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INDIGENOUS AGRICULTURAL DEVELOPMENT FOR SUSTAINABILITY AND *"SATOYAMA"*

ABSTRACT. *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. The Japanese government is seeking to revitalize it locally and promote it internationally, receiving accreditation as UNESCO *Satoyama* Initiatives. Here we explore the dynamics of this system and how it can be used as a model for any intended agricultural development in indigenous communities globally. In this paper we strongly address sustainable agriculture development which takes into consideration the local culture and traditions which exists.

KEY WORDS: satoyama, indigenous agriculture, sustainable development, landscape use, nature conservation

INTRODUCTION

Indigenous people around the world built there lives in specific areas globally which were influenced and shaped in unique ways by the geographic characteristics, climatic conditions, flora and fauna, and access to natural resources [Bruyneel, 2000]. They have been living on the fruits of nature such as fishing, hunting, gathering edible plants, and obtaining materials for clothing and housing [FAO, 2013]. It is a fact that many were migratory, leaving a location when the area would have been exhausted and moving on to a new location to repeat the same steps again, finally returning to the area where they began at a time when the natural environment would have been rejuvenated over time.

Over time, they have been affected by political decisions, exploitation of natural resources such as mining, urbanization, modernization, infrastructural development, climate change, and global warming which have altered their lives dramatically often resulting in a reduction of land capital at their disposal [Climate Frontlines, 2013; FAO, 2013; Nakashima *et al*., 2012; Salick and Anja, 2007]. This reduction in land capital propels them into the direction of agricultural development so as to guarantee the food security of their respective communities [Galloway McLean, 2010]. Agricultural development is crucial since it is prudent that it be done in a way so as to guarantee cohesion with their natural surroundings and a preservation of their culture and traditions [Salick and Anja, 2007].

In this perspective, we investigate how the principles of *Satoyama* can be utilized to guarantee this much needed balance between agricultural development and the preservation of the natural environment as well as their culture and tradition.

CONCEPTUAL ORIGIN AND EVOLUTION OF *SATOYAMA*

The term *Satoyama* (里山) is derived from two Japanese words, namely *sato* (里) meaning village, arable land or homeland, and *yama* (山) meaning mountain. The most widely accepted definition of *Satoyama* is a term for landscapes that comprise a mosaic of different ecosystem types which include secondary forests, agricultural lands, irrigation ponds, grasslands and human settlements [Duraiappah and Nakamura, 2012]. These were formed and developed through prolonged interaction between humans and the nature that surround them.

Nevertheless, the concept is quite flexible and manipulative, with the definition varying from person to person, depending on their perspective [Tsunekawa, 2003]. Numerous groups and individuals have attempted to define *Satoyama* from their own backgrounds and interests, and refer to it as ecosystems, coppices and secondary forests, while others refer to it as rural landscapes including human settlements [Osumi and Fukamachi, 2001].

SATOYAMA LANDSCAPE AND ITS IMPORTANCE

In 1860, at the end of the *Edo* period, Japan was primarily a rural agricultural country [Tsunekawa, 2003]. In the late 1960s, there was a surge of suburban development along with rapid growth. Over time people became increasingly conscious of the environment and citizens voluntarily started to manage the surrounding woodlands. Eventually this movement influenced the entire nation and *Satoyama* evolved into a household name for the traditional Japanese rural landscape [Tamura *et al*., 1983].

The nature conservation movement of the 1960s in Japan was focused on conserving natural areas near human settlements, while simultaneously opposing desctructive development on important remote natural areas. An effective method of preserving local nature was through local residents learning to recognize the beauty and wonder of nature through various events and activities. The conservation of *Satoyama* landscapes required both the cessation of destructive development and adequate management. In the late 1980s, local movements began to appear that focused on *Satoyama* landscape management [Kuramoto, 2003]. *Satoyama* landscape indicates the rural landscape that is comprised of woodlands, farmlands, settlements and reservoirs with considerable secondary nature that allows wildlife and humans to live together [Environment Agency of Japan, 1994; Yamamoto, 2001].

