

JSPS Global COE Program
In Search of Sustainable Humansphere in Asia and Africa

The Third International Conference
Changing Nature of *Nature*: New Perspectives from Transdisciplinary Field Science

December 14 – 17, 2009
Inamori Foundation Memorial Hall, Kyoto University

Conference Statement

Social and natural sciences have long engaged in the study of connections. From community, region, nation-state, to empire -- or from patch to landscape -- we have scaled and rescaled the units of analysis in time and space to comprehend how constituent parts of a system are related, and distant places linked.

Such engagements in the study and theorization of connections, however, have usually been pursued without connecting their thoughts to other attempts, and a common ground for the confluence between geo/biospheric and humanosperic systems has not been fully investigated. While the science of nature and technology deals with the material flows such as water, gases, and minerals through physical and biological processes, social science looks into commodity chains and levels of socio-cultural, economic, and political integration and disintegration.

The distinction between a social and a natural domain continues to make communication between researchers in these two categories an uneasy task. However, the current global confluence of geo-, bio-, and humanosheres is too important to be addressed in any way other than a transdisciplinary approach. We can no longer afford to be in isolation and separation in the task of understanding the connections between natural and social systems.

This workshop is a sequel to the previous Global COE International Conference “In Search of Sustainable Humansphere in Asia and Africa: Biosphere as a Global Force of Change” (2008) which challenged conventional anthropocentric perspectives for the understanding of the modern world. Specifically looking at the interfaces between nature and non-nature as a crucial field for investigation, the workshop brings participants out of their own comfort zones by posing the following questions.

What are the points of articulation between material cycles and socio-economic movements of capital, human, technology, and institution? What are the consequences of connections, not only at the local but also at the cross-continental and global scales? How do we locate linkages among non-adjacent and seemingly disconnected locations in nature and society?

We ask, for instance, anthropologists, historians, and political scientists to identify agents of social change in the natural world with their own logics of reproduction and evolution. Ecologists, environmental and material scientists are, in turn, asked to situate non-human agency and its working in sociocultural fields of humansphere.

Workshop participants examine the multi-dimensional driving forces of change generated at nature non-nature thresholds at micro, meso, and macro-levels. The integration of the three levels of analysis leads us to new understandings of the changing nature of nature in a globalizing world. The obligation now falls on us to take a holistic look at nature as a social process as well as society as a natural process, and to consider how arguments about the past and the present are applied for the understanding of the future.

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In Search of Sustainable Humansphere in Asia and Africa

The Third International Conference

Changing Nature of *Nature*: New Perspectives from Transdisciplinary Field Science

Program (Updated on Dec. 7th, 2009)

December 14, 2009

Field Trip to Satoyama (Shiga Prefecture)

December 15, 2009

8:30 Registration

9:00-9:15 Keynote speech by Noboru Ishikawa (Kyoto University)

Session 1: Rethinking Human Disturbance

(Conveners: Masayuki Yanagisawa, Kusumaningtyas Retno, and Motoko Fujita)

9:15-9:20 Introduction

9:20-9:55 Ryoji Soda (Osaka City University)
“River Improvement History in Japan: Rethinking Human-nature Interactions”

9:55-10:30 Katsue Fukamachi (Kyoto University)
“The Role of Sustainable Management of Traditional Satoyama Landscape Elements: A Case Study from the Ecological Viewpoint.”

10:30-10:40 Coffee break

10:40-11:15 Sara Cousins (Stockholm University)
“Slow Species in Fast Landscapes”

11:15-11:50 Eben Kirksey (University of Pittsburgh)
“The NaturalCultural History of Palo Verde, Costa Rica”

11:50-12:20 Discussion

12:20-13:30 Lunch

13:30-13:50 Short film by Eben Kirksey

Session 2: Cross-continental Connections

(Conveners: Kunio Tsunoda, Hiromu Shimizu and Noboru Ishikawa)

