Full Report

International Workshop on Sustainable Management of Socio-Ecological Production Landscapes in Noto


Photo: Go Tabinuki

Organizers:
United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS), and
UNU-IAS Operating Unit Ishikawa/Kanazawa (OUIK)

Co-organizers:
School of Regional Development Studies, Center for Regional Collaboration, Kanazawa University;
Ishikawa Prefectural University; and
Graduate School of Global Environmental Studies, Kyoto University

Cooperation:
Ishikawa Prefecture

Date: 10 – 12 Feburary 2014

Venue: Large Meeting Room, Kanazawa Bunka Hall, Kanazawa City, Ishikawa Prefecture, Japan

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ACKNOWLEDGEMENTS

This workshop was organized by the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS), and UNU-IAS Operating Unit Ishikawa/Kanazawa (OUIK), and co-organized by the School of Regional Development Studies, Center for Regional Collaboration, Kanazawa University; Ishikawa Prefectural University; and the Graduate School of Global Environmental Studies, Kyoto University, in cooperation with Ishikawa Prefecture. It was undertaken as a part of the research project "Tradeoff Analysis and Local Governance Model of Satoyama Ecosystem Services" (ES-Tradeoff, FY2013-FY2015, 1-1303), supported by the Ministry of the Environment, Japan through its Environment Research and Technology Development Fund.

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EXECUTIVE SUMMARY

1. Background

The Noto Peninsula in Ishikawa Prefecture is famous for its rich "*satoyama*" socio-ecological production landscapes (SEPLS) and management traditions. Local governments have been very active in maintaining and revitalizing these landscapes. Thanks to their efforts, the Noto Peninsula has been designated as one of the Globally Important Agricultural Heritage Systems (GIAHS)[1] by the Food and Agriculture Organization (FAO) of the United Nations.

In order to promote SEPLS management and spread awareness that protecting biodiversity entails the protection of both wild and human-influenced natural environments, the United Nations University (UNU) has established the Satoyama Initiative in collaboration with the Ministry of the Environment, Japan (MOEJ). The Satoyama Initiative serves as an effort at creating thoughtful action towards the conservation and use of human-influenced natural environments.

UNU also implemented the Japan Satoyama Satoumi Assessment (JSSA)[2] from 2006 to 2010. As the second phase of JSSA, UNU's Operating Unit Ishikawa/Kanazawa (OUIK) is planning to initiate a new regional-scale assessment of socio-ecological production landscapes and seascapes (SEPLS, or satoyama and satoumi in Japanese) in Ishikawa Prefecture. This assessment will be developed on the basis of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) conceptual framework. Additionally, UNU has started a new project on SEPLS ecosystem service tradeoff analysis in the Noto Peninsula[3], in collaboration with Kyoto University and Kanazawa University.

2. Objectives and Key Questions

In promotion of these recent research projects, this workshop was organized to share information and ideas on data, methodologies, and ongoing research activities. Workshop participants also explored future research directions for developing new co-management and co-governance models, which may be applicable in other areas such as Europe and Oceania.

This workshop explored the following five key questions:

(1) What are the key challenges and opportunities in management of socio-ecological production landscapes?
(2) How can the different stakeholders overcome challenges and promote collaboration in developing new co-management and co-governance models in harmony with nature?
(3) What approaches, methods, and techniques can be used to integrate traditional ecological knowledge and modern science to promote innovation and transformation?
(4) How can the IPBES Conceptual Framework be transferred/tuned to local application?
(5) What are new research areas or frontiers that should be explored in the next five years (joint research proposals as outcomes of this workshop)?

[1] GIAHS: http://www.fao.org/giahs/giahs-sites/south-east-asia/notos-satoyama-and-satoumi-japan/en/
[2] JSSA: https://www.ias.unu.edu/sub_page.aspx?catID=1043&ddlID=1042
[3] http://isp.unu.edu/research/local-governance-ecosystem/index.html

3. Key Messages

1) What are the key challenges and opportunities in management of socio-ecological production landscapes?

Key challenges emphasized during the workshop included:
(1) demographic change represented by depopulation, aging, and emigration from rural to urban areas;
(2) expansion of abandoned land;
(3) human-animal conflict;
(4) substitution of mono-cropping systems where previously there was a diverse array of food and fibre production;
(5) disconnection of urban and rural people and policies;
(6) weak policy and science interface;
(7) misunderstanding of different cultures; and
(8) conventional values systems (inertia, business-as-usual-mindset).

At the same time, we identifed opportunities to improve and transform management of socio-ecological production landscapes, including:
(a) ecosystem based approach to enhance resilience;
(b) creations of an environmental friendly, green infrastructure;
(c) growing organic and natural products from abandoned farmland;
(d) increasing production of renewable energy;
(e) linking small farmer into their own co-operative to improve market advantages;
(f) direct marketing from farmers to consumers;
(g) accrediting SEPLS products to international certification schemes;
(h) crowdfunding to invest more small farmers' new business; and
(i) developing new tourism and new business models.

2) How can the different stakeholders overcome challenges and promote collaboration in developing new co-management and co-governance models in harmony with nature?

We propose the following six approaches to overcome the challenges and promote collaboration in developing new co-management models.

(1) Stakeholder Engagement:
- Collaboration depends on getting all the stakeholders involved throughout the process. Therefore, who should be stakeholders? Everybody is a stakeholder. Sharing a feeling of crisis (current situation) is key.
- Team effort will depend on understanding the values and priorities of diverse stakeholders; dialoguing with various stakeholders is needed to discuss what benefits they get from SEPLS.

(2) Vision, Leadership and Local Networks:
- Collaboration may require participants to rearrange their value system and mindset. Sharing a common understanding/vision brings cohesive effort, though we don't need to agree entirely for constructive joint action (debate and creative tension suggest a variety of solutions).
- Leadership and successors are important parts of social capital to enable adaptation and transformation of SEPLS. Social networks may have to be strengthened or extended before local knowledge and energy can be harnessed for a common cause (utilizing local networks).

(3) Reorganizing of Value Systems:

- SEPLS are not just places for food production or tourism resources. They are systems that hold the value of beliefs and ethics of people and societies. We can make use of international recognition schemes like GIAHS as an opportunity for the community to reassess the value of their culture and natural capital. Cultural identity and connection to place are key ingredients of social capital that underpin the future care and restoration of SEPLS.

(4) New Producer-Consumer Model:

- Long supply chains for most provisioning services make consumers 'blind' to who has produced the food or fibre they use and what care has been taken to produce it in a way that does or does not support SEPLS. A method is needed to indirectly reconnect consumers and producers.
- Corporative Social Responsibility (CSR): There may be a need to help small business, subsidize production, and sponsor entrepreneurship.
- Direct marketing, food co-ops, SEPLS-branding for local products, etc.

(5) Good Governance and New Commons Approach:

- Intra- and inter-governmental cooperation provides cross-scale linkage to manage threats and capture opportunities that can restrore and protect SEPLS. Local policymakers have a particularly important and active role. Long-term commitment should be ensured because conservation, adaptation, and learning can take a long time. Also, threats and drivers are likely to change in the coming decades – sustainability is more about a journey than a single destination. Good governance therefore emerges as a fundamental requirement if SEPLS are to still be present in 100 years.
- Multiple partners have roles. These could include "U-, J-, and I-turners"[4], local residents, private sector members (shifting from CSR to Creating Shared Value, or CSV), urban citizens, volunteers, etc.

(6) Information, Data Management, and Knowledge Sharing:

- Trans-disciplinary research should be enhanced. Standardized data gathering, collaborative mapping and measuring where possible, and using qualitative information where more appropriate can all build knowledge of what to do, where, and when, in order to sustain SEPLS. Collective strength comes from scientists becoming involved with NPOs' and NGOs' activities and a network of "citizen scientists" from the local community; local eyes see and care most, but their information has more value if it is structured, collected, and analyzed to some degree.

3) What approaches, methods, and techniques can be used to integrate traditional ecological knowledge and modern science to promote innovation and transformation?

The main discussion considered the ways to harness the transdisciplinary power of integrating Traditional and Local Knowledge (TLK) with science to promote innovation and the transformation of the Noto Peninsula's SEPLS. Dedication of sufficient time and investment into forming a network and respectful relationship between local TLK experts, policymakers, politicians, and scientists will underpin this integration and make to the emerging new synthesis of knowledge more complete and reliable.

Co-discovery from knowledge-sharing is likely to identify more choices for managing SEPLS while simultaneously building the trust and social capital necessary to apply collaborative interventions to solve problems and take avantage of opportunities for people, profit, and the planet.

[4] In Japan, people from rural areas who moved to big cities to attend school or find work and then later return to their hometowns are called "U-turners"; those from rural areas who do not return to their hometowns but decide to live permanently in cities on the way are dubbed "J-turners"; and big-city dwellers who relocate to new rural areas to live and work are called "I-turners" (Yahata, 1997).

Collaborative planning, many face-to-face meetings, and communication of results in both popular and formal scholarly ways are needed. Cultural mapping, rapid appraisal methods to score Cultural Health, and gathering of oral histories are some of a growing set of formal research techniques for TLK and science partnership.

Cultural Keystone Species can be identified for priority research and intervention. Qualitative and quantitative information can be cross-referenced by applying Qualitative Data Analysis, Discourse Analysis, Choice Modelling, and calibration of TLK indicators to ecological survey results. Gathering large volumes of locally-grounded credible data from TLK experts and citizen scientists can give added power, replication, and representativeness for subsequent scientific analysis.

Ultimately, TLK and science can be cross-referenced to expose what is happening, and science can add a series of tools for identifying causes of observed trends and patterns. TLK and science working together can build consensus on joint action for transformation and can then proceed to monitor the success of collective intervention in retaining and enhancing SEPLS on the Noto Peninsula.

4) How can the IPBES Conceptual Framework be transferred/tuned to local application?

In the process of applying the IPBES Conceptual Framework (CF) to local ecosystem assessment, we need the involvement of (local) practitioners/stakeholders to fully take into account the linkage between "quality of life" and "nature". More fundamentally, the CF could better support SEPLS if it recognized the feedback from having a healthy society and economy to being better able to manage and support biodiversity and ecosystem services. Maintaining all these services helps humans and their communities, nations, and cultures maintain a presence in the landscape. Such a presence is essential to monitor, plan, intervene, invest, and collaborate to maintain biodiversity and the SEPLS itself. We therefore introduced a new feedback loop for the CF to emphasise the huge amount of reciprocity involved. This led workshop participants to call for more positive language in the CF and for it to recognise the benefits that people confer on the land and biodiversity.

The importance of data collection and sharing for each of the CF's components (building blocks) was also highlighted as having common ground with the assessment. The IPBES CF should recognize positive aspects of anthropogenic drivers and environmental impacts as well as synergistic relationship between "anthropogenic assets" and "nature's benefits to people". Our discussion also pointed out that both ecosystem services and anthropogenic assets should consider various types of capital (stocks) as sources of benefits and services to human beings. One of the key challenges lies in how to overcome the gap between policy- and scientific/temporal/spatial scales.

5) What are new research areas or frontiers that should be explored in the next five years (joint research proposals as outcomes of this workshop)?

New research areas or frontiers in assessment and knowledge generation to be explored in the next five years include investigations of;

(1) abandonment of forest and farmland;
(2) ecosystem services synergy and trade-offs;
(3) long supply chains of ecosystem services and reorganization of value chains;
(4) appropriate scales and levels for co-management;
(5) maintaining pollination and decomposition chains in ecosystems;
(6) land degradation;
(7) food security;
(8) nutrient cycles;

(9) human wealth and well-being through filling in the missing arrow between nature and human well-being in the IPBES CF;
(10) measuring human well-being and its relation to ecosystem services;
(11) watershed management;
(12) wildlife damage and human-wildlife conflicts;
(13) integration and compilation of information by GIS;
(14) creating new indicators (e.g. landscape evaluation);
(15) valuation of ecosystem services at different scales;
(16) inclusive knowledge generation, bridging traditional local knowledge and scientific knowledge;
(17) landscape governance strategies between different countries/cultures; and
(18) analyisis of best-practice examples of rural development and its transferability to other places in rural areas.

Needs for policy support and capacity development were also identified, including enhancing attractiveness and revitalization of isolated or less-preferred places. There is a need to learn from successes and best practices (through international comparative studies)

Next steps:

Based on the discussion at the workshop, six potential actions or programs were identified that should be considered as next steps:

(1) Organize a dialogue workshop with local stakeholders in Noto to facilitate the interface of science, policy, and society, and encourage further partnership and co-management.

(2) Organize a workshop to develop a common data set and maps to integrate various research projects in Noto and Ishikawa, and in the Hokuriku region.

(3) Develop an international joint workshop proposals to the Japan Science and Technology Agency (JST), Japan Society for the Promotion of Science (JSPS), or other potential funding sources.

(4) Conduct comparative case studies between UNU, Kanazawa University, and BOKU.

(5) Create a student exchange program/internship between UNU, Kanazawa University, and BOKU, relating to the common case study research.

(6) Exchange knowledge between locals/stakeholders and scientists in New Zealand, Austria, and Japan. E.g., “study groups” from the three countries are visiting each other in order to see best-practice examples in other countries.

1. INTRODUCTION

The Noto Peninsula in Ishikawa Prefecture is famous for its rich "*satoyama*" socio-ecological production landscapes (SEPLS) and management traditions. Local governments have been very active in maintaining and revitalizing these landscapes. Thanks to their efforts, the Noto Peninsula has been designated as one of the Globally Important Agricultural Heritage Systems (GIAHS)[5] by the Food and Agriculture Organization (FAO) of the United Nations.

In order to promote SEPLS management and spread awareness that protecting biodiversity entails the protection of both wild and human-influenced natural environments, the United Nations University (UNU) has established the Satoyama Initiative in collaboration with the Ministry of the Environment, Japan (MOEJ). The Satoyama Initiative serves as an effort at creating thoughtful action towards the conservation and use of human-influenced natural environments.

UNU also implemented the Japan Satoyama Satoumi Assessment (JSSA)[6] from 2006 to 2010. As the second phase of JSSA, UNU's Operating Unit Ishikawa/Kanazawa (OUIK) is planning to initiate a new regional-scale assessment of socio-ecological production landscapes and seascapes (SEPLS, or "*satoyama*" and "*satoumi*" in Japanese) in Ishikawa Prefecture. This assessment will be developed on the basis of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) Conceptual Framework. Additionally, UNU has started a new project on SEPLS ecosystem service tradeoff analysis in the Noto Peninsula[7], in collaboration with Kyoto University and Kanazawa University.

BOX 1.
Research Framework for Trade-off Analysis and Local Governance Modelling of Satoyama Ecosystem Services

In April 2013, Kanazawa University, Kyoto University, and the United Nations University Institute of Sustainability and Peace (now merged into the United Nations University Institute for the Advanced Study of Sustainability: UNU-IAS) launched a new collaborative research project on the Noto Peninsula in Japan to analyze the local governance of ecosystem services, focusing on Japanese *satoyama* landscape models which emphasize interdependence between humans and nature. An innovative research framework for trade-off analysis and local governance modelling was proposed (**Fig. 1**), addressing some of the common gaps in biodiversity and ecosystem service assessments identified in the above IPBES review. With this new framework, the Noto research attempts to connect basic information on ecosystem services to capacity building for the conservation and sustainable use of biodiversity. Quantitative multi- and cross-scale analyses of trade-offs and synergies among ecosystem services were also incorporated. The Noto study also addresses the need to strengthen functioning and resilience in socio-ecological production landscapes by integrating traditional and scientific knowledge.

The research draws on the "new commons" approach expounded in the Japan Satoyama Satoumi Assessment. This approach seeks new socio-ecological systems to sustain functions and provide services best suited to regional needs through co-management by local people, municipal governments, the private sector, and non-governmental and civil society organizations. This necessitates the development of new social contracts including all actors to foster a public consciousness that embraces decentralized, regional, and local initiatives.

