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Evaluation of SATOYAMA – human and nature coexistence system- in applying Satoyama Agricultural Development Tool (SADT) and Happiness Survey in Sabah State, Malaysia

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ABSTRACT

With the objective of demonstrating the effectiveness of complimentary application of the Satoyama Agricultural Development Tool (SADT) and Happiness Survey, a case study was undertaken in Sabah State, Malaysia from May 2014 to February 2015. This trial was conducted by an individual researcher in cooperation with various stakeholders including government officials and villagers. Results obtained demonstrated effectiveness for Satoyama project designing and Satoyama System evaluation. Project has a defined term. In view of this, project designers and evaluators seek out effective and efficient tools to identify local needs and priority issues. As is often the case with community development and community-based environment conservation projects, the local situation changes from time to time in the course of project implementation. More importantly and seriously, the local community is oftentimes hesitant to open up to outsiders including donor agencies in the beginning even when community participatory approaches are applied. In this view, it is concluded that the approach taken by the study is quite useful for identifying issues that need to be addressed by the project at the initial designing stage. Furthermore, it is strongly suggested that the approach taken by this study be applied not only at the beginning stage as a base line survey but during the implementation of the project to ensure that stakeholders concerned including local communities can mutually identify real needs. Incidentally, the approach in this study can be used as a monitoring tool for the situation of Satoyama agricultural point of view and of human interaction with nature (Satoyama system). Depending on the place and the context, the questionnaire framework of happiness survey should be modified. The attempt demonstrated by this study is promising and serves as a guiding methodological framework for designing Satoyama Projects, but it is apparent that the framework of the study should be improved and evolved in a more synergistic way through more practical field-based exercises.

KEYWORDS:
Satoyama Initiative, Satoyama Agricultural Development Tool (SADT), Happiness Survey, Natural Capital, Millennium Development goals (MDGs).

Introduction

The ecosystem in tropical equatorial areas, especially that of the Borneo Island, has been relatively stable because of abundant rainfall, a moderate climate, and rich forest; thereby resulting in high biodiversity. Due to recent rapid development and climate change, resilience of the area has been degraded and the need for coping with vulnerability has been recognized. These circumstances can be also found worldwide. Millennium Assessment initiated by the UN from 2001 to 2005 indicated that ecosystem services on the earth have been deteriorating on a larger scale irreversibly. It has been recognized that the restoration of ecosystem services was indispensable for the conservation of valuable nature and improvement of human-wellbeing. Thus, international communities agreed on the occasion of CBD COP10 in 2010 in Japan that restoration and protection of ecosystems services were absolutely necessary for achieving millennium development goals (MDGs). It is generally said that challenges for the conservation of ecosystem services include lack of economic incentives and financial resources, therefore conservation in some cases, is not a workable measure for sustainable development. Economic value of ecosystem services needs to be fully recognized as natural capital, and such value should be treated as one of the important factors, and not merely as an external diseconomy (like environmental pollution), and thereby integrated into the policy making system. Incidentally, Rio+20 adopted the Natural Capital Declaration, saying that ecosystem goods and services from Natural Capital are worth trillions of US dollars per year and constitute essential services such as food, energy, healthy water, climate security and others. Neither these services, nor the stock of Natural Capital that provides them, are adequately valued compared to social and financial capital. In the meanwhile, Natural Capital has two different types. One is the Natural Capital that human beings cannot influence. The other is the Natural Capital which can be protected through interaction between

nature and human beings. The former and latter types are defined as "neo Natural Capital" and "nature-human coexistence Natural Capital", respectively. The nature-human coexistence Natural Capital is well known as Satoyama (system) in Japan, and such a system has been recognized in South Asia for generations. Satoyama System is a small and economically ineffective system in terms of modern agricultural productivity, thus can be innovated and often is transformed into large scale plantation industries. However, such large scale industries are mainly sustained by fossil fuels and non-renewable energy. It is clear that such a system cannot be sustained due to resource depletion and waste disposal problems (Osaki, 2014).

The term 'Satoyama' has roots in Japanese society that go back a very long time. However, it is Tsunahide Shidei (1911-2009), a forestry ecologist, who conducted research focusing on material circulation (production, consumption and decomposition of organic matter), who defined 'Satoyama' as a 'farm forest' from which we obtain the fertilizers required for farmland fertility. Since then, the term 'Satoyama' has come to be used to express such a 'farm forest' concept (Mori, 2001). Satoyama generally represents landscapes that comprise a mosaic of different ecosystems including forests, agricultural lands, grassland irrigation ponds and human settlements aimed at promoting viable human nature interaction (Duraiappah and Nakamura, 2012).In a nature-human-society framework the main components are society (sato) and nature (yama),and a framework where humans are closely involved in both of the other components, and this is defined as the Satoyama System. Satoyama is a system of nature-human co-existing, having a material (nutrient) cycle and nature capital conversation. Therefore, Satoyama concept is different from protection of nature (Osaki, 2014). And From the initial discussions about Satoyama there is no unified definition used to describe such landscapes, but since the International Partnership for the Satoyama Initiative (IPSI) was established during the 10th Conference of the Parties to the Convention on Biological Diversity (CBD COP10) in Nagoya, Japan in 2010, the term "Socio-Ecological Production Landscapes and Seascapes (SEPLS) has been widely recognized and used worldwide. SEPLS has been focusing on more human interaction with nature for realizing human-nature coexistence or a society in harmony with nature. Thus, the SEPLS concept was established, and criteria on how to evaluate the SEPLS was needed.

