BIODIVERSITAS
Volume 19, Number 5, September 2018
Pages: 1722-1729

ISSN: 1412-033X
E-ISSN: 2085-4722
DOI: 10.13057/biodiv/d190518

Recognizing indigenous knowledge of the Karangwangi Rural Landscape in South Cianjur, Indonesia for sustainable land management

FATIYA AMELIA[1], JOHAN ISKANDAR[2,3], RUHYAT PARTASASMITA[3,♥], NICHOLAS MALONE[4]

[1]Post Graduate and Environmental Study (PSMIL), Padjadjaran University. Jl. Sekeloa Selatan I Bandung 40134, West Java, Indonesia.
[2]Postgraduate of Environmental Study (PSMIL & DIL) and Institute of Ecology PPSDAL, Padjadjaran University. Jl. Sekeloa Selatan I Bandung 40134, West Java, Indonesia.
[3]Department of Biology, Faculty of Mathematics and Natural Sciences, Padjadjaran University.Jl. Raya Bandung-Sumedang Km 21, Jatinangor, Sumedang 45363, West Java, Indonesia. ♥email: rp2010rikkyo@gmail.com ; ruhyat.partasasmita@unpad.ac.id
[4]Department of Anthropology, University of Auckland, Levels 7 and 8, Human Sciences Building, 10 Symonds Street, Central Business District, Auckland 1010, New Zealand

Manuscript received: 14 May 2018. Revision accepted: 23 August 2018.

Abstract. *Amelia F, Iskandar J, Partasasmita R, Malone N. 2018. Recognizing indigenous knowledge of the Karangwangi Rural Landscape in South Cianjur, Indonesia for sustainable land management. Biodiversitas 19: 1722-1729.* Karangwangi is a rural community on the south coast of West Java, Indonesia. The people of Karangwangi possess traditional ecological knowledge (TEK) of local landscapes through cultural inheritance and personal experiences of interacting with their environment. The people of Karangwani Village recognize various natural-cultural landscape types, including *leuweung* (forest); swidden field (*huma*); wet rice fields (*sawah*); home garden (*pekarangan*); garden (*kebun*); mixed-garden (*kebun campuran*); river (*sungai*); and sea (*laut*). These various landscapes have continuously changed over time due to people's socio-economic and cultural activities. The aim of this study was to develop an ethnoecological approach to elucidate historical changes to the Karangwangi landscapes. Toward this aim, we conducted mixed-method, qualitative and quantitative research. In addition to recognizing the various types of cultural and natural landscapes, the local people of Karangwangi are able to describe the history of landscape changes between 1950 to 2017. As identified by informants, these changes have been caused by various factors, including increases in population density, implementation of government policies and village development.

Keywords: Ethno-ecology, landscape, Karangwangi, local people, TEK

INTRODUCTION

The people of Karangwangi live in rural West Java and possess traditional ecological knowledge (TEK) of their natural surroundings. They predominantly use Sundanese as a local language and have customary habits in activities related to the natural surroundings. For example, the timing of rice farming activities are determined by observing the *bintang kidang* (orion belt), and the rain cycle called *windu* (*alim, he, early jim, je, dal, be wau and jim akhir*) associated with climate and planting time (Iskandar and Iskandar 2016). Agricultural activity is the main sector of people's livelihood in Karangwangi. The village landscape is patterned by human due to human interaction with the surrounding environment. Within the Karangwangi landscape, it is apparent that the community is required to preserve the natural environment as reflected by the various landscape units formed. Based on research conducted by Iskandar et al. (2017) it has been revealed that there are several land type categories present in Karangwangi Village, including conservation forest (*hutan konsevasi*), swidden (*huma)*, homegarden (*pekarangan*), mixed garden (*kebon tatangkalan*), dry land (*tegalan)*, community plantation, semi-technical irrigation, simple irrigation, rain-fed rice field, and tidal rice field.

Karangwangi Village administratively began to form in 1984 which is the division of the Village Cidaun (Iskandar and Iskandar 2016). The formation of the landscape in Karangwangi is in line with the development of the village due to the utilization and management of the land. It is influenced by several additional factors, including changes in *huma* land policies; increasing population; expanding infrastructural development; tourism; and reduced forest area. Furthermore, the development of a market economy caused changes in the behavior and lifestyle of the people of Karangwangi Village. These dynamic processes of transformation align with the opinion of Farina (2010) that the landscape continuously to transforms by way of religious, cultural, economic, political and environmental activity. Thus, information about the history of change and the formation of various patterns of landscape use in this village is of interest (Ramdhan et al. 2015), and can facilitate sustainable landscape utilization and management (Takeuchi 2010; Jumari 2012; Asmiwyati 2015; Ramdhan et al. 2015).

MATERIALS AND METHODS

Study Sites

This research was conducted in Karangwangi Village, Cidaun Sub-district, Cianjur District, West Java Province, Indonesia. Geographically, the village is located at 7º25'-7º30 'S and 107º23'-107º25' N. Administratively, it is an expansion of Cidamar Village with an area of 2,300.17 hectares, and located at an altitude of 200-275 m above sea level. The village is traversed by two rivers, namely Cikawung River and Cisela River. Karangwangi Village is bordered by to the north by Cimaragang Village to the west by Cidamar and Kertajadi Villages, to the east by and to the south by the Indian Ocean. In 2015, the population in Karangwangi Village has recorded 5,587 inhabitants consisting of 1,817 families (Partasasmita 2015; Iskandar et al. 2016; Partasasmita et al. 2017) (Figure 1).