This project aims to:

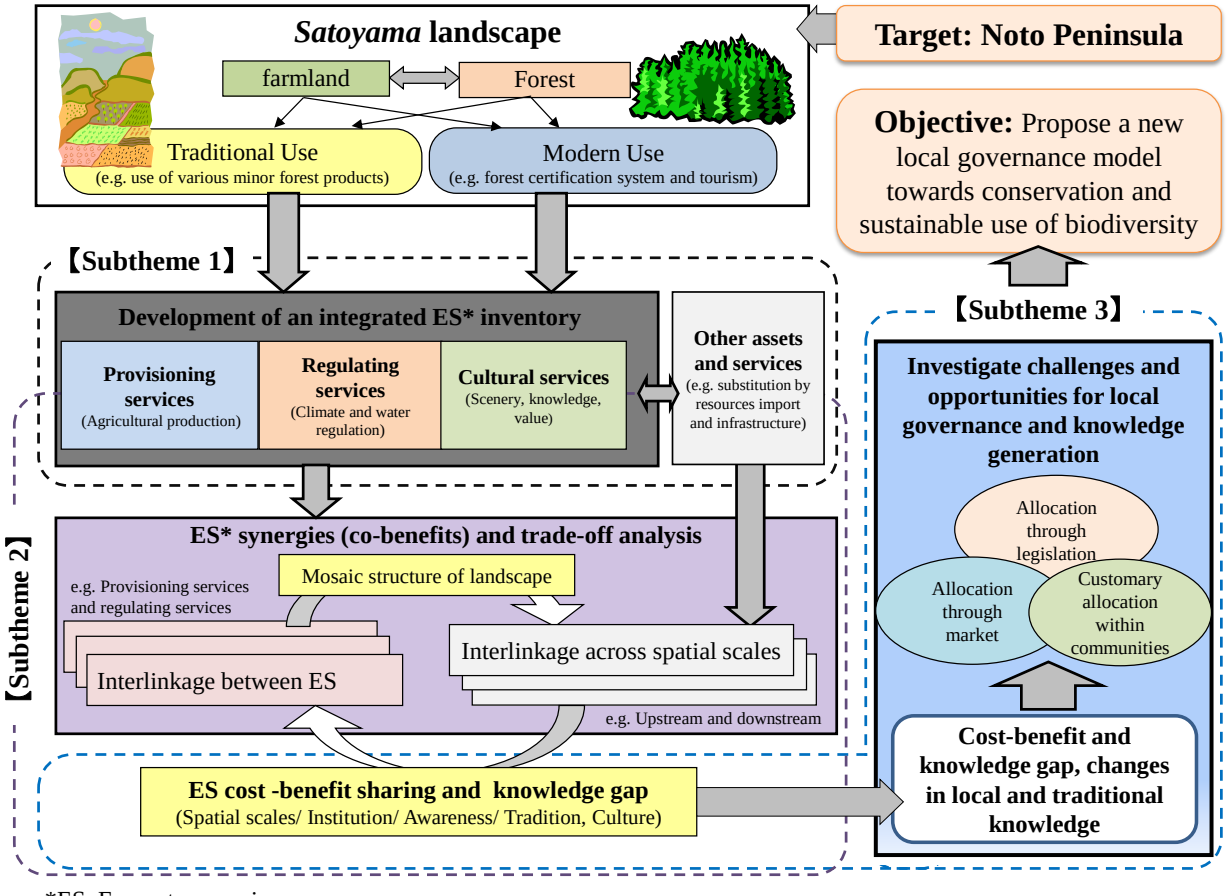
[5] GIAHS: http://www.fao.org/giahs/giahs-sites/south-east-asia/notos-satoyama-and-satoumi-japan/en/
[6] JSSA: https://www.ias.unu.edu/sub_page.aspx?catID=1043&ddlID=1042
[7] http://isp.unu.edu/research/local-governance-ecosystem/index.html

i. *Develop an ecosystem services inventory for the Noto Peninsula*. This will take into account the stock and flow of each identified ecosystem service, the interrelations of ecosystem services, and the spatial distribution of their suppliers and beneficiaries (subtheme 1)

ii. *Assess synergies and trade-offs in ecosystem service management.* This will include trade-offs and synergies between different ecosystem services, as well as across different spatial and temporal scales (***subtheme 2***).

iii. *Propose new methods of local governance and knowledge generation towards a sustainable society*. The role of local and traditional knowledge will be examined, together with possibilities for integrating it into modern and scientific knowledge (subtheme 3). Cost-benefit and knowledge gaps in ecosystem services will be identified and new approaches and methods to fix the gaps will be proposed

As well as improving local governance of SEPLS in the Noto Peninsula, the project is expected to contribute towards a localized and integrated assessment model for IPBES, the Convention on Biological Diversity (CBD), and the Satoyama Initiative.



*ES: Ecosystem services

Fig. 1 The research framework for tradeoff analysis and local governance model of *satoyama* ecosystem services

2. OBJECTIVES AND KEY QUESTIONS

In promotion of these recent research projects, UNU held an international workshop in Ishikawa Prefecture in February 2014 in order to share information and ideas on data, methodologies, and ongoing research activities, and to explore future research directions for developing new co-management and co-governance models, which may be applicable in other areas such as Europe and Oceania.

Key questions explored in this workshop include:

(1) What are the key challenges and opportunities in management of socio-ecological production landscapes?
(2) How can the different stakeholders overcome challenges and promote collaboration in developing new co-management and co-governance models in harmony with nature?
(3) What approaches, methods and techniques can be used to integrate traditional ecological knowledge and modern science to promote innovation and transformation?
(4) How can the IPBES Conceptual Framework (**Fig. 2**) be transferred/tuned to local application?
(5) What are new research areas or frontiers that should be explored in the next five years (joint research proposals as outcomes of this workshop)?

The workshop was followed by a seminar, open to the public, to disseminate the outcomes of the workshop to the community and seek feedback from various stakeholders.

BOX 2.
IPBES Conceptual Framework

According to the latest IPBES document (IPBES/2/17), the Platform's Conceptual Framework includes six interlinked elements constituting a socio-ecological system that operates at various scales in time and space: nature; nature's benefits to people; anthropogenic assets; institutions and governance systems and other indirect drivers of change; direct drivers of change; and good quality of life. The framework is graphically depicted in **Fig. 2**.

Fig. 2 demonstrates the main elements and relationships for the conservation and sustainable use of biodiversity and ecosystem services, human well being, and sustainable development. Similar conceptualizations in other knowledge systems include "living in harmony with nature" and "Mother Earth", among others. In the main panel, delimited in grey, "nature", "nature's benefits to people" and "good quality of life" (indicated as black headlines) are inclusive of all these world views; text in green denotes the concepts of science; and text in blue denotes those of other knowledge systems. Solid arrows in the main panel denote influence between elements; the dotted arrows denote links that are acknowledged as important, but are not the main focus of the Platform. The thick coloured arrows below and to the right of the central panel indicate different scales of time and space, respectively.

"Nature" in the context of the Platform refers to the natural world with an emphasis on biodiversity. Within the context of science, it includes categories such as biodiversity, ecosystems, ecosystem functioning, evolution, the biosphere, humankind's shared evolutionary heritage, and biocultural diversity. Within the context of other knowledge systems, it includes categories such as "Mother Earth" and "systems of life". Nature contributes to societies through the provision of benefits to people (instrumental and relational values, see below) and has its own intrinsic values, that is, the value inherent to nature, independent of human experience and evaluation and thus beyond the scope of anthropocentric valuation approaches.

"Anthropogenic assets" refers to built-up infrastructure, health facilities, knowledge (including indigenous

and local knowledge systems and technical or scientific knowledge, as well as formal and non-formal education), technology (both physical objects and procedures), and financial assets, among others. Anthropogenic assets have been highlighted to emphasize that a good life is achieved by co-production of benefits between nature and societies.

"Nature's benefits to people" refers to all the benefits that humanity obtains from nature. Ecosystem goods and services, considered separately or in bundles, are included in this category. Within other knowledge systems, "nature's gifts" and similar concepts refer to the benefits of nature from which people derive a good quality of life. Aspects of nature that can be negative to people, such as pests, pathogens or predators, are also included in this broad category. All nature's benefits have anthropocentric value, including instrumental values – the direct and indirect contributions of ecosystem services to a good quality of life, which can be conceived in terms of preference satisfaction, and relational values, which contribute to desirable relationships, such as those among people and between people and nature, as in the notion of "living in harmony with nature".

Anthropocentric values can be expressed in diverse ways. They can be material or non-material, can be experienced in a non-consumptive way, or consumed; and they can be expressed from spiritual inspiration to market value. They also include existential value (the satisfaction obtained from knowing that nature continues to be there) and future-oriented values. The latter include bequest value – in other words, the preservation of nature for future generations – or the option values of biodiversity as a reservoir of yet-to-be discovered uses from known and still unknown species and biological processes, or as a constant source, through evolutionary processes, of novel biological solutions to the challenges of a changing environment.

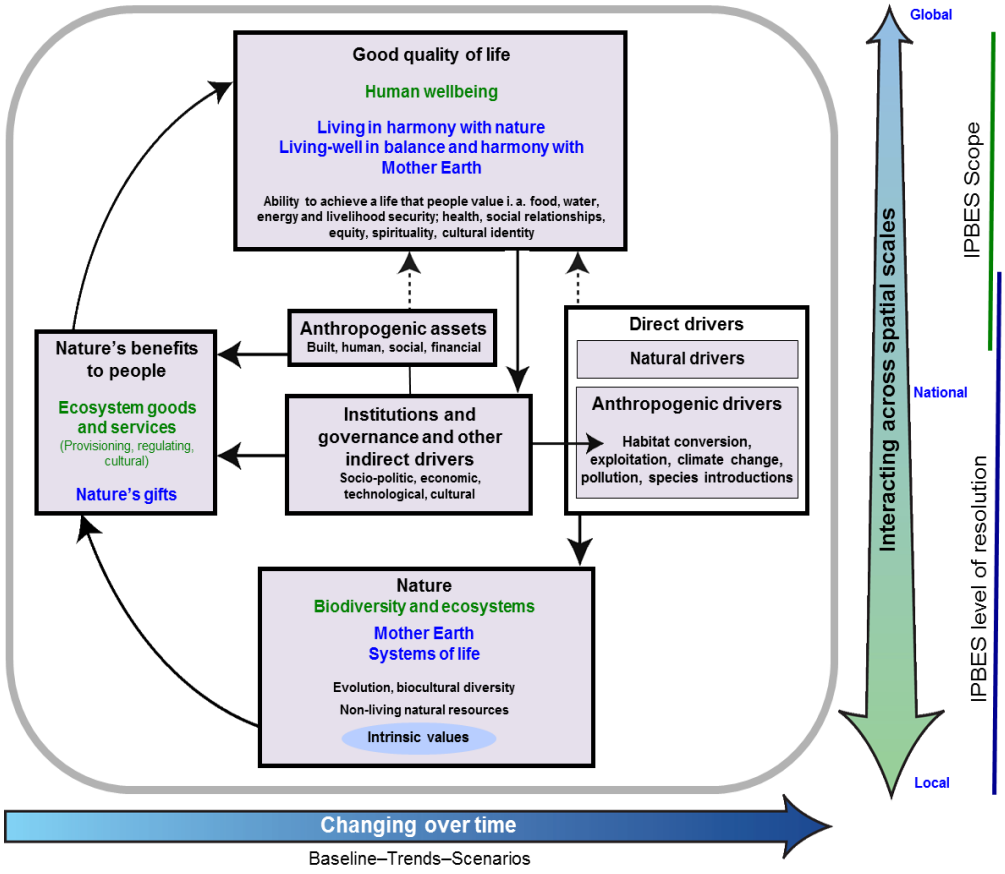


Fig. 2 IPBES Analytical Conceptual Framework

(Source) United Nations Environment Programme. (2013). Report of the second session of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES/2/17.

3. WORKSHOP PROGRAM

Date	Time	Event	Remarks
Mon, 10 Feb	9:00-10:00	Expert Workshop Opening Session Chair: - Opening remarks (UNU, Kanazawa Univ.) - Self-introduction of the participants - Background and objectives of the workshop (Suzuki & Saito)	Closed to the public (Language: English only)
	10:00-11:30	Overview of satoyama and satoumi regional assessments and studies (5 experts X 15mins) - Wataru Suzuki (UNU-IAS) & Chen Siew Fong (Regional Env Planning) Overview of JSSA Hokuetsu Cluster and OUIK research project - Osamu Saito (UNU-IAS) Overview and Progress of ES-Tradeoff research project - Shizuka Hashimoto (Kyoto University) Identifying the characteristics of Noto, Ishikawa from its land use and ecosystem services - Ryo Kohsaka (Kanazawa University) Traditional Knowledge, Biodiversity and Governance: Linking global and local - Shiwei Gou (Kyoto University) Assessing the baseline condition of Nakahechi, Kumano Pilgrimage Route and explore its conservation and restoration under the context of cultural landscape	
	11:30-11:45	Break	
	11:45-13:00	International context: (3 experts X 15mins) - Prof. Henrik Moller Choice of optimal indicators for Co-management of Production Landscapes: Joining Science, Traditional and Local Knowledge, Policy Expertise and Consumers for Sustainability - Dr. Pia Kieninger Kulturlandschaft and Satoyama Socio-ecological Production Landscapes: Parallels and Differences between Austria and Japan - Rodger Mpdane Overview of IPBES. - Q&A (30min)	
	13:00-14:00	Lunch	
	14:00-18:00	Breakout Discussion Session 1) What are the key challenges and opportunities in management of socio-ecological production landscapes? 2) How can diffirent stakeholders overcome challenges and promote collaboration in developing new co-management and co-governance models in harmony with nature? 3) What approaches, methods and techniques can be used to integrate traditional ecological knowledge and modern science to promote innovation and transformation? 4) How can the IPBES Conceptual Framework be transferred/tuned to local application? 5) What are new research areas or frontiers that should be explored in the next five years (joint research proposals	

		as outcomes of this workshop)?	
	18:30	Dinner	
Tue, 11 Feb	9:00-12:00	Expert Workshop Wrap-up session: Chair - Key messages, outline and timeline of the workshop's outcome document - Closing remarks (co-chairs) ・Photo session	Closed to the public
	12:00-13:00	Lunch	
	13:00-16:30	Seminar - MC: Mr. Tsunao Watanabe - Opening Remarks: Kazuhiko Takemoto - Keynote Speakers ・ Prof. Henrik Moller (30min) Indicators for Co-management of Production Landscapes: Joining Science, Traditional and Local Knowledge, Policy Expertise and Consumers for Sustainability ・ Dr. Pia Kieninger (30min) Kulturlandschaft and Satoyama Socio-ecological Production Landscapes: Parallels and Differences between Austria and Japan - Case Studies ・ Mr. Kiichiro Tada (30 min) Shunran-no-Sato: Rural Regeneration ・ Prof. Seiji Yanai (30min) The Role of Land Crabs in Linking Satoyama and Satoumi - Panel Discussion (60min) ・ Discussants: Moller, Kieninger, Hashimoto, & Kohsaka ・ Chair: Saito	Open to the public. (Language: Simultaneous interpretation, Japanese and English)
Wed, 12 Feb	9:30-	AM: Report Writing	OUIK

4. PRESENTATION ABSTRACTS

OUIK's Efforts toward *Satoyama* and *Satoumi* Assessment in Noto

Wataru Suzuki
(Satoyama Initiative Coordinator, UNU-IAS)

1. Background of the JSSA

Since 2001, the international community has been carrying out efforts toward assessment of biodiversity and ecosystem services, such as the Millennium Ecosystem Assessment (MA), Sub-Global Assessment (SGA) Network, IPBES, and Inclusive Wealth Index. Meanwhile, nationally, OUIK initiated the Japan Satoyama Satoumi Assessment (JSSA) in 2007.

The JSSA is a study of the interaction between humans and terrestrial-aquatic ecosystems (*satoyama*), and marine-coastal ecosystems (*satoumi*) in Japan. It follows and applies the framework of SGAs developed by the MA, with the main goal of providing scientifically credible and policy-relevant information on the significance of ecosystem services provided by *satoyama* and *satoumi* landscapes and their contributions to economic and human development for the use of policymakers. There are three main reasons the JSSA adopted the MA's ecosystem-services framework:

1) the centrality of human well-being in considerations of ecosystem services;
2) recognition of the interdependency, synergy, and trade-offs between ecosystem services and human well-being; and
3) acknowledgement of different temporal and spatial scales that impact this interdependency.

2. Findings and contributions of the JSSA

The JSSA systematically collected valuable scientific data including changes that have occurred in *satoyama* and *satoumi* in five major clusters throughout Japan in order to encompass different geographical, climatic, ecological, social, economic, and political characteristics over the 50 years since the end of World War II.

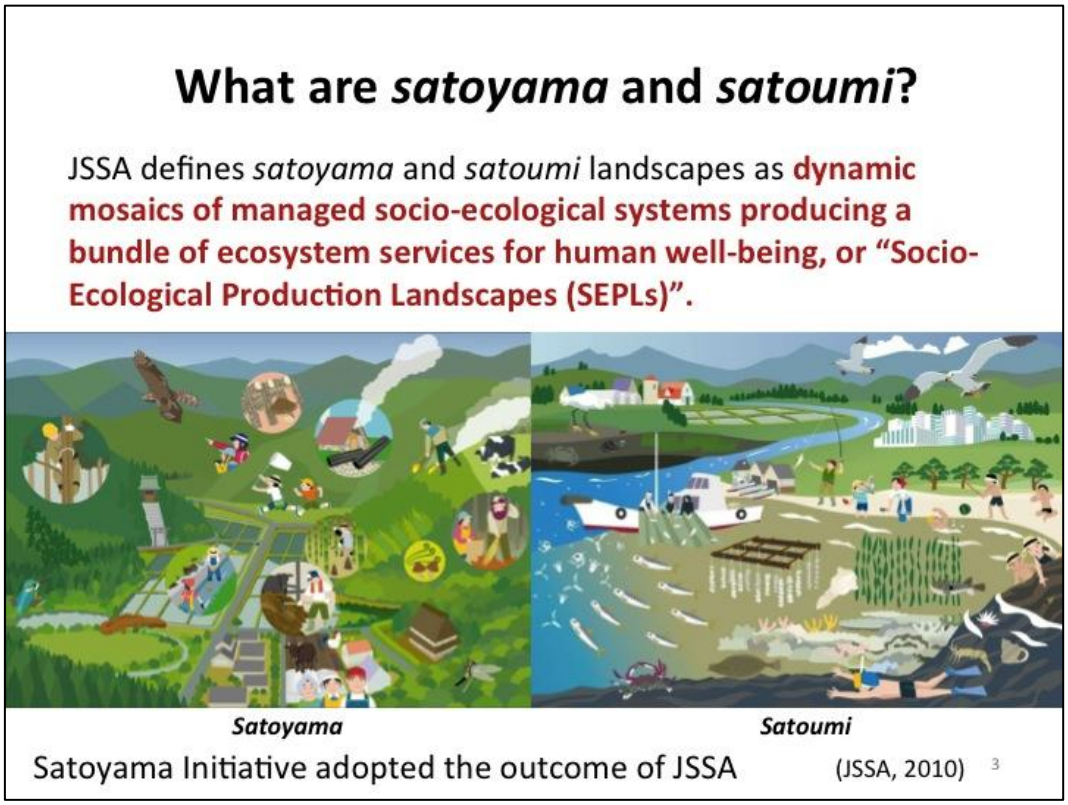
The JSSA defined *satoyama* landscapes as "Socio-Ecological Production Landscapes" (SEPLs), leading to the recognition of the Satoyama Initiative and the establishment of the International Partnership of the Satoyama Initiative (IPSI) at COP10.

