Integrated Assessment of Environment and Social Capacity for Risk Management and Sustainable Use of Natural Resources

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Key words: environmental risks, sustainability, social capacity assessment, stakeholder participation, leadership development

ABSTRACT

Effective risk management and sustainability promotion require proper assessment of the environment and social capacity for managing the environment. National governments and international agencies provide monitoring data of the environment such as air and water quality, forest cover, land, biodiversity and waste management. While local communities and stakeholders need to play a vital role in managing risks and promoting sustainability at the field level, they often lack scientific information. Instead they rather rely on sensible and observatory information and such information is often useful in communicating to other community members and stakeholders. The participatory assessment can provide a useful tool for community members and stakeholders to comprehend environmental risks and challenges in promoting sustainability. The feedback from the communities and stakeholders are useful information for decision-makers and practitioners to plan and facilitate policy and institutional transformation toward improving environmental risk management and promoting sustainability.

INTRODUCTION – Environment and social capacity assessment for effective environmental risks and sustainable resource management

It has been long acknowledged that local communities and stakeholders have a vital role to play in protecting the environment, managing risks and promoting sustainable use of natural resources as reaffirmed that environmental issues are best handled with the participation of all concerned citizens (UNGA 1992). Ostrom (1990) refers to participatory environmental management by characterising as a management of common pool resources by non-governmental actors. Ostrom (2000) further articulates the feature of self-governance of natural resources. Ostrom asserts that the presence of leaders or entrepreneurs are an important factor in instigating the social mobilization, structuring governance mechanisms and promoting collective actions for managing the environment and natural resources.

While the role to be played by leaders or entrepreneurs is underlined in developing and operationalizing self-governing mechanism for environmental management or sustainable natural resource use, an emphasis is also given to the usefulness in involving external facilitators in similar processes (APFED 2010a). The leaders or entrepreneurs mentioned above can be endogenous. At the same time, there has been an involvement of the external facilitators in raising awareness of the local community members and stakeholders, organizing them and institutionalizing collaborative management of the environment and natural resources. External facilitators can play an instrumental role in identifying and providing options for interventions in addressing environmental risks or sustainability challenges. It is however important to note a caveat that the external facilitators also need to understand the local conditions and context (Adandedjan and Niang 2006). The external facilitators are not supposed to impose their own preconceived notions of the collective actions on community members and stakeholders (Sow 2006). It must be the local community members and stakeholders who make final decision on the modalities of collective actions.

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It is a core of sustainability science to understand the mechanisms of natural resource use and impacts on the environment and livelihood. To carry out effective sustainability science, it has been suggested to facilitate in-depth transformation of organising scientific research by consolidating diverse disciplinary expertise (Dedeurwaerdere 2013). Science and knowledge integration about natural and social systems have evolved as sustainability science (Rockström et al 2006, Blackstock et al 2007 and Yasunari 2013) and a platform has been established to promote science-policy interface on sustainability (Takeuchi 2013). Sustainability science is said to consists of two key components namely a descriptive analytical mode based on an advanced form of complex system analysis, and a transformation mode oriented towards developing practical solution for sustainability problems, and an increasing emphasis is given to the latter component to facilitate a socio-economic transition towards achieving stronger sustainability (Dedeurwaerdere).

If the participatory appraisal for the environment and ecosystems can be undertaken in the simple and indicative assessment approach, such a process can provide a useful tool and step for stakeholder/community leaders, scientists and practitioners to commence dialogues on the ways for improving environment/ecosystem management and livelihood as a preliminary/initial stage of participatory learning and action (PLA) or participatory sustainability science research. It also provides a meaningful opportunity for students to acquire holistic viewpoints on sustainability and develop analytical and facilitation skills required for environmental leaders by confronting reality and being required to comprehend complexity and dynamism intrinsic to sustainability conundrums. In practice, PLA or participatory sustainability science research do not always lead to the intended outcome due to the poor conflict resolution or insufficient facilitation (Blackstock et al 2007) and there are a number of challenges in integrating PLA or participatory sustainability science in environmental leadership training programmes. This paper aims to outline the genesis and evolution of PLA or participatory sustainability science, its advantages and challenges in applying them in environmental leadership development at the university.

GENESIS AND EVOLUTION OF PARTICIPATORY SUSTAINABILITY SCIENCE

There has been a looming question about the researchers and university scholars can carry out sustainability science with greater impacts on the society. A participatory rural appraisal (PRA) that has spread and evolved in 1980's has evolved as an approach and method to learn rural livelihood from, with and by rural people (Chambers 1994a) or to enable local people to share, enhance and analyse their knowledge of life and conditions, to plan and to act (Chambers 1994b). PRA flows from. PRA emanates from some preceding streams such as an activist participatory research that aims to enhance people's awareness and confidence and to empower their action. With the increased proactive involvement of local people in learning processes, a scope of PRA was expanded and renamed in 1990's "participatory learning and action" (Chambers 2007). Knowledge generation from multi-stakeholders about sustainability and attempts to prompt changes in personal and institutional behaviours and a transition towards sustainability have emerged and been being promoted as participatory sustainability science (Blackstock et all 2007). The evaluation framework for participatory sustainability science research is structured with multiple components including the level and modalities of stakeholder collaboration that changed people's behaviours, norms and culture. (Blackstock et all).

A participatory sustainability research framework has been being applied with a more articulate focus on the environment, natural resources and local livelihood. A variety of multi-ecosystem service assessment techniques have been developed and practiced (Kelvin et al 2013). Multi-ecosystem service assessment techniques are mainly based on the framework provided by Millennium Ecosystem Assessment 2005. Millennium Ecosystem Assessment

categories various ecosystem services into four namely (i) provisioning, (ii) regulating, (iii) cultural and (iv) supporting ones (Table 1). Millennium Ecosystem Assessment presents the direct and indirect drivers that affect ecosystems and delineates the mutual interactions – positive and negative – between ecosystems and humans at different timescale and at different spatial and temporal scales.

Table 1: Ecosystem services and drivers of change

Ecosystem services	Direct drivers	Indirect drivers
(i) Provisioning (e.g., food, water, fibre and fuel), (ii) Regulating (e.g., climate regulation, water and disease), (iii) Cultural (e.g., spiritual, aesthetic, recreation and education) and (iv) Supporting (e.g., primary production and soil formation).	(i) Changes in local land use and cover, (ii) Species introduction or removal, (iii) Technology adaptation and use, (iv) External inputs (e.g., fertilizer use, pest control and irrigation), (v) Harvest and resource consumption, (vi) Climate change and (vii) Natural, physical and biological drivers (e.g., evolution, volcanoes).	(i) Demographic, (ii) Economic (e.g., globalization, trade, market, and policy framework), (iii) Socio-political (e.g., governance, institutional and legal framework), (iv) Science and technology and (v) Cultural and religious (e.g., beliefs, consumption choices).

Millennium Ecosystem Assessment (2005)

Millennium Ecosystem Assessment assesses the trend of major ecosystem service components with “enhanced”, “degraded” and “no change in net”. The drivers’ impact were assessed with “low”, “moderate”, “high” and “very high”. The driver’s trends were assessed with “decreasing”, “continuing”, “increasing” and “rapidly increasing” impacts. The approach to indicating the drivers’ impacts and their trends with simplified indicators is deemed as pragmatic particularly in the participatory environment/ecosystem assessment. In addition, Millennium Ecosystem Assessment employed the approach to assess the response options for managing ecosystems with a particular attention to “government”, “business” and “civil society”.

Matsuoka et al (2008) scrutinize the capacity of these three social actors in the framework of “Social capacity assessment” and “actor-factor analysis”. The government, business and civil society is assessed in terms of the capacity to meet the required social system functions with an emphasis particularly on (i) policies and measures, (ii) human and organisational resources and (iii) knowledge and technology.

For the United Nations Conference on Sustainable Development (Rio + 20 Summit) held Rio de Janeiro, Brazil in June 2012, institutional framework for sustainable development was chosen as one of the two main themes together with green economy (UNGA 2012). In the outcome document adopted at Rio + 20 Summit, an unequivocal statement was included in paragraph 99 that calls for actions to promote access to information, public participation and justice in environmental matters. While importance of participation is being underlined and a number of initiatives have been launched to promote access to information, decision-making and judicial proceedings over environmental matters, many countries still lag behind in developing required legislations and enforcement mechanisms (Kobayashi 2012). In 2002, the World Resource Institute has undertaken a fist assessment in its kind on access to information, participation in decision making and judicial proceedings over environmental matters (Petkova et al 2002). A call was reiterated to urge the governments in Asia to make available the environmental information more proactively in the format comprehensible to the public without a request and to enhance transparency with information disclosure to enable the public to participate in decision-making (WRI 2013).

The priority and selection of factors that are important in environment and social capacity assessment varies depending on the local conditions and the context of the intended participatory sustainability research. 2007). The collective self-reflection through interaction and dialogue among diverse participants support the cyclical process of observation, analysis, planning, implementation, monitoring, and reviewing based on experiential learning and fosters adaptive management of the environment and ecosystems (Mackenzie 2012). Further analysis will be presented in the following section regarding the applicability and challenges of participatory sustainability research based on the experiences in implementing a joint research progamme undertaken by Yokohama National University and the University of Antananarivo.

ACHIEVEMENT AND CHALLENGES FOR APPLYING PARTICIPATORY SUSTAINABILITY RESEARCH – CASE STUDY OF FIELD STUDY IN MADAGASCAR

As a part of the Leadership Development Programme for Sustainable Living with Environmental Risks (SLER), Yokohama National University has undertaken a joint field study with the University of Antananarivo for the past years of 2011 – 2013. The second joint field study was undertaken from 27 October – 10 November 2012 with the preparatory consultations meeting and an outcome presentation symposium in Antananarivo from 28 – 30 October and 7 November, and the field visit from 30 October – 6 November 2012. 17 participants including 7 faculty members and 10 graduate students from two universities participated in the field visit (YNU-SLER 2013a and b). The main objective of the field visit was to understand environmental risks and their mechanisms and to observe the intervening measures for reducing risks and promoting sustainability in Madagascar. The participants were separated into two groups and Group A visited the mid-east of Madagascar such as Andasibe, Ambatondrazaka and Alaotra lake. Group B visited the north-east of Madagascar such as Andapa, Sambava and Anlataha (so called SAVA region – named after the initial of the main city in the region namely Sambava, Antalaha, Vohémar et Andapa).

The groups intended to undertake (i) environment/ecosystem assessment, (ii) soil survey, and (iii) social/stakeholder survey (interviews and questionnaire). This paper is not meant to present the details of the findings in the field research. Instead, this paper aims to highlight the potential and challenges in undertaking participatory sustainability research as a part of the environmental leadership development programme.

Generally, the groups have both comprehended the trend of environment and ecosystem degradation through pre-visit literature review and interviews with stakeholders. Deforestation is prevalent for charcoal production, land reclamation to expand paddy and crop fields and lumber extraction. In Ambatondrazaka, it is evident that deforestation causes siltation and sedimentation in irrigation cannels and paddy fields, and reduces paddy field productivity. Due to the reduced rice productivity coupled and an increasing demand for rice, local farmers and villagers recourse to forest destruction and land reclamation. A series of these conducts constitutes a so-called “poverty-environment degradation vicious cycle” (Aggrecy 2010). A based on the outcome of the field survey, an assessment was also made on the overall ecosystem service status and trend covering major ecosystem services though they are not exhaustive (Table 2).

Table 2: Ecosystem assessment in Madagascar - Highlight

Ecosystem	Ecosystem service (resource)	Assessment	Future condition of the resources	Reason of the condition
Forest	Fruits	++	↘	Increasing cutting trees Expanding forest fire
	Fuel	+++	↘	
	Building material	++	→	
	Craft products	n/a	→	
	Honey	+	↘	
	Medicine	+	→	
	Tourism	n/a	→	
Coast	Seafood	+++	↘	Sedimentation Deforestation Increasing fisherman
	Tourism	n/a	→	
Crop land	Crop	+++	↘	Land erosion Low input

+++: Abundant ++: Adequate +: occasionally available -: poor/rare n/a data not available
↑ Rapidly increasing ↗ Increasing → No change ↘ Decreasing ↓ Rapidly decreasing
Developed from Miura (2013)

Soil survey was undertaken to examine the potential co-relation between the land use practice and soil conditions with a particular emphasis on whether land is excavated or is under non-tillage cultivation (YNU-SLER 2013b). The Groups conducted soil survey on the assumption that conservational land use namely non-tillage farming or grass coverage of slopes for soil erosion control would improve soil conditions. It was assumed that the positive impacts on soil conditions could be shown by the optimal level of soil ph or marginal deviation from the optimal ph level (expressed by ｜Ph-6.75｜), high electric conductivity, high transparency of soil dissolved water, low level of soil hardness and low weight of soil per unit. The result obtained in the soil inspection in the SAVA region concurs with the said assumption as shown in Table 3. The soil samples taken at the site with the history of non-tillage land use demonstrated the projected co-efficiency with the soil condition factors.

The groups also have undertaken questionnaire surveys to understand socio-economic conditions of local people living in the visited sites. The question encompass from the household income level, the number of children in each household, and education history. The question also included the self-assessment of the environment and their suggestions for possible interventions for arresting the trend of environmental degradation and promoting the restoration of the environment and ecosystems (Tables 4 and 5).

Table 3: Soil analysis – SAVA region

Co-relation with non-tillage land use history – 24 points of 12 sites

Variables	Data	Expectation	Correlation coefficient
PH	| 6.5-Ph | (pH <6.5) 0 when pH is 6.5 – 7	Low	0.2795
Electric Conductivity	mS/cm (miliSeimens per centimeter)	High	0.3069
Transparency of dissolving water	Measures from 1 – 9 with 9 for highest transparency	High	0.3941
Hardness	Higher number for higher hardness	Low	0.2677
Weight/100 cc	g	Low	0.2726

Note: pH is less than 7 in all sites. Optimal range of pH is between 6.5 – 7. (Thermo Fisher Scientific. n.d.)