Satoyama landscapes contain nature that is maintained through its use and management by the local human population. Grasslands and diverse woodlands were created around residential areas and water bodies, thus allowing easy access to fertilizer and water for cultivation, fodder for cattle, wood, cogon grass (*Imperata cylindrical* Poales: Poaceae), bamboo for construction material, pine leaves for fuel, and so forth. This facilitated traditional lifestyles based on cultivating rice crops, using organic compost, living under thatched structures, and generating warmth from firewood and pine needles [Washitani, 2003].

The mosaic of various ecosystem types in a *Satoyama* landscape including forest, farmland, reservoirs and water channels is a habitat for a wide variety of wildlife and has maintained rich biota and biodiversity. The diversity of ecosystem mosaics supports ecosystem functions such as primary production, nutrient cycling, soil formation and habitat structure through various processes and mechanisms. It provides a place for agriculture, forestry, a human living space, and plays an important role in nurturing biodiversity [Saito *et al*., 2012].

Firewood and charcoal as fuel was very important prior to the fossil fuel revolution, while timber is an important livelihood resource. Forest materials such as fallen leaves and underbrush were used as

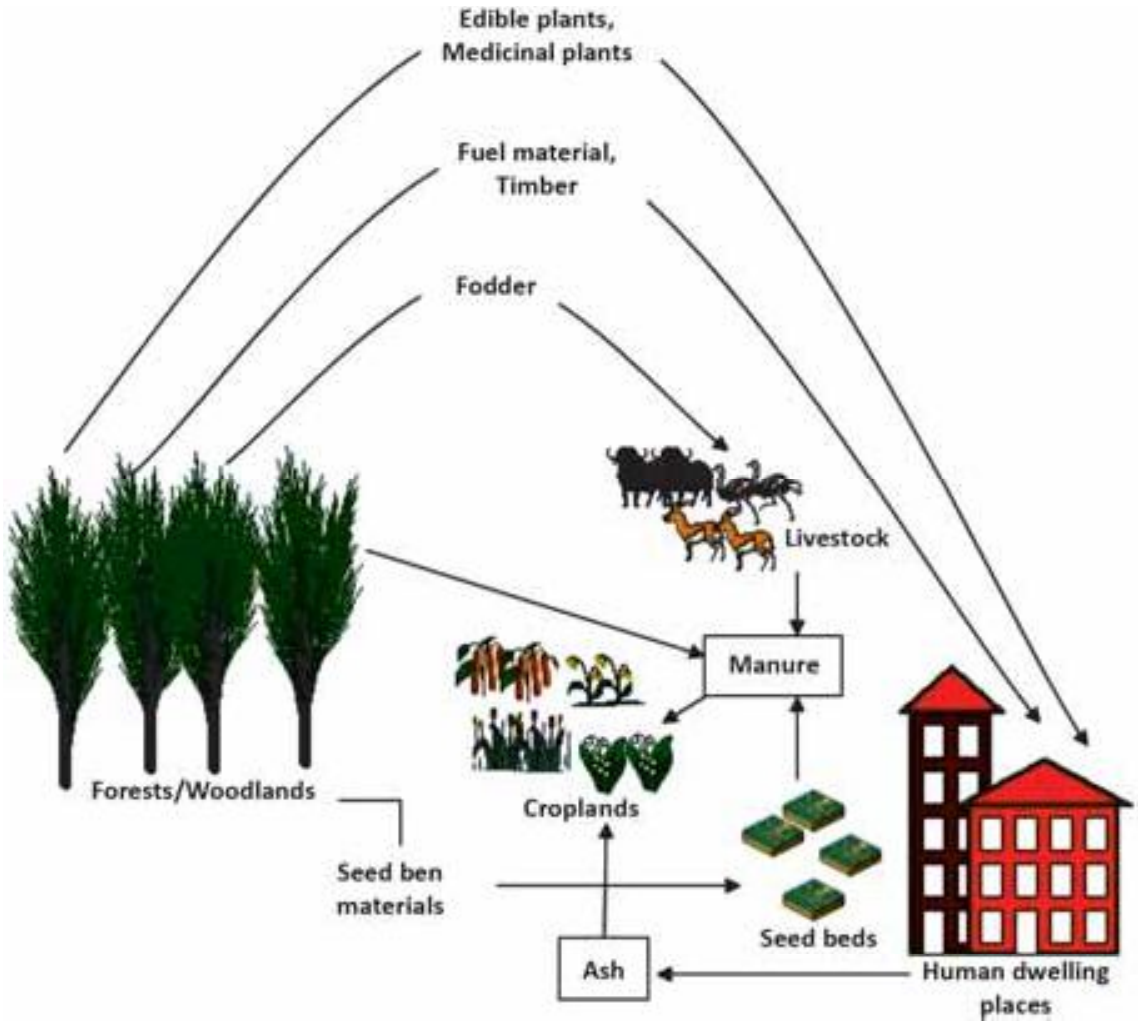

Fig. 1. Resource use and circulation in Satoyama landscapes [After Inui, 1996].

