

Agricultural Development based on Satoyama Principles in Indigenous Communities: Case studies from Gabon, Guyana, Indonesia and Malaysia

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ABSTRACT

With the objective of evaluating and comparing communities based on the five perspectives of **Satoyama** identified by the International Partnership for the **Satoyama** Initiative (IPSI), case studies were undertaken in Gabon, Guyana, Indonesia and Malaysia using data collected between October 2011 and April 2014. The **Satoyama** Agricultural Development Tool (SADT) was utilized by individual researchers in each study site in collaboration with various stakeholders. Results obtained demonstrate many similarities in the challenges and characteristics faced by these communities but addressed differently. We conclude that if the tool is utilized in a collaborative manner, it is possible to classify communities correctly and determine acceptable approaches to overcome their shortcomings, thus contributing to sustainable agricultural development premised on its local culture and characteristics.

KEYWORDS

Agriculture, Sustainable Development, Satoyama, Indigenous People

Introduction

Satoyama is a Japanese term for landscapes that comprise a mosaic of different ecosystems which include forests, agricultural lands, grassland irrigation ponds and human settlements aimed at promoting viable human nature interaction (Duraiappah and Nakamura, 2012). From the initial discussions about the **Satoyama** Initiative there is no unified definition used to describe such landscapes, but the term “socio-ecological production landscape” is proposed to refer to the targeted areas of the initiative (Bélaire *et al.*, 2010). The Ministry of the Environment of Japan (MOE-J) in collaboration with the United Nations University-Institute of Advanced Studies (UNU-IAS), and co-organized by United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP), and the Secretariat of the Convention on Biological Diversity (SCBD) has resulted in a quest to see this principle globalized and the United Nations recognizing and ratifying this position in the “Paris Declaration” at the Headquarters of the UNESCO in Paris in January 2010. As Dublin and Tanaka (2014c) point out, **Satoyama** is nonexistent without agriculture and as such any developmental model based on **Satoyama** should be an agricultural based developmental one. Therefore this inseparable connection between **Satoyama** and agriculture should be explored in a structured and scientific way. Development in indigenous communities is largely based on agriculture and as a result, in this paper, we analyze indigenous communities from Gabon, Guyana, Indonesia and Malaysia on the basis of the **Satoyama** Agricultural Development Tool advocated by Dublin and Tanaka (2014a), using data collected between October 2011 and April 2014.

Each country is discussed in relation to the five perspectives of **Satoyama** on the basis of its sociological,

ecological and environmental characteristics and they are compared based on their local management systems and how this translates into their use of biological resources in conjunction with their agricultural enterprise.

Methodology

Locations and Communities

The countries of Gabon, Guyana, Indonesia and Malaysia were chosen with a view of covering indigenous communities located in the main tropical rainforest areas of the world, namely Sub-Saharan Africa, South America, and Southeast Asia respectively. Tropical rainforests are characterized by a warm and wet climate with mean monthly temperatures exceeding 18 °C (64 °F) during all months of the year. Average annual rainfall is no less than 168 cm and can exceed 1,000 cm although it typically lies between 175 cm and 200 cm (Newman, 2002). Specific communities were adopted into this research on a voluntary basis and the village profiles are shown in Table 1. The choice of these communities depended largely on past research and affiliation in these villages of the respective researchers which used the tool for this project. All the communities were also selected on the basis that they are indigenous in nature meaning the inhabitants are culturally or historically distinctive from the rest of the population and are historically tied to the territory, and due to direct or indirect factors have undergone changes in their traditional agricultural practices or have had the need to increase their productivity.

Gabon

In Gabon, the community of Lopé was chosen. It is located in the Ogooué-Ivindo Province about 380km from Libreville (Fig 1). The village benefits from its proximity to the national park of Lopé which became a Wildlife Reserve in

1964. Temperatures average 30 °C during the day and 22 °C at night. From October to May there is a long rainy season while June to September is fairly dry.

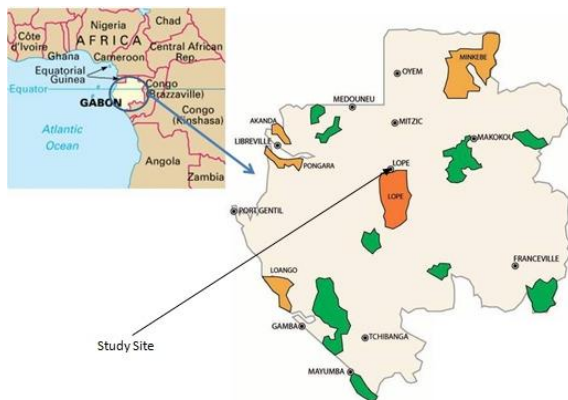


Figure 1. Study site, Gabon.