Table 4: Social survey – Ambatondrazaka and SAVA areas Highlight (1)

Average monthly salary US1=MGA 2,200		<20k	20 - 60k	60 - 200k	200 - 400k	400 - 800k	>800k
	Ambatondrazaka area (n=32)						
	Household No.	7	12	9	3	1	0
	Accumulative % (n=32)	22%	59%	88%	97%	100%	***
	SAVA area (n=32)						
	Household No.	9	12	6	3	0	0
	Accumulative % (n=32)	30%	70%	90%	100%	***	***
Number of children		≦2	3 ～ 4	5 ～6	7 ～ 8	9	10
	Ambatondrazaka area (n=32)						
	Household No.	15	10	7	3	***	***
	Average 3.2/household						
	SAVA area (n=32)						
	Household No.	7	8	10	3	2	1
	Average 4.6/household						
Education		Not at all	Elementary	Elementary + Junior High	High school	Vocational	University
	Ambatondrazaka area (n=35)	2	7	6	11	7	2
	SAVA area (n=27)	1	9	11	6	0	0

Table 5: Social survey – Ambatondrazaka and SAVA areas Highlight (2)

	Ambatondrazaka area			SAVA area		
	Agree	Disagree	Do not know	Agree	Disagree	Do not know
Promoting environmental education	33	1	0	31	0	0
Enforcing penalty on illegal logging	31	0	0	31	1	0
Giving more budget for government's monitoring of the environment	22	7	1	28	1	1
Raising tax on the sales of charcoal	13	17	0	11	6	3
Increasing the tax on land use	4	23	0	6	16	5
Increasing the government's subsidy for tree plantaiton	30	1	0	31	0	0
Encouraging private sector support for tree plantation	29	0	2	23	2	0
Nothing we can do to improve the environment	0	27	5	1	16	0

The outcome of the questionnaire surveys (n=62) showed that 88 per cent of respondents considered the surrounding environment as either severely degraded or degraded, and 87 per cent respondents considered forests as severely depleted or depleted. 70 per cent of the respondents were under the income level of less than one dollar per day. An average fertility rate is in a range of 3.2 – 4.6 per household equivalent to the national average of 4.5. 58 per cent of the people have completed only more than junior high school. In terms of intervening measures for arresting the trend of degrading environment and promoting the restoration of degraded environment, almost all the responded supported the promotion of environmental education and enforcement of penalty on illegal logging. On the other hand, only 48 per cent supported an idea of raising tax on the sales of charcoal and 19 per cent supported an idea of increasing the tax on land use. It showed the options of creating additional payment at the side of local people were not favoured.

It is also interesting to note the people's understanding on the causes of lavakar or land slide. The groups have found out from the interviewing the experts and local people and observing site, the massive land slide is brought about in Madagascar due to a mixture of excessive logging and deforestation and tectonic movement. It was explained that in the process of illegal logging and deforestation, the root systems of the trees degrade or disappear and create small space in the soil. Rainwater intrudes into such space and makes soil structures fragile. Such a processes cause lavakar or land slide possibly prompted by tectonic movement. Whether people give an emphasis to deforestation or tectonic movement as a major cause of lavakar alter the weight to be given to the intervening measures for arresting lavakar. In the questionnaire survey, 35 persons indicated slush and burn as a major cause of lavakar followed by logging (32), heavy rain (9), gravity (7) and tectonic movement (2). This result indicates the reasonable level of the local people's understanding on the causes of lavakar and a possibility of creating a basis for undertaking collective actions to arrest lavakar and restore degraded environment.

In the interviews with experts, officials and local stakeholders, the groups strived to collect information on social capacity for managing the environment and ecosystems. The 2009 political crisis have compelled the Government of Madagascar to recourse to austere fiscal and administrative policies particularly in the environment and forestry sector. The budget and the number of staff for the Ministry of Forestry and Environment has been substantively cut as donor countries have suspended economic assistance except humanitarian areas on the ground that the presidential election conducted in 2009 was not consistent with the constitutional procedures and considered as coup d'état or unconstitutional change of the government. The democratic and constitutional election was planned thereafter and the first round of the presidential election was held on 25 October 2013 with the involvement of international election monitoring. The second round of the presidential election is planned to be held on 20 December 2013 to elect the next president. The process of electing the president in a manner satisfactory to the constitutional requirement and internationally agreeable procedure is expected to ameliorate the current international financial assistance to Madagascar. Yet, as of October 2013, the donor countries have not yet restored the level of economic assistance to the one prior to 2009 and the financial situation of environment and forestry governance remains to be an arduous task. With the restrained financial inflows from overseas, government sector, business and civil society organizations all continue to face strained economic situations.

Table 6: Recent development in environment/natural resource management in SAVA area

Masoala Natoinal Park deforestation (ha)

2007	2009	2010	2011	2012
45	5.5	40.5	17	9.25

Illegally logged tree numbers

2004	2005	2006	2007	2008	2009	2010	2011	2012
212	182	165	165	36	6970	4163	853	91

Illegal lemur capture

2004	2005	2006	2007	2008	2009	2010	2011	2012
23	7	10	2	6	11	42	91	13

YNU-SLER (2013b)

Based on the information collected during the field survey, questionnaire and interviews, assessment was made on the social capacity for environment and ecosystem management following an approach of the actor-factor analysis by analysing the level of (i) policy and law, (ii) staff, (iii) budget, (iv) knowledge an technology, (v) law enforcement and (vi) capacity building (Table 6). While a certain level of knowledge accumulation and technology application have been acknowledged, the overall trend of social capacity is at the level that is barely sufficient and in either declining or unchanging trends.

Table 7: Social capacity assessment – Madagascar Highlight

Factor / Actor	Policy and law		staff		budget		Knowledge and technology		Law enforcement		Capacity building	
Government	+	↘	-	↘	-	↘	+	↘	-	↘	-	↘
Firm and Industry	+	→	+	→	+	↘	++	→	+	→	+	→
INGOs/ NGOs	++	→	+	→	+	↘	++	→	++	↘	+	→

+++: Abundant ++: Adequate +: Minimal -: poor/rare n/a data not available

↑ Rapidly increasing ↗ Increasing → No change ↘ Decreasing ↓ Rapidly decreasing

Developed from Oo and Aung (2013)

LESSONS LEARNED AND WAYS FORWARD TO IMPROVING THE IMPACTS OF PARTICIPATORY SUSTAINABILITY RESEARCH IN THE ENVIRONMENTAL LEADERSHIP DEVELOPMENT PROGRAMME

While the field survey was conducted very productively and efficiently within the time and resource constraint and the outcome of the survey was reasonably praised at the outcome presentation symposium, a number of challenges could be pointed out and some reflections could be also noted for enhancing the impacts of participatory sustainability research in the environmental leadership development programme in the future.

The field surveys were useful in understanding the local socio-economic and environmental conditions and gave the outsider visitors further ideas about possible support to improve the natural resource use and promote alternative sustainable livelihood. However, the survey could not reach the stage to plan and undertake consultations on possible intervening measures or pilot projects. This is in contrast with the SLER's involvement in Rikuzentakata – a city hit by 2011 great disaster in Japan. SLER students, faculty members and partners have visited Rikuzentakata four times over the period of 2011 – 2013. Each visit to Rikuzentakata was for 2 – 3 days. One pilot initiative undertaken during the visit in September 2012 was to collect sprouts of endogenous ever-green broad leaved tree species. 34 students and faculty members participated in the visit and collected 477 seedlings of three tree species namely *Persia/Machilus thumbergii* (445), *Camellia japonica* (30) and *Eurya japonica* (2). In the September 2013, 27 faculty members and students returned and observed that 40 seedling survived over the year out of about 200 that were transplanted on the ground in October 2012. The survival rate of the collected and transplanted seedling was estimated to be 20 per cent. About 280 seedlings were transplanted into the garden of the public community house, and inadvertently removed in the spring 2013. In the 2013, about 400 seedlings of *Persia thumbergii* and *Cameia japonica*. The students reported afterwards that the proactive involvement of the students in concrete pilot initiative such as the collection and transplantation of ever-green broad leaved tree species has given them sense of participation in the local process, in this case, reconstruction and community empowerment, and made them feel partnership with local people as well as belief that they were making useful contributions to local communities. Further details need to be elaborated in the different occasions, but the students could also understand the changes in the local people's reaction to the initiative of producing ever green broad leaved trees in the midst of their preoccupation with the restoration of pine woodland – a local legendary scenic coastal site that was completely destroyed in the tsunami in 2011.

The funding is critical for undertaking effective participatory sustainability research not just funding is needed to cover the cost, but also it must be flexible enough to allow adaptive management of research activities (Mackenzie et al 2012). The pilot initiative needs to be planned and implemented based on the appraisal of local socio-economic and environmental conditions. A broad range of the possible activities can be suggested with the intended procedure, but such plans and the expected outcome may not necessarily stated rigidly as they will need to be adjusted in accordance with the findings and outcome of local consultations.

It is vital to put in place an institution that can promote participatory sustainability action research as a part of the leadership development programme in higher education. There are a number of centres and institutions established within or in partnership with universities to promote sustainability science research in higher education (CLiGS , CML, GMV, and Sustainability Institute n.d.). There is a case where a NGO was established to support a sustainability action research (Harada Laboratory 2012). The operation of such centres or institutions is highly instrumental in bridging students and experts on a wide range of sustainability and environmental issues and support trans-disciplinary science and its pragmatic application (MOEJ 2007). If such a center or institute can be established to support the type of activities equivalent to SLER within YNU, it would be highly effective with the more reliable continuity and adaptive management of research and operational activities.

Integration of research and education is another essential factor. A number of educational courses can be further inter-linked, but the students do not necessarily take such inter-linked courses in entirety and the universities or faculties do not design and offer courses with higher consistency and sequence. In case of SLER, the participating students for the intensive course on integrated risk management and resilience overwrap with those of the Asia – Africa II – a group study tour to Madagascar, but not all students take both courses. The course on local risk and resource management was used to follow up to the field studies undertaken

particularly in Madagascar, but again the students attending the Asia – Africa II do not necessarily attend the local risk and resource management.

On the other hand, further analysis is required on the linkages between individual research for the students' degree dissertation and the group research, other course works or leadership development programme activities. While the research method and approach can be common or related, they do not necessarily correspond to each other directly. It is not straightforward task to link both as the students have diverse interest and focus even though they address environment and sustainability issues.

Environment and sustainability education is still at a development stage and supporting faculty and administrative members operate on extra budget of the university and relies on subsidies from the central government, in the case of SLER, the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT). It is essential to integrate such supporting staffing and operational cost in the core staffing and budget of the university in order to ensure continuity, up-scaling, constructive evolution and impact enhancement of sustainability science and leadership development.

There are a number of emerging and non-materialized opportunities for undertaking effective sustainability science and leadership development in higher education and the universities and academics can play a further instrumental role in bridging science, policy and stakeholders toward building a sustainable society. Both providers and receivers of sustainability education need to refurbish their concept and approach to facilitate transformation of research and education in order to increase their impacts in terms of forging sustainability in society. Good practice and past trial experiences must to be shared more widely and substantively and capitalized upon to develop effective policies, programmes, curriculum, intuitions and partnership for fostering sustainability science and leadership development.

REFERENCE

Adandedjan, C and Niang, A. 2006. Forging Links between Research and Development in the Sahel: The Missing Link. In: Bessette, G. ed. People, Land and Water - Participatory Development Communication for Natural Resource Management. London: Earthscan, pp. 217-220.

Aggrecy, N., Wambugu, S., Karugia, J. and Wanga, E. 2010. An Investigation of the Poverty-Enviornmental Degradation Nexus: A Case Study of Katanga Basin in Uganda. Research Journal of Environmental and Earth Sciences 2(2), pp. 82-88.

Asia Pacific Forum for Environment and Development (APFEDa). 2010. APFED II Final Report. http://www.apfed.net/apfed2/APFED_II_Final_Report_for_CD.pdf. Accessed on 28 September 2013.

Blackstock, L.D., Kelly, G.J. and Horsey, B.L. 2007. Developing and applying a framework to evaluate participatory research for sustainability. Ecological Economics 60, pp. 726-242.

Center for Leadership in Global Sustainability (CLiGS). n.d. About. http://vatech.beekeeperdev.com/about/. Accessed on 5 October 2013.

Centre for Environment and Sustainability (GMV). n.d. Collaboration for sustainable development. http://www.gmv.chalmers.gu.se/english/. Accessed on 4 October 2013.

Chambers, R. 1994a. The Origins and Practice of Participatory Rural Appraisal. World Development, Vol. 22, No. 7, pp. 953-969.

Chambers, R. 1994b. Participatory Rural Appraisal (PRA): Challenges, Potentials and Paradigm. World Development, Vol. 22, No. 10, pp. 1437-1454.

Chambers, R. 2007. From PRA to PLA and Pluralism:Practice and Theory. Brighton: Institute of Development Studies.

Dedeurwaerdere, T. 2013. Transdisciplinary Sustainability Science at Higher Education Institutions: Science Policy Tools for Incremental Institutional Change. Sustainability 5, pp. 3783-3801.

Harada Laboratory. 2012. Report on the activities of PGV in Indonesia. http://www.u-

hyogo.ac.jp/shse/harada/PGV_Web/indonessia.pdf. Accessed on 5 October 2013.
Institute of Environmental Sciences (CML). n.d. General Information - Overview of activities of Institute of Environmental Sciences. http://www.cml.leiden.edu/organisation/about/aboutcml.html. Accessed on 4 October 2013.
Kelvin, S.H. P., Balmoford, A., Bradbury, R.B., Brown, C., Butchart, S.H.M., Hughes, F.M.R., Stattersfield, A., Thomas, D.H.L., Walpole, M., Bayliss, J., Gowing, D., Jones, P.G.J., Lewis, S.L., Mulligan, M., Pandeya, B., Stratford, C., Thompson, J.R., Turner, K., Vira, B., Willcock, S. and Birch, J.C. 2013. TESSA: A toolkit for rapid assessment of ecosystem services at sites of biodiversity conservation importance. EcosystemServices5, pp. e51 -e57.
Kobayashi, M. 2012. Forging Policy and Institutional Frameworks to Promote Access to Environmental Information. In: Institute for Global Environment Strategies (IGES) ed, Greening Governance in Asia-Pacific. Hayama: IGES, pp. 34-53.
Mackenzie, J, Tan, P.L., Hoverman, S. and Baldwin, C. 2012. The value and limitations of Participatory Action Research methodology. Journal of Hydrology 474, pp. 11–21.
Matsuoka, S., Murakami, K., Aoyama, N., Takahashi, Y. and Tanaka, K. 2008. Capacity development and social capacity assessment (SCA).
Millennium Ecosystem Assessment. 2005. Ecosystems and Human Well-being: Synthesis. Washington DC: Island Press.
Ministry of Environment, Japan (MOEJ). 2007. On-going Overseas Research. Committee on the Development of Environmental Leadership Development in Higher Education for a Sustainable Asia. http://www.env.go.jp/council/34asia-univ/y340-04/mat07.pdf. Accessed on 3 October 2013.
Miura, T. 2013. Assessment of natural resource and social capacity in Madagascar. Final Report for Local Risk and Resource Management, Yokohama National University. 25 February 2013 (Unpublished).
Oo, W.P. and Aung, T. 2013. Assessment of natural resource and social capacity in Madagascar. Final Report for Local Risk and Resource Management, Yokohama National University. 25 February 2013 (Unpublished).
Ostrom, E. 1990. Governing the commons. Cambridge: Cambridge University Press.
Ostrom, E. 2000. Collective Action and the Evolution of Social Norms. The Journal of Economic Perspectives, Vol. 14, No. 3, pp. 137-158.
Petkova, E, Maurer, C, Henninger, N., Irwin, F., Coyle, J, and Hoff, G. 2002. Closing the Gap: Information, participation and justice in decision-making for the environment. Washington DC: World Resource Institute.
Rockström, J., W. Steffen, K. Noone, k. Persson, F. S. Chapin, III, E. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. Schellnhuber, B. Nykvist, C. A. De Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sölin, P. K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J. Foley. 2009. Planetary boundaries:exploring the safe operating space for humanity. Ecology and Society 14(2): 32.
Sow, F. and Adjibade, A. 2006. Experimenting with Participatory Development Communication in West Africa In: Bessette, G. ed. People, Land and Water - Participatory Development Communication for Natural Resource Management. London: Earthscan, pp. 153-157.
Sustainability Institute. n.d. Overview. http://www.sustainabilityinstitute.net/about/overview. Accessed on 4 October 2013.
Thermo Fisher Scientific. n.d. Gardening & Soil pH. www.eutechinst.com/tips/ph/15_soil_ph.pdf. Accessed on 2 October 2013.
Takeuchi, K. 2013. Science and Innovation for a Sustainable Future: The Role of Sustainability Science. International Symposium Developing Leaders for Managing Risks and Promoting Sustainability toward Establishing a Resilient and Sustainable Society. Tokyo, 23 September 2013. http://www.sler.ynu.ac.jp/node/592. Accessed on 23 September 2013.
Yasunari, T. 2013. Future Earth – A new international initiative toward global sustainability. International Symposium Developing Leaders for Managing Risks and Promoting Sustainability toward Establishing a Resilient and Sustainable Society. Tokyo, 23 September 2013. http://www.sler.ynu.ac.jp/node/592. Accessed on 23 September 2013.
United Nations General Assembly (UNGA), A/CONF.151/26 (Vol. I). Report of the United Nations Conference on Environment and Development. 12 August 1992

