattimena (2014) &Wulandari (2011) explain that local ecological knowledge is a collection of knowledge, practices, and beliefs that develop through adaptive processes and are passed down from generation to generation. from generation to generation through the spread of culture, about the relationship between living things, including humans and with their environment.

Agroforestry management systems are usually established on forest-based land which is then used to cultivate agricultural crops with forest crops. According to Marwoto et al. (2017) the development of agricultural commodities cannot be separated from the development of human civilization, if some of these techniques can be applied and achieved perfectly, then we have created a food adequacy program for people who live around abundant natural resources which so far have not been optimized for development. fully empowered, in addition to the management and utilization of land resources, will cause several problems if the development activities and the results to be achieved are not in accordance with the expected management objectives, while the expected management objectives are so that existing resources can be utilized optimally and sustainably in the sense that community welfare can increase without causing damage and degradation of natural resources and the environment that can harm the survival of future generations (Earles & Williams, 2005; Purwanti et al., 2017; Salampessy et al., 2017).

As for some of the references and previous studies that the researchers used in the process of compiling this research, the Socio-Economic Aspects of the Agroforestry System in the Community Forest Work Area (Hkm) of West Lampung Regency, Lampung Province, this research was compiled by, Puspasari et al (2017) using qualitative research methods and primary data collection is done by means of observation and interviews to obtain respondent identity data, the results of this previous study explain that, agroforestry activities contribute to farmers' income by 66% and the rest from other sectors. Based on the income from agroforestry activities, it is known that 93% of farmers are in the prosperous category. Factors that have a significant effect on farmers' income are the area of arable land, the number of types of plants that have been produced and the training attended by farmers. In accordance with the provisions, the area of land cultivated by farmers in the HKm area is no longer possible to be expanded, therefore it is better for farmers to enrich

with more types of multi-purpose plants and participate in trainings to increase knowledge so that land management is more optimal to improve
income

The next research is entitled, Characteristics and Economic Prospects of Agroforestry Systems in Bireun Aceh Regency, this research was compiled by Fuady et al (2015) using quantitative research methods and the results of this previous study explained that, Types of agroforestry developed in Bireuen Regency are Agrisilviculture and agrisilviculture with dominant species of agrisilviculture The average total cost of production and income in the agroforestry system is Rp. 4,332,857/year and Rp. 19,480,714/year, with an average profit of Rp. 15. 147,857 per year. Generally, farmers experience problems with low prices of farm products because the price determinants at the farm level are traders. However, the heterogeneity of crops and the sustainability of farmers' income from the application of agroforestry provide social and economic security and resilience for the people in Bireuen Regency. On the other hand, more intensive government attention is needed either through counseling, training and assistance in managing superior plants.

And the last research entitled, Ecological Knowledge of Local Communities in the Selection of Protective Trees in the Dusung Pala Traditional Agroforestry System in Ambon, this research was compiled by Salampessy et al (2017) This research uses a case study methodology, and the results of this study This previous chapter explained that Dusung is one of the traditional agroforestry systems that developed in Maluku Province. The management of dusung nutmeg in Hutumuri Village is carried out in three phases, namely: gardens/fields, aong, and dusung. Decision making in the selection of protective plant species in the nutmeg hamlet is carried out based on local ecological knowledge of the community that has developed from generation to generation. The decision-making is based on certain reasons, namely, the suitability of biophysical conditions, supporting the growth of nutmeg, ease of maintenance and harvesting, parental inheritance, money income, diversity of results, and ease of marketing

2. Research methodology

This study uses descriptive analysis using qualitative methods. Researchers also want to examine the phenomenon that discusses Local Ecology-Based Agroforestry Management: Building Effectiveness of Knowledge-Based Wetland Management. Collecting data using literature studies related to this research. Qualitative approach in research is very detailed and detailed research where research results are studied in depth and then interpreted clearly. There are two sources of data used in this study, where the data includes primary data and secondary data, then the facts of the findings are described in a very easy form of discussion so that researchers can find a complex and structured understanding in a directed manner.

3. Results and Discussion

3.1 Planting Preparation Activities

In simple terms Agroforestry, often interpreted as a new branch of science in agriculture and forestry, the system seeks to recognize and develop the existence of agroforestry systems that have been practiced by farmers since time immemorial. In simple terms, agroforestry means planting trees on agricultural land, and it must be remembered that farmers or the community are the main elements (subjects). Thus, agroforestry studies are not only focused on technical and biophysical issues but also social, economic and cultural issues that are always changing from time to time, so that agroforestry is a dynamic branch of science. determine associations between the types of vegetation planted. In the context of agroforestry, multipurpose tree means all trees or shrubs that are used or managed for more than one product or service use; whose emphasis is on economic and ecological aspects (Shrestha & Dhillion, 2006; Arifin, 2014; Tamrin et al., 2015).