Guyana

In Guyana, communities of Laluni and St. Cuthbert’s Mission were selected from Region 4 Demerara-Mahaica; while Fairview, Kumu and Nappi were selected from Region 9 Upper Takutu-Upper Essequibo (Fig 2). Region 4 is predominantly low coastal plain, with a small portion of the hilly sand and clay region further inland. Region 9 is primarily made up of the Kanuku and Kamao highlands and the vast Rupununi savannahs. The forested Kanuku Mountains divide this Region in two.

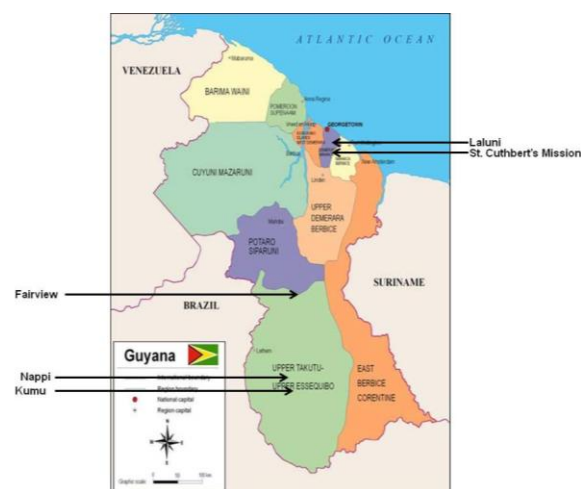


Figure 2. Study sites, Guyana.

Indonesia

In Indonesia, five villages in Central Kalimantan Province were chosen (Fig. 3). Taruna Jaya and Tumbang Nusa were selected from the Regency of Pulang Pisau. Marang was selected from the Municipality of Palangka Raya. Terantang and Seragam Jaya were selected from the Regency of Kotawaringin Timur. These villages are found in heavily forested areas and in general, their livelihood depends on agriculture and/or fisheries. Marang and Seragam Jaya were both setup as transmigration villages,

however, the latter is still well-settled while the former was gradually abandoned due to floods. The transmigration program in Indonesia is defined as a voluntary migration to improve the welfare in which transmigrants live in determined transmigration areas held by the government.

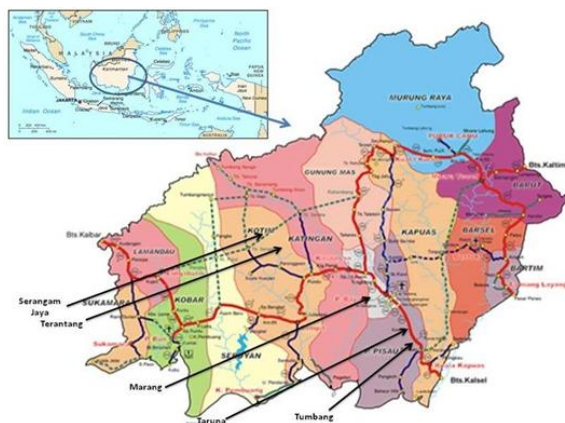


Figure 3. Study sites, Indonesia.

Malaysia

In Malaysia, the village selected was Tudan which is located in Tuaran district in Sabah. It is 1651 km east of Kuala Lumpur and 27 km east of Kota Kinabalu. Sabah is the only Bornean state to have notable populations of orang-utan, Asian elephant, Malayan sun bear and proboscis monkey, all species that are under pressure throughout their natural range in Indonesian Kalimantan and elsewhere in Southeast Asia. It is widely acknowledged that conserving forest habitats here provides the best hope for the survival of these species (Vaz, 2012).

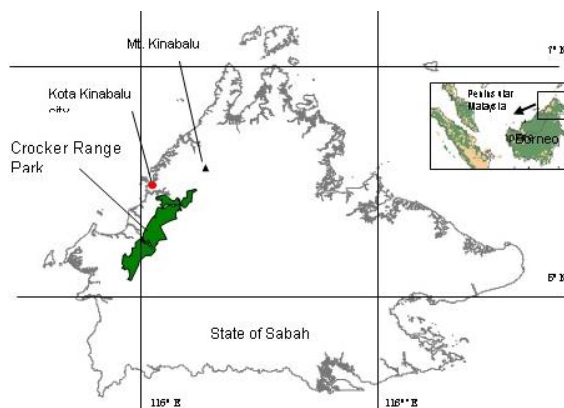


Figure 4. Study sites, Malaysia.

Data Collection

In all instances, data was collected based on field visits which were complemented by officially published and available data from government organizations, international organizations and Non-Governmental Organizations (NGOs). In Gabon data was collected between October 2011 and September 2013 by a Japan International Cooperation Agency (JICA) consultant in collaboration

Table 1. Study site Profiles.

