Proceedings of the 1st International Workshop

on Social Network Approaches to

Urban and Regional Carbon Management

5-7 April, 2005, Tsukuba, Japan

Editors

Stephan Scholz
Penelope Canan
Yoshiki Yamagata

National Institute for Environmental Studies

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Editors: Stephan Scholz
Penelope Canan
Yoshiki Yamagata

Global Carbon Project
National Institute for Environmental Studies
16-2 Onogawa, Tsukuba, Ibaraki 305-8506 JAPAN
Tel: 029-850-2672 Fax: 029-850-2690

Copies of Global Carbon Project Reports are available by request from:

Global Carbon Project
National Institute for Environmental Studies
16-2 Onogawa, Tsukuba, Ibaraki 305-8506 JAPAN
Tel: 029-850-2672 Fax: 029-850-2690

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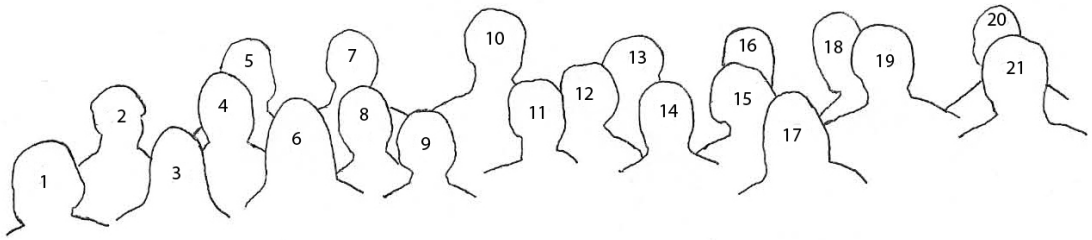
Front Cover Photograph: spring cherry blossom in Tsukuba, taken by Fukuya Iino

PARTICIPANTS



1. Kazumi Kondoh
2. Catherine Dibble
3. Beth Schaefer-Caniglia
4. Frank Malone
5. Stephan Scholz
6. Yukako Ojima
7. Erich Schienke
8. Liz Malone
9. Mikiko Kainuma
10. Jeffrey Broadbent
11. Penelope Canan
12. Yasuko Kameyama
13. Michael Obersteiner
14. Yoshiki Yamagata
15. Melanie Hartman
16. Rajesh Nair
17. Midori Usui Aoyagi
18. John Sonnett
19. Hiroyasu Sugihara
20. Joseph Cabrera
21. Fukuya Iino
22. (Not Pictured: Yukiko Yoshida)

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EXECUTIVE SUMMARY

What can social network analysis (SNA) contribute to addressing the problem of climate change? This question was explored at the International Workshop on Social Network Approaches to Urban and Regional Carbon Management (URCM), hosted by the Global Carbon Project (GCP) in Tsukuba, Japan April 5-7, 2005. Social scientists from Japan, the USA, and Europe reported on social network theory, applications and methodology to envision their use for on-the-ground social change regarding carbon management.

Some Beginning Assumptions: We began with the assumption that network action is a powerful organizational force, especially useful for intentionally flexible response to changing conditions in an operating environment. Network ties can also be usefully called upon to resist threats to the status quo from external challenges. (Consider, for example, the power of the "old boys network" in resisting acceptance of women and minorities in decision making positions in most societies).

Network analysis is especially promising to go beyond the static conceptual categories of organizational behavior (firms, nation-states, disciplines) in that it facilitates the examination of non-continuous social units that traverse nation-states, regions and continents. Essentially, network analysis is concerned with the structure of social relations, examining patterns in connectedness among non-contiguous, multi-site entities, using interpersonal, inter-organizational, informational, cultural and other ties as the basic units of analysis. Anheier and Katz (2005: 207) explain that "network analysis measures social reality not by reference to people's individual attributes (gender, class, age, values and so on) but by looking at their social relationships, the patterns they form, and their implications for choices and behaviour".

The mission of earth system science and of the Global Carbon Project is revolutionary: to change the way science and management of carbon are conducted. Everyone agrees that accomplishing this mission requires understanding the intricately woven fabric of systemic relations in nature, including those among human societies, in order to tease out "windows of opportunity" for efficacious interventions in the "business as usual" scenario.

We know that business as usual is supported by complex systems of economic, political, and cultural interests, with the dominant culture being globalized capitalism with "local" growth machines. These systems (networks of existing practices) have been institutionalized, making challenge by an activated public, interested media, or scientific consensus difficult. Therefore, the GCP call for a regional/urban future far different than business as usual requires understanding conservative networks of BAU as well as processes of network transformation and the emergence of networks for innovation.

The earth has always cycled carbon in the atmosphere (mainly as CO2); in the oceans (surface, intermediate waters, deep waters and marine sediments); in terrestrial ecosystems (vegetation, litter and soil); in rivers and estuaries; and in fossil carbon, which is being remobilized by human activities. However, with the rate of fossil fuel burning feeding industrialization, urbanization and transportation and with large scale land clearing, the naturally balanced carbon cycle is in a non-analogous and dangerous state.

We agreed that current management of the carbon cycle is piecemeal, careless, inconsistent, profligate and shortsighted. Enabled by past and current networks of power, the world has embraced a carbon culture that has spun out of control in the past 100 years.

So, social change needs to take place, but how? Part of the answer will require the creation of new networks at every level and sector of human activity to revolutionize the way we live on the planet. Such sweeping social change must occur at local (regional) levels since regions vary in their natural resources and ecosystem properties (forest, plains, desert, e.g.) as well as in their social resources and socio-economic characteristics. Moreover, and very importantly, places vary in their location in larger networks of regional, national and global carbon-based power.

What We Learned: We feel that the workshop successfully represented the broad array of research that exists within the SNA tradition from empirical studies to dynamic agent simulations. One of the central threads that ran throughout all of these presentations was how to create networks for pro-active change.

This issue has often been referred to as a problem of scale in the climate change research community (or frames in the social science community). Climate researchers have focused their analyses on global level simulations that are too abstract and removed from local level policy concerns. Successful carbon management in the future will have to bridge this gap by mapping different stakeholder needs and finding synergistic intersections for policy implementation. For example, how can policies be designed that reduce particulate pollution in urban areas that would simultaneously mitigate carbon emissions? How can urban heat island issues be addressed and/or rural development be fostered that also achieve carbon mitigation? These examples would benefit from social network analyses that can map cultural, rhetorical space as well as actual connections between different actors. One such application is taking place in rural Japan that will attempt to knit rural actors together around the creation of biomass power that addresses economic, ecological and environmental needs.

The potential application of dynamic network simulations was also explored. Basic network evolution can be modeled and coupled with urban or land-use change dynamics. International networks of civil society actors can also be modeled to predict which actors will have the greatest impact on policy formation based on the social capital they can draw upon. For example, it was shown that within the context of Japan's environmental policy arena those NGOs that draw on domestic social capital are more successful than those which draw on international social capital. Finally, we introduced qualitative comparative analysis as a potential method to compare case studies of network mobilization success or failure, as in the presented case of the Oklahoma Dust Bowl.

Overall, the workshop was very stimulating and successfully pushed the GCP's thinking in new directions, which is reflected in the subsequent URCM framework drawn up in June.

Penelope Canan
Stephan Scholz

INVITATION LETTER

It is with pleasure that we invite you to participate in the GCP Workshop on Social Network Theory and Methods for Ecosystem Management to be held in Tsukuba, Japan on 5-7 April 2005.

The purpose of the workshop is to convene top minds in social network analysis to construct a framework to guide future research relevant to carbon management. In the workshop we will:

- Explore the current state of network theory and methods
- Explore directions for application of network theory & methods for regional carbon management
- Organize into subgroups around theoretical, methodological, and practical concerns
- Outline an article for co-authored publication: "Social Network Theory Applications for Regional Ecosystem Management."

What is the GCP?

The Global Carbon Project is one of the Earth Systems Science Partnerships created by four international science communities known as the International Human Dimensions Programme on Global Environmental Change (IHDP), the International Geosphere-Biosphere Programme (IGBP), the World Climate Research Programme (WCRP), and the International Programme of Biodiversity Science (DIVERSITAS). The Earth Systems Science Partnerships were created to foster the integration of the natural and social sciences for policy-relevant science on global environmental issues. The GCP's mandate is to promote and support coordinated science on the global carbon cycle as it takes place around the world.

The GCP's international project office in Tsukuba, Japan is headed by sociologist Penelope Canan from the University of Denver in the USA. One of the Tsukuba office's challenges is to foster policy-relevant science for place-based carbon management. The other GCP office is directed by Pep Canadell, a terrestrial ecosystem biologist, in Canberra, Australia. The Canberra office focuses on vulnerable carbon pools, among other things.

Why is the GCP interested in social networks?

Social networks are known to be powerful vehicles for social change and the diffusion of information and knowledge. The GCP wishes to bring together experts in social network analysis to advance a framework for social network research that would be useful for regional carbon management. We need your expertise to help us draft such a research framework.

The workshop organizers do not expect the invited participants to know about the global carbon cycle, carbon budgets, greenhouse gases, or ecosystem management (although some do). What we hope is that you bring your experiences in social network research,

comparative methodology, and the study of social behavior to bear on a pressing environmental challenge, the transformation of social institutions at local, regional, national, and global scales. (We are sending you a very brief overview of the carbon cycle that appeared in National Geographic earlier this year to help locate the policy issue. But, again, your expertise in social network research is the reason we are inviting you.)

We sincerely hope you will join us in April, at cherry blossom time in Japan. It will be a great pleasure to see you and to hear insights from you and to socialize with you. For our part, we will do our best to facilitate an exciting meeting in what is a very interesting part of the world. The information that we are mailing to you will also tell you more about the GCP.

If you have any questions or need any further assistance, please don't hesitate to contact our office.

Sincerely,

Penelope Canan, Ph.D.
Executive Director, GCP

PRESENTATION THEMES AND SCHEDULE

GCP 2005 International Workshop on
Social Networks and Regional Carbon Management

GCP URCM Initiative

Social Networks and Regional Carbon Management — Canan

Capturing Network Dynamics Across Space and Time

The "String Accordion" Network Dynamics Through Space and Time — Broadbent

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Stakeholder Identification, Participatory Research and Citizen Involvement

From Perfect Knowledge to Working Knowledge (s): Rethinking Scientific Output for Effective Public Participation in the Context of Carbon Budgets — Schienke

Future Climate Regime Assesment by Scenario Planning Approach — Kameyama

The Battle Over Definitions of Development: Overwhelming the Resistance to the Growth Machine — Canan

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Networks in/for Ecosystem Understanding and Management

Learning from a Counter Case of Social Network Failure: Dust Bowl Recovery in the Great Plains of the USA — Caniglia

The Urban Growth Machine and its Unintended Ecological Consequences: A Case Study of the Urban Heat Island Problem — Kondoh

A Caricature of Transatlantic Differences over Risk Management — Obersteiner

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Early Report on Regional Carbon Management Case Study in Hokkaido

Towards a Carbon Balanced Region: Integrated Modeling Approach — Yamagata

Towards a Regional Carbon Management System: Creating Network Economies Between Nature and Economy — Sugihara

Sustainable FMBECS Market in Hokkaido	Scholz

Making Case Studies Comparable

An Introduction to Qualitative Comparative Analysis	Scholz, Sonnett

Network Views of Cultural Content and Media Analysis

Rhetorical Elements as Social Network Links and Potential Pathways of Change	Malone
Mapping Global Climate Change in Multiple Media Arenas	Sonnett

Simulations, Modeling, Network Dynamics

Network Analysis, Process, Simulation	Dibble
Cultural Integration: A Network Simulation Study	Cabrera

Expo 2005

About the 2005 World Exposition: Message from Japan, Nature's Wisdom	Yoshida

Keynote Presentation

Pathways to Participation: Global Network and NGO Voice in Japanese Climate Change Policy-Making	Broadbent

GCP 2005 International Workshop on
Social Networks & Regional Carbon Management
Schedule

Monday April 4th: Arrive at *Okura Frontier Hotel,* Tsukuba

18:30 – 22:00	Open House Dinner	Ninomiya House Rm. 1203 Penelope's Apartment	

Tuesday April 5th: Hotel Breakfast Buffet *Camellia* – 2nd Floor (beginning at 07:00)

	Panel/Topic	**Speakers/Panelists**	**Reporters**
08:30	Taxis leave hotel for NIES		
09:00 – 09:45	Introductions, Logistics, Templates	Canan, Broadbent	
09:45 – 10:30	GCP URCM Initiative	Canan	Caniglia
10:30 – 11:15	Capturing Network Dynamics Across Space and Time	Broadbent	Schienke Yamagata
11:15 -13:00	Stakeholder Identification, Participatory Research & Citizen Involvement	Schienke, Kameyama, Canan	Kondoh
13:00	Van to lunch		
13:20 – 14:45	Japanese Lunch *San Suitei*		
14:45 – 16:30	Networks in/for Ecosystem Understanding & Management	Caniglia, Kondoh, Obersteiner	Malone
16:30 –17:30	Early Report on Regional Carbon Management Case Study in Hokkaido	Yamagata, Scholz, Sugihara	Obersteiner
17:30 – 18:45	Walk to NIES Pond and Write/Enter Tuesday Session Reports on GCP Computer		Reporters
18:45	Cars to dinner		

19:00 – 22:00	Pizza & Salad Dinner *Cork Heads Aussie Bar*	Darts, Billiards & Toasts by All	None!
22:00	Taxis leave for hotel		

Wednesday April 6th:Hotel Breakfast Buffet *Camellia* – 2nd Floor (beginning at 07:00)

	Panel/Topic	**Speakers/Panelists**	**Reporters**
08:30	Taxis leave hotel for NIES		
09:00 – 10:00	Making Case Studies Comparable (QCA)	Scholz, Cabrera, Sonnett	Canan
10:00 – 11:30	Network Views of Cultural Content and Media Analysis	Malone, Sonnett	Dibble Kameyama
11:30	Walk to lunch restaurant		
11:45-12:45	Lunch: *Coco's*		
12:45 13:00	Walk back to NIES		
13:00-14:30	Simulations, Modeling Network Dynamics	Dibble, Cabrera Yamagata	Scholz
14:30-15:00	Break and Group Photo		
15:00 – 17:00	Pathways to Participation: Global Networks and NGO "Voice" in Japanese Climate Change Policy	*GCP Seminar* Broadbent	Scholz
17:00-18:00	Summary and Synthesis	Canan and Broadbent	Sonnet
18:00	Van leaves for dinner		
18:30 - 20:30	Japanese Dinner *Kenchintei*	Guest Introductions Expo Logistics	Canan Hartman Yoshida
20:30	Van leaves for hotel		

***Thursday April 7th**:* Hotel Breakfast Buffet *Camellia* – 2nd Floor (beginning at 07:00)

08:30	Taxis leave hotel for NIES	(if you need to download reports)	
09:00 – 10:30	Write/Enter Wednesday Session reports on GCP Computer	Hartman	Reporters
10:30 - 11:00	Duplicate and assemble summaries & outlines	Ojima, Scholz, Cabrera, Sonnett, Kondoh, Umemiya	
11:00	Bus departs *Okura Frontier Hotel* for NIES		
11:15	Bus Departs NIES for Hakone (Box Lunches)		
18:30	Japanese Dinner *Hakone Yumoto Hotel*		

***Friday April 8th**:* Hotel Japanese Breakfast 7:30

08:45	Bus Departs for Aichi (Box Lunches)		
12:45 - 22:00	World EXPO 2005		
18:00	Dinner at EXPO - *Tou-Ka-Rin* (Chinese)		
22:00	Shuttle to *Chisan Inn*		

***Saturday April 9th**:* Hotel Breakfast and Departure for airports etc.

PRESENTATIONS

GCP URCM Initiative

PENELOPE CANAN

Biographical Statement

Dr. Penelope Canan is the Executive Director of the Global Carbon Project, International Office at the National Institute for Environmental Studies in Tsukuba Science City, Japan. She comes to the GCP having been a professor of sociology at the University of Denver, the University of Hawaii, and the University of Virginia. An environmental sociologist, Canan is known for her work on integrated social impact assessment, energy and community development, democratic governance, and the formation of knowledge sharing expert networks.