United Nations General Assembly (UNGA). Resolution 66/288. The future we want. 11 September 2012.
Yokohama National University - Leadership Development Programme for Sustainable Living with Environmental Risks (YNU-SLER). 2013a. Newsletter, Vol.6. March 2013. http://www.sler.ynu.ac.jp/en/newsletter. Accessed on 1 October 2013.
Yokohama National University – Leadership Development Programme for Sustainable Living with Environmental Risks (YNU-SLER). 2013b. Report – Asia・Africa II Group Study Tour to Madagascar. https://sites.google.com/site/ynuslermadagascar/final-report. Accessed 28 October 2013.
World Resource Institute (WRI). 2013. Jakarta Declaration for Strengthening the Right to Environmental Information for People and the Environment. 1 May 2013. http://pdf.wri.org/jakarta_declaration_for_strengthening_right_to_environmental_information.pdf.

Impacts of Environmental Degradation on Food and Health Security in the Laguna Lake Watersheds

（フィリピン・ラグナ湖集水域における生態系荒廃と食・健康リスク）

Ryohei Kada[1]

The Philippines' Laguna de Bay and its sub-watersheds provide a host of services vital to the communities living in and around its surroundings. However, as in many cases, natural and artificially induced disasters severely disrupt the way of life of the people living within the lake and its sub-watersheds. Similarly, the rate of ecological degradation heightens the risk of more flooding in already flood prone areas; introduce new flooding to areas previously not flooded; proliferation of infectious water-borne diseases in the communities and; induce massive eradication of marine biodiversity and aquaculture. As a result, agricultural food production-including aquaculture- centers and its subsequent supply chain are interrupted, while health related risks in the middle and low income classes are aggravated.

Rapid urbanization has created an added form of human induced flooding and a permanent loss of agricultural areas. The pattern of land use conversion for housing and other urban uses is disintegrating agricultural lands causing many areas prone to future conversion and significantly reduces the access of farmers enclosed by urbanized lands to major transport and support facilities.

Agricultural production in farming areas in the Laguna de Bay region is directly related to the capacity of farmers to manage the flood waters brought in by complex interrelated problems of climate, topography and lately by unplanned and uncontrolled patters of urban development. Local farmers in the region have continuously adapted to changes in natural resource endowments as they are periodically subjected and respond to natural events and many human-induced alteration of land and water qualities in the basin areas.

Improvements in public health can be brought about through the provision of adequate and potable water supply, by reducing the risks from or the incidence of water-borne diseases in both children and adults. The most common water-borne diseases associated with drinking water include diarrhea, intestinal flu, gastro-enteritis, cholera and dysentery. Flooding at the same time, poses health hazards. Prolonged flooding with slow drainage especially in highly populated areas conveniently traps water which then transforms it into the breeding ground for mosquitoes and mixes with human and animal wastes, resulting into mosquito related diseases as well as skin diseases. Most common diseases associated with flood water include dengue fever and leptospirosis.

We will finally discuss the sources and effects of environmental degradation on food security in selected Laguna Lake communities in the Philippines. Also discussed are the activities in the surrounding communities within the watershed areas of the lake that are contributing to its degradation, the impacts of environmental degradation on the delivery of critical ecosystems services and their effects on food and health securities

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Environmental Risks and their Impacts on Food and Health Security in Laguna Lake Watersheds, Philippines

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Key words: Laguna Lake, Food and health risk, water contamination, adaptive co-management

Laguna de Bay, the largest lake in the Philippines that covers 24 watersheds including Metro Manila and 5 provinces poses a great developmental challenge that has vastly been left unresolved over the years. This developmental challenge typifies the similar challenges facing many other Asian Watersheds, that the process of economic growth has been characterized by rapid land use changes and increase in population brought about by urbanization and industrialization. These changes have led to continuing deforestation with the resulting increase in soil erosion and sedimentation that has led to persistent flooding, and decline in the quality of water and food as well as productivity of lake resources. This has affected the food security and health of a sizable population, mostly belonging to the poorest communities, who live around the lake and are very dependent on its resources for their livelihood.

The "LakeHEAD" research in the Silang-Santa Rosa Watershed undertaken by an transdisciplinary team of Japanese and Filipino researchers in the social, biological, physical and medical sciences has sought to understand the major issues besetting the degradation of the lake resources. This is very important for developing strategies to address issues related to food security and health. The terrestrial and aquatic teams identified the sources of pollution that could be affecting the quality of food and water derived from the lake. The team also analyzed the fish kill incidence around the lake waters in an effort to come up with an early warning system. The socio-economic team on the other hand characterized the socio-economic conditions of people around the lake, especially on matters related to waste management, which has been identified as a major source of pollution and contaminants of products around the lake. The team also studied the correlated issue of vulnerability to flooding incidence and the coping mechanisms of the communities. It looked into the possibilities for utilizing the payment for environmental services (PES) as an approach to addressing the problems of deforestation in the watershed areas by providing incentives to join an agroforestry program. The Health Risk Evaluation Team described human nutrition, history of disease, and life expectancy in the region, especially in relation to socioeconomic dynamics. The GIS-based Risk Mapping Team supported the entire research project by creating a spatially explicit database of key variables associated with risk in the food chain.

With initial data gathered from these different studies, the research team has begun to build partnerships with locally organized leaders, the local government units and the Laguna Lake Development Authority through the Yaman ng Lawa (Treasures of the

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Lake) program. This program provides a forum for continuing dialogues with local leaders to develop strategies and policies to address issues related to waste management, aquatic resource productivity and health. It is institutionalizing the adaptive co-management approach in the implementation of projects identified by the local communities, which is an imperative for the sustainable development of the lake region.

Introduction

The diversification of economic systems in a rural-urban setting, called the "desakota", often leads to a change in the relationship between ecosystems and livelihoods. "Desakota" is a Bahasa Indonesian term meaning village-town, a mixed-economy region between "rural" and "urban". The desakota phenomenon not only refers to the "peri-urban" but also the closely interlinked rural/urban livelihoods, communication, transport and economic systems. This is attributed to two interacting forces: (1) "Intensifying processes of technological and economic globalization" that puts increasing pressures on ecosystems on which the population is dependent for its livelihood, and (2) environmental degradation including climate change. These forces affect the capacity of the environmental and social systems to provide critical services which particularly affect the livelihoods of vulnerable populations, particularly the poor who are often the most directly dependent on these ecosystem services (Desakota, 2008).

The *desakota* phenomenon seems to be influenced by a number of macro-level factors that include improved transportation, communication systems and energy systems that have allowed the penetration of previously remote areas. The improvement in the movement of goods and people and access to information has strengthened linkages between product and labor markets in *desakota* systems and fundamentally changed the relationship between livelihoods and ecosystems. "Where populations were once dependent on locally produced food, now prices and access reflect global markets and conditions in distant ecosystems" (Figure 1). These have been the major catalyst for pushing people to migrate and seek opportunities elsewhere. In addition, there are climate related changes that have intensified the frequency of extreme weather events and changes in temperature leading to floods that have adversely affected agro-ecosystems and settlements (Desakota, 2008).

The expansion of the Desakota systems and associated major changes in the nature, intensity and spatial pattern of land use due to severe pressure from a combination of agricultural, local non-farm and urban demands coupled with climate change has concentrated pressures on ecosystems and the services they provide. They have also fundamentally changed the effectiveness of both formal and informal institutions in delivering

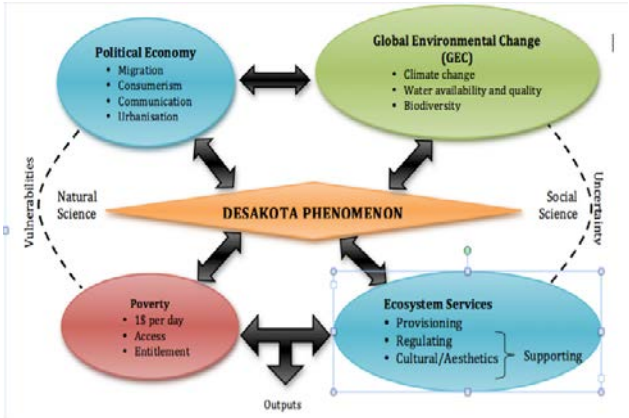

Figure 1. The *Desakota* Phenomenon

environmental management services. The subject of this pressure that stems from the land use changes, increasing demands for water and increasing pollution from all sectors are the water-related ecosystems. Specifically, the effects of Desakota "cascade from catchment to floodplain to river channel, severely impacting water-related ecosystem functioning and services" (Desakota, 2008).

It is very important therefore to understand these changes in the water ecosystems as they affect the health, food security, physical security and other socioeconomic aspects of people. This may be used for developing effective mechanisms for informing and enabling responsive and effective development, environmental management and poverty alleviation strategies (Desakota, 2008).

This paper highlights the experience in the Sta. Rosa-Silang Subwatershed in the Philippines that experienced the transformative changes in land and water ecosystems as a result of urbanization and expansion of MetroManila into its peripheries. These changes affected the capacity of the ecosystems to provide environmental services that ultimately affected household food security and health status of communities within the subwatershed. It also highlights the transdisciplinary approach to address the complex issues surrounding these environmental changes. With the results of the analysis from the different studies, the research team forged partnerships with local leaders and the different government units through the Yaman ng Lawa Program. The program institutionalized the adaptive co-management approach in the implementation of projects identified by the communities, which is very important of the development of the lake region.

The Case of Laguna Lake Subwatershed

The case under study is the Sta.Rosa-Silang Subwatershed that drains into the Laguna de Bay or Laguna Lake, the largest lake water resource in the Philippines with an area of 922 square kilometers. It traverses the two regions of Metro-Manila (National Capital Region) and Southern Tagalog (Region IV). The lake receives water from 21 river systems that flow through five provinces including Manila, 10 cities and 51 municipalities. It is a service provider and waste sink for the fast expanding economic activities around it (PEM, 2003).

On the other hand, the watershed area that feeds into the lake covers about 292,200 hectares with an estimated 1,600 industries located in it. An estimated 66% of the watershed is considered vulnerable to erosion due to deforestation, quarrying activities and urban expansion. About 4 million tons of suspended solids enter the lake annually with an average net accretion of 0.5-cm/yr. and sedimentation rate of 0.5 cm/year (DENR-EMB and LLDA 2002 as cited in PEM 2003). The degradation of the watershed poses a very real threat to the capacity of the resource ecosystems to sustain the provision of environmental services.

As defined, a "watershed" is a "hydrologic system that normally contains one or more ecosystems. It is a topographically delineated area of land from which rain water can drain as surface run-off via specific stream or river system to a common outlet point which may be a dam, irrigation system or municipal water supply take off point, or where the stream/river discharges into a large river, lake or sea. It is also defined as a discrete geographical unit capable of providing water, timber and non-

timber products including food, fiber, minerals, medicines and many intangible goods such as aesthetics and wholesome environment with solar radiation, precipitation, land, labor and capital as major inputs. It is not necessarily an upland or a mountainous land form as it may also occur in a lowland setting, and the land surface maybe a major site for residential, commercial, industrial, agricultural, educational, experimental and forest land uses (Cruz, 1999).

The properties and behaviors of a given watershed are the products of interactions between its components as influenced by other systems and factors around it, including human activities and climate. According to the 2005 Millennium Ecosystem Assessment Report, the understanding of these interactions is very important because "Changes in ecosystem services affect human well-being through impacts on security, the basic materials to support a good life, health through impacts on security, health and social and cultural relations and such changes disproportionately affect the poor." This understanding is also very important for the effective evaluation of present and future strategies for the preservation of the ecosystem.

What is happening and why it is happening thus need to be understood at the micro-household level. Though nature, extent and risk of land degradation, and the potential sustainable yield of individual agricultural farms and other land use enterprises are ultimately determined by the prevailing bio-physical conditions of a given land unit, it is also influenced by the socio-economic circumstances in which individual household operate. In most cases, the root causes are found within the range of economic, social and political pressures, or out of their control forcing them to use their resources in the way they do (WRDP Inception Report, 1994). It is also in this context that environmental risks associated with land and water resources degradation are viewed as caused by naturally occurring hazards and anthropogenic activities. The information thus generated by the study can contribute to the management of the watershed defined as "the process of guiding and organizing land and other resource uses in a watershed to provide desired goods and services without adversely affecting soil and water resources" (Brooks et al. 1991).

The link between the socioeconomic conditions of households and the quality of the ecosystem resources is premised on the influence of these socioeconomic conditions on their decisions for the use and management of land and water resources as well as the range of economic, social and political pressures which are out of their control forcing them to use their resources in the way they do (WRDP Inception Report 1994). The household socioeconomic conditions include their human, social and financial capital and the physical and productive resources and other support systems or entitlements. These include also their perceptions, knowledge and attitude toward the conditions of their land and water resources, the risks associated with their economic activities and the effects of declining resources in the event of natural and anthropogenic hazards to their livelihood, income, health and food security as well as their adaptation strategies in response to these risks and uncertainties. The view within a watershed framework is that the spatial and temporal interactions between the socioeconomic circumstances and production activities will have an effect on both land and water-based resources. Interactions here refer to pressures imposed at any one place or point in time that can be propagated through the entire watershed and

lake ecosystems and its implications for future ecosystems function over varied spatial scales.