Procedure

This research used an ethnoecological approach with a mixed method design (Iskandar 2012b; Albuquerque et al. 2014). The collection and analysis of qualitative and quantitative data were carried out simultaneously. Qualitative data collection techniques included participant observation, in-depth, semi-structured interviews, with key informants, selected purposively with snowball sampling. Quantitative data were collected through the use of structured interviews (questionnaire) with randomly selected respondents to support and cross-check qualitative data.

Data analysis

Qualitative data analysis of semistructured interviews is done in three stages: (i) identifying themes present across; (ii) determining salient aspects of-of the interview data and summarizing the responses of interview participants; and (iii) contextualizing the information with the relevant literature and descriptive (quantitative) analysis (Iskandar 2012b). Quantitative data analysis of structured interviews (questionnaires) will use simple statistics with percentages and descriptive analysis.

RESULTS AND DISCUSSION

Based on local knowledge, information on the history of landscape changes in this village began in the 1950s. These landscape changes are categorized into roughly one-to-two decade length periods (Figure 2).

The changes of Karangwangi landscape between 1950-1970

The history of Karangwangi village is inseparable from the history of the *leuweung* (forests) and *bojonglarang* (nature reserves) that play a major role in village formation. The Jayanti Bojonglarang forest has a total area of 750 ha. Initially, the area of 250 ha forest is utilized by the community and 500 ha is a *Hutan Perlindungan Alam* (Natural Forest) or forest that should not be disturbed. Since prior to the formation of the village, only the local people of Karangwangi only accessed this *leuweung* (forest) because they believed that *bojonglarang teu meunang digadabah* (should not be disturbed). This is because the community believes in hereditary myths which consider the *bojonglarang* to be historically sacred. For example, it is believed that the village of Karangwangi is a place of *petilasan* (once visited someone important), in this case, Raden Kian Santang, the son of Prabu Siliwangi (the former ruler of the Sundanese Kingdom of Padjajaran). Folk mythologies describe that the son of Prabu Siliwangi had intended to circumcise (*sunat*) his father. However, it did not happen because Prabu Siliwangi who was reluctant to be circumcised by his son, fled, and transformed into a tiger (*Maung Padjadjaran*) in the forest (then called *bojonglarang*).

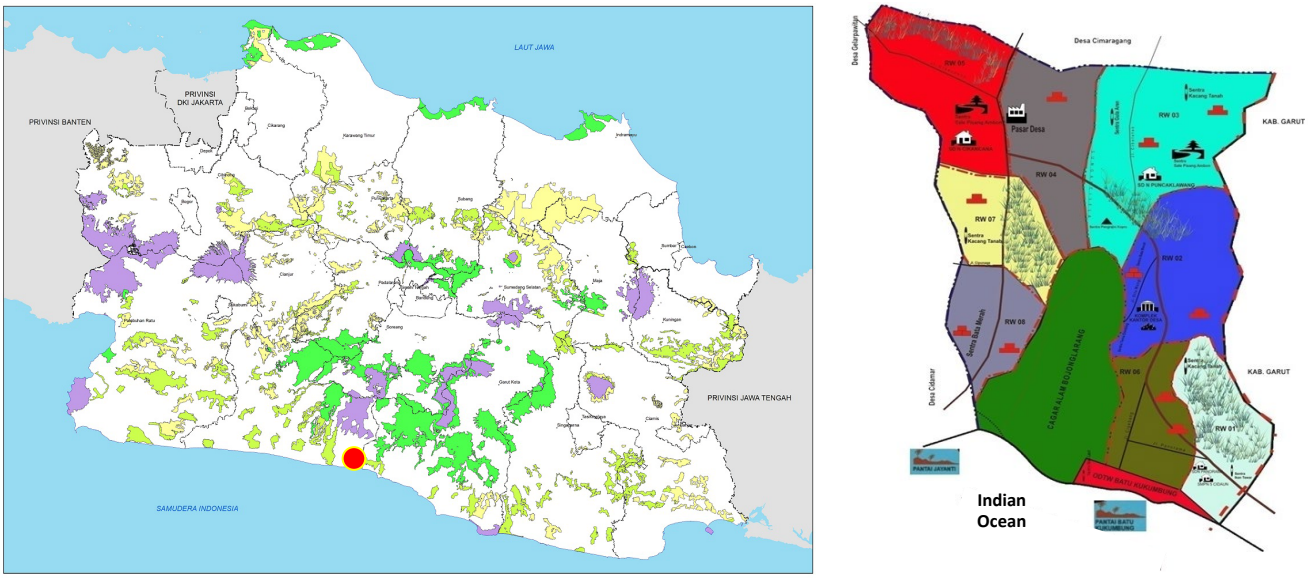

Figure 1. Research location, Karangwangi Village ( ), South Cianjur, West Java, Indonesia (Iskandar et al. 2016; Partasasmita et al. 2016)

The place used for this circumcision is known as *Batu Kukumbung*, located on Cigebang Beach on the southern coast of Karangwangi Village. Batu Kukumbung is defined as a stone where *kukumbung* (gathered) the community when Prabu Siliwangi will be circumcised by his son. This traditional story has spread to other villages as well. Many people believe that Batu Kukumbung is evidence of the entry of Islam (first) to Java Island, brought by Raden Kian Santang. Presently, it is common to find at Batu Kukumbung the placement of various incense (evidence of ritual prayer) conducted by people outside Karangwangi Village. According to some scholars (Lovelace 1984; Berkes 1999; Toledo 2002; Iskandar 2012a), myths are the result of the mutual relationship between humankind and nature and strongly impact the communal management and/or exploitation of nature.