She has served as lead author on the Technology and Economic Assessment Panel of the UNEP Montreal Protocol on Substances that Deplete the Ozone Layer, chair of the Environment and Technology Section of the American Sociological Association, vice president of the Society for Applied Sociology, and director of the International Institute for Environment and Enterprise. Currently on leave from the University of Denver, she continues as a board member of the Colorado Energy Science Center, president of the SLAPP Resource Center, and member of the Awards Committee for the Ozone Layer Protection and Climate Change Office of the US Environmental Protection Agency and of the Asahi Foundation Blue Planet Award in Japan.

She is the recipient of the Ozone Layer Protection Award of the US EPA, the Distinguished Practice Award of the Pacific Sociological Association, and the Driscoll Master Teacher Award at the University of Denver. For 20 years Canan has collaborated with law professor George Pring on SLAPPs or "Stategic Lawsuits Against Public Participation," that is, the use of civil lawsuits to silence political speech. Their book, *SLAPPs: Getting Sued for Speaking Out* (Temple University Press 1996) and testimony before state legislatures helped lead 23 states and Guam enact anti-SLAPP laws. Her latest book with Nancy Reichman is entitled *Ozone Connections: Expert Networks in Global Environmental Governance* (Greenleaf 2002), published in Japanese in 2005 by Nippon Hyoronsha Co. Ltd. This work combines participant observation with depth interviews, surveys, and a formal network analysis to dissect the social system of global regulation into three intersecting networks—policies, programs, and projects—and showed how the networks evolved from the happenstance of initial contacts into complex working systems or regimes.

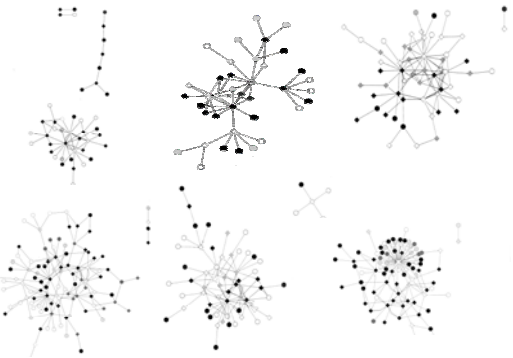


Fig. 1-6 TEAP Committees

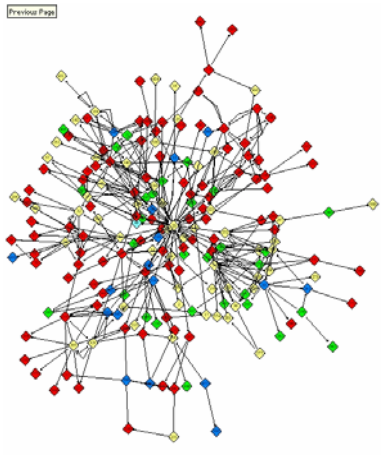


Figure 7. TEAP, with Andersen

Social network analysis of the committees comprising the Technology and Economic Assessment Panel (TEAP) that rose as the policy advisory committee to the Parties for the implementation of the Montreal Protocol reveals the importance of collaborative leadership to explain its network properties and globally acknowledged effectiveness (Canan and Reichman 2002). Dr. Stephen Andersen of the US EPA acted as the quintessential collaborative leader: he auditioned, recruited, inspired, steered, cajoled, rewarded and awarded collaborative performance on demonstration ODS phase-out projects and the policy synthesis of state-of-the-art technological and economically feasible phase out possibilities. He united business, industry, NGOs and academics across very different industries, nations, and time. His example reminds us that characteristics of individual leadership are key factors for intentional network action as opposed to descriptive knowledge of the structure of social relationships. Figures 1-6 show committee networks. Figure 7 shows the overall TEAP network with Andersen located at the center of a powerfully cohesive unit. Figure 8 removes Andersen from the analysis to confirm his central role as an ozone protection institutional entrepreneur.

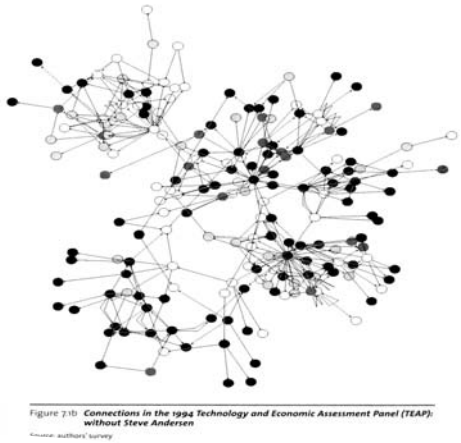


Figure 7.1b *Connections in the 1994 Technology and Economic Assessment Panel (TEAP): without Steve Andersen*

Some of the questions for social network research applied to social change regarding regional carbon management are: (1) who leads an emerging network from cliques to a coherent and dense structure; (2) what is the process of enrolling the commitment of potential network actors with the "right" social capital; (3) how is commitment to the network sustained over time; (3) how does a network evolve a common vision of action; (4) what resources (social capital) do leaders need to have in order to foster creativity, reliability, and brilliance; and, (5) who do we work for when we embark on intentional social network formation for planned social change?

Presentation Summary

GCP URCM INITIATIVES
Penelope Canan
(Reporter: Beth Caniglia)

Main Points

Penelope Canan and Elizabeth Malone

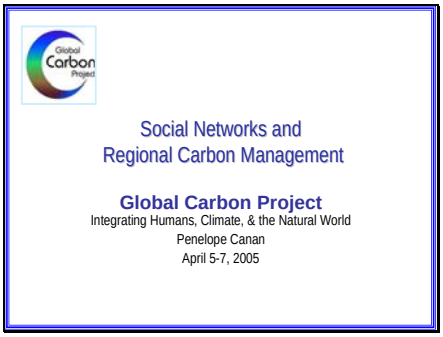
- The Earth System Science Partnership was created to overcome barriers to cooperation across scientific fields.
- The GCP envisions building a true integration between the social and natural sciences as a tool for regional carbon understanding and management.

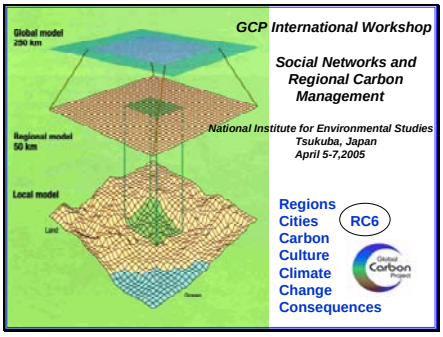
- Social science models developed to date (e.g. I=PAT) do not adequately capture the full range of social dynamics. The GCP hopes to encourage the development of richer models that also incorporate social network theories and techniques. Extant literature from social impact analysis can also provide valuable insights.
- Within the POETICs categorization, social networks fall primarily within the organizational dimension.
- One goal of the GCP URCM initiative is to facilitate the development of a database of place-based studies that can provide comparative and cumulative insights.
- Another goal is to purposively build carbon expert networks and training programs that are regionally focused yet collaborative across regions.

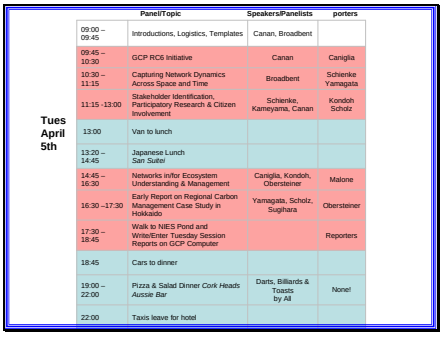
Relevant Literature

The Association of American Geographers GCLP Research Team. 2003. *Global Change and Local Places: Estimating, Understanding, and Reducing Greenhouse Gases*. Cambridge University press.

Berkes, F. 2002. "Cross-Scale Institutional Linkages: Perspectives from the Bottom Up". Pp. 293-321 in The Drama of the Commons, edited by Ostrom, T. Dietz, N. Dolsak, P.C. Stern, S. Stonich and E.U. Weber. National Academy Press, Washington, DC.







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	18:45 Cars to dinner		
	19:00 – 22:00 Pizza & Salad Dinner *Cork Heads Aussie Bar*	Darts, Billiards & Toasts by All	None!
	22:00 Taxis leave for hotel		

Introductions & Logistics

Wed April 6th

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11:15	Bus Departs NIES for Hakone (Box Lunches)		
15:30 - 18:30	Onsen - *Hakone Yumoto Hotel* or free time		
18:30	Japanese Dinner *Hakone Yumoto Hotel*		

SUMMARY OF PRESENTATIONS

Penelope Canan, Stakeholder Identification as a Matter of Policy, Program, Or Project Analysis

Beth Caniglia, Regional Elites in the US Cropland Growth Machine

MAIN POINTS

- Geographical scale of network connections can be taken into account by range measures developed by Dibble and Watts (2006)
- Measures of average path length provide an indication of the relative swiftness of information flow and therefore innovative capacity of a network
- Network boundaries are arbitrary and need to be fixed by a combination of informed expert judgment and network member wisdom.
- The strength and duration of commodity subsidies has perverted the market in a way that discourages innovation in the large scale agribusiness.

IMPLICATIONS FOR RC6 NETWORKS

- Just as bottom up-top down approaches are necessary for understanding regional and local carbon budgets, understanding social networks of power and decision making operating at global, regional and local levels provide insights into the barriers to and opportunities for regional carbon management
- Understanding regional Sectoral dynamics (e.g. agriculture, transportation, residential commercial, waste, energy) helps identify the stakeholders who are relevant to considerations of social change and innovation and the historical context of their willingness to change
- National policies (regulation, subsidization) have a critical influence on the current local POETICs that cause local emissions and land use behavior. Enlightened national policies aimed at empowering local areas to change those POETICs can have a critical influence on more sustainable future behavior.

TESTABLE HYPOTHESES

- The shorter the network average path length, the more swiftly new technological information is exchanged.
- Industrial sectors with long term government subsidies will be less likely to innovate.
- Geographic morphology and network morphology are related isotonically.

RELEVANT LITERATURE

Canan, p., 1992. "Environmental disputes in changing urban political economies: A dynamic research approach," *Studies in Law, Politics, and Society*, Vol. 12: 287-308.

Caniglia, B. S., 2004. "Human Behavior & Land Use." *Oklahoma's Environment: Pursuing A Responsible Balance*. Oklahoma City: The Oklahoma Academy.

Dibble, Catherine and Duncan Watts, 2006. "Matching range in physical and social space," *Journal of I Wish They Would Work on This Together*

Assoc of American Geographers Global Change and Local Places Research Group, 2003. *Global Change and Local Places*. Cambridge U. Press.

Friday April 8th: Hotel Japanese Breakfast 7:30

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08:45	Bus Departs for Aichi (Box Lunches)		
12:45 - 22:00	World EXPO 2005		
18:00	Dinner at EXPO - *Tou-Ka-Rin* (Chinese)		
22:00	Shuttle to *Chisan Inn*		

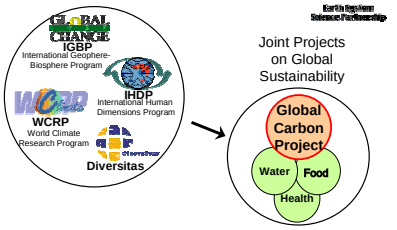
Sat April 9th

Saturday April 9th: Hotel Breakfast and Departure for airports etc.

What is the GCP?