Continent	Country	Community	Parameters			
			Size (km ²)	Popln.	Number of households	Ethnic Groups
Africa	Gabon	<i>Lopé</i>	No data	350	100	Okandais
Asia	Indonesia	<i>Marang</i>	124	903	223	Dayak, Banjar
		<i>Seragam Jaya</i>	14	764	175	Dayak, Banjar, Jawa, Timor
		<i>Taruna Jaya</i>	99	616	210	Dayak, Banjar, Jawa
		<i>Terantang</i>	30.9	1761	458	Dayak
		<i>Tumbang Nusa</i>	200	1037	285	Dayak, Banjar, Jawa
	Malaysia	<i>Tudan</i>	4.8	315	42	Dusun
South America	Guyana	<i>Fairview</i>	296.41	224	55	Makushi, Wapishana, Arawak, Patamonas
		<i>Kumu</i>	187.16	372	54	Makushi, Wapishana
		<i>Laluni</i>	631.96	617	150	Arawak
		<i>Nappi</i>	235.95	646	118	Makushi
		<i>St. Cuthbert's Mission</i>	621.6	1261	342	Arawak

with locals. In Guyana data was collected between August 2012 December 2013 by employees of the Ministry of Agriculture, the Ministry of Natural Resources and Environment, and the Ministry of Amerindian Affairs in collaboration with a researcher of Hokkaido University. In Indonesia, data was collected between January and September 2013 by a researcher of Hokkaido University in collaboration with locals. In Malaysia data was collected between March and May 2014 by a researcher of Hokkaido University in collaboration with locals.

Data Analysis

In general data was analyzed in English. Raw data from Gabon, Indonesia and Malaysia was translated from French, Indonesian and Malay respectively. This information was utilized to classify the communities into **Satoyama** like, in transition, or non compliant based on the **Satoyama** Agricultural Development Tool (SADT) developed by Dublin and Tanaka (2014b) on the basis of the five perspectives as advanced by the International Partnership for the **Satoyama** Initiative (IPSI). These are: Cyclic use of Natural Resources; Resource Use based on Carrying Capacity and Resilience of Environment; Recognition of the Importance and Value of Local Cultures and Traditions; Collaborative Management of Natural Resources; and Contribution to Local Socio-Economies. The SADT was developed to estimate the criteria of the five perspectives, which comprises of a questionnaire, a definition of each community classification type and solutions for resolving problems encountered based on the Millennium Development goals and was translated into various languages. In Gabon and Malaysia, researchers of Hokkaido University used the Japanese version of the SADT. In Guyana and Indonesia the English version of the SADT was utilized. The responses to the questions were based on a Likert scale from one to five with one being the lowest and five being the highest or vice versa, namely, Strongly Agree; Agree; Neither Agree nor Disagree; Disagree; Strongly Disagree. The value of each perspective was determined by the percentage of points obtained from the total possible points attainable and as a result, they were evaluated as high, medium and low if 80-100%, 60-79%

and 0-59% respectively of the total possible score was achieved. An average of the percentage obtained for the 5 perspectives was then taken to obtain the total **Satoyama** points resulting in the community being determined as **Satoyama** like, in transition or non compliant if the total **Satoyama** points fell within the ranges of 0.8 - 1, 0.6 - 0.79 and 0 - 0.59 respectively.

Results and Discussion

Detailed results from the SADT are shown in Table 2. Of the communities evaluated, nine were found to be In Transition (75%), and three found to be **Satoyama** Like (25%). When the ANAVO test was applied to the final scores obtained the villages, a clear difference was found between the two classifications into which the villages fell ($p=0.0043$) demonstrating that there were no villages which were statistically similar between classifications. A statistical comparison was conducted among the villages studied using the five scores obtained for the perspectives and the ANOVA test was applied and were found to be statistically different ($p=0.0209$). This indicates that while the villages may have obtained similar ratings in a general sense, their weaknesses and strengths differ in relation to the perspectives under which they were evaluated. These similarities and differences are highlighted in Fig. 5 where we can see that statistically important differences are only found between Seragam Jaya and Tudan; Seragam Jaya and Kumu; and Seragam Jaya and Nappi. Now to better examine the dynamics between the villages evaluated, the discussions are categorized on basis of the five perspectives used to evaluate them.

Cyclic use of Natural Resources

The macro-zoning of the landscape of *Lopé* was implemented by the Gabonese government following the review leading to the 2001 Forestry Code. However, in many areas, community zones, logging concessions and park buffer zones overlap, producing a complex mosaic of land use micro-zones (Starkey and Maisels, 2010). Similarly, in Guyana, the Amerindian lands are zoned into farmland, grassland and forest. There are no problems with erosion in Amerindian communities except for the trails,

Table 2. Results of Satoyama Evaluation of the communities studied.