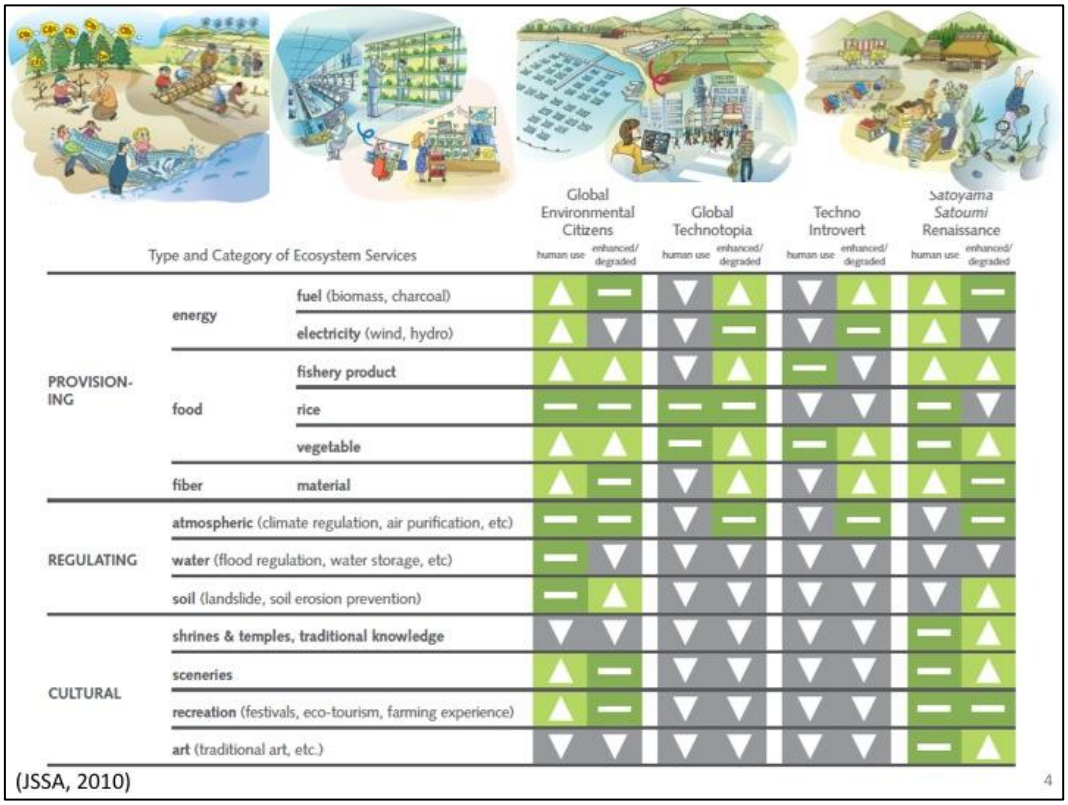
Efforts in the agriculture and food production sectors led to the establishment of GIAHS, and as such it is considered a complementary programme to the Satoyama Initiative.

3. Future challenges identified toward IPBES

In considering contributions to IPBES' regional and sub-regional assessments, it is essential to provide policy-relevant information with scientific credibility related to the significance of biodiversity and ecosystem services and the contributions of economic and human development. In Noto and the Hokuriku region, however, there is only a limited amount of available common data and no common platform for sharing such data. For the next step in contributing to the IPBES assessment, it will be important to establish a common platform for sharing scientific data on the target region and also to conduct sub-national

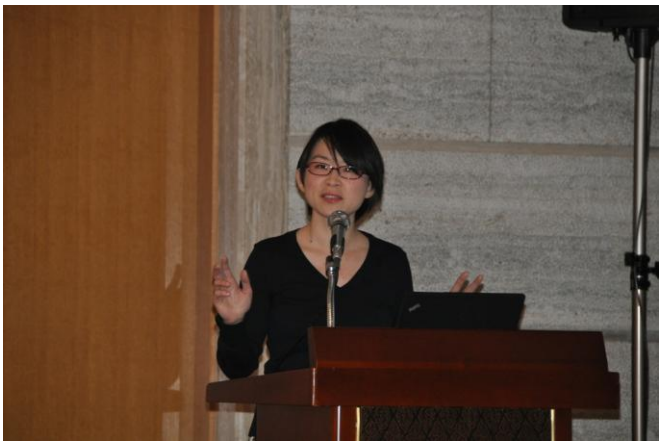
assessment to help multiscale assessment under IPBES. The second phase of the JSSA is expected to include these.





Spatial Data Collection and Perspectives on the Multi-scale Assessment of the Noto Peninsula's Ecosystem Services

Chen Siew Fong, Tadashi Masuzawa, Hajime Ise
(Environmental Consultant, Regional Environmental Planning Inc.)



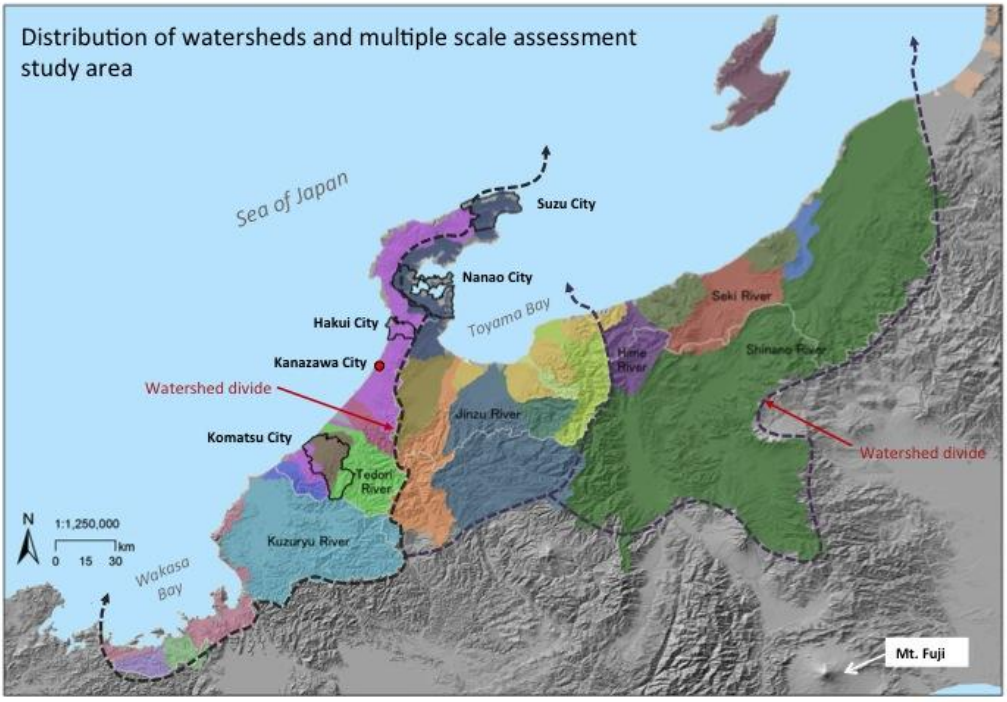
Addressing ecosystem services and their interaction across spatial scales is an important component of the IPBES Conceptual Framework, but depending on administrative boundaries to define its scale and extent may be inadequate. We recommend a multiscale assessment unit based on watersheds as planning units in *satoyama* and *satoumi* management, this being an enclosed system that encompasses ecological processes from the mountains (upstream) down to the sea (downstream).

Focusing on Noto, we divided our data collection into three scales: regional (Fukui, Ishikawa, Toyama and Niigata prefectures), large watershed (Ishikawa prefecture), and three cities in Noto namely Suzu City, Nanao City and Hakui City. We then collected data based on the Japan Satoyama Satoumi Assessment's ecosystem-services indicators for the Hokushinetsu cluster, and assigned them to their respective spatial scale and appropriate spatial resolution.

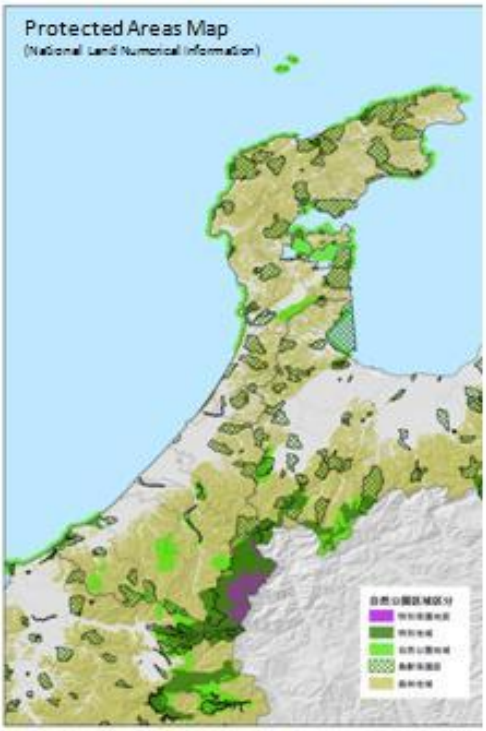
The important outcomes of our study can be divided into three categories: watershed divide and recommendations for strategizing ecosystem-services evaluation; biodiversity and environmental issues that transcend prefectural boundaries and are crucial for re-thinking co-management; and the importance of digitizing and making available more spatial data as a basis for scientific research. At the regional scale, the main watershed lines divide Hokushinetsu into *satoyama* and *satoumi* regions with watersheds that flow into the Sea of Japan, and regions with watersheds flowing into Toyama Bay, which is especially important in evaluating provisioning services and environmental risk management of riverine and coastal ecosystems. The Noto Peninsula depends on both systems, and this reflects the importance of synchronizing environmental management strategies and co-management across prefectural lines to preserve the provisioning and biodiversity services of the Noto Peninsula. Increasing wildlife-human conflict is also a crucial issue that demands immediate cooperation across prefectural lines.

Lastly, there is a need for quality spatial data and digitization of existing data in GIS for quick visualization and analysis, as a basis for scientific research. Good maps are important persuasion tools for policymakers and local residents. Up-to-date data for evaluating ecosystem services at local scale is especially lacking, particularly agricultural production, anthropogenic drivers and natural drivers. Data availability takes time; therefore sharing of scientific research results (published data), and transdiciplinary cooperation among researchers in Noto and Hokushinetsu will be key in strengthening the scientific basis for evaluating Noto's ecosystem services.

INTRODUCTION TO TARGET STUDY AREA

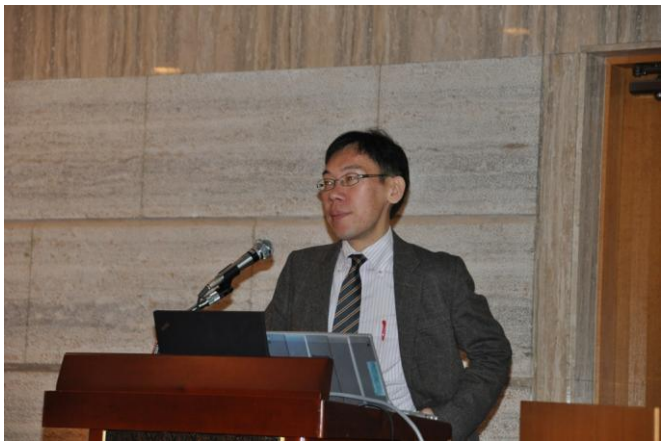


BIODIVERSITY SERVICES – Protected Areas



Trade-offs and Local Synergies in *Satoyama* Ecosystem Services

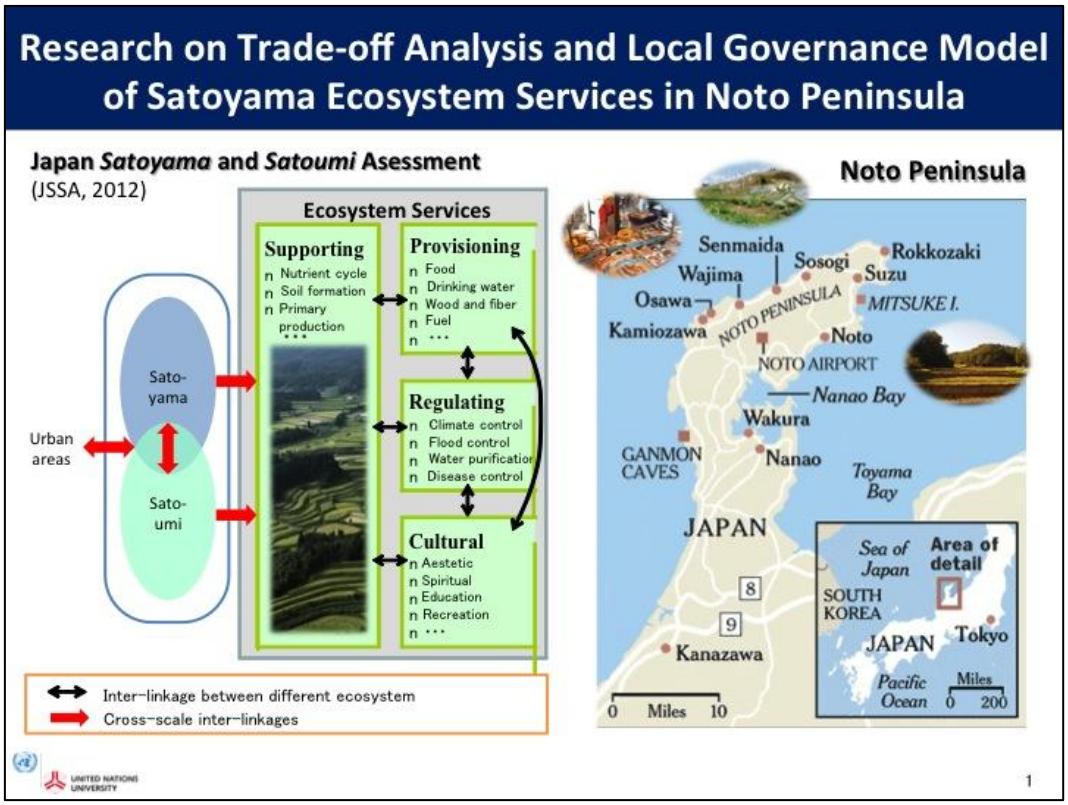
Osamu Saito
(Academic Programme Officier, UNU-IAS)

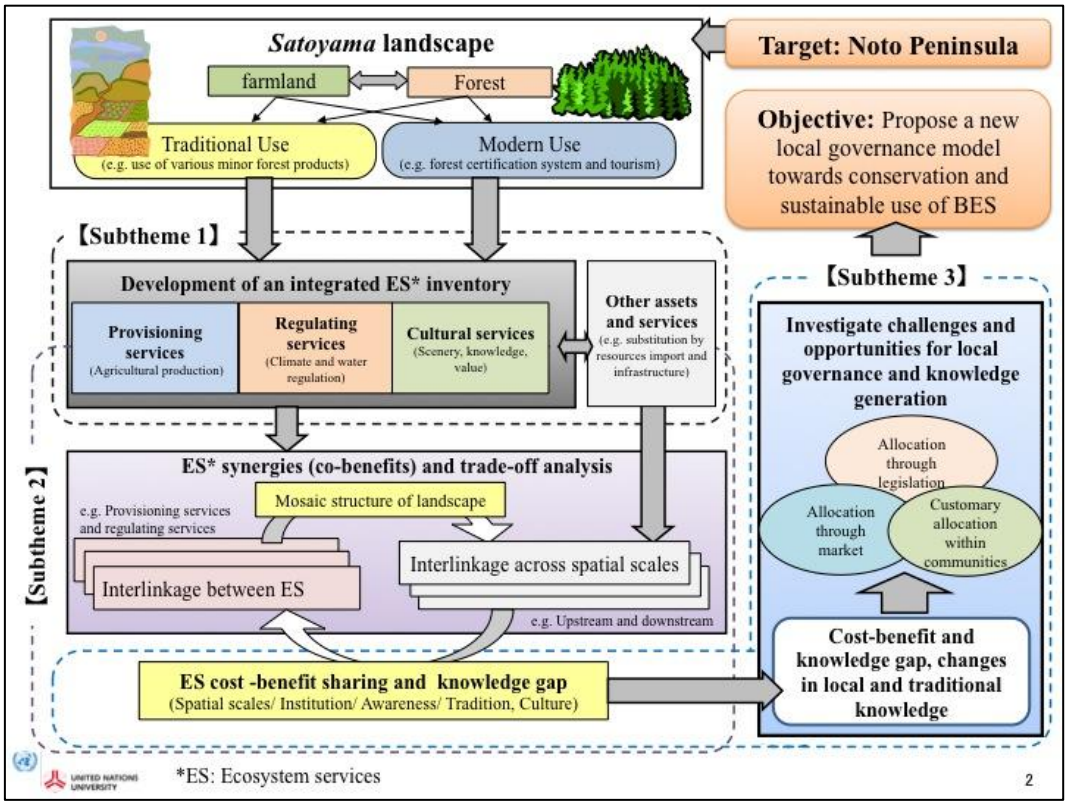


The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), established in 2012, is an independent intergovernmental body which aims to provide scientific support for policy-making in the area of biodiversity and ecosystem services (BES). It is expected that IPBES will focus on regional and sub-regional scale scientific activities that contribute to policy-making. In particular, the Asia-Pacific region is expected to play an important role as it houses mega-biodiversity. Our study discusses how identified needs for advanced biodiversity and ecosystem-service governance may be met through a new assessment framework implemented on the Noto Peninsula of Japan by the United Nations University, Kanazawa University, and Kyoto University. The Noto project highlights the importance of local context and knowledge in ecosystem-service management, focusing on new adaptations of Japanese '*satoyama*' landscapes models emphasizing interdependence between humans and nature. Such models seek to scientifically answer how to share and improve the diverse benefits nature provides, and identify new types of integrated knowledge and social initiatives in order to pass on interdependent *satoyama*-type landscapes to future generations.