fertilizers prior to the 1960s when chemical fertilizers became widespread (Fig. 1). Rice paddies and vegetable fields, serve as important food provisioning services. Gathering of mushrooms and other edibles from the forests has been traditionally done and in present day the cultivation of *shiitake* mushrooms (*Lentinula edodes* Agaricales: Marasmiaceae) using trees [Inui, 1996; Saito *et al*., 2012].

The main regulating services are climate, water quality and disaster control. The forest is responsible for carbon fixation and clean water supply. The house and forest zone arrangements provide windbreaks and temperature control. The reservoirs and rice paddies are essential for flood prevention and nutrient recycling.

Pollination by pollinators inhabiting the ecosystem, as well as natural pest control as agricultural management are both important regulating services [Saito *et al*., 2012].

The traditional knowledge used in managing these landscapes, as well as the cultural identity they provide for society in general, offers valuable cultural services such as cultural heritage, sense of identity, tourism, and amenity. These vary depending on region, influencing regional cultures, customs and established practices [Tadaki, 2008].

SATOYAMA AND AGRICULTURE

Analysis of ruins and relics of the Paleolithic age reveal that ancient human lifestyles relied upon abundant natural resources from the surrounding mountains and oceans through fishing, hunting, and gathering. Evidence suggests that agriculture was first practiced in Japan in the *Jomon* period during the

