Coffee: ethnobotany, tourism and biodiversity conservation in East Java

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Abstract Recent growth of third wave coffee movement provides opportunities for small holders coffee farmer and biodiversity conservation programs. The link of coffee consumption and biodiversity comes from several aspects, ranging from sustainable coffee farming to the development of rural tourism in coffee sites production. This paper will explore the ethnobotanical aspect of coffee, in which it is rarely described but crucial in the development of coffee in thirds wave coffee era. Secondly, this paper discuss the models of coffee involvement in tourism sectors. Thirdly, this paper describes the contribution of coffee cultivation under agroforestry approach to support biodiversity conservation. This paper shows that coffee rich in term of ethnobotanical aspects, ranging from cultivation to consumption. These aspects are crucial for the future development of coffee produced by smallholders farmers, especially for tourism development in thirds wave coffee era. Recent growth of café and coffee lovers become the crucial point to develop coffee farm tourism. This form of traveling is especially important to educate people about sustainable agricultural farming system, especially in coffee production. Coffee cultivations through agroforestry system represent the sustainable coffee culture cultivation. Coffee agroforestry systems provides opportunities as habitat for numerous small mammal, birds and insects. Coffee agroforestry therefore crucial to support biodiversity conservation. This paper present argument that linking ethnobotany, tourism and biodiversity conservation are the key to the future of sustainable coffee cultivation in East Java. This is especially important to support environmental conservation and smallholder farmers prosperity

Keywords: coffee tourism, coffee agroforestry, cultural landscapes, agro-ecotourism

1. Introduction

Coffee is the world’s valuable traded commodity. Coffee widely consumed as a favorites beverages in the words. Statistical data shows that coffee consumption grows significantly. From 2016/2017 to 2019/2020, global coffee consumption was grows 2.1%. Asia-Oceania, Europe and North America records significant grows in coffee consumption [1]. Nine European countries has been identified as a countries with higest consumption of coffee per capita, including Finland, Norway, Iceland, Denmark, Netherlands, Sweden, Switzerland, Belgium, and Luxemburg.

Biogeographically, coffee is native to Africa tropics and recently cultivated in many topical countries, with the most import of coffee production includes Brasilia, Vietnam, Columbia, Ethiopia and Indonesia. Globally, coffee is the favorite’s beverages for improving moods. Recent scientific report confirm that consuming coffee good for health. Consuming coffee could help reduce risk of
stroke, diabetes, digestive diseases, gout, multiple sclerosis, Parkinsons, liver cancer, colon cancer, and prostate cancer [2,3].

In Indonesia, coffee was firstly introduced in Java from India between 1690 to 1696. In 1699, Dutch East India company introduced coffee from Sri Lanka as one of the important profitable trade commodity [4]. The climates of Indonesian archipelagoes has been reported suitable for coffee cultivations. Coffee grows in tropical region with the support of suitable and ideal rainfall, temperature, soils and humidity. Importantly, the fertile lands of many sites in Indonesia provides ideals habitats for coffee cultivations. Coffee grown in most of the country, except Kepulauan Riau. From 34 province, the area with the high coffee green bean production in 2019 was include South Sumatera (196,016 tons), Lampung (110,291 tons), Aceh (71,182 tons), North Sumatera (72,343), East Java (66,681 tons), Bengkulu (58,528 tons). Coffee production was grows in some province, but decline in South Kalimantan, West Kalimantan, Central Kalimantan and East Kalimantan, Gorontalo, North Maluku [5].

In Indonesia, coffee is one of the significant crops which were widely cultivated by smallholder farmers in coffee cultivation center. Two species of coffee were commonly cultivated, the Coffea canephora and C. Arabica [6]. According to Indonesian investment report in 2017, the area of coffee cultivation area calculated about 1,24 million hectare, 933 hectare was Coffea canephora (known as robusta) and 307 hectare was Carabica. More than 90% of the total coffee orchards was cultivated by smallholder farmer with 1-2 hectare lands [7]. There are definitely some difference between Coffea canephora and C. Arabica, ranging from plant morphology to coffee taste. Another coffee species, C. liberica, cultivated in some area in limited number, with the centre of Liberian café was includes Jambi, Tanah Laut (South Kalimantan) and some spots in eastern part of East Java province.

East Java is an important regions in coffee cultivation. Supported by the chains of mountains and fertile lands, East Java provides ideal sites for coffee cultivation. There are coffee estates in East java, in which many of them area established by Dutch company in past centuries ago. Recently, some regencies in East java are the center of coffee cultivation and production, including Malang, Lumajang, Probolinggo, Situbondo, Jember and Banyuwangi. Coffee cultivated in large area by state owned enterprises (PTPN) private enterprises. In private lands, coffee was cultivated in small patch of family gardens. Coffee grown in the backyard with other edible plant and cash crops [8].