There are several initial stages that must be prepared by farmers in preparing for planting, including land preparation, water management, land management, soil fertility management and planting. Land preparation activities for plants are usually carried out at the end of the dry season (towards the beginning of the rainy season) which ranges from September to October. This research was conducted in early September because it had started to rain. The activity begins with land clearing, namely clearing weeds by slashing followed by chopping up the results of the slash in the form of weeds and the remnants of tree roots around them.

Land processing is done manually only by using simple equipment such as hoes, tajak and sundak although based on following technological advances and changing times, some farmers cultivate the land by mechanical means, namely by using a tractor. The reason for using the manual method is that the cost is cheaper, the land is easy to organize and neater. The use of a tajak or a long-stemmed machete has a dual function, namely, in addition to cutting weeds, it is also used to remove the soil surface layer as deep as 5 –

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10 cm for minimum tillage, This is related to farmers' efforts not to expose the pyrite layer (Utami et al, 2003; Hayyun et al., 2018).

In general, agroforestry systems can function as protective (which leads to more biophysical benefits) and productive (which leads to more economic benefits). The biophysical benefits of agroforestry are divided into two levels, namely the landscape or global level and the plot level. At the global level includes the function of agroforestry in soil and water conservation, carbon stocks (C stock) on land, maintaining biodiversity, on the other hand agroforestry systems are also used by farmers to maintain soil fertility, although in reality not all trees can have a significant impact. profitable.

3.2 Characteristics of Local Ecological Knowledge

As for the characteristics of some understandings of local ecology and have been used by farmers for generations, among them are, Like scientific understanding, farmer knowledge systems evolve with the addition of new experiences and the development of new situations following the development of the existing era, knowledge Old knowledge will always be updated with new knowledge from own observations or from secondary sources. Knowledge that is less useful will slowly be forgotten with the discovery of several new systems that are more relevant and can certainly provide more satisfactory results, then local ecological knowledge is also always accompanied by an explanation that can be understood logically, namely development through observation and testing. Try, Farmers can explain various ecological processes and relate them to the factors that influence them. Although inaccurate and lacking in depth in many cases, in general the farmers were able to provide a logical explanation of natural processes.

Furthermore, the local ecological system is interdisciplinary and holistic, meaning that farmers do not classify their knowledge according to scientific studies, their knowledge system is integrated with the relevant ecosystem components, can be digested using logic, and the understanding that has been passed down from generation to generation, on the other hand local ecology is also limited by observational skills, farmers mostly learn from close observation (Widianto & Suprayogo, 2003). Indeed they do not use sophisticated measuring tools. Therefore their knowledge is often limited to what they can see and feel (Waluyo & Nurlia, 2017). The level of sophistication varies according to experience, as farmer knowledge develops on the basis of experience. Therefore, more experienced farmers will have more knowledge. The type and depth of knowledge of farmers is often related to the environment and their socio-economic role in community life (Rotinsulu et al., 2016).

However, farmers' knowledge has a weakness because many things are also unknown to farmers. What farmers know is often inaccurate and incomplete and sometimes even contradicts scientific knowledge. For example, farmers do not understand the interactions that occur in the soil. Regularity of principles and basic concepts across similar agroecosystems. Terms and interpretations between farmers and between communities may differ. However, studies across agroecosystems reveal that in similar agroecosystems the basic understanding of ecology is also similar, regardless of the distance between the communities, complementing scientific knowledge: Since farmer knowledge, like scientific knowledge, is mostly based on actual observations, both knowledge systems have many similarities. The existence of differences in the method of producing the two knowledge will cause differences, especially in the scope and depth.

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3.4 Use of Agroforestry Systems in Wetlands

Extracting information on local community knowledge and innovations adopted by local farmers can describe the pattern of natural resource management surrounding. In addition, it can also be used as input in improving the lives of farmers, both in terms of economy, ecology and social. Local knowledge and innovations adopted by the farmers are collected, then assembled and analyzed into a more structured model of farmer knowledge so that it can be easily applied by other communities. plantation or agricultural area is increasing in line with the increase in population. In addition, the issue of land tenure rights between residents, the government and the private sector is also a factor causing land extensification efforts in Sumberjaya. These things trigger the conversion of primary and secondary forests into agricultural areas and land use to sloping land areas which further opens up opportunities for increased soil erosion so that critical lands are formed.

