

Strategy of the Outer Baduy community of South Banten (Indonesia) to sustain their swidden farming traditions by temporary migration to non-Baduy areas

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Abstract. Iskandar BS, Iskandar J, Partasasmita R. 2018. Strategy of the Outer Baduy community of South Banten (Indonesia) to sustain their swidden farming traditions by temporary migration to non-Baduy areas. *Biodiversitas* 19: 453-464. The Baduy people live in the forest village of Kanekes, in Leuwidamar sub-district, Lebak district, Banten Province, Indonesia. They have long practiced a form of swidden farming based on traditional ecological knowledge and beliefs about the cosmos. Unlike the rest of the surrounding Sundanese society, the Baduy have prohibited wet rice field cultivation on their lands. Moreover, in conserving their traditional swidden farming system, the Baduy people have resisted the use of modern rice varieties, inorganic fertilizers, and synthetic pesticides. On the basis of Baduy culture, their swidden-produced rice is not sold, and for at least the past 50 years the harvested rice has not been stored away in barns but instead has been mainly used for daily home consumption and various traditional rituals. Nowadays, Baduy swidden farming is affected by many new pressures – particularly by population increase, and increasing food demand – but the forest land used for practicing their swidden farming is limited. Therefore, in order to maintain the sustainability of their swidden farming system, the Baduy people, particularly the Outer Baduy, have developed cultural strategies that include temporary outmigration (*nganjor*) to neighboring, non-Baduy areas where Muslim value-systems provide the main cultural dynamic. The aim of the study reported in this paper was to elucidate the cultural strategy of the Outer Baduy to maintain their sustainable swidden farming by temporary outmigration to non-Baduy areas in territory of the Muslim majority. The method used in this study was qualitative based on an ethno ecological approach. Several techniques were used, namely direct observation, participant observation, and deep interviews with competent informants who were purposively selected. The results of the study confirmed that up until now the Outer Baduy have maintained the sustainability of their swidden farming, by various means, especially by conducting contemporary outmigration to non-Baduy areas in Muslim majority territory. They plant swidden rice in a way that fulfills various traditional rituals, and by diversifying their non-rice-trading options that include growing a variety of mainly tree crops in their swidden land (*huma*) and in other anthropogenic land. This involves occasional negotiated out-migration to non-Baduy area for temporary swidden farming in surrounding Muslim majority territory. This has enabled the Outer Baduy swidden farming system to be maintained on a long-term basis.

Keywords: Cultural strategy, Outer Baduy, out-migration swidden farming

INTRODUCTION

Historical studies have revealed that swidden cultivation (*huma* or *ladang*) was dominant as the principal livelihood of the rural people in the ecology of upland West Java and Banten, until the beginning of twentieth century (Geertz 1963; Iskandar 1998; Iskandar and Iskandar 2011). The system of irrigated rice field cultivation (*sawah*) initially penetrated West Java in regions such as Sumedang, Rancaekek-Bandung and Sukapura (Tasikmalaya), from Central Java in about 1750 (Terra 1953; Geertz 1963). Similarly, *sawah* was firstly introduced into the Banten area in 1520 in line with the initial establishment of the Banten Sultanate. The *sawah* cultivation was particularly developed in North Banten, where flat plains and dense populations were a feature of the geography at the center of the Sultanate of Banten (Kartodirdjo 1966; Iskandar 1998). Conversely, at that

time, the swidden system was still the predominant rice-growing practice of the rural people in South Banten where large forest areas, lower soil fertility, and low human populations were conducive for swidden cultivation methods (cf. Kools 1935; Mohr 1945).

Nowadays, due to combined effects of government policy, intense demographic pressure, and rapid socio-economic and land-use change, the traditional swidden cultivation system (*huma*) is now confined only to South Sukabumi, in West Java province and to South Banten, in Banten Province. In South Sukabumi, it is mainly practiced by the Kasepuhan community (*Urang Kasepuhan*); while in South Banten, it is practiced by the Baduy community (*Urang Baduy*) who reside in the village (*desa*) of Kanekes, in Lebak District (*kabupaten*), Banten Province (*provinsi*), Indonesia.

The Baduy people's practice of swidden farming is based strongly on traditional ecological knowledge (TEK)

and beliefs about the cosmos (cf. Toledo 2002; Berkes 2008). Based on Baduy traditions, the practice of swidden system is considered an obligation of their religion – *Agama Baduy* or *Sunda Wiwitan*. They believe their territory to be sacred land that must be specially managed, while the land of the neighboring Muslim majority territory is considered to be non-sacred, profane, i.e., not subject to Baduy religious strictures. In addition, Baduy believe in a goddess of rice, called *Nyi Pohaci* (*Dewi Sri* in Javanese) who must be respected. Accordingly, various prohibitions (taboos) are strongly applied in the Baduy practice of swidden farming. For example, the Baduy prohibit the planting of modern rice cultivars; the use of inorganic fertilizers and synthetic pesticides; the digging of soil; the rearing of cows, buffalo, sheep, and goats; the planting of monoculture industrial crops such as coffee, clove, teak, and rubber; and the cultivation of rice in an irrigated rice field (*sawah*) system. In other words, the Baduy swidden cultivating farming is based on TEK and beliefs, and applied the 'LEISA' system, low-external input and sustainable agriculture, in which most of the inputs used originate from the own farm or village, and deliberate action is taken to ensure sustainability (cf. Reijntjes et al. 1992; Toledo 2002; Berkes 2008). In addition, the rice produced in their swidden (*pare huma* or *padi ladang*) is not allowed to be traded, whereas various non-rice crops such as 'petai' (*Parkia speciosa* Hassk.), 'durian' (*Durio zibethinus* L.), 'pisang' (*Musa x paradisiaca* L.), 'kelapa' (*Cocos nucifera* L.), 'rinu' (*Piper rindu* C.DC), 'jengkol' (*Archidendron pauciflorum* (Benth) I.C. Nielsen), and 'picung' (*Pangium edule* Reinw.) are allowed to be traded.