The rapid land uses and market price cultivation, however, lead to the decrease of coffee cultivation. The strategy to preserve coffee lands and provides high quality of coffee are important. In line with the recent growth of tourism, coffee consumption and the thirds wave of coffee, it crucial to explore the ethobotanical and related aspects of coffee in thirds wave movement. The aims of the paper is to describes the ethnobotanical aspect of coffee.

2. The ethnobotany of coffee

Coffee is the evergreen shrubs in the genus of Coffea (Fam. Rubiaceae). Coffee recently planted in Sumatra, Java, Kalimantan, Bali, Lesser Sundas Island and Papua. In these island, coffee cultivated by local community in specific soils and climates of the islands. Indonesian coffee culture may stem from varying aspects such as indigenous community culture, local belief and local climates. The relationship between people and coffee varies, ranging from coffee cultivation to coffee preservation to drink.

Coffee firstly introduced to Indonesia in 1960s by VOC as world’s valuable traded commodity. Since first introduction to Batavia (recently known as Jakarta), coffee recently has spread throughout Indonesian archipelago. Coffee has significant contribution Indonesian daily life’s, ranging from economic, social, cultural and environmental aspects. It has been 400 years coffee has introduced and grown in Indonesia. From the first introduction in 1600’s to 2000s, coffee has contributed to the construction of socio-cultural aspect of many local community in Indonesia. There are numerous aspect related to the study of coffee and human in traditional community. Basically, it can be classified into (1) coffee cultivation, and (3) coffee bean consumptions.
2.1 Coffee cultivation
The ethnobotany of coffee cultivation is interesting research field because coffee has cultivated in numerous countries with different climates, physical and cultural aspects. The importance of coffee bean has led to the high appreciation of farmer in cultivating, providing and serving high quality of coffee under specific climates and environmental conditions. These produce the special coffee bean produced from particular area with specific climates and cultivation techniques. It was known as coffee with a geographical indication of origin.

In Indonesia, the traditional coffee cultivation techniques was diverse. Coffee widely cultivate under agroforestry system. Depend on the climates, physical environment, human perception, types of land use and economical aspect, the diversity and composition of plant in coffee agroforestry was diverse [9-11]. Many local people has basic knowledge in the tree selection as coffee shading trees. Traditional coffee farmer in Sumber Jaya Lampung select Dadap Erythrina subumbrans as a shading tress. Javanese traditional farmer select Erythrina subumbrans (locally called dadap srep) as plant with the hope to cool environment as “srep or asrep” means “making cools”. Javanese rich in symbols, and often plant and use plant as a messages and wishes.

In East Java, coffee-based agroforestry widely found in the center of coffee cultivation, including Malang, Blitar, Lumajang, Probolinggo, Jember and Banyuwangi. Compared to C. Arabica and C. liberica, C. canephora is the dominant coffee species cultivated under agroforestry. The cultivation of C. canephora take place in lowland to mountain ecosystem. The cultivation area of C. arabica associated with mountain climates in some highland places. The moist mountain provides significant area for C. arabica cultivation in area around Mts. Ijen, Iyang highlands and the slope of Mts. Bromo Tengger Semeru. Field observation shows that plant species composing agroforestry for C. arabica lowest than C. canephora.

In western slope of Mt. Semeru, at least 23 plant species with numerous functions to support daily lives of local people was recorded gros as shading trees of coffee plants. Coffee grown with others shrubs such as Calliandra calothyrsus and Gliricidia sepium. These shrubs was important as animal’s feeds. The coffee cultivation in Banyuwangi was also grows under numerous plant tress species, in which many of them has numerous cultural benefits. The hogh level of shading tree species also found in coffee based agroforestry system in Jember [12-14].

2.2 Coffee consumptions
Coffee is considered as nonnative plant species to Java. It has biogeographic origins from Africa. Firstly, coffee was introduced and cultivated in Java as a significant community by Dutch East Indies Company (VOC). The high price of coffee grains lead to the monopoly policy by the company. In order to increase the productivity of coffee grain and increase the economic earnings from coffee bean trading, the Dutch East Indies Company introduce policy to force local farmer to cultivate coffee. These policy, however, provides opportunities to coffee grains to spread distribute in all part of Java Island. The drink of coffee firstly exclusive to Dutch and Javane Priyai. However, with the cultivation of coffee in rural area and people ability to process and preserve coffee, this drinks become has become popular type of beverage among the Indonesian people. Coffee culture absorbed and evolved as a local culture. The local people has opportunities to drink coffee and developed the simple methods to prepare coffee [15-17].