Firstly, we reviewed the state of knowledge in the Asia-Pacific region by using the online IPBES Catalogue of Assessments on Biodiversity and Ecosystem Services to identify gaps and needs for future assessments contributing to IPBES key functions. Through our review, we found that: (1) urban, dryland ecosystems, and cultural ecosystem services are least assessed; (2) direct engagement of cross-scale public, private, and civil society stakeholders is low; and (3) combinations of citizen science and local and indigenous science are underrepresented and cross-stakeholder priorities in trade-off analysis are less considered.

Secondly, to overcome key challenges addressed in the review, we propose an innovative research framework integrating local stakeholder and scientific knowledge generation for understanding of the synergetic relationships between underrepresented ecosystem services, such as co-beneficial cultural and provisioning services. As preliminary results, we found that people share diverse agricultural products grown in their own farmlands by bartering and sharing within and beyond their communities. The amount of such products with no market transaction was significantly higher in the Noto Peninsula than other regions. These findings also help identify how social drivers of land-management change can have unexpected feedbacks to BES, which in turn eventually undermines the positive impact that sharing of various provisioning services has in maintaining knowledge and cohesion in aging communities.


Research on Trade-off Analysis and Local Governance Model of Satoyama Ecosystem Services in Noto Peninsula
Japan Satoyama and Satoumi Asessment
(JSSA, 2012)
Ecosystem Services
Supporting
n Nutrient cycle
n Soil formation
n Primary production
Provisioning
n Food
n Drinking water
n Wood and fiber
n Fuel
Regulating
n Climate control
n Flood control
n Water purification
n Disease control
Cultural
n Aestetic
n Spiritual
n Education
n Recreation
Sato-yama
Sato-umi
Urban areas
Inter-linkage between different ecosystem
Cross-scale inter-linkages
Noto Peninsula
Senmaida
Wajima
Sosogi
Rokkozaki
Suzu
Osawa
Kamiozawa
NOTO PENINSULA
MITSUKE I.
Noto
NOTO AIRPORT
Nanao Bay
Wakura
GANMON CAVES
Nanao
Toyama Bay
JAPAN
Sea of Japan
Area of detail
SOUTH KOREA
JAPAN
Tokyo
Kanazawa
Pacific Ocean
Miles
0 Miles 10
0 200
UNITED NATIONS UNIVERSITY
1


Satoyama landscape
farmland
Forest
Traditional Use
(e.g. use of various minor forest products)
Modern Use
(e.g. forest certification system and tourism)
Target: Noto Peninsula
Objective: Propose a new local governance model towards conservation and sustainable use of BES
【Subtheme 1】
Development of an integrated ES* inventory
Provisioning services
(Agricultural production)
Regulating services
(Climate and water regulation)
Cultural services
(Scenery, knowledge, value)
Other assets and services
(e.g. substitution by resources import and infrastructure)
【Subtheme 3】
Investigate challenges and opportunities for local governance and knowledge generation
Allocation through legislation
Allocation through market
Customary allocation within communities
【Subtheme 2】
ES* synergies (co-benefits) and trade-off analysis
e.g. Provisioning services and regulating services
Mosaic structure of landscape
Interlinkage between ES
Interlinkage across spatial scales
e.g. Upstream and downstream
ES cost -benefit sharing and knowledge gap
(Spatial scales/ Institution/ Awareness/ Tradition, Culture)
Cost-benefit and knowledge gap, changes in local and traditional knowledge
UNITED NATIONS UNIVERSITY
*ES: Ecosystem services
2

Identifying Characteristics of Noto, Ishikawa from its Land Use and Ecosystem Services

Shizuka Hashimoto[1] & Shogo Nakamura[2]
(Associate Professor[1] & Research Fellow[2], Kyoto University)

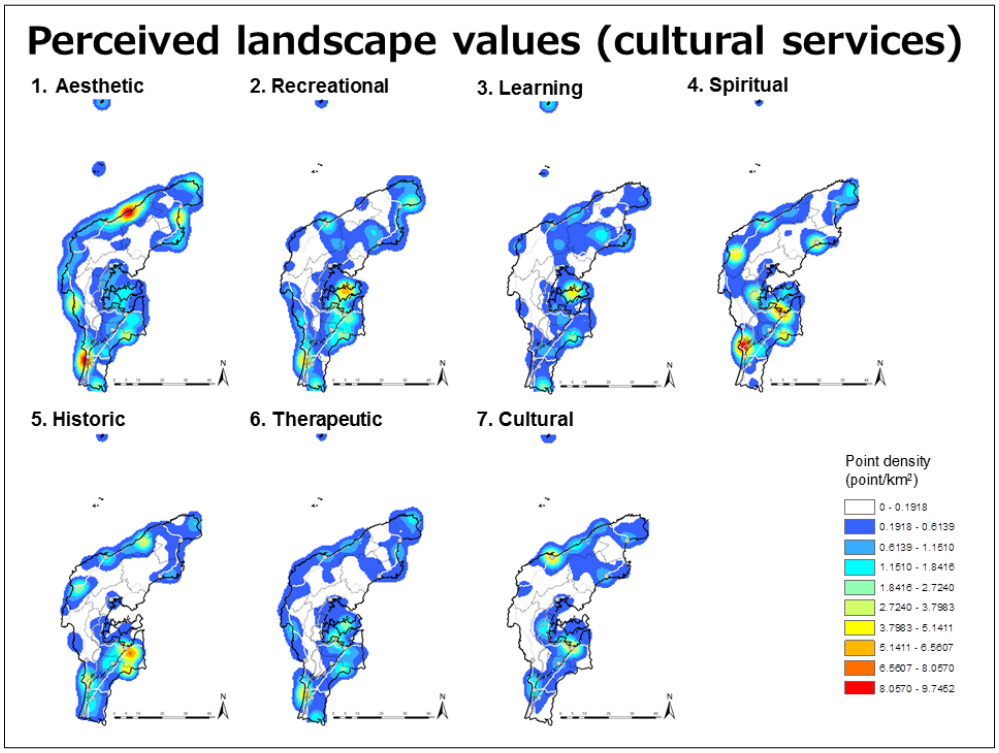
The Noto Peninsula has been designated as one of the Globally Important Agricultural Heritage Systems (GIAHS) by the Food and Agriculture Organization (FAO), recognized for its social-ecological production landscapes (SEPLS) consisting of a mosaic of villages, farmlands, secondary forests, artificial forests, and irrigation ponds. The landscape of Noto has been formed and maintained through long-term human influence on nature. However, its sustainability is currently in trouble in large part due to rapid depopulation and aging, which is gradually breaking down the balance of SEPLS, causing, for instance, the abandonment of farmland and forests and increased human-wildlife conflicts. In order to achieve the sustainable management of Noto's SEPLS in a strategic manner, developing common ground regarding the current situation in the Noto peninsula is of crucial importance. To this end, we have been carrying out a macroscopic assessment of Noto's ecosystem services and landscape quality.

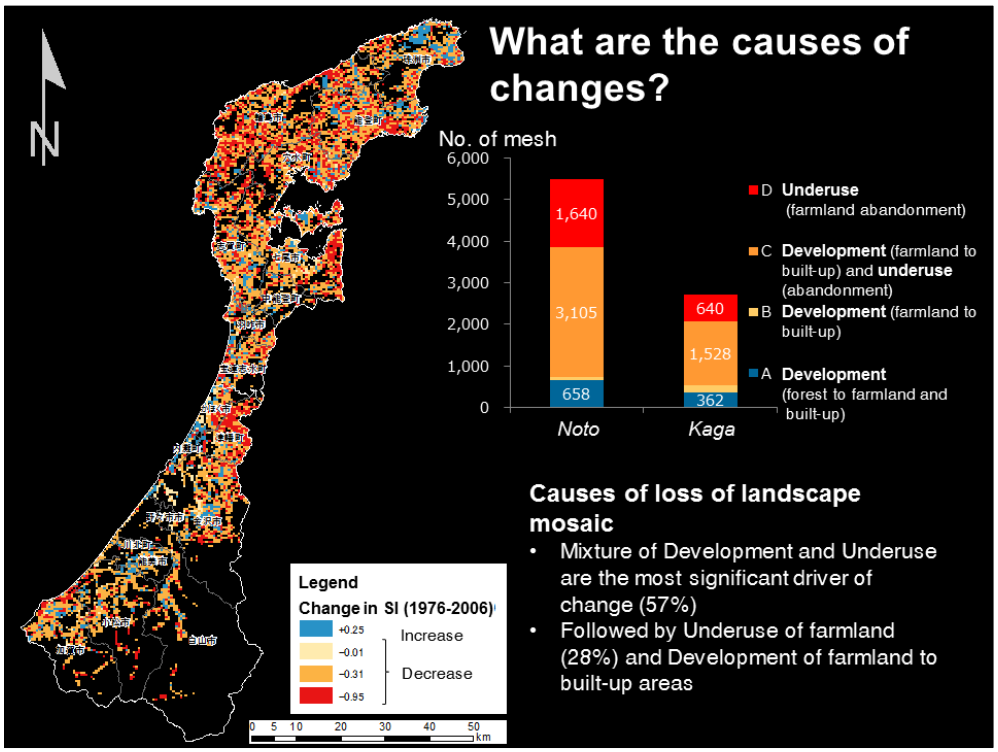
Firstly, we have developed an ecosystem services inventory of Noto, based on a literature review including the GIAHS application documents by the Noto Regional GIAHS Executive Committee and the Hokushinetsu cluster report developed by the Japans Satoyama-Satoumi Assessment. Our ecosystem services inventory represents the wide variety of ecosystem services available in Noto for each of the three ecosystem service categories, namely provisioning, regulating and cultural services.

Secondly, one of the challenges we faced in evaluating provisioning services is that not all services are available as statistics. For instance, although there are over 700 types of agricultural and forest products available in Noto, the agricultural statistics cover only a small portion of the products with large production volume, and are therefore insufficient to capture the diversity of cultivars which fall into the same statistical category, such as rice.

Another challenge is the assessment of cultural services as "non-material or intangible benefits people obtain from ecosystems". To handle this issue, a questionnaire survey was conducted in October2013, targeting people living in Noto to capture people's perceptions about seven landscape values: aesthetic, recreational, learning, spiritual, historic, therapeutic, and cultural values. Questionnaire sheets were delivered to 8,000 residents of Noto, of which 1,662 responded (response rate 21%). The responses were digitized and analyzed with GIS to visualize the spatial distribution of the seven landscape values as point-density surfaces. The spatial variation of landscape values are presumably characterized by the distribution of scenic spots, historical sites, and facilities or geographical features that help people link different landscape values to different places in Noto. As for regulating services, we have created a map of flood mitigation services produced by Noto's agroecosystems as an example. The volume of flood mitigation services in at a certain place is closely related to the area of paddy fields: the larger the paddy field area, the greater the available flood mitigation service.

Finally, we analyzed the landscape quality of Noto because the types and volume of ecosystem services available in a certain place are closely related to its biodiversity and land-use intensity. We introduced the "Satoyama Index" as a proxy indicator to evaluate the spatial variation of biodiversity in Noto using land-use data for the years 1976 and 2006. Our analysis showed that Noto has rich heterogeneous landscapes compared with the Kaga region with relatively higher SI values. However, those landscapes have been deteriorating at a rapid rate over the past three decades. Over 40 percent of Noto's landscapes experienced loss of heterogeneity, presumably undermining the production base of ecosystem services.





Traditional Knowledge, Biodiversity, and Governance: Linking Global and Local

Ryo Kohsaka
(Associate Professor, Kanazawa University)

People face a dilemma at the forefront of biodiversity conservation. There is a desire to improve the economy and social welfare in the majority of countries, but there is also a need for biodiversity in these areas. The so-called "mega-diverse" countries are rich with biodiversity, but face challenging tasks as a result of the desire for development. Here we discuss how their economies and social needs can be accommodated while conserving biodiversity.

Genetic Resources and Traditional Knowledge

The Convention on Biological Diversity (CBD) was signed in 1992, as a result of the world community's growing commitment to sustainable development. It has three objectives; (1) conservation of biological diversity; (2) sustainable use of its components; (3) fair and equitable sharing of benefits arising out of the utilization of genetic resources.

For a legitimate use of genetic resources, a using country and a providing country should build trust with each other through mutually-agreed terms and should share benefits including collective sampling, collective research, and monetary benefits. There are a large number of species, especially of fungi and other microbiota, which are hypothesized but not identified yet. Thus, genetic resources have further unknown capacity to be discovered in the future. This means it is necessary to discuss the most appropriate means for their appropriate use.

Ecosystem Services

Ecosystem services, which are obtained from ecosystems, consist of supporting services, provisioning services, regulating services, and cultural services. As the Millennium Ecosystem Assessment (MA) defined, all of them support human well-being, incorporating security, basic materials for a good life, health, good social relations, and as their basis, freedom of choice and action. However, ecosystem services always have the potential to change due to multiple drivers, and sooner or later these changes impact human well-being to some extent. As the MA framework shows, we have to think of these changes and impacts with a holistic view.

Multiple interactions between species are seen in ecosystem. All ecosystem services are produced by these interactions, while the species and their interactions differ depending on the ecosystem types.

Ecosystem services changes have caused various issues around the world, and these issues have spread globally. In Japan, we face issues which cannot be resolved easily. Most of these issues, such as global warming, waste, air pollution, and so forth, should be confronted in cooperation with other countries. However, many scientists suggest that issue of urban-rural environments should be handled by our own efforts.

Depopulation in Noto

Noto is considered to be an area that maintains *satoyama* and *satoumi* landscapes and traditions that have sustained generations for centuries. However, the actual situation in Noto demonstrates the serious issue of depopulation and population aging. The total population in Noto is expected to continue to decreased, and people over 64 years old will account for 50% of the population by 2030. Depopulation and population aging are causing an increase of abondoned cultivated areas in Oku-Noto due to a lack of farmers.

Shiitake mushrooms

In snowy areas of Japan, farmers used to produce rice in summer and shiitake mushrooms in winter since climate conditions were not suitable for growing vegetables. This system continued until the price of shiitake mushrooms dropped, caused by a rapid increase in the import volume of shiitake mushrooms from China in the 1980s. Moreover, the consumption volume of raw shiitake mushrooms also dropped. Against this background, the production volume of raw shiitake mushrooms decreased in Ishikawa. However, as an exception, the amount increased in the Oku-Noto area.

"Noto-Temari" – the highest rank of "Noto 115", a kind of branded shiitake mushroom - is produced and shipped from Oku-Noto. Two main forces support the accelerated production of Noto-Temari. One of them is the Japan Kinoko Research Center Foundation, which provides workshops and information for farmers to help them learn cultivation methods, etc. The other is Japan Agriculture (JA), which adapted a "joint selection and joint sales" system. JA collects Noto-Temari from farmers, even if they ship only one Noto-Temari, and then sorts the ranks and sells them. This means that each farmer doesn not have to grow a large amount of Noto-Temari. This is the main reason why the production amount of raw shiitake mushrooms increased in Oku-Noto.

Assessing the Baseline Condition of Nakahechi, Kumano Pilgrimage Route and Explore its Conservation and Restoration under the Context of Cultural Landscape

Shiwei Gou
(Ph.D. Candidate, Kyoto University)

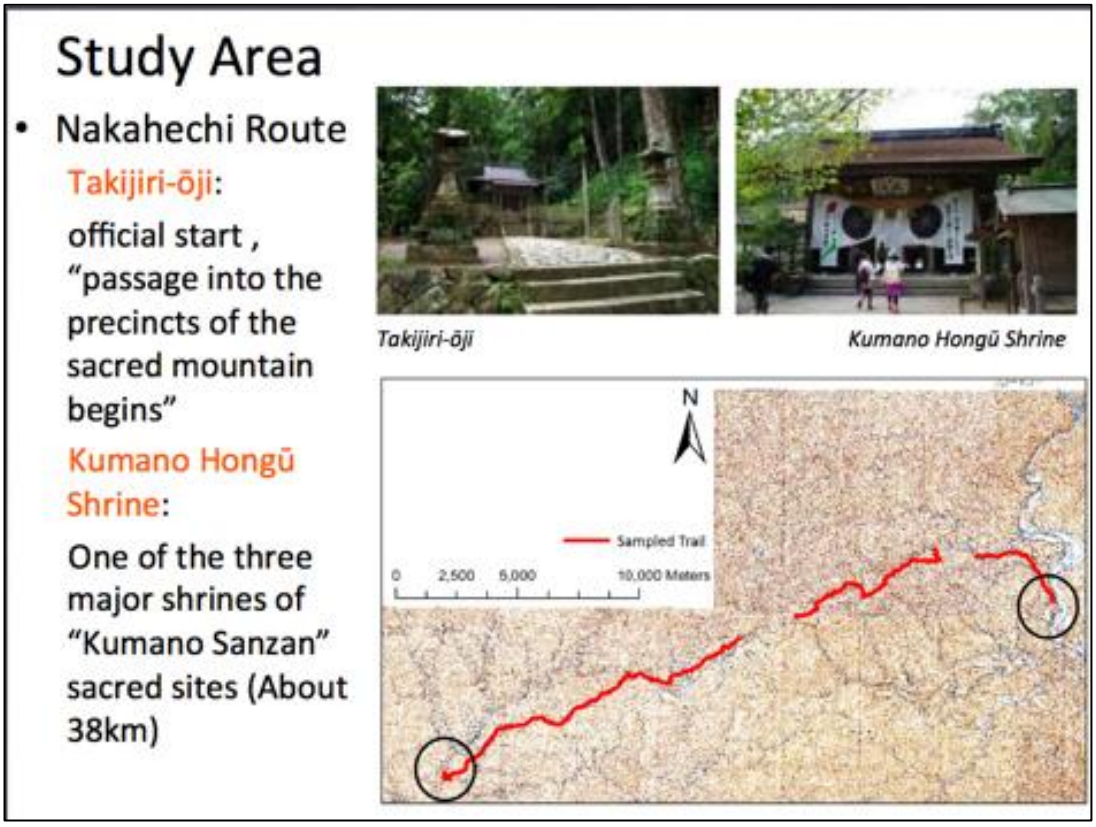
The UNESCO World Heritage Site called "Sacred Sites and Pilgrimage Routes in the Kii Mountain Range" represents a special type of cultural landscape in Japan, "reflect(ing) the fusion of Shinto, rooted in the ancient tradition of nature worship in Japan, and Buddhism, which was introduced from China and the Korean Peninsula…and their surrounding forest landscape reflect a persistent and extraordinarily well-documented tradition of sacred mountains over 1,200 years. The area, with its abundance of streams, rivers and waterfalls, is still part of the living culture of Japan…" according to the brief description by UNESCO. It is the first site in Japan registered as a "cultural landscape" and one of the only two pilgrimage roads registered: the other being the "Way of St. James" in Spain.