Today, like swidden systems in many regions of Asia, the Baduy swidden system has been impacted by many socio-economic and ecological changes: including new government policy; rapid population growth; market economic development; land-use changes; and commercial plantation development (cf. Alcorn 1999; Iskandar 2007; Mertz et al. 2009; Yin 2015; Van Noordwijk et al. 2015; Aryal and Chodhury 2015; Cramb 2015; Xu and Yi 2015; Iskandar et al. 2016). Consequently, swidden farming in Baduy and many regions of Asia has dramatically changed. Indeed, swidden farmers have had to adapt to these various ecological and socio-economic changes (Cramb et al. 2009; Mertz et al. 2009; Vien et al. 2006). In general, based on case studies in Baduy and many regions of Asia, it can be seen that swidden farmers have not been static in responding to ecological and socio-economic changes, but have dynamically adapted by adopting new strategies. As a result of these new strategies, the swidden system of Baduy and other regions of Asia has been maintained, and remains to this day an important source of rural livelihoods and cultural identity (cf. Iskandar 2007; Ellen 2007; Cramb et al. 2009).

In recent times, the Baduy swidden farming system has dramatically changed; nevertheless, the Baduy people have been able to maintain the ancient agricultural practices of West Java and Banten. They have been able to develop appropriate strategies for practicing swidden farming that balance the moral and cultural dictates of their traditional value system against the pragmatic requirements of self-

interest in a changing world order (cf. Granovetter 1992). Maintaining their approaches to planting rice is considered a moral imperative, while planting non-rice crops serves new economic interests. The Baduy have the perception that the territory they have occupied since ancient times is sacred land, land entrusted to their care (*tanah titipan*), while the neighboring Muslim majority territory is considered as non-sacred, profane land, that can be more flexibly cultivated for commercial crops. Therefore, in general, the Baduy swidden farming system has been sustained due to pragmatic adaptations by the Outer Baduy people who have developed strategies such as crop diversification in their swiddens; selective commercial crop introductions; petty trading of non-rice crop products; making palm-sugar (*gula kawung*); taking up various off-farm jobs; and conducting occasional, temporary, out-migration to non-Baduy areas (Iskandar 2007; Iskandar and Iskandar 2016). Although the occasional migration of Outer Baduy people to undertake the temporary practice of swidden-farming in non-Baduy areas has been previously identified by researchers (Purnomohadi 1985; Iskandar 1985; 1991; 1992; 1998); this strategy is not yet been intensively elaborated.

This paper focuses on the strategy of the Outer Baduy community of South Banten, Indonesia, to sustain their swidden-farming way of life, by temporary migration to neighboring areas of Muslim territory.

MATERIALS AND METHODS

Study sites

This research was carried out in the Baduy area of Kanekes village, Leuwi damar sub-district, Lebak district, province of Banten, Indonesia (Figure 1). In addition, field research was conducted in Muslim majority territory bordering on the Baduy lands; including the villages of Bojong menteng, Cisimeut Raya, and Nayagati of Leuwidamar sub-district (Figure 2).

The Baduy area of Kanekes village is located approximately between latitudes 6° 27' 27" and 6° 30' North and between longitudes 106° 3' 9" and 106° 4' 5" East. The main river flowing through the area is the Ciujung. In its upstream – located on the forest area of Gunung Kendeng, South Cikeusik hamlet, Inner Baduy – is found a sacred place called *Arca Domas*. The river flows in a northerly direction from Cikeusik, passing the Outer Baduy hamlets, downstream to Rangkas bitung, Serang, and eventually into the north Java Sea.

The Baduy area of Leuwi damar sub-district has a total area of about 5,136.58 hectares. This is based on the local regulation (*Perda*) of Lebak district No.32, 2001, defining the area as *Ulayat* land (*tanah ulayat*), with its status strengthened by a decree of Lebak district (*SK Bupati Lebak*) No.590/Kep.233/Huk/2002 concerning the setting of boundaries of a *Hak Ulayat* for the traditional Baduy community, on 16 July 2002. Based on the Lebak District decree, out of this 5,136.58 hectares of Baduy land area, about 3,000 hectares is devoted to forest protection while 2,136.58 hectares comprises land used for agriculture and settlement (Kurnia and Sihabudin 2010).



Figure 1. Study site: the Baduy area of Kanekes village, Leuwidamar sub-district, Lebak district, Banten Province, Indonesia (adapted from Iskandar and Ellen 2000)



Figure 2. The non-Baduy land areas predominantly used for swidden farming by the Outer Baduy people (Iskandar 1998)

Today, the Baduy area of Kanekes village is surrounded by 11 non-Baduy villages in 5 sub-districts. The nearest villages to the north are Desa Bojong menteng, Desa Cisimeut Raya, and Desa Nayagati of Leuwidamar sub-district. To the south, the Baduy area is bordered by Desa Cikate and Desa Mangunjaya of Cijaku sub-district. To the west it is bordered by Desa Parakan Biru, Desa Kebon Cau and Desa Karang tunggal of Bojongmanik and Cirinten sub-districts; and to east by Desa Karang combong, Desa Haring, and Desa Cicalbang of Muncang and Sobang districts (Figure 2).