- 13:50-14:00 Introduction
- 14:00-14:35 Heather Swanson (University of California, Santa Cruz)
“Patterns of Nature-cultures: The spatial redistribution of Pacific Salmon”
- 14:35-15:10 Eric Tagliacozzo (Cornell University)
“A Sino-Southeast Asian Circuit: Ethno-histories of the Marine Goods Trade”
- 15:10-15:20 Coffee break
- 15:20-15:55 Anna L. Tsing (University of California, Santa Cruz)
“Blasted Landscapes (and the gentle arts of mushroom picking)”
- 15:55-16:30 Fumito Koike (Yokohama National University)
“Biological Invasions as a Cause of Irreversible Change”
- 16:30-17:00 Discussion
- 18:00 Reception
Place: Hakusanso, Hashimoto Kansetsu Garden and Museum (Fee: 1500 yen)

December 16, 2009

Session 3: Water Resources as a Driving Force of Social Change

(Conveners: Toshitaka Tsuda, Yasuyuki Kono and Osamu Kozan)

- 9:00-9:10 Introduction
- 9:10-9:45 Kenneth Pomerantz (University of California, Irvine)
"Drought, Climate Change, and the Political Economy of Himalayan Dam-Building"
- 9:45-10:20 Shinjiro Kanae (Tokyo Institute of Technology)
“A State-of-the Art Global Water Resources Assessment and its Future Extension for Sustainability”
- 10:20-10:30 Coffee break
- 10:30-11:05 Fumiaki Inagaki (Keio University)
“The Water Management of Central Asia in Transformation”
- 11:05-11:40 James Warren (Murdoch University)
“Climate Change and the Impact of Drought on Human Affairs and Human History in the Philippines, 1582 to 2009”
- 11:40-12:10 Discussion

December 17, 2009

Session 4: Redefining the Scale and Scope of Enquiry
(Conveners: Shigeru Araki, Naoki Shinohara and Shuhei Kimura)

- 9:00-9:10 Introduction
- 9:10-9:45 Anthony Reid (Kyoto University / The Australian National University)
“Seismology and Human Settlement: Global Contexts for Local (Sumatra) Patterns”
- 9:45-10:20 Miyako Koizumi (Research Institute for Humanity and Nature)
“Objective and Methodology of Natural Science and Its Limitations to Deal with Environmental Problems”
- 10:20-10:30 Coffee break
- 10:30-11:05 Sanga-Ngoie Kazadi (Ritsumeikan Asia Pacific University)
“GIS and Remote Sensing for Wildlife Monitoring and Management in Eastern Africa”
- 11:05-11:40 Sing Chew (Humboldt State University / Helmholtz Centre for Environmental Research - UFZ)
“Nature–Culture Relations over World History: Globalization, Crises, and Time”
- 11:40-12:10 Discussion
- 12:10-14:00 Lunch
- 14:00-16:30 **General Discussion** Chair: Noboru Ishikawa
- 17:00-18:00 Advisory board meeting

The conference will be held under the joint auspice of Japan Society for the Promotion of Science (JSPS): International Scientific Meetings in Japan.

Abstract

December 15, 2009

Session 1: Rethinking Human Disturbance

This session aims to rethink the interactions between human and nature from different perspectives. We focus on the effects and consequences of disturbance on ecosystems, river engineering, and perception of "Nature" to discuss the sound relationships between human and nature.

9:20-9:55

River Improvement History in Japan: Rethinking Human-nature Interactions

Ryoji Soda

Graduate School of Literature and Human Science, Osaka City University

The aim of this paper is to examine human-nature interactions from the aspect of river improvement history in Japan. The Japanese landscape is mainly composed of precipitous mountains with soft erosive ground, which causes active changes of fluvial morphology. The population in Japan, concentrated in alluvial plains, have historically suffered constant disasters from flood, and therefore, built up local knowledge and elaborated social systems to co-exist with river disasters. However, the centralization of river administration since the establishment of modern state in 1868 (Meiji restoration) have gradually undermined the interactive relations between local residents and rivers. In the 1960s and 1970s rivers in Japan were not regarded as 'nature' as a result of excessive government-led river management after the WWII, and even floods have become considered to be human-made disasters (government mismanagement), not natural ones. In the late 1980s, however, the government realized that 'perfect management' is impossible and introduced environment-conscious river improvement, adopting the nature restoration projects in Europe. However, European construction methods were introduced ad hoc to make 'quasi-/pseudo-' nature. In other words, the Japanese government abstracted only functional/technical aspects from the European projects, and failed in the holistic examination of differences between European and Japanese environmental thoughts.