In the 1950-1960s villagers were heavily dependent on forests, because local people used it as a swidden farming site that was the main livelihood of the community at the time. Farming rice in the forest is locally known as *ngahuma* (swidden cultivation). The advantage of planting rice in the forest is the natural fertility that is available so that *pare* (rice) which is the main commodity can flourish. This is confirmed by Geertz (1963) that the *huma* system is very good for ecology because it is more integrated into the general structure of the natural ecosystem (forest), and therefore facilitates ecosystem dynamics. *Huma* system (swidden agriculture, shifting cultivation, slash-and-burn cultivation or long-fallow agriculture system) caused changes in the forest used. Therefore, in the process of formation of *huma* there are several stages, namely: (i) *jami*, secondary forest former *huma* newly abandoned or *diberakan* (fallowed) less than a year that still has the remaining straw; (ii) *reuma*, jami which is *diberakan* (fallowed) more than one year; (iii) *rungkun*, *ruyuk* or *dungus*, secondary forest overgrown with shrubs; (iv) *reuma*, if the land is old enough to be marked with old shrubs, this land can be cultivated again (Iskandar and Iskandar 2012a; Iskandar 2012b; Iskandar and Iskandar 2016; Iskandar and Iskandar 2017; Iskandar et al. 2017).

According to Arifin and Nakagoshi (2011), the conversion of primary forests into other forms of use has two forms, namely: (i) primary forest is converted to plantations; and (ii) primary forest is converted to *huma* and other uses. If forests have been converted to plantations, there will be less possibility for the land cover to return to natural forests. Conversely, if natural forest becomes *huma* it will return to secondary forest and even primary forest, but if free from human disturbance for long period of time, this second conversion, will result in abandoned or fallow forest areas and lowland rice fields. Meanwhile, the area used for *huma* can be transformed into several types of land use such as plantations (perennial crops). This form of conversion occurred at the beginning of the Karangwangi landscape changes that originated from *leuweung, followed by huma, and eventually the* formation of land use types.

The changes of Karangwangi landscape in 1970-1980

According to the informants, prior to the formation of Karangwangi Village, there were only five inhabited *kapunduhan* (hamlets). The five *kapunduhan* include Mekarlaksana, Batubentang, Puncakbayuning (currently Hegarwangi), Cimindi and Bantarwaru. The *kapunduhan* are centered in Bantarwaru which is near the Cilaki River. Then in the 1970s it developed into a further 16 *lembur* (*kampung*) consisting of Bantarwaru; Cibeledik; Puncakkukun; Datareurih; Mekarlaksana; Nempel; Cikoletak; Jati; Cikajar; Cadasleur, Gerdog; Bayuning; Puncakbayuning; Cijengkol; Batubentang; and Cimindi. With the growth of the village, the population is also increasing. This led to the start of settlement neighborhood where each family has *buruan* (homegarden), *kebon* (garden), and *huma* (swidden field). According to the local community, the *buruan* is a field around a house planted with various types of annual and perennial crops. While *kebon* is the development of the *huma* system in the form of *gundukan* (plot fields/mounds). In addition to *kebon*, the *huma* system also leaves an open field called *tegal* or *tegalan*.

In 1977, road access in the village was still a path (0.5 m). Thus, no vehicles entered the village, and crops were sold and distributed in a simple manner. At that time, the main source of sales for the Karangwangi people was the *suuk* (peanut) grown in a *kebon* or land in the Bojonglarang forest. On 16 October 1973, the Bojonglarang forest inaugurated become Bojonglarang Jayanti Nature Reserve by the Decree of the Minister of Agriculture. Yet, until the 1980s Bojonglarang has not closed. Thus, people use Bojonglarang area measuring 250 hectares to plant *suuk*. While in the forest (*leuweung*) planted with *pare* (rice) in the *huma* system, to meet the needs of households.

The changes of Karangwangi landscape in 1980-1990

In the 1980s during the transmigration policy, many villagers responded to request to migrate out of Java, but some chose to remain. The most affected by the transmigration policy were those local people without jobs or land to work. A primary resettlement location of government transmigration for rural communities is to Tulang Bawang area, Lampung, Sumatra. In the same year, discussions regarding the closing of this territory due to plans for the development of a palm oil plantation by Tien Soeharto (ex Indonesian first lady). But it did not happen. Then other issues arise to close this area, such as the relocation of the settlements because it will become the ABRI Headquarters, or potentially will be the location of a special retired state apparatus, and so on. In 1982, SD *Inpres* (Presidential Instruction) was actually built in this village. This knowledge is in line with the information sourced from Presidential Instruction No. 4 of 1982 that in 1982-1983 President Soeharto built 22,600 Inpres Elementary Schools for education in villages and towns with a small population. This school is a forerunner to the establishment of Karangwangi Village followed by the appointment of an interim official whose administrative center is located in Kampung Nempel which is part of Cidamar Village. Land clearing is done and land is legalized by Redist and SPPT. On March 23, 1984, the village was divided and the election of permanent officials in Karangwangi Village.