On the basis of Baduy tradition, the Baduy area can be divided into three territories, namely Inner Baduy (*Baduy Dalam*), Outer Baduy (*Baduy Luar*), and *Dangka* area. The

Inner Baduy (*Baduy Jero* or *Baduy Dalam*) consists of 3 permanent hamlets (*kampung*), namely Cibeo, Cikartawarna and Cikeusik, where reside the Inner Baduy people who have maintained stronger Baduy traditions compared to that of the Outer Baduy people. The traditional leader (*Puun*) and his staff, namely *Jaro Tangtu*, *Girang Seurat*, *Jaro Parawari*, and *Baresan* reside in this hamlet. The Outer Baduy (*Baduy Luar* or *Panamping*) in 2009 consisted of 56 hamlets, such as Kaduketug, Cibalingbing, Marengo, Gajeboh, and Kadujangkung, which are predominantly located in the northern area of Kanekes village. The *Dangka* area initially consisted of 7 locations: 4 locations located in the Outer Baduy area, namely Dangka Cipatik at Kampung Cihulu, Dangka

Carungan and Dangka Singalayang at Kampung Kaduketug, Dangka Sindang Nyair at Kampung Nungkulan, and Dangka Ingung at Kampung Panyaweuyan; while 3 Dangka areas are located in Muslim enclave areas, namely Dangka Warega at Kamancing, Dangka Sirah Dayeuh at Cihandam, and Dangka Padawaras at Cibengkung. However, because of the pressure of Muslim people, two dangka areas, Dangka Kamancing and Dangka Cihandam were moved to Kampung Cipondoh and Kaduketgug, of Outer Baduy, respectively (Kurnia and Sihabudin 2010).

In 2017, the total population of Baduy was recorded as 11,699 people (5,911 males and 5,798 females) representing 3,413 households. The population was dominated by Outer Baduy people with a total of 10,488 people (89.64 %) and the rest were Inner Baduy people recorded as 1,211 people (10.36%) (Statistics of Kanekes village 2017). The Baduy population has increased over time. For example, in 1888, the Baduy population was recorded as 1,476 people, whereas in 2017, it was recorded 11,699 people (Table 1).

The main livelihood of the Outer Baduy community is swidden cultivation and is considered to be an obligation arising from Baduy religious practices, *Sunda Wiwitan*. In addition, Baduy women are involved in making traditional woven cloth (*kain tenun*) (Figure 3), while some men are involved in making traditional woven backcloth bag; *koja* and *jarog* (Figure 4). The material used is the bark of young teureup trees (*Artocarpus elasticus* Reinw. Ex Blume), tanned with gintung bark (*Bischofia javanica* Blume) or salam (*Syzygium polyanthum* (Wight) Walp.). These handicraft products are produced for personal use, as well as for sale to visitors or small shops (*warung*) in both the Outer Baduy area and neighboring areas. In addition, the community is involved in making brown sugar (*gula kawung*) by tapping the inflorescence stalks of the Arenga palm (*Arenga pinnata* (Wurmb) Merr).

Table 1. Population of Baduy over the period 1888 to 2017

Year (year)	Time period (years)	Population (people)	Change in number of people
1888-1908	20	1,476-1,547	71
1908-1928	20	1,547-1,521	-26
1928-1966	38	1,521-3,935	2414
1966-1969	3	3,935-4,063	128
1969-1980	11	4,063-4,057	524
1980-1983	3	4,057-4,574	517
1983-1984	1	4,574-4,587	13
1984-1986	2	4,587-4,850	263
1986-1994	8	4,850-6,483	1633
1994-2000	6	6,483-7,317	834
2000-2008	8	7,317-10,941	3624
2008-2010	2	10,941-11,172	231
2010-2015	5	11,172-11,620	448
2015-2017	2	11,620-11,699	79
1888-2017	129	1,476-11,699	10,223

Source: Iskandar (1991,1998) and Kanekes Village Statistics (2017)

Research procedures

The method used in this research was qualitative based on an ethno ecological approach. The techniques applied to collect primary data were direct observation, participant observation, and deep interviews with informants (Newing et al. 2011; Iskandar 2012; Albuquerque et al. 2014). Observation was undertaken to observe conditions of settlements, forests, and the swidden field of the Outer Baduy community, both in the Outer Baduy area and in neighboring Muslim territory. Participant observation was mainly carried out involving the researcher with some activities of the Outer Baduy people in managing the swidden fields in both the Outer Baduy lands and in nearby Muslim territory. Deep interviews were undertaken with competent informants purposively selected to reflect various aspects of management of swidden cultivation in both the Outer Baduy area and the Muslim territory, and occasional out-migration activities in Muslim territory. The informants were purposively selected based on competence and local expertise: included among them were the village leader of Baduy community (*Jaro Pamarentah*) and his staff (*Carik Desa*); staff of Baduy informal leaders (*Jaro Dangka*, *Jaro Tanggungan* 12); village leaders of non-Baduy (*Jaro* or *Kepala Desa*) and their staff (*Carik Desa*); some outer Baduy people who undertake occasional out-migration to non-Baduy area; and landowners in the neighboring Muslim territory who lease land to Outer Baduy swiddeners. In interviews, informants gave extensive responses to a series of general questions, some of which had been prepared in advance, particularly in relation to occasional outmigration of Outer Baduy to Muslim territory, and some additional questions which naturally arose during the course of the conversations (cf. Martin 1995).

Data analysis

The data obtained by observation, participant observation and deep interview with informants were analyzed by crosschecking, summarizing and synthesizing, in order to build up a narrative account with an emphasis on descriptive and evaluative analysis (cf. Newing et al. 2011).

RESULTS AND DISCUSSION

Swidden farming of Outer Baduy people

Historical evidence of the ecology in the area indicates that the Outer Baduy people initially owned swidden land not far from their hamlets. They obtained the swidden land in various ways; through inheritance, purchase, borrowing, and rental (Iskandar 1998). The swidden area is predominantly located in the slopes of a hill, between the top and valley bottom. Because it is traditionally prohibited to clear the forest at the top of a hill for swidden farming, the hill is predominantly used for area of settlement and village forest. Based on Baduy tradition, the village forest (*dukuh lembur*) and also the river bank forest is not allowed to be to open up for swidden farming.