The Satoyama Agricultural Development Tool (SADT) developed by Dublin and Tanaka (2014a) was applied in the village of Sabah State, Malaysia, and then a questionnaire survey, what is referred to as "Happiness Survey", was conducted to evaluate from a more social point of view by adding another criteria. This study was conducted in Tudan Village, Tuaran District, Sabah State, Malaysia from May 2014 to February 2015. The research highlights issues to be carefully considered for designing the project and demonstrates the effectiveness of SADT and Happiness Survey as a diagnostic tool for evaluating a Satoyama System through formulating a Satoyama Project.

Methodology

Study Site

Tudan village was selected as the case study site. Tudan village (GPS 5°51'45" N, 116°19'53" E) is located on the western slopes of the Crocker Range in the northern section of the Crocker Range Park, and it is 27 km east of Kota Kinabalu, the capital city of Sabah State (Fig.1). It lies at an elevation of approximately 1,130m above sea level. Administratively, Tudan village is located in Tuaran District. At the moment, Japan International Cooperation Agency (JICA) together with Sabah State Government, and the Malaysian Federal Government is implementing a joint technical cooperation project on Sustainable Development on Biodiversity and Ecosystems Conservation in Sabah (SDBEC) under Japan's Official Development Assistance (ODA), from July 2013 to June 2017 for a four-year cooperation project. Under SDBEC, Tudan village was selected as the first pilot site based on the following five criteria 1) The existence of threatened importance biodiversity / wildlife; 2) A high potential for livelihood improvement; 3) The willingness to participate in the Project among local stakeholders and adequate local governments' commitments; 4) Relatively easy access and a high display potential as a model; and 5) No similar major projects in the area, In the meantime, Crocker Range Park and its surrounding areas called Crocker Range Biosphere Reserve (CRBR) was designated as a Bioshere Reserve under the Man and Biosphere (MAB) program in June 2014, UNESCO (core zone: 144,492ha, the buffer zone: 60,313 ha, the transition zone: 145,779ha), and Tudan village is located in the buffer zone of CRBR. In light of MAB concept, a buffer zone is a place where people's livelihoods are enhanced and at the same time environmental sustainability is ensured. In other words, the buffer zone of the MAB is a place where human-nature interactive relations exist where the SEPLS is dynamic. Under the UNESCO principle, the MAB should conserve biodiversity and local culture through appropriate land management and sustainable development. In addition, global network for biodiversity and ecosystem research, education, and training needs to be developed. Considering these UNESCO MAB principles, JICA is implementing the pilot project for the livelihood improvement and community-based conservation in Tudan village through activities such as making compost for agriculture improvement, capacity building for locals and government officials; policy support; support for local governance; and environmental education in collaboration with the Tuaran local District Office and other various stakeholders including local communities at Tudan village. The village's recorded population is 315 persons (as of 2014) with 42 households. The local community of Tudan village is of Dusun ethnicity, and is made up of Roman Catholic Christians with the exception of a single family. The younger generation demonstrates sufficient fluency in Bahasa Malaysia while many senior members of the community are only fluent in the Dusun language.