Community	Cyclic use of Natural Resources (PP=45)			Resource Use based on Carrying Capacity and Resilience of Environment (PP=60)			Recognition of the Importance and Value of Local Cultures and Traditions (PP=35)			Collaborative Management of Natural Resources (PP=25)			Contribution to Local Socio-Economies (PP=35)			Final Evaluation		
	PO	%A	R	PO	%A	R	PO	%A	R	PO	%A	R	PO	%A	R	%A	SP	R
Lopé	34	75.56	M	38	63.33	M	26	74.29	M	19	76	M	16	45.71	L	66.98	0.67	IT
Marang	20	44.44	L	36	60	M	30	85.71	H	19	76	M	28	80	H	69.23	0.69	IT
Seragam Jaya	25	55.56	L	35	58.33	L	18	51.43	L	19	76	M	27	77.14	M	63.69	0.64	IT
Taruna Jaya	28	62.22	M	38	63.33	M	23	65.71	M	19	76	M	27	77.14	M	68.88	0.69	IT
Terantang	39	66.67	M	40	66.67	M	30	85.71	H	19	76	M	27	77.14	M	74.44	0.74	IT
Tumbang Nusa	28	62.22	M	32	53.33	L	26	74.29	M	19	76	M	26	74.29	M	68.03	0.68	IT
Tudan	36	80	H	52	86.67	H	24	68.57	M	23	92	H	28	80	H	81.45	0.81	SL
Fairview	37	82.22	H	58	97.67	H	21	60	M	21	84	H	26	74.29	M	79.43	0.79	IT
Kumu	40	88.89	H	56	93.33	H	21	60	M	23	92	H	26	74.29	M	81.7	0.82	SL
Laluni	33	73.33	M	53	83.33	H	10	28.57	L	21	84	H	25	71.43	M	69.13	0.69	IT
Nappi	38	84.44	H	58	96.67	H	22	62.86	M	21	84	H	30	85.71	H	82.74	0.83	SL
St. Cuthbert's Mission	35	77.78	M	54	90	H	17	48.57	L	23	92	H	28	80	H	77.67	0.78	IT

Key: PO/PP – Point Obtained of Possible points, %A – Percent of Answer Points obtained, R – Rating, SP – **Satoyama** Points, NC – Non Compliant, IT – In Transition, SL – **Satoyama** Like, H – High, L – Low, M – Medium

largely due to heavy rainfall. In Malaysia, bamboo is planted strategically to curb soil erosion and this knowledge was traditionally handed down through generations. Apart from curbing soil erosion, it should be noted that bamboo is also used as construction material for houses, traditional irrigation system to supply water to farmland and houses. Young bamboo shoots are consumed as vegetables while traditionally, bamboo is used to make handicraft, baskets and weapons for hunting. As a result of this technique, landslides are avoided which is usually the main natural disaster which can affect Tudan village, since planting is done on steep slopes (FAO, 2005). An interesting practice in Guyana is a type of shifting or rotational land use within the designated cropland area. Therefore all of the cropland area is not cultivated at the same time but instead is portioned into 3-4 designated farming plots and cultivated on a rotational basis thus allowing sections to be rested for about 5 years. In this way, mono cropping usually the staple cassava can be successfully practiced. In communities plagued with Acushi ants (*Atta* spp.), this type of rotation also serves as a way of escaping these ants. Another measure implemented by the Amerindian communities is the planting of sorrel (*Hibiscus sabdariffa*) which is liked by the ants, which serves as a buffer between their nests and the farms, thus providing an eco-friendly and organic way of dealing with the issue. Ironically, the government is promoting the use of pesticide sprays to extinguish the ants. The choice of the use of non eco-friendly ways of controlling the ants by the government shows that those in authority do not necessarily promote the higher ideals of environmental protection as the indigenous people. Commercial pesticides and fertilizers are not largely used by Amerindians, probably due to economical factors, but when this is done it is based on technical advice of the agriculture officers. Farms are not close to the creeks and therefore runoff is avoided. At the village level, rangers make checks as well as the Monitor Resource Verification (MRV) officers. While farming has been the usual livelihood of most Amerindians, many today do not own a farm or have abandoned them. Savannah farming is practiced and an attempt is made to

rear both crops and animals so fencing of crop areas is important but costly.

Resource Use based on Carrying Capacity and Resilience of Environment

In both Guyana and Indonesia, villages are being demarcated mostly by the government and are partly funded from the REDD++ agreement signed with the Kingdom of Norway. The Kanuku Mountains which is a protected area is managed collaboratively with villages that live nearby such as Kumu. Water supply is based on wells, creeks, or rivers but in hilly areas, solar pumps are employed and supplied by pipelines. In all communities studied, waste disposal is the responsibility of every household which is usually buried or burned. In Malaysia, recyclable materials are collected and sold in the cities. In Gabon, there were attempts by JICA consultants to encourage and facilitate the sorting of waste. Communities in Indonesia, Gabon and Guyana face floods and droughts as the main natural disasters. In Indonesia the villages of Taruna Jaya and Tumbang Nusa are affected due mainly to the failed Mega Rice Project (MRP) which was established in 1997 in Central Kalimantan which saw the destruction of large areas of peat swamp forest. This resulted in many catastrophic forest fires, one of which was in 2007 with peat becoming very dry and a dramatic loss of forest cover. The Indonesian government has put programs in place to provide guidance to villages in the prevention and control of forest fire. To confront this issue and avoid crop losses, Amerindians in Guyana conduct farming in the low areas during the dry season and in the high areas during the rainy season. However, in Indonesia, the situation has been very severe which resulted in persons having to migrate as a result of frequent floods which prevented them from earning a livelihood. In Marang, extensive lands are currently abandoned because of this fact. Fishing is still a means of survival for many Amerindians and is practiced in the waterways and wetlands area. Methods employed include hooks and lines, hand nets and cast nets, catching by hand in drying out pools, and the use of natural plant poison that stuns the fish thus allowing them to be caught