9:55-10:30

The Role of Sustainable Management of Traditional *Satoyama* Landscape Elements: A Case Study from the Ecological Viewpoint

Katsue Fukamachi

Graduate School of Global Environment Studies, Kyoto University

Satoyama landscape typically combines various types of environments including rice paddies, grasslands and woodlands. The focus in this presentation is on the locality and its significance in the conservation of a landscape in which the relationship between people and nature has a long history. Distribution, function, management and change over time of a *satoyama* landscape on the west side of Lake Biwa, Shiga, Japan are examined based on field surveys. The area between the lake and the mountains is almost completely covered by farmed landscape that includes agricultural areas, residential areas and forests. Dominant tree species include oak and pine species. Until the early 1960s, most people in the study area made their living from rice farming and the production of firewood and timber. Since the 1970s, however, socio-economic conditions in rural areas have improved, resulting in drastic changes in the agricultural ecosystem and the rapid decrease of

many *satoyama* elements that play an important ecological role in the landscape such as networks of narrow linear habitats provided by traditional hedges. Places where traditional land use and management are remaining have become fewer and fewer. Today, in order to conserve both the local ecosystem and the cultural diversity of *satoyama* landscapes, the history of land use must be understood and the lifestyle of the local people investigated.

10:40-11:15

Slow Species in Fast Landscapes

Sara A. O. Cousins

Department of Physical Geography and Quaternary Geology, Stockholm University

Semi-natural grasslands across the world have exceptionally high small-scale species richness where centuries of extensive disturbance such as grazing or mowing have created unique habitats for many organisms. This biodiversity is threatened today due to habitat destruction and fragmentation, where 24% red listed species across the world is associated to agricultural landscapes. Despite being two of the largest terrestrial biomes on Earth only 1.8% cropland and pastures are protected. Small remnant semi-natural habitats in agricultural landscapes are important for plants and animals, and also essential for many ecosystem services, such as pollination and pest control. These small remnants may be significant as stepping stones for species in a changing environment. However, current conservation management in agricultural landscapes will have difficulties to mitigate future biodiversity loss, particularly in an era of climate change.

Producing food and fibre of good quality but still protecting biodiversity and ecosystem services within agricultural landscapes is a major challenge. Proactive conservation management should identify and protect small habitat remnants and to acknowledge abandoned agricultural land as potential sources of biodiversity. Protection of biodiversity should not be concentrated to restricted areas only, but also within ordinary agricultural landscape where multiple ecosystems services can be maintained simultaneously.

11:15-11:50

The Natural Cultural History of Palo Verde, Costa Rica

Eben Kirksey

School of Information Sciences, University of Pittsburgh

This presentation will explore how power relations among humans determine which non-humans live and die in the cultured spaces of natural refuges. Palo Verde National Park in Costa Rica is natural cultural contact zone where multiple species of plants, animals, and microbes have encountered human social worlds—those of conservation biologists, hunters, and farmers. In the 1970s, when Palo Verde was part of a North American cattle ranching scheme, migratory ducks (*Anas discors* and *Dendrocynna autumnalis*) would arrive in spectacular flocks of up to 50,000. In other words, these species were flourishing alongside a capitalist scheme to produce beef. But when the land was expropriated, and turned into a National Park, the ducks disappeared. The decline of the ducks in Palo Verde can perhaps be best understood as a tale of two rhizomes: the native cattail (*Typha domingensis*) and cultivated sugarcane (*Saccharin officinarum*). The cattails, a rhizome with anti-capitalistic tendencies that flourishes in post-industrial landscapes, covered up the favorite resting places of the ducks within the National Park. Sugarcane, a rhizome spreading in the service of capital, started to displace the favorite food of the ducks just beyond the park's borders in the rice fields of Costa Rican farmers. Following the contingencies of strange connections among diverse natural cultural worlds, this presentation will showcase conceptual and methodological tools from the emergent interdisciplinary of multispecies ethnography.

Session 2: Cross-continental Connections

What is the nature of human nonhuman relationships in the making of global landscapes? Looking at spatial configurations of natural resource commodity chains and non-indigenous species across continents, session 2 examines the dynamics of regional interconnections of nature as history and process.