Figure 3. Outer Baduy woman making traditional woven cloth (*kain tenun*)



Figure 4. Outer Baduy man making traditional woven backcloth bag (*koja* and *jarog*)

Each year, about between 0.4 hectare and 0.8 hectares of mature secondary forest (*reuma kolot*) is cut for the swidden system (*huma*). There are several stages in the management of swidden cultivation by the Outer Baduy and also by the Inner Baduy people: namely site selection according to the *narawas* ritual; land preparation, including cutting underbrush with the *nukuh* ritual, felling and pruning trees, burning debris (*ngahuru*), and reburning debris (*ngaduruk*); planting rice based on the *ngaseuk pare* ritual; looking after the swidden, including the first weeding with the *ngirab sawan* ritual, and the second weeding with the *ngubaran pare* ritual. Each stage in the Outer Baduy swidden cultivation activities must proceed in accordance with the traditional Baduy calendar. For example, site selection and land is normally undertaken in *Kanem* (June-July); cutting underbrush, and felling and pruning trees in *Kapitu* (July-August) and *Kadalapan* (August-Sept); burning and reburning debris, and planting rice in *Kasalapan* (September-October); first weeding and second weeding in *Kasalapan* (September-October); and *Kasapuluh* (October-November); and harvesting rice in *Katiga* (March-April).

Traditionally, to practice swidden cultivation, a piece of land opened up from the mature secondary forest is usually only cultivated for one or two years before again being fallowed. The duration of the stages depends on the soil fertility. After harvesting rice and other annual crops, the land is fallowed and transformed into secondary forest (*reuma*) through natural succession. A swidden (*huma*) left to fallow for less than one year, and which therefore still has lots of dried rice stalks (*jarami pare*), is called *jami*. From this land, annual crops such as taro ('taleus' = *Colocasia esculenta* (L.) Schott), African tuber ('kumili' = *Plectranthus rotundifolius* (Poir.) Spreng.), and pigeon pea ('hiris' = *Cajanus cajan* (L.) Millsp.) continue to be harvested. In addition, in more recent developments particularly in Outer Baduy, the leguminous tree species,

Albizia (*Paraserianthes falcataria* (L.) I.C.Nielsen), has been introduced and grown during swiddening. *Albizia* trees are also grown together with natural vegetation. Therefore, even after the rice has been harvested, the land is regularly visited by the owner to check on the progress of the fallow (*nempo jami* or *noongan jami*).

Fallowed immature secondary forest (*reuma ngora*) can be opened for rice planting again in the following year or after two to three years. People also shift activities to another piece of mature secondary forest (*reuma kolot*) for rice planting and follow the same procedure: cutting and pruning (*nyacar* and *nuar*), burning (*ngahuru*) and reburning (*ngaduruk*), planting rice (*ngaseuk*), first weeding (*ngored munggaran*) and second weeding (*ngored ngarambas*), harvesting rice (*panen* or *dibuat*), and fallowing.

Unlike in Inner Baduy, in Outer Baduy, due to high population density and lack of mature secondary forest (*reuma kolot*), farmers are predominantly involved in temporary outmigration (*nganjor*) to neighboring areas of non-Baduy territory. They do this by means of renting and share-cropping non-Baduy land, while waiting for their own land during the fallow phase. They usually return to cultivate their own land after about 3 year's swidden farming in non-Baduy areas.

On the basis of their traditional forest management strategies, forests of both Outer Baduy and Inner Baduy can be divided into two categories: protected and non-protected.

Protected forest is comprised of those areas that have never been opened for swiddening, and is called *leuweung kolot* (old or mature forest not known to have been previously farmed), big forest (*leuweung gede*) or entrusted forest (*leuweung titipan*). In general, protected forest is predominantly found in the Inner Baduy area.

The other forest type is forest that can be opened for swiddening; mature fallowed forest (*reuma kolot*). If

mature forest has been opened for swiddening, the term *leuweung* is usually no longer used and is replaced by *reuma*. Moreover, if *reuma* is opened to establish a settlement (*kampung* or *lembur*), then the anthropogenic forest surrounding the hamlet is called *dukuh lembur* (hamlet forest) or *lindung lembur* (hamlet shelter forest). Thus, most types of traditional agroforestry – namely swidden cultivation, fallowed secondary forest (*reuma*), mixed garden (*kebun campuran*), and village forest (*dukuh lembur*) – are derived from non-protected forest. The *reuma* lands of Outer Baduy are different from those of Inner Baduy. Inner Baduy *reuma* lands are communally owned, and all that is inherited by individuals are some perennials crops which grow on the land. By contrast, Outer Baduy *reuma* lands are owned by households and can be sold, rented and mortgaged to other households of Outer Baduy people. In addition, unlike Inner Baduy, Outer Baduy people have predominantly practiced swidden farming not only in their own area but also in non-Baduy area on swidden land obtained by renting, share-cropping, and providing labor for establishing commercial gardens of non-Baduy people. Therefore, after harvesting rice and returning the land to fallow, Outer Baduy farmers will shift to a piece of mature secondary forest (*reuma kolot*) for rice planting in the next year, if such land is available in their

area. However, if they do not have mature *reuma* in their area, they instead negotiate an opportunity for out-migration and will temporarily reside (*nganjor*) in non-Baduy areas, such as Leuwidahu, Cibengkung, Cihandam, and Cisimeut (Figure 2). They predominantly reside in farm shelters (*saung huma*) during their practice of swidden farming. They usually return to cultivate their own *reuma* land after about 3 years of swiddening in non-Baduy area.

Temporary out-migration and swidden farming in non-Baduy area

To illustrate our understanding of how the Outer Baduy people in sustain their swidden farming way-of-life by temporary out-migration and swidden farming in non-Baduy territory, we have constructed a model based on the examples of Foin and Davis (1987) and Hall and Day (1977). The model suggests that Outer Baduy swidden cultivation involves five main components: human population, agricultural factors, market factors, food availability, and cash income (Iskandar 1991; 1992; 1998). Each component and the interrelationship among components of the Outer Baduy's swidden cultivation will be described in Figure 5.