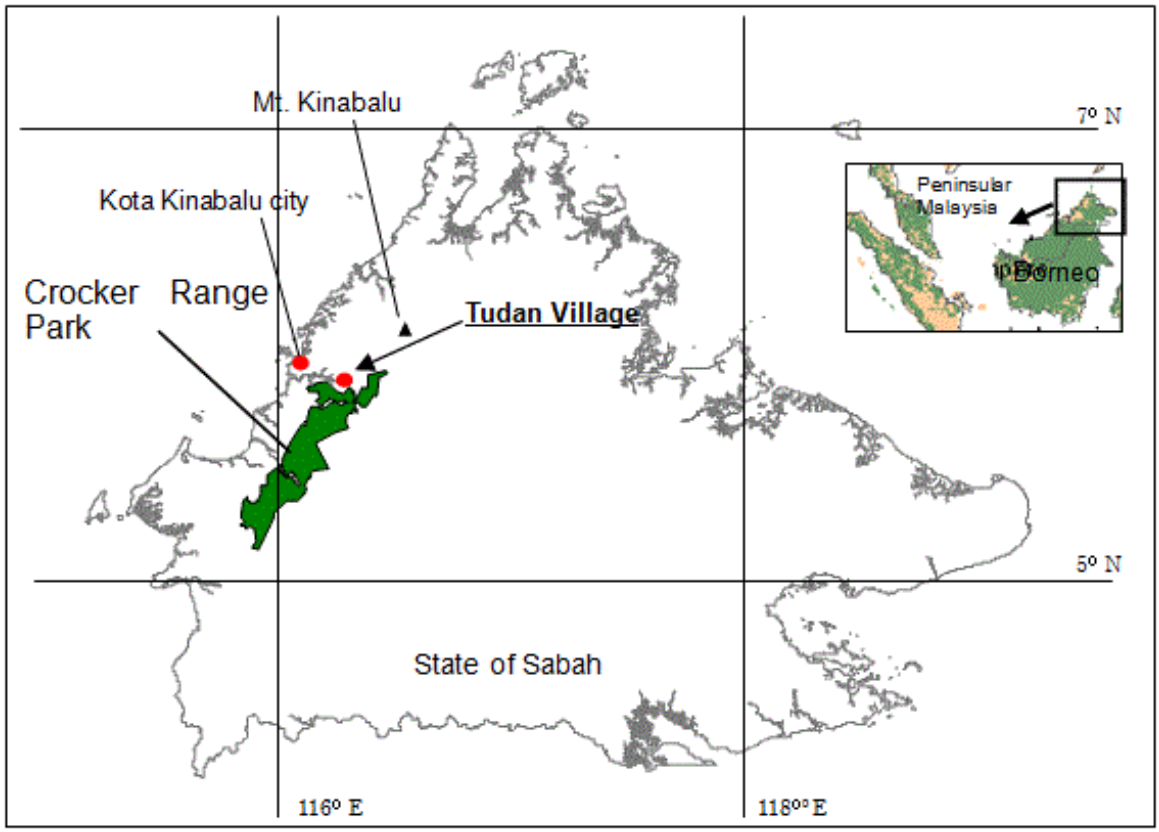

Figure 1. Research site.

Data Collection

Data was collected by a researcher based on field visits which were complemented by officially published and available data from government organizations, international organizations, and Non-Governmental Organizations (NGOs). Data collection by SADT was made on May 7, 2014 by a researcher through interviews with the help of a representative from the local community. The questionnaire of Happiness Survey was prepared in reference to some advanced case studies, and was distributed to 19 local community members on May 27, 2014.

Data Analysis

In general, data was analyzed in English. Raw data from the local community was translated from Bahasa Malaysia or the Dusun language. The results were utilized to classify the communities of Tudan village into Satoyama like, in transition, or non-compliant based on the SADT developed by Dublin and Tanaka (2014a) from the five perspectives as advanced by the 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. As stated by Dublin and Tanaka (2014a,), the SADT was developed to estimate the criteria of the five perspectives, which comprises of a questionnaire, a definition of the community classification type, and solutions for resolving problems encountered based on the Millennium Development goals (MDGs). After identifying some characteristics in the context of Satoyama Agriculture Development by the SADT, a questionnaire was prepared and a survey entitled the "Happiness Survey" was conducted, which covered some representatives of the village to explore more human interactions with nature. Happiness Survey was designed for aiming at understanding the level of satisfaction of the local community in their daily life, and the questions in the survey focused on two aspects, namely the village in general, and the community's behavior and awareness totaling 67 questions. All responses were graded (scored), and averaged by actual observed data and expectations. Then these were compared for statistical differences. As a result, items that showed significant differences between actual observed data and expectations were identified as ones to be carefully considered for project designing. Differences between male and female were also analyzed by applying the Exact Wilcoxon Test. Furthermore, answers "free description" were summarized. SADT and Happiness Survey were used in a mutually complementary manner for the purpose of identifying prioritized issues and activities for project designing processing.

Table 1. Questionnaire framework

I. About Tudan Village in General

A	Natural Environment And Life Environment At Tudan Village	D	Preservation And Inheritance Of History/Culture At Tudan Village
1	Life In Harmony With Nature	1	Medical Service In Case Of Illness And Injury
2	Conservation/Protection Of Rich Environment	2	Welfare Service For Elderly People
3	Hygienic Conditions (Garbage Treatment)	3	Precaution For Illness Such As Health Consultation, Guidance And Health Check
4	Renewable Energy (Solar Panel etc.)	**E**	**Preservation And Inheritance Of History/Culture At Tudan Village (Satisfaction/Dissatisfaction)**
5	Water Supply	1	Preservation And Inheritance Of Local Food And Local Food Culture
6	Sewerage Systems	2	Preservation And Inheritance Of Local Custom, Law, Rule, Wisdom, Legend And Knowledge
7	Road Conditions	3	Preservation And Inheritance Of Landscape
8	Information And Telecommunication Conditions	**F**	**Circumstance Of Life At Tudan Village**
9	Housing Conditions	1	Measures For Security, Safety And Crime
10	Public Facilities	2	Measures In Case Of Disaster
11	Purchase of Daily Commodities	3	Fire-Fighting Community And Patrolling For Security/Safety
12	Securement of Means Of Daily Transportation	4	Environment For Child-Raising/Nurturing
13	Land Ownership	5	Leisure
B	**Educational Environment At Tudan Village**	6	Place Where Elderly People Live Safely
1	Educational Environment At The Village Level	**G**	**Community Empowerment At Tudan Village**
2	Educational Environment At School	1	Community Meetings And Community Activities
C	**Industry At Tudan Village**	2	Support For Each Other In Times Of Need
1	Agriculture	3	Group Members And Friends In Times Of Need
2	Forestry	4	Circumstances Where You Can Practice Your Knowledge And Skills
3	Fishery/Aquaculture	5	Communication With Outside (Human Exchange, Information Etc.)
4	Farming/Livestock	**H**	**Governance At Tudan Village**
5	Local Production For Self/Local Consumption	1	Community Needs In Reflection To Village Policy And Village Activities
6	Outside Market For Business	2	Accountability Of Government
7	Tourism/Eco-Tourism	3	Access To Sources Of Necessary Information
8	Job Opportunities	4	Communication Between Government And Local Community
		5	Community Development In A Participatory And An Initiative Way Of Local Community