SUMMARY OF PRESENTATIONS Presenter(s), Title(s) MAIN POINTS	IMPLICATIONS FOR RCS NETWORKS •
TESTABLE HYPOTHESES	RELEVANT LITERATURE

Earth System Science Partnership



Setting Up

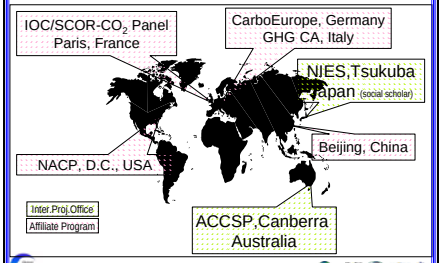
SCIENCE FRAMEWORK IN

- **CHINESE-MANDARIN**
- **RUSSIAN**
- **JAPANESE**

- **GCP SEMINAR SERIES**
- **e-NEWS**
- **TV DOCUMENTARIES**
- **GCP PAMPHLET**
- **IMPROVED WEB SITE**
- **TSUKUBA WEB PAGE**

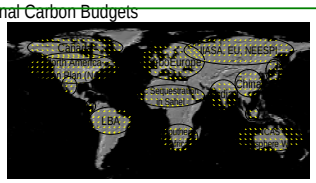
- **Newsletters**
- **Editorials**
- **Journal Articles**
- **Conferences**
- **Lectures, Presentations**

Partnerships with the major C programs

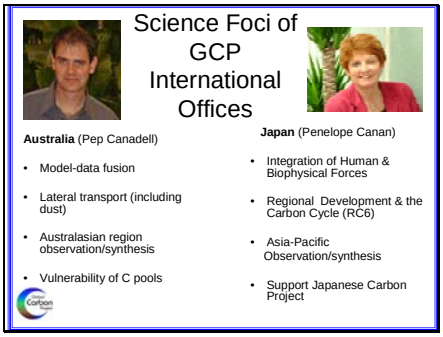


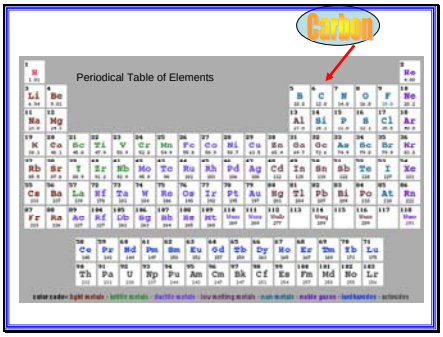
Publications

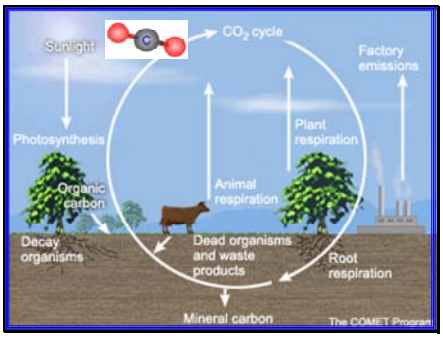
Science Networks for Comprehensive & Dynamic Regional Carbon Budgets

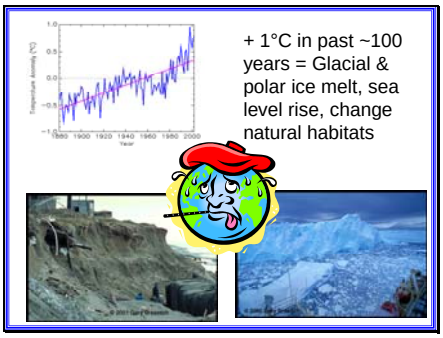


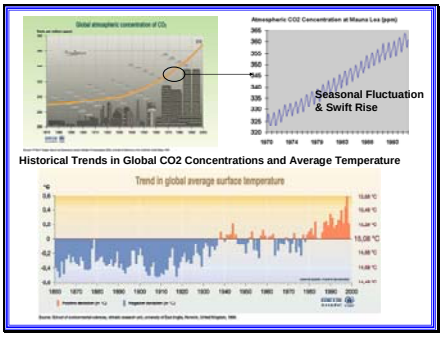
- Bottom-up constraints to the global carbon cycle
- Driving processes of carbon sources and sinks
- Carbon management tools for informing policy development
- With the goal to integrate socio-economics to biogeochemistry

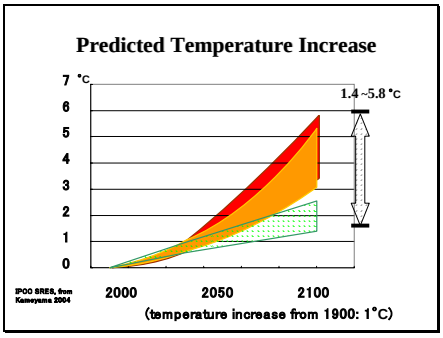

Science Foci of GCP International Offices
Australia (Pep Canadell)
• Model-data fusion
• Lateral transport (including dust)
• Australasian region observation/synthesis
• Vulnerability of C pools
Japan (Penelope Canan)
• Integration of Human & Biophysical Forces
• Regional Development & the Carbon Cycle (RC6)
• Asia-Pacific Observation/synthesis
• Support Japanese Carbon Project

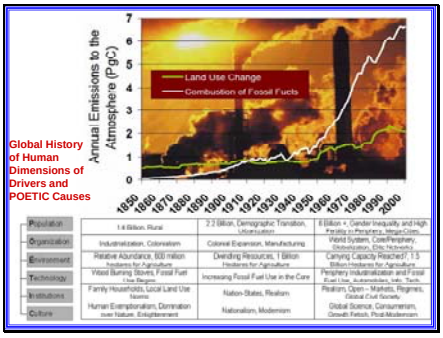

Carbon
Periodical Table of Elements

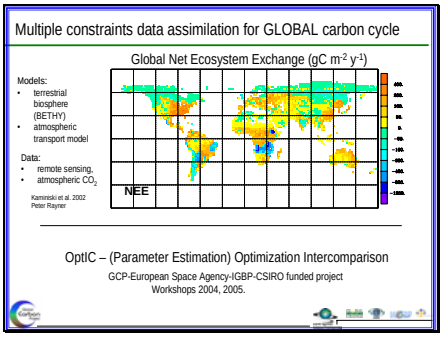

Sunlight
CO_2 cycle
Factory emissions
Photosynthesis
Plant respiration
Organic carbon
Animal respiration
Decay organisms
Dead organisms and waste products
Root respiration
Mineral carbon
The COMET Program

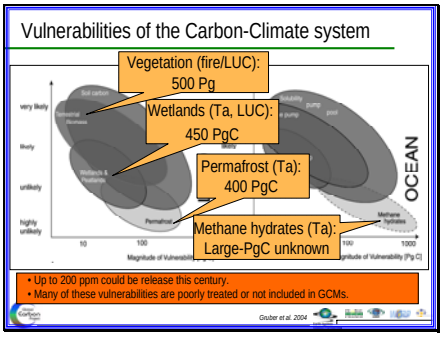

+ 1°C in past ~100 years = Glacial & polar ice melt, sea level rise, change natural habitats

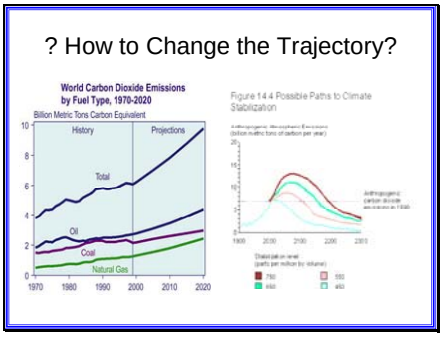

Seasonal Fluctuation & Swift Rise
Historical Trends in Global CO2 Concentrations and Average Temperature
Trend in global average surface temperature

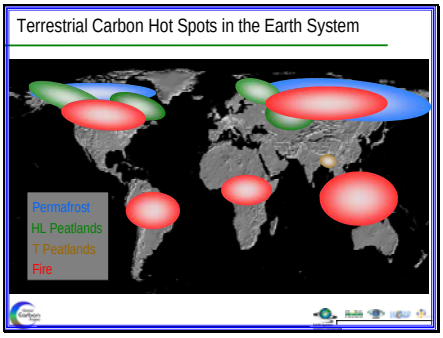

Predicted Temperature Increase
7 °C
6
5
4
3
2
1
0
1.4 ~5.8 °C
IPCC SRES, from Kanesyama 2004
2000
2050
2100
(temperature increase from 1900: 1°C)

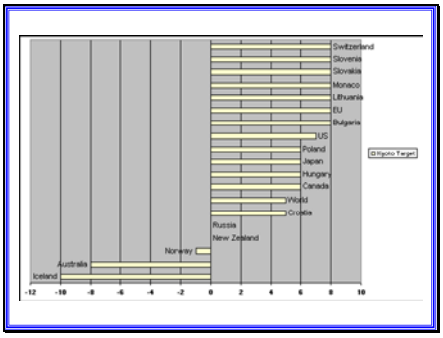

Global History of Human Dimensions of Drivers and POETIC Causes
Annual Emissions to the Atmosphere (PgC)
Land Use Change
Combustion of Fossil Fuels
Population
Organization
Environment
Technology
Institutions
Culture

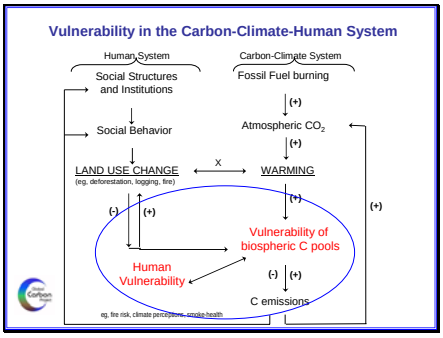

Multiple constraints data assimilation for GLOBAL carbon cycle
Global Net Ecosystem Exchange (gC m-2 y-1)
Models:
terrestrial biosphere (BETHY)
atmospheric transport model
Data:
remote sensing,
atmospheric CO2
Kaminski et al. 2002
Peter Rayner
NEE
OptIC – (Parameter Estimation) Optimization Intercomparison
GCP-European Space Agency-IGBP-CSIRO funded project
Workshops 2004, 2005.


Vulnerabilities of the Carbon-Climate system
Vegetation (fire/LUC): 500 Pg
Wetlands (Ta, LUC): 450 PgC
Permafrost (Ta): 400 PgC
Methane hydrates (Ta): Large-PgC unknown
OCEAN
very likely
likely
unlikely
highly unlikely
• Up to 200 ppm could be release this century.
• Many of these vulnerabilities are poorly treated or not included in GCMs.
Gruber et al. 2004

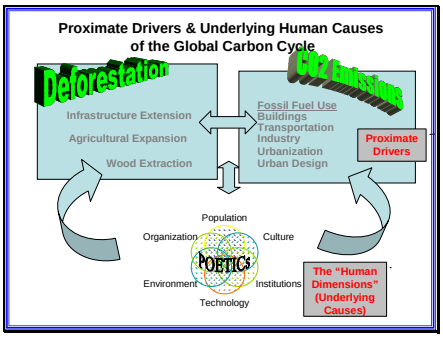

? How to Change the Trajectory?
World Carbon Dioxide Emissions by Fuel Type, 1970-2020
Billion Metric Tons Carbon Equivalent
History
Projections
Total
Oil
Coal
Natural Gas
Figure 14.4 Possible Paths to Climate Stabilization

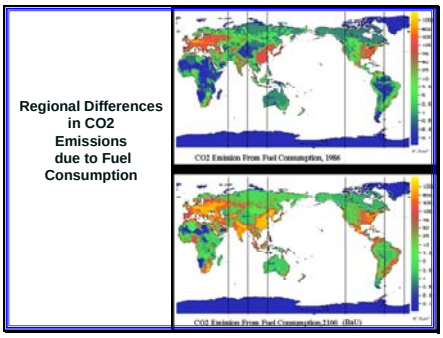

Terrestrial Carbon Hot Spots in the Earth System
Permafrost
HL Peatlands
T Peatlands
Fire

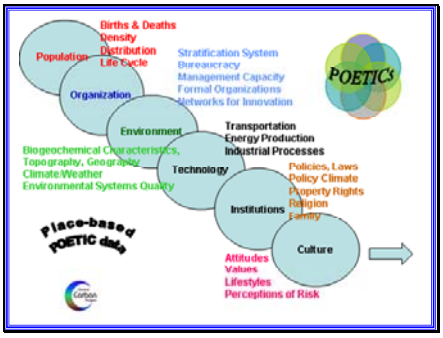

Switzerland
Slovenia
Slovakia
Monaco
Lithuania
EU
Bulgaria
US
Poland
Japan
Hungary
Canada
World
Croatia
Russia
New Zealand
Norway
Australia
Iceland
Kyoto Target

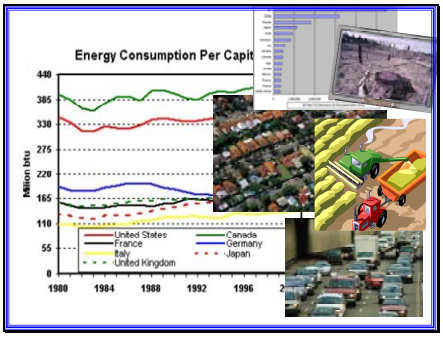


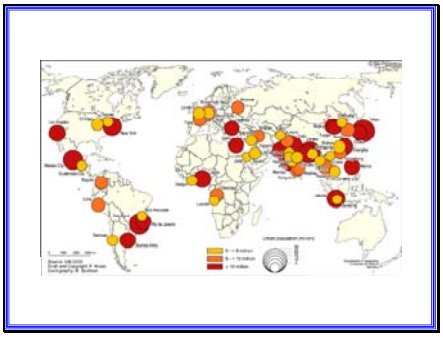
The “Human Dimensions” of the Global Carbon Cycle

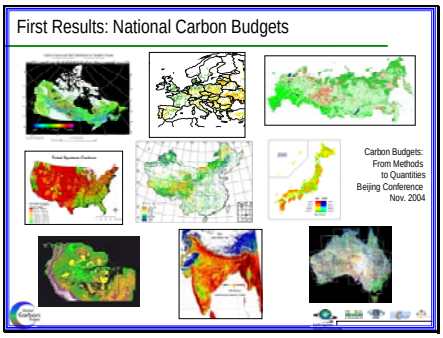


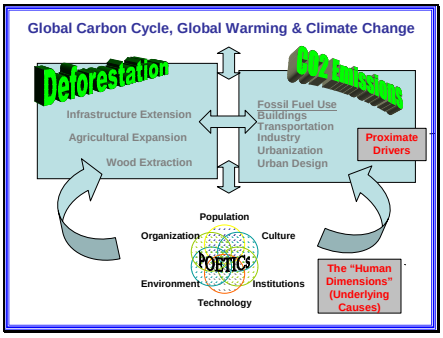






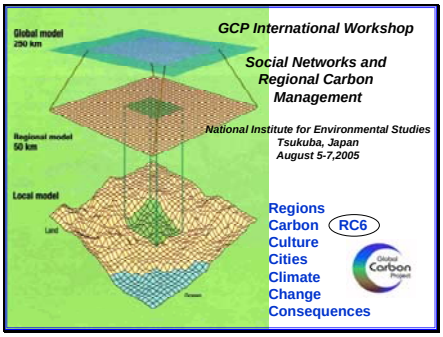


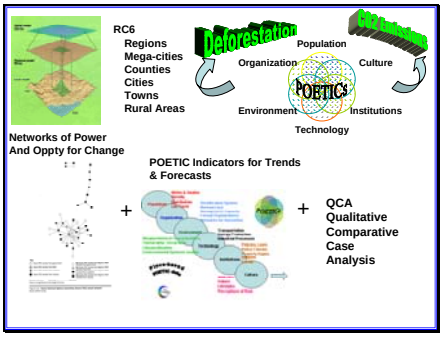


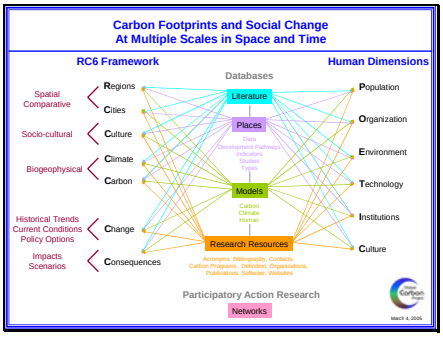


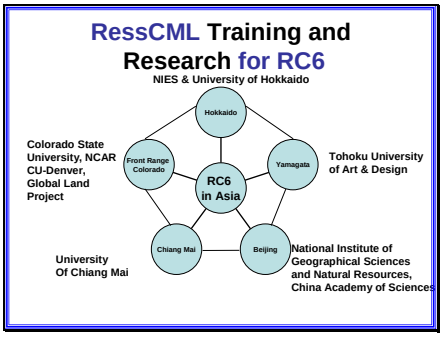
Typical Steps in Quality of Life Studies and Social Impact Assessments