Environmental Hazards and Risks

There are two types of risks distinguished by their causes and consequences: (1) Environment-Human-Risks that are naturally caused environmental changes that put humans at risk; and (2) Human-Environment-Human-Risks that are anthropogenic environmental changes that in turn jeopardize humans via alterations of the environment. The first type of risks have been observed in the three bio-physical locations in selected sub–watersheds along Laguna Lake, namely, terrestrial upstream / midstream sites and downstream lakeshore sites. Typhoons that are naturally caused that frequently visit the area affect the inhabitants in these different sites in varying types and degrees. In the upstream/midstream sites, typhoons lead to landslides, soil erosion, overflowing of rivers, farm losses and destruction of properties and infrastructure. In the downstream lakeshore sites, they cause flooding, siltation and destruction of fish cages resulting to huge economic losses (Desakota, 2008).

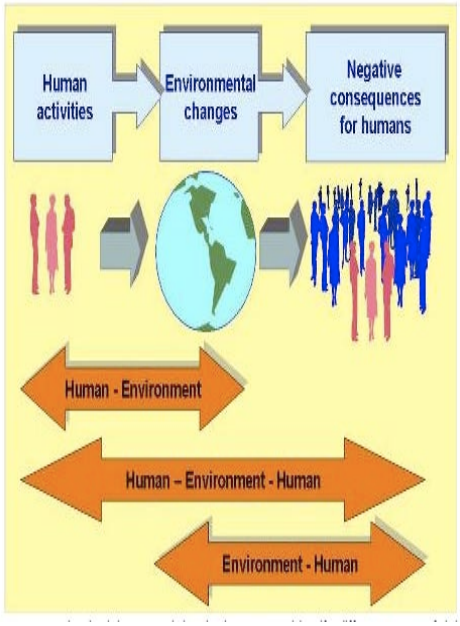

Figure 2. Human Activities and Environmental Consequences

The second type of risk is anthropogenic in nature, that is, due to human activities. This type is important because anthropogenic causation allows for the ascription of responsibility and affects coping strategies. The human activities in the upstream areas include the application of fertilizer and farm chemicals in the farms and the housing developments. In the midstream areas, the major problems are wastes dumped in the nearby creeks and rivers. The disposal of wastes namely, the human and animal wastes, domestic household wastes and industrial wastes are a major concern in the lakeshore areas.

The combined effects of the hazards of natural and anthropogenic nature have led to the reduction of household income, food insecurity, and health deterioration of the inhabitants in the area. In the upstream areas, the soil has become more acidic from over application of fertilizer while in the lakeshore areas, water quality has deteriorated and volume as well as quality of fish catch has declined.

The continuing degradation of the terrestrial and aquatic resources has led to the reduction of their current resource base. A better understanding of these different types of risks is important to come up with measures to improve and protect and if possible expand the current resource base.

APPROACH TO THE STUDY

Given the interconnectedness of these cross-cutting issues, it was deemed necessary to integrate the perspectives from a transdisciplinary team and involve the different

stakeholders in the entire process to connect new knowledge and get a deeper understanding of the relevant issues. The stakeholders included the scientists from different disciplines of social science (economists and socio-anthropologists), biological science (terrestrial), physical science (chemists and geographers) and medical science (medical doctors) as well as the community members, the local government units and the line agencies involved in the management of the lake.

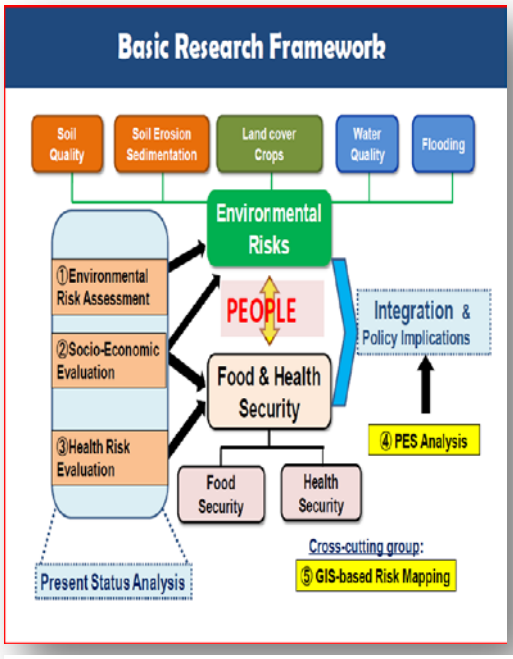

Figure 3. Transdisciplinary Teams to Address Complex Issues

FINDINGS

Results of the survey of household respondents in three (3) bio-physical locations in the sub-watershed study sites, namely the terrestrial upstream/midstream sites and downstream lakeshore sites show that the major concerns in these areas relate to the improvement, protection and expansion of their current resource base given the continuing degradation of the terrestrial and aquatic resources. There were three development issues observed within the subwatershed under study:

Skewed population density. The northeast section of Sta. Rosa comprises 58% of the city's total land area, and settlements are concentrated in this portion with 91% of the total population residing for a density of 39 persons per hectare as of 1999.

Informal Settlements. Most informal settlements are located in environmentally critical zones such as the lakeshore area (Barangays Sinalhan, Caingin and Aplaya) and along rivers, creeks and irrigation canals, high-risk areas: along the railway and adjacent to industries.

Depletion of groundwater resources. Groundwater resources are being depleted as a result of the increasing water demand by residential, industrial and commercial sectors. The water quality decreases as leachate from dumpsites, industries, oil spills and septic tanks infiltrate into aquifers. Groundwater exploitation has reached around 60% of the threshold level in 1999. In Sta. Rosa, no dumpsite was maintained before 1996. Open burning, dumping, burying and disposing into waterways are practiced in the city. Based from the CLUP 2006-2020, the entire city lacks liquid waste treatment facilities. The city resorts to discharging wastes into surface waters, local rivers and creeks. Consequently, Sta. Rosa contributes to the unfavourable class C status of Laguna Lake.

In the uplands, the observations show that the conversion of the farmlands to housing developments has led to the loss of major water catchment in the sub-watershed of Sta. Rosa, Laguna and Silang, Cavite contributing to massive landslides

and flooding in the adjacent lowland communities. The loss of the farms due to these land conversions has also increased the income disparities among the households with the poorer sector of the community experiencing a higher incidence of food insecurity.

The unsustainable upland farming practices is one major factor leading to the deterioration of the biophysical conditions of the farms. The soils have become more acidic and the incidence of soil erosion has increased which has made it very difficult if not impossible to grow two crops in a year. The deterioration in soil quality has forced farmers to further increase the use of fertilizer in an effort to minimize the decline in crop yield. However, the lack of access to credit facilities has also limited the amount of fertilizer and other inputs that farmers are able to apply in the farms. This is aggravated by their limited knowledge of the benefits from the use of organic fertilizer and integrated pest management. The low farm yields, the inferior quality of harvested crops and depressed prices of farm produce have reduced farm incomes and worsened food insecurity in these areas.

The fisherfolks along the lakeshores are seriously affected by the pollution of the lake. The major sources of pollution are the households and industries located along the lakeshores. It is observed that the quality and quantity of fish harvested from the lake has considerably declined due to pollution and consequently reduced the income of these fisherfolks.

Fisherfolks on the lakeshore areas are faced with risks of unsafe fishing activities due to climatic conditions, fish scarcity and decline in fishing income attributed to lake pollution, damage of aquatic resources due to inappropriate fishing practices, foul smell, tainted taste of fish catch and lax implementation of governing rules on fishing.

The probable health risk associated with unsafe or an unhealthy environment would include the use of farm chemicals, intoxicating smell from burned accumulated household wastes, plastic containers and other wastes dumped in nearby creeks and rivers and lack of toilet facilities especially among those in the lakeshore areas. There are also indications of deteriorating water quality not only in the upstream but in lakeshore areas given the preference of households for bottled mineral waters.

In the lowland Sta. Rosa study area, there are a number of factors that have reduced the amount and quality of goods and services provided by the lake water ecosystems. The first is the land use conversions that initially led to the uncontrollable increase of solid wastes from households and liquid wastes from factories that were dumped into the lake. The resulting pollution as well as the reduction in the fingerlings observed to have been trapped in plastic bags thrown into the lake contributed to the reduction of the population of native fish species. The plankton population, which also declined as a result of pollution, was mentioned too as the cause of the disappearance of shrimps and other fish species. Residents also mentioned the tainted taste of fish, which they attributed to heavy siltation from upstream areas caused by human activities and the lake becoming shallow over time. The lake becoming shallow also contributed to the flooding as the lake tended to overflow during monsoon rains and typhoons (Macandog et. al., 2011).

Another factor is the expansion of the areas occupied by the fish pens and the illegal fishing practices of fishermen like trawling. Based on the responses of 73% of survey respondents, the fish catch of small fishermen have been reduced because the fishermen were not allowed near the fish pens, given warning gunshots if ever they go near them (Rañola et.al. 2011) According to Borja (n.d.), the expansion of the areas occupied by the fish pens contributed to the slower growth of fish and consequent decline of harvest. Between 1973 and 1982, the yield from the fish pens was reduced by half and during the same period, harvest from open water fishery declined by 46%. With smaller fish harvest, fish pen operators increased supplementary feeding that had a detrimental effect on water quality. The expansion of fish pen areas and increase in supplementary feeding not only reduced the area for open water fishing but also reduced water circulation favoring the spread of water hyacinth.

A third factor is the introduction of exotic but unwanted fish species like the knife fish and janitor species. These species are not edible and have no market value. They are predators of fishes of market value, highly invasive in nature and cause damage on fishnets from their hard and uneven sharp teeth. It was mentioned by fishermen during the field interviews that in 1986, the big carp head and the 'arroyo" fish species were introduced into the lake to increase its productivity. They also mentioned that it was in 1982 that the first janitor fish was caught (Macandog et.al. 2011).

The study of Mutia and Zafaralla (2012) shows that among the different fish species with commercial value, tilapia now is the dominant species in the landed catch during the cool season, accounting for an average of 39% of the total daily weight. The relatively high-priced species, like milkfish, Manila catfish, milkfish, silver perch, and goby have become scarce. These commercially important fish species are the most threatened by the growing menace coming from the janitor fish. The Janitor fish has the advantage of multiplying fast while hiding its eggs away from the access of bigger fish species, explaining its higher survival rate. It reportedly feeds on the attached eggs of fishes, which diminishes the competing ability of other species.

The knife fish also is a species that poses a threat to all commercial and lesser species in the lake and if not addressed, it may just be a matter of time that the commercially important fish species will become extinct from predation. The presence of janitor fish, and knife fish in the lake may actually lead to the alteration of the food chains, food webs, material and energy cycles in the lake (Zafaralla, 2011).

A major impact of these ecological changes in all the study sites in the upstream, midstream and downstream areas is on the incidence of food insecurity. This is characterized by seasonal inflow of income, climate and weather variability, difficulty in meeting food expenses and the cost of farm inputs and fuel. In the midstream area for example, some 67% of the households experienced difficulty with meeting the food requirements of the family. This is despite the fact that expenditures for food are a top priority in the budget of households. Households in the midstream areas gave accounts of insufficient funds to purchase food; perceived that foods eaten by household members are inadequate in quality or quantity; made adjustments by reducing the quantity and quality of the foods taken.

In Silang-Sta. Rosa area, the periods when the households are most food insecure are usually during the entire wet period from May to December and dry months from January to April. It would normally last for two months but sometimes extends up to three or four months and for some, an extended period of four to five months during the wet and dry seasons or for a whole year.

Overall, the deterioration of the biophysical resources (terrestrial and aquatic) has led to the decline in income, food security, and health of the upland and lakeshore inhabitants. The pollution of the water of the lake has led to: (1) risk and uncertainty in upland agriculture and fishing activities due to (2) risk of being food insecure; (3) probable health risk due to unsafe or an unhealthy environment; and (4) deteriorating quality of water supply for domestic purposes.

Willingness to Pay for Environmental Services

Two major problems that were identified as causing the environmental problems were land use conversions and waste management that was contributing to the flooding and incidence of diseases. On the issue of land use conversion, the question raised was how to provide enough incentives so that the remaining forested areas within the watershed would no longer be converted for other uses. How much these landowners be willing to accept to join an agroforestry program. On other hand, how much would the beneficiaries of the program be willing to pay to avoid flooding and other adverse consequences from deforestation? The study showed that among households affected by pollution and flooding, there was willingness to pay for environmental services (PES) for agroforestry programs that would protect biodiversity, improve water quality and reduce flooding. The important factors influencing their willingness to pay include their level of family income, price or cost of supporting the PES program, exposure to the hazard, impacts of flood on sources of income, the presence of children in the household that are at most risk to flooding and food insecurity and the number of perceived benefits from agroforestry systems. The recommendation is to intensify environmental education and information dissemination (Rañola, et.al, 2013).

Another problem was the waste that was clogging the waterways especially during heavy rains and the concomitant diseases that these brought. The results of the surveys showed that in a number of areas, there were in fact limited or no collection of garbage on a regular basis. A study was therefore undertaken to determine the willingness to pay for garbage collection services. Results showed that one-half of the respondents are willing to pay for a garbage collection service in their area. The amount they were willing to pay does not vary much across the barangay. Respondents from Barangays Bucal and Aplaya were willing to pay PhP48 per month, Php49 per month in Pulong Bunga, Php50 monthly in Tartaria and Gulod, and in Sto. Tomas Php64 per month. While the respondents were willing to pay for this service, it would count as an additional expense on poorer households, and concern was expressed by some on where to get the additional budget to pay for this service (Ranola, et. al., 2011).

Coping Mechanisms and Household resilience

Although farmers have faced these risks over the years, they claimed that their level of exposure to these types of risks is low. This can be attributed to their resiliency and the measures they have adopted to address them. The factors affecting their level of resiliency include their earning capacity, family assets and asset management as well as support from family and relatives that provide financial assistance in times of need.

For the most part however, these adaptive measures are ad hoc and limited in mitigating the impacts of climatic events and other forms of risks (Rañola et.al.2009). For example, some 47% of farmer respondents in Lumil, an upstream area, mentioned immediate replanting to replace damaged crops after typhoons and heavy rains or watering crops or simply waiting for crops to recover naturally as mentioned by 20% of farmer respondents in Tartaria. The majority (73%) of the households would try to generate enough cash from off-farm or non-farm employment to buy their staple foods.

Households in the lakeshores have adopted varying forms of coping mechanisms to deal with these risk situations. Some would seek employment elsewhere while others would make use of their savings or borrow from their relatives. In response to typhoons and flooding events, households would stock on food and clothing and make sure they have ready cash to meet emergencies. Some would also move to evacuation centers while others would tie their houses or build a second floor for their house.