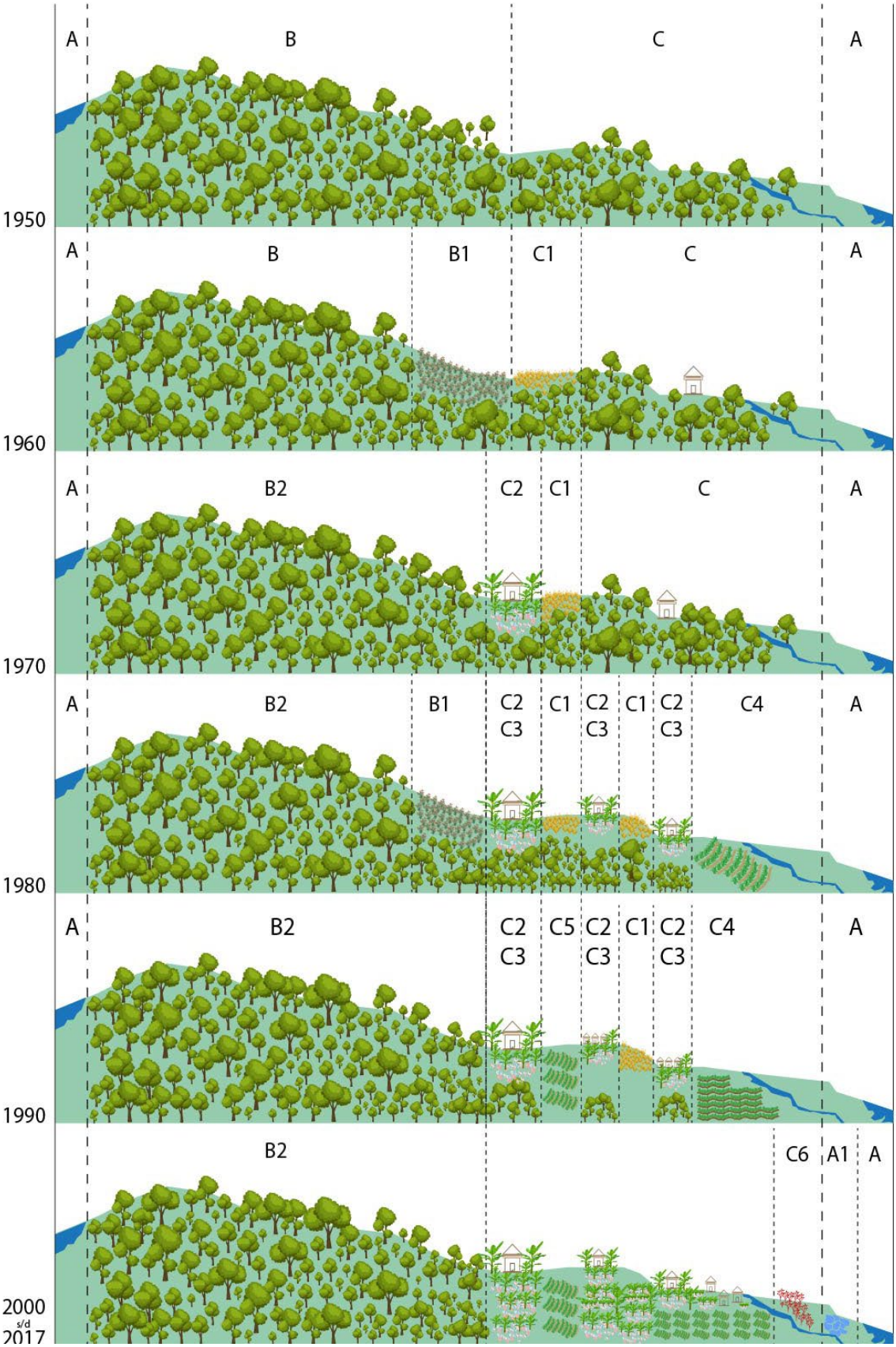

Figure 2. The illustration of the changes of Karangwangi Landscape since 1950. Note: : Punduh/dusun/kampung (hamlet), : Wahangan/sungai (river), A: Pantai (beach), A1: Tambak (fish pond), B: Bojonglarang, B1: Kebon suuk (peanut farm), B2: Cagar Alam (nature reserve) Bojonglarang Jayanti, C: Leuweng/hutan (forest), C1: Huma (swidden field), C2: Kebon (garden), C3: Buruan pekarangan (homegarden), C4: Sawah boyor (irigated rainfed), C5: Sawah tadah hujan (non-irigated rainfed), C6: Kebon cabe/kebon jagung (chili/corn rainfed)