II. About Community's Behavior and Awareness

I	Behavior	M	Happiness
1	Environment-Conscious Life	1	Are You Happy Now?
2	Environment-Conscious Local Activities	2	Priority Criteria And Issue For Judging Happiness
3	Personal-Health Conscious Activities	3	What Is Your Image Of A “Happy Place" And "Happy Life"?
4	Activities For Learning And Education	N	**Wish/Knowledge About Village**
5	Participation In Local Activities	1	Do You Feel Attachment And Familiarity To The Village?
J	**Food/Dietary Life**	2	Do You Know Local Goods/Products Of The Village?
1	Procurement Of Safe Food And Preparation	3	Do You Know Local History And Cultural Resources Of The Village
2	Procurement Of Local Traditional Food And Preparation	4	Do You Want To Continuously Live In The Village?
K	**Feeling**	5	Things You Are Proud Of The Village
1	A Sense Of Solidarity/Togetherness As A Member Of The Community		
2	A Sense Of Loneliness/Isolation In Daily Life		
3	A Sense Of Anxiety/Uneasiness In Daily Life		
L	**Satisfaction In Daily Life**		
1	Health Condition		
2	Daily Food		
3	Balance Between Work And Life (Leisure)		
4	Income (Household)		

Rating

Options	score
I'm satisfied, I'm active, I feel, I think so, I know	4
I'm rather/somewhat satisfied, I'm rather/somewhat active,	3
I rather/somewhat feel, I rather think so, I know some	
I'm rather/somewhat dissatisfied, I'm rather/somewhat inactive,	2
I rather do not feel, I rather don’t think so, I do not know many	
I'm dissatisfied, I'm inactive, I do not feel, I do not think, I do not know at all	1

Note: Score of a sense of loneliness/isolation at K-2, and a sense of anxiety at K-3 are in reverse order from the above.

Happiness Survey

Happiness survey originated from case studies conducted in Japan which researched the degree of happiness of people affected by the Great earthquake and tsunami in 2011. As referred to in the title, the survey in this paper was tailored for assessing the level of happiness degree of the community at Tudan Village. In fact, this survey focused on more social aspects of the people and the community. In this study, the questionnaire framework was developed with reference to previous studies in Japan and the Kingdom of Bhutan which is widely recognized as a happy state in the world and has some advanced studies to assess the level of happiness among its citizens. Furthermore, the 'Rules of Village Consensus and Organized Plan of Village Development' at Tobobon village which is a neighboring village of Tudan was referenced to reflect more of the locality. The questionnaire framework is shown in Table 1. By making references to some case studies in Japan and Bhutan, and the rules and development plan at Tobobon Village, questions for measuring the degree of happiness can be grouped into eight categories in "Tudan Village in General" and five categories in "community's behavior and awareness". Each question item provides 4-levels of options for choice, and a rating from 1 to 4 brings the level of satisfaction to light, and eventually assesses the total level of happiness. Open-ended items were also included.

Results

1) Satoyama Diagnosis by SADT

As Dublin *et al*. (2014) found, Tudan village was evaluated to be Satoyama Like. Detailed results are shown in Table 2. Through the data collection process of the interview with a representative of the village, apart from arriving at a score from 1 to 5 by utilizing SADT, additional data which helped to sharpen the understanding of the village background was collected. This process could contribute to enhancing mutual communication between a researcher and an interviewee. As can be found from the Percent of Answer Points as shown in Table 2, Tudan village, of the five perspectives, only "Recognition of the Importance and Value of Local Cultures and Traditions", obtained less than 80% (68.75%). The item related to tourism was the only one with 1 score. The Interviewee, the deputy head of village, confired that Tudan village did not have practices of eco-tourism, agro-tourism, nor homestays. However, some villagers are interested in environment–based tourism, but they do not know how to begin or what should be done. Among the issues with low scores is waste management. Waste management is a crucial issue which needs to be urgently addressed. The village does not have a functioning waste management system. In fact, the households in the community dispose of their waste including plastic materials on their own in inappropriate ways.