easily. In Indonesia, the community of Terantang embarked on aquaculture production along the river but this was unsuccessful largely due to improper water management resulting in most villagers switching to farming. Amerindians in Guyana still practiced hunting though markedly reduced. Even in areas that are not protected, animals have moved far away from village dwellings and hunting requires trekking for long distances. In addition, young people no longer want to use the traditional bow and arrows and blowpipes with poisoned darts but opt instead for the use of guns but it is difficult to obtain a hunting license. As a result, meat is now bought and brought to the villages. In some communities such as Kumu, animal husbandry is practiced in areas with lots of savannahs suitable for grazing. Controlled savannah burning is done to facilitate regrowth of grass. Food for the Poor Inc. (FFP) has done several poultry projects in communities such as St. Cuthbert's Mission as a way of compensating for protein which can no longer be obtained from hunting. Larger trees have been lost due to farming. Villages are not engaged in commercial lumbering on their village land. However, some villages such as St. Cuthbert's Mission have applied for logging concessions which allow them to do commercial logging in areas awarded to them by the Forestry Commission. Indigenous people are also cognizant of the fact that many trees that can be harvested for lumber are medicinal plants and therefore bear that in mind when practicing commercial lumbering.

In Indonesia however, deforestation occurs as a result of government sanctioned establishment of new transmigrant villages and the need to create new farming areas. As a result, there is evidence of a reduction in the biodiversity of both flora and fauna resulting in a decrease in the flow of ecosystem services (Hooper *et al.*, 2005; Flombaum and Sala, 2008). Similar to Guyana, in Indonesia lumber cutting is traditionally done to facilitate the building houses for the villagers. Some villages in Indonesia have the tradition of replanting trees as well. One tree that is very rare now due to destructive harvesting and no replanting is the Gemor (*Nothaphoebe Kosterm coriacea*) which is cut to obtain the bark which is used to produce an insecticide and mosquito coils commercially (Zulnely and Martono, 2003).

Recognition of the Importance and Value of Local Cultures and Traditions

In Gabon, Guyana and Malaysia, there is a very high interest in eco-tourism. In the case of Lopé, the benefits are tremendous since this village has a train station and is located on the periphery of the La Lopé National Park and are also governed by rules associated with the park. The Gabonese government is promoting ecotourism as an alternative to rather than depending on the extraction of oil as the main economic activity. Amerindian communities have also embarked on projects of this nature such as homestays, trekking and bird watching. Iwokrama provides valuable insights on how this can be done from the experience and success derived from ecotourism. The month of September which is dedicated as heritage month by the Guyanese government allows for the showcasing of Amerindian culture, cuisine and craft.

Lopé is one of the few sites in the tropics where one can easily observe the mandril. The valley of the Ogooue river is a rich source of pre-historic artifacts and rock engravings. In fact Lopé is one of the oldest known human habitation sites in Africa, with stone tools from before the Iron Age, and other signs of human habitation dating back 400,000 years (Rayden and Essame Essono, 2010). Equally, most Amerindian communities in Guyana possess areas with petro glyphs coupled with beautiful waterfalls and are generally conserved through the establishment of Community Conserved Areas (Massey, 2011; National Toshao Council, 2012). Balata craft is unique to many Amerindian communities but it takes time to develop the skill. Craft from Mucru plants are also employed in craft and is also very important for life since it is used to make fish traps, quakes, sieves, sifters, sleeping mats, hand fans, as well as closely woven squeezers used to process and extract the lethal poison from the bitter cassava (Redclift, 2002; Sullivan 2002). In Lopé, craft is made generally for everyday use. These include musical instruments, masks and jewelry. However, the economic potential of these craft is not actively pursued since they are not made for sale.

With the exception of Guyana, all other communities actively use their indigenous language in their daily life. However, in the transmigrant villages in Indonesia, the problem of losing local language capabilities arises from the mixed type of communities which develops thus requiring various groups to utilize the national language to communicate with each other within the community. These mixed villages in Indonesia also tended to show less social cohesion among villagers as opposed to those that were made up of a dominant ethnic group. In the case of Guyana, this is not a problem since in spite of the various native groups that exist, there is a common camaraderie that exists among Amerindians, which may be in part due to the multi-ethnic composition of the rest of the population which are the majority in the national population. In Lopé, French is generally spoken because the village is currently a mixed one. This occurred due to persons of other tribes migrating to the village to take up job opportunities that became available in the advent of La Lopé becoming a National Park and subsequently a UNESCO World Heritage site on 28 June 2007.