As for some of the processing techniques applied to the wetland agroforestry system and developed by farmers in Indonesia, including the mound and ring technique, this technique is made through the accumulation of soil where the pile is in the form of a circle or a rectangle, according to the farmer the mound is made 5 with a height size 30-40 cm or mounds are made with a size of 1 meter in the form of a circle with a height of 60 cm. And the distance between the mounds is 5.5 m. According to farmers, the use of this mound technique is so that plants are not easily flooded and so that tree-shaped plants can be even better, because with the addition of stacked soil, more nutrients will be obtained.

Then there is the surjan technique, this technique consists of tabukan or trenches with a depth of up to 40 cm and a width of 3 m, this technique is considered to be more suitable for plant cultivation using an agroforestry system, especially on peatlands, ideally using the surjan system this is a mistake. an effort to overcome the effect of tidal overflow. Making a surjan is intended to provide adequate regulation of the root environment, besides that it is also useful for making the soil more firm so that the anchorage of roots in the soil can be stronger.

The practice of the surjan system allows the development of cropping patterns and diversification of commodity types. The type that is usually planted is rice (Oryza sativa) in the tabukan which remains wet, while the mounds can be planted with wood-producing trees, fruits and vegetables. The making of the surjan system is carried out in stages, first the soil is excavated and arranged stack by stack so that the soil condition which was originally wet becomes dry, namely in the mounds, while in the taboo section it remains wet. And in the taboo section the water can be accommodated, so that for agricultural activities it is very necessary because there rely on rain-fed irrigation and tidal water. Based on several observations regarding the use of agrofprestry systems on peatlands, we can conclude that land management techniques in the form of ring and surjan on all types of plants are suitable as a place to grow plants. This is because both of these techniques provide more space for plant development in the growth process than the mound system. One measure of success in the plant manufacturing process is the large percentage of plant life tested, the greater the percentage of plant life shows the magnitude of the adaptability of the species to planting location/site. The live percentage of the plant also shows an indication of the suitability of a plant species to the planting site (Spies, 2008;Senoaji, 2012).

3.5 Analysis of Agroforestry Processing in Indonesia

Lately, the agroforestry system has become an important discussion material and is even widely practiced in forest management in various regions in Indonesia, one example of the Ciamis City *Perhutani*agenda which held an event for planting fruit seeds in community forests, the program is the idea of the Governor of West Java in the movement of planting and maintaining trees on critical land bordering the forest plot area, the event was also attended by the KPH Administrator *CiamisSukidi* and the ranks of the Head of the Agriculture Service, also attended by the Regional Disaster Management Agency, Head of the Forestry Service Branch , and *the Gunung Sawai* Environmental Activist Tree Community, where on this occasion the Ciamis City government wants to welcome the 38th Forest Service Day in collaboration with

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PerumPerhutani, wanting to synergize with the community in terms of utilizing forest areas for production and management so that they always produce benefits. bag i the surrounding community, especially in managing the agroforestry system in the Ciamis area so that it can run continuously and bring various benefits to the survival of the surrounding community, because the concept not only solves land use problems, but also obtains various kinds of needs related to human survival such as aspects of food, animal feed, firewood and building wood, as for several types of agroforestry systems that are often used by some farmers in Indonesia, including simple agroforestry systems, in this system the community cultivates mixed garden cropping patterns that combine seasonal crops such as, Corn, Banana, Papaya and forestry plants (tree species) such as nantu, mahogany, teak, coconut and candlenut. The types of trees planted can be of high economic value, for example, (coconut, nantu, candlenut and teak) or of low economic value, such as (*mahogany*), while non-timber crops with high economic value, such as (*corn, banana and papaya*), agroforestry models a simple combination of conventional combinations consisting of a small number of elements, which describes what is now known as a classic agroforestry scheme (Gur et al., 2012; Indra et al., 2017).

Then there is also a complex agroforestry system, where this complex agroforestry system generally uses land in the yard of the house, both in front and behind the house, with a land capacity of between 0.5 ha-1 ha. Types of plants planted are usually secondary crops, mango, banana, corn, cocoa, coconut, rambutan, jackfruit and candlenut. Land management with agroforestry systems does require the selection of appropriate species and proper silvicultural treatment. Arrangements to maintain optimum light, water and nutrients for each type of constituent are the key to the success of this agroforestry system. Different agroforestry patterns allow for different responses to the growth of staple crops, this is because each individual plant in the agroforestry system interacts so that it can have a positive or negative impact on the growth of staple crops and seasonal crops. farmers can take advantage of the system according to their expectations and needs, According to Evival (2011) and Wezel et al (2014) the proportion of contributions received from the agroforestry system to the total income of the community varies greatly from place to place, therefore it is necessary to conduct research on the contribution of plant composition agroforestry on farmers' household income so that farmers can manage agroforestry land better because they know the right composition of plants to improve the welfare of farmers in Indonesia.