Table 2. Results of Satoyama Evaluation of the communities studied (Dublin *et al*., 2014)

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			Contribution to Local Socio-Economies			Final Evaluation		
PO/PP	**%A**	**R**	**PO/PP**	**%A**	**R**	**PO/PP**	**%A**	**R**	**PO/PP**	**%A**	**R**	**PO/PP**	**%A**	**R**	**%A**	**SP**	**R**
36/45	80	H	52/60	86.67	H	24/35	68.57	M	23/25	92	H	28/35	80	H	81.45	0.81	SL

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

Table 3. Significant items

1) Items showing a high degree of satisfaction (difference between statistically expected value and actually observed value is more than 4.)		2) Items showing a high degree of dissatisfaction (difference between statistically expected value and actually observed value is less than 0.)	
Category	Question item	Category	Question item
A	life in harmony with nature	A	purchase of daily commodities
A	conservation/protection of a rich environment	A	securement of means of daily transportation
A	water supply	C	farming/livestock
B	educational environment at the village level	C	tourism/eco-tourism
B	educational environment at school	D	welfare service for elderly people
C	Agricultura	F	measures in case of disaster
C	Forestry	G	community meetings and community activities
G	support each other in times of need	K	a sense of loneliness/isolation in daily life
G	group member and friends in times of need		
I	environment-conscious local activities		
I	personal-health conscious activities		
J	procurement of safe food and preparation		
J	procurement of local traditional food and cook by using it		
L	health conditions		
L	daily food		
L	balance between work and life (leisure)		

2) Happiness Survey

(1) Identification of Significant items

After grading, all responses, identifying items which shows an outstanding feature in terms of the satisfaction level, averaging the actual observed data, and comparison with expectations; the results are shown in Table 3. Most of the respondents were satisfied with the natural environment of the village. Surrounded by pristine water and rich forest, people can live satisfactorily. However, as for daily life, the results showed that the community found difficulties in purchasing daily commodities and securing means of their daily transportation to have access to town or city. As stated in Dublin *et al*. (2014), Tudan community revealed that they would have purchased most of their daily groceries from outside of the village if they had a higher spending power. This shows that the low spending power actually allows them to consume healthy foods such as chemical-free food which is produced at the village level. It was found that the educational environment was satisfactory although Tudan only has a primary school, thus, junior high school and high school students need transportation to attend school. On the contrary, they may live in the neighboring town away from their family. Regarding industries at the village level, most of the respondents indicated that they were satisfied with agriculture and forestry. It can be easily understood that because agriculture was their major source of income, these traditional practices formed part of their own identity. It was also evident that the local community owes much of their livelihood to the existence of a rich forest. In contrast, livestock especially pigs and wild boars damage the community's agricultural land and the backyards of their houses. In regard to nature-based tourism such as eco-tourism and homestays, as was identified by the SADT, the Happiness Survey also found that the community was less satisfied though some residents were willing to begin, thus utilizing the benefits of the beautiful environment and local culture such as the local dances of the village. The incidence of natural disasters is one of the serious concerns for the community. Traditionally, the community has taken measures against landslides and soil erosion caused by heavy rains by placing huge stones on the ground and planting bamboo. However, sometimes the disaster is beyond their control. Some say that the drainage system designed by the government contributes to disasters because the government paid no attention to the topographic features of the village. Therefore, it can be surmised that the community members are not satisfied with the public works performed by the government. Community empowerment corrects this anomaly. As indicated by the results, the community members help and take care of each other, especially in the face of natural disasters and serious illness in the village. This kind of social cohesion and ties among community members are based on their traditional customs, and serves as a basis for community empowerment and development. Against this background, some feel loneliness and isolation and it was revealed as a case especially among the elderly. And welfare service for elderly people was the issue. On the one hand, elderly people can transfer their knowledge to the younger generation and are actually willing to do so. However, the younger generation has difficulties to find job opportunities and educational enhancement at the village level. Therefore, they are eager to go to urban city centers such as Kota Kinabalu City and even peninsula parts in Malaysia like Kuala Lumpur, becoming separated from their family in the process. This phenomenon is generated by economic globalization which affects communication between the two generations. Communication and socialization including community meetings and community activities between different generations are crucial for local knowledge preservation as well as community empowerment in the long term. Community members consider themselves as environmentally conscious people who always act in an environmentally friendly way. They are satisfied with their daily local food supply which comes from the healthy natural environment of the village. Partly due to healthy food consumption, it is believed that people in the community live longer. The eldest living person is currently 101 years old (as of 2014). All community members are proud of this. At the stage of Happiness Survey, significant features with regards to health and wealth; culture and history of the village; and governance in the village cannot be easily appreciated.