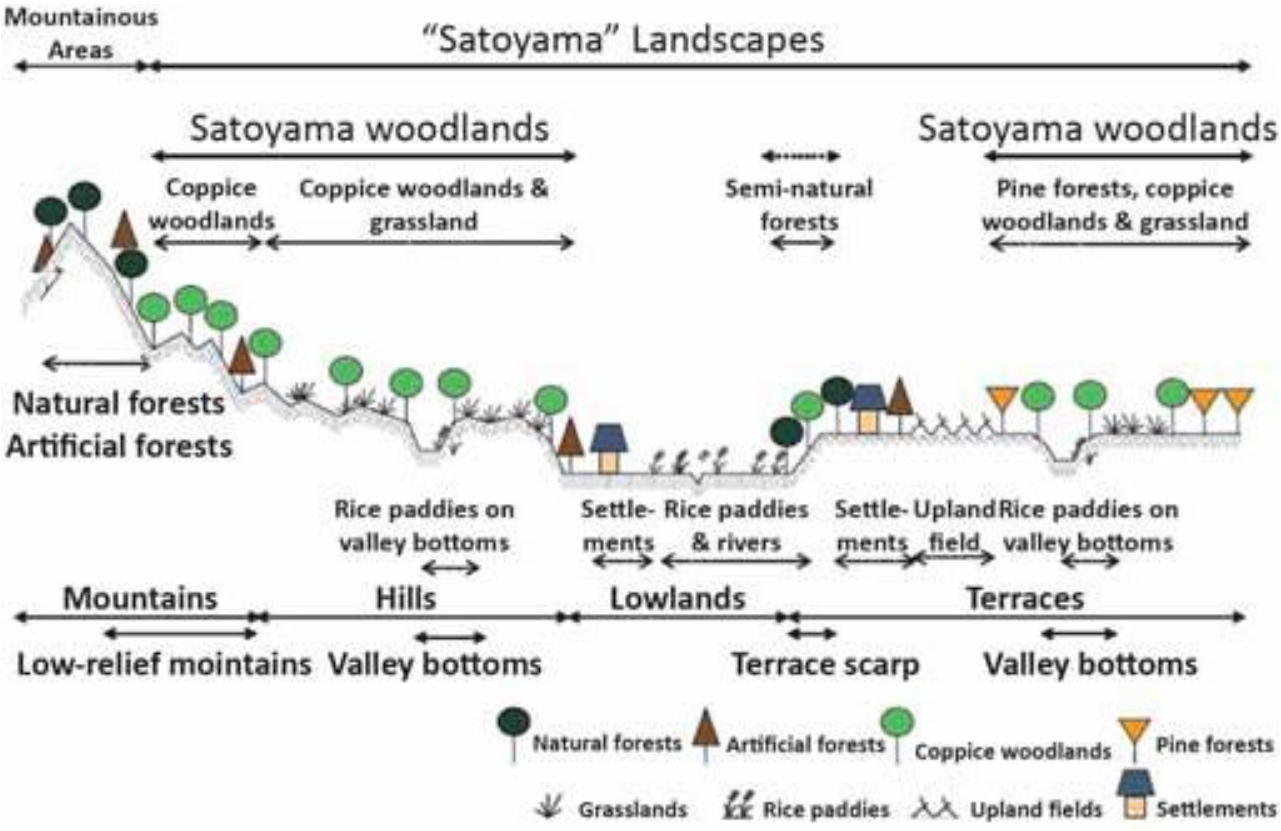

Fig. 2. Transect schematic representation of *Satoyama* woodlands and *Satoyama* landscape [After Yamamoto, 2001].

New Stone Age, a time when agriculture began around the world. Agricultural production apparently did not make a great contribution to food supplies during this time because there was an abundant natural supply of food [Washitani, 2003]. Therefore, the *Satoyama* prototype began when at fixed locations people started to make the transition from gathering, hunting and fishing to a more settled life.

Examples of early villages were Ani in the Akita Prefecture, Akiyama in the Nagano Prefecture, and isolated mountainous villages such as Miomote. Until the end of the 1940s, there were four clearly visible zones as shown in Fig. 2 which are: the village area; agricultural fields such as rice paddies and nurseries, and other crops; grasslands for feed and fertilizer, firewood gathering and managed Japanese chestnut (*Castanea crenata* Fagales: Fagaceae), walnut (*Juglans ailantifolia* Fagales: Juglandaceae), and horse walnut (*Juglans nigra* Fagales: Juglandaceae) forests; and the *"Okuyama"*, a wild area consisting of natural forest [Taguchi, 2009]. In these communities there was a relationship between agriculture and hunting, where wildlife that were attracted by the crops were caught and utilized. *Sato-mataki,* refers to trap hunting in the *Satoyama* zone [Sato, 2009].

Therefore, forests that were located near agricultural villages were maintained by human activities and as such became known as *Satoyama* forests [Kobori and Primack, 2003].

SATOYAMA AND THE INDIGENOUS WAY OF LIFE

Indigenous communities commonly occupy remote rural areas and their livelihoods are fundamentally linked to land and natural resource use. They possess a wide body of knowledge about agriculture, fishing, hunting, gathering, sustainable environmental management, biodiversity, and environmental adaptation. Because of the close and necessary link between indigenous people and the land in which they dwell, the relation between environmental quality and socio-economic

prosperity is easily highlighted in the way in which their life has evolved during the course of modernization to this present day. The world's 370 million indigenous people are among the most vulnerable and disadvantaged groups, comprising about 15 % of the total global poor. One of the obvious factors that have exacerbated this fact is that of climate change [FAO, 2013].

These realities of indigenous people the world over are strikingly similar to the circumstances in which *Satoyama* was conceived. Nevertheless, heightened exposure to negative impacts is not the only reason for specific attention and concern. Many indigenous societies are socially and culturally distinct from mainstream society. Therefore, decisions, policies and actions undertaken by the major group, even if well-intended, may prove inadequate, ill-adapted and inappropriate. There is therefore a need to understand the specific vulnerabilities, concerns, adaptation capacities, and longer-term aspirations of indigenous peoples and marginalized communities the world over. Indigenous and traditional knowledge contribute to this broader understanding [Nakashima *et al*. 2012].

THE REVITALIZATION AND INTERNATIONALIZATION OF *SATOYAMA*

Generally, when we think of ecological consciousness; content, attitude, and relation immediately comes to mind. It is in this framework that *Satoyama* exists. Basically, this translates into the position that *Satoyama* improves our attitude and relationship with global environmental problems such as climate change, biodiversity, global warming, food security, poverty, etc.