Yaman ng Lawa: An Adaptive Co-Management Approach

One of the major objectives of the study was to share the findings with the communities where the studies were undertaken. Thus was conceived the *YAMAN ng Lawa program.* The *YAMAN ng Lawa* program was developed as an adaptive co-management approach for the sustainable management and utilization of the lake resources. *YAMAN* is the Filipino word for *treasures* while *LAWA* means lake, thus translated as “treasures of the lake”. It has been designed as an approach that provides a platform for Laguna de Bay communities, the local government officials and policy makers and the local and foreign scientists to identify and provide solutions to the major issues facing the Lake. It is a social experiment with different stakeholders getting together to take action for the sustainable development and use of the Lake resources.

It is based on an understanding that the environment and development can co-exist. It gives importance to three key elements. The first is Village Participation throughout the entire process, especially in the lake management. The second is the value given to both indigenous, traditional or local knowledge and modern technologies in searching for solutions or interventions to the problems of the Lake. The third is continuously searching for better solutions or interventions in answer to emerging issues.

A key concept in the approach is adaptive co-management. *A **systematic, rigorous** approach for **deliberately learning** from management actions with the intent*

to ***improve subsequent management policy or practice (MFR, 2008*** as cited in British Columbia***).*** There are several key characteristics of the concept that are universal and fundamental. This includes (1) reducing key uncertainties from learning; (2) Changing the policy and practice based on this learning; (3) focusing on improving management; (4) an experimental management to achieve desired goals; and (5) it is formal, structured and systematic but flexible and not ad-hoc or simply reactionary.

The adaptive co-management (ACM) is the result of combining the iterative learning of adaptive management with the linkages of collaborative management. "The emerging concept of ACM is a collaborative approach to adaptive management that engages governments, proponents and planning participants explicitly in defining issues, developing management plans and monitoring outcomes" (Ruitenbeek, J. and C. Cartier. 2001 as cited by MFR British Columbia).

There are six steps in the adaptive management process that starts with (1) assess problem, (2) design, (3) implement, (4) monitor, (5) evaluate, and (6) adjust (Figure 3). The six steps are important to be completed for successful adaptive management. It is important to understand each of these steps and the implications of omitting any.

Figure 4. Adaptive Co-Management Process (MFR, British Columbia

The LakeHEAD Project has applied the ACM approach in four major community initiatives within the sub-watershed. These include the: "Bio-Park", the "Yankao Fish Method" and "ACM Community Waste Management" and "Management of Ecologically Related Diseases".

The *BioPark* remediation approach "is an integrated system of river restoration, rehabilitation, protection and conservation embodying a combination of sustainable efforts aimed at achieving ecological balance, environmental health, aesthetic advantage, socio-cultural interactions that instill an attitudinal change among stakeholders towards the total environment" It is a phytoremediation system comprised of bamboo and native aquatic macrophytes of the stream to be rehabilitated. The physical effect of the BioPark phytoremediation system is the clarification of the water and increase in the fish population in its immediate vicinity. The chemical effect on the other hand depends on the macrophyte used, water hyacinth or kangkong. The relative importance of these two biologically mediated processes however needs further investigation. With the BioPark phytoremediation program, members of the communities are drawn to cooperate in stream clean up and rehabilitation (Zafaralla, 2011).

The "Yankao" eco-restoration for better lake water quality and fishery resources is another initiative of the ACM. Its objective is to address the decline in fish catch and seasonal fish quality changes in Laguna de Bay. A pilot demonstration was developed to show the fisherfolks the efficacy of the "Yankaw" Fishing Method, the impacts of their local practices and the use of bio-signals for the restoration of local fishes and habitat in the Calamba City Sanctuary.

Village Participation in addressing the major issue of Household Waste Management in the communities is the third initiative of the ACM approach of the project. It involved different processes from an assessment of the waste management conditions and their on-site and off-site effects and the consideration of the proposals of the communities for addressing these issues. Results of the focused group discussions (FGDs) and the ensuing following meetings with the community people and local government units show great interest in the program and the willingness to participate in such programs. There was willingness also among the LGUs to implement the agreed program of actions that were proposed during the FGDs and among the households, the willingness to share in paying for the cost of these programs

The last initiative of ACM dealt with community-based management of ecologically related diseases. It dealt with issues related to environmental deterioration and the consequent threat of ecological diseases resulting from poor waste management. It highlighted the strategies and roles of local health practitioners, local government and the affected households in preventing the spread of ecological diseases in the Laguna Bay lakeshore areas.

Yaman ng Lawa Community Forums

The Yaman ng Lawa Community Forum of 2012 showcased the importance of community partnerships in environmental management to address the environmental issues facing Laguna de Bay. The focus of the 2012 Community forum was on "Partnerships in Laguna de Bay: Community-Based health, Food and Ecological Risks Communication and Early Warning Systems". It provided a venue for the Laguna de Bay communities and the researchers from the Philippines and Japan and other stakeholders to exchange information, identify and analyze issues and challenges related to ecological risks to health and food security. A major objective of the forum was to provide the different stakeholders an opportunity to understand the contemporary ecological abnormalities, particularly the recurrent Fishkill episodes whose impacts extend to declining market acceptance of local fishes in and around the Laguna de Bay Region.

The focus of the 2013 Yaman ng Lawa Community Forum was on Adaptive Co-Management. This was an attempt to share with the wider community the concept and importance of the approach to the management of the environment.

Lessons Learned

There are five major lessons that can be derived from the experience with the LakeHEAD Project. First, the process of economic growth and development is not without costs to the environment given the consequent effects on food security and health. The most affected are the poor, marginalized sector of society that is most dependent on these environmental resources. Second, given the complexity and interrelatedness of the environmental issues, it is important that a transdisciplinary team be tasked with analyzing the complex environmental issues and develop the appropriate approaches or strategies to addressing these issues. Third, in addition to the regulatory mechanisms, market-based instruments can be very useful in helping to

mitigate the adverse consequences on the environment. Fourth, there should be a major effort in sharing the findings of the research with the stakeholders as exemplified in this case by the *Yaman ng Lawa* Program. Lastly, the strategies should go beyond the traditional environmental management approach of predicting, mitigating, implementing and monitoring given the uncertainties of outcomes emanating from unanticipated changes in the environmental conditions or inaccurate predictions that is borne by subsequent information. The adaptive co-management approach involves the stakeholders in the development and implementation of strategies and adds the additional step of "adapting," to make the necessary changes in these strategies in response to outcomes from their implementation.

Literature Cited

Brooks, K. N. (1991). *Hydrology and the management of watersheds.* Ames, Iowa: Iowa State University Press.

Cruz, R. V. (1999). Integrated Land Use Planning and Sustainable Watershed Management. *Journal of Philippine Development*, 27-43.

Desakota Study Team. (2008). *Re-imagining the Rural-Urban Continuum: Understanding the role ecosystem services play in the livelihoods of the poor in desakota regions undergoing rapid change.* Retrieved August 01, 2012, from Institute for Social and Environmental Transition - Nepal (ISET-Nepal): http://www.nerc.ac.uk/research/programmes/espa/documents/Final%20Report%20Desakota%20Part%20I.pdf

Kristensen, P. (2004). *The DPSIR Framework.* Nairobi: UNEP Headquarters.

Laguna Lake Development Authority (LLDA). (2005). *Laguna de Bay Watershed Environmental Action Planning (LEAP).* Manila: LLDA.

Macandog, D.B.M., Balon, J.L., Engay, K.G. and Nicopior, O. S. 2011. Understanding the patterns, drivers and impacts of land use change in Santa Rosa subwatershed. LakeHEAD Annual Report No. 1. FY 2010. RIHN, Kyoto, Japan.

Ministry of Forest and Range of British Columbia (n.d.) Defining Adaptive Management. http://www.for.gov.bc.ca/hfp/amhome/Admin/index.htm

Mutia, M.T.M. and Zafaralla, M.T. 2012. Assessment of Fishery Resources in Sta. Rosa Sub-Watershed of Laguna de Bay. LakeHEAD Annual Report No.2. FY 2011. RIHN, Kyoto, Japan.

Millennium Ecosystem Assessment, 2. (2005). *Millennium Ecosystem Assessment: Living Beyond our Means: Natural Assets and Human Well-being (Statement from the Board).* Retrieved August 01, 2012, from http://www.millenniumassessment.org/

Rañola, R.F., Rañola, F.M, Casin, M.C.S and Tan, M.F. 2011. The Social and Economic Basis for Managing Environmental Risk for Sustainable Food and Health in Watershed Planning: The Case of Silang-Sta. Rosa Sub-Watershed Communities in Lake Laguna Region. LakeHEAD Annual Report No. 1. FY 2010. RIHN, Kyoto, Japan

Rañola, Roberto Jr. F., Fe M. Rañola, Ma. Cynthia S. Casin, Ma. Francesca O. Tan, Josefina T. Dizon and Ma. Noriza Q. Herrera, 2011. Assessment of Domestic, Fishery and Agricultural Wastes in Silang-Santa Rosa Sub-watershed: Survey Results for the Yaman ng Lawa (YNL) on Adaptive Community Waste Management (ACWM) Project Sites LakeHEAD Annual Report No. 2. FY 2011. RIHN, Kyoto, Japan

Rañola, R.F, Jr., Macandog, P.B. & Tanaka, K.. 2013. Estimating Household Demand for Ecosystem Services from Agroforestry Systems in Laguna Lake Basin, Philippines. A

paper presented in the 88th Western Economic Association International (WEAI) Annual Conference in Seattle, United States of America, June 30, 2013.

Zafaralla, M.T. 2011. The BioPark Concept to Degraded Shallow Stream Restoration and Rehabilitation. Progress Report. Save Silang-Santa Rosa River Foundation Inc., Santa Rosa City, Laguna.

Water Resources Development Project. Inception Report. 1964. Task 2. Environmental Assessment and Catchment Management of the World Bank - National Irrigation Administration National Water Resources Board thru Elc Consult (Milan, Italy), Asiatic Consultant Inc. (Manila, Philippines), Hydraulic Research (Walingford England) and Sycip, Gorres, Velayo and Co. (Manila, Philippines)

統合的生態系管理としての里山保全とその多面的機能[1]
―神奈川県里地里山保全条例の実施過程を中心に―

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キーワード：里山、持続可能な開発、ランドスケープ、生態系、ガバナンス

１．はじめに

農業人口が高齢化し、耕作放棄地が増えるなか、都市部では“里山”のもつ多様な価値が見直され、その保全と活用が「まちづくり」の観点から重視されるようになった。人の手が加えられた二次的自然である“里山”は数百年にわたって持続可能な方法で維持され、豊かな地域文化や生物多様性を育んできた(Takeuchi 2003)。国民の大部分が都市部に住むようになった現在においても、“里山”は教育、レクリエーション、景観、保健・福祉、防災といった多面的機能を有しており、統合的生態系である“里山”の保全や再生、活用を図ることは、持続可能な地域の形成に際して大きな意義をもつものと考えられる。

筆者らは、神奈川県が 2007 年に制定した「里地里山の保全・再生・活用の促進に関する条例」にもとづいて進めている里地里山保全事業の実施状況について、2011-2012 年度の２か年にわたって現地調査を行った。神奈川県の里地里山保全条例は、神奈川の里地里山の持つ「四季折々の風景」、「多様な生物を育む空間」、「生活文化の伝承の場」、「自然とのふれあいの場」などの多面的機能の発揮と次世代への継承を図ることにより、県民の健康で心豊かな生活の確保に寄与することを目的としている。神奈川県の里地里山保全条例は、都道府県レベルでは全国で２例目になるが、その特徴は、①土地所有者と地域住民の主体性の尊重、②土地所有者、県民、県、市町村の相互の連携及び協働、③地域の農林業の営みを尊重した継続的な保全を基本理念としている点にある。神奈川県では条例の施行にあたって「かながわ里地里山保全等促進指針」を策定し、2012 年度までに県内の 13 地域を「里地里山保全等地域」として認定し、14 の活動団体による「里地里山活動協定」を認定している。

現地調査の結果、里地里山保全等地域では、耕作放棄地や荒廃した森林を再生させる活動が地域住民の自発的な努力によって行われているほか、親子の農業体験事業や小学校と連携した生物調査、伝統的な食文化を伝えるイベントの開催など多様な活動が行われていることがわかった。しかしながら、活動団体ではメンバーの高齢化が進み、鳥獣被害に対応できないなど、多くの課題にも直面している。統合的生態系である“里山”を保全再生し、活用していくためには、公共部門の積極的な関与が必要になる。地方自治体は“里山”のもつ公益的機能を十分に認識し、地域住民の取組みを積極的に支援するとともに、土地利用規制や農地法の改正、民間企業との協働、国内・海外との連携などの総合的な政策を推進する必要がある。

1　本論文は、横浜国立大学大学院国際社会科学研究科比較公共政策ゼミナール（研究代表：小池治）が、神奈川県の「大学発・政策提案制度」による「里地里山の保全手法等に関する調査研究」の採択を受け、神奈川県環境農政局農政部農地保全課の協力のもとに 2011～2012 年度の２年度にわたって実施した調査研究の成果の一部に加筆したものである。

なお、本論文では、神奈川県における里地里山保全の取組を事例に、わが国における里地里山の多面的機能の保全や活用を図るうえで必要な政策課題について検討するが、統合的生態系である“里山”の保全は、ヨーロッパを中心に進められている農村景観保全（rural landscapes conservation） や開発途上国における森林保全とつながる部分があることから、国際的な連携のあり方についても若干言及する。

２．神奈川県における里地里山保全への取り組み

（１）国における里山保全施策の展開

わが国の国土の約 40%を占める里地里山は、都市化による開発や耕作放棄地の増加によって崩壊の危機にあるといっても過言ではない。わが国において「里山」の価値が再認識され、国や地方自治体による取組が始まるのは 1990 年代以降である（小寺 2008）。

国では、環境基本法（1993 年）を受けて 1994 年に閣議決定された第一次環境基本計画が、里山保全を正面から取り上げた最初のものとされている。同計画では、「人口密度が比較的低く、森林率がそれほど高くない地域としてとらえられる里地自然地域については、二次的自然が多く存在し、中大型獣の生息も多く確認される。この地域は、農林水産業活動等様々な人間の働きかけを通じて環境が形成され、また、野生生物と人間とが様々な関わりを持ってきた地域で、ふるさとの風景の原型として想起されてきたという特性がある。すぐれた自然の的確な保全と自然とのふれあいの場としての活用を図ることが必要であり、また、過疎化、高齢化が進行している地域を中心に森林、農地等の有する環境保全能力の維持を図り、雑木林等の二次的自然を適切に管理することが重要である。」として、すぐれた自然の保全、森林、農地、水辺地等における自然環境の維持形成、公園、緑地等の整備、社会資本整備等の事業の実施時の配慮などを盛り込んだ。