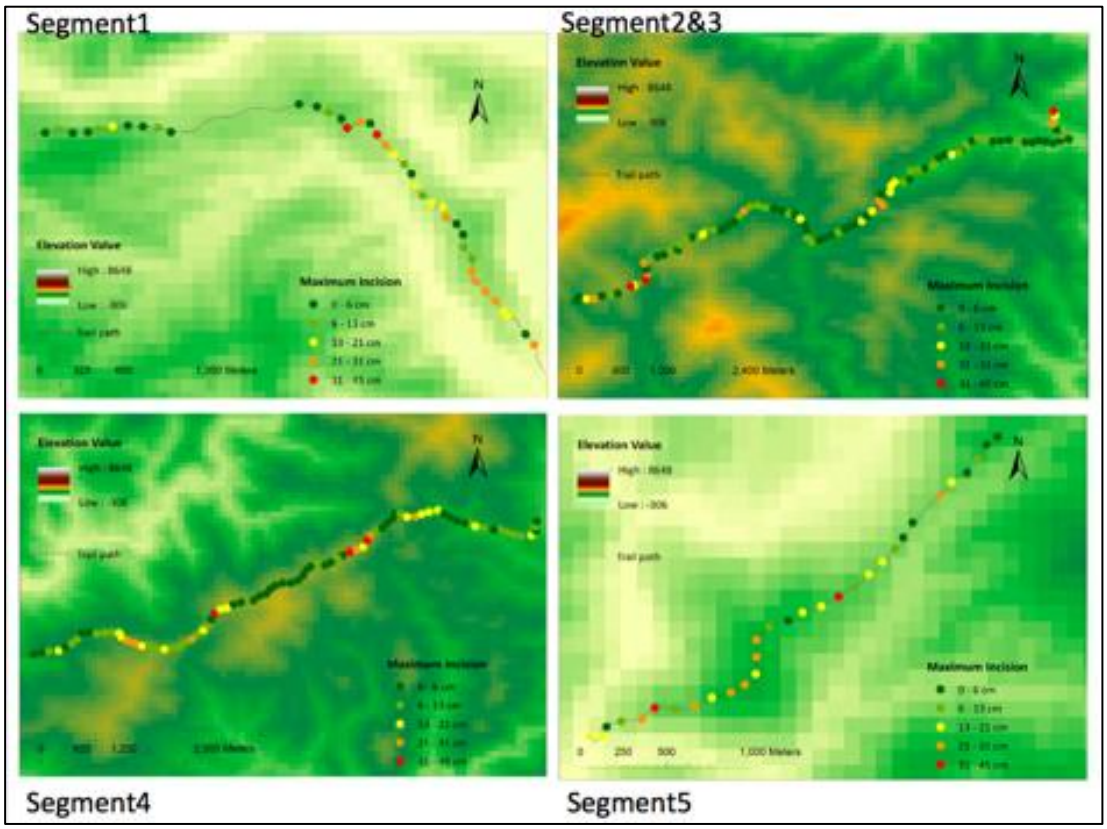
Since the Kii Peninsula is a forested area, most of the pilgrimage routes linking the sacred sites look like little more than a forest trail that receives impacts from both natural and anthropogenic processes. Degraded trail conditions can detract from their functional value as an important component of the cultural landscape and other potential values such as their role in disaster recovery and as evacuation routes for emergency situations.

A study on the trail degradation of one of the main routes, "Nakahechi", was conducted in 2013, aiming to identify the current physical condition of the trail and both environmental and cultural influencing factors in order to further explore the meaning of trail conservation and degradation within the context of the cultural landscape. The research received a great deal of help from the staff of the Wakayama World Heritage Center as well as from some warmhearted local people. The study conducted a point-sampling method for the unpaved section of Nakahechi between Takijiri-Oji and Kumano Hongu Shrine, covering a distance of about 38 km. 254 sample points were set made along the trail at 100m intervals, with m*aximum incision* caused by soil loss and *root exposure* identified as the most significant impact problems and measured as trail condition indicators. Possible environmental factors including topographic and vegetation variables along with cultural variables of trail design, trail maintenance, and use-related variables were also measured for each sample point. Finally, each sample point was rated with a general-condition class rating system developed by the researcher with the help of management staff.

The results show that, for the sampled part of the Nakahechi route, a generally good condition has been maintained for the trail, and spatial variances can be seen for different segments of the trail. 35% of the sample points are in a good environmental location with gentle landform slopes and 11% are of a good design with hillside style, which requires more dig and fill construction work. 77% of the stone-surfaced trail and 62% of the step construction is located where the trails are of a comparatively erosion-susceptible grade. This reveals that the stone-paved surface is not only of important historical value, but also plays an important role in protecting the trail. Different management approaches should be applied to different impact levels.

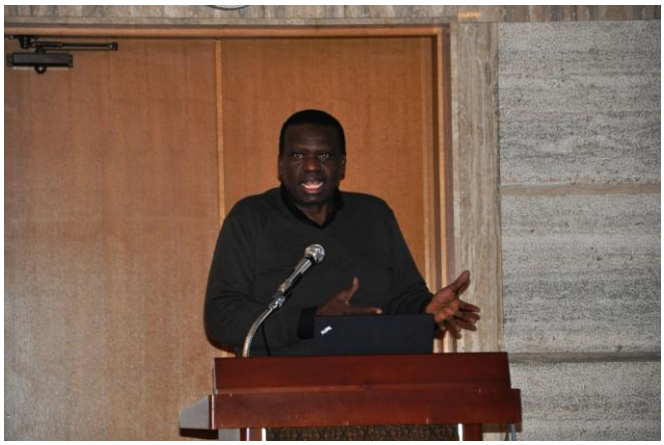
Further study is needed to research the perceptions of users, including not only tourists but also local people, and what and how landscape values are attached to this ancient trail.





IPBES in Biodiversity and Ecosystems Management

Rodger Mpande
(United Nations University Institute for the Advanced Study of Sustainability)



The Intergovernmental Platform on Biodiversity and Ecosystems Services (IPBES) is a body established by governments to strengthen the science and policy interface for biodiversity and ecosystems services. The platform will perform four key functions:

- Generate knowledge for policy makers at the appropriate level.
- Perform regular and timely biodiversity and ecosystems services at the sub-regional, regional, and global levels.
- Identify policy-relevant tools and methodologies for decision making.
- Build capacity to improve the science-policy interface.

The platform is supported by four main bodies:

- **The plenary**, which is the overall decision-making body, responsible for the development and implementation of the work program.
- **The Bureau**, which is an advisory body to the Chair and is responsible for overall policy and administrative issues
- **The Multidisplinary Expert Panel (MEP)**, an elected group of experts that carries out scientific and technical functions of the platform. The current MEP is interim and will be replaced in January 2015 at the third plenary of the platform.
- **The Secretariat**, based in Bonn. The secretariat ensures the effective functioning of the platform by supporting the Plenary, Bureau and MEP. The Secretariat is headed by an Executive Secretary supported by permanent staff members other secondments from governments and organizations.

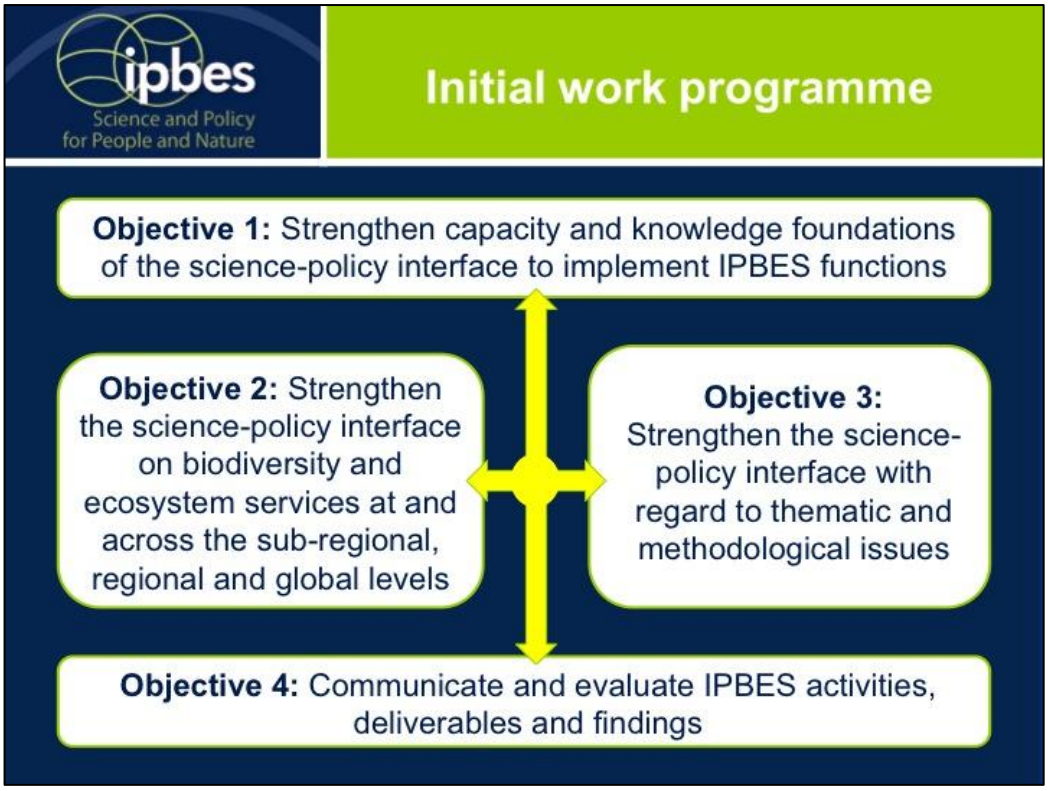
These bodies are supported by various other mechanisms that include the Technical Support Unit based in Trondheim, Norway; task forces; ad-hoc expert groups; and other stakeholder engagement strategies. To support implementation, a partnership between four UN agencies (FAO, UNDP, UNEP and UNESCO) has been established.

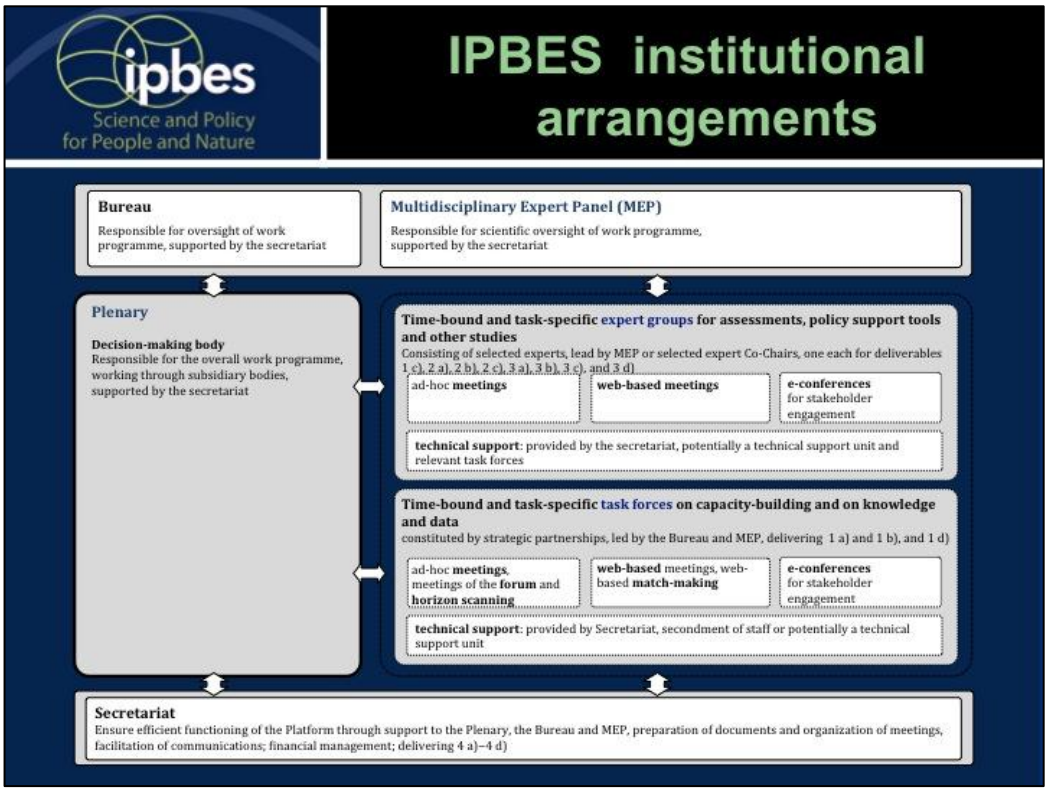
A four-year work program for the platform has been developed, and its implementation will be guided by a conceptual framework. The IPBES Conceptual Framework is constructed on the premises that there are dynamic interactions between human beings and ecosystems elements, and thus changes in human conditions will bring about direct and indirect changes in ecosystems services. The new Conceptual Framework also recognizes key constructs of the relationship between nature and the human being, Mother Earth, and living in harmony with nature.

The use of multi knowledge systems in undertaking assessments is highly valued in the new Conceptual Framework. In this direction a specific deliverable in the program is the production of policies and

procedures for how to work with other knowledge holders, including indigenous people and local communities.

The full details of the work program 2014 -2018, institutional framework, and budget is presented on the IPBES website www.ipbes.net . More information can be requested from the Secretariat based in Bonn through respective MEP members.



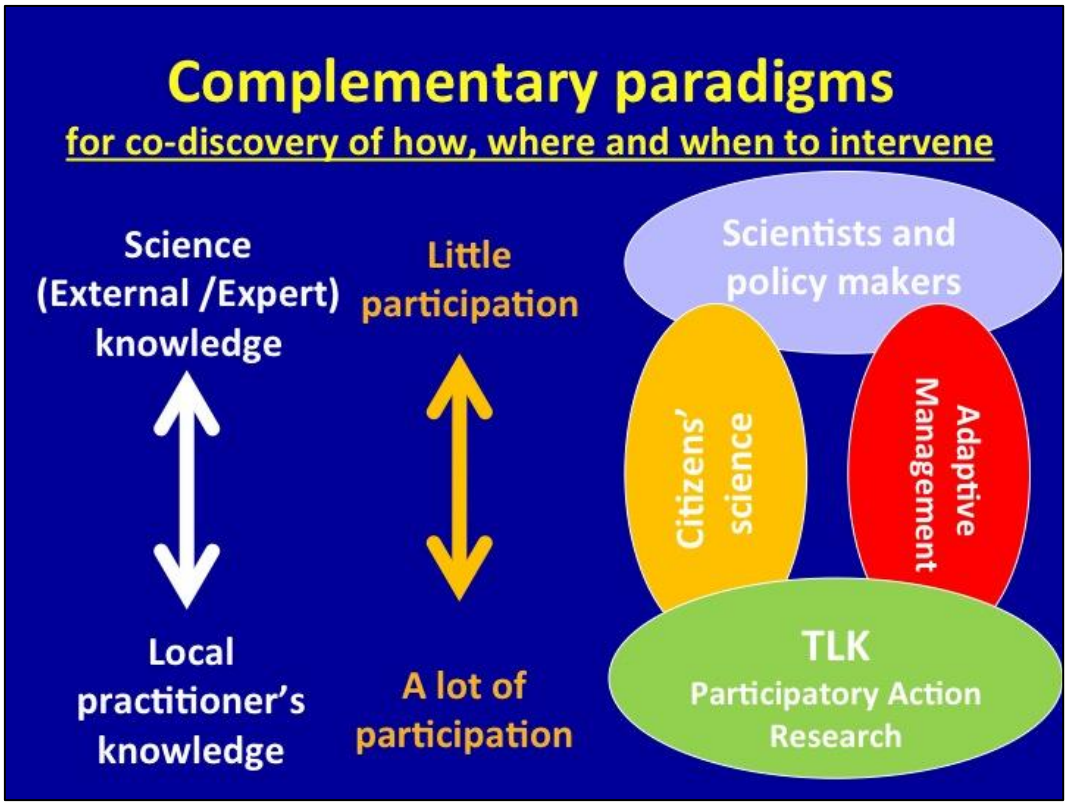


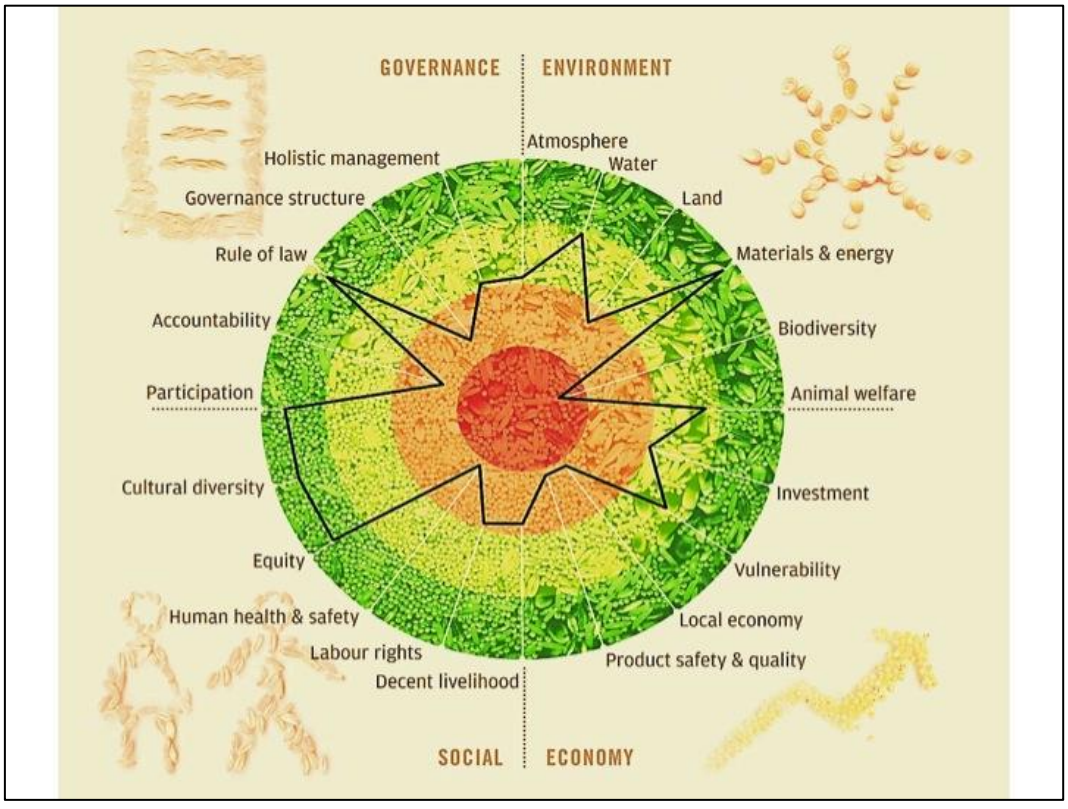
Indicators for Co-management of Production Landscapes:

