

## Forest Management by Villagers in a Hillside Village in Northeast Thailand

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The objective of this study is to report the present situation of forest management by villagers in a hillside village in northeast Thailand. The field research was conducted in a hillside village in Loei province, northeast Thailand. As of 2011, the village had a population of 206 divided among 56 houses. The people who lived in the study village engaged in shifting cultivation in the past. The present main subsistence and economic activity of the villagers is agriculture, and they mainly grow upland rice and hybrid maize for realization. Field research in this village was mainly conducted from March to May 2011, from October to November 2011, and from June to August 2012. With the help of a 2012 GPS survey, I made a map of land use in the study village. I also made a cultivated area distribution map of 1976 and 2003 using aerial photographs as a guide. In the study village, the introduction of corn cultivation for realization advanced after 2003. As a result, the amount of cultivated area increased rapidly, and there was a transition from shifting cultivation to continuous upland farming. In 2012, 77% of the village land was cultivated. Some households do not own any secondary forest or fallow land. In the situation that secondary forest and fallow land are disappearing as a result of the expansion of corn cultivation for realization, the villager leaves forests to gather bamboo shoots, mushrooms, and firewood. In the daily life of the villager, such forest products play an important role and form a significant part of their diet. I visited the common forest from where villagers gather mushrooms to observe how this is done. I found at least three places for gathering mushrooms in the village and selected one for observation. The forestland is privately owned, but there is open access to it. Villagers are allowed to collect mushrooms and firewood, but only dead trees could be taken for use as firewood; they are not allowed to cut down green wood. Mushrooms emerge only during the rainy season, and even this is not predictable. When villagers discover that mushrooms have begun to spring up in the forest, this information is shared with the rest of the village. Women gather mushrooms more often than men do. All mushrooms are edible. Open-access forests make up a significant source of gathering for the home consumption of local residents. If forests are lost, villagers will lose their access to mushrooms. Therefore, we can assume that villagers appropriately restrict and self-regulate their use of the forests.

Keywords: forest management, gathering activities, open-access, natural resource utilization, land use change, Northeast Thailand

## Geomorphological background for traditional agroforestry in West Java

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Traditional land-use systems practiced in some areas of Java are known as a source of the idea of agroforestry. Pekarangan is particularly remarked in both high productivity and compound land-use which is visualized as complicated landscape. It is a kind of home garden in which various kinds of crops including tall and small trees and herbs are mixedly cultivated in combination with feeding of fish, chickens and, in some cases, small domestic animals in a restricted area. Plots for respective crops are carefully arranged in consideration of water- and material-flow in a garden. In West Java, many pekarangans are distributed on sloping and slightly undulating lahar plateaus at the foots of stratovolcanoes, where water is supplied to the gardens from springs or streams through artificial small channels, flumes and pipes made of bamboo in many cases, which are given gentler slope than that of lahar plateau surface. Moderate slope with almost constant direction, which is realized on lahar plateau surfaces, provides for the complicated land-use with valuable resources which make transmittance and distribution of water easy. Of course, porous volcanic edifices also play an important role in almost steady water supply. Shallow depressions on lahar plateaus are used, for example, as small fish ponds in a garden. Productivity of volcanogeneous soils supports all of the land-use on lahar plateau. In addition, narrow but flat bottoms of rather deep valleys by which lahar plateaus are dissected are important. Narrow valley bottoms adjacent to lahar plateaus provide sites suitable for wet paddies from which farmers obtain rice. In other words, very intensive land-use systems practiced on lahar plateaus are partially supported by paddy rice production outside the systems. Both lahar plateaus and valleys are typical landforms of which volcanic foots consist. The geomorphic setting, including hydrologic and pedologic conditions, common to particularly the central and southern zones of West Java is thus evaluated as important environmental resources for traditional compound land-use systems as a prototype of agroforestry.

Keywords: geomorphic environment resources, agroforestry, pekarangan, volcanic footplateau, West Java

## Importance of Loose Management: A Case of Highland Forest of Southwestern Ethiopia

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This presentation points out that the highland forest located in southwestern Ethiopia may lose the biodiversity because of the forest management project.

The forest located in the highland of southwestern Ethiopia is not only recognized as precious forest but also as habitats of diverse living things. The forest fosters Ethiopian origin plants, such as *Coffea arabica* of Rubiaceae and *Aframomum corrorima* of Zingiberaceae, and endangered plant species, including *Prunus africana* of Rosaceae and *Cordia africana* of Boraginaceae.

The forest is also the place for local people to conduct livelihood activities. The local residents of Geera administrative district, which is located in the highland of southwestern Ethiopia, gather fruits from naturally grown *C.arabica* while they cultivate the fields at their home villages. They do not manage *C.arabica* trees in order to enhance their growth or their fruiting except for removing weeds and sapling and young trees which will compete with *C.arabica*.