Collaborative Management of Natural Resources

In the villages studied, there seems to be a fairly good community-based decision making process in place. However, the leaders and elders are well respected and they are usually trusted to make decisions on behalf of the villages, oftentimes unquestioningly. In Guyana, decisions made are purported to be from the grassroots but in the final analysis, it is really the village council that make them. Disputes are resolved at the level of the village and resolutions taken are documented. Only when serious issues such as rape and murders occur would the law enforcement be involved. By law, no alcohol is sold in the villages and outsiders have to report to the relevant authorities when they desire to visit the community so this enhances security. Amerindians generally will observe rules that are either handed down traditionally or newly implemented. For example, they will not change the course

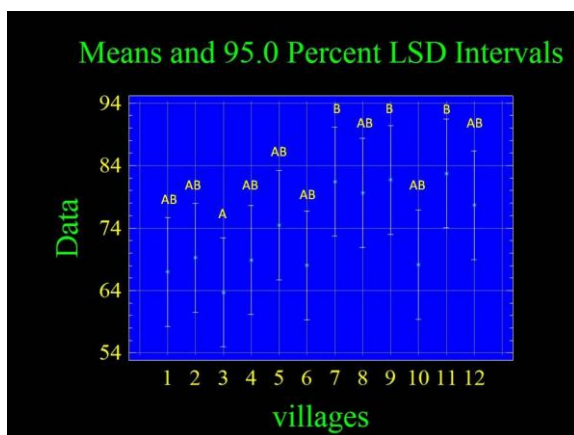


Figure 5. Comparison of villages studied on the basis of multiple Range Tests at a 95% confidence level. Villages are numbered 1-12 and correspond to Lopé, Marang, Seragam Jaya, Taruna Jaya, Terantang, Tumbang Nusa, Tudan, Fairview, Kumu, Laluni, Nappi, and St. Cuthbert's Mission respectively.

of the waterways but instead will establish their farms to suit the natural flow of water. Amerindian communities are family oriented and they do not put up fences between neighbors. Families help each other on their farms in a collective manner when extra labor is needed. An interesting aspect in the collaborative management of resources in villages studied in Indonesia is the fact that the villagers themselves participate actively in the mapping and surveying of the various communities. Villagers are generally free to choose what type of crops they prefer to grow and are not pressured to follow any particular plan in this regard. Technical advice is obtained from professionals. Iwokrama and FFP have both provided training in finance and accountability.

Contribution to Local Socio-Economies

In Guyana, the grocery used is brought from Georgetown in the case of Region 4 and Brazil in the case of Region 9. A very good indication of outside influence is the increased use of rice which has replaced the traditional farine (made from cassava) and cassava bread as a staple. Varieties that do not require flooded fields have been successfully introduced. As a result of this dependency, there is a reduction in agriculture for domestic use. The women and the elderly are generally involved in farming since the young people are keener on finding work with the lucrative goldmines or in neighboring Brazil. Youths living in villages located close to the coastline where most of the Guyanese population is located are influenced and tend to seek jobs outside of agriculture. Iwokrama, Shell beach, Kaieteur national park and other companies also provide employment for villagers in their vicinity. Income is also obtained when visitors to these tourist spots desire to visit the neighboring villages thus purchasing souvenirs and experiencing homestays.

In an interesting contrast, villagers in Malaysia revealed that they would have purchased most of their groceries from outside of the village if they had a higher spending power. This shows that the low spending power actually

allows them to eat healthy, organic and pesticide free food which they themselves produce. Therefore, we need to be cognizant of the spinoff effects that can be derived from increased economic power in indigenous communities.

In an effort to boost the economical potential of the Amerindian communities, the Community Development Program was started which sees projects of the choice of the communities implemented. These are done collaboratively between government agencies such as the Ministry of Agriculture (MoA), Ministry of Amerindian Affairs (MoAA), the Guyana Forestry Commission (GFC), Ministry of Natural Resources and Environment (MoNRE), the National Agricultural Research Extension Institute (NAREI) and Guyana Livestock Development Agency (GLDA), and others such as the United Nations Development Program (UNDP), the FFP, World Wildlife Fund (WWF) and Conservation International (CI). In spite of the decline in agriculture, most of the projects selected are agricultural in nature including animal husbandry, farming and aquaculture. The others are related to tourism, infrastructure development and the establishment of grocery shops that follows the trend of the dependency on food from outside the village. Similarly in Indonesia, the Food and Agriculture Organization (FAO) has supported villages by giving training to farmer groups about environmentally friendly agriculture, water management, compost making, fire control, and oyster mushroom cultivation. Villages in both Indonesia and Guyana benefit through projects that are financed as a result of the Reduction of Emission from Deforestation and Forest Degradation-plus (REDD+) agreements that were signed with the Kingdom of Norway (Barnsely, 2008). In some Amerindian villages, different types of crops such as white potatoes and red cabbage were introduced and produced for outside markets and when marketing became a problem because of the high cost of transporting, they were abandoned and left to be spoiled because they were not traditional crops eaten by the local people. Transportation is sometimes facilitated by middle men and as a result the villagers loose benefits through this process. As a result, trucks and tractors are bought through the fund by villages that selected agriculture type projects. Now there is an obvious interest by young people in farming from an entrepreneurial perspective. Successful savannah farming has shown that areas which were once considered unsuitable for agriculture is actually producing crops such as cassava at high yields without the use of fertilizers. Although the government of Guyana is currently promoting savannah farming, it was a few villages such as Kumu and Nappi that actually pioneered the activity successfully largely based on trial and error and from whom the government can learn. Savannah farming is an excellent alternative that should be actively pursued because it avoids deforestation which occurs when mountain farming is undertaken. In addition, villagers prefer not to do mountain farming since it requires climbing the mountain to get to their farms which can take as much as three hours; a reality that was also found in Tudan village, Malaysia.