Joining Science, Traditional and Local Knowledge, Policy Expertise, and Consumers for Sustainability

Henrik Moller
(Professor, Centre for Sustainability, University of Otago, New Zealand)

Achievement of sustainability requires a "social contract" – a collective agreement to not reduce the opportunities and well-being of current and future generations. People will collaborate if they feel respected, have their values accepted, and are given meaningful and trusted roles in achieving sustainability. Building identity and pride in one's own place and community therefore underpins the quest for sustainability. It requires collaborative planners and politicians to root governance and share power with local communities to achieve co-management and "environmentality". Creating a common framework and sustainability indicators that can be scored and interpreted by all stakeholders (farmers, business people, citizen scientists, planners, policymakers) provides the basis for measuring group progress towards achieving sustainability and resilience. Such indicators also allow learning about what works and does not work for sustainability, and helps bond the community by reinforcing and demonstrating the community's collaboration. Integration of top-down and bottom-up approaches brings collective strength. Scientists and planning experts with an "etic" (outsider) perspective can bring lessons from afar and take a bigger-picture view. Traditional and Local Knowledge (TLK) holders have a deeper and more nuanced "emic" (insider) understanding of local ecology, community, and economy that can lead to "local tuning" of strategies for sustainable living. Sharing information, trust, and sound scholarship will drive accountability and learning, but this will require considerable investment in community networking, sharing of information, and benchmarking performance. The New Zealand Sustainability Dashboard (NZSD) is a recent example of on online tool for joining widely-dispersed growers and industry managers together to create "social networking" for sustainability. It helps market-accreditation schemes to drive consumer choice for ethical food and fibre production. Price premiums and preferential market access in Japan might result from having a *satoyama-satoumi* market accreditation brand which acts like an eco-label and also celebrates the wider social and economic dimensions of sustainability and uniquely Japanese values that it protects. The NZSD also automates upscaling of sustainability indicators data for "State of the Environment" reporting to local governments (like Japan's prefectures) and the Ministry for Environment or Ministry for Primary Production. Such "cross-scale linkages" are important to guide top-down investment and policy and underscore the public "license to farm". The NZSD team has discovered that designing indictors for sustainability monitoring and learning is relatively easy. Prioritizing indicators and creating defendable targets for measuring progress towards joint goals is harder. Operationalising the indicator framework and triggering participation by all stakeholders, not just professionals from government or research agencies, to score indictors and interpret the results is hardest of all. Sustained and collective care of the *satoyama-satoumi* systems could benefit from creating a community networking tool like a dashboard to link grassroots actors together, reinforce their vision and kowledge, create business opportunities for sustainable action, and salute their identity and wisdom. Japan should rightfully be very proud of its wonderful *satoyama* and *satoumi* systems and the underlying philosophy that has much to teach western approaches to environmental care.


Complementary paradigms
for co-discovery of how, where and when to intervene
Science (External /Expert) knowledge
Little participation
Local practitioner's knowledge
A lot of participation
Scientists and policy makers
Citizens' science
Adaptive Management
TLK
Participatory Action Research


GOVERNANCE
ENVIRONMENT
Holistic management
Governance structure
Rule of law
Accountability
Participation
Cultural diversity
Equity
Human health & safety
Labour rights
Decent livelihood
Atmosphere
Water
Land
Materials & energy
Biodiversity
Animal welfare
Investment
Vulnerability
Local economy
Product safety & quality
SOCIAL
ECONOMY

Kulturlandschaft and Satoyama: Sustainable Management of Socio-Ecological Production Landscapes -Parallels and Differences between Austria and Japan

Pia Kieninger
(Institute of Integrative Nature Conservation Research, Department of Integrative Biology & Biodiversity Research, University of Natural Resources & Life Sciences, Vienna, Austria - BOKU)

Austria, situated in the middle of Europe, is very similar to many other European countries along the Alps. Like elsewhere in Central Europe, in Austria wilderness and/or untouched nature is very scarce. There are some small remnants of virgin forest (counting 3% of the territory). Most of the Austrian landscape is "Cultural Landscape" (in Gernman "*Kulturlandschaft*"), shaped by centuries of human land-use.

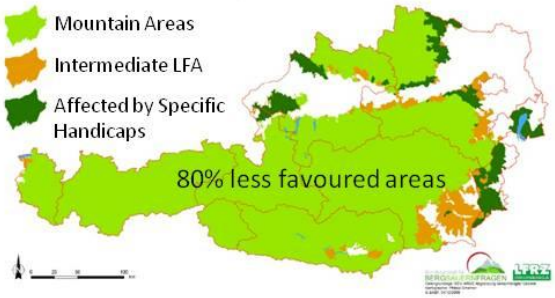
This *Kulturlandschaft* is a hotspot not only of biodiversity, but also of biocultural diversity and is very important for the maintenance of ecosystem services. This is the same as in the case of Japanese *satoyama* landscapes. *Satoyama* and *Kulturlandschaft*, showing many similarities in topography, land-cover, and socio-demographic and economic situation, can both be defined as socio-ecological production landscapes (SEPLS).

Since the last 50-60 years, these highly-industrialized countries are facing the problems of urbanization, land loss due to the increasing need for road transport infrastructure, and intensification of agriculture on the one hand, and of aging populations, declining farming households, land abandonment, and consequently the loss of cultural landscape and its biocultural diversity on the other hand.

Japan and Austria have tried to handle the trend of dwindling cultural landscapes partly with different strategies. While the two main landscape governance strategies in Austria are relying on subsidies to keep the farmers in farmland management and relying on laws and regulations to protect existing precious cultural landscapes, Japan has a more human-centred approach. Japan has the focus more on the rural-urban exchange and volunteers for the revival of the *satoyama* landscape. A good example therefore is the nationwide rice terrace ownership system (the so-called *tanada* ownership system; about 300 in Japan), where volunteers, mostly from the cities, engage in rice-farming management and help to save the landscape from abandonment (Kieninger et al., 2011; Takebe & Tomiyoshi, 2010). Volunteer landscape stewardship however plays in Austria a rather subordinate role.

As both countries can learn from each other, comparative interdisciplinary/transdisciplinary studies between Japan and Austria are needed in order to exchange experiences and to find and develop new innovative ideas and solutions to a common challenge.

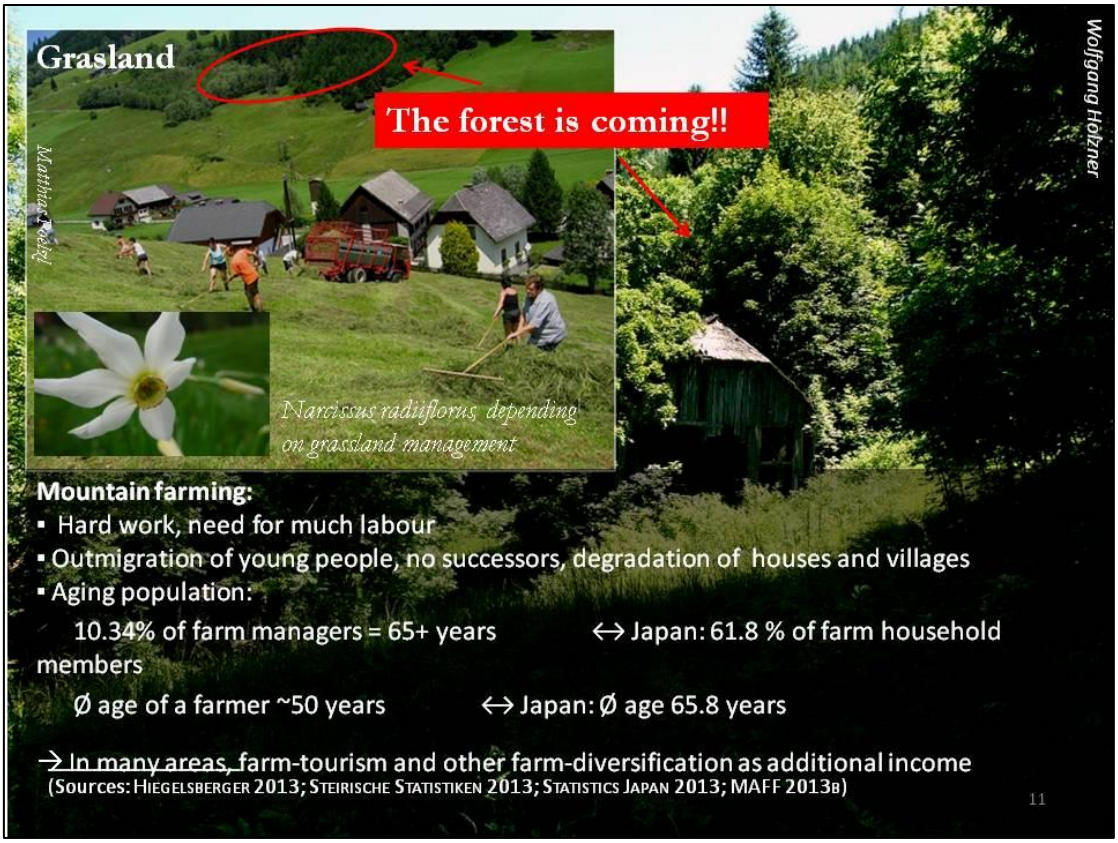
Agriculture – key for cultural landscapes
オーストリアの農業



Trend: less but bigger farms

- Primarily family farms (92.7%)
- Ø farm size 18.8 ha ↔ Japan: Ø 2,39 ha
- 54.2% part time ↔ Japan: 71.5%
- ~ 20% organic farmland

(Sources: GREEN REPORT OF THE MINISTRY OF AGRICULTURE 2014; AGRICULTURAL STRUCTURE SURVEY 2010; MAFF 2014, 2013A)



Mountain farming:

- Hard work, need for much labour
- Outmigration of young people, no successors, degradation of houses and villages
- Aging population:

10.34% of farm managers = 65+ years ↔ Japan: 61.8 % of farm household members

Ø age of a farmer ~50 years ↔ Japan: Ø age 65.8 years

→ In many areas, farm-tourism and other farm-diversification as additional income

(Sources: HIEGELSBERGER 2013; STEIRISCHE STATISTIKEN 2013; STATISTICS JAPAN 2013; MAFF 2013B)

11

Shunran-no-Sato: Rural Regeneration
Kiichiro Tada
(Chairman, Shunran-no-Sato)

Mr. Kiichiro Tada, a founder of Shunran-no-Sato (the Japan's first farm-stay village) delivered a speech on the idea and importance of rural communities. Shunran-no-Sato is a project aiming to revitalize rural communities in the Noto Peninsula by providing local residents' houses as accommodation for visitors. Shunran-no-Sato's goal is to revitalize not only Noto, but also other marginalized communities in Japan by providing a successful model case from this project. Mr. Tada insisted that one of the key elements to achieve the success of Shunran-no-Sato is to secure economic income for each household at an average of 400,000 JPY (approx. 4,000 USD) per month through accommodating visitors. Recognizing the identity of their own community encourages local residents' mindset and will to attract outsiders to visit.

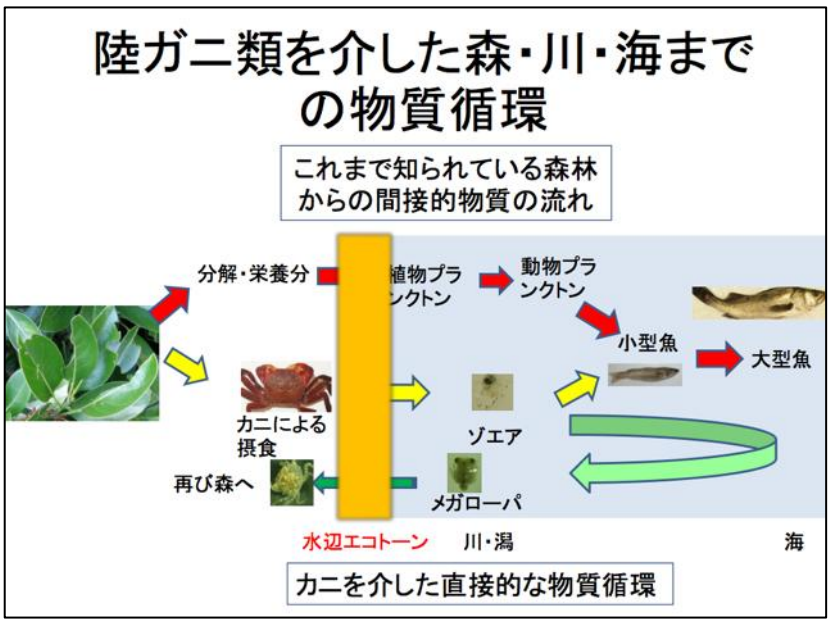
Mr. Tada added that the uniqueness of rural communities could be seen in local foods that are not available anywhere else. The nostalgic scenery of a rural community comes not simply from the satoyama and *satoumi* landscape, but from the people as well. The form of the people's spirit and mind has existed in rural communities, and their morals and parenting nourish the next generation who can then contribute to build healthy future societies. Vigorous senior citizens with knowledge and managing of an adequate childcare system are invaluable resources. This necessary human interaction creates sensation and makes the community move. The gift of sensation is what Shunran-no-Sato can provide to visitors. If society recognizes the importance of rural communities, the number of visitors will increase and secure income for more households in the community.

Shunran-no-Sato started with one household in 1996, and has grown to 47 households among 13 rural communities now participating. 8,000 people have visited to the communities including some from overseas. Although the number of visitors is important to secure income, Shunran-no-Sato prioritizes the depth of human interaction between the community's people and visitors. Filling visitors' five senses is the priority, not seeking or creating attractive touristic spots. Mr. Tada concluded his speech with how revitalizing rural communities revitalizes youth. The strength of rural communities lies in their fast and smooth decision-making and implementation. He and his colleagues first spent five years discussing whether they should get consensus from everyone or move forward with just people who agreed. Challenges always emerged when they tried to deal with communities. Through the challenges that Shunran-no-Sato experienced, they chose to run the project with the people who supported it, and to be flexible if people wanted to join or leave. The important thing in community-building is to always be warm and keep a positive manner. Mr. Tada's empirical knowledge as a practitioner inspired the audience with the necessity of the proper attitude and motivation for overcoming the problems of aging, depopulation, and lack of successors which many SEPLS commonly face.