In 1984, houses in Karangwangi were rarely dominated by *huma* and *kebon* (garden). One neighborhood unit consists of only eight families. The population number was still low and during the dry season, many people went temporary migration to other areas for obtaining off-farm jobs, including as laborer. The number of residents is also still small, and during the dry season came a lot of people who become coolies to other places. In 1986, the local people of Karangwangi began to cultivate *sawah* (rice field). This *sawah* opening is at RW I. The wetland system was originally a change from the *huma* system by providing irrigation on cultivated land. In the beginning, Karangwangi people who switch and use the rice system are very few in number. The ration of *huma* with *sawah* in this village is about 30:70. Even wetland systems are rarely found in high-income farmers. This is due to the high cost of paying the workers needed to create new fields with wetland systems. In the end, the farmer chooses to transform his own *huma* that is close to the water source to be used as a rice field. There is no striking difference in the management of rice field and *huma* system. Farmers practice an organic farming system that uses various local rice and fertilizer from manure and organic waste. The period of planting and harvesting remains the same once a year and the distance between harvesting and planting is again used by farmers for fish ponds and for planting *genjer,* or stand-alone crops.

The changes of Karangwangi landscape in 1990-2000

In the 1990s local rice began to be rarely planted in the village. Local people are starting to recognize new types of rice that can harvest three times a year. This knowledge is derived from the knowledge of the people who go to other villages or return from the transmigration sites. The root of this system comes from the introduction of the Green Revolution Program and *Panca Usaha Tani* (Five Farming Program) by the government in the 1970s in certain areas of Indonesia. This program has implications for the uniformity of farmers in making suitable planting. The five farming programs are as follows: (i) use of modern varieties paddy, such as IR, PB, and other genetically engineered seeds from laboratory; (ii) use of chemical fertilizer, like urea, TSP, etc.; (iii) improvement in land preparation (using pesticide); (iv) improvement in irrigation; and (v) improvement in crop maintenance.

Implementation of the Green Revolution Program has had a significant impact on agricultural life in Karangwangi Village. In addition to the use of modern rice seeds, also the use of pesticides is increasingly often found in the farming process of Karangwangi Village people. Another noticeable change is the changing rice cropping cycle, which was previously done only once a year, now the cropping cycle is done many times depending on the location of the rice field and the availability of water. Typically, the *musim rendeng* (rice planting) is done in November or December and the harvest is done three months later. The second planting will be farmers in March or April and harvest will be obtained in around August. For land close to the water source, a third rice planting can be done in August to be the harvested in November. As for the rice fields which are far from the water source then the rice field will be used to plant crops like corn or fallow until the next planting season. The use of pesticides and inorganic fertilizers has become very influential in the life of farmers in the village of Karangwangi. As a result, the costs of farming are higher than in the past. Another disadvantage that farmers often experience after using pesticides is the resillience of rice pests (*hama beuki meuweuh*). This is quite a dilemma, because if farmers do not use pesticides, then the brown planthopper (*Nilaparvata lugens* Stal) becomes uncontrollable and causes crop failure.

In this year, *huma* systems are less developed, and rice fields are the main farming location. According to Pranowo (1985), there are two factors that affect the duration of the cultivation of *huma:* namely, (i) forest type; and (ii) population density. Types of primary and secondary forest if used as *huma* have different cultivation times. The cultivation time in primary forest is longer in the range of 2-4 years, compared to the secondary forest that is less than two years. This is influenced by the natural content of the existing fertilizer, which is more in the primary forest than the secondary forest. In addition, population density also affects the duration of cultivation time. The greater the population in a region, the longer the cultivation time. This is due to the opportunity for forest clearing becoming smaller. The number of residents also affects the number of *huma* in Karangwangi Village, so that the number of *huma* has been reduced and replaced by rice fields.

The changes of Karangwangi landscape in 2000-2017

In 1995, village roads were *dibeko* (ground leveling from the path). In early 2000, construction began on the village road from Karangwangi to Cianjur and completed in 2005/2006. Establishment of access in Karangwangi Village had produced an influx of information, communication, and technology. One primary example is the construction of *lio* (home brick factory) to build more permanent houses, whereas before the houses in this village were constructed of bamboo with reeds for roofing material. Bamboo was obtained from *kebon awi* (bamboo garden) and *alang-alang* (reeds) coming from *huma*. Beginning in 2007, the houses of the people of Karangwangi Village have been predominantly using bricks for their walls. In 2009, the village road began to be paved, and in the same year permanent bridges over the Cikawung and Cilaki Rivers completed. In 2010, the southern highway was finished paving.

The southern road through Karangwangi, connected villages and even sub-districts and resulted in many changes. Most changes are considered beneficial for local people. Examples include: the entry of electricity and a communication tower to Karangwangi Village in 2012, produced an increase of information flow through electronics such as television, radio, mobile phone usage; changes in processing systems such as food storage in the refrigerator, rice processing with diesel engines instead of *lisung*; and the use of *sosin* to drain water. Changes are also seen in the dominant vehicles of motorcycles used by local

people in transporting crops or performing many other uses.