In Geera administrative district, the forest management project had taken place between 2003 and 2012 in order to conserve the forest and at the same time, improve the local people's living. In the project, local residents who have the forest use right are organized into forest managing cooperatives. Also project enabled cooperative members to sell *C.arabica* fruits at premium price by making coffee beans produced in the area certified by one of major fair trade organization.

In this presentation, I first show different vegetations are established in mosaic in the forest. Then I point out reason behind the mosaic vegetations are loose forest management which is conducted through the *C.arabica* fruits gathering activities. At last, the system of enabling local residents to sell coffee beans at premium price may decrease the diversity of forest vegetation followed by loss of biodiversity.

Keywords: loose management, forest conservation, highland forest, *Coffea arabica*, Ethiopia

## Effect of topography and geology on vegetation decline in small-scale agricultural area of northwest Namibia

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In order to address the desertification of each region, it is necessary to understand the interaction of local environmental factors. In this study, we have investigated the relationship between the vegetation decline and topographic and geological condition in Kaoko land, northwestern Namibia. This study area is located in the semi-arid region of 100-200mm annual rainfall. The small-scale stock farming in communal land is conducted in this area. The vegetation decline and land devastation seen to be caused by overgrazing has been recognized. The decline of the vegetation does not occur uniformly. The degree of decline is different between the topographic surfaces. On the terraces, the vegetation declines by overgrazing induce the gravel accumulation at the surface under the influence of wind erosion. As a result, the vegetation reaches the irreparable situation. On the other hand, such gravel accumulation is difficult to occur on the pediment that is covered by fine granule produced by physical weathering.

Keywords: Namibia, vegetation decline, topographic and geological condition, overgrazing, small-scale agricultural area

## The coping strategies of Hausa cultivators for the drought and land degradation in Sahelian Niger, West Africa

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The land degradation (desertification) problem and drought bring about crop failure, food shortages and malnutrition to the people in the Sahel region, West Africa. Although the production of the millet cultivation and livestock grazing is limited by the severe aridity and poor soil nutrition, we recognize the rapid population increase, the expansion of the cultivation and the grazing, and deforestation. In Sahel region, the rain-fed agriculture was dominant and the crop yields are strongly depended on rainfall variation. The Hausa cultivators in Sahel region of Niger faced the ecological vulnerability of land degradation and rainfall variation of the unexpected drought and rainfall abundance. This study focused on their coping strategies for ecological vulnerabilities of rainfall variation and land degradation with their ecological knowledge to the tree management.

Hausa people recognize the tree forms by eyesight and classify four categories of tree forms: mayanchi, matashi, rabu and barau. Mayanchi indicates trees with about 3 m height and one or two trunks. Matashi indicates small trees, with cutting lower branches. Rabu indicates small saplings, less than a year old without cutting lower branches. Barau indicates over two year old trees without cutting branches. Mayanchi provide shade, livestock fodder, and food for people. Mtashi is excellent at catching sand, which is easily lost by water and wind erosion. Rabu and barau is used for avoiding land degradation and catching sand. The farmland owners manage the tree location and density, and simultaneously tree forms in the millet field, by judging the field condition and household economy. Trees play important roles for avoiding food insecurity from drought and rainfall variation as well as soil fertility decline, soil erosion, and depletion of fodder during long term dry season.

The landowners have ownership for the trees within their own farmland and utilize trees with their own aims. During rainy season, the tree use is strongly limited by the landowners. The residents are willing to avoid the crop damage by cutting branches and they are not permitted to use trees in the other households' farmland. During the dry season, the natural resources are open to all the residents in the village and they are able to utilize the trees without cutting down trees. In order to sustain their life, they can collect livestock fodder and famine food from all the farmland. *Faidherbia albida* provide important livestock fodder and *Balanites aegyptiaca* provide famine food for the residents during the hunger season. The rich households, called mai-kudi in Hausa language own the wider millet fields and provide the livestock fodder and famine food by leaving the trees in their farmland. Collecting of famine food and livestock fodder is women's work. In that time they use network of parents or siblings. This network supports their livelihood in rainy season or drought.