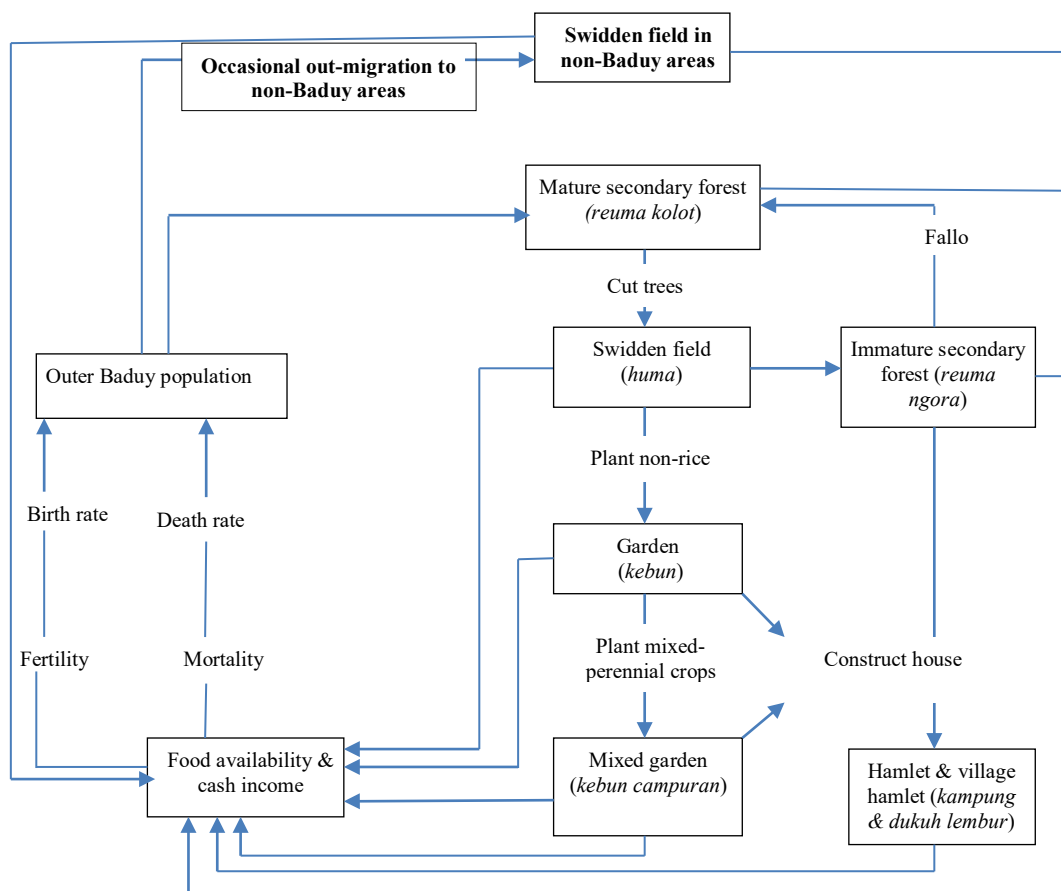


Figure 5. The principal causal loops in the swidden cultivation model for Outer Baduy

Human population, food availability and food consumption

The main component of Outer Baduy's swidden cultivation is the human population. The Outer Baduy population is an integral part of the system. The Outer Baduy population is not static but changes according to the relative balance of population inputs and outputs. Inputs for Outer Baduy population are determined by birth rate and in-migration rate, while outputs for population are determined by death rate and outmigration rate (Figure 5). Due to the traditions of the Baduy people, there has not been in-coming migration by non-Baduy people into their community. Migration has mainly been temporary out-migration and then return of Outer Baduy people to their hamlets in Kanekes village for the purpose of undertaking negotiated swidden cultivation and related activities in the nearby Muslim majority territory.

In general, the Outer Baduy population has increased over time (Table 1), i.e., the rate of population inputs has exceeded rate of population outputs. At the same time, an amount of agricultural land and of mature secondary forest (*reuma kolot*) area ready for cultivation has not been sufficient to allow for the expanding population to restrict their swidden cultivation activities to their own limited territory. Consequently, they adopted the strategy of negotiating temporary stays in non-Baduy area for practicing swidden farming on lands obtained by paying rent, by sharecropping, by providing labor for making gardens for non-Baduy people, and by planting Albizia (*Paraserianthes falcataria* (L.) I.C.Nielsen). Based on our studies in 1985 with 16 informants of Outer Baduy people in Kaduketug, Marengo, and Gajebuh, a majority of the informants had temporarily practiced swidden farming in non-Baduy areas, in the Muslim territory (Iskandar 1985). They lived temporarily in non-Baduy areas for swidden farming, by means of renting land or by sharecropping. Moreover, by swiddening in non-Baduy areas, the Outer Baduy people established intensive contact with non-Baduy, and gained experience of the market system. Normally, during temporary stays in the non-Baduy area (for example, in farm shelters, *saung huma*), they become involved in various jobs. Thus, both men and women sell firewood or barter (*ojol*) with rice. In addition, women become involved in planting and harvesting *sawah* rice farming, in weeding gardens, and in carrying timber (rubber trees or Albizia trees) from gardens to trucks. Men are commonly employed in hoeing wet-rice, fencing gardens, carrying timber, and working as contract laborers in town. In return, they obtain cash, which is used to buy food and other goods, and to rent land in non-Baduy areas (Iskandar 1998).

In the 1980s, Outer Baduy obtained the swidden land in non-Baduy areas in various ways; by renting, share cropping, and managing gardens of non-Baduy people. They rented land for swidden fields from non-Baduy people with cash at a cost of approximately Rp 20,000.00 to Rp 60,000.00 per-hectare depending on the soil fertility conditions. In some cases, they also paid rent with necklaces of gold bought in a jewelry shop in Rangkas bitung, the capital city of Lebak District, Banten Province. The agriculturally fertile land was more expensive to rent

than non-fertile land.

Some Outer Baduy swiddeners obtained fields in non-Baduy areas by share cropping; paying the landowners with rice bundles harvested from their swidden production. Normally, if they share-cropped swidden fields on land that had been converted from former government rubber plantations (*bekas perkebunan karet*), then the swiddeners paid for the land in rice bundles equivalent to 10% of the total rice harvest from the swidden. In other words, if they harvested a total of 100 rice bundles (*pocong*) from the swidden, then the rice production was divided into two parts: 90 rice bundles (*pocong*) for the cultivator (swiddener) and 10 bundles for the landowner. On the other hand, if the share-cropped swidden field was located on land that not previously been occupied by government rubber plantations, then the amount of rice bundles paid to the landowner was 20% of the total rice harvest; i.e. for every 80 rice bundles retained by the cultivator, 20 rice bundles were paid to the land owner.