Farina (2010) argued that globalization and enhanced information connectivity and the spread of media (radio, television between various countries homogenizes the environment and reduce the ecological diversity. This statement is supported by changes in planting patterns in Karangwangi Village. For example, better access and information obtained from other regions have to lead to the introduction of new plant commodities such as *jati/jabon* (teak), chilli and albasiah/jengjen. by. Initially, albasiah (locally called *jengjen)* (*Paraserianthes falcataria* (L) Nielsen), *jabon* (*Anthocephalus* sp.), and mahogany (*Swietenia mahagoni* (L) Jacq) were known through the introduction of the Forestry Service in the 2000s. The purpose of this introduction is to reforest the formerly open fields. However, in the development of local communities Karangwangi get information that albasiah wood much in demand as building materials, furniture, and have its own market for sale to other areas. This causes the planting of albasiah in the fields such as *tegalan* (open dry field) and dominating the so-called *kebon jengjen*/albasiah. Based on Iskandar et al. (2017) with intensive *jengjen* planting in Karangwangi Village provides ecological and socioeconomic benefits. These benefits come from maintaining soil fertility through nitrogen fixing and ease of cultivation which facilitates the provision of household needs and increasing income. This development makes the growth of the higher market that causes changes in traditional agroforestry systems such as *kebon awi* (bamboo garden), *kebon kai* (wooden garden) and *talun* (forest-garden) into monoculture system that is kebon jengjen. This monoculture causes reduced species and varieties of locally grown crops, increased pests and plant diseases, and low resistance to market fluctuations (Reijntjes et al. 1992; Iskandar et al. 2017).

With access to the southern roads, it is easier for local people to sell and buy wooden seedlings for planting. In addition, in 2014 the rising prices of *cabe keriting* (chilli pepper) compel local people to grow chili pepper (*Capsicum annum* L) on their farms. Planting chili pepper is shifting rapidly to plants such as *suuk/*peanut (*Arachis hypogaea* L). The entry of investors to the village of Karangwangi is also directly related to the better access road. In 2013, the village government conducted a certification program of former fields. Therefore, the former fields and gardens in Karangwangi Village became owned and certified. Many investors purchased land in villages where in fact the land is managed by the local community. Even recently foreign investors from Korea bought tens of hectares of land near the coast. In addition to the land, sand mining on the beach near the Cilaki River also occurred in 2010. Eventually, this was stopped by the village chief at the time because of related casualties from dangerous holes on the beach that are often used for children to swim. (For illustration, see Figure 3)

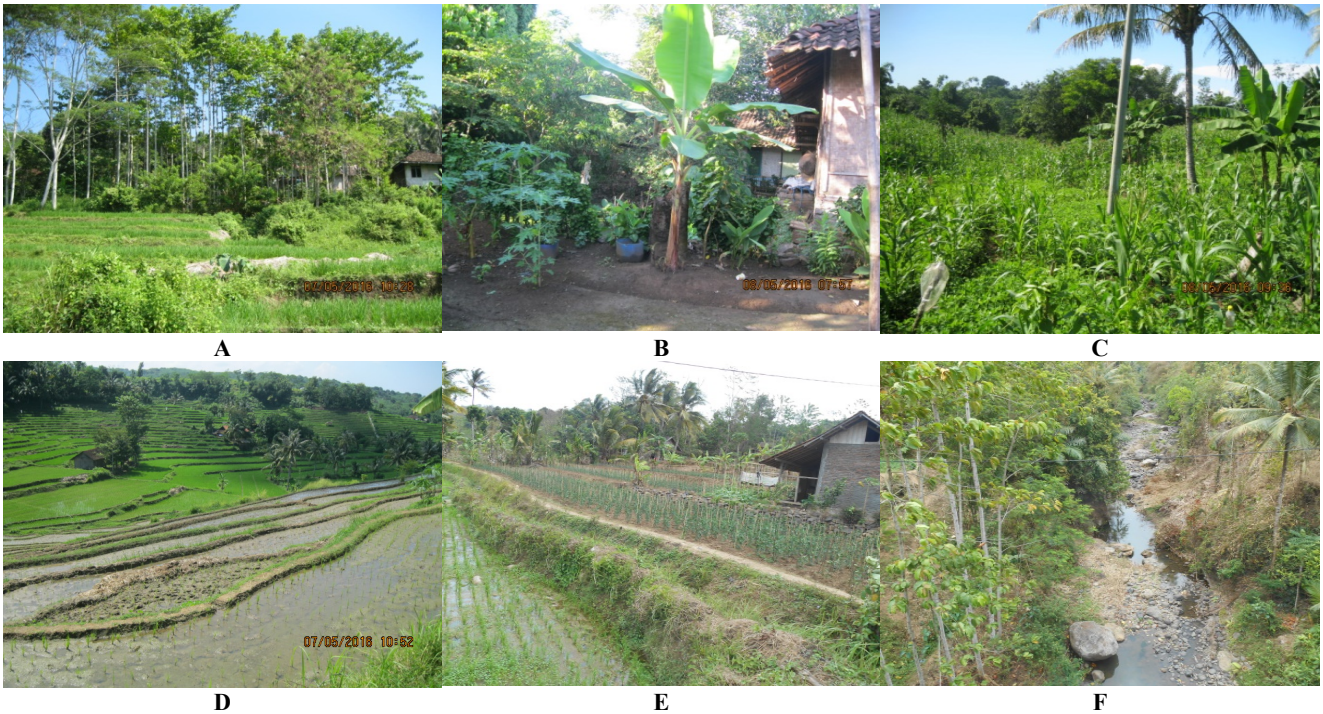

Figure 3. A. Albasiah and jabon trees are grown in tegalan, B. Homegarden is planted by various annual and perennial crops, C. Peanut crop is predominantly grown in garden, D. The wet rice field (sawah) landscape of Karangwangi, E. The chili pepper crop is one of commercial crops grown in garden or rainfed field of Karangwangi, F. Cikawudung river of Karangwangi which has a lack of water during the dry season