4. Conclusions

Management of forest systems using agroforestry techniques is indeed very helpful for various human survival, especially for farmers who are greatly helped by the application of the system, because as we know the system brings many benefits both in terms of material and in terms of income during the rainy season. In general, when the harvest comes, Agroforestry is a land management system that is offered to overcome problems that arise due to land use change and to overcome food problems. Forms of agroforestry in general include mixed gardens, fringed fields, fields, fallow land (shrubs), home gardens, community plantation forests which are richer in species. Agroforestry is widely adopted by farmers in Indonesia because it is a land use technique that is very suitable to be done on land that In addition, the factor of the Indonesian state as the owner of the largest tropical forest in the world is quite influential on the suitability of the Indonesian people in carrying out agroforestry activities which are much more useful and bring much more maximum profits.

5. References

[1] Agus, F., Gintings, A. N., & van Noordwijk, M. (2002). Pilihan teknologi agroforestri/konservasi tanah untuk areal pertanian berbasis kopi di Sumberjaya, Lampung Barat. Southeast Asia Regional Office. Bogor. Indonesia.
[2] Arifin, H. S. (2014). Analisis Lanskap Agroforestri. PT Penerbit IPB Press.
[3] Earles, R., & Williams, P. (2005). Sustainable agriculture an introduction. ATTRA.
[4] Evizal, R. (2013). Etno-agronomi pengelolaan perkebunan kopi di Sumberjaya Kabupaten Lampung Barat. Agrotrop Journal on Agriculture Science, 3(1), 1-12.
[5] Fuady, Z., Satriawan, H., & Mayani, N. (2015). Aliran permukaan, erosi dan hara sedimen akibat tindakan konservasi tanah vegetatif pada kelapa sawit. Sains Tanah-Journal of Soil Science and Agroclimatology, 11(2), 95-103.
[6] Gurr, G. M., Wratten, S. D., & Snyder, W. E. (Eds.). (2012). Biodiversity and insect pests: key issues for sustainable management. John Wiley & Sons.
[7] Hafif, B., Prastowo, B., & Prawiradiputra, B. R. (2014). Pengembangan perkebunan kopi berbasis inovasi di lahan kering masam. Pengembangan Inovasi Pertanian, 7(4), 199-206.