- Profiling
- Projecting
- Estimating
- Evaluating
- Mitigating
- Adopting
- Monitoring
- Revising







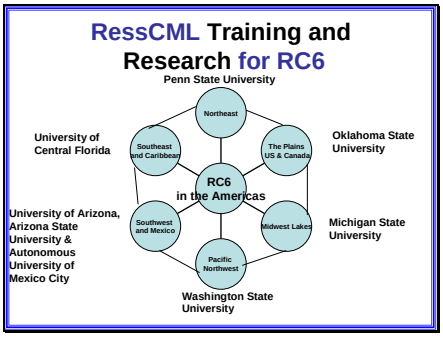


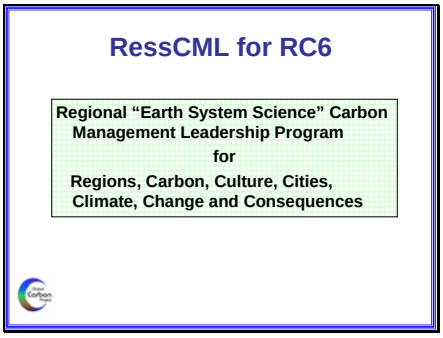
The Basic Social Impact Assessment Model:
Pre-Test/Post-Test with Generalized Control Group

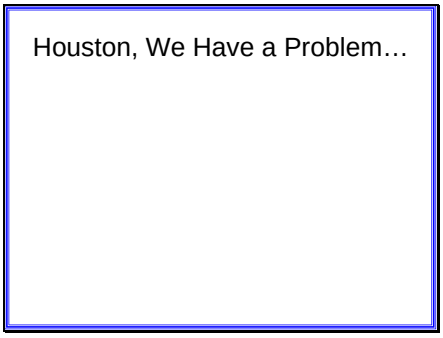
Comparative Study (a)	$T_{1a} \xrightarrow{X_a} T_{2a}$
Impact Study (b)	$T_{2b} \xrightarrow{X_a} T_{3b}$
Control Study (c)	$T_{1c} \rightarrow T_{2c} \rightarrow T_{3c} \rightarrow T_{4c}$ (Past, Present, Future, Far Future)

Burdge 1998

(X = Policy)







Capturing Network Dynamics Across Space and Time

JEFFREY BROADBENT

Biographical Statement

Jeffrey Broadbent is Professor in the Department of Sociology and Institute of Global Studies, University of Minnesota, USA. His research primarily concerns the application of network methods to the study of comparative environmental politics and movements from a cultural and structural approach, with a regional focus on Japan. His book *Environmental Politics in Japan: Networks of Power and Protest* (Cambridge 1998) won the "Masayoshi Ohira Memorial Prize" in Japan and the "Outstanding Publication Award" from the Section on Environment and Technology, American Sociological Association (2000). Recent publications include "Movement in Context: Thick Networks and Japanese Environmental Protest," in Diani & McAdam, *Social Movements and Networks* (Oxford, 2003) and "Japan's Environmental Regime: the Political Dynamics of Change," in Uday Desai (editor), *Environmental Politics and Policies in the Industrialized Countries* (MIT Press, 2002).

Pre-Workshop Thought Piece

Pathways to Participation: Global Networks and NGO "Voice" in Japanese Climate Change Policy-Making

Greater direct participation by the public in the making of government policies related to climate-change is thought to be essential to policy success (Agenda 21). Under what conditions do governments allow greater direct public participation on advisory councils and other ways of helping to write legislation? Since the start of the 1990s, Japan has seen an upsurge of civil society, such as environmental non-governmental organizations (NGOs). The government has allowed some of these NGOs greater participation in its traditional "corporatist" method of writing policy, through the participation of "stake-holders" on

advisory councils. What types of NGOs get included and for what reasons? This research tests four hypotheses that could bring about greater NGO participation: civil society growth, the boomerang theory, international INGO pressure, and the diffusion of new global norms supporting participation (from the UN, Agenda 21, etc.). The data comes from the Global Environmental Policy Network survey of 1997. This survey collected data on 128 organizations in Japan concerned with climate change issues, including 14 climate-change related NGOs, as well as on 33 international organizations. The data include the "policy networks" of these organizations on the exchange of vital information and of public political support, as well as other types of data. The network and other data provide information on the resources and other characteristics of each NGO. These organizational differences in combinations of resources, compared using Qualitative Comparative Analysis, indicate why some NGOs participated in advisory councils and writing legislation, while others did not. The results offer the most support for the civil society growth theory, a result explainable by various Japanese institutions and other features. Further research is required to assess the effectiveness of NGO participation on the eventual actual content and implementation of policy – the point of real impact. The degree to which the results are tied into the Japanese institutional formation makes generalization to other countries risky. This paper combines network analysis with testing theoretically-derived hypotheses, a good approach for further network research on carbon use societal processes.

Presentation Summary

THE "STRING ACCORDION":
NETWORK DYNAMICS THROUGH SOCIAL SPACE AND TIME

Jeffrey Broadbent
(Reporter:Eric Schienke)

Main Points

Jeff Broadbent and Erich Schienke

- Network measurement has typically worked with a slice in time approach.
- Networks are not static and their members change over time. Thus, they need to be studied temporally. Patterns are likely to emerge by studying the network shift over time. Final pattern is a squeezed view down the tunnel of time.

- "String Accordion" unfolding theory of network interactions over time. Encompassing of time, rather than an additive slice approach.
- Action Dyads -> "relation units" between people, organizations, nations, etc.
- Edges of the network multiply with more nodes.
- "String theory" approach, actors are the products of relationships. This is the thread with which the social fabric is woven. A->B vs. A->A'->B->B'->B"
- Transfer/exchange of hard/soft sanctions. One can look at any kind of exchanges that change behaviors.
- By looking at the network over time you can begin to see the appearance and disappearance of institutions, people, and actors in the processes development.
- Relationship vectors, tracing power, such as domination and persuasion. These can indicate how the "fabric" is woven.
- Field study on environmental conflict in Oita Japan, 1960—1980. Over 500 formal and informal interviews.
- Coding is the primary work of this kind of study. Emergent codes based on a tacit knowledge of the investigation.
- With this you can find points on the cube of power. Axes - Cohesiveness/Rationality - Tangibility - Malleability... two dimensions developing a picture of conjoint action.
- Dyads can be linked to other dyads to form other types of action dyads.
- We can develop a visualization of institutional impacts over time.
- Difficult to be predictive with this form, however, since uncertainty is high in dyad formation.
- Networks are difficult to study as dynamic entities, but interesting things emerge when you look at them over time.
- Taking network dyadic conjoinments and coding them, and looking at them over time can produce visualization of institutional impacts.

<u>Testable Hypotheses</u>

How does conflict-persuasion change impact of an institution or actors over time?

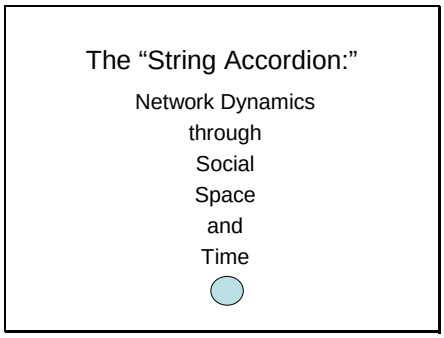
Do emergent patterns allow for future predictions, i.e. what are the valuable patterns (lessons learned, unexpected generations) and where can interventions be generative?

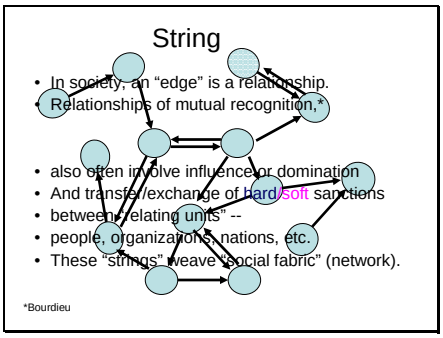
Implications for URCM Networks

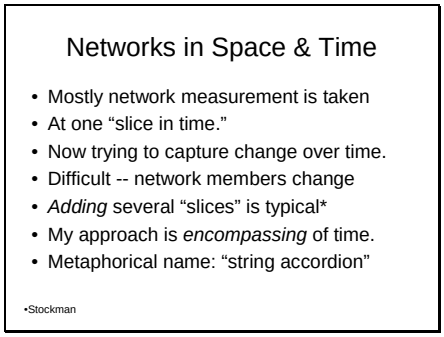
RC6 can be the major coding categories for qualifying and weighing (quantitatively) the relationship vectors.

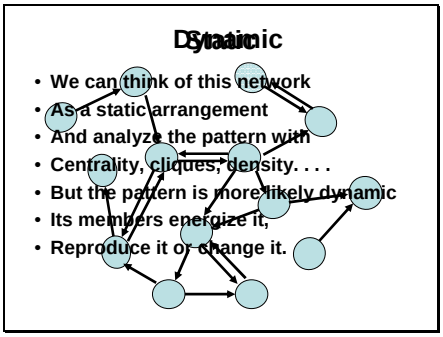
Institutional impacts within RC6 can be temporally understood.

Emergent patterns in conflict, while not prognostic because future relations are highly difficult to predict, can provide warning signs for communities or institutions at risk of being taken out of the picture.



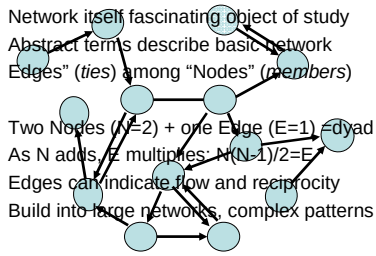






Network in Abstract

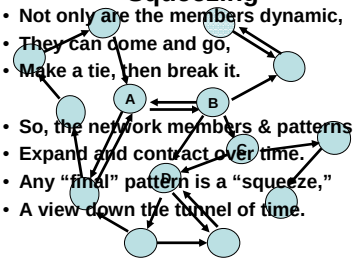
- Network itself fascinating object of study
- Abstract terms describe basic network
- Edges" (*ties*) among "Nodes" (*members*)



- Two Nodes (N=2) + one Edge (E=1) = dyad
- As N adds, E multiples: N(N-1)/2=E
- Edges can indicate flow and reciprocity
- Build into large networks, complex patterns

Squeezing

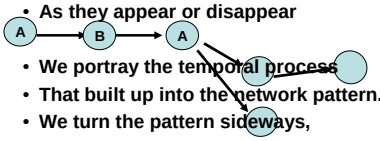
- **Not only are the members dynamic,**
- **They can come and go,**
- **Make a tie, then break it.**



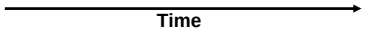
- **So, the network members & patterns**
- **Expand and contract over time.**
- **Any "final" pattern is a "squeeze,"**
- **A view down the tunnel of time.**

Accordion

- **If we look at the network over time**
- **Noting the actors and interactions**
- **As they appear or disappear**



- **We portray the temporal process**
- **That built up into the network pattern.**
- **We turn the pattern sideways,**
- **And "expand the accordion."**



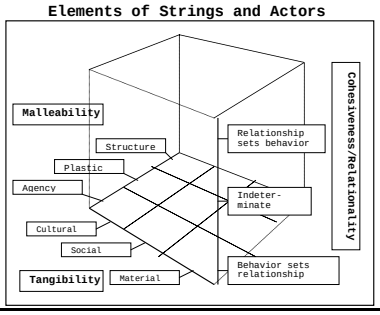
Coding of Action Dyads

- Code each A-B dyad in the sequence(s)
- Can draw data from qualitative sources
- Code all important factors of
- actors and "strings" tying them together-
- Name of organization, sector/type of org.
- Date, issue, motivations, strategies
- Types of incentives, sanctions used
- Net control and impact

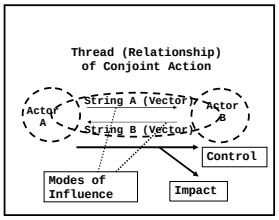
Influence Vectors

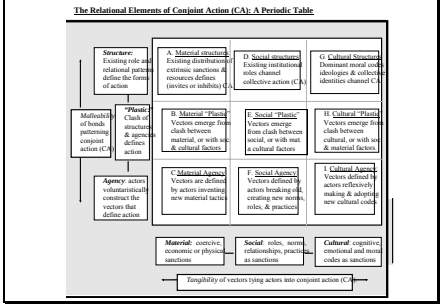
- To study "political" process in large groups
- Relationships become "vectors"
- Vector transmits "power" A→B
- Vector also affects outcome V→O
- Vector composition: binary contrast
- Incentives: dominative & persuasive *incentives*
- Sanctions: soft (symbolic, normative) &
- hard (cost imposing) *sanctions*
- What kind of social fabric do vectors weave?