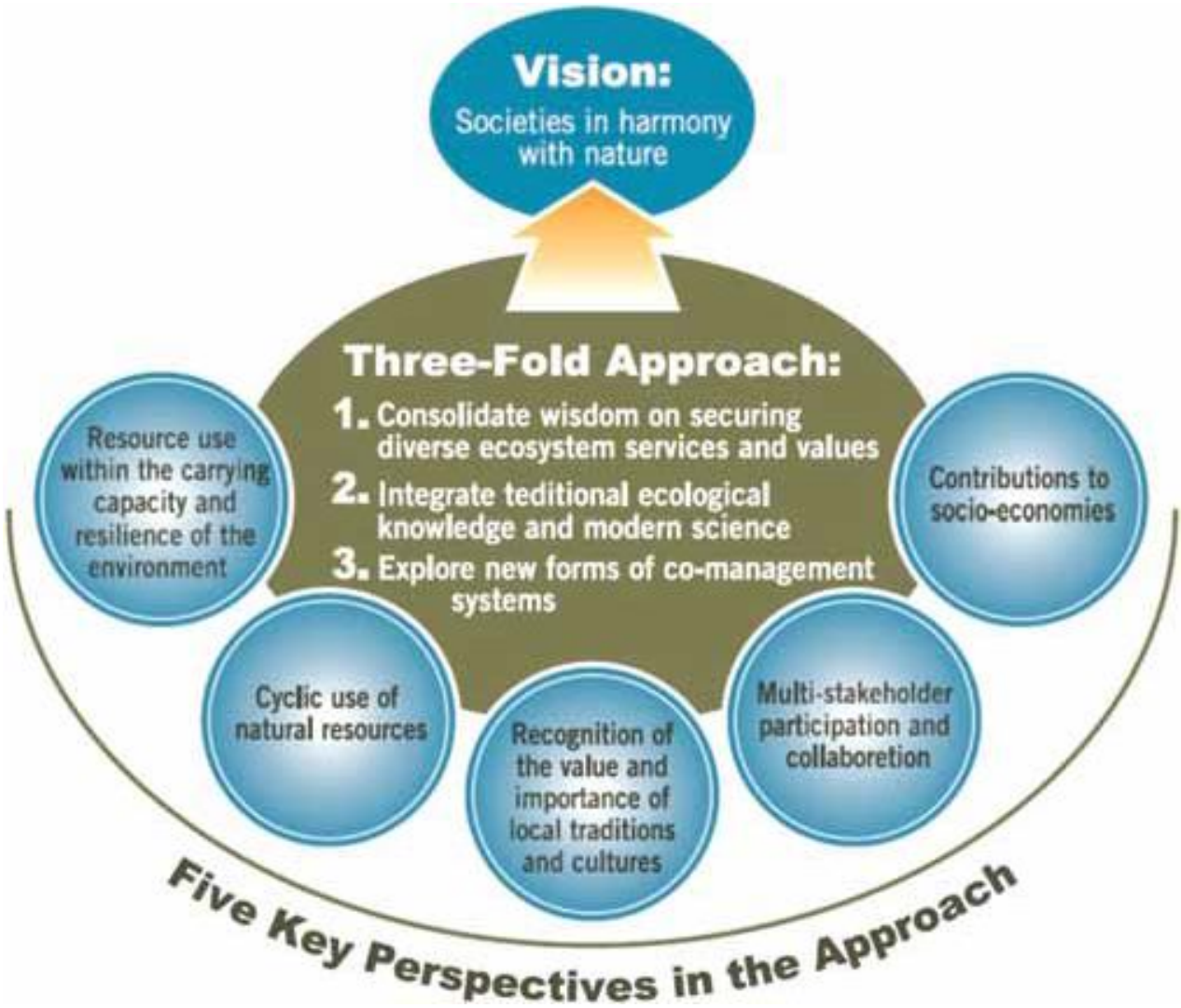

Fig. 3. The five elements that build and constitute *Satoyama* [IPSI, 2010].

The International Partnership for the *Satoyama* Initiative (IPSI) has promoted five points as shown in Fig. 3, that are essential for the realization of societies in harmony with nature [IPSI, 2010].