Keywords: Niger, drought, land degradation, Sahel, tree use

## A critical investigation on environmental security: towards examination of rural water resource use in Western Kenya

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The theme of environmental security has brought about an ongoing debate on natural resource scarcity as a trigger of conflict in developing countries. One reason is that many studies insist micro-level causation relying on macro-level country data, causing the problem of cross-level inference. In recent years, therefore, a series of studies have tried to explain the relationship between environmental variables with relatively high spatial resolution on the one hand, and conflict count data that are down-scaled by identifying the location of conflict on the other. For pastoral societies in Eastern Africa, for instance, a generalised linear model with rainfall (one of natural resources) data as explanatory variables shows that various hypotheses may be correct including resource scarcity, cost-benefit calculation, and resource abundance (Raleigh and Kniveton 2012), thus urging reconsideration. However, its explanatory power is not great, and it leaves room for methodological scrutiny. The present study therefore re-examines the relationship between conflict and rainfall by applying hierarchical Bayesian models to the data, and by using explanatory variables with higher spatial resolution. It also examines issues related to the application of the same type of models to agrarian societies. Taking semi-arid areas in Western Kenya as an example, where most rivers are seasonal, this study begins preliminary investigations into the geographical distribution, use, management, conflict and cooperation concerning boreholes that are significant sources of water both for human being and domestic animals.

Keywords: environmental security, semi-arid area, water resource, Kenya

## Development of precious coral fishery and its effects in Kashiwajima Island, Kochi prefecture

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Since old times, precious coral has been harvested, and processed into jewels and ornaments. Red coral (*Corallium rubrum*) is a major species of precious corals and mainly inhabits and has been harvested in Mediterranean Sea. In Japan, precious coral fishery was launched in the 19th century. As the decrease in the population of red coral in Mediterranean Sea, precious corals being harvested in Japan and Taiwan, especially *Paracorallium japonicum* and *Corallium elatius*, draw much attention.

In recent years, the price of raw coral has been soaring related to increasing in the demand of precious corals in China. Given this situation, there arises a concern that the abundance of precious corals as resource might be depleted owing to excessive or inappropriate fishing. In response to the suggestion about a need for imposing international regulation on precious coral fishery from several countries, international discussions had been made at the Washington Convention Conference of the Parties (2007). While such a discussion is being developed, the habitat and biomass of precious corals are not yet known clearly. Therefore, some local governments and research institutions undertake a survey for proper use of precious corals as resource.

Kashiwajima Island is one of the regions where people are engaged in precious coral fishery in Kochi prefecture, Japan. Owing to the effects of the Kuroshio Current, the waters around the island have rich biodiversity. Before 2008, there were few fishermen harvesting precious corals. Then, in 2010, the number of fishermen had increased sharply in response to the increase in the demand of precious coral. Most of them usually engaged in other fisheries, so that there are various relationships between precious coral and each fisherman. In this presentation, I would like to show the details of local activity of precious coral fishing, and consider the impact of the revival and continuation of capturing precious corals on the region.

Keywords: marine resource, precious coral, Kashiwajima Island

## Regional Distribution of Agricultural Production and Behavior of Agro-pastoralists in Inner Mongolia, China

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Regional Distribution of Agricultural Production and Behavior of Agro-pastoralists in Inner Mongolia, China

Keywords: Agricultural Production, Regional Development, Behavior of Agro-pastoralists, Natural Resources, Inner Mongolia Autonomous Region

## Indigenization and Internalization of Oil Palm Plantation Development in Sumatra, Indonesia

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In the core areas of economic development in Southeast Asia such as Peninsular Malaysia, the traditional plantation sector has been losing its importance during the last three decades in step with the rapid industrialization and urbanization of society. In contrast, in some parts of the Outer Islands of Indonesia such as Sumatra and Kalimantan the plantation sector, especially the oil palm plantation sector, has expanded dramatically during the same period, owing a great deal to capital flowing from outside these areas. Riau province, Central Sumatra, is one of the focal areas of this expansion. In Riau province, oil palm acreage has jumped from only 7,000 ha in 1982 to 1,567,054 ha in 2007. In the almost same period the population of Riau province has more than doubled from 1,741,184 in 1980 to 4,563,406 in 2005. There is no doubt that the explosive expansion of the oil palm plantation sector since the 1980s has been accompanied by drastic changes in the social and ecological environments of Riau province. However, the nature of the oil palm plantation sector in Riau province had begun to change dramatically after the year of 1998.

The nature of evolutionary change of the oil palm plantation sector in Riau province with the late 1990s as a turning point could be discussed from two points, that is, "indigenization" and "internalization (from external expansion to internal expansion)". Until the late 1990s, under the Suharto's regime, the oil palm plantation sector in Riau province consisted of mainly external agents, that is, plantation companies whose capital originated from outside Riau province and estate workers and smallholders who were migrants from other provinces. Since the late 1990s, however, in the era of reformasi and decentralization, local agents have gained greater importance in the oil palm plantation sector in Riau province, reaching comparable level with external agents in the mid-2000s. On the other hand, until the late 1990s, the development of oil palm plantation and smallholdings in Riau province had mainly targeted primary forest areas as their sites. Since the late 1990s, however, such external expansion is considered to be approaching its limits. The rapid increase in the oil palm acreage of smallholdings has resulted from a combination of development of smallholdings in not only primary forest areas but also secondary forest areas and conversion from other crops such as rubber on the existing smallholdings.