Strategy for sustainable rural landscape management

The changing landscape of Karangwangi Village is influenced by many factors. First, a fundamental transformation occurred whereby an increase in the population resulted in the reduction of forest area and a conversion of the huma system into a wet rice field system (*sawah*). In addition to being converted to wet rice fields, *huma* also were converted to gardens. This garden system takes place because of the adaptation of densely populated and rapidly growing market economies. Consequently, the local population selects and introduces new crops that are more profitable economically, and introduces new inputs such as inorganic fertilizers and pesticides to fit the market demand (Iskandar 2009; Mutaqin et al. 2018). The denser the population, the higher the need for settlements. This is certainly the case in Karangwangi Village with new settlements adding pressure to the land use needs of the community. To meet their needs, the community maintains gardens planted with various kinds of plants such as fruits, spices and ceremonial plants and livestock. This home-garden system is not managed intensively and is rarely attacked by pests because it is a polyculture system. The people of Karangwangi Village usually harvest their own produce from the homegarden to meet their personal or family needs. Generally, the existence of home-gardens are very good from an ecological standpoint because they are maintained without inorganic fertilizers or pesticides, and sustain diversity of local plants. Secondly, government policies such as bans on swidden cultivation system in the forest, reforestation of former land, Green Revolution programs and policies, and *Panca Usaha Tani* have all had significant impacts The introduction of modernization in the form of intensive agriculture supported by the government through the Green Revolution and *Panca Usaha Tani* have clearly degraded the quality of land in Karangwangi Village. This is caused by monoculture, pesticides and inorganic fertilizers that are increasingly used by the community. Thirdly, the improvement and development of infrastructure such as roads are the mainstream of modernization in Karangwangi Village. Soembodo (2008) argues that the processes of rural society modernization are underpinned by the construction of connecting roads and the transportation that facilitates mobilization. The development of irrigation channels and new agricultural technology, as well as the shifting of jobs from the agricultural sector to other sectors, combine to produce dramatic changes to the development trajectories of rural communities.

The aforementioned factors have changed, and will continue to alter the landscape of Karangwangi Village. Therefore, a stable strategy is needed to provide a more balanced development plan that produces benefits for the environment and social and economic prosperity for the local community. Fritz-Vietta (2017) defines two factors in sustainable land management: (i) satisfaction of human needs in the use of land and natural resources; and (ii) maintenance of the future functioning of the natural resource environment (Figure 3).

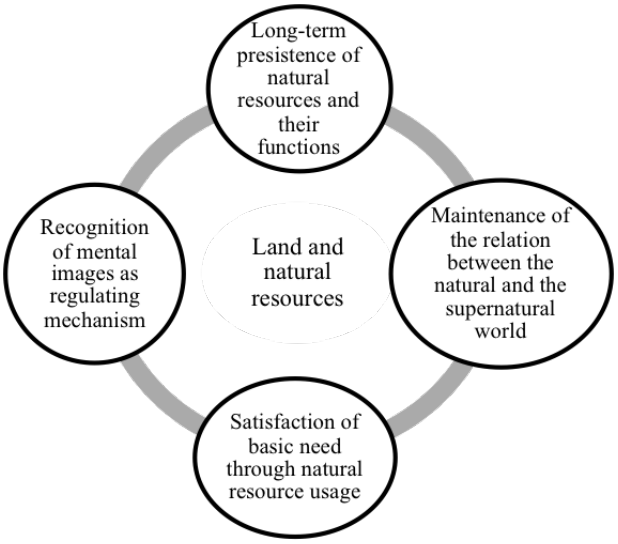

Figure 3. Elements of sustainable land management (adapted from Mahafaly Plateau region) *(*Fritz-Vietta 2017*)*

Implementation of these two factors is facilitated by identifying people who still hold tightly the mental image associated with a site, location, or resources that have a supernatural connection. *Pronoto Mongso* which is an inheritance of local knowledge in the seasonal traditional calendar in Yogyakarta plays an important role in overcoming complex socio-economic changes in the area of Karst Gunung Kidul. Pronoto Mongso teaches the relevant environmental ethics and life balance used today, such as adaptation and environmental change (Retnowati et al. 2014). In addition, Tri Hita Karana in Bali can also be used as a reference in overcoming problems in the landscape of Batukaru slopes and the associated factors of water, soil and climate throughout each year (Asmiwyati et al. 2015). In short, it can be inferred that the Karangwangi people affect, and been affected by, their ecosystem. Various landscapes of Karangwangi, and the people themselves have continuously changed over time due to the reciprocal nature of socio-economic and cultural developments.