In addition, some Outer Baduy people obtained swidden fields by providing labor to manage the clove gardens of the land owners. They cultivated the swidden field, and while growing their rice they had to maintain the clove trees. After planting rice for two years, before leaving the land the cultivators were required to weed the land.

Finally, a few Outer Baduy people with ready cash, such as the village leaders and middlemen, were able to purchase agricultural land in non-Baduy areas instead of having to rent, share-crop, or provide labor.

The current situation, based on this study conducted in 2017, is that most Outer Baduy people are extending their swidden activities to agricultural lands in non-Baduy areas of the neighboring Muslim majority territory. They obtain this land in non-Baduy area by sharecropping, renting, borrowing, or buying it. Unlike in the past, today, many people sharecrop albizia trees instead of rice bundles. Normally, the cultivators rent land from the non-Baduy, Muslim people, or by sharecropping of Albizia trees. They cultivate their swidden field by planting rice crops mixed with albizzia trees. For example, a swidden field of 0.4 ha can be planted with 350 trees of Albizia. Young Albizia trees of Albizia approximately 0.5 m in height are worth between Rp 1,000 and Rp 1,500, based on a value for the harvested wood of Rp 250,000 per m³. The albizia trees can be harvested after approximately 4 years old, and the wood production must be divided into two parts – 50 percent for the cultivator or tenant, and 50 percent for the land owner. They also obtain swidden fields by borrowing from relatives of Outer Baduy who own land in non-Baduy area. In addition, due to development of the market economy that has penetrated the village way of life, some land used by Outer Baduy in the non-Baduy territory is predominantly planted to commercial crops, such as coffee, cacao and albizia, instead of to rice.

In our Outer Baduy swidden cultivation model (Figure 5), it is assumed that the level of food supply responds to population factors, namely to rates of birth, death, in-migration, and outmigration. An food surplus is defined as the excess of food availability over food consumption as a

percentage of food consumption, while a food deficit, is defined as a negative food surplus. Food availability in Outer Baduy is determined by the dynamic balance of input and output of food line the community. Food input is assumed to be determined by agricultural production and by food imports. While food output is assumed to be determined by food consumption, food export, and food loss. Food export contributes to cash income while cash income is used up in financing food imports. Cash income is largely determined by income from farming, which is a function of the balance between total agricultural production and basic food requirements of a household.

The source of food in Outer Baduy is mainly from agricultural production, with some amounts from small shops (*warung* or *toko*) or urban markets. The traditional agroforestry land-use system can be divided into five categories: namely, swidden field (*huma* or *ladang*); fallowed land of the secondary forest (*reuma*); monoculture garden (*kebun*); mixed-garden (*kebun campuran*); and village forest (*dukuh lembur* or *hutan kampung*) (see Figure 6 and Figure 7) (Iskandar and Iskandar 2017). Various plants are predominantly planted in the swidden farming. These include rice ('pare' = *Oryza sativa* L.), 'hanjeli' (*Coix lacryma-jobi* L.), 'kumili' (*Plectranthus rotundifolius* (Poir. Spreng.), 'jeunjing' (*Albizia chinensis* (Osbeck) Merr.), 'kawung'/'aren' (*Arenga pinnata* (Wurmb) Merr.), 'pisitan' (*Lansium domesticum* Corr), 'petai' (*Parkia speciosa* Hassk.), 'kacang hiris' (*Cajanus cajan* (L.) Millsp.), 'waluh' (*Cucurbita moschata* (Duchesne), 'hui manis' (*Dioscorea alata* L.), 'kacang roay' (*Dolichos lablab* L.), 'kadu/durian' (*Durio zibethinus* Murr), 'sempur' (*Dillenia aurea* Sm.), 'cau/pisang' (*Musa x paradisiaca* L.), 'jaat' (*Psophocarpus tetragonolobus* (L.) DC.), 'tiwu/tebu' (*Saccharum officinarum* L.), and 'jirak' (*Symplocos javanica* (Blume) Kurz.). Unlike the swidden field, various perennial crops are predominantly planted in the fallowed secondary forest (*reuma*) and the village forest (*dukuh lembur*). These include 'kawung'/'aren' (*Arenga pinnata* (Wurmb) Merr.), 'kelapa' (*Cocos nucifera* L.), 'kadu'/'durian' (*Durio zibethinus* L.), 'bambu gombong' (*Gigantochloa verticillata* (Willd.) Munro), 'kiray' (*Metroxylon sagu* Rottb.), 'rambutan' (*Nephelium lappaceum* L.), 'pisitan' (*Lansium domesticum* Corr), 'binglu'/'kemang' (*Mangifera caesia* Jack), 'petai' (*Parkia speciosa* Hassk.), 'kaweni' (*Mangifera odorata* Griff.), 'jengkol' (*Archidendron pauciflorum* (Benth.) I.C.Nielsen), and 'albizia' (*Paraserianthes falcata* (L.) I.C.Nielsen). In addition, 'kopi' (*Coffea arabica* L.) is commonly planted in gardens (*kebun*).

These species of plant provide staple food and other products, such as fruits, vegetables, spices, medicinal plants, building materials and fire wood. In Baduy culture, rice can be produced only from the swidden fields (*huma*) that are considered sacred, and such rice is not allowed to be traded. However, other non-rice products are used for both home consumption and to earn cash income. These include products such as kadu/durian, cau/pisang, petai, brown sugar of aren/kawung, kelapa, albizia and kopi are commonly sold by Outer Baduy and provide cash income (Iskandar 2007).