14:00-14:35

Patterns of Nature-cultures: The Spatial Redistribution of Pacific Salmon

Heather Swanson

Department of Anthropology, University of California, Santa Cruz

If one reads a newspaper story about salmon in Idaho or California or Russia's Kamchatka Peninsula, it will almost invariably convey the following message: "Salmon are threatened species in need of urgent protection." Yet if one reads an article about salmon in Alaska or Hokkaido, Japan, one will most often see headlines boasting of record fish runs.

In and of themselves, both kinds of stories tell important truths about salmon in specific areas - about the construction of dams and the impact of poaching and illegal trade, or the successful protection of watersheds and the use of improved hatchery technology. Yet put together, these stories come to tell an even more critical story about the /overall/ /redistribution/ of salmon in the North Pacific over the course of the past 200 years - a story about how fish bodies and financial wealth have come to migrate differently both within watersheds and across oceans.

Tracing such changes, this paper makes visible the patterned ways in which processes such as frontier encounters and the displacement of indigenous peoples, the rise of the global canned salmon trade, the development of new hatchery technologies, and the territorialization of ocean waters have impacted the people and fish of the North Pacific in varied and geographically uneven ways, ultimately producing a radically new map of fish populations.

Although salmon management successes and failures are still typically understood as relatively "local" phenomena, this paper demonstrates that increases and decreases of salmon populations are also profoundly intertwined with pan-North Pacific socio-political changes.

14:35-15:10

A Sino-Southeast Asian Circuit: Ethno-histories of the Marine Goods Trade

Eric Tagliacozzo

History Department, Cornell University

The present essay looks at Overseas Chinese networks through one window: the historical and contemporary trade in marine produce, which linked China and the many countries of Southeast Asia in an economic embrace for hundreds of years. In the first third of the article, I note some of the theoretical, historiographical, and historical outlines for examining these communities and processes across historical time. This is done in fairly shorthand form, as I have written about these connections in more detail in other places. The second two-thirds of the essay links these historical peregrinations with how the marine goods trade works now between China and Southeast Asia. This portion of the essay is based on published academic literature, but also significantly comprises my own oral-history interviews with these traders throughout East and Southeast Asian ports, as well as visits to collecting and trans-shipment sites of these commodities too. In the pages that follow, I hope to show the broad dimensions of this commerce in both historical and contemporary terms, as a crucial connective link between China and Southeast Asia over the past several centuries. Far from being an antiquated trade in strange and often exoticised objects culled from the sea, the traffic in marine goods can be seen as an important vestige of historical trans-oceanic connections. This commerce echoes the past in nostalgic and interesting ways, but it also continually evolves into the future, as the statements of these traders reveal when they speak into the record on their own terms.

15:20-15:55

Blasted Landscapes (and the Gentle Arts of Mushroom Picking)

Anna Tsing

Department of Anthropology, University of California, Santa Cruz

Continent-crossing commodity chains have become known for their environmental irresponsibility; they extract natural resources without any attempt to replenish natural landscapes. Instead of pursuing worst cases, this paper argues that the ecological dynamics of irresponsible extraction might also be illuminated by exploring a singularly benign example: the extraction of a commodity that flourishes in already damaged landscapes. Pursuing histories of radical disturbance here opens an otherwise suppressed question: How can humans live together with other species on an already damaged earth?

Matsutake are gourmet wild mushrooms picked in forests across the northern hemisphere for export to Japan. Matsutake thrive with pioneer trees on nutrient-poor soils. Such places are created by histories of radical disturbance—whether by human or nonhuman forces. In some cases, these forests are the ruins of modern production regimes or failed industrial resource management. Mushroom pickers make something from these multispecies histories of disturbance: To make money from mushrooms from such ruins suits a catch-as-catch-can neoliberal freedom best practiced by the displaced and disempowered. Humans as well as mushrooms live the disturbance in such sites.

This paper compares the disturbance histories that produce matsutake forests in four world areas (Japan, southwest China, the U.S. Pacific Northwest, and Finland). All four have joined a Japan-centered matsutake commodity chain. The comparison thus addresses the role of continent-crossing commodity chains in gleaning wealth from radical disturbance.

