

Challenges to achieve transdisciplinary studies

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The author discusses on the subjects to achieve transdisciplinary studies.

Keywords: Transdisciplinarity, Standards of Sympathy, idea(principle), rationality, World of Urban and Rural, Scientist's well being and social contribution

		科学観	
		View of science	
		Linear model	Stakeholder model
民主主義観	View of democracy Madison	①純粋な科学者 Pure Scientist 政策には関与せず 研究の成果を提示	③論点主義者 Issue Advocate 研究成果をもとに特定の 政策を提言、主張
	Schattschneider	②科学の仲介者 Science Arbiter 研究成果を政策に提言	④複数の政策の 誠実な仲介者 Honest Broker of Policy Alternative 研究に基づき可能な複数の 政策を提言

Practical techniques for desertification control and livelihood improvement made with local people

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Due to rapid expansion of population and human activities, the use pressure on soils and ecosystems is increasing. It goes to marginal areas or vulnerable areas such as dryland, mountainous and slope land and wetland. Semi-arid Africa, an interest area in this presentation, is the typical area and the frontline of desertification inseparably associated with land degradation and poverty.

Desertification is one of the problems/issues of international community, as found in the ratification of UNCCD (1994).

Sahel region of West Africa is characterized by vast distribution of sandy soils, which is fragile to human activity, and fluctuating rainfall. Land degradation is appeared as soil erosion (both by wind and water), fertility depletion and disappearance of vegetation, mainly caused by human activities, such as collection of fuel wood, crop cultivation and animal husbandry, to support the daily subsistence. This fact poses difficulty to the efforts of desertification control.

Together with local people, we developed some practical techniques for agro-ecosystems management especially relevant to the fragile environment semi-arid Africa that enable both livelihood improvement and control of desertification. Some innovations are 'fallow-band system' and 'contour-lines of Andropogon'. It may shift a concept of agro-ecosystems management from 'human vs nature' to 'human with nature'.

Keywords: Desertification, Livelihood improvement, Desertification control, Beyond dichotomy of 'Human vs Nature', Participation of local people

Landscape change induced due to permafrost degradation in eastern Siberia: For knowledge-action with local communities

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In the recent decades, many kinds of climate-driven landscape changes have taken place in Central Yakutia (CY) of Sakha Republic, Russia. Development of thermokarst landscape is one of the important geomorphological evidences of permafrost degradation along with climate change in continuous permafrost region in CY. Increases in active layer thickness have caused rapid thermokarst subsidence since 1990s, which has negatively impacted boreal ecosystem and social environments. The rapid warming after 1990s and perennially wet climate causing extensive waterlogged surfaces during 2000s enhanced the warming and deepening active layer extensively. The changes in interannual trends of thermokarst subsidence and subsequent channeling and ponding provide us further understandings on current status of permafrost instability against climate change and its impacts on livelihood of people in CY.

The present study examined the relationship between permafrost degradation and eco-hydro-climatological changes in Churapcha in CY where the apparent environmental changes have been observed due to the unexpected climate-driven damages of permafrost-related landscape by transdisciplinary research project under “People and Community in the Arctic: Possibility of Sustainable Development” in the ArCS (Arctic Challenge for Sustainability) project funded by Japan. We carried out initial collaborative excursion and field research in September 2016 based on co-design of field research with local researchers at degraded dry grasslands and agricultural fields. We have attempted to extract current environmental issues and future perspectives of natural and social systems under activating permafrost environmental changes.

Keywords: Permafrost, Thermokarst, Alaas, eastern Siberia

Transdisciplinarity Approach toward Solution of Environmental Issues in Watersheds

- Process of Co-production of "Environmental Icons" in a Rural village in Shiga pref.

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In watershed scales, environmental issues and the solutions vary among macro, meso, and micro scales. Therefore residents can participate the environmental conservation activities by not global goals but local achievements which are based on their life and livelihood. Then we proposed "Environmental icons" which residents can understand and measure the effects of environmental conservation activities by themselves. In a rural village, Shiga Pref., candidates of environmental icons were chosen through dialogues among rice farmers and researchers.

In this presentation, we will report process of Co-production of "Environmental Icons" and progress.

Keywords: Rice cultivation, Transdisciplinarity science

Trans-disciplinary Approach of Marine Protected Area Designation in Tsushima

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Marine Protected Areas (MPA) are attracting attention not only for protecting biological diversity and conserving the natural environment, but also for promoting sustainable fisheries and tourism on the local level. Bottom-up style decision-making that respects each stakeholder's independence is needed to manage a protected area in a busy part of the sea subject to a host of various uses; it also promotes harmony among stakeholders.