The first preparation techniques mostly done through the add of through the mix of medium or fine ground coffee with hot water in a cup, known as kopi tubruk. In Indonesia, it was consumed in the morning as stimulating beverages to increase physiological moods to start numerous activity. Kopi tubruk is typically served at breakfast, free times, and after dinner. The kopi tubruk drinks is particularly popular in the past decades, in which it was consumed by old people in many cultural and social events. Kopi tubruk is obligatory provided as part of the offering material (called sajen) in supranatural beings and rituals in local belief. Kopi tubruk is a symbol of brotherhood. Among Javanese, Kopi tubruk is obligatory drink in communal work, welcome drink for family guest, drink in weeding party. Among moslem community in Java, coffee presented to religious community in
praying, reading Qur’an in Ramadhan night, reading Muhammad Propet History (Maulid Diba’) and other religious events [18,19].

Indonesian knowledge and perception to coffee bean preservation as drink has been identified numerous. Anothes techniques of coffee preservation was Kopi tarik Aceh and Kopi sanger (Aceh), Kopi joss/kopi arang (Yogyakarta), Kopi talua Minang (West Sumatra), Kopi kopyok Gresik (Gresik, East Java), Kopi rabongan Ambon (Ambon Maluku), Kopi manggar (Belitung) and Kopi takar Mandailing. Another techniques for coffee preservation was kopi rempah; in which coffee was mix with some species, including ginger and cinnamon.

Recent trend in coffee consumption, however, has result numerous coffee brewing (Fig.1). There are numerous techniques has been used by recent café. In East Java, the grows of café offering espresso, cappuccino and latte increase significantly. The new preparation techniques to prepare a cup of coffee need special skill and equipment.

3. The wave of coffee

Compared to the other herbs and spice, coffee received a lot of attention among coffee lovers, environmental activist and scholars throughout the words. Coffee has contribute to the social changes and social movements. Drinking coffee is an interesting phenomena, as shown by the “wave of coffee”. There are first, second and third wave of coffee as described bellow [20].

Table 1. The potential of specialty coffee of Indonesia

| Arabica         | Specialty                  | Production (tones) |
|-----------------|----------------------------|--------------------|
| Aceh            | Gayo Kopi                  | 30,000 – 40,000    |
| Sumatera Utara  | Mandheling Coffee          | 10,000 – 15,000    |
| Sumatera Utara  | Linthong Coffee            | 5,000 – 10,000     |
| Bengkulu        | Mangkuraja Coffee          | 1,000 – 1,500      |
| Jawa Barat      | Java Preanger              | 500 – 1,500        |
| Jawa Timur      | Java Coffee                | 3,000 – 5,000      |
| Sulawesi Selatan| Toraja Coffee              | 5,000 – 10,000     |
| Sulawesi Selatan| Toarco Toraja Estate Coffee| 500 – 1,000       |
| Sulawesi Selatan| Kalosi Coffee              | 5,000 – 10,000     |
| Bali            | Bali Kintamani Coffee      | 2,000 – 3,000      |
| Bali            | God Mountain Coffee        | 500 – 1,000        |
| Nusa Tenggara Timur | Flores Bajawa Coffee | 2,000 – 3,000     |
| Papua           | Baliem Valley Coffee       | 500 – 1,000        |
| Sumatera, Jawa, Bali, dll | Kopi Luwak | 20 – 30 |

https://gaeki.or.id/areal-dan-produksi/

The first wave coffee era occurs in the late of 1800s to the early of 1990s. Coffee bean enter to the factory and manufactured to provide accessible coffee. Consumers consume the factory taste coffee without experienced coffee origins and processing techniques. The innovation of coffee production and packaging flourish and it is become the environmental problems. The waste of plastics and npot degradable materials as component of coffee packaging become the crucial problem in environments. There are also critics for the intensive coffee cultivation, forest degradation and land uses changes to increase coffee beans production [21,22]. The contribution of the first wave of coffee, however, introduce coffee in global community as favorites beverages.

Second wave coffee (1970). The second wave coffee was characterized by coffee consumers with better beans. Consumers argues that good taste are related to the cultivation area ants its climates. Therefore, consumers concern to the origins of coffee beans. The grows of 2nd wave coffee consumers provides opportunities for Indonesian coffee known by both foreign and Indonesian consumers. It is especially important because Indonesia has been known as a hot spot for coffee specialty (Table 1).
Thirds wave coffee. The thirds wave coffee movement appears in 2000s. Coffee starts being purchased based on its production origin and its methods of production. The thirds wave coffee consumer concern to the basic characters of coffee, including agronomic data and the farmer. With the recent increase of coffee consumptions, a lot of attention is paid to the impact of coffee on human health, environmental conservation and community development [23].