15:55-16:30

Biological Invasions as a Cause of Irreversible Change

Fumito Koike

Faculty of Environment and Information Sciences, Yokohama National University

Land cover change, global warming by CO₂, chemical contamination, and introduction of non-indigenous organisms, are all threats to original ecosystems on the Earth. Ecological succession usually erases footprints of human land use, and contaminated chemicals in the environment will be decomposed after several years. Invasive non-indigenous species, however, reproduce themselves and persist. New invading species will change the nature of forests, rivers and lakes in the future.

Intentional introduction of non-indigenous species (erosion control, horticulture, zoo, etc.), often cause invasion into wilderness areas. International commodity trade causes unintentional introduction of weedy species and oceanic species. The naturalized organisms disperse themselves. In the case of green crabs from Europe (*Carcinus aestuarii*), we detected natural dispersal and secondary transport by coastal shipping, but transport by international ocean-going shipping was not statistically significant, suggesting quite a small immigration probability of the crab by long voyages.

Japanese people thought wilderness areas as valuable ecosystem before 1980s, however; people began to consider traditionally managed rural landscape (satoyama) as valuable after 1980s. Some of traditional flora in rural landscapes are considered as an ancient non-indigenous plant from China. We consider newly introduced species after the end of long seclusion (Meiji Restoration) as the species to control.

December 16, 2009

Session 3: Water Resources as a Driving Force of Social Change

Water is circulating resources on a global scale. If all countries cooperate and work well together in water management, water resources is well-sustainable system. In this session, we discuss the interaction among water circulation which includes extreme event (e.g. drought, flood, typhoon, etc.), water resources and human society.

9:10-9:45

Drought, Climate Change, and the Political Economy of Himalayan Dam-Building

Kenneth Pomerantz

History Department, University of California, Irvine

Both North China and North India have made impressive agricultural gains over the last 50 years, but the irrigation essential to those gains required unsustainable amounts of groundwater extraction; both now face crises as those aquifers are depleted. Today, both countries are contemplating massive river diversion efforts to address these shortages: from South to North in China (already underway) and from East to West in India. These schemes have complex implications for the Himalayas plateau – the source of most of the rivers in question, as well as others that are vital to other countries (eg. the Mekong). Meanwhile, a combination of energy needs, growing technical and financial capabilities, and complicated political forces are also accelerating dam building for hydro-electric power in the Himalayas; and last but not least, it is becoming increasingly clear that climate change has very serious implications for both Himalayan glaciers and annual precipitation in the mountains. This paper looks at the interlocking forces behind planned and actual Himalayan mega-projects, with special attention to China -- which, because of geography and the ability to self-finance its large projects, is the most important single actor in this critical situation.

9:45-10:20

A State-of-the Art Global Water Resources Assessment and its Future Extension for Sustainability Studies

Shinjiro Kanae

Department of Mechanical and Environmental Informatics, Tokyo Institute of Technology

The sufficiency of global water resources has been assessed by calculating the ratio between water withdrawal and water availability throughout the world. The calculated ratio is usually called as “water stress.” However, such conventional water stress assessment is not sufficient for measuring the sustainability of world water resources. Measurement of sustainability does not necessarily depend on water stress; rather, it should depend on the services and impacts achieved. For carrying out such a global water resources assessment for sustainability, a numerical model that represents temporally varying natural and anthropogenic water cycles along with the representation of the role of “green” water and “virtual” water is useful. A prototype of such a model and preliminary results of the calculation of the model will be introduced in the presentation. In addition to the model, data on water availability and withdrawal are indispensable. Data on the availability of water stocks and the withdrawal from water stocks are also indispensable for sustainability analysis. However, these data such as ground water depletion are still sparse and uncertain. Even with successful model calculation, criteria for evaluating sustainability remain an unsolved issue, partly because we should consider the ethical aspects like as how much is the basic need of human beings. Finally, the linkages of water with other resources and energy will be introduced in the above context.