(2) Gender Considerations

Noticeable differences between male and female in the respondents were found when the Exact Wilcoxon Test was applied. Results are shown in Table 4. The results can be of use for identifying prioritized issues that needs to be urgently taken into consideration. Communication and negotiation with the outside, particularly with central and local governments are dealt with mostly by men. However, most of these men encounter difficulties communicating with the government. They feel that directions and instructions given by the government to the community in relation to agriculture and infrastructural development such as irrigation systems have been unclear or absent. Rural areas such as Tudan village is still categorized as "poor" in accordance with the standards set by the Sabah State government, thus Tudan village needs support from the government. Communication with the government cannot be ignored for community development.

Compared to women, men are seeking out opportunities for more income generation. Nowadays, unemployment is one of the big social problems in Sabah, and Tudan village is no different. Young men who graduated from high school in the neighboring town or Kota Kinabalu returns to Tudan after failing to find a job in the town or city. One point highlighted here is the fact that men rather than women are anxious about health issues though the previous Happiness Survey 1 showed no significant result associated with health. This might be worthwhile being explored during the project implementation. Overall, men's territory is close to the village boundary for agriculture activities while women's are mostly restricted to areas nearby to the housing. JICA conducted a community mapping session for the community after the Study in this paper. Map making is

a useful tool to visualize the spatial and social organization of a community. A map that was made by the community allows for the visualization of the landscape the way the community members see themselves, often highlighting assets, resources, areas, institutions, and structures that are important to the community. Differences in resource use between men and women were found through the community mapping works. Generally women collected resources in areas that were nearer to the homesteads while men would venture out further, for example, up to the boundaries of the forest protected area to extract large trees for timber to build houses. Thus, it was observed that women, whom mostly were housewives, tend to closely map out their activities closer or being in the neighborhood conducting farming and foraging for herbs and edible plants in closer proximity to their village; men were mapping out with a focus on the boundaries of the village which is their territory for natural resource use. In this light, men raised the issue of illegal hunting in the forest around the border.

(3) Open-ended Questions

Responses to "Open-ended questions" are summarized in Table 5. Responses to the open-ended questions indicate that family ties, community cohesion, and understanding each other are important aspects for living happily. Peace and security in the village are also indispensable aspects to which high priority should be given.

Discussion

1) SADT

In agricultural terms, it has been recognized in general that Tudan village was a "chemical-free" or "chemical less" village in agriculture. It was discovered through interviews, however, that a few community members utilized herbicides and pesticides at the land preparation stages to speed up the scouring of weeds and to kill pests. This suggests that the SADT is not only a method or tool to analyze the degree of Satoyama but is also a useful tool to register aspects that may be present in spite of the evaluation obtained.

Table 4. Results of differences between male and female.

$p < 0.01$		
Category	Question item	Description of differences
C	Farming/Livestock	Most of males (83%) are less satisfied or not satisfied while most of females (86%)are very satisfied.
C	Job Opportunities	More than half of males (67%) are less satisfied or not satisfied while all females are very satisfied.
D	Medical Service In Case Of Illness And Injury	More than half of males(73%) are less or not satisfied while most of female(86%). are very satisfied or satisfied
D	Precaution For Illness Such As Health Consultation, Guidance And Health Check	Most of males (82%) are less or not satisfied while most of female (83%) are very satisfied.
G	Communication With Outside (Human Exchange, Information Etc.)	More than half of males (75%)are less satisfied while half of female(50%) are very satisfied.
H	Accountability Of Government	Most of males (92%)are less satisfied while more than half of female(71%). are very satisfied
H	Access To Sources Of Necessary Information	Mostof males (83%)are less or not satisfied while most of female(86%). are very satisfied or satisfied
H	Communication Between Government And Local Community	Most of males (92%)are less satisfied while more than half of female (71%). are very satisfied
I	Activities For Learning And Education	More than half of males(58%) are less satisfied while most of females (86%). are very satisfied
$p < 0.05$		
Category	Question item	Description of differences
A	Sewerage Systems	Half of males (50%) are less satisfied while most females (83%) are very satisfied.
A	Public Facilities	More than half of males (73%)are less satisfied or not satisfied while more than half of females (71%) are very satisfied.
A	Land Ownership	More than half of males (58%) are less satisfied while more than half of females (57%) are very satisfied.
B	Educational Environment At The Village Level	All females are very satisfied while not all male are very satisfied.
B	Educational Environment At School	All females are very satisfied while not all male are very satisfied.
C	Forestry	All females are very satisfied while not all male are very satisfied.
C	Fishery/Aquaculture	More than half of males (75%) are less satisfied or not satisfied while most of females (83%) are very satisfied
C	Tourism/Eco-Tourism	Most of males (92%) are less satisfied or not satisfied while most of female (80%) are very satisfied or satisfied.
D	Welfare Service For Elderly People	More than half of males (73%) are less or not satisfied while more than half of female (71%) are very satisfied or satisfied.
F	Fire-Fighting Community And Patrolling For Security/Safety	More than half of males(73%) are less or not satisfied while most of female (86%)are very satisfied.
I	Environment-Conscious Life	All females are very satisfied while not all males are very satisfied.
I	Personal-Health Conscious Activities	All females are very satisfied while not all males are very satisfied.