ACKNOWLEDGEMENTS

This study is one of topics of the Academic Leadership Grant (ALG) program of Prof. Johan Iskandar, funded by DIPA Universitas Padjadjaran, Indonesia fiscal year 2015. Therefore, on this occasion, we would like to thank the rector of Universitas Padjadjaran, Prof. Tri Hanggono Achmad, who has provided ALG program as implementation to achieve World Class University. In addition, we also would like to thank the village head of Karangwangi Village and his staff, along with the informants of Karangwangi who have kindly helped us to provide information.

REFERENCES

Albuquerque UP, Cruz da Cunha LVF, Lucena RFP, Alves RRN. (eds). 2014. Methods and techniques in ethnobiology and ethnoecology. Springer Science & Business Media, New York.

Arifin HS, Nakagoshi N. 2011. Landscape ecology and urban biodiversity in tropical Indonesia cities. Landscape Eco J 7:33-43.

Asmiwyati I, Mahendra M, Arifin NHS. 2015. Recognizing indigenous knowledge on agricultural landscape in bali for micro climate and environmental control. Procedia Environ Sci 28: 623-629.

Berkes F.1999. Sacred ecology: traditional knowledge and resource management. Taylor and Francis, Philadelphia.

Diver S. 2017. Negotiating indigenous knowledge at the science-policy interface: insights from the Xaxli'p community forest. Environ Sci Pol 73: 1-11.

Farina A. 2010. Ecology, Cognition and landscape: linking natural and social systems. Springer, New York.

Fritz-Vietta NVM, Tahirindraza HS, Stoll-Kleemann S. Local people's knowledge with regard to land use activities in southwest Madagascar-conceptual insights for sustainable land management. J Environ Manag 199: 126-138.

Geertz C. 1963. Agricultural involution: the processes of ecological change in Indonesia. University of California Press, Berkeley.

Iskandar J. 2012a. Baduy swidden cultivation ecology (sustainable management of indigenous-based forest). PT. Alumni, Bandung [Indonesian].

Iskandar J. 2012b. Ethnobiology and sustainable development. AIPI Bandung, Puslitbang KPK LPPM Padjadjaran University [Indonesian].

Iskandar J, Iskandar BS. 2016. Ethnoecology and agroecosystem management among village people of Karangwangi, Cidaun Sub-district, South Cianjur, West Java. J Biodjati 1 (1): 1-12 [Indonesian].

Iskandar J, Iskandar BS. 2017. Local knowledge of the Baduy community of South Banten (Indonesia) on the traditional landscapes. Biodiversitas 18 (3): 928-938.

Iskandar J, Iskandar BS, Partasasmita R. 2017. Introduction of *Paraserianthes falcataria* in the traditional agroforestry 'huma' in Karangwangi Village, Cianjur, West Java, Indonesia. Biodiversitas 18 (1): 295-303.

Lovelace GW. 1984. Cultural beliefs and management of agro-ecosystems. In Rambo AT, Sajise PE. (eds), An introduction to human ecology research on agricultural systems in Southeast Asia. East-West Environment and Policy Institute, Honolulu, Hawaii.

Mutaqin AZ, Fatharani M, Iskandar J, Partasasmita R. 2018. Utilization of Araceae by local community in Cisoka Village, Cikijing Sub-district, Majalengka District, West Java, Indonesia. Biodiversitas 19 (2): 560-571.

Partasasmita R, Nuari T, Erawan TS, Iskandar J. 2015. The diversity of fish species and the disturbances in the Cikawung river, Cianjur, West Java, Indonesia. Nusantara Biosci 7 (2): 165-170.

Partasasmita R, Iskandar J, Malone N. 2016. Karangwangi people's (South Cianjur, West Java, Indonesia) local knowledge of species, forest utilization and wildlife conservation. Biodiversitas 17 (1): 154-161.

Pranowo APDS. 1985. Man and forest: process of ecological change in slope of Mt. Merapi. UGM Press, Yogyakarta [Indonesian]

Presidential Instruction No. 4 of 1982. Concerning Guidelines Implementation of 1982/1983 Primary School Development Assistance; http://www.bphn.go.id/data/documents/82ip004.pdf

Ramdhan B, Tatik C, Waluyo EB. 2015. Cultural perspective of environmental management in Cikondang indigenous people, Bandung Regency, West Jawa. Sumberdaya Hayati (1): 7-14. [Indonesian]

Retnowati A, Anantasari E, Marfai MA, Dittmann A. 2014. Environmental ethics in local knowledge responding to climate change: an understanding of seasonal traditional calender Pronoto Mongso and it phenology in Karst Area of Gunung Kidul, Yogyakarta, Indonesia. Procedia Environ Sci 20: 785-794.

Setiadi J, Purwanto YD, Edi G. 2012. Ethnoecology of Samin people Kudus Central Jawa. Bioma 14: 7-16.

Soembodo B. 2008. Cultural Social Aspiration of Rural Community for Family Prosperity. [Hom. Thesis]. Universitas Airlangga, Surabaya.[Indonesian]

Takeuchi K. 2010. Rebuilding the relationship between people and nature: the satoyama initiative. Ecol Res 25: 891-897.

Toledo VM. 2002. Ethnoecology: a conceptual framework for the study of indigenous knowledge of nature. in Stepp JR, Wyndham FS, Zarger RK (eds), Ethnobiology and biocultural. The International Society of Ethnobiology, Georgia.