Information about various weather phenomena known for generations by local fishers and coastal residents (e.g. traditions, experience, wisdom, historical documents, local history) fused with scientific knowledge and the latest technology can result in marine management methods well adapted to local conditions.

Surveys were conducted in Tsushima City (Nagasaki prefecture) and its adjoining seas, where marine protected area policy has been ongoing since 2010. As part of our consideration of "Collaborative oceanographic monitoring grounded in local knowledge," We checked for correspondance between good fishing grounds (marine area known to be ecologically important by fishers) and physical oceanographic findings.

Transdisciplinary approach as 1)collaborative oceanography, 2)Fish ecology assisted by environmental DNA meta-barcoding, 3) Ocean GIS mapping of local knowledge and status of sea weed bed, 4)Meteorological disaster risk reduction of fishery. activities. Trans-disciplinary research is essential to link latent oceanographic, ecological local knowledge to utilize in the process of MPA in changing climate situations.

Keywords: Marine Protected Area, Tsushima, oceanography

Combination Participatory Backcasting and Sustainability Transitions Study - A Case Study of "Future Fortunate Dining" Workshop

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The following may be mentioned as typical problems arising in deepening the involvement of local governments in policy aspects of sustainable development: setting short-term goals and not fulfilling their objectives sufficiently (Bulkeley and Broto, 2012). Factors such as division of policies and projects (eg, sectionism) and discontinuous commitment (eg election) (Maas et al., 2012). For solve these problems, attention is focused on participatory governance, that is, transform from a top-down model to a bottom-up model through exchanging views of society's diverse stakeholders and forming consensus (Aylett, 2011). Among them, Transdisciplinary (TD) has been proposed as an effective approach to cope with sustainability issues in cooperation with society (Lang 2012, Scholz and Steiner, 2015).

As a success factor of TD research in Japan, common understanding of identifying stakeholders and continuing problems and financial problems after the project is pointed out (Mori 2014b). This report focuses on the effectiveness of participatory backcasting as a method for sharing and developing problem consciousness and outcomes between researchers and stakeholders. At the same time, we clarify the necessity of participatory backcasting and research on "Transformation to sustainable social system" in science and technology sociology. In addition, as a concrete example of participatory backcasting, a practical case of workshop for transition of agrifood system on the theme of "Future Fortunate Dining in 30 years from now" in Noshiro city, Akita prefecture will be introduced.

Participatory backcasting has been used in the Dutch government program since the early 1990s, due to the need for a wide range of stakeholders to participate to achieve the long-term goal of sustainability (Vergragt et al. 1993, Quist et al. 2001). The purpose of the implementation is to (1) analyze the adequacy and feasibility of the desired future goals and (2) encourage practice and policy making for that.

Researchers and stakeholders participate in two stages of creation and evaluation of this future image (Carlsson-Kanayama et al. 2008). Participatory backcasting requires not only problem consciousness and sharing of predicted images, but also images that can be accepted by researchers and stakeholders (Vergragt, 1993). Also, it is important to mutually confirm the manageable / inmanageable aspects in realizing the image in the future. It is pointed out that mutual confirmation is necessary among researchers in different fields, too (Mori 2014a).

Measures promoted through participatory backcasting will focus on the aspects that can be managed at the present time (or by constructing mechanisms). However, with respect to the aspect considered as management impossible, sharing of knowledge about future ways of change and related factors becomes important in promoting common recognition about continuation after finishing the program and fiscal. Consequently, confirmation of STS research accumulation (Geels & Schot 2007, Wiek et al. 2011) is expected to bring much contribution to TD by concurrent with participatory backcasting practice. As a concrete example based on the above viewpoint, we introduce three workshop practices for transition of the agrifood system on the theme of "Future Fortunate Dining in 30 years from now" held in Noshiro city, Akita prefecture in 2016. The theme of the workshop are "What kind of dining table surrounded by Noshiro in thirty years?" and "What must we do now to realize that?" Eleven participants had the sketch of "Future Fortunate Dining" respectively, and exchanged views for realization. Regarding the accumulation of research on STS related to "Sustainability Transition", it is planned to supplement it by consecutive

contributions in local newspapers.

Participating backcasting with local governments is particularly important in the context of Japan where a strong civil society that affects national policies like the EU does not yet exist .