一方、2000 年代に入ると、里山地域における生物多様性が認識されるようになり、2002 年 3 月に策定された「新・生物多様性国家戦略」では生物多様性の保全における里地里山の重要性が盛り込まれた。なお、この年には議員立法で「自然再生推進法」が制定されたが、同法にも里山が自然再生の対象地域に含まれた。こうしたなか、環境省は 2004 年度から 2007 年度にかけて「里地里山保全再生モデル事業」を実施し、神奈川県秦野市を含む全国の 4 地域をモデルに指定して里地里山を保全するための行動計画の作成に取り組んだ。それを受けて 2010 年 9 月に策定されたのが「里地里山保全活用行動計画」である。これは生物多様性国家戦略の具体的な施策展開のための実行計画と位置付けられ、地方自治体が行う里地里山保全活用施策のガイドラインとなることが企図されている。

このほか国レベルでは、農林水産省も「食料・農業・農村基本法」（1999 年）のなかで農業がもつ多面的機能を強調するようになり、農村景観や自然循環機能を重視する施策を進める一方で、増加する耕作放棄地の再生・利用に関する施策を打ち出している。また国土交通省は、都市公園法や都市緑地法制度をつうじて里地里山の保全や多様な主体による管理・利用等の活動の推進に乗り出している。さらに、総務省は地域活性化の観点から、地方自治体による里山地域における地産地消やエコツーリズムなどの推進を支援している。

もっとも、政府は関係各省の連携による里地里山保全事業の推進をうたっているが、里地里山の保全を直接の目的とした法律はまだ策定されておらず、里地里山保全は縦割り行政の仕組のなかで断片的に、かつきわめて小額の予算で行われているのが現状である。

それに対して早くから里地里山のもつ多面的な機能の重要性を認識し、里地里山の保全や再生・活用に積極的に取り組んできたのが、地方自治体や市民活動団体（NPO）である。1960 年代には都市化や地域開発による自然や景観の破壊に対して各地で市民運動や住民運動が起こり、街並みや自然環境を保護保全するための条例が相次いで制定された。その動きは里地里山の保全へと波及し、都市部では住宅開発による里地里山の消滅、農村部では過疎化による里山の荒廃に対して全国各地で保全運動が盛り上がった。やがて市町村レベルでは、高知市（2000 年）、茅野市（2004 年）、埼玉県嵐山町（2007 年）、相模原市（2011 年）などで里地里山を保全するための条例が制定され、都道府県レベルでも千葉県（2003 年）と神奈川県（2007 年）が里山条例を制定したところである。

こうした動きのなか、政府は 2007 年 6 月に「21 世紀環境立国戦略」を閣議決定し、日本の里地里山保全の取り組みを「里山イニシアティブ」として世界に発信していくことを宣言した。政府はこれを 2010 年に名古屋市で開催された生物多様性条約第 10 回締約国会議（COP10）の場で提唱し、国内でも里地里山の保全活用を率先して促進するとしている。

（２）神奈川県の里地里山保全条例

以下の部分では、神奈川県における里地里山保全の取り組みを事例に、わが国の里山保全の問題を考察する。さて、神奈川県の里地里山保全条例の出発点となったのは、2003年３月にまとめられた「かながわ里山づくり構想」である。神奈川県では、2001年度に環境農政部職員９名によるプロジェクトチームを設置して里山に関する調査研究を行い、農家と市民グループが連携して里山の保全・活用を図ることなどを提言した。それを受けて県の環境農政部では2002年度に県内の里山の実態把握を行うとともに、大学の研究者、NPO団体のリーダー、農家代表等９名を構成メンバーとする懇話会を設置して、里山保全の具体的な方策を検討した。それらの検討結果をとりまとめたものが「かながわ里山づくり構想」である。同構想では、神奈川県では農業振興の観点や緑行政の観点から施策が講じられてきたが、県内の里山の減少、荒廃が現在も続いていると指摘する一方で、さまざまな分野で市民のボランティア活動が盛んになっており、本県の里山においても雑木林の手入れ、農地の管理などの活動が芽生えており、それらの活動の発展が、農業の活性化や里山の環境保全の面からも期待されるとする。そして、従来の施策を超えた新たな施策として、農家、市民、行政が共働した開放性のある「里山農業エリアづくり（里山づくり）」を推進し、地域農業の活性化と良好な里山環境の保全を図ることを提唱している。この「里山づくり構想」の特徴は、地域の農業の活力を踏まえた取り組みをその中心においたことである。そのうえで調和のとれた「里山づくり」を円滑に推進するために、農家、市民グループ、行政等が幅広く参画した協議組織を設置し、「里山づくり」の実施計画を策定するとともに、取組の連携を図り、多様な活動のネットワークを構築するとし、行政の取組としては「里山づくり」の活動を情報発信し、「里山づくり」の普及啓発や参加者の募集等を行うとともに、「里山情報バンク」を設置してフィールドと担い手の一体化を促すことを提言した。

同構想に基づいて、県では 2004 年度から 2008 年度にかけて県内各地において「里山づくり推進事業」を展開した。この事業は、神奈川県内の里地里山で活動する 9 団体（川崎市野川地区、小田原市久野地区、相模原市（旧城山町）小松・城北地区、厚木市七沢地区、秦野市名古

木地区、秦野市菩提地区、南足柄市大雄町浦山地区、大井町山田地区、愛川町八菅山・尾山地区）に対して、財政支援や事務局支援、アドバイザー派遣等の支援や補助を行ったものである。

この事業を担当した県農地課農地活用班では 2007 年度に事業の実施状況を検証し、各地で多様な活動が行われていることを把握した。その検証結果によれば、県内の里地里山では、農業生産活動（遊休化していた棚田・谷戸田の復元による耕作放棄地の解消）の以外にも、教育活動（小学校と連携した「生き物調査」や田植え・稲刈り体験や地元学など）、環境活動（絶滅危惧種の保全）、世代間交流、観光活動（ざる菊まつりなど）、健康づくりなど多様な活動が行われていた。また、活動にあたっては推進母体（協議会）を設置し、推進母体が事業を実施するという方式を採用した。協議会は地域住民と行政で構成したことから、活動の主体である地域住民と支援する行政が一体となって事業をスピーディに進めることができた半面、行政が事務局機能を担うと、発案やとりまとめが行政依存になりがちな傾向もみられたとしている。

この「里山づくり推進事業」の成果を踏まえて、神奈川県は今後の里地里山保全の在り方を検討するため「神奈川県里地里山専門委員会」（委員長：勝野武彦（日本大学教授））を設置した。同委員会では 2007 年 8 月に現地調査を実施し、これまでの県の取り組みを総括した結果を「みらいに引き継ぐ里地里山をめざして」（2010 年 3 月）として公表した。そこでは今後の里地里山保全の課題として、①ボランティア活動における地域の知恵と技術の継承、②人と自然の関わりを学べるプログラムづくりと農家と非農家の中間支援、③経済的な自立に向けた自主財源づくり、の 3 項目を指摘するとともに、県民への理解と参加の拡大、活動に対する行政の支援の柔軟性、安心できる体制づくり、活動団体による農作物の販売といった点にも留意する必要があるとした。

こうした取り組みを踏まえて、神奈川県では里地里山の保全等を促進するための基本理念や仕組みなどを定めた条例の制定について検討するため、2006年４月に学識者や活動団体代表者、市町村職員による「かながわの里地・里山の管理活用に関する検討委員会」を設置し、2007年１月までに５回の審議を行った。県ではこれらの意見等を踏まえて条例案の検討を進め、2006年９月の県議会定例会環境農政常任委員会へ条例の骨子案を報告した。また、これと併せて、市町村説明会を４回開催するとともに、2006年11月には条例骨子案に対する県民意見募集を実施した。そして2007年９月の県議会定例会環境農政常任委員会に条例の素案を報告した。こうした経過を経て、「神奈川県里地里山の保全、再生及び活用の促進に関する条例案」は、2007年12月の県議会定例会に提案され、同月20日開催の同定例会本会議において全会一致で可決、成立した。そして同月25日に神奈川県条例第61号として公布され、2008年４月１日に施行された。里地里山保全を直接の目的とする条例の制定は、都道府県レベルでは千葉県の「千葉県里山の保全、整備及び活用の促進に関する条例」（2003年）に続いて全国で２番目になる。[2]

神奈川県の里地里山保全h条例の特徴としては、次の３点をあげることができる。その第１は、里地里山がもつ多面的な機能を重視している点にある。県では、条例制定の趣旨のなかで、「里地里山は、農地や山林、集落が一体となった地域であり、農林業の生産活動や薪炭資源の場、人々の日常生活の場として、人の手が入ることによって長い時間をかけて形成されたもの

2 里地里山の保全を直接にはうたっていないが、条例のなかに里山保全に関する規定を設けている都道府県条例としては、長野県「長野県ふるさとの森林づくり条例」（2004 年）、三重県の自然環境保全条例（2005 年）、石川県「ふるさと石川の環境を守り育てる条例」（2004 年）、東京都「東京における自然の保護と回復に関する条例」（平成 2000 年改正）、埼玉県「ふるさと埼玉の緑を守り育てる条例」（2005 年）などがある。

であり、その結果として、里地里山は、農林業の生産の場のみならず、良好な景観の形成、生物の多様性の確保、災害の防止、生活文化の伝承、情操のかん養、レクリエーションの場の提供などの多面的機能を発揮しており、その多面的機能の恵沢は多くの県民が享受しているものである。」と述べる。しかし、県内では近年、産業構造や生活様式の変化、農家の高齢化、集落の混住化等により里地里山は適切な管理がされにくくなっており、里地里山の持つ多面的機能が失われつつある。だが、その一方で、地域住民や市民団体等が里地里山へ関心を寄せ、その保全、再生及び活用のための様々な取組を行うなどの活動が広がりを見せているとして、里地里山が有する多面的機能の発揮と次世代への継承を図るため、里地里山への県民の関心と理解を深めるとともに、土地所有者や地域住民を主体とし、農林業の営みを尊重しつつ、多様な主体が連携し、及び協働する取組を推進するために、里山条例を制定したとしている。

第２は、里地里山の多面的機能に着目しつつも、里地里山における農地の活用を重視している点である。これは農地の活用が図られている地域では里地や里山が良好に保全される傾向があるのに対して、農地の活用が図られていない地域では、地域住民の里地里山保全に対する意欲が低く、耕作放棄地の増加など荒廃が進む傾向があるという見方による。このことは里地里山保全等地域の選定を受けた地区が県西部に多いこととも関係している。大都市地域では農地の活用よりも都市緑地の保全に市民の関心が向けられがちである。その結果、県が選定した里地里山保全等地域は、農地の多い県西部や北部の中山間地域に集中する傾向がある。これはすでに 100を超える里山が認定されている千葉県との大きな違いともいえる。千葉県の場合、里山活動協定を締結している団体には、森林整備や自然観察、環境教育など環境保全を目的とするものが多い。

第３は、県の役割である。条例は「県は、前条に定める里地里山の保全等についての基本理念にのっとり、里地里山の保全等の促進に関する総合的な施策を策定し、及び実施する責務を有する。」（第４条）と定め、第７条において「県は、里地里山の保全等の促進に関する施策の総合的かつ計画的な推進を図るため、里地里山の保全等の促進に関する指針を定めなければならない」と定めた。そして指針では、里地里山の保全等の促進に関する総合的かつ長期的な目標及び施策の方向とそれを総合的かつ計画的に推進するために必要な事項を定めるとした。また、市町村との関係については、県は、里地里山の保全等の促進に関する施策の推進に関し、市町村との連携を図るとともに、市町村が行う里地里山の保全等に関する施策との調整に努めるものと定めている（第４条）。

その一方で、条例は里地里山保全における市町村の役割を重視しており、第８条において「知事は、土地所有者等及び地域住民の主体的な活動により里地里山の保全等が図られると認められる地域を、当該地域を管轄する市町村長からの申出により、里地里山保全等地域として選定することができる。」と定めている。これは、里地里山の保全等にあたっては、基本理念に掲げるように、農林業の営みを尊重することが必要であるが、多様な主体の連携・協働によって里地里山の保全等を推進していくためには、地域づくりや地域の活性化という視点が重要であるとの認識に立っている。したがって里地里山保全等地域の選定の権限は知事が有するものとしつつも、その実際の選定は、地域の実情を良く知る市町村のイニシアティブにより、市町村長からの申出を受けて、その主体性及び自主性を尊重して知事が行うこととしている。

なお、里地里山保全等地域の選定については、①地形的、歴史的、文化的な一体性を持ち、かつまとまりのある土地利用がなされている地域であること、②里地里山と認められる地域で

あること、③地域内の農林地等が、都市公園等国又は地方公共団体が管理を行う土地のみからなるものでないこと、④地域の自主的な活動又は県民と行政の協働・連携により、里地里山の保全等が図られると認められること、⑤土地所有者等や地域住民が主体となって現に保全等の活動が行われている地域、⑥土地所有者等や地域住民が主体となって保全等を進めていこうという機運が見られる地域、⑦市町村が、土地所有者等や地域住民と協働して保全等を進めていく必要があると認める地域、等の点を考慮するとしている。

（３）里地里山保全等地域の選定と里地里山活動協定の認定状況

県が里山条例の施行に際して策定した「かながわ里地里山保全等促進指針」（2009年3月）では、里地里山保全等地域の選定及び里地里山活動協定の認定について、表１のようなスケジュールを示している。

表１　里地里山保全等地域の選定及び里地里山活動協定の認定のスケジュール

（地区数、団体数は累計）

施策	2009年	2010年	2011年	2012年	2013年
里地里山保全等地域の選定	5地区	8地区	11地区	14地区	16地区
里地里山活動協定の認定	6団体	10団体	14団体	18団体	20団体

（出典：「かながわ里地里山保全等促進指針」（2009年3月）

2013年３月末の時点では14地区が里地里山保全等地域に選定され、14団体の里地里山活動協定が認定されている。そのうち県が2006年度から実施した「里山づくり推進事業」の対象であった地域は６地区（小田原市久野地区、相模原市小松・城北地区、秦野市名古木地区及び菩提地区、南足柄市大雄町浦山地区、厚木市七沢地区）であり、里地里山保全条例制定をきっかけに県内各地に里地里山保全の動きが広がってきていることが推測される。ただし、里地里山保全等地域に選定された地区は、県の中央部から西部に集中している。

2012 年度までに里地里山活動団体の認定を受けた 14 団体の活動をみると、棚田や谷戸田の復元や休耕田の再生など農地の保全活用を軸に、生物多様性の保全、地元の小学校と連携した生き物調査や環境教育、蕎麦打ち体験や料理教室などの健康づくり、さらにはコスモス祭りやざる菊祭りといった観光農園型の活動まで多様な取組みが行われている。以下では、筆者が実施した現地調査（ヒアリング）の結果から、活動団体の活動の特徴をみていく。