10:30-11:05

The Water Management of Central Asia in Transformation

Fumiaki Inagaki

Graduate School of Media and Governance, Keio University

As represented by shrinking Aral Sea, former Soviet Central Asian republics confronted with the water disputes over the water distribution. Before the collapse of the USSR, Moscow played mediator roll on this problem, so the Central Government of the USSR coordinated the distribution of water among the five Central Asian States. By the collapse of the USSR, however, Moscow left the problems. Therefore, Central Asian newly republics establish the regional organization, ICWC, and asked the support for International Society as substitute for Moscow. In spite of support from UNDP, World Bank or the other international organization, and the establishment of framework of regional cooperation on water distribute, the Aral Sea has not stopped shrinking and the dispute or conflict among the Central Asian states is unsolved.

In other hand, Central Asian republics are in the process of transformation. So, its policy, institutions or norms of water management inherit from the USSR. And we should analyze the effect of Soviet legacy on water management or governance in Central Asia. The aim of this paper, therefore, is showing the mechanism of the water dispute through analyzing the water management policy of Central Asia from the view point of “path-dependency.”

11:05-11:40

Climate Change and the Impact of Drought on Human Affairs and Human History in the Philippines, 1582 to 2009

James Warren

School of Social Science and Humanities, Murdoch University

This paper will draw attention to the causes and consequences of food shortages and famine with respect to the relationship between climatic factors, namely El Niño events, drought and disease, and, food scarcity, regional characteristics and social structure. Hence, in examining famines in the past and present, I will stress the structural links between food shortages, Filipino peasant societies and the weather factor. In addition, I will explore the historical relationship associated with economic and political changes and societal group inequality that becomes ever more explicit in famine.

Until recently, famine and starvation have been so distasteful to many scholars of the Philippines that little effort has been made to understand their historical bases and social behavioural effects. In employing a classic approach to climate, the environment and human activity, I will try to understand the present in the Philippines by looking at the past. As such, I will reconstruct a picture of the past with respect to drought, food shortage and famine.

December 17, 2009

Session 4: Redefining the Scale and Scope of Enquiry

The purpose of this session is to deepen the interdisciplinary dialogue toward sustainable Humanosphere. Technological advance (such as the introduction of GIS) has clearly brought to us a new set of knowledge, and has redefined the scale and scope of available information. It is influencing our understanding of the world, including some unlikely corners of our knowledge. On the other hand, scientific observation and categorisation have always been conditioned by the level of contemporary knowledge, which was in turn shaped by culture and historical path-dependence. Now, contemporary issues such as global climate change and disaster require imagination unlimited by disciplinary compartmentalization. In this context this session aims to identify the specific ways of moving between different scales of enquiry in terms of time and space.

9:10-9:45

Seismology and Human Settlement: Global Contexts for Local (Sumatra) Patterns

Anthony Reid

Center for Southeast Asian Studies, Kyoto University / The Australian National University

The human-induced global warming of our time, partly the fruit of massive deforestation over recent centuries, makes us very aware of what man can do to harm the planet. The earthquake and tsunami of December 26th, 2004, on the other hand, reminds us of how dependent we all are on the basic beneficence of that planet, and how much its changes affect our lives. This paper arises from the striking fact that seismological events of this massive sort are scarcely mentioned in the histories we have of Indonesia, although they must have been extremely influential in the long term. In particular, recent research on the Sumatran historic preference for highlands for settled agriculture, including my own, has been strangely oblivious to the importance of past tsunamis in moving population away from the coast. Geological advances in the methodology of dating past seismological traumas offer a hope of better integrating science and history, and providing a more comprehensive picture of our past, including the disjunction between Hindu-Buddhist and Muslim kingdoms. Continuing to ignore the lessons of this kind of planetary trauma may have very severe consequences for humanity.

9:45-10:20

Objective and Methodology of Natural Science and Its Limitations to Deal with Environmental Problems

Miyako Koizumi

Research Institute for Humanity and Nature

My questions are how natural science has become an effective system to understand nature and why natural science or natural scientists cannot satisfactorily deal with many of the environmental problems today. I review the development of Western natural history, which finally led to the theory of evolution, as an example of natural science with the main focus on Linnaeus's works and the criticism of his methodology to understand the objective and methodology of natural history and its change. An example of ethnobotanical knowledge, based on the data collected during my fieldwork with the Penan Benalui people of Borneo, is also shown to discuss similarities and differences between natural science and local knowledge. Finally I point out the limitations of natural science to deal with environmental problems and suggest how social science can bridge natural science and the public to solve the problems.