Keywords: Transdisciplinary, Participatory backcasting, Sustainability Transitions, Sustainable Food Consumption and Production

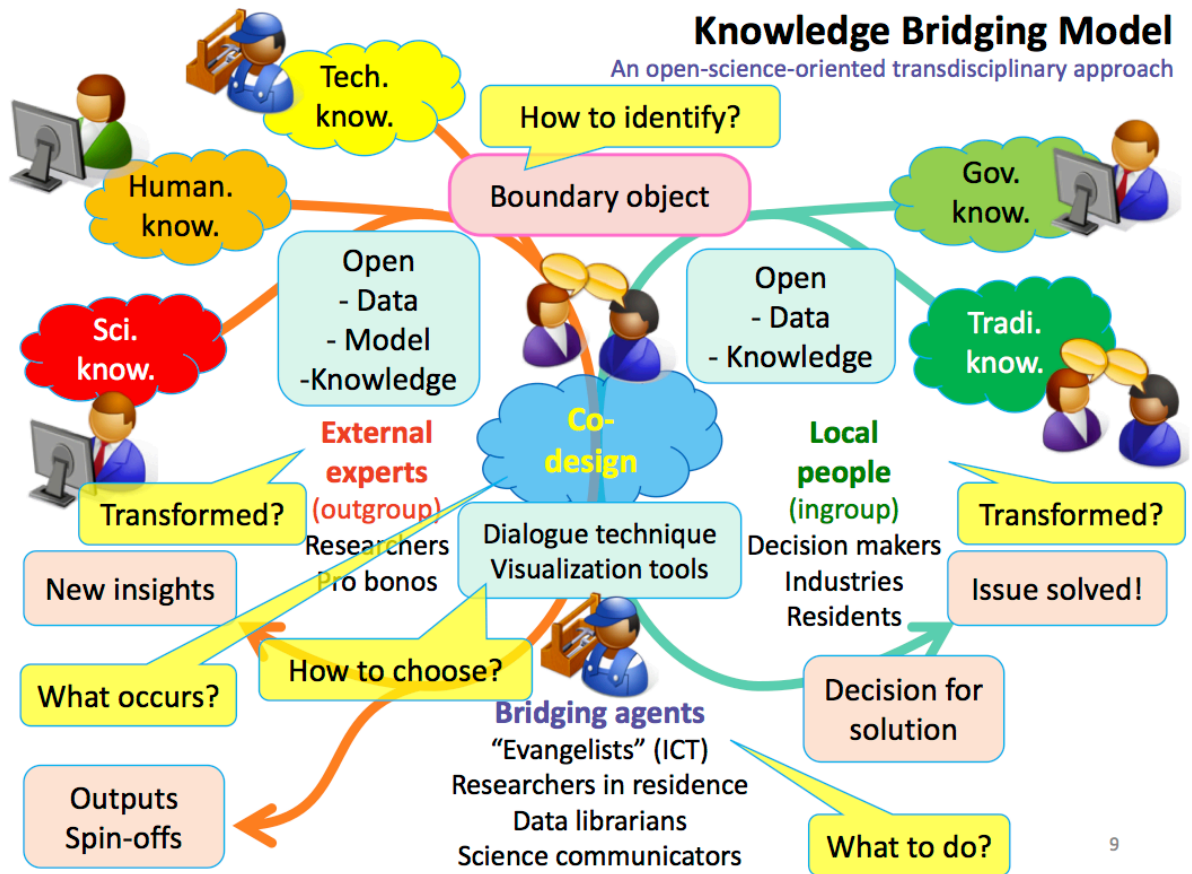
Knowledge bridging model to visualize and overcome knowledge information gaps between societal actors with the help of bridging agents

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Environmental issues tend to be a wicked problem, which is difficult to be solved by scientific approach only, because they are typically caused by a complex of natural and societal factors at diverse spatio-temporal scales from the global to the local, and because diverse societal actors, including governmental agents, industries, and residents, are usually involved as stakeholders. Solution of the issues may sometimes be obstructed by knowledge information gaps between actors. As a methodology to visualize and overcome such gaps, this paper presents the Knowledge Bridging Model, in which bridging agents, such as evangelists who lead transformation of value and life styles in the domain of ITC business, researchers in residence, data librarians in the context of open science, and science communicators, facilitate the mutual learning, trust, and understanding between societal actors by means of techniques for participatory equal dialogue such as *unconference* and *hatenathon* (questioning workshop) and tools for information visualization such as participatory GIS and ontological mapping. The discussion with participants of the poster session will contribute to elaborating this model.

Keywords: Transdisciplinary research, Societal actors, Bridging agents, Knowledge information gap



How to deal with global environmental problems in a pastoral area of Kenya

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Toward solving the global environmental problems, challenges not only in developed countries but also in developing countries are important. Thus, in developing countries, there are many projects including development assistance and private investment, for the approach to environmental problems at regional and national level. On the other hand, there is little information from the bottom-up approach on the impact of projects about environmental issues to the local community, local inhabitants and landscape. In this presentation, we show some example such as geothermal and water management project with large scale investment in the pastoral areas of Kenya. And we want to think about how we can advance cooperation with local society in this area.