Table 5. Summary of free description

1. Priority criterion and issue for judging happiness
Always to be open to each other
Increase more recreational and group gatherings
Good farm yields
Family ties
Sports and recreational activities
Unity and understanding among family and community
2. What is your image of a "Happy Place" and "Happy Life"?
Togetherness among community members
Being with family
Have understanding and tolerance within the community
Peace/peaceful area
Cool weather
Have interesting attractions such as waterfalls
Good infrastructure
3. Things you are proud of in the Village
Farming and animal husbandry
Cool weather, preserved surroundings
Peaceful surroundings
Local fruit
Festivals such as Kaamatan (Harvest Festival) and Christmas Community Gathering
Unity among community members

This is very important in terms of consideration of potential activities such as awareness programs. Traditionally the Dusun community has been practicing diversified agriculture in Sabah. This was inherited from their ancestors for nearly 100 years or more. They fully understood through this traditional knowledge (TK) that agriculture with diversified crops could increase production rather than monoculture cultivation, and that it helps to enhance resilience against pests. When it comes to TK, the Tudan community selectively planted bamboo to curb soil erosion. This knowledge was traditionally handed down through generations. According to the interviewee, the awareness level of the community in relation to the environment was relatively high as they are proud of pristine water, fresh air, and an abundance of forest in the village environs. Also, they recognized that the area surrounding the village comprises of the Sabah national park and forest protected areas. This indicated that they also recognized the ecosystem linkages between the protected areas and the village territory. In social aspects, it was found that the amount of alcoholic intake was high in the village. This in itself was not recognized as a problem but as a social culture. Most villagers enjoy social communication with each other while consuming beer and local rice wine.

Through the interview process by utilizing the SADT, the village profile from the perspective of the five Satoyama principles can be visualized. As stated above, this is a strong merit of utilization of SADT as a diagnostic tool. We can easily identify a series of issues to pay attention to, for example, waste management, and nature-based tourism; and also issues to be strengthened, for example, "less chemical" traditional-based agriculture, and environmental protection. In the case of Tudan village, as Table 1 shows, the village has sufficient elements to meet the criteria to be qualified as "Satoyama like" although some issues persist. In terms of project designing or prioritization of possible activities for a Satoyama Project, it can be reiterated that SADT may not be a stand alone tool. In the meanwhile, two questions have arisen. Firstly, is an individual interview enough for collecting information by SADT to identify significant features and issues to be improved even if the interviewee is a representative of the village? Secondly, do we need more subjective views of interaction between human and nature? Responding to the first question, Dublin *et al*. (2015) has already studied and produced results showing uniformity amongst villagers and amongst officers in three Karen villages in Chiang Mai, Thailand. It was found through his past studies that no statistical differences existed when analysis between officers and villagers were compared, demonstrating that if persons are exposed to the same data and experiences within a given locale, they would produce similar evaluations when using SADT. As for the second question, scoring Satoyama points by SADT is rather based on objective observation by the interviewee, and results are descriptive and show the level of "agreement" on the village environment. Presumably, since most of the questions set by SADT began with "Is there? ~ or Are there? ~", relatively objective observation for the current situation of the village was attributed to these types of questions. Ideally, more information with a focus on harmony between human well-being and nature conservation is needed to design the Satoyama Project because Satoyama is, repeatedly speaking, a village or community which is built on human-interaction with nature. In this sense, the village should be assessed from the perspectives of human-nature interactions. Considering these short discussions above, the method to assess the

level of interaction between human and nature which was introduced and applied as "Happiness Survey" would now be assessed.

2) Happiness Survey:

To the question "Are you happy now?", all gave the answer of"Fully happy" or "partially happy". No one selected " Less happy" or "Not happy". Everyone is entitled to define happiness for themselves. The happiness survey produced persuasive results to evaluate the status of human-nature interaction by identifying distinguishing characteristics. The survey only represents 6% of the community (n= 19: Female 7, Male 12). It is desirable to conduct more studies with a higher number of respondents. More in-depth survey with comparison between younger and elderly generation should be considered. It should be noted however, that all respondents were representative of the village and are socially active villagers such as the village head, leader of the agricultural group, and the school teacher. The survey assisted in understanding the general trend of community perspectives on their satisfactions and dissatisfactions. Items that need to be prioritized in the future can be successfully identified. These are summarized in Table 6.