①活動の発足の経緯

里地里山保全活動の発足の経緯は多様であるが、荒廃する農地や山林の保全に取り組んできた農家を中心とするボランティア組織が母体となっているケースが多い。都市部に近い地域では、廃棄物の不法投棄から農地を守るため休耕地の再生に取り組んだ例（相模原市「小松・城北」地区）や、ホタルの保護運動がきっかけとなって里山保全の組織ができたところもある（藤沢市石川・丸山地区）。活動歴をみると、「小松・城北」地区、南足柄市矢倉沢地区、平塚市土屋地区のように、すでに 10 年以上の活動歴をもつ地区もあれば、秦野市菩提地区や小田原市栢山地区のように、里山条例の制定をうけて活動団体が結成された地区もある。

②土地所有者と活動団体の関係

里地里山保全等地域に選定された地区では、活動団体が土地所有者と里地里山活動協定を締結して里地里山の保全等の活動を行っている。選定された地区のほとんどでは農家の高齢化等によって耕作放棄地となる農地が増加している。そこで活動団体が、そうした土地を無償で利用し、農地の再生保全を図っている事例が多くみられた。また、県西部では同じく無償で利用している耕作放棄地にざる菊等を植え、農村景観の整備や観光による地域活性化に取り組んでいる地域もある。聞き取り結果によれば、耕作放棄地の所有者は概ね活動団体が荒廃した農地を活用することを歓迎しているようである。ただし、一部には、里地里山保全活動のために農地を利用してもらうことに抵抗感をもつ地権者も存在するとのことである。

③地元自治会との関係

活動団体と当該地区の自治会の関係は概ね良好である。活動団体の里地里山保全活動は、地元の自治会からも概ね認知されている。これは活動団体のメンバーが自治会の役職者を兼ねている場合が多いためである。そうした地区では里地里山保全活動と自治会の活動を結び付けている事例もみられる。

④教育機関との関係

里地里山保全活動を地元の児童の環境教育と結び付けている団体が多い。対象は地元の小学校が中心であり、地区の川に児童を招いて「生き物調査」を実施したり、収穫体験などの環境教育を実施している例が多い。また、平塚市の土沢地区の「里山をよみがえらせる会」では雑木林を再生させて子供たちの遊び場を提供している。

⑤都市との交流

活動団体のなかには、都市住民との交流に積極的な地区と消極的な地区がある。例えば、表丹沢菩提里山づくりの会では、生協（コープかながわ）とタイアップして都市住民を対象とした農業体験イベントを実施している。その一方で、積極的な宣伝は行わず会員中心に活動を進めている地区もある。

⑥企業との連携

上に挙げた表丹沢菩提里山づくりの会は積極的にコープかながわとの連携を図っているが、それ以外の活動団体では企業との連携は今後の検討課題にとどまっている。ユニークなものに、「小松・城北」里山をまもる会が東京ガスの社員を草刈ボランティアとして受け入れている事例がある。

⑦市町村との関係

里地里山保全等地域の選定を受けた地域には、市町村が積極的に里山保全活動を支援してきたところが多い。秦野市は、1999 年度から「里山ふれあいの森づくり事業」を実施し、里山保全再生を行う団体に対して補助を行ってきた。また、秦野市は環境省が 2004 年度から 2007 年度にかけて実施した「里地里山保全再生モデル事業」に選定されたことを受けて、市内各地の里地里山保全再生のための活動を支援してきた経緯がある。

また、藤沢市では藤沢のみどりを保全するためのボランティアリーダー養成を目指し、2001 年度から「藤沢グリーンスタッフ・里山保全ボランティアリーダー養成講座」を実施している。2006 年度には、この養成講座の受講生を中心としたメンバーが特定非営利活動法人（NPO 法人）「藤沢グリーンスタッフの会」を立ち上げ、様々な自然保護対策や市有緑地等の緑地保全活動・緑化啓発活動等を行っている。藤沢市の活動団体である「石川・丸山ホタル保存会」は、このグリーンスタッフが結成した援農クラブとともに保全活動を行っている。なお、藤沢市は

藤沢グリーンスタッフの会と里地里山保全活動に関する協定を結び、市内緑地の保全活動やボランティアリーダー養成講座などを実施している。2010 年度からは新たに協定を結び、従来の活動に加えて、生態調査などの環境調査事業、自然観察会やクラフト教室の開催などの普及啓発活動、地域で緑化推進活動などを行う団体を支援する地域支援活動などを行っている。

また、「里山をよみがえらせる会」と「土屋里地里山再生グループ」が活動している平塚市では、平塚市環境基本計画（2007 年改訂）のなかで里山の保全再生とふれあいの推進を重点施策に掲げ、西部丘陵地域に残された貴重な自然環境を次世代に継承するため、里山保全モデル地区を設定し、市民と協働して里山の保全に向けた取り組みを推進している。

このほかに小田原市では 2004 年度から「おだわらルネッサンス推進本部事業」の一環として「ふるさとの原風景再生」に取り組み、そのなかで久野地区が小田原市が選定した「小田原ふるさとの原風景百選」に選定された経緯がある。小田原市では現行の「おだわら TRY プラン」（第５次総合計画）に里山の保全整備を盛り込み、久野・栢山地区の活動を支援している。なお、「小松・城北」地区がある相模原市では、2011 年に「相模原市里地里山の保全等の促進に関する条例」を制定し、2012 年２月 14 日に「『小松・城北』里山をまもる会」との間に、第１号となる「里地里山保全等促進包括協定」を締結したところである。

⑧活動協定の締結における行政との連携

協定の締結までのプロセスでは、県や市町村の支援が重要であったという意見が多く聞かれた。また、市町村からも多様な支援が活動団体に対して行われていることがわかった。締結後においては、補助金の申請や会の運営など事務作業がかなりの負担になっていることから、事務局の運営に対する行政の支援を求める声がいくつかの地区で聞かれた。

３．里地里山の多面的機能の保全と行政の課題

すでに述べたように、里山保全における国の取組が本格化するのは 1990 年代半ば以降である。しかし、環境省が主に生物多様性の観点から里地里山の保全活用を考えているのに対し、農水省は中山間地域の農業振興、国土交通省は都市近郊緑地の保全活用、そして文部科学省は環境学習というように、各省の取り組みはばらばらである。また、国の関心はもっぱら農山村地域に向けられ、神奈川のように都市化が著しい地域の里地里山に関してはほとんど関心が払われていないことが明らかとなった。

そうしたなかで都市部の地方自治体は、わずかに残された里地里山の保全や多面的機能に着目し始めている。ここでは神奈川県の取組みを中心に、他地域の事例も紹介しながら、教育・研究、レクリエーション、景観、保健・福祉、防災の各分野における行政課題について考察する。

（１）教育・研究

教育や研究活動と里地里山を結び付ける動きは近年ますます活発化している。教育には小中学校などで行われる学校教育と、社会人を対象とする社会教育（生涯学習）の２種類があるが、いずれの教育活動においても里地里山の活用が進められている。学校教育では、総合学習の時間を利用して里山について調べたり、理科の時間に里山で生物調査を行うなどの活動が行われている。神奈川県の里地里山活動団体でも、地元の小学校と連携して小川の生物調査や田植えや稲刈りの農業体験活動を行っている団体がかなりある。秦野市の蓑毛里地里山保全地域を守

る会では、横浜市の児童養護施設の児童を受け入れ、田植えと収穫体験を実施している。[3]また、神奈川県の里地里山保全等地域には選定されなかったが、川崎市麻生区黒川地区では、JAセレサ川崎が不登校やひきこもりの子ども達を対象とした農業体験実習および収穫祭を実施している。これは神奈川県食農教育連携促進モデル事業として実施されているもので、2011年度には黒川観光農業振興会の指導のもとに子どもたちが落花生の収穫とゆで落花生の試食、こんにゃく作りを行った（神奈川県「食育取組事例集」）。

社会教育活動では、公民館で地元の食材でつくる料理教室を実施したり、竹トンボや正月飾りをつくるなどの活動が各地で行われている。なかでも小田原市久野地区では、里山親子そばづくり体験塾や野遊び探検など、多様な事業を子ども会や小学校、PTA など地域の各団体との連携で実施しており、地域ぐるみで里山の保全・活用に取り組んでいる。

里地里山における教育活動の展開は、食育の観点からもさまざまな可能性を考えることができる。食育に関しては、里地里山で収穫した米や野菜等を地元の学校給食に提供したり、幼稚園や小学校の生徒が農家や JA の指導のもとに米や野菜をつくり、給食で食べながら食や栄養について学ぶという食育活動が全国各地で進められている。[4]神奈川県も同様の取り組みを「食育取組事例集」にまとめて情報提供を行っているほか、「かながわ食育推進県民会議」を設置し、毎年「かながわ食育フェスタ」を開催している。

このほかに、森の再生と教育活動を結び付けた神奈川県の取組として「新学校林創生事業」がある。新学校林創生事業は、旧県北地域県政総合センター（現県央地域県政総合センター）が2007 年度から2009年度にかけて実施した森林学習プログラムである。同事業では、県が森林所有者との交渉・森林使用の承諾・地域調整等を行い、学校が自由にかつ継続して利用できる学習活動の場としての「新学校林」を確保する。学校では、この学校林において、教科の枠に縛られずに児童生徒がさまざまな体験学習を行い、地域と森との関係の理解を促進するというものである。この事業は、相模原市立青根小学校、厚木市立玉川小学校、相模原市立広陵小学校の３校で実施され、学校周辺の森の歩道整備、野生きのこの観察、原木シイタケの栽培体験（以上は青根小学校）、ヤマビルの駆除（玉川小学校）、自然観察林の再生（広陵小学校）などが行われた。注目できる点は、学校林での活動が正規の学校の教育活動に組み込まれたことと、地域の林業家や林業会社、NPO法人、大学との連携のもとに事業が進められた点である。同事業は３年間で終了したが、学校教育・森林保全・林業を結び付けたことは、里山の次世代への継承という点で注目に値する。なお、神奈川県の県央地域県政総合センターでは、同事業の成果をもとに、小中学校の総合学習「森林学習」の参考用に「新学校林づくり事例集」と「学習プログラム集森林DEで学ぼう!!」を作成して提供している。[5]

研究活動については、神奈川県では日本大学生物資源学部や東京農業大学短期大学部などが里地里山の生態系に関する調査研究を秦野市名古木などで実施している。しかしながら、これ

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3 蓑毛地区における横浜市の児童養護施設の児童の受け入れは、東海大学の学生ボランティアのコーディネートによるものである。

4食育基本法では「食育は、我が国の伝統のある優れた食文化、地域の特性を生かした食生活、環境と調和のとれた食料の生産とその消費等に配意し、我が国の食料の需要及び供給の状況についての国民の理解を深めるとともに、食料の生産者と消費者との交流等を図ることにより、農山漁村の活性化と我が国の食料自給率の向上に資するよう、推進されなければならない」（第７条）と定めている。

5 この他にも、秦野市千村地区では、里山保全団体が整備した共有林を渋沢小学校の学習林として開放し、児童生徒の環境教育に提供している。

らの研究は県や市町村の里地里山保全活動と結びついているものではなく、大学や研究者の学術研究として行われている場合が多い。里地里山の生態系に関する学術研究の成果は、生物多様性における里地里山の重要性を住民に訴えていくうえで重要である。したがって、神奈川県には、里地里山の生態系やその多面的効果に関して地域の活動団体と大学や研究機関とが積極的に連携していくことが望まれる。

（２）レクリエーション

神奈川県の里地里山保全条例は、里地里山の多面的機能のひとつにレクリエーションの場の提供をあげている。レクリエーション（余暇活動）には多様な活動が含まれるが、神奈川の里地里山は都市の近郊に位置するため、滞在型の余暇活動にはあまり向いておらず、日帰りや短時間の滞在がメインである。具体的には、散策やハイキング、自然観察やバードウオッチング、歴史散歩、キャンプ、川遊びなどが挙げられる。活動団体のなかにも、遊歩道や登山道の整備、ざる菊まつりや菜の花まつりなどのイベントに取り組んでいる団体がある。

近年注目を集めているものに、エコツーリズムがある。環境省と国土交通省はエコツーリズム推進法にもとづいてエコツーリズム推進基本計画をたて、エコツーリズムガイド育成事業等を推進している。神奈川県でも 2006 年度から「丹沢エコツーリズム担い手講座」を実施しており、2008 年には同講座の修了生が NPO 法人丹沢自然学校を立ち上げ、山・沢・里・森をテーマにエコツアーを実施している（米津・原 2010）。しかし都市近郊の里山地域については、エコツアーガイドを養成するまでには至っていない。里山に住む人々は山野草、キノコ、薬草、昆虫や野鳥などに詳しいだけでなく、民話や伝統行事など地域の民俗文化の重要な伝承者であり、貴重なエコツアーガイドであることから、市町村にはそうした人材を里山ガイドとして養成・認定するなどの取組も求められよう。[6]

（３）景観

2004年に制定された景観法にもとづいて、地方自治体は景観に関するまちづくりを進めるための景観計画を定めることができる。現在まで神奈川県では、県のほか横浜市など24市町が景観条例を定めているが、県の「景観づくり基本方針」では、景観づくりを推進する上で市町村が果たす役割の重要性から、概ね５年以内に県内全ての市町村が景観行政団体となり、景観計画を策定して景観行政を推進できるよう支援するとしている。

景観法は、地域の自然、歴史、文化等からみて、地域の特性にふさわしい良好な景観を形成する必要があると認められる土地の区域について景観区域を定めることができると定めている（第８条２）。したがって、市町村は地域内の里地里山を景観区域に定めていることも可能である。しかしながら、景観区域では景観保全のための建築や開発行為等の規制が可能であるため、とくにすぐれた自然景観や歴史的文化的に貴重な景観だけが景観地区に指定されることが多い。全国ではこれまで35か所が景観地区に指定されているが、神奈川県では藤沢市の江の島地区と湘南C－X地区、鎌倉市の鎌倉景観地区と北鎌倉景観地区の４か所が指定されている。

6 神奈川県内の事例では、県と相模原市、山北町、愛川町、清里村の４市町村が水源地域交流の里づくり推進協議会を設立し、上流域と下流域の交流を図る観点から「里の案内人」の育成に取り組んでいる。

なお、景観法は景観と調和のとれた営農条件の確保を図るため、地域の合意形成を得て、景観と調和のとれた良好な営農条件の確保を図るべき区域（棚田、景観作物地帯など）について景観農業振興地域整備計画[7]を定めることができるとしている（景観法第55条）。だが、これまで景観農業振興地域整備計画を策定した団体は全国でも３団体にとどまっており、神奈川県では景観農業振興地域整備計画を定めている団体はない。