Keywords: Africa, Clean energy, Water management, Local community

Analysis of land use change with its policy driving during recent sixteen years in Horchin desert-an example of Ar-Horchin Banner in Inner Mongolia, China

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The modern agricultural prescribed form of the Horchin desert was formed in the middle Qing Dynasty, and then it developed through 20 century. The increasing or decreasing of farming area, increasing or decreasing of intensity of agricultural activities, are the direct causative factors for the land use changes in this region. Consequently, these factors caused quantitative and qualitative changes of grassland and farming area, being as the most intuitive expression of the Horchin desert land use changes. In this study, we selectively analyzed farm land changes in Ar-Horchin Banner in recent 60 years using statistical data of farm land from 1946 to 2013, LANDSAT-5 TM images of 1986, 1996 and 2006, LANDSAT-8 OLI images of 2013; meanwhile, we discussed the driving relationship between the land policy changes and farm land, and we concluded as below. (1) In recent 60 years, the area of reclamation in the Ar-Horchin has been gradually northing to high latitude region, and the farm land area has been increased, the scale of farm land area has been experienced a severe process. (2) From the establishment of Inner Mongolia Autonomous Region, the principle policies for agriculture, such as “The Land Reform” (from 1947 to 1952), “The Agricultural Collectivization” (from 1953 to 1977), “The Household Contract Responsibility System” (from 1978 to 1999), “The Return the Grain Plots to Forestry and Grassland” (from 2000 to now), have been conducted in the study area. (3) Seen from the result of farm land scale change coincident with the tightness of agricultural policies in the study area, we considered the level of economic development, the consciousness of residents for ecological and environmental, agricultural technologies are also factors that cannot be ignored for land use change in the study area.

Keywords: Horchin desert, policy driven, land use, Inner Mongolia Autonomous Region, China

Vegetation Structure and Utilization of Natural Forests in Shimizuyama, Miyama city, Fukuoka prefecture, Japan

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In recent years, the needs and interests of utilization of natural environment are increasing. But there are many problems between the use of forest resources and the management of natural forests.

The problem is difficult to design the management and use system because both the manager and the user do not understand the value of forest resources correctly.

In Japan, on the other hand, the evergreen forest, many of which are natural forests, is now destroyed by human impact and remains only a few as shrine forest. In addition, the evergreen forest in the Kyushu is a microcosm of the Japanese evergreen forest because it is composed of representative plant communities of evergreen forests in the east of Kyushu in Japan. Therefore, in considering future conservation of natural forests in Japan, it is meaningful to target shrine forests, which are evergreen forests in the Kyushu. So in this study, we examined conservation measures of natural forests and suitable usage methods of them in natural forests in Shimizuyama, Miyama City, Fukuoka Prefecture.

Shimizuyama is located in the northeastern part of Miyama City, Fukuoka Prefecture. Its elevation is about 350m. Kiyomizudera temple is at the middle of Shimizuyama. There are mountain roads and roadways from the parking to near the summit. So we can move by car from the foot to the summit. In addition, *Symplocos glauca* - *Castanopsis sieboldii* of *Camellia japonica* - *Gebiet* spreads around the Kiyomizudera temple as a shrine forest.

The method of this research is divided into two, one to grasp the actual condition of vegetation structure of natural forest and one to grasp the actual situation of forest resource utilization by the people.

The method of grasping the actual condition of the vegetation structure of natural forest was carried out by the line transect method. We set a line orthogonal to the approach road to Kiyomizu temple and recorded vegetation structure and environmental characteristics on that line. Also, the line crosses the mountain roads used by climbers and others. And we verified human impact to vegetation structure based on the obtained data. The verification method is to compare with the structure of the second-growth forest. We also verified a human impact in the part adjacent to the mountain roads and planting area.

As a method of grasping the actual situation of forest resource utilization by people in the investigation area, we mainly took three ways. The first is an interview visitors. The second is an interview with young priests of Kiyomizudera temple as a manager of Shimizuyama. The third is a questionnaire survey for groups of climbers in Fukuoka. Also, a question was asked them about the image of the favorite forest. As a result of the survey, on the whole, it can be said that it is the structure of the natural forest. However, in a more detailed vegetation structure, there was human impact in the part adjacent to the mountain road and the planting part.

In forest resource utilization, Shimizuyama has three values, natural value, cultural value and climbing value. As a reality of visitors, many of them need climbing value and cultural value.

Considering the method of utilization of forest resources from the above, we think that it is necessary to give natural value by the characteristics of natural forest for the purpose of utilization. This is because using forest resources with the purpose of giving natural value will create understanding of natural forests and encourage appropriate use.

However, there will be human impact. Therefore, it is necessary to further study methods to prevent the influence, appropriate management and countermeasures after being influenced.

Keywords: natural forests, utilization of forest resources, shrine forests, vegetation structure, human impact