Japan has had fairly good successes in community based management of its resources and this is very notable in fishing villages and farming communities. In addition, the Japanese culture both historical and present day, is one that embraces the necessity of living in harmony and respect of nature which gave rise to the *Satoyama* principle. 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.

Notwithstanding, the successful globalization of *Satoyama* is dependent on the perceptions and attitudes of the local residents to their respective environments [Duraiappah and Nakamura, 2012].

SATOYAMA AGRICULTURE MODEL DEVELOPMENT

A diverse, locally adaptable set of agricultural techniques, practices and market branding certifications such as Good Agricultural Practices (GAP), Organic/Biodynamic Agriculture, Fair Trade, Ecological Agriculture, Conservation Agriculture and related techniques and food supply protocols exemplify the varying shades of green agriculture [UNEP, 2011].

Satoyama agriculture development is capable of being evaluated because the necessary indicators are those that are readily available and can be done using a system of survey analysis [Mekush, 2012]. This should include the management of landscape ecology, conservation of natural heritage, and the connection and integration of all components rather than treating them separately [Adams, 2003]. To illustrate how this can be done we utilize the very five criteria as advanced by the IPSI and propose how they can be measured in Table 1.

We posit that this approach would allow us to evaluate the extent to which the perspectives of *Satoyama* are met in any given community. This would be diagnostic in nature and would set the stage for the orientation of the systematic and scientific approach that should be employed to advance sustainable agricultural development in the community in question.

When dealing with indigenous communities, certain things have to be clear and should only come from their perspective:

- What is their aim as a community?
- What is the definition of a community for them?
- What are the views of the residents and what percentage of them share that view?
- What is community involvement and action for them?
- Who or what is/are responsible for social ills such as poverty?
- Is capacity building needed for their participation?

These and other questions needs to be answered since any *Satoyama* type agricultural development would only be successful if done collaboratively with all stakeholders. In addition, because local culture and traditions are to be incorporated, a proper understanding is necessary to capture their perspectives correctly and accurately.

Table 1: Evaluation of Satoyama based Agriculture

Perspectives	Criteria	Variables	Sub-Variables
Cyclic use of Natural Resources	Land Use Variation		
	Biodiversity	Microbial	
		Flora and Fauna	
	Human Agricultural Activities	Crops	
		Livestock	
	Eutrophication		
Resource Use based on Carrying Capacity and Resilience of Environment	Land Size	Threats of Further Reduction	Anthropogenic
			Natural
	Resources	Water	
		Soil	
		Forestry	
		Environment	
Recognition of the Importance and Value of Local Cultures and Traditions	Heritage	Tangible	
		Intangible	
	Tourism	Visitors	
		Activities	
		Impacts	
Collaborative Management of Natural Resources	Organization		
	Decision Making Process		
	Conflict Resolution		
Contribution to Local Socio-Economies	Social	Health	
		Cost of Living	
		Public safety	
		Pathology	
		Education Level	
	Economic	Self-sufficiency	
		Employment Levels	

Inference for success could be obtained from the Royal Project Foundation of Thailand which was established with the express objective of discouraging the cultivation of poppy (*Papaver somniferum* Ranunculales: Papaveraceae) used to produce opium by providing agricultural alternatives that were equally economically beneficial. This approach also curbed the shifting cultivation practices of the Hilltribe communities and thus contributed to the conservation of the neighboring forests. In addition, the social wellbeing of the inhabitants was improved since help was offered to opium addicts, health care improved and educational facilities enhanced [Royal Project Foundation, 2012]. The success of this program has subsequently been extended to other nations with communities plagued with a similar situation of highland poverty and drug-crop production such as Bhutan, Afghanistan (opium poppy) and Colombia (coca plant: Erythroxylaceae) [HRDI, 2007].

CONCLUSION

We conclude by advancing that the flexibility of the term *Satoyama* if considered as a concept can favor its adaptation into

a sustainable agricultural management model. Trials should be conducted exploring various models of evaluation based on the aforementioned principles in communities willing to try new approaches in the interest of sustainable development. Success stories can then be shared with other communities around the world. We have contributed directly and indirectly to the ills that affect our indigenous peoples and we should therefore be a part of the solution. ■

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