Recognizing that an appropriately protected environment is the base for future development at Tudan village, it is definitely important to use natural resources (forest, water, soil, etc.) for village development in a sustainable manner. In the meantime, since Tudan village is located in a remote area, the purchase of daily commodities and securement of means of daily transportation to have access to the city and town nearby are pressing needs. The more Tudan village relies on urban areas due to the expansion of the economic market, the more such needs will be amplified. From the viewpoint of village development, eco-tourism might be a potential for constant income generation if it can be designed and carried out in an environmentally sustainable manner. Priority should be given to development for a society where local customs and culture including local language can be preserved and conveyed to future generations. In addition, it was pointed out that the measurement for disaster was crucial because the village is located in a mountainous area and might be easily affected by natural disasters. It was also found that solidarity and cohesion; support for each other in times of need; and close daily communication among communities are critical issues to ensure that community members do not feel loneliness, isolation, anxiety, or uneasiness. Especially, care for the elderly people, including medical and welfare services should be taken into consideration. Moreover, communication between the government and local community should be promoted, and community-based transparent and accountable governance system should be developed. Differences between the perspectives of men and women presented in Table 4 should be taken into account for developing Satoyama projects. For example, communication with government should be enhanced by the project with a focus on men as the main target group. The results of open-ended questions reaffirmed that cohesion and solidarity among communities had substantial influences on the feelings of happiness. At the same time, a clean and cool environment, and peaceful village are also important for feeling happiness.

Overall Discussion

This study demonstrated the effectiveness of the complementary application of two different tools, namely SADT and Happiness Survey to identify prioritized activities, and issues that need to be carefully considered in formulating a Satoyama Project for evaluating a Satoyama System. A Satoyama project ultimately aims at realizing a society in harmony with nature, and for the purpose of achieving this ultimate goal, this study provides a clue on how to make use of the strengths of each tool. Table 6 shows a summary of the issues which was obtained by the two tools to be addressed. Issues identified by SADT can also be identified by the Happiness Survey. Some issues such as a sense of loneliness and isolation, and communication with government, to name a few were not identified by the SADT. This indicates a strong feature of Happiness Survey as a complementary tool with the SADT.

Table 6. Summary of the issues to be addressed.

	SADT	Happiness Survey
Issues to be sustained	· Clean environment · Traditional agriculture	· Clean environment · Traditional agriculture · Education · Solidarity and cohesion among communities · Support for each other · Peaceful life
Issues to be considered/improved	· Eco-tourism and homestay · Waste management	· Purchase of daily goods · Access to town and city · Eco-tourism · Disaster (land slide) · Livestock · A sense of loneliness and isolation · Communication with government · Job opportunities (younger men generation) · Health (men) · Illegal hunting (men)

After identifying issues to be addressed by the project, some issues were prioritized by consensus of the community in Tudan village through the consultation meeting, and strategies were developed in an attempt to holistically address the urgent and central concerns of the community. The strategy includes; 1) Protect and Conserve Natural Resources, 2) Enhance Traditional Agriculture Activities, 3) Improve Capacity for Community Governance and Enhance communication between Tudan village and the government. In line with such a development strategy, it was agreed by consensus among village communities, Sabah State government and JICA that land use mapping and community profile would be developed in a participatory manner to more visualize the village landscape and community life. Activities such as making-compost for improving soil quality for hillside vegetable farming, participatory rural appraisal (PRA) training for enhancing communication between Tudan community and government (especially Department of Agriculture); and an awareness program for waste management were also agreed to be implemented.

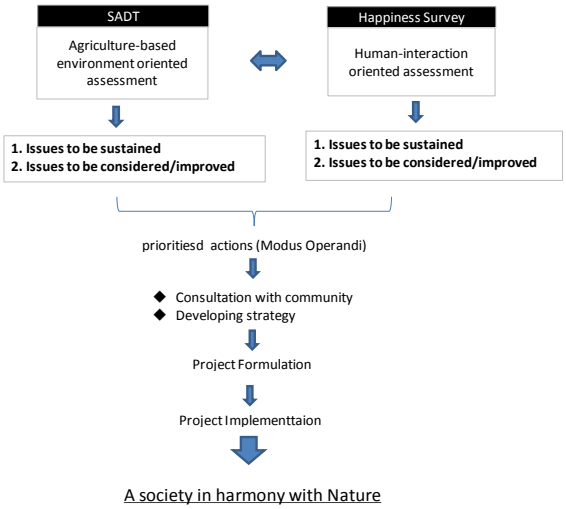

Figure 2. Overall picture of the approach and the results.

Through this study, the effectiveness of the complimentary use of SADT and Happiness Survey was demonstrated as an entry point and baseline survey for project designing in the context of Satoyama system evaluation. The sketch below in Figure 2 shows the overall picture of the approach taken by this study. Dublin *et al*. (2014) conducted a verification of the effectiveness of the SADT through a variety of world-wide case studies. Complimentary Happiness Survey was the first case in Sabah. This study can provide forward-looking assessment for the identification of several aspects to be taken into consideration in the future. Because of the wide definitions of happiness, it might be debatable if the question 'Are You Happy Now?' should be included. Perhaps the meaning and concept of Happiness should be developed through a considerable degree of community consensus at first. To say the least, sampling number is not enough to fully understand the interaction between nature and human. Differences between older and younger generations might be useful for identifying priorities. Considering these, happiness survey should be modified and improved through more practical case studies.

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