The Cube of Power:
Elements of Strings and Actors



Key Influence Relationship: Conjoint Action Dyad



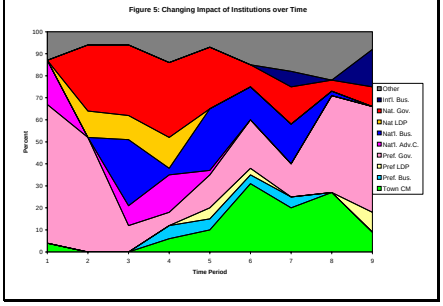


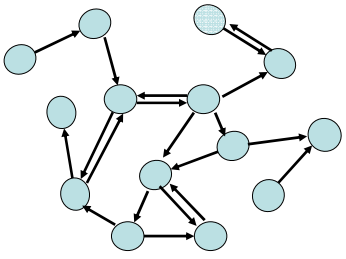
Example

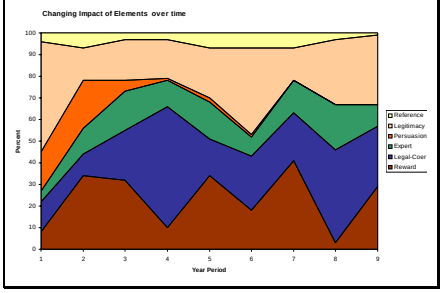
- I coded all the action dyads
- In my field study on environmental conflict
- In Oita Japan, 1960—1980.
- This is in an SPSS data base.

Many Aspects of Networks

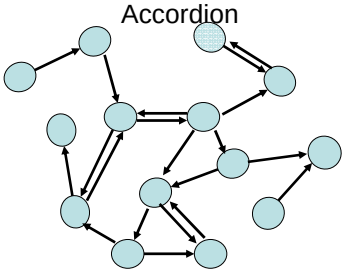
- *Network content (type of incentive)*
  - "Hard" – dominates B despite resistance
  - Example:Votes make politician lose election
  - "Soft" – persuade B to change preferences
  - Example: Agenda 21 convinces official to allow more NGO participation
- *Network cohesion*
- *Network pattern*
- *Also, interaction of multiple networks*
- *Network context*







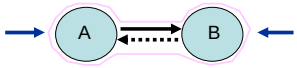
Accordion



Network Contexts

- Resources
  - Distribution of wealth, status, etc.
- Rules & institutions
  - Voting system & political parties
  - Press and other freedoms
- Culture and beliefs
  - Credibility of leaders
  - Legitimacy of science
- Provide other sources of influence/power
- Also affect behavior and outcomes

- "Influence Vector" - members *seem* intentional
- Ties voluntary choice, networks *"crumbly"*



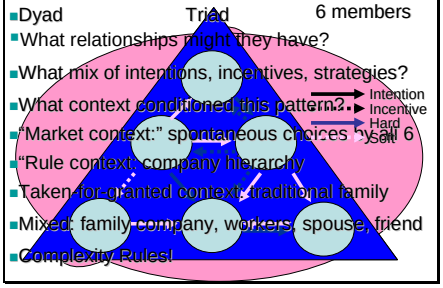
- *But* degree of choice depends on *context*
- Ties might exist due to rules, coercion*
- BUT, ties might be "taken for granted"**
- Or, ties might represent identity of member***
- Members *embedded,* network *"sticky" (cohesive)*

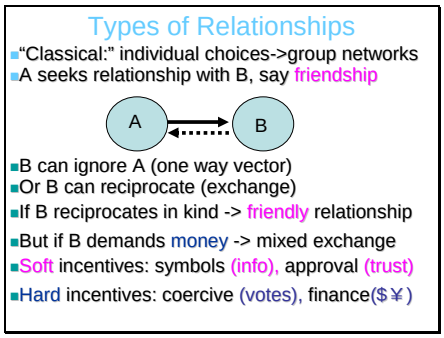
*New institutional theory: North, Moe, Nee ; **Neo-Institutional Theory: Meyer, Scott; ***Relationalism: Emirbayer

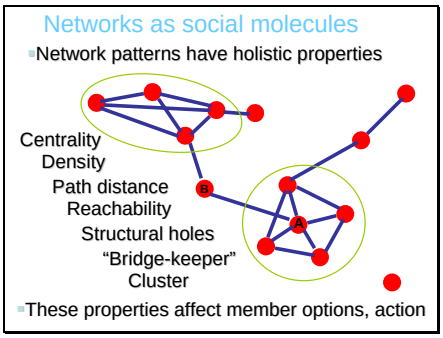
Networks in Social Science

- Start by Moreno, social group interaction
- Since 1970s, mathematical analysis of networks
- Focus on networks as static, whole "entities"
- Produce crucial methods for analyzing networks.
- In small group, social network is main dynamic.
- But for larger groups: community, nation, globe
- Social networks interact with other networks & factors.
- Process to outcome much more complex, "political"
- Networks help study dynamic process over time

- As members grow, network pattern complicates
- Dyad Triad 6 members
- What relationships might they have?
- What mix of intentions, incentives, strategies?
- What context conditioned this pattern?
- "Market context:" spontaneous choices
- "Rule context: company hierarchy
- Taken-for-granted context: traditional family
- Mixed: family-company, workers, spouse, friend
- Complexity Rules!







Stakeholder Identification, Participatory Research and Citizen Involvement

ERICH SCHIENKE

Biographical Statement

I am working to identify where technological and scientific production can be improved by better understanding their social and political consequences. In my graduate research I study, across multiple sites, the use of environmental information systems in the social and political decision-making process on environmental issues, particularly as they apply to human health.

Since the early 1990's, I have been conducting research across various sites and domains of research concerning one overriding question: "How, what kind, and in what ways does information shape and direct action in society – particularly in the environmental domain?" I have come to realize that this question is an instrumental one in how we define differences and conduct operations in information rich/dense societies. As we develop more methods and instruments for gathering and analyzing data, we are able to refine predictive models on historical, current, and future trends across all sectors of societies and the physical world in which these trends operate. However, while we are refining our technoscientific methods at what appears to be a rapid pace (such as Moore's Law), understanding exactly what to do with the mounds of predictive information and how to do it is less directly a function of computing power and data gathering, than it is a function of social networks and culturally derived modes of meaning-making. That is, data and predictive models are only a part of the process in understanding how to proceed in issues concerning governance of local, regional and global collectives. The other part of a successful governance equation would necessarily include data that is difficult to quantify, and thus model, such as data about people's motivations, symbolic systems, cultural preferences, habits, rituals, risks, belief structures, modes of reasoning, etc. Thus, I strongly contend that any attempt to answer the question "how does information direct humans' actions" would necessitate an evaluation of both the development of technoscientific systems and the cultural, social, and civil contexts in which these systems operate and inform.

Reflecting my long-term core interest in the interface between culture and technology, my undergraduate thesis at Hampshire College was on the early cultural and technical history of the loudspeaker. Here, I investigated how loudspeakers changed the physical as well as the social structures of public spaces beginning with the emergence of late Nineteenth Century scientific and technological innovations (in amplified audio) that pre-cursed the field of electroacoustics.

My Ph.D. thesis is the production of an ethnographic record on the use of environmental information systems in the policy-making process in Beijing, China. I will document, through various interviews and participant observations, the global, local, collaborative, and material-cultural influences on generating (with science and technology) and using, through policies and reforms, environmental information. Currently, there is little historical or contemporary data being collected on the emergence of this newer kind of scientific research, particularly in the context of transnational partnerships and collaborations.

Pre-Workshop Thought Piece

Based on
Greening the Dragon:
Information Systems in the Eco-Environmental Governance of China

China is currently undergoing rapid change across all social, political-economic, cultural, technoscientific, and eco-environmental domains of development. These rapid structural changes have put tremendous strain on all eco-environmental resources, which have repeatedly been put under serious threat since the Maoist reforms of the Great Leap Forward and the following Cultural Revolution. Over the past two decades, funding research into plausible solutions to eco-environmental problems in China has become a scientific and political imperative of global organizations, transnational enterprises, national bureaus, and local administrations. Though Deng Xiaoping's reforms ('78-'92) began to acknowledge the seriousness of the environmental situation, projections for China's future eco-environment are less than optimistic for the state of forestry resources, carbon output, fresh water, clean air, and their collective impacts on human health. Now, more than ever before, the Central Government (NPC & CPPCC) and scientists (in the Chinese Academy of Science) are addressing the seriousness of this situation in a sober and self-critical manner that promises a future different from its past, though the results of these promises remain to be seen, especially in how the public is to become more involved in environmental protection.

In previous ethnographic research I have conducted in the U.S. on the design and implementation of information systems (in media design and in the design and production of geographic information systems in the case of breast cancer research) successful "formulas" for directing/motivating social change have come from both the enhancement of public understanding of science and public participation at various levels of the design process itself. However, public participation methods (often requiring some degree of enhancing public understanding) in such a directly influential (democratic) manner as has been successfully implemented in Europe, the US, and Latin America, currently have little or no purchase on national and local decision making processes in China. Political and scientific elites' actions are being brought into line less by internal pressures to reform, than by external

pressures to be "good players" in the global capital markets, including cultural as well as material capital. Enhancing the visibility to a broader audience of the local actions and outcomes of the processes these elites manage will increase degrees of accountability, not only to local stakeholders, but to the central government as well as direct foreign investors. I contend that enhancing public understanding of eco-environmental science by improving how scientific research is produced, critiqued, and distributed by Chinese scientists, so as to be accessible across multiple forms of literacy, will result in changes that are more on-target with the promises of the central government. Studying how and where these enhancements can be made requires close empirical (qualitative) research as to how and under what conditions these epistemic communities are formed and sustained, and thus, where they can be changed.

At this point, I have minimal experience with the application of social network analyses, though I am particularly interested in how network analyses can be used in conjunction with spatial analyses of socio-cultural phenomena (something I do have experience with) to improve environmental regime performance. For example, how can Tobler's first law of geography, that ‘‘everything is related to everything else, but, near things are more related than distant things", be applied or used in conjunction with the study of social networks, particularly when these networks often (geographically) span the globe? While demands on environmental regime improvement often come from global governing regimes, necessary action plans responding to these demands are often entirely localized -- moving from the general to the specific. Using spatial analyses in conjunction with social network analyses can produce more targeted planning at various scales of governance (local, regional, global). For example, understanding where to target efforts on changing fuel wood collection habits for the sake of biodiversity preservation is more temporally critical in some places (such as nature reserves) than it might be in others. These areas, then, would be more crucial for directing social network analyses, such as on family habits, food production, local economies, conflicts, kinships, linguistic hurdles, etc. Currently, one of the major difficulties in conjoining spatial analyses and network analyses is figuring out how the disparate data and models can and should 'talk' to each other in a productive way. One area I see as most productive for such a spatial-network conjunction is in targeting public participation efforts, and through the analyses of census data to determine literacy rates, public understanding and communication efforts.

Presentation Summary

FROM PERFECT KNOWLEDGE TO WORKING KNOWLEDGE(S): RETHINKING SCIENTIFIC OUTPUT FOR EFFECTIVE PUBLIC PARTICIPATION IN THE CONTEXT OF CARBON BUDGETS

Erich William Schienke
(Reporter: Kazumi Kondoh)

Main Points

- Postmodernist critique of science (truth vs. reality).
- Deeper public participation requires scientific literacy.

Jeffrey Broadbent and Erich Schienke

- The public has demonstrated a propensity for learning scientific subjects on a need-to-know basis.
- We need to develop better bridging metaphors.
- Bring public participation in at the beginning of the processes.
- Efforts to inform need to be localized, which requires better information tools.
- Science is best learned hands-on.
- Develop robust interpretive frameworks.

Testable Hypotheses

Public participation and the adoption of desirable policy are related.

Implications for URCM Networks

Although a majority of dialogue for the global warming issue takes a top-down approach, bottom up approaches are also necessary. Thus, understanding citizens' networks is a relevant topic. We may want to incorporate the social movement literature to make a theoretical argument on the relationship between public participation and network effects.

Relevant Literature

Agarwal, Bina. 2001. "Participatory exclusions, community forestry and gender: an analysis for South Asia and a conceptual framework. *World Development*. 29(10):1623-1648.

From Perfect Knowledge to Working Knowledge(s): Rethinking Scientific Output for Effective Public Participation in the Context of Carbon Budgets

For the GCP 2005 conference on
Networks and Regional Carbon Management
Erich William Schienke
Department of Science and Technology Studies
Rensselaer Polytechnic Institute
Troy, NY
schiee@rpi.edu

"The dream of the Enlightenment subject..."

- Since the Enlightenment, the production of a "perfect knowledge" has been the overt goal of scientific output. *The true.*
- Over the past few decades, there has been an historical shift in how *objectivity* is produced... moving towards an "informed objectivity", i.e. a robust and socially constructed production of knowledge systems. (Fortun, Galison) *The real.*
- Scientific objectivity, in policy driven contexts, is "opening out", requiring scientific knowledge to work in conjunction with other forms of knowledes, i.e. local, economic, cultural.

Science on trial vs. science in policy contexts

- Science on trial (or science at the bar, Jasanoff) often becomes the trial between experts. Scientific evidence is weighed and a shadow of doubt can be cast... often leading to inaction or non-justice.
- This model does not work well for policy (decision-making) contexts, where well informed actions are often either economically beneficial or systemically required, before the thresholds of a perfect certainty are crossed.

From stabilization to strategic thresholds

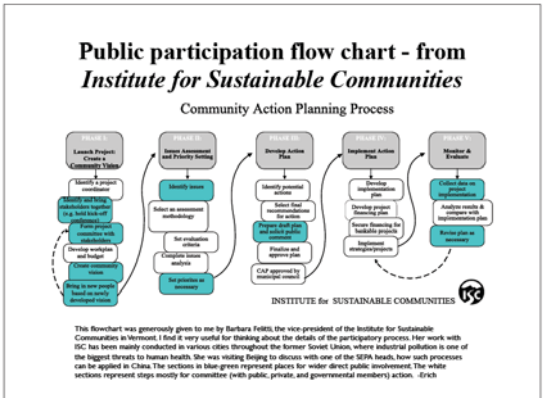
- Scientific knowledge, achieving points of testable certainty, is considered to have reached a point of epistemic stabilization.

Science of open systems, such as the climate, ecosystem, or environmental effects on human health, will rarely, if ever, achieve such traceable points of stabilization. This is because what is studied never remains static or precisely reproducible. (Rheinberger, Latour)

- Scientific output for decision-making processes (including public participation) should be most concerned with realizing *strategic thresholds,* where the ethos of action overrides the ethos for perfection. (Schienke)

Public understanding for public participation

- Deeper public participation requires some enhanced degree of scientific literacy on the part of the participating public.
- While the public may not be generally literate about current scientific facts and developments, the public has demonstrated a propensity for learning scientific subjects on a need-to-know basis (ozone depletion, amneocentesis, breast cancer, asthma, pollution, etc.)
- These are transitions on the part of the subject(s) from having something *generally at stake* to something *specifically at stake* in the process, and usually is motivated by personal experience. *A complexification of standpoints.*
- Carbon will have a difficult time making this transition...