In contrast, in Indonesia, young people are willing to be farmers but opt to do something else because they do not possess the skill necessary to manage the peat soil. Peat is a

type of soil that has very low fertility with high acidity and is found mostly in Kalimantan and Sumatera Island. Therefore, as the land degrades, people are forced to migrate, exploring new forest frontiers thus increasing deforestation (Wilkie *et al.*, 2000; Amor and Pfaff, 2008). In villages such as Seragam Jaya, there is a difficulty to access clean water and electricity which further exacerbates the exodus of young people to other locations. One important aspect of villages in Indonesia is the establishment of economic partnerships with the private sector which results in the creation of jobs and the provision of guaranteed markets for products from the village. In Marang the poor soil quality resulted in an abandonment of agriculture and the focus on fishing but due to the depletion of fish blamed on destructive fishing practices by outsiders, they have now turned to poultry farming (Natalia *et al.*, 2013).

In Lopé, the reason for shunning agriculture is because of wild animals such as elephants, buffalos and monkeys, which destroy and consume the crops. Although fencing is done in some cases this too is oftentimes inadequate and therefore most of the food consumed is purchased from outside the village. In addition, edible forest products are collected from the forest that pertains to the village.

From a socio-economic perspective, the transmigrants consider the program as beneficial to them because government provides them with free housing, free land to manage (2 hectares) per household with the ownership certificate, and free stocks of staple such as rice, and farming needs (seeds and fertilizer). Local people in traditional villages consider this as unfair treatment. Similar sentiments can be perceived from the populace as regards the Amerindians who have a Ministry that addresses their affairs and who benefit from several projects and grants that are exclusively for them. However, this “special treatment” seems to be justified when one considers that most of the Amerindians are currently living in a disadvantageous state as compared to other members of the Guyanese population.

In Guyana, social education is largely related to HIV/AIDS, alcohol and drug abuse, as well as human trafficking. There are no programs related to environmental education but they promote keeping a safe and clean environment. In Indonesia, the main focus is on environmental awareness and the danger of fire. Fire is a major tool used in clearing the forest for shifting and permanent agriculture and for developing pastures. Fire used responsibly can be a valuable tool in agricultural and forest management but if abused it can be a significant cause of deforestation (Repetto, 1988; Rowe *et al.*, 1992). Unlike other villages, Seragam Jaya never experienced a forest fire but this is ironically because it does not have any forest cover since it was set up as a transmigration village in 2001. In general, all the villages studied are provided with medical services such as a health center but in the event of a serious condition, these facilities and staff are not equipped to handle them. In Lopé, for example, only one nurse is staffed there who also serves other nearby villages, with Malaria as the main health risk in the village. Education is also guaranteed, usually with at least a primary school in close proximity but partly due to the low population and

how isolated communities are higher learning requires temporary migration of children. The issue arises where many of them opt not to return to their village after studying thus robbing the community of much needed human capital. Although not necessarily a social ill per se, in all communities studied alcohol is consumed as a social past time. Laws in Guyana prohibit the sale of alcohol to indigenous people and as such they are not sold in Amerindian communities. However, locally made alcoholic beverages are made with Piwari which is made from cassava as the most popular one. In Lopé beverages are made from palm and sugarcane.