The Role of Land Crabs (*Chiromantes haematocheir* and *C. dehaani*) as Indicators for Connectivity between Satoyama and Satoumi

Seiji Yanai
(Professor, Department of Environmental Science, Kanazawa Prefectural University)

Two species of land crabs (*Chiromantes haematocheir* and *C. dehaani*) inhabit coastal forests in the Noto Peninsula, Ishikawa Prefecture, Japan. The adult crabs inhabit coastal deciduous and evergreen forests. They feed mainly on fallen leaves, but also harvest fresh leaves, mushrooms, nuts and invertebrates in the forests. To remove toxic substances from the leaves and aid digestion, *Chiromantes* crabs either bury the leaves in the soil or soak them in the water. Each adult female release tens of thousands eggs into the sea from July to September each year. The number of females releasing eggs increases steadily from the new moon to the full moon, with smaller numbers observed when avian predators and/or humans are present. Both eggs and larval stages of *Chiromantes* are important food sources for a variety of small marine fish, such as the striped mullet (*Mugil cephalus*). *M. cephalus*, in turn, are fed on by larger fish species including the Japanese sea perch (*Lateolabrax japonicus*). The larval stage (zoea) of *Chiromantes* species is both abundant and widely distributed around the Noto Peninsula and, therefore, plays a crucial role in supporting rich marine faunal diversity in the region. The crabs return to terrestrial habitats as they reach the juvenile stage between late September and October. Degradation of coastal habitats poses a major threat to *Chiromantes.* For example, juvenile *Chiromantes* are abundant in reed (*Phragmites* spp.) grasslands, with an average density of 100 individuals per m^{-2}. Their density, however, declines significantly to approximately forty, five and zero individuals per m^{-2} in concrete ground with fallen leaves, sandy soil, and concrete ground without fallen leaves, respectively. Our presence/absence survey of *Chiromantes* in terrestrial environments and comparison with historical data indicated that they have disappeared from at least twelve monitoring locations in the Noto Peninsula. Locations where *C. haematocheir* and *C. dehaani* have disappeared typically suffer from coastal forest and grassland removal, housing construction and/or construction of concrete embankments. Concrete embankments particularly, prevent the movement of *Chiromantes*. Therefore, it is important to create corridors so that *Chiromantes* can continuously utilise both marine and terrestrial habitats. We conclude that ensuring the connectivity between *satoyama* and *satoumi* is crucial for supporting sustainable ecosystems in the Noto Peninsula.



5. SUMMARY OF PANEL DISCUSSION ON 11 FEBRUARY.

Panelists: Prof. Moller, Dr. Kieninger, Dr. Hashimoto, and Dr. Kohsaka
Moderator: Dr.Saito

The panelists responded to three main questions raised from the audience. The first was on the different goals of restoring SEPLS in Austria (i.e., biodiversity restoration) and in Japan (i.e., attracting new people to rural areas and increasing human well-being). Dr. Pia Kieninger highlighted that the Western's worldview sees humans rather outside of nature, and not as a part of nature. This means that Austrians put a focus on the restoration of nature, trying to keep the "detrimental" humans out of it. In the Eastern World, such as Japan, maybe due to the religious belief of Buddhism and Shinto, people are regarded as a part of nature. Thus, the people's wellbeing is the focus as well as an indicator of the health of the environment.

The second question related to how traditional local food and knowledge were communicated and maintained in New Zealand society, particularly among the indigenous communities. Prof. Henrik Moller responded that it is important to keep traditional knowledge, beliefs, and practices alive by allowing people to have continuous access to these resources and local governance to apply their knowledge. For example, Rakiura Māori (the indigenous people) retain rights to harvest sooty shearwater chicks from 30 offshore islands where the birds are nesting. Traditional ecological knowledge (and the ethics of how to act towards each other and towards the land and biodiversity) is often communicated to younger generations in the *Marae* (their traditional gathering place). Prof. Moller also stressed that traditional and local knowledge does not only refer to those from indigenous communities, but also includes those in wider society, farmers, and local foresters – all of whom have learned locally-tuned ecological knowledge. Dr. Kohsaka referred to invasive alien species in New Zealand and rest of the world.

The final question was what were the key aspects are in creating a successful model like Shunran-no-Sato (the Japan's first farm-stay village), and how to find and mentor successors in rural areas. Mr. Tada Kiichiro, the chairperson of Shunran-no-Sato, highlighted that local leaders must identify what is required for a particular area, implement change, demonstrate success, and lead the way for others. He added that "we also need to create a social system or framework in which small landowners (who may only own 2-3 ha) can survive. The availability of mentors is also important. It is not necessary to seek successors from the next generation – people who are only slightly younger than the mentors might be sufficient successors to fill the gaps until younger people come along."

The take-home message from the panel discussion was that we need to move forward from purely focusing on biodiversity restoration to bio-cultural restoration (i.e., reconnecting humans to the land and keeping traditional knowledge, beliefs and practices alive). Co-designing and collaboration would be crucial for the successful adoption of a SEPLS movement on a global scale. Globalization is often identified as a big threat to the conservation and sustainability of rural communities. It has, however, also allowed us to become more united, and to share both ideas and solutions. The Noto Peninsula provides a great example of farmer-led

business initiatives and research that highlights the importance of connectivity between SEPLS for the rest of the world. Further efforts into participatory approaches to sustainability monitoring are likely to add value and depth to ongoing research. By learning from one another, we are taking a big step towards sustainable land management.

6. DISCUSSION AND RECOMMENDATIONS REGARDING FIVE KEY QUESTIONS

1) What are the key challenges and opportunities in management of socio-ecological production landscapes?

Key challenges emphasized during the workshop include demographic change represented by depopulation, aging, and out-migration from rural to urban areas, expansion of abandoned land on the one hand and intensification of agriculture on the other, human-animal conflict, mono-cropping systems, disconnection of urban and rural linkage, weak policy and science interface, misunderstanding of different cultures, and conventional values systems (**Table 1**). At the same time, various opportunities were identified to improve and transform management of SEPLS.

Table 1 Challenges and opportunities identified and discussed at the workshop

	Challenges	Opportunities
(1) Natural drivers		
Climate	Climate changes, natural succession	Less snow, revival of indigenous species
Natural events	Natural disasters and extreme weather events enhanced by climate change, natural succession	New disaster management such as ecosystem-based approach to enhance resilience
(2) Anthropogenic drivers		
Demographic changes (shifts)	Aging, depopulation	Younger generations can come to rural areas
Land use	Urbanization, expansion of abandoned land, human-wildlife conflict	Environmentally-friendly, green infrastructure
Agricultural systems	Mono-cropping (intensification), replacement of traditional crops with commercial crops	New farmers, organic and natural products from abandoned land
Technology drivers	Productivity, hybrid, GMO	Renewable energies (biomass/PV)
Industrial structures	No jobs, no young leaders in agricultural sector	Small-farmer-owned co-operatives Direct marketing Foodcoops Organic farming New "SEPLS" brand for local products
Market pressures	Domestic and international market pressure on prices, conventional tourism	Direct marketing, international certification schemes, crowdfunding, new tourism
Cultural gaps	Marginalized knowledge (vs. mainstream), misunderstanding of different cultures	Encourage communication between city and countryside to bridge understanding
Value systems	Loss of emotional connection/attachment to landscapes, disatisfaction with basic living conditions	Re-look at values, regaining pride and confidence, inclusive wealth
(3) Institutions, governance, and other indirect drivers		
Rural and urban linkage	Disconnect between rural and urban: urban population does not feel any responsibility towards rural people Loss of local shops and stores Large supermarkets Same convenience everywhere	Widen marketing boundaries, new producer-consumer models Food cooperation by consumers, community supported agriculture, investment-for-harvest to share risks of harvest failure (also benefits in good times)
Scientific knowledge and assessment	Lack of awareness Lack of capacity Difficulty in trans-disciplinary research	Benefit from ES: pollination services New Conceptual Framework Co-operation with policy, in order to get awareness for the research results
Policy support and governance	Legal restrictions No policymakers involved at national scale, need national platform	Policy and legal reform Regional, national platforms such as JPBES
Knowledge generation	Institutional structures do not facilitate knowledge from diverse knowledge holders	Centralized information dissemination, use of ICT

Capacity building	Need to understand policy-science interface, include practitioners, and build human capital/education	Dialogue sessions, workshops, training

2) How can different stakeholders overcome challenges and promote collaboration in developing new co-management and co-governance models in harmony with nature?

We would like to propose the following six approaches to overcome the challenges and promote collaboration in developing new co-management models.

(1) Stakeholder Engagement:

- Collaboration depends on getting all the stakeholders involved throughout the process. Therefore, who should be stakeholders? Everybody is a stakeholder. Sharing a feeling of crisis (current situation) is key.
- Team effort will depend on understanding the values and priorities of diverse stakeholders; dialoguing with various stakeholders is needed to discuss what benefits they get from SEPLS.

(2) Vision, Leadership and Local Networks:

- Collaboration may require participants to rearrange their value system and mindset. Sharing a common understanding/vision brings cohesive effort, though we don't need to agree entirely for constructive joint action (debate and creative tension suggest a variety of solutions).
- Leadership and successors are important parts of social capital to enable adaptation and transformation of SEPLS. Social networks may have to be strengthened or extended before local knowledge and energy can be harnessed for a common cause (utilizing local networks).

(3) Reorganizing of Value Systems:

- SEPLS are not just places of food production or tourism resources. They are systems that hold the value of beliefts and ethics of people and society. We can make use of international recognition schemes like GIAHS as opportunities for the community to reassess the value of their culture and natural capital, Cultural identity and connection to place are key ingredients of the social capital that underpins the future care and restoration of SEPLS.

(4) New Producer-Consumer Model:

- Long supply chains for most provisioning services make consumers 'blind' to who has produced the food or fibre they use and what care has been taken to produce it in a way that does or does not support SEPLS. A method is needed to indirectly reconnect consumers and producers.
- Corporative Social Responsibility (CSR): There may be a need to help small business, subsidize production, and sponsor entrepreneurship.
- Direct marketing, food co-ops, SEPLS-branding for local products, etc.

(5) Good Governance and New Commons Approach:

- Intra- and inter-governmental cooperation provides cross-scale linkage to manage threats and capture opportunities that can restrore and protect SEPLS. Local policymakers have a particularly important and active role. Long-term commitment should be ensured because conservation, adaptation, and learning can take a long time. Also, threats and drivers are likely to change in the coming decades – sustainability is more about a journey than a single destination. Good governance therefore emerges as a fundamental requirement if SEPLS are to still be present in 100 years.

Multiple partners have roles. These could include "U-, J-, and I-turners"[8], local residents, private sector members (shifting from CSR to Creating Shared Value, or CSV), urban citizens, volunteers, etc.

(6) Information, Data Management and Knowledge sharing:

- Trans-disciplinary research should be enhanced. Standardized data gathering, collaborative mapping and measuring where possible, and using qualitative information where more appropriate can all build knowledge of what to do, where, and when, in order to sustain SEPLS. Collective strength comes from scientists becoming involved with NPOs' and NGOs' activities and a network of "citizen scientists" from the local community; local eyes see and care most, but their information has more value if it is structured, collected, and analyzed to some degree.

3) What approaches, methods and techniques can be used to integrate traditional ecological knowledge and modern science to promote innovation and transformation?

Combining Traditional and Local Knowledge (TLK) with science is an important strategy for learning how to maintain SEPLS while simultaneously building trust and collaboration between actors working at very different scales. For instance, knowledge partnership can join local experts to national policymakers and international researchers. The resulting "cross-scale linkage" is a key for the transformation of SEPLS and their resilience to shocks and different drivers.

(1) Harnessing the power of interdisciplinary and transdisciplinary teams

Interdisciplinary research demands that scientists and humanities scholars, as well as scientists from different academic disciplines, work together for the same goals. They share tools and methods in all aspects of research: problem definition, research design, interpretation, and communication. Innovation and synergy emerges if the disciplines genuinely interact throughout the entire research process, rather than simply getting together at the end to give separate advice from within their own discipline (the latter is called "multidisciplinary" research).

Transdisciplinary research goes one step further by inviting the partnership of formal scholars with practitioners – people who have experiential knowledge and who have "learned by doing". TLK experts are often amongst the latter, while reserve managers and policymakers also have knowledge forged by experience of what does and does not work for sustainability.

The strongest application of SEPLS principles will emerge from a transdisciplinary approach, but this can sometimes be expensive and slower to get going. Innovation and new insights can also emerge from interdisciplinary approaches amongst scholars, and while this is still a challenging process requiring researchers to learn each other's terms and trust their approaches, it is conceptually easier to achieve than full transdisciplinary partnership.

Innovation and transformation emerge from the integration of knowledge systems that are not normally brought together. Formal scholarship by experts with a wider perspective, for example scientists and policymakers, can complement the experiential knowledge of local TLK experts. Local-tuning for sustainability can emerge and strength can be added when scientists bring knowledge from long traditions of broader scholarship. TLK often provides diachronic knowledge, or long runs of information from a few places, while science often relies on more synchronic knowledge, or short data sets measured in the same

[8] In Japan, people from rural areas who moved to big cities to attend school or find work and then later return to their hometowns are called "U-turners"; those from rural areas who do not return to their hometowns but decide to live permanently in cities on the way are dubbed "J-turners"; and big-city dwellers who relocate to new rural areas to live and work are called "I-turners" (Yahata, 1997).

way from multiple places. TLK and local practitioners and citizen scientists can potentially provide masses of data and information referenced to local scales for scientific analysis, whereas conventional scientific research is often constrained by weak replication and limited coverage (Moller and MacLeod, 2013).

(2) Successful partnership depends on respectful processes

This type of innovation and transformation can only come from an established relationship between science and TLK experts. Respectful and equal participation mus underpin the reliability and completeness of the integration of the two knowledge systems. In concrete terms, "cultural safety" measures or other safeguards can be agreed to guide the relationship and intellectual property (IP) rights before the methods and techniques are implemented (Moller et al. 2009). Knowledge-sharing for co-discovery abandons the more traditional "extension approach" where experts discover solutions on their own terms and then try to impart them to "end-users" afterwards. Instead, both TLK and science experts together become co-drivers from the beginning to the end of the co-discovery process. This means that practitioners already own the research and are more likely to trust and act on its recommendations. Partnership between science and TLK does not mean melting or blending the two together; the power of mutual peer-review comes from a respectful recognition of differences and the value of each.

(3) Practical steps in TLK and science partnerships

Commonly encountered issues and approaches which may be negotiated and elaborated include:

- Collaborative planning to set joint goals: "Where are we going and how are we going to get there together?";
- Negotiating the relationships and resource sharing (including research funds) between researchers and TLK holders; Sharing research funding to allow full participation of TLK holders in research processes;
- Many round table discussions and face-to-face discussions with all stakeholders;
- Gathering local knowledge and communicating it back for local people to make collective sense of it. Normally, practitioners are more isolated and learn in a more passive and serendipitous way;
- Potentially, protection of ownership of TLK by Intellectual Property (IP) agreements;
- Safeguarding publication rights and professional ethics. Locals must understand that professional scientists need to submit articles for peer review no matter what the findings are, even if they show unsustainable use or inconvenient truths;
- Finding new ways of communicating that are not just academic, but which enable local stakeholders to understand and contribute. This does not mean peer-reviewed academic outputs are not needed, just that they are not enough in themselves. This makes the whole research process more time-consuming, and scientists need resources for additional ways of contributing;
- Creating tools that link local, national, and international actors and knowledge-holders. The development of a Sustainability Dashboard in New Zealand is a recent example that deploys online sustainability assessments and a web hub to create a sustainability network and share information for benchmarking, indicator trend analysis, State of Environment reporting, and to drive consumer choice for sustainably-produced food and fibre (Manhire et al. 2012); and
- Media management. Locals often wish to speak for themselves and scientists want to speak about their contribution and the limits of scientific certainty.

(4) Specific applications of research partnerships

TLK provides insight not only on all aspects of resource use, but also about relationships between people and the environment and a holistic understanding of how SEPLS work. It also helps monitor ecosystem and

biocultural health, i.e., the linkage between people and ecology. Commonly-recurring specific applications of TLK include:

- Knowledge about hunting and ecosystem rhythms and changes;
- Food processing, storage, and sharing;
- Traditional crafting;
- Disease and pest control;
- Medicinal plants and therapies (bio-piracy is a potential risk here and verification of benefits may be needed/helpful for marketing);
- Old agricultural land management practices (farmers store old equipment, and this can indicate changes and past practices);
- Historical and cultural values, and the way these have changed; and
- The meaning of ancestral sayings and stories as guides to environmental ethics and sound management (Wehi, 2009).

Both science and TLK are constantly adapting and being updated (Berkes, 2011). Indeed, adaptation and strengthening of TLK can come through dialogue with science and vice-versa. This partnership accelerates learning and adaptation. Transmission of techniques to younger people keeps the knowledge alive and growing. TLK can be used for training young people in customary activities and to rebuild their connection to place and identity. The coalition of science and TLK can provide new ways of using materials and applying knowledge, including new ideas for marketing and economic benefits.

(5) Methods and techniques for transdisciplinary research

In addition to general approaches above, there are several techniques that could be applied on the ground:

- Rapid appraisal methods can be applied to score "Cultural Health Indicators" of biodiversity and environmental health, supporting "biocultural" conservation and restoration and simultaneously informing biodiversity conservation and restoration (Townsend et al., 2004).
- Community based "cultural mapping", or preparing maps to collect knowledge in a different way that sometimes resonates more with TLK than science).
- Documentation and reporting of existing knowledge and oral history to prevent it from getting lost and making it available to scientists to help co-discovery of sustainability solutions.
- Literature and oral archive surveys, e.g., food culture and old records of past meals.
- "Cultural keystone" species (Garibaldi and Turner, 2004) can be identified as priorities for management and restoration. These are species that are pivotal in maintaining knowledge, identity and commitment to environmental care for local communities and cultures. Often they will also be important species for ecosystem functioning, or "ecological keystone species", but they might also be the keys for social connections and kinship relationships, or iconic "flagships" for the relationship between people and place. Seen in the SEPLS context, restoration efforts are about restoring links between people and their economy with ecology, so reinstating or maintaining links is just as important as restoring or maintaining actual biodiversity.

Many case studies of partnerships between TLK and science are described in IPBES's recent working group (UNESCO, 2014). Some case studies discussed in our workshop included:

- In the Philippines, local people revitalized traditional knowledge and brought it to the government for

policy formation.

- In projects to identify the needs of local communities, women drew maps on the ground. Men tend to focus on a-market-based economy, while women focus on daily life.
- A New Zealand sustainability assessment for 'Tītī' (sooty shearwater chick sustainability) combined population simulation modelling, TLK historical records, traditional monitoring signs, and Catch per Unit Effort. Computer models could simulate and corroborate the effectiveness of traditional teachings for sustainability.