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Example 1 - The TRI and EDF's Scorecard.org

"I had a lot of environmental science background which they (EDF) needed, and so we got funding to start to provide services to community-based environmental organizations who were desperate for technical assistance in assessing of the different types of polluting behavior going on in an area, which were the most significant? Which were the highest risk either to the workers or the surrounding community? That introduced me to a situation where organizations like the one I used to work for would be regularly calling and essentially asking for very similar kinds of information: what chemicals are used in this area? What kinds of health effects could they cause? Which are the worst ones if we needed to worry about that, how should we prioritize our campaigns in trying to change?" (Pease interviewed by Schienke 2001)

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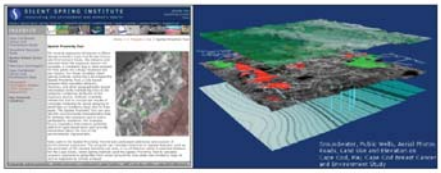
Example 2 - Spatial Proximity Tools from Silent Spring



"We already know that Cape Cod is a cluster. So we've been using GIS to estimate exposures to chemicals. And that's something a little bit new. And there are some papers coming out now. But I think that this organization was the first to really use GIS for that kind of modeling. It's one of the biggest problems. It's the life history modeling. It's reconstructing historical exposures. Breast cancer, by the time a woman feels a lump, it's been there for, like, 10 years, 15 years. So the exposure that you're interested in was year's ago. And if you ask a woman what were you doing on the 5th of May in 1956, she's not going to be able to tell you. And our GIS, because we had a long history of land use, as well, we have land use from the '50s, '70s, '80s, and '90s, we can look at where the cranberry bogs were, look at where the golf courses were, look at where agriculture was." (Kennedy interviewed by Schienke 2001)

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Example 3 - Ecosystem Marketplace - a local market for carbon? (in theory)

The Ecosystem Marketplace will provide the information and connections to help overcome obstacles, taking the carbon market to another level. The Ecosystem Market Place will:

- Add transparency to carbon markets by illustrating and evaluating transactions, contractual conditions and financial mechanisms that buyers and sellers need to create robust and active markets.
  - At present, there is a huge variation in what investors pay for carbon credits. Variation on carbon trading has ranged from US$1 to US$8 per ton of CO2 equivalent for all projects, with afforestation projects averaging US$3.60 per ton.
- Provide the world's communities with guidance and examples to facilitate increased participation in carbon markets, helping to bring buyers and sellers together.
- Help investors tap this under-appreciated contributor to global, regional, and local economies.
- Provide governments around the globe with examples of successful local, national and international regulations.

(Quoted from: http://ecosystemmarketplace.net/pages/static/marketwatch.php)

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Example 4 - Virtual Coursewear for global warming by UCBerkeley

"Global warming's future impact depends on factors such as human population growth and fossil fuel use. High school and introductory college classes can learn how these and other variables might influence temperatures, sea levels, and more at a new tutorial hosted by California State University, Los Angeles. The Java applet helps students work through scenarios for the future sketched by the Intergovernmental Panel on Climate Change. For example, animations illustrate flooding in areas such as Florida and Indonesia under different sets of conditions. Included are diagrams showing global temperature increases in 2300 if rapid population growth continues, and if population stabilizes faster and countries introduce clean technologies more rapidly."

(Quoted from: Science Vol 308, Issue 5718, 29 - 1 April 2005)

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Example 5 - Carbon management action plans of local urban centers (Belfast)

Carbon Management Action Plan of Belfast:

° 2000: The approximate CO2 produced by all council sites in 2000 was 20,000 tonnes/year

° 2001/02: The savings in CO2 [reduction of 1000 tonnes from previous year] were a direct result of changing the electricity to Energia (renewable) for the Waterfront Hall and the Zoo.

° 2002/03: The savings in CO2 [reduction of 1200 tonnes from previous year] were a result of changing the electricity in the City Hall to Energia as well as converting some of the major sites to natural gas, i.e. Avoniel LC, Andersonstown LC, Whiterock LC, Belfast Castle and Belfast Zoo.

° 2003/04: The savings in CO2 [reduction of 3000 tonnes from previous year] will be due to changing the electricity in approximately 100 council owned sites to Airtricity (renewable) and installing CHP into four BCC lesure centres, i.e. Avoniel LC, Andersonstown LC, Whiterock LC, and Shankill LC. [FROM: Carbon Management Action Plan, Belfast City Council, Local Authority Carbon Management Programme. April, 2004. <http://www.thecarbontrust.co.uk/carbontrust/about/publications/Belfast-LAP-111104%20FINAL11.pdf>]

So... how to turn carbon into diamonds?

Some lessons learned from public

- People learn most about scientific and environmental matters through interpersonal discussions. (Ungar, Kempton) Interaction ritual chains are essential to knowledge acquisition and reproduction. (R. Collins)
- The public tries to understand through *synchretism*—ozone is the closest previous model people have to climate change.
- Ozone was capable of capturing public imagination (sunscreen, shields, shells, protection)
- Which is it, global warming, climate change? Is it a blanket? Why is warmer weather a bad thing? How does global warming lead to worse winters? (Stamm)

understanding of climate change versus ozone depletion

- Not all parties see a problem with global warming. (New Arctic shipping lanes! Carbon is life.) But most can relate to sunburns and skin cancer. (Fish don't wear sunglasses!)
- No overt connection observed in public (2000) between energy conservation and global warming. Much as there was no overt link between cooling and refrigeration with ozone...
but with styrofoam and aerosol cans, yes. (Ungar, Kempton)
- How can climate change, as a perceived *future oriented problem,* be brought into the present with carbon budgets?

How can carbon budgets be better understood and taken up for public participation?

- *Efforts to inform need to be localized!* Conduct "literacy gap analyses" in certain local contexts. Some regions may need to be more focused on communicating towards supporting the increase of carbon sinks, such as rural reforestation efforts, while other regions require greater emphasis on release/emissions reduction methods, such as urban centers.
- Home energy consumers have learned to read their energy use (as kilowatt hours) into their energy budgets and have learned to take steps to reduce energy use, such as insulation, draft reduction, fuel choice, etc. Can carbon budgets begin to be read as another part of the home energy budget? Let's find out how well that works.

Development of better *bridging metaphors*

- Climate change - the slow and permanent tsunami? (I was actually asked if the extreme nature of the recent tsunami was an effect of climate change... is it earthquake weather?)
- Should the necessity of carbon markets be best explained through global warming? Or global ecological protection? Or energy budgets? Or daily weather reports? Or reforestation efforts? Or urban growth? Or sustainable development?
- Making human health effects of global warming & climate change very apparent. Drought, disease vectors, flooding...
- Carbon as useful and valuable resource, not as pollution. (Wang)

Design and development of better Toolsets

- Bring public participation in at the beginning of the processes. In many circumstances, participatory design has proven quite successful in improving the design process.
- Better information tools, such as the previous examples, such as a regional carbon layer for Scorecard.org.
- Carbon counters for different forms of energy use.
- Useful tax credit incentives.
- A *Molecularium*™ for youth education about climate change and carbon cycles. Science is best learned hands-on.
- Develop robust interpretive frameworks.

...but all of this will require a lot of work for scientists and the public(s)!

- The goal: to develop better working knowledge(s), and thus, transform the topologies of perception. (M. Fischer)
- Merging frames of analysis to create better hybrids (ethical assemblages). Spatial Proximity with Social Connections. Qualitative with Quantitative. Policy with Science. Local with Regional with Global. Coherency with Uncertainty. Pro-action with Reasonable Precaution.
- Concerted effort on the part of the carbon and climate science community to communicate their knowledge in ways that decision makers and the public process can uptake. This will require better multi-way communications and multiple forms of scientific output to be usable across multiple forms of literacy.

Thank you for your participation

YASUKO KAMEYAMA

Biographical Statement

Yasuko Kameyama's main field of research has been on international negotiation on climate change, from the aspect of international relations. She is currently head of a research project on "Future International Climate Regime Beyond 2012". She has participated in such negotiations since COP1, 1995 as a member of the Japanese governmental delegation.

During 1999-2001 she was engaged in the drafting of UNEP's Global Environmental Outlook 3, as a researcher of NIES, the Asia Pacific regional coordinating office.

In 1999-2000, she was a visiting researcher at Department of Government and Politics, University of Maryland, U.S. She is a member of several committees set up under central and local administrations, including: "Sub-Committee for International Climate Change Strategy, Global Environmental Committee, Central Environmental Council" of the Ministry of Environment, and "Council on Urban Planning" of Kamakura City.

She is a member of seven academic societies including: the International Studies Association (ISA), the U.S.; and Society for Environmental Economic and Policy Studies, Japan. Honors received from these societies include: award for the Best Treaties, the Academic Association of Social Information, in 1999; Award for the Best Treaties from the Society of Environmental Science, in 1998; Young Scholar Merit from the Japan Association for Planning Administration in 1994.

Yasuko Kameyama earned her doctoral degree at Tokyo Institute of Technology in 1997.

Pre-Workshop Thought Piece

Personal View on "Methodology to Social Change in Real Places"

Since I am not an expert on social network theory and my research is more oriented towards International Relations (IR) -related theories, the following description will mainly be on my personal view on "methodology to social change in real places".

Many of the works done in the past realm of IR and other social science mainly focused on objective explanation of past events, and theories and methodologies were built on meeting such purpose. However, this type of study was not aimed at assessing the past, forecasting the future, or raising political suggestions. This meant that studies were not intended to be "useful" for policy makers, and also were not expected to be flexible enough to fit social changes.

On the other hand, there has been increasing needs from policy makers for policy-relevant studies, which require knowledge of social science experts. Many of recent studies in the last

decade have thus aimed at meeting such needs, and have come up with new ideas for methodology. Social network theory is one of such theories.

I myself have been engaged in studies related to climate change negotiation at international level. However, in order to fully respond to the needs of policy makers as to how we should negotiate to reach an agreement on effective climate mitigation policies, methodologies in addition to pure IR theory was necessary. One way is to introduce "2-level game" theory or methodology similar to it. It is a way to explain behavior of nations by looking both from IR and domestic politics. Other methodologies have integrated methodologies in other fields such as statistics. For instance, I have made a lot of interviews in the past. Information gathered by interviews is useful to confirm explanation for 2-level game, but it could also be used to explain social reality in a quantitative manner.

I feel such new methodologies are in many cases not very well received among traditional IR academic community (especially in Japan), but more recognized by researchers in academic community outside of social science, and policy makers.

Presentation Summary

FUTURE CLIMATE REGIME: ASSESSMENT BY SCENARIO PLANNING APPROACH

Yasuko Kameyama
(Reporter: Kazumi Kondoh)

Main Points

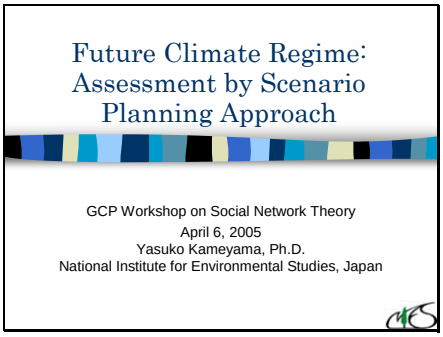
Yasuko Kameyama, Kazumi Kondoh
Michael Obersteiner

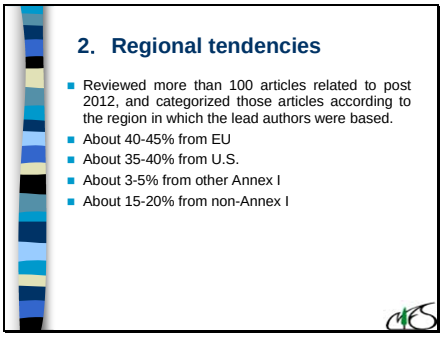
- Defining the possible scenarios after the Kyoto protocol or "Beyond-2010".
- By using a scenario planning approach the following three scenarios are identified: carbon market initiative, government-led policies & measures, and technology optimist.
- Carbon market initiative: climate institutions will be private-sector driven. Firms that are likely to benefit from ET or new technology will push governments to agree on multilateral climate change.
- Government-led policies & measures: climate change negotiations will be government-driven as private sector finds little benefit from accepting emissions limitation and reduction.
- Technology optimist: climate change is expected to be overcome by technology.

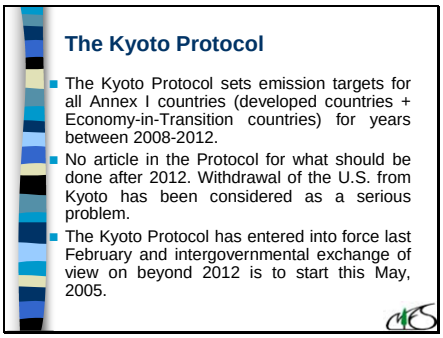
- Scenario planning approach is a useful tool to define several scenarios that could be used to categorize options and to show their strengths and weaknesses.

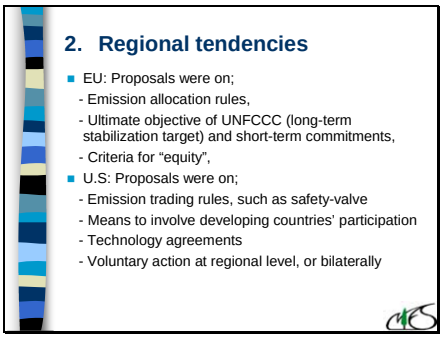
Testable Hypotheses

If business interests occupy the central position in networks in negotiations beyond 2012, either the carbon market initiative or technology optimist scenario, or a combination of both is more likely to be adopted.









2. "Beyond-2012"…

- Informal dialogue on "beyond 2012" had already been become popular among researchers and various stakeholders since 2001.
- Many proposals exist, but there seems to be tendencies or areas of common ground shared among groups of proposals in each region
- What can be said from existing literature?

  ---- Implicit messages

2. Regional tendencies

- Other Annex I countries: Proposals were on;
  - Emission trading rules,
  - Separation of treaties according to themes
  - Involvement of sub-national stakeholders in negotiations
- Non-Annex I countries: Proposals were on;
  - Sustainable development and climate policy such as SD-CDM
  - Emission allocation according to responsibility
  - Funding from Annex I to non-Annex I

2. Regional tendencies – explanation from IR

- EU : Assumes "international society" where an order, or a norm, exists. Countries basically keep their promises. Enough discussion should be made to reach an agreement before using force.
- U.S.: Considers international arena as an Hobbesian world (a war as is of every man against every man). Countries basically aim for their self interest, and can only be expected to take action voluntarily.
- Other Annex I: Caught between the two worlds. Supports U.S. view for self-protection.
- Other non-Annex I: Caught between the two worlds. Supports the UN system to maintain negotiating power.