As mentioned earlier, the five types of land-use in the Outer Baduy agroforestry system are the swidden field (*huma*), fallowed secondary forest (*reuma*), garden (*kebun*), mixed-garden (*kebun campuran*), and village forest (*dukuh lembur*). These traditional agroforestry types are close related. Therefore, changes in one type of agroforestry activity will affect the other agroforestry types. Nowadays, the most significant changes in agroforestry land-use categories are mainly between *huma* and *reuma*.

Normally, mature secondary forest (*reuma kolot*) with a fallow duration of more than 2 years is cut for swidden farming, which usually needs approximately between 0.40 ha and 0.80 ha/household per year. However, there is a lack of available mature fallow land for cultivating new swidden system. The amount of mature secondary forest cut is scarce and therefore limits the swidden system.

In the swidden field (*huma*), after rice and other annual crops are harvested, the field is abandoned to fallow, which in time will develop into immature secondary forest (*reuma ngora*) and then into mature secondary forest (*reuma kolot*) by natural succession. However, some fraction of the fallowed secondary forest fields can also be developed into monogarden (*kebun*) if the land is planted to annual crops such as sweet potatoes ('mantang' = *Ipomoea batatas* (L.) Lam) and cassava ('dangdeur' = *Manihot esculenta* Crantz). After harvesting the annual mono-crop, the garden can be developed either into immature secondary forest (*reuma ngora*) or it can be developed into a mixed garden, particularly if the mono-crop garden is planted to perennial crops such as coffee ('kopi' = *Coffea arabica* L.), clove ('cengkeh' = *Syzygium aromaticum* (L.) Merr. & L.M.Perry), and fruit crops. Furthermore, immature secondary forest will develop into mature secondary forest after the lands have been for at least three years. Some agroforestry types, such as monogarden and mixed garden, can also be developed into hamlet or settlement areas and into village forest areas, if houses are constructed on those lands (Figure 5).

Based on this model, the changes in each agroforestry land-use category in Outer Baduy can influence agricultural productivity, which in turn also affects food supply. Each agroforestry land type provides agricultural production. Based on our study in 1985/1986, each household of Outer Baduy obtained from agriculture the equivalent of Rp 78,564 per household per year. The price of hulled rice (*beras*) in 1985 was Rp 200 per liter, with 1.25 kg of hulled rice equal to 1 liter of unhusked rice and 1 US \$ equal to Rp 625. The average landholding of the swidden field (*huma*), monoculture garden (*kebun*), mixed garden (*kebun campuran*), village forest (*dukuh lembur*), and fallowed secondary forest (*reuma*) recorded for each household was 0.7 ha, 0.6 ha, 0.7 ha, 0.03 ha and 0.8 ha, respectively (Table 2).

The market prices received for non-rice and non-swidden crops, such as kadu/durian (*Durio zibethinus* Murr), cau/pisang (*Musa paradisiaca* L.), peuteuy/petai (*Parkia speciosa* Hassk), gula kawung/aren (*Arenga pinnata* (Wurmb) Merr), and albizia (*Paraserianthes falcata* (L.) Nielsen for three different study periods

(1985/86, 2003/4 and 2017) is summarized in Table 3. The data in Tables 2 and 3 indicates the important role that these non-rice products have played in Outer Baduy agriculture, in meeting both daily subsistence needs and in providing a source of cash.

Based on data from 16 informants (1985/1986), it was revealed that all informant had swidden fields and fallowed secondary forest, but only some informants owned all five

agroforestry land-use types, namely swidden field, the fallowed secondary forest, monoculture garden, mixed garden, and village forest in the Outer Baduy area. However, most informants, after cultivating their own swidden system, took part in out-migration because not enough of their own fallowed secondary forest could be returned quickly enough into cultivation to provide for their total needs.



Figure 6. Outer Baduy swidden system is planted to rice mixed with annual and perennial crops



Figure 7. Fallow land (*reuma*) of the Outer Baduy is predominantly planted with albizia trees and banana trees

Table 2. Agricultural production in Outer Baduy

Area/household (ha)	Area/household (ha)	Production	
		(Rp/household/year)	Rp/ha/year
Swidden field (<i>huma</i>)	0.8	277,986	347,483
Fallowed secondary forest (<i>reuma</i>)	0.8	329,620	412,025
Monogarden (<i>kebun</i>)	0.5	159,363	318,726
Mixed-garden (<i>kebun campuran</i>)	0.7	223,924	319,891
Village forest (<i>dukuh lembur</i>)	0.03	47,31	954,620

Note: 1 liter of hulled rice (*beras*) was Rp 200.00 in 1985/1986; Source: Iskandar (1985)

Table 3. Market prices for various non-rice products commonly traded in Outer Baduy, 1985/86, 2003/4, and 2017

Non-rice products	Unit	Market values (rupiah)		
		1985/86	2003/4	2017
Kadu, durian (<i>Durio zibethinus</i>)	Per fruit	400-500	5,000-5,500	25,000-30,000
Cau, pisang (<i>Musa x paradisiaca</i>)	Per bunch	200-300	400-500	8,000-8,500
Peuteuy, petai (<i>Parkia speciosa</i>)	Per <i>papan</i>	50-55	500-550	2,500-3,000
Gula kawung, aren (<i>Arenga pinnata</i>)	Per portion	250-300	2,000-2,500	7,000-7,500
Rinu, pepper (<i>Piper rindu</i>)	Seed per kg of dry	3,000-4,000	20,000-25,000	120,000-125,000
Albasiah, albizia (<i>Paraserianthes falcataria</i>)	Per tree	5,000-6,000	10,000-15,000	75,000-100,000
Kelapa (<i>Cocos nucifera</i>)	Per fruit	100	200	3,000-3,500
Cengkeh, clove (<i>Syzygium aromaticum</i>)*	Seed per kg of dry	400	27,000	50,000-75,000
Coklat, kakao (<i>Theobroma cacao</i>)	Seed per kg of dry	-	-	25,000-30,000
Kopi (<i>Coffea arabica</i>)*	Seed per kg of dry	200-850	8,000-9,000	20,000-25,000
Hulled rice of <i>sawah</i> bough in local small shops	Per liter	200	2,100	8,500-10,000