神奈川県において積極的に里山の景観保全に取り組んでいる自治体として、秦野市と南足柄市をあげることができる。秦野市は景観法制定に先立つ2003年に「秦野市景観形成基本計画」を策定し、市民と事業者、行政が協働して市の共有財産である良好な景観の保全に取り組み始めた。2005年には「秦野市景観まちづくり条例」を制定し、山並み景観、里山・田園景観、水辺景観などの形成を進めている。一方、南足柄市は花を活用したまちづくりに取り組んでいる。2005年には市内の11団体で構成する「あしがら花紀行ネットワーク」を結成し、その取組は農水省の「農村景観～「農」と歩む景観とともに、地域の魅力を伝える～」のパンフレットでも紹介されたところである。[8]なお、南足柄市では2012年12月に策定した景観計画のなかで「丘陵部に広がる里山等の景観保全とその周辺の建築物等に対する景観コントロールが望まれます」と述べ、「本市の原風景ともいえる田園風景や里山風景の保全を図るべく、良好な田園・里山景観の維持・保全と良好な営農条件の確保を一層推進するため、『南足柄農業振興地域整備計画』と整合性を図りながら、『景観農業振興地域整備計画』の策定を検討」するとしている。

これまでにみてきたように、県内の里地里山保全等地域においても多くの活動団体が棚田の復元や植樹などをつうじて里山の景観保全に積極的に取り組んでいる。農山村に生きる人々の活動によって形成された里山の景観は、都市に暮らす人々にとっては懐かしく、心が安らぐ風景（ランドスケープ）であり、物見遊山的な「観光」の対象にはなりにくいものである。欧州では、こうした長い間の人々の生活の営みから形成された風景を守るための欧州ランドスケープ条約が 2000 年に締結され、各地で農村風景の保全が進められている。しかし、日本では都市計画の観点から土地利用の規制を行っているものの、農村風景を保全するための規制という発想はほとんどない。例えば、都市計画法は市街化調整区域を設定しているが、そこには景観を守るという発想はなく、美しい山並みの一角に資材置き場やゴルフ練習場、携帯電話無線基地局のアンテナ、墓地・霊園等が無造作に作られている。また、行政も里山の景観に配慮することなく、ごみ焼却施設の建設や橋梁等の公共工事を行っている。

美しい里山の風景は、神奈川県のような都市部ではもうわずかになってしまった。その大切さに気づいて行動を起こしたのが里山保全団体である。地方自治体には里山の風景を大切に保全していくための規制や活動団体の取組に対する積極的な支援が求められるといえよう。

（４）保健・福祉

里地里山と保健医療との連携も近年注目を集めている。美しい里山の景観を楽しみながら散策をしたり、地元の人々と会話を楽しむことで、人々は癒しを得ることができる。また、農作

7 景観法第 55 条は、「市町村は、景観計画に係る景観計画区域のうち農業振興地域内にあるものについて、農業振興地域整備計画を達成するとともに、景観と調和のとれた良好な営農条件を確保するため、その地域の特性にふさわしい農用地及び農業用施設その他の施設の整備を一体的に推進する必要があると認める場合には、景観農業振興地域整備計画を定めることができる」としており、対象地域が農振地域であることが前提となっている。

8　このパンフレットでは、南足柄市千津島地区の取り組みが紹介されている。

業が健康に良いことは、里山の高齢者がいたって元気なことからも明らかである。こうした里山の「癒し効果」には農林水産省も着目しており、2010（平成 22）年版森林白書では森林の癒し効果や各地での取組事例を紹介している。また、地方自治体のあいだでも「アグリセラピー（農業療法）」や森林浴に着目して事業を展開するところが増えている。

神奈川県では、藤沢市が 2012 年３月に「健康の森基本計画」を策定している。これは 2010 年に策定された「健康づくりの森構想」を具体化するもので、同構想では、湘南台駅西方 3.5km に位置する 33ha の谷戸地域を「健康の森」として整備し、谷戸環境や緑地空間を恒久的に保全しつつ、自然環境を活用して総合的に健康増進機能を充実することを目指すとしている。同計画では、フットパスや森林セラピー、農業体験等の自然環境にふれあい気軽に健康づくりができる機会の充実、慶應義塾大学看護医療学部と連携した健康チェック及びヘルスケアなどの推進が事業計画として盛り込まれている。[9]県外では、遊休農地での漢方薬の栽培（長野県佐久市）や、和漢薬の里ヘルスツーリズム事業（富山県）といった取り組みも注目されるところである。

また、福祉と里山の連携についても興味深い取り組みが増えている。農林水産政策研究所によれば、社会福祉法人や NPO 法人等の農業分野への進出等により、農業分野における障がい者の就労が拡大しているという。ここには農作業が障がい者の身体や精神に良い影響があるという社会福祉法人側のニーズがある。近年は、障がい者の収入を高めるため就労活動や地域の農業を守る社会貢献活動としての農作業が拡大しており、農業分野での取り組みが本格化している。[10]例えば、福岡市では市が中心となって転作水田を福祉農園として無償で供する事業に取り組んでいる。同農園では園芸療法の観点を取り入れ、野菜や花の種蒔きから収穫までの一貫した農作業を通じて障がい者や高齢者の自立と癒しを図っている。なお、神奈川県内では、矢倉沢里地里山会が地元の北小田原病院の入院患者に呼びかけを行い、畑に種蒔きをしてもらう等の活動を行っている。

（５）防災

2011 年３月 11 日の東日本大震災を契機に、地域では防災への関心が高まっているが、特に都市部においては地域防災の観点から農地や森林の機能が再評価されてきている。都市近郊の里地里山は、樹木の働きによる二酸化炭素の吸収などの大気浄化機能をもつだけでなく、火災などの災害時の緩衝帯（グリーンベルト）や災害時の避難空間としての機能など、地域防災のうえで重要な役割を担っている。神奈川県では、横浜市、川崎市、藤沢市、秦野市が防災協力農地の制度をもっている。防災協力農地は、災害時に農地を一時避難場所や仮設住宅建設用地、

9 このほかには、相模原市が「新都市農業推進計画」（平成 16 年）のなかにアグリセラピー事業（農業の癒し効果活用事業）を盛り込んでいる。ここには、社会福祉法人や医療法人が農地の権利を取得し、入所・通所等の農業体験の場づくりを行うことや、農業と保健福祉の連携による農業の癒し効果を活用した心と体の健康づくりが盛り込まれている。また同計画には、農業の新技術開発と医療福祉分野への応用を図る「アグリテクニカル＆メディカル創造事業」の推進も盛り込まれている（相模原市ホームページより）。

10 農林水産政策研究所の報告書は、横浜市の社会福祉法人グリーンの取り組みを紹介している。同報告書によれば、社会福祉法人グリーンは知的障がい者の就労支援事業として農業活動を取り入れ、稲作、露地野菜栽培、梅干しや味噌、ジャムなどの加工・販売などを行っている。農地は横浜市北部農政事務所の仲介で、地域の農家から労働力不足のため農家が耕作しきれない部分を借りており、市ではハウスや機械等の整備について社会福祉法人に助成を行っている。

復旧用資材置場として使用するもので、これらの自治体では農家や農協の協力のもとに市内の生産緑地や市街化区域内の農地を防災協力農地として登録している。

全国的には、高知市の取組が注目される。高知市では南海トラフ巨大地震に備えるため、市の里山保全条例に基づいて市沿岸部の「ノツゴ山」の西側約 2.1ha を保全地区に指定するとしている。指定されれば、高知市では「防災の里山」として初の指定になる。[11]神奈川県でも東海地震や首都直下型地震が起きれば、沿岸部では大津波による甚大な被害が想定されることから、湘南や三浦地域では里地里山地域を防災拠点として整備することも考えてよいであろう。

（６）小括

都市近郊の里地里山は多面的な機能を備えている。そうした里地里山の多様な価値に着目し活用することで、多くの県民や団体のあいだで里地里山の大切さに対する認識が高まっていくことが期待される。これまでにみてきたように、里地里山の保全活動団体は、地域住民と協働しながら、里地里山の価値を広める活動を行っている。しかしながら、活動団体の活動には限界がある。したがって、都市住民や企業などとの幅広い連携を作り上げていくことが、里地里山の多面的機能を活用していくうえで重要になる。

また、里地里山の保全・再生・活用は、まちづくりと一体となって推進する必要がある。いまや都市周辺の里地里山は消失の危機にあるといっても過言ではない。里山を保全するためにはもはや「守り」の施策だけでは不十分であり、積極的に「里山づくり」に取り組む必要性がある。そのためには、まずもって市町村が里地里山の保全や活用方針を基本構想のなかにきちんと位置付け、計画的に取り組む必要がある。さらに、里地里山の保全に対する市町村の責任を明確にする必要がある場合は、里山条例の制定を考えてもよい。現在のところ神奈川県内で里山保全に関する条例を定めている市町村は相模原市だけである。だが、景観や防災の観点から里山保全を考えるときは、開発行為等を規制するための条例制定が望ましいといえる。

また、里地里山の保全や活用を進めるうえでは、県の行政機関の積極的な関与が求められる。神奈川県の機関のなかには里地里山の多面的機能と結び付いた業務を行っているものが数多くある。例えば、田や小川の貴重な水生生物の保護に関しては、自然環境保全センターや水産技術センター内水面試験場が専門的な知識を蓄積している。不登校対策では、足柄ふれあいの村が「きんたろうキャンプ」を行っている。こうした機関が積極的に里山に関わることで、里山のもつ多面的な機能に対する県民の認識はさらに高まるであろう。

これらのさまざまな行政機関の参画にあたっては、ばらばらな対応にならないように総合調整機能を強化する必要がある。なお、県は公の施設の運営・管理を民間企業等の指定管理者に移すことができる指定管理者制度[12]を県の出先機関にも一部導入している。だが、出先機関を指定管理者の管理運営に移すと、県や市町村の関係機関との連携は弱くならざるを得ない。地方自治体は、長期的かつ総合的な観点から行政のより直接的な関与が望ましいと考えられる場合には、直営化や地域団体との長期的な契約による管理に移すことも検討すべきである。

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11 高知市里山保全条例第６条は、「市長は、次の各号のいずれかに該当する里山を里山保全地区として指定することができる」と定めており、第１号に「防災機能を確保するために保全することが必要な里山」をあげている。

12 指定管理者制度は、住民の福祉を増進する目的をもってその利用に供するための施設である公の施設について、民間事業者等が有するノウハウを活用することにより、住民サービスの質の向上を図っていくことで、施設の設置の目的を効果的に達成するため、2003 年の地方自治法改正で導入されたものである。

また、里山づくりにはさまざまな民間団体の参加と協力が必要である。神奈川県でも、JAや地元の企業、社会福祉法人、NPO 法人、大学などが里地里山の保全や活用に積極的に関わっている事例が多くみられる。しかし、民間企業の参加については企業の社会貢献という面が強く、持続性に課題がある。

以上から、地方自治体においては、地域の多様な団体が里山保全に長期的に関与していくための地域協働の新しい手法の開発が求められているといえよう。

４．おわりに

本論文では、神奈川県における里地里山保全の取組を中心に、統合的生態系である“里山”が有する多面的な機能を保全・再生し、活用するための行政のあり方について論じてきた。現在、日本各地ではさまざまな里地里山保全の取組が進められているが、神奈川県に典型的に示されているように、大都市近郊の“里山”は急激な都市化の進行や農業の衰退によって荒廃の一途をたどっている。とりたてて“風光明媚”でもない平凡な農村風景は政府の政策対象とされず、その保全や再生はふるさとの原風景を将来の世代に残したいとする住民のボランタリーな努力によって支えられているのが現状である。一方、世界に目を転じると、例えばヨーロッパでは、2000 年の欧州ランドスケープ条約締結を受けて、地方自治体を中心に農山村風景を保全する動きが活発化している（Dejeant-Pons 2011)。ヨーロッパでは、美しい農山村風景の保全は伝統的文化や風習の保全・継承に寄与するだけでなく、環境収入の増加をつうじて人々の生活の安定にも貢献するとして、政府も積極的に支援している（Swaffield and Primdahl :2010)。

もっとも、目をさらに開発途上国に向けると、都市や都市近郊の生態系は乱開発や違法伐採によってきわめて深刻な状況にある。商品経済は山奥の自給自足的な農山村にまで浸透し、一部の国立公園や保護地域を除くと、生態系の破壊がすさまじい勢いで進行している。筆者はケニヤやネパールにおいて森林保全に関する調査を行ってきたが、人間の経済活動と生態系を調和させてきた日本の里山の経験は、開発途上国の持続可能な農林業においても大いに参考になると考えている。この点において日本が提唱する「里山イニシアティブ」には、日本各地における里山保全の経験を途上国に伝える触媒的的な役割を期待したい。しかしながら、里山保全は日本国内においてさえ、大変きびしい状況にあることを認識する必要がある。“里山”の保全に際しては、経済的価値以外の価値の存在に気付き、“里山”を公共財と位置付け、地域住民と地方自治体が積極的に保全に関わっていくことが大切である。ただし、それらの取組みはまだ日本国内でも小さな歩みにとどまっていることを我々は十分に自覚する必要がある。

参考文献

神奈川県「新学校林づくり事例集」
http://www.pref.kanagawa.jp/uploaded/attachment/9673.pdf（2013. 11. 10 最終アクセス）
関東農政局「平成 18 年度関東食料・農業・農村情勢報告第 1 部関東地域における都市農業の動向と課題 ～食・癒・和・・・都市農業のフロンティア～」
http://www.maff.go.jp/kanto/kihon/kikaku/jyousei/18jousei/dai1bu-zentai.pdf （2013. 11. 10 最終アクセス）
国際連合大学/日本の里山・里海評価委員会編（2012）『里山・里海』朝倉書店
小寺正一（2008）「里地里山の保全に向けて～二次的な自然環境の視点から」『レファレンス』

686：53－74.

農林水産政策研究所「農業分野における障害者就労と農村活性化」に関する研究（平成21 年度・平成22 年度実施）」
http://www.maff.go.jp/primaff/kenkyu/Syogaisya/pdf/101203_houkokusyo.pdf （2013. 11. 10最終アクセス）

米津達哉・原美登里（2010）「神奈川県西丹沢地域におけるエコツーリズム事業にみるエコツアー実施団体とエコツアーガイドに関する一考察」『地球環境研究』12：161-171.

Dejeant-Pons, M (2011) “The European Landscape Convention: From Concepts to Rights.” In Egoz S, Makhzoumi J, and Pungetti G (eds.) *The Right of Landscape: Contesting Landscape and Human Rights*. Burlington, VT: Ashgate Publishing Limited

Swaffield S, and Primdahl J (2010) “Globalisation and Local Agricultural Landscapes: Patterns of Change, Policy Dilemmas and Research Questions.” In Primdahl J, and Swaffield S (eds.) Globalisation and Agricultural Landscapes: Changing Patterns and Policy Trends in Developed Countries. Cambridge: Cambridge University Press.

Takeuchi K (2003) “Satoyama Landscapes as Managed Nature.” In Takeuchi K *et al.* (eds) *Satoyama: the Traditional Rural Landscape of Japan*. Tokyo: Springer