The oil palm plantation sector in Riau province has spread its roots in the economy and society of Riau province through the process of indigenization since the late 1990s. As a result, the economy and society of Riau province has become strongly influenced by the plantation economy, which, by its very nature, is closely connected with external environments at national, transnational, and global levels. On the other hand, in terms of spatial configuration in real geographical settings, the external expansion basically ended by the mid-2000s and the internal expansion has become the emerging trend.

Keywords: Indonesia, Sumatra, oil palm, plantation

## Diversity of small farmers' management based on natural and social environments in Peruvian suburban highland area

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Poverty in Peruvian rural areas has increased; even natural resources in those areas are plentiful. Lack of social infrastructures, education conditions and medical services is seen obviously compared with centralized cities. Recently a large number of populations from rural area migrate to capital city to find new job for better income. Small farmers in Andean highland area are in worse economic conditions than other areas in Peru. Peruvian land is generally divided into three different areas. Costa: desert area, Sierra: Andean highland area and Selva: tropical area. Small farmers in suburban highland area, however, continued their agricultural managements.

San Mateo de Otao village is one of such suburban highland areas, located 120km east from Peruvian capital. Amount of small farmers in San Mateo de Otao own less than 1ha and produce avocados and cherimoyas that are traded high cost in domestic market. The superiority in accessibility to big market is one of reasons of their sustainable management.

From other point of view, the natural environment of San Mateo de Otao village gives small farmers opportunities to produce higher cost crops and that is another superiority point. Pulgar (1941), who is one of Peruvian geographers, divided Andean highland area to five different areas based on its different heights and diversity of natural environments: 1) Yunga:500-2300m, 2)Quechua: 2300-3500m, 3)Suni:3500-4000m, 4)Puna:4000-4800m, 5) Janca/Cordillera: 4800-6768m. Traditionally, people in higher than Quechua area live by farming traditional crops such potatoes or corns, or by grazing llamas and alpacas. In Yunga area is available to farm traditional crops such potatoes and corns as in Quechua area, but also is available to farm untraditional crops that are such higher cost crops as avocados, lucumas and cherimoyas. This natural environment differs what farmers produce for selling in domestic market and limit farmers what they produce. At this point, small farmers in San Mateo de Otao village where located in Yunga-Quechua area, have superiority in natural environment to produce higher cost productions.

By researching small farmers in San Mateo de Otao village, however, I found diversity of each farm-management based on difference of micro natural and social environments. The height and environmental difference of farming land give opportunities to produce higher cost crops even in one village. At social point, the relationship between farmers and intermediaries is not the same individually. Sometimes intermediaries obtain financing service function. These different natural and social environments cause the diversity of small farmers' management in San Mateo de Otao.

Keywords: Peru, small farmers' management, highland area, Cherimoya, Avocado

## Wildlife Conservation of Vicuna(*Vicugna vicugna*) and Village Revival of Andean Mountain in Peru

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This presentation shows the natural environment of Andean highland, ecology of vicuna and wildlife conservation in Peru. The vicuna lives at vast plains from 3500 to 5600 meters above sea level. The vicuna is a grazer of forbs and grasses. The distribution occurs from Ecuador, Peru, Bolivia, Chile and Argentina. Because of continuous hunting, the population declined to 6,000 by 1965 and this led to the listing of the species in Appendix I of CITES. The history of vicuna protection was synonymous with that of Pampa Galeras National Reserve in Department of Ayacucho. In 1967, the Peruvian Government set up Pampa Galeras National Reserve for wildlife conservation and rational use of vicunas. After the 1960s, the population steadily increased due to the cooperation of local residents and ranger activities for anti-poaching. The re-establishment of ancient hunting method, chaco, was important for the residents' incentive to wildlife conservation. Chaco is an ancient indigenous hunting method in central Andes. The Inca Empire had called up villagers for chaco, hunting animals on the puna. Thousands of people walked abreast in a line and caught vast animals including camelids and deer. They had classified the species, sex, and age of the animals and did not kill them indiscriminately. After shearing the wool of vicunas, they released them to the wild. In 1994, the village started chaco. They capture vicuna alive and shear the wools without killing them. The vicunas were released to the wild. They sold the shorn wool to international consortium through the representative committee of local campesino community. The community members engaged in chaco and obtained valuable income. The taking of vicuna wool was used for infrastructure for improving everyday life and other facilities. The re-establishment of chaco provided not only economic benefit, but also cultural revival in Andean mountains.

Keywords: vicuna, Andean Mountain, Peru, Wildlife Conservation