10:30-11:05

GIS and Remote Sensing for Wildlife Monitoring and Management in Eastern Africa

Sanga-Ngoie Kazadi

College of Asia Pacific Studies, Ritsumeikan Asia Pacific University

The Serengeti (Tanzania) and Mara (Kenya) ecosystems in Eastern Africa are among the most spectacular world heritages endowed with rich and diverse fauna and flora. The presence of hundreds of thousands of the migrating wildebeest (*Connochaetes taurinus*) makes the area a great concern for conservationists and at the same time, a major tourist attraction. The herds traverse territorial and climatic boundaries, various landscapes and biomes, and attract other herbivore and carnivore species as they migrate. The routes taken by the herds change every year depending on, among others, seasonal and climatic conditions. Foraging and movement of these large numbers of herbivores influence the structure and functions of ecosystems: they alter the dynamics of plant communities, modifying the distribution and the turnover of nutrients. The movements also affect the habitats and related disturbance regimes, e.g. frequency and intensity of fires. They also affect other communities sharing the same habitat (nomad people, their herds) often resulting in fierce human-wildlife conflicts. An integrated monitoring of these movements is of vital importance, not only for the wildlife managers in the region, but also for governments or any other decision maker concerned with this unique phenomenon at various space and time scales. Three objectives are set for this work: (i) to determine those factors that influence the migration, and how they relatively influence the routes during different phases of the migration cycle, with special attention to food availability (green vegetation as indicated by the NDVI), landscapes and relief heterogeneity (slope and altitude), and water availability (rivers, streams, ponds and water points); (ii) to analyze the influence (direct and indirect) of climate on the migration routes and patterns, and (iii) to predict and simulate migration routes in different climatic conditions. Using GIS and remote sensing techniques, together with various ancillary digital and cartographic data, indices are developed and modeled, and then used, separately or in combination, as measurable indicators for quantitative analysis and migration route simulation. Finally, simulated results are compared to the routes determined by radio tracking techniques in order to evaluate the robustness of this new analytical methodology.

11:05-11:40

Nature–Culture Relations over World History: Globalization, Crises, and Time

Sing C. Chew

Helmholtz Centre for Environmental Research – UFZ / Humboldt State University

The basis for the reproduction of material life over world history has been the wide-scale utilization of the resources of Nature. If the accumulation of surplus, urbanization, and population growth are the main socio-historical dynamics that determine the trajectory of Nature–Culture relations over world history, intensification of these socioeconomic dynamics tend to lead to ecological exhaustion, and perhaps, even ecological crisis conditions. The motions of world history exhibit periods of ecological recovery of the degraded areas, and the penetration (incorporation) of new areas for fresh natural resources to sustain further world system evolution (globalization).

At the world systemic level, for at least the last five thousand years, the ceaseless accumulation of materialistic surplus/wealth, urbanization, and population growth seem ultimately self-defeating as they have produced recurring system crises and unequal distribution of ecological degradation across zones of the system. The ‘world systemic connections’ formed as a result of the evolution of the world system (globalization) over world history have led to ecological and socioeconomic system crises (Dark Ages) and collapses being experienced simultaneously and unevenly. It might be that ecological relations are as primary as socioeconomic relations in the self-expansory processes of the evolution of the

world system (globalization). Thus, an analysis of the dynamics of the Nature/Culture relations (ecological relations) and other conditions – climatological changes (natural rhythms and human induced) and natural processes (for ex., volcanicity earthquakes, and tsunamis) – as conducting factors in system reproduction and crisis is necessary to understand the trajectory and limits of the globalizing world (the evolution of the world system). In order to examine and understand such historical system limits, an awareness of the dynamics of the Nature with its own natural duration and characteristics of reproduction and regeneration, and the Social domain with its own logic of reproduction that are conditioned by historical world system processes need to be theoretically and methodologically fleshed out. In doing so, ‘Time’ in its ecological and social dimensions warrants our attention. Theoretical and methodological attempts to decipher cycles and trends of social systems, and articulation points between social and natural systems need to consider these different aspects of ‘Time’. Exemplars from world history will be presented to reflect on the above theoretically generalized account of the dynamics and structures of world system evolution (globalization).