What is Scenario Planning Approach?

- An effective strategic planning tool for medium to long-term planning under uncertain conditions
- Thinking in scenarios helps us understand the logic of developments, clarify driving forces, key factors, key players and our own potential to exert an influence. (Lindgren and Bandhold, 2003)
- Originally, the scenario planning approach was used by Shell (oil company) to determine its long-term strategy. In recent years, the approach have been used in the area of global environmental management.

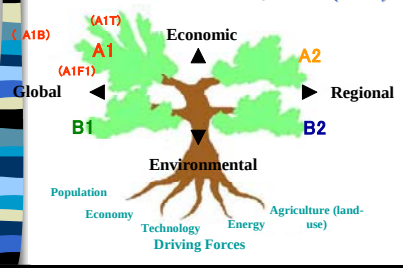
2. Regional tendencies – two scenarios

- **"Leadership of International society" case**

  Leadership of EU continues. Japan, Canada and Russia follow EU. They support non-Annex I countries to engage in sustainable development with climate-related actions, such as SD-CDM. A new round of negotiation secures success of global mechanisms which U.S. and Australia gradually participate.
- **"Voluntary action under national interest" case**

  EU gets more interested in regional actions than global. The U.S. comes up with its own climate strategy, which consists of bilateral economy & technology cooperation. The Umbrella group follows the U.S. They set up bilateral agreements with non-Annex I countries for emission limitation strategies.

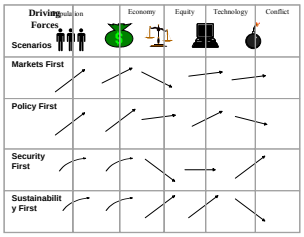
Scenarios used for SRES, IPCC (2000)



NIES/IGES Project: use of Scenario Planning Approach for assessment of future climate regimes

- The most suitable climate institution may differ according to a scenario into which the world is moving.
- Conclusion of evaluation differs according to the underlying scenario

GEO3, UNEP (unpublished, 2000)



Three Scenarios

High expectation for innovative technological solutions

Scenario C Technology Optimist

Wide use of regulations

Wide use of emissions trading

Scenario B Government-led Policies and Measures

Scenario A Carbon Market Initiative

Pessimistic about innovative technological solutions

Scenario B:

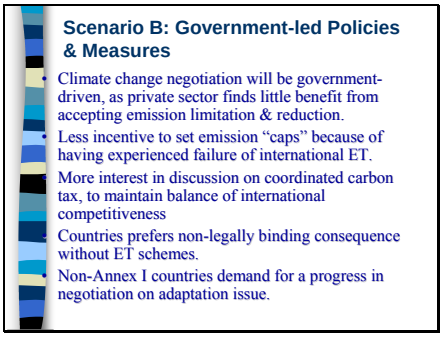
- Climate change is expected to be overcome by "technology" in the next several decades.
- A country or countries that are likely to benefit by the "technology" becomes a strong leader in pushing other countries to agree to a climate agreement, while other countries have less willingness to negotiate.
- CDM fails together with ET, and non-Annex I countries demand for technology transfer.
- Countries prefer non-legally binding consequence, except for technology standards.
- Concern on adaptation strategies decreases.

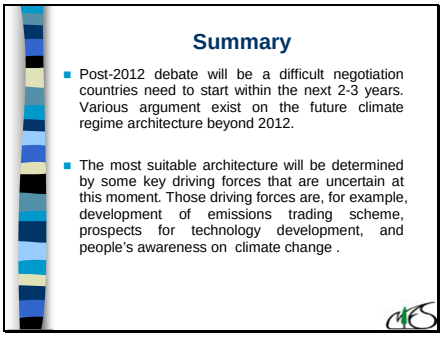
Scenario A: Carbon Market Initiative

- Climate institutions will be private-sector driven.
- Firms that are likely to benefit from ET or new technology push the governments to agree on a multilateral climate regime.
- Industrialized countries strongly urge the developing countries to commit to emission "caps". Loose emission limitation targets may be sought for.
- The U.S. may change its position if its private sector is to benefit by a multilateral climate regime.
- ET scheme prefer enforcement procedure in case of non-compliance.
- Concern on adaptation strategies decreases.

Assessment of Options for future climate regime (example)

	Carbon Market Initiative	Government-led P&M	Technology Optimist
Existing Proposals	A1 A2 A3	B1 B2 B3	C1 C2 C3
Strength			
Weakness			
Additional ideas	NIES A	NIES B	NIES C





PENELOPE CANAN

Presentation Summary

THE BATTLE OVER DEFINITIONS OF DEVELOPMENT: OVERWHELMING THE RESISTANCE TO THE GROWTH MACHINE

Penelope Canan
(Reporter: Kazumi Kondoh)

Main Points

- Penelope presented some of her prior research on the structure of community values on the island of Moloka'i, Hawaii.
- Based on her findings she recommended the adoption of biomass, hydro-electric energy and smart energy consumption to meet the needs of the community residents.
- However, despite the overwhelming support for this recommendation, the priorities of the Tourism and Development Office were such that they favored the pro-growth coalition, which ultimately won out in shaping the community's energy choices.

Testable Hypotheses

Perhaps the more that a community has non-governmental organizations representing local residents' interests the more likely they are to draw their favored political outcomes.
Also, a community that has connections with central government actors (governmental agencies, political parties etc.) is more likely to draw their favored political outcomes.

Implications for URCM Networks

It is interesting to see if networks among local residents and/or with extra community actors give collective power to local residents in pursuing their collective interests (i.e., preserving their traditional values and lifestyle) in the local political arena.

Relevant Literature

Canan, P. and Michael Hennessy. 1989. "Tourism, the Growth Machine and the Selling of Culture." *Sociological Perspectives*. vol. 32, No.2:227-243.

Canan, P. and Michael Hennessy. 1982. "The Moloka'i Databook: Community Values and Energy Development". Univ. Hawaii: Department of Urban and Regional Planning.

Moloch, Harvey. 1976. "The City as Growth Machine: Towards a Political Economy of Place." *American Journal of Sociology 82*(2): 309-352.

Overview Handout

THE BATTLE OVER DEFINITIONS OF DEVELOPMENT: OVERWHELMING THE RESISTANCE TO THE GROWTH MACHINE

Policy makers, civic leaders, community advocates and researchers alike often aim to involve the public in deliberations about community futures, but they are just as likely not to know how. Now more than ever we need ways to do this. A collaborative research project conducted 20 years ago on the island of Moloka'i in the Hawaiian archipelago provides a good (and award-winning) example of community-based sustainable development policy research and a few untoward lessons. Returning to this island locale would be ideal for RC6 comparison over time.

When the island of Moloka'i was faced with the challenge of retiring and replacing its aging diesel generator at a time when a relatively poor community was paying 24 cents/kwh for electricity, it was right in the aftermath of the oil crisis of the late 1970s. Alternate energy technologies were a hot policy topic then (only to be dropped subsequently by the Republican Reagan administration). At the time the US Department of Energy commissioned the Hawaii Natural Energy Institute of the University of Hawaii to conduct a demonstration project regarding Moloka'i's becoming electrically self-sufficient. As a professor of the University's Department of Urban and Regional Planning, I led a graduate planning practicum to work with community residents and social science experts to articulate **a process by which community values would guide the selection of energy technology options**.

Our **methods** included in-depth interviews regarding the Preferred Way of Life on Moloka'i, a survey- based multidimensional analysis of the structure of the community's values (conducted by trained island residents), the projection of social and economic trends from indicator data (Canan, Hennessy et al. 1982), a household survey of electrical appliances and matched of household energy bills for 18 months (Canan & Hennessy 1981). **The energy production technology path that we recommended** was a combination of a biomass energy facility, hydro-electric energy, and smart

energy consumption (using the excess steam to power a community-wide food freezer locker system so people could retire their individual home food freezers) (Canan and Hennessy 1982).

The recommendations were based on the findings that the following Gemeinschaften values were held dear by the community residents: Hawaiian Culture, Everybody Knows Everybody, Living Off the Land, Rural, Land, and Slow Pace. By utilizing biomass, the rural nature of the island would be supported and the land kept in sugarcane. The frozen food locker system designed as part of a civic center would satisfy the desire for maintaining the local norm of knowing everybody and the ability to live off the land by freezing local harvests.

Despite the overwhelming support for this plan, there were divisions within the community that were more closely aligned with the values of off-island elites. The community values survey results from a purposeful sample of statewide decision makers (the governor, members of the legislature, the mayor, business elites e.g.) revealed that they endorsed the values of Tourism and Development. A sub-set of local residents who were pro-growth (the local growth machine) were likely to select the value concepts of Tourism and Development as well as an identity based, not in traditional Hawaiian culture, but in socio-economic status (Gesellschaften) defined in terms of the concepts of Jobs, Education, and Land (Canan and Hennessy 1989).

The alignment of forces defining "development" as "business as usual" overwhelmed the community-based vision of the future. Yet 20 years later the vision may have changed as the current electricity provider, Maui Electric Company (MECO), has been awarded $1.1 million in USDA grant funds for its "Solar for Molokai" project. MECO was one of just nine applicants chosen under the USDA's Assistance to High Energy Cost Rural Communities program. Solar for Molokai is expected to install 300 or more solar water heating systems over two to three years (www.heco.com/MECO). A revisit to this island setting would be an ideal addition to RC6 case studies.

Canan, Penelope and Michael Hennessy. 1989. "Tourism, the Growth Machine and the Selling of Culture," *Sociological Perspectives*, Vol. 32, No. 2: 227-243

Canan, Penelope, Michael Hennessy et al. 1982. *The Moloka'i Databook: Community Values and Energy Development*, University of Hawaii: Department of Urban and Regional Planning.

Canan, Penelope and Michael Hennessy. 1982 "Community Values as the Context for Interpreting Social Impacts." *Environmental Impact Assessment Review*, Vol. 3, No. 4: 351-365

Canan, Penelope and Michael Hennessy. 1981. "In Defense of Lifeline Rates: An Empirical Analysis." *Public Utilities Fortnightly*, Vol. 108, No. 10 (November): 31-35, with Michael Hennessy.

BETH SCHAEFER CANIGLIA

Biographical Statement

Beth Caniglia is Assistant Professor of Sociology at the University Oklahoma having received masters and doctoral degrees from the University of Notre Dame. Her research interests as an environmental sociologist span global, international, transnational, regional and organizational scales. Her work is known for combining insights on social networks, social movements, and social stratification. She has won numerous awards for excellence in teaching and her early scholarship brought public honor (Outstanding Thesis at the University of Notre Dame; Olsen Outstanding Graduate Student Paper Award - Environment & Technology Section of the American Sociological Association). She has published in leading journals (e.g., *Mobilization,* the *American Sociological Review*, and *Society & Natural Resources)* as well as in a wide range of book chapters and conference proceedings.

Pre-Workshop Thought Piece

Building Effective Regional Carbon Management Networks: Lessons from the Dust Bowl

In 1889, the state of Oklahoma was opened to white homesteaders for settlement. Tracts of 160 acres were claimed by the thousands, and quickly the vast grasslands, bottoms and forests were put under the plow. For many, Oklahoma seemed a paradise. The plains were, in the words of Walt Whitman, "North America's characteristic landscape" – a land filled with endless possibility.[1] For forty years, the dream seemed to be real. The wheat fields prospered. But in the spring of 1931, the rain stopped, ushering one of the largest environmental disasters in recent U.S. history: the Dust Bowl. How did the Great Plains recover from this disaster? And, more specifically, what role did regional social networks play?

Unfortunately, this story provides a counter-case, rather than an exemplary model. Dust Bowl recovery networks were by and large a failure on every front. However, counter-cases are critical components of theory building, and the Dust Bowl recovery case provides important lessons related to regional carbon management networks. Numerous federal, regional and state agencies, alongside scientists, university cooperative extension units, community groups and individual farmers devised strategies for Dust Bowl recovery. Key challenges that ultimately blocked cooperation included: divergent land management philosophies, private land ownership, distrust among potential allies, and tradition. In the end, the effects of draught and wind – a convergent cycle that repeats itself approximately every twenty years on the plains – were mitigated by deep well irrigation, rather than by strategies offered by Dust Bowl recovery networks.

[1] Worster, Donald. 1982. *Dust Bowl: The Southern Plains in the 1930s*. New York: Oxford University Press.

This paper provides an examination of the social network failures of Dust Bowl recovery in order to provide insights into conditional factors that may impact the success of regional social networks for carbon cycle management. The primary lesson that emerges from this story is that geographic scale and local social contexts play important roles in the creation, transmission and implementation of environmental management technologies. Managerial decision making processes – those that rely upon the scientific method to derive the "common good," may produce best practices that will lead to environmental benefits. Nonetheless, indigenous knowledge systems and local social structures often resist change.

Current research related to the carbon cycle in Oklahoma reveals that significant losses in soil carbon levels resulted from intensive tillage of cropland.[2] Since 1950, just under half of the carbon lost due to tillage was regained from conversion of cropland to grass. These estimates do not account for carbon releases that result from evaporation on irrigated fields. Oklahoma's current land use practices require modification if we hope to further ameliorate our regional carbon losses. Therefore, this paper is intended to provide initial recommendations for building successful carbon management networks in our state.

Presentation Summary

BUILDING EFFECTIVE REGIONAL CARBON MANAGEMENT NETWORKS: LESSONS FROM THE DUST BOWL

Beth Schaefer Caniglia
(Reporter: Elizabeth Malone)

Main Points

- The Dust Bowl is a good case study because the causal conditions persist: carbon loss (soil, vegetation) from tillage, monocropping, soil erosion.
- Dust Bowl networks for relief and recovery included federal (often working at cross purposes), regional and state (often reporting to the federal level), county, and local groups.
- Dust Bowl networks failed to bring significant change to better adapt to the existing ecology and climate. The farmers who stayed wanted to return to wheat production and did, enabled largely by irrigation.

Malone, Kondoh, Obersteiner, Caniglia

[2] Oklahoma Conservation Commission. January 6, 2003. "Oklahoma Carbon Sequestration Enhancement Act."