Satoyama Agricultural Development Process

Irrespective of the classification received as shown in Table 2, namely Non Compliant, In Transition and **Satoyama** Like, this research conducted in the various study sites allowed us to further determine four distinct patterns in the evolution of Satoyama agricultural development. These are Government led, Village Council led, Private Sector led, and People led. The People led approach occurs as a result of political, socio-economical or environmental pressure that causes the villagers to initiate this type of agricultural development. On the other hand, it could be as a result of their natural way of life but expanded to accommodate the changing dynamics of population and available land capital. This has been largely observed in Malaysia. For generations, and certainly pre-dating the formation of the Federation of Malaysia in 1963, Indigenous Dusun communities have lived and practiced a way of life that is closely interlinked with the natural resources and landscapes and conserve these ancestral territories not only for the biodiversity values, but also for the cultural values of these lands as places of common ancestry and cultural identity (Majid-Cooke and Vaz, 2011). The Government led approach occurs as an imposed response to irresponsible behavior and unsustainable practices on the part of the people. On the other hand it may simply be a modified developmental approach which factors in the local traditions and cultures of the people in an effort to win over their support. This has been largely observed in Gabon. The local people have been involved in illegal logging and the illicit sale of wild meat as a way of obtaining income. To curb this situation, the government of Gabon initiated various processes that saw the local people living more sustainably with the natural environment while gaining income from the tourists who came to visit the national parks. These measures involved the legal and sustainable management of forest concessions and the extension of national parks, and included the enforcement of wildlife law within forestry concessions (Rayden and Essano, 2010). The village Council led approach occurs as a result of leaders and families that have been in control of the village or community over an extended period of time and as a result have gained the trust of the people or are followed unquestioningly. This may occur as well as a result of village leaders being controlled by the Government or Private Sector to advance their interest. This has been largely observed in Guyana where the Toshaos (village chief) generally enjoy the trust of the villagers under their care but are politically pressured into

making decisions that are *en sync* with the government. The Private Sector approach occurs as a result of the Corporal Social Responsibility (CSR) of companies that have affected the lives of the villagers in a negative way and feel compelled to improve their lives. It may occur as well when it is impossible to invest in the area without the express permission of the village. This has been largely observed in Indonesia where the private sector has forged partnerships agreement with the villages in crop and livestock production as well as processing (Natalia *et al.*, 2013). Irrespective of who initiates the process by forming a partnership, it may eventually evolve into the stage where other stakeholders join. A statistical analysis conducted into the possible relationship between the final **Satoyama** evaluation obtained and the types of stakeholders onboard, and the stakeholder that initiated the process, found that there was no significant relationship between the final **Satoyama** evaluation and the stakeholders onboard ($p=0.7486$), and the stakeholder that initiated the process ($p=0.3618$) thus highlighting that it is possible to achieve **Satoyama** Like status with or without multi-stakeholder collaboration. It must be emphasized however, that each stakeholder brings to the fore important aspects that are needed for sustainable development such as the enactment of laws and policies (Government), marketing (private sector), social cohesion (people), and local accountability (village leaders). Whenever a stakeholder is missing, another stakeholder usually assumes its roles. For example, communities with **Satoyama** like activities without the Government as a stakeholder, usually have strong traditional and cultural rules that are strictly observed by villagers which fulfill the function of missing governmental legislation.

Conclusion

Coincidentally, in the Arawak language **Sato** means good and one **Toshao** expressed the sentiment that **Satoyama** is indeed good for indigenous people. In all of the villages studied, we found them to be full of diversity and natural capital, but there is a lot of human and social capital also involved. The problem is primarily infrastructure capital and financial capital, which is less than desirable and these are the bottlenecks that many indigenous people down the road are facing. Now the traditional farming has been slash and burn, a system which many modern agriculturalists blamed as destructive but now there are many reports that it was indeed a very wise system within the context of the fact that sufficient land was available which allowed for the possibility of moving around. This is no longer practical because there are many other competitors in the space that they were living in traditionally, and they are now confined to permanent and limited areas. Beyond a doubt, the indigenous people were and are still responsible for preserving the genes, the plants, the seeds, and all kinds of agro forestry systems, and therefore deserve payment for these environmental services. Satoyama type development can make this a reality since it is premised on valuing human nature interaction and the recognition of this fact by all stakeholders.

In this study, the tool was used by individual researchers who were able to obtain information from site visits,

interviews with village leaders and villagers, official data from government sources and NGOs as well as published documents. This allows for the researcher to analyze the village with minimal biases since it is premised on the data available to him or her. Our study also demonstrates that in the absence of a multi-disciplinary team available to conduct the evaluation, individuals are capable of doing so when collaboration with various stakeholders is sought. The tool allows us to see various aspects of the characteristics of the village as it relates specifically to the five principles of Satoyama and moves it from an abstract state to a connection with real issues and conditions which exist. It is possible to obtain additional information apart from what the tool requires that can also be useful for understanding the status of the village. While the tool serves an evaluative purpose it is also accompanied by a recommended course of actions that is directly related to the weaknesses that may be discovered in the village being analyzed, an aspect that many professionals would find useful. The tool can also be used to compliment other methods and by no means is promoted to stand alone. This is revealed by that fact that various indices, parameters and methods can be employed by the user to facilitate answering any or all of the questions. Some researchers have utilized the tool in conjunction with baseline, happiness and household surveys. Finally, this research allowed us to further contribute to the understanding of what is **Satoyama** agricultural development by providing the mechanisms through which it is initiated and strengthened.

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