Note: *) Based on Baduy tradition, this crop is prohibited to be plant in the Baduy area; Source: Iskandar (1985, 2007, 2017)

Production of each agroforestry type is presented in Table 2. It can be seen from Table 2 that the fallowed secondary forest (*reuma*) has an important role not only in forest succession to provide biomass for the swidden fields (*huma*) and in soil conservation, but also for providing economic benefits. Many products are usually harvested from *reuma*, such as fruit, vegetables, building materials and fire wood. The swidden field (*huma*), from the standpoint economic productivity is less important than the fallowed secondary forest (*reuma*). However, *huma* is very important for the wellbeing of the Baduy community, because *huma* provides rice for home consumption, while other types of agroforestry only provide non-rice products. Average rice production recorded from the *huma* of the Outer Baduy was 488 kg of hulled rice per household per year, equivalent to 697 kg of hulled rice per hectare per year. Unlike the Inner Baduy, the Outer Baduy people, apart from practicing swidden farming in their own area, also practice swidden farming in non-Baduy area.

Outer Baduy people consume many kinds of foodstuffs. On the basis our research in 1984/1985, at least 39 varieties, 22 varieties, and 25 varieties of foodstuff are usually consumed by Outer Baduy at breakfast, lunch, and dinner, respectively. Foodstuffs that were consumed most frequently were rice, salt, salted fish, fish paste with hot relishes (*sambal*), cooked banana and vegetables. Salted fish was the most common source of animal protein, while rice was main source of carbohydrates (Iskandar 1991; 1992). The main source of foodstuffs is from the traditional agroforestry systems, namely swidden farming (*huma*), fallowed secondary forest (*reuma*), village forest (*dukuh lembur*), and swidden farming of non-Baduy area. Various food imports, such as salt (*garam*), fish paste (*terasi*), fried salt fish (*ikan asin*), noodles (*mie*) and processed cakes, are bought from small shops both in Baduy and non-Baduy area, and from markets in non-Baduy area.

Based on the empirical cross-cultural data from many regions in Asia (Geertz 1963), it can be seen that the ideal type of swidden system provides multiple benefits in terms of: provision of a sustained yield of diverse food crops throughout the year; the avoidance of total failure of harvest; lower incidence of pest attacks; reduction of weeds; efficient use of energy; maintenance of soil nutrients; and conservation of genetic diversity. However, based on many case studies of swidden cultivation, sustainable swidden cultivation in different regions can often only be maintained on a long-term basis if it is practiced in conjunction with other subsistence techniques, including extraction of non-swidden starch staples, hunting, and fishing (e.g. Ellen 1975; Persoon 1992; Dove 1983; Rappaport 1971; Sutlive 1978; Nations and Nigh 1980; Pelzer 1978; Chazee 2015; Van Noordwijk et al. 2015).

On the basis of our study, the Outer Baduy swidden farming system has been maintained on a long-term basis by the people responding proactively to various ecological, political, and socio-economic changes. The Outer Baduy people have developed strategies, that balance cultural cohesiveness based on religious and ethical principles inherent in their swidden farming way of life along with

enlightened self-interest associated with innovations in their economic practices (cf. Granoveter 1992). Their planting of rice in the swidden system is strongly based on long held moral principles. Many activities in their swidden farming practice are accompanied by traditional rituals. In addition, based on Baduy traditions, their swidden rice is not allowed to be sold but is incorporated into various rituals in management of the swidden farming, and for household consumption if they are unable to buy *sawah* rice from small shops (*warung*). However, in contrast to the swidden-produced rice, various non-rice crop products are used commonly for home consumption, while surpluses are sold to earn cash. They adopt aspects of a developed market economy, an expression of economy of self-interest, in order to preserve the cultural cohesiveness and communal values of their long sustained swidden farming way of life. The swidden practice based on these moral principles and cultural values is more resistant to change than is the economic self-interest apparent in their response to external market forces especially in relation to the non-rice products from their system. In recent developments, some commercial crops, particularly Albizia trees, have been introduced into their swidden farming. This has been based on 'hybrid knowledge' about the ecological and economic advantages of such innovations (Iskandar and Ellen 2007). In addition, the Outer Baduy have partaken significantly in temporary out-migration to neighboring Muslim territory in pursuit of economic self-interest based on innovation in their swidden farming practices in non-Baduy territory. For example, although cultivation of some crops, such as clove (*Syzygium aromaticum*), coffee (*Coffea arabica*), and cacao (*Theobroma cacao*) (Figure 8 and Figure 9) have traditionally been prohibited as monocultures within the Baduy areas, these crops are intensively cultivated by Outer Baduy people on neighboring Muslim territory considered to be non-sacred land.

The Outer Baduy people's practice of swidden agriculture, incorporating the moral principles and cultural value of their ancient ways of life along with the economic self-interest of their interactions with outsiders, has produced a sustainable system possessing ability to cope with various external stresses and disturbances (cf. Berkes and Ross 2012; Westerman et al. 2012). It is a way of life based on strong traditional ecological knowledge, values and belief; diverse and innovative economy; and a social network that underpins the socio-ecological resilience of the Outer Baduy community. As a result, the sustainable swidden farming system of Outer Baduy can be maintained on a long-term basis.

In conclusion, it can be said that by planting swidden rice for the performance of various traditional rituals, by diversifying their non-rice trading options based on a variety of mainly tree crops incorporated in their swidden (*huma*) and other anthropogenic lands, and by partaking in occasional out-migration to non-Baduy area for temporary swidden farming in neighboring Muslim majority territory, the Outer Baduy swidden farming has the resilience to be sustained on a long-term basis.



Figure 8. Rice is mixed with coffee trees planted by Outer Baduy people in their swidden fields in non-Baduy Muslim territory



Figure 9. Cacao trees are planted in fallow land on Muslim territory, and a number of such trees have also been introduced into the Outer Baduy area

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