Recently, there is a words of “ngopi” among youngest coffee consumers and coffee lovers in Indonesia, which means to “have coffee”. The growth of ngopi contributes significantly to the growth of cafe. Some cafe concern and appreciate to the quality of coffee beans and provides rooms for discussions of numerous social and environmental issues. Cafe teach consumers the science of coffee, ranging from social to environmental aspects of coffee cultivation. Through the education and knowledge about coffee, consumers awareness and appreciation to coffee and its related issues increase. These lead to the opportunities for the uses of cafe as a media for environmental conservations.

4. Coffee and tourism

The relationship between coffee and initial tourism coffee-based tourism can be traced back in the beginning of coffee shop in 1550. This moment is the crucial point for the history of recent cafe in modern society. The existence of cafe provides significant room for pleasure, meets relatives and friends, and community discussion in pleasure sites with the support of a cup of coffee. With the recent increase of tourism industry, there are challenges for coffee involvement in tourism industry.

The significant relationship between coffee and tourism are includes:
1) Grows of interest to visit nature and rural area, including visit coffee estates
2) Awareness to eco-product. The 3rd wave coffee movement relevant with the recent awareness to eco-product. The cultivation of coffee in smallholders through agroforestry system is one of the best practices to produce high quality of coffee green beans.
3) Grows of 3rd wave coffee consumer is the significant market for the development of tourism focus to coffee product
4) Recommendation to visit recreation sites low risk to COVID-19. Visiting rural area and coffee plantation offer some benefits, including fresh air, physical exercise, and importantly is activity in low tourist density.

The development of coffee-based tourism is especially important to increase smallholder, especially coffee farmers. Through the development of tourism, some benefits for local economic development has been reported, including providing jobs and many new business opportunities. Through the involvement of coffee into tourism there are opportunity increase coffee prices [24,25].

5. Coffee and environmental conservation

Coffee and conservation are interesting to be discussed. Scholar point out that coffee cultivation under agroforestry system is the sustainable agricultural practices which are crucial to support biodiversity conservation. Numerous studies have been conducted to evaluate the importance of coffee-based agroforestry ecosystems. The contribution of coffee on environmental aspect are mainly includes support biodiversity conservation, global warming mitigation, and soil conservations.

In East Java, it is especially important because coffee cultivation under agroforestry system able to support biodiversity conservation, especially in area adjacent to conservation area (i.e. national park, strict protected area, and wildlife reserve). Most of the conservation area are rural area with the long tradition of coffee cultivation.
Table 2. Important coffee cultivation area in adjacent to some conservation area in East Java

| Conservation area          | Coffee cultivation area and local brands                                      |
|----------------------------|--------------------------------------------------------------------------------|
| Bromo Tengger Semeru       | Dampit, Ampelagding, Tirtoyudo, Senduro (Kopi Amstirdam)                      |
| Meru Betiri                | Sumber Jambe, Sukamade                                                          |
| Mt. Arjuno                 | Jatiarjo (Kopi Kapiten), Karangploso (Kopi Carlos), Tulung Rejo Ngantang       |
| Mt. Ijen                   | Jampit (Kopi Blawan)                                                           |
| Mt. Argopuro- Yang Highlands| Krucil, Sumbermalang                                                           |

6. Linking ethnobotany, tourism and conservation

There are mutualistic relationship among ethnobotanical studies, recent of tourism growth and conservation agendas. Modernization has changes the coffee preservation tradition to numerous new life sty in drinking coffee (Fig. 1). Modern life style in drinking coffee, however, without problems. Drinking coffee especially contribute to the environmental and human health through the intensive consumption of sachet coffee. With the increase of special interest of tourism (i.e. ecotourism, agrotourism, gastronomy tourism), there are opportunities to drink coffee in authentic experience. In such a case the study of ethnobotany was important.

An important aspect of the study of ethnobotany come from several reasons, including

- Understanding story of coffee in community culture
- Finding sustainable practices of coffee cultivation
- Understanding original methods for the preparation and authentic coffee taste
- Designing future conservation strategy
- Getting community support in biodiversity conservation

Through the strong relationship between ethnobotanical aspect of coffee and tourism are opportunities for conservation support. These relationships will contribute to basic aspect of conservation, including:
7. Conclusion and recommendation

Coffee is an important cash crops among smallholder farmers in East Java. Recent growth of coffee consumption and increase of appreciation to coffee open opportunities to enhance sustainable coffee cultivation. In East Java, the ethnobotanical study of coffee is important, especially to support tourism and conservation development. Best practices of coffee cultivations and environmental issues can be promoted to increase coffee bean price in market with specific buyers and consumers.

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