(6) Joining quantitative and qualitative information

Science relies on and trusts quantified information over written qualitative information, while TLK can sometimes mistrust numbers and be skeptical of written records without oral verification by local experts. Wider sustainability requires consideration of deeper spiritual and intangible values that cannot always be reduced to numbers. A huge benefit of joining science and TLK can be the inclusion of both qualitative and quantitative indicators of sustainability, but models must be developed for building trust in both types of information if all stakeholders are to collaborate and respect each other's contributions.

In addition to qualitative and visualizing methods, quantitative approaches could also be applied to interview transcripts. For example, Qualitative Data Analysis (QDA), Discourse analysis, and Critical Content Analysis can provide rigorous and repeatable ways of bridging qualitative and quantitative information. Discourse is first coded into key themes identified by formal Qualitative Research methods using NVivo or similar software. The frequency (presence/absence of mentions of the theme) or word counts (a proxy measure for degree of emphasis) associated with each code can then be analyzed by formal statistical methods and compared by gender, age, ethnicity, role, area, culture, etc. (McCarthy et al., 2013).

"Choice Modelling" is an ecological economics technique for measuring the trade-offs between different values or choices in environmental care. The model measures the "utility" (a proxy measure of well-being or benefit) from alternative choices, which can naturally embody intangible values (Chhun et al., 2013). This technique allows reintegration of values and beliefs in quantitative ways and avoids reductionism that can cause problems for science-TLK partnerships.

Scientific studies can calibrate TLK and cultural-health indicators against scientifically-measured sustainability indicators; for example, Catch Per Unit Effort (CPUE) of a traditional harvest is often used in TLK to assess resource abundance (Moller et al., 2004). Ecological field studies can check whether CPUE is linearly related to wildlife abundance and test whether CPUE can warn reliably of declining abundance or guide successful restoration (e.g., once invasive species are removed or harvest pressure is adjusted).

(7) Mutual support, cross-validation and increasing management choices

TLK and science both offer the other a type of "peer review", triangulation, or test for reliability. Conventional science can validate local knowledge and vice-versa. Feedback to policymakers and society is thereby more reliable and a consensus between stakeholders more likely, which in turn encourages joint action for sustainability. Surprises and new syntheses can emerge, but this partnership also helps identify contested beliefs and provides safety to SEPLS management by identifying uncertainties and keeping options open.

The ways people make sense of the world and categorize elements of SEPLS can vary between knowledge systems and sometimes offer alternative points of view and unusual indicators. For example:

- Farmers may categorize species differently than scientific taxonomy does.
- Subtle and locally-grounded signs of climate change have emerged from TLK, and climate science has provided a wider overview and identification of causes.

- Different signs can guide farming decisions. For example, the way snow melts can indicate the timing of farming actions.
- Local communication shares knowledge about changes in fishing stocks at the local scale that cannot be monitored at national science-based monitoring and management scales.
- TLK detailed knowledge can enable the adaptation of resource use after perturbations. In one example, the migration route of yellowtail fish changed after a typhoon in the sea around Japan, and local fishers were able to predict where netting would remain productive.
- In some tea plantation, TLK experts understand the role of wind in reducing pests and plan shelter to maintain this regulating ecosystem service.
- Impacts of disasters can be lessened by traditional teachings. For example, Japanese fishers take their ships out to sea when a tsunami is coming. In Malaysia, people living in the rainforest know to stay close to the trunks of large trees when trees are falling.

Sustainability and resilience emerges from identifying as many choices for intervention as possible, and then selecting the best choice to reach agreed goals. The combination of TLK and science helps broaden the choice set and sharpen the decision of how to respond. TLK especially adds locally-grounded and practical responses while science can bring options from far away or add technological strategies to help mitigation and adaptation.

(8) Identification of causation: the key to effective management

Scientists and TLK experts often agree on what is happening (e.g., trends in resource abundance or biodiversity), but they agree less often about why certain changes are happening (Newman and Moller, 2005). TLK tends to be more descriptive and monitors patterns, while science starts in the same place but then tries to test why a pattern occurs. Some TLK may have metaphysical explanations for what causes change, whereas scientists consider only biophysical mechanisms and work to test causes.

Even if TLK experts ascribe a different reason for an observed change than scientists do, it is important to consider that there might be some social reasons why their explanation has been believed by local people for a long time. These beliefs may be strong reinforcers of sustainable (or unsustainable) behavior in a local community, so understanding TLK perceptions can help identify enablers and constraints for transforming or sustaining successful management.

Reliable identification of causation is very important for identifying where and when to intervene in order to change trends or engineer new features of SEPLS to steer them towards more sustainable and resilient states. Knowing the cause of a problem also helps predict where and when a proposed solution is more likely to work. Partnership of TLK and science can lead to less expensive, more efficient, and more equitable investments in strategies to retain, restore, and enhance ecosystem services and biodiversity in SEPLS like those in the Noto Peninsula.

4) How can the IPBES Conceptual Framework be transferred/tuned to local application?

In the process of applying the IPBES Conceptual Framework (CF) to local ecosystem assessment, we need the involvement of (local) practitioners/stakeholders to fully take into account the linkage between “quality of life” and “nature”. More fundamentally, the CF could better support SEPLS if it recognized the feedback from having a healthy society and economy to being better able to manage and support biodiversity and ecosystem services. Maintaining all these services helps humans and their communities, nations, and cultures maintain a presence in the landscape. Such a presence is essential to monitor, plan, intervene, invest, and collaborate to maintain biodiversity and the SEPLS itself. We therefore introduced a new feedback loop for

the CF to emphasise the huge amount of reciprocity involved. This led workshop participants to call for more positive language in the CF and for it to recognise the benefits that people confer on the land and biodiversity.

The importance of data collection and sharing for each of the CF's components (building blocks) was also highlighted as having common ground with the assessment. The IPBES CF should recognize positive aspects of anthropogenic drivers and environmental impacts as well as synergistic relationships between "anthropogenic assets" and "nature's benefits to people". Our discussion also pointed out that both ecosystem services and anthropogenic assets should consider various types of capital (stocks) as sources of benefits and services to human beings. One of the key challenges lies in how to overcome the gap between policy- and scientific/temporal/spatial scales.

5) What are new research areas or frontiers that should be explored in the next five years (joint research proposals as outcomes of this workshop)?

Finally, the workshop explored new research areas or frontiers that should be explored in the next five years as part of the ongoing IPBES process. The IPBES CF, which had been modified to incorporate expert opinions, helped participants explore new research areas and topics and to clarify the relationship between the CF and research topics or needs for policy support and capacity development as indicated by **Fig. 3**. below.

(1) New research areas in assessment and knowledge generation that were identified include:

- Deepening the scientific basis for understanding regional/local ecosystem such as nutrient cycling, pollination, and decomposition chains;
- Synergy/tradeoff analysis between different ecosystem services as well as between policy interventions and ecosystem services;
- Long supply chains of ecosystem services for reorganization of the value chain of consumer products;
- Clarifying the relationship between well-being and other components in different settings (including negative aspects of ecosystem services such as the effects of wildlife damage on human well-being);
- Establishing measurement of well-being and its relation to ecosystem services;
- Different from place to place in anthropogenic drivers to be taken into account in assessment (land degradation, wildlife-human conflict, and abandonment of farmland/forest would also be among the anthropogenic drivers in some countries);
- Creating new indicators as well as integration and compilation of data, by GIS for instance, for sharing common ground among different stakeholders;
- Valuation of ecosystem services at different scales;
- Inclusive knowledge generation, bridging traditional local knowledge and modern scientific; and
- International comparative studies on the best practices of rural development and its transferability to other areas.

(2) Needs in policy support and capacity development include:

- Application of studies in developing countries;
- Attractiveness/revitalization of isolated/less preferred places;
- Learning from successes and best practices through international comparative studies;
- Clarifying policy effects on nature and ecosystem services; and
- Identifying appropriate scales and levels for co-management of ecosystems.

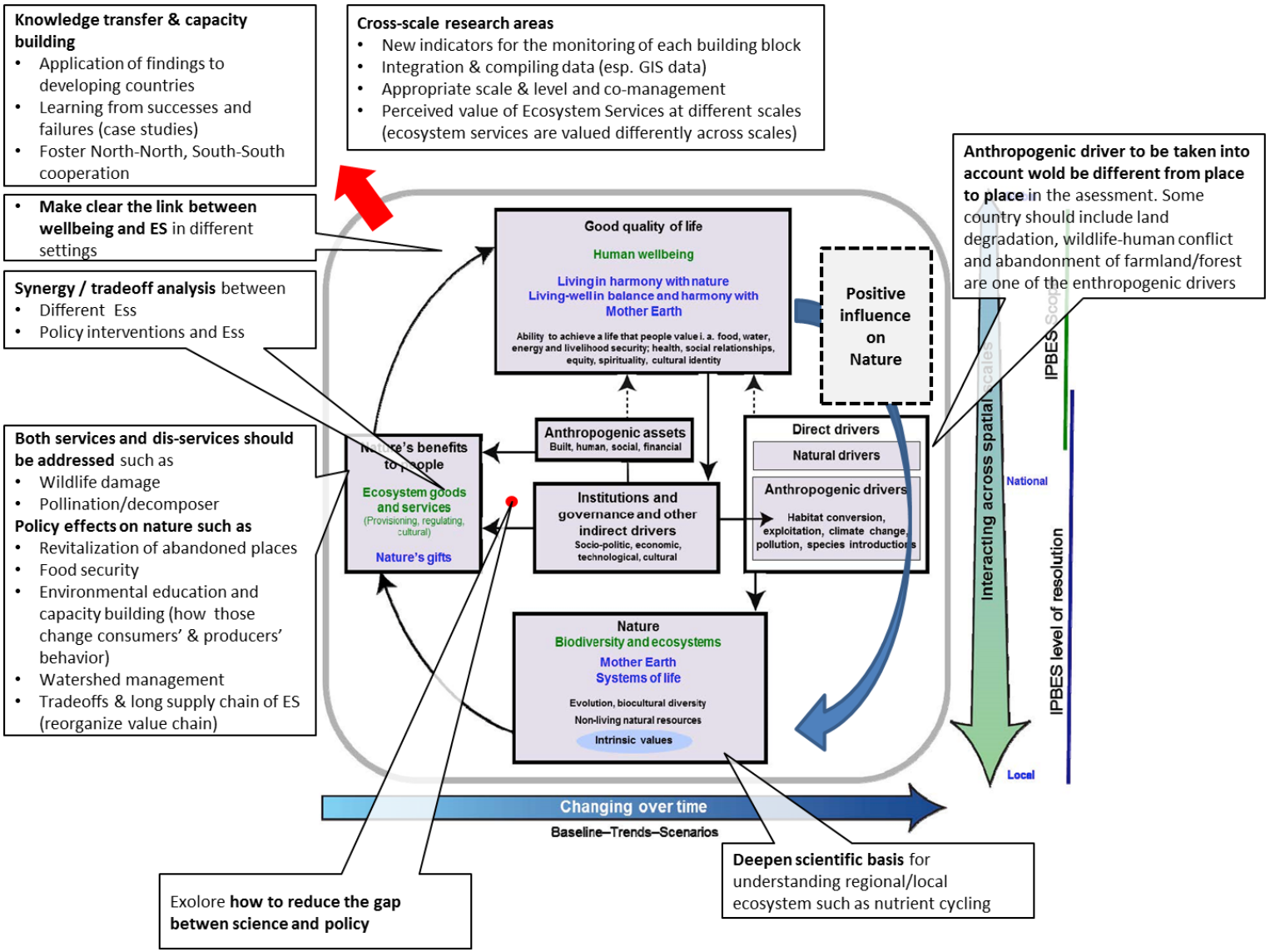


Figure 3 New research areas or frontiers in assessment and knowledge generation in relation to the IPBES Conceptual Framework

(Source) United Nations Environment Programme (2013) Report of the second session of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES/2/17.

7. CONCLUSIONS

Overall Summary:

Given the recent research activities and international initiatives on socio-ecological production landscapes, this workshop was organized to share information and ideas on data, methodologies, and ongoing research activities, and to explore future research directions for developing new co-management and co-governance models for these landscapes. The workshop explored the following five key questions:

(1) What are the key challenges and opportunities in management of socio-ecological production landscapes?
(2) How can the different stakeholders overcome challenges and promote collaboration in developing new co-management and co-governance models in harmony with nature?
(3) What approaches, methods, and techniques can be used to integrate traditional ecological knowledge and modern science to promote innovation and transformation?
(4) How can the IPBES Conceptual Framework be transferred/tuned to local application?
(5) What are new research areas or frontiers that should be explored in the next five years (joint research proposals as outcomes of this workshop)?

Key Message 1:

We actively discussed all of these questions in breakout group sessions and then reported back to a plenary session to integrate our discussions. Key challenges emphasized during the workshop include demographic change represented by depopulation, aging, and out-migration from rural to urban areas, expansion of abandoned land, human-animal conflict, mono-cropping systems, disconnection of urban and rural linkage, weak policy and science interface, misunderstanding of different cultures, conventional values systems, and lack of capacity.

Key Message 2:

We proposed six approaches to overcome these challenges and promote collaboration in developing new co-management models: (1) stakeholder engagement; (2) vision, leadership, and local networks; (3) reorganizing of value systems; (4) new producer-consumer model; (5) good governance and new commons approach; and (6) information, data management, and knowledge sharing.

Key Message 3:

Co-discovery from sharing knowledge is likely to identify more choices for managing SEPLS while simultaneously building the trust and social capital necessary to apply collaborative intervention to solve problems and capture opportunities for people, profit, and the planet. Cultural mapping, rapid appraisal methods to score Cultural Health, and gathering of oral histories are some of a growing set of formal research techniques for a Traditional Local Knowledge (TLK) and science partnership. Cultural Keystone Species can be identified for priority research and intervention. Gathering locally-grounded and large-volume of adequate and reliable (soft and hard) data from TLK experts and citizen scientists gives added power, replication, and representativeness for subsequent scientific analysis.

Key Message 4:

In the process of applying the IPBES Conceptual Framework (CF) to local ecosystem assessment, local practitioners/stakeholders must be involved in order to fully take into account linkages between “quality of life” and “nature”. Promoting a healthy society, with a strong identity and collaborative approach to equality is key to enhancing biodiversity and ecosystem services. The IPBES CF should capture positive aspects of anthropogenic drivers and environmental dis-services as well as synergetic relationships between

"anthropogenic assets" and "nature's benefits to people". It was also pointed out in the discussion that both ecosystem services and anthropogenic assets should include consideration of various types of capital or stocks as sources of benefits and services that human beings can receive. One of the key challenges lies in how to overcome the gap between policy- and science-temporal/spatial scales.

Key Message 5:

New research areas or frontiers in assessment and knowledge generation to be explored in the next five years include investigations of:

(1) abandonment of forest and farmland;
(2) ecosystem services synergy and trade-offs;
(3) long supply chains of ecosystem services and reorganization of value chains;
(4) appropriate scales and levels for co-management;
(5) maintaining pollination and decomposition chains in ecosystems;
(6) land degradation;
(7) food security;
(8) nutrient cycles;
(9) human wealth and well-being through filling in the missing arrow between nature and human well-being in the IPBES CF;
(10) measuring human well-being and its relation to ecosystem services;
(11) watershed management;
(12) wildlife damage and human-wildlife conflicts;
(13) integration and compilation of information by GIS;
(14) creating new indicators (e.g. landscape evaluation);
(15) valuation of ecosystem services at different scales;
(16) inclusive knowledge generation, bridging traditional local knowledge and scientific knowledge;
(17) landscape governance strategies between different countries/cultures; and
(18) analyisis of best practice examples of rural development and its transferability to other places in rural area.

Needs for policy support and capacity development were also identified, including enhancing attractiveness and revitalization of isolated or less-preferred places. There is a need to learn from successes and best practices (through international comparative studies)

Next steps:

Based on our discussion at the workshop, we came up with six potential actions or programs that we should consider as next steps:

(1) Organize a dialogue workshop with local stakeholders in Noto to facilitate the interface of science, policy, and society, and encourage further partnership and co-management.

(2) Organize a workshop to develop a common data set and maps to integrate various research projects in Noto and Ishikawa, and in the Hokuriku region.

(3) Develop international joint workshop proposals to the Japan Science and Technology Agency (JST), Japan Society for the Promotion of Science (JSPS), or other potential funding sources. For example:

- Joint workshop on partnership between traditional and local knowledge and scientific, social, and economic scholarship in New Zealand;

- Conference/workshop between Japan (UNU, Kanazawa University) and BOKU, relating to "Satoyama preservation strategies in Austria and Japan" with sections such as "terrace landscapes" and "consumer-producer relationships"; and
- Small expert sessions before or after existing international conferences, symposia, and forums.

(4) Conduct comparative case studies between UNU, Kanazawa University, and BOKU. Research could be done either by researchers or students, for example as a master's thesis.

(5) Create a student exchange / "Cultural landscape internship" program between UNU, Kanazawa University, and BOKU, relating to the common case study research. Students can be matched to "partners" and "partner regions" in the other country, in order to broaden their horizons and experience how science is done in the other country. This could be a kind of "Cultural landscape internship exchange" for students.

(6) Exchange knowledge between locals/stakeholders and scientists in New Zealand, Austria, and Japan E.g., "study groups" from the three countries are visiting each other in order to see best-practice examples in other countries.

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APPENDICES

Participants list

The Participants List is divided into three categories as follows: “Workshop”, participants of the workshop on February 10-11; “Presentation”, speakers who presented during the workshop or seminar on February 11; “Report writing”, participants who contributed to writing this report on February 12. The participants are listed in alphabetical order.

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