[8] Hayyun, D. A., Megantara, E. N., & Parikesit, P. (2018). Kajian layanan ekosistem pada sistem agroforestri berbasis kopi di Desa Cisero, Garut. Jurnal Pengelolaan Lingkungan Berkelanjutan (Journal of Environmental Sustainability Management), 200-219.
[9] INDRA GUMAY FEBRYANO, F., Safe'i, R., & Irwan Sukri Banuwa, I. (2017). Performapengelolaan Agroforestri Di Wilayah Kesatuan Pengelolaan Hutan Lindung Rajabasa. Jurnal Hutan Tropis, 5(2), 127-133.
[10] Keraf, A. S. (2002). Environmental ethics. Jakarta: Kompas Book Publisher.
[11] KISSINGER, K., Ahmad, Y., & Rina, M. N. (2016). KONSERVASI S. BELANGERAN DARI HUTAN KERA SEBAGAI BAHAN OBAT ALAMI.
[12] Kohler, F., Kotiaho, J. S., Bhagwat, S. A., Navarro, L., Reid, R. S., Wang, T., & Desrousseaux, M. (2018). Concepts and perceptions of land degradation and restoration.
[13] Lusiana, B., Widodo, R., Mulyoutami, E., Nugroho, D. A., & Van Noordwijk, M. (2008). Kajian Kondisi Hidrologis DAS Kapuas Hulu, Kabupaten Kapuas Hulu, Kalimantan Barat. World Agroforestry Center Working Paper, (60).
[14] Martens, J. T., Entz, M., & Wonneck, M. (2013). Ecological farming systems on the Canadian prairies. A path to profitability, sustainability and resilience. Manitoba: University of Manitoba.
[15] Marwoto, H. K., Darusman, D., & Adiwibowo, S. (2017). Para Rimbo: Inti Budaya Petani Jambi Dan Peluang Integrasi dengan Pembangunan Sektor Kehutanan. Sodality: Jurnal Sosiologi Pedesaan, 5(2), 250-259.
[16] Pattimahu, D. V., Tanasale, J., & Wattimena, C. M. A. (2014). Strategi Pengelolaan Agroforestri Berbasis Lingkungan (Kasus: Negeri Kilang Kota Ambon). In Prosiding Seminar Nasional Agroforestri ke (Vol. 5, p. 125).
[17] Purwanti, P., Susilo, E., & Indrayani, E. (2017). Pengelolaan hutan mangrove berkelanjutan: pendekatan kelembagaan dan insentif ekonomi. Universitas Brawijaya Press.
[18] Puspasari, E., Wulandari, C., Darmawan, A., & Banuwa, I. S. (2017). Aspek sosial ekonomi pada sistem agroforestri di areal kerja hutan kemasyarakatan (HKm) Kabupaten Lampung Barat, Provinsi Lampung. Jurnal Sylva Lestari, 5(3), 95-103.
[19] Rotinsulu, J. M., Sosilawaty, S., & Yanarita, Y. (2016). Agroforestri Berbasis Rotan Terhadap Sosial Ekonomi Masyarakat Di Barito Selatan. Jurnal Hutan Tropis, 4(1), 93-101.
[20] Salampessy, M. L., Febryano, I. G., & Bone, I. (2017). Pengetahuan ekologi masyarakat lokal dalam pemilihan pohon pelindung pada sistem agroforestri tradisional "Dusung" pala di Ambon. Jurnal Penelitian Sosial dan Ekonomi Kehutanan, 14(2), 135-142.
[21] Schugren-Meyer, K., Jerneck, A., & Sjöström, C. (2010). Agroecology: Integrating a socioecological model into the mainstream agrifood system in the United States (Doctoral dissertation, Master's thesis). Lund University, Lund, Sweden. Retrieved from the Lund University LUMES site: http://www. lumes. lu. se/html/lumes_theses. aspx).
[22] Senoaji, G. (2012). Pengelolaan lahan dengan sistem agroforestry oleh masyarakat Baduy di Banten Selatan. Jurnal Bumi Lestari, 12(2), 283-293.
[23] Shrestha, P. M., & Dhillion, S. S. (2006). Diversity and traditional knowledge concerning wild food species in a locally managed forest in Nepal. Agroforestry Systems, 66(1), 55-63.
[24] Shrestha, P. M., & Dhillion, S. S. (2006). Diversity and traditional knowledge concerning wild food species in a locally managed forest in Nepal. Agroforestry Systems, 66(1), 55-63.
[25] Spies, T. A. (2008). Patterns and processes in forest landscapes: multiple use and sustainable management. Springer Science & Business Media.
[26] Tamrin, M., Sundawati, L., & Wijayanto, N. W. (2015). Strategi Pengelolaan Agroforestri Berbasis Aren di Pulau Bacan Kabupaten Halmahera Selatan. RISALAH KEBIJAKAN PERTANIAN DAN LINGKUNGAN Rumusan Kajian Strategis Bidang Pertanian dan Lingkungan, 2(3), 243-253.
[27] Utami, S. R., Verbist, B., Van Noordwijk, M., Hairiah, K., & Sardjono, M. A. (2003). Prospek Penelitian dan Pengembangan Agroforestri di Indonesia. World Agroforestri Centre (ICRAF). Bogor.
[28] Waluyo, E. A., & Nurlia, A. (2017). Potensi Pengembangan Kopi Liberika (Coffea libericca) Pola Agroforestry dan Prospek Pemasarannya untuk Mendukung Restorasi Lahan Gambut di Sumatera Selatan. Pengembangan Ilmu dan Teknologi Pertanian Bersama Petani Lokal Untuk Optimasi Lahan Sub Optimal. In Prosiding Seminar Nasional Lahan Suboptimal (pp. 255-264).
[29] Wartman, P., Van Acker, R., & Martin, R. C. (2018). Temperate agroforestry: How forest garden systems combined with people-based ethics can transform culture. Sustainability, 10(7), 2246.
[30] Wezel, A., Casagrande, M., Celette, F., Vian, J. F., Ferrer, A., & Peigné, J. (2014). Agroecological practices for sustainable agriculture. A review. Agronomy for sustainable development, 34(1), 1-20.
[31] Widianto, N. W., & Suprayogo, D. (2003). Pengelolaan dan Pengembangan Agroforestri. Bahan Ajaran Agroforestri, 6, 24.
[32] Wulandari, C. (2011). Agroforestry: Kesejahteraan masyarakat dan konservasi sumberdaya alam.

Accredited "Rank 4"(Sinta 4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.