Testable Hypotheses

If relief agencies provide incentives to change, people will change their behaviors (e.g., farm management).
Given mixed messages from relief and recovery agencies, farmers will choose to continue previous practices and ways of life.

Implications for URCM Networks

The same processes that contributed to deterioration of the soil in the Dust Bowl region also contribute to carbon release; these processes continue.
Private property ownership patterns challenge new policy implementation.
Attitudes in the region suggest that local citizens will not be inclined to alter their practices in the name of carbon fixation, and government actions may enable the continuation of harmful farming techniques and attitudes.
Natural circumstances (e.g., groundwater depletion in the Ogallala aquifer) and technological innovations (e.g., fuel efficiency) may have a positive impact.
Coordination and agreement among federal agencies is important, but networks are only important when their goals correspond to the goals of local community members.

Relevant Literature

Caniglia, B.S. 2004. Human Behavior & Land Use. *Oklahoma's Environment: Pursuing a Responsible Balance*. Oklahoma City: The Oklahoma Academy.

Harrington, John 2003. [altering attitudes in the name of carbon fixation].

Oklahoma Conservation Commission. January 6, 2003. Oklahoma Carbon Sequestration Enhancement Act. Worster, Donald. 1982. *Dust Bowl: The Southern Plains in the 1930s*. New York: Oxford University Press.

Building Effective Regional Carbon Management Networks: Lessons from the Dust Bowl

Beth Schaefer Caniglia, PhD
Assistant Professor of Sociology
Oklahoma State University

Why the Dust Bowl?

- Carbon loss in the Great Plains is closely tied to land management.
  - Conversion of grass to cropland
  - Tillage
  - Deforestation

Lessons from the Dust Bowl: Overview

- Why the Dust Bowl?
- Case Review
- Closer View of Dust Bowl Recovery Networks
- Lessons from the Case

Why the Dust Bowl?

- Wind is both friend and enemy in the Great Plains.
- Cycles of draught hit the plains every 20 years, bringing significant soil erosion.
- Causes of the Dust Bowl and Carbon loss are the same.

Why the Dust Bowl?

- Carbon loss in the Great Plains is closely tied to agriculture, especially to tillage.
- Similar techniques caused the Dust Bowl.
- Looking around at the lush greenery, one might guess that Dust Bowl recovery was successful.
- In fact, Dust Bowl recovery networks were a failure.

Why the Dust Bowl?

- The Dust Bowl was region-specific in its conditions, causes and consequences.
- Possible solutions were funneled to the area by a variety of elite, expert organizations, operating at various scales: national, regional, state, county and local levels.
- The failure of these networks to bring significant changes provides insights into possible challenges to carbon cycle management in the region.

The Dust Bowl Case

- Physical Environment Pre-Land Run
  - Upper East/C. Kansas
    - Tall Grass Prairie
  - Colorado, New Mexico, Texas & Oklahoma
    - Short Grass Prairie
  - Bison, antelope, jackrabbits, mice, prairie dogs, gophers and rats, rattle snakes, hawks, eagles, skunks, coyotes and wolves.

The Dust Bowl Case

- The ecosystem that fixed the soil had been dramatically changed, bringing dust storms and static electricity, which killed crops and choked animals and people.

The Dust Bowl Case

- Manifest Destiny & the Boomers
- Late 1800s brought thousands to homesteads on the Great Plains
- 1889 Land Run opened Oklahoma to settlement

The Dust Bowl Case

- Across the Dust Bowl region, 20-33% of the population left for greener pastures.
- Many stayed, hoping rain would come.
  - These are the folks who form the center of Dust Bowl recovery networks.

Dust Bowl Case

- 1920s tractors came to the Great Plains
- By 1935, the year dust storms began to blow, one-third of the Dust Bowl region had been plowed.
- 33 million acres

Dust Bowl Network Actors

- Dust Bowl relief & recovery networks were comprised of organizations and individuals at many scales – federal, regional, state, county and local.
- Federal Government Aid/Relief was the largest category in the network.
- Federal Government Education/Recovery groups were also significant.

Dust Bowl Network Actors

- Federal Government Aid/Relief
  - Agricultural Adjustment Administration
  - Drought Relief Service
  - Works Progress Administration
  - Rural Rehabilitation Program
  - Bureau of Reclamation
  - Federal Emergency Relief Administration
  - Farm Credit Administration
  - Resettlement Administration
  - US Department of Agriculture

Dust Bowl Network Actors

- County Organizations
  - Ecology Field Stations
  - Cooperative Extension Offices
  - Soil Conservation Districts
  - Truth Squads & Last Man's Clubs
- Local Organizations
  - Churches, Fraternal Lodges, Women's Clubs, 4-H Clubs, Townsendites
  - Grocers, Families & Farmers

Dust Bowl Network Actors

- Federal Education & Recovery
  - Soil Conservation Service
  - National Research Council
  - National Forest Service
  - Bureau of Agricultural Economics
- Federal NGOs & Industry Associations
  - American Farm Bureau Association
  - Ecology Society of America
  - National Livestock Association

The Dust Bowl Networks

- In all, nine (9) federal agencies provided relief during the Dust Bowl.
  - Jobs, low-interest loans, subsidies for leaving land bare or implementing new farming techniques, purchasing unproductive lands, food aid.
- Only four (4) federal agencies focused specifically on ecological/conservation education and recovery.

Dust Bowl Network Actors

- Regional Organizations
  - Great Plains Council
  - Great Plains Drought Area Committee
  - Tri-State Land Utilization & Conservation Project
- State Organizations
  - Governors
  - Land Grant Universities

The Dust Bowl Networks

- Federal agencies often worked at cross-purposes.
  - Ecology/conservation groups focused on teaching farmers about ecological balance, insisting that large portions of cropland revert to grass; but they did not attend to the socio-economic dimensions of such changes.
  - Ecology agencies advocated crop rotation and biodiversity, but these agents were not trusted by local farmers.
  - Relief agencies often rewarded those whose moncropping strategies caused the Dust Bowl by basing incentives on the amount of wheat produced in 1931-32.
  - Relief agencies also encouraged the continuation of plowing by allowing people to endure without questioning whether the Great Plains region was suitable to monocrop farming.

The Dust Bowl Networks

- Regional groups were primarily reporting mechanisms for the federal government.
- State agents, too, remained distant from farmers.
- At the county level, cooperative extension agents competed with ecology field stations. Advocating "conservation agronomy," their intent was to increase productivity on the land, while the ecologists wanted to decrease and/or drastically change approaches to productivity.

Dust Bowl Attitudes

- During the Dust Bowl, the primary barrier to the success of Dust Bowl recovery was attitudes – at the local level and beyond.
- "Water will follow the plow" exemplifies only one side.
- On the other side lies beliefs about the ability of science and technology to enable humans to maintain the productivity of the land.
- Very few members of Dust Bowl recovery networks advocated significant changes in human-environment relations; and, those that did were distrusted and ignored.
- There is severe recalcitrance in the area and a strong preference to preserve traditional methods.

The Dust Bowl Networks

- At the county and local levels, citizen groups sided primarily with the conservation agronomists. Most of these groups hoped to return to wheat production when the rain returned.
- Farmers did implement shelter belts and terracing techniques, which curbed soil erosion and increased water uptake by crops.
- When the land returned to productivity in the 1940s, however, farmers plowed down most of the shelter belts to make room for more wheat.

Lessons for Regional Carbon Management

- The same processes that contributed to deterioration of the soil in the Dust Bowl region also contribute to carbon release; and these processes continue.
- Private property ownership patterns continue to be a challenge for new policy implementation.
- Attitudes in the region suggest that local citizens will not be inclined to alter their practices in the name of carbon fixation (John Harrington 2003).
- Natural circumstances (e.g. groundwater depletion in the Ogallala aquifer) and technological innovations (e.g. fuel efficiency) may have a positive impact.

Mini-Dust Bowls

- Drought came to the Great Plains in the 1950s and 1970s. In both cases, dust storms rolled across the lands, suffocating livestock and killing crops.
- These mini-Dust Bowls were shorter-lived, but they illustrate the failure of the original Dust Bowl networks to foster long-term, meaningful changes in farming techniques.
- Attitudes among local farmers, families and leaders were and remain a significant barrier to required changes.
- Deep-well irrigation was the primary mitigator.

Farming Lessons

- Recent evidence suggests that other semi-arid environments will become vulnerable to carbon release through the global dissemination of Western agricultural practices.
- Extent research shows these monocrops and corresponding chemical and irrigation intensive techniques disrupt successful grassland carbon sinks, alter local climates through evapo-transpiration, and leave areas vulnerable to wind and water erosion.
- Biodiversity, no-till techniques, crop rotation, and choosing environmentally suitable crops increase carbon sequestration, deter soil erosion and require less or no irrigation.

Network Specific Lessons

- The primary contribution of Dust Bowl networks was to enable the continuation of harmful farming techniques, along with corresponding attitudes regarding human-environment relations.
- Lack of coordination and/or agreement among federal agencies allowed locals to choose the approach most suited to their views.
- Managerial networks (top-down) were only influential when their goals corresponded to the goals of the local community members.

Network Specific Suggestions

- Coordinate federal agency approaches to regional and local carbon management. Facilitate coordination from top to bottom.
- Encourage holistic approaches toward carbon management at all levels (scientific and socio-economic).
- Build trust at the local level by facilitating stakeholder participation processes – not only related to policy implementation, but in the scientific process.

KAZUMI KONDOH

Biographical Statement

Kazumi Kondoh is a Ph.D. candidate in sociology at Washington State University. Her research interests include global and regional environmental issues, science and technology, and sustainable agriculture. Her work also focuses on the advancement of sociological theory.

During 2001-2003 she was involved in an interdisciplinary project on local food systems in Washington State and conducted two surveys. She is currently conducting her dissertation research on urban heat island in Tokyo. This research attempts to understand dynamic processes in which diverse stakeholders interacts over urban spaces and resources. It particularly focuses on the role of citizens and civic networks in mitigating urban heat island and collectively governing urban spaces.

Pre-Workshop Thought Piece

The Role of Civic Networks in Sustainable Urban Community Building: A Case Study of the Urban Heat Island Problem

The proposed research investigates an emerging urban environmental problem called "urban heat island." Urban heat island (UHI) refers to a phenomenon in which the center of urban cities becomes warmer than its surrounding rural areas because of intensive urbanization. In particular, massive conversion of natural landcovers to artificial landcovers, such as asphalt roads, parking lots and concrete buildings, as well as the energy dependent lifestyle in densely populated areas lead to UHI effects including local climate alterations (e.g., temperature increases, floods, and lowering humidity) deterioration of air quality and threats to public health.

Due to the severity and the world-wide prevalence of this problem, many scientists, as well as government agencies, have recently initiated the scientific study of this urban environmental problem. Although research conducted by natural scientists has provided overwhelming evidence of the occurrence of UHI and reveals the mechanism of UHI, no systematic study has been conducted on how people have collectively responded (or failed to respond) to the UHI problem.

My research attempts to directly address this concern. It pays attention to the emerging differences in municipalities' responses to the UHI problem and their environmental and land use policies, and attempts to explain these differences. Drawing upon the social capital and environmental movement literatures, my research particularly focuses on the role of local citizens and their collective power derived from civic networks. More specifically, I hypothesize that dense civic organization networks help local citizens to initiate environmental and land-use policies that mitigate UHI and build a sustainable community.

I use a comparative method to understand the roles of local civic networks. Four cities are selected within the Tokyo Metropolitan Area to investigate the roles of local citizens and their civic networks in responding to UHI while controlling for cultural, social and political influences. I already have collected existing archival documents and statistical data on land-use and population changes, and household energy consumptions. The information concerning each municipality's UHI mitigation policies, general environmental and land-use policies had been also collected. The proposed project is for the final phase of my dissertation research. I will conduct a mail survey to local civic organizations and interview individuals that play important roles in local environmental and land-use policies. The survey and interview data will provide the information on the strength and nature of civic networks in each city and their role in creating local UHI mitigation policies.

This research has significant implications. The findings will advance our understanding of the extent that common-pool resource theory explains resource sustainability in the urban setting. This research will also provide a coherent theoretical foundation for the study of other urban environmental problems such as air pollutions. In addition, by examining the role of civic networks in mitigating the UHI problem, it may fill the gap between theoretical understanding and local activists' emphasis on the importance of citizen participation in local decision-making processes. Furthermore, the findings will offer practical implications to urban planners and policy makers in many urban cities around the world that have experienced UHI.

Presentation Summary

URBAN HEAT ISLANDS

Kazumi Kondoh
(Reporter: Elizabeth Malone)

Main Points

Kazumi Kondoh, Chisa Umemiya, Yukako Ojma

- Large-scale conversion of land to artificial cover plus energy-dependent lifestyle and air-conditioning feedbacks contribute to urban heat island effect.
- In rural areas evaporation and transpiration keeps temperatures cooler.
- Negative consequences of the heat island effect include change in local climate (temp increase, precipitation patterns and wind patterns), a changing urban ecosystem, deteriorates AQ and increases public health risk (heat-related illness, respiratory illness).
- Tokyo's average temperature has increased ~3 deg Celsius over the past century. An average of 250 hours per year of 30 deg Celsius temperatures has increased to an average of over 400 hours in the past 20 years.

- Tokyo is comprised of 23 wards and 29 cities covering 2,187 square km and has a population totaling 12 million (plus 3 m commuters).
- 2001 land use coverage was 56.6% in buildings, 21% in roads (80% artificial cover) and steadily increasing (road length); registered automobiles increased dramatically after WWII to 3.6 m cars in 2000.
- Mitigation policies: urban heat island is an important government environmental issue; March 2003, UHI Action Plan to mitigate involves multi-agency efforts by powerful agencies; engineering solutions are emphasized [roof-top gardens, reflective pavements, water-retaining pavements], little effort to control building and population densities and changing lifestyles → promotes large-scale unsustainable urban renewal projects [engineering solutions].
- Governor Ishihara created Council for the Urban Revitalization Project in April 2001; national government set up Urban Renaissance Headquarters (URH) in May, in July announced Priority Project Areas, including 7 areas in Tokyo.
- The national government enacted the Urban Renaissance Law in 2002, but is has many exemptions so is pretty much ignored.

- Example: Shiodome Shio-Site Project: 30.7 ha Tokyo Bay Waterfront Development – business interested; as of 2003, 12 high-rise buildings were constructed; est. pop in 2007 is 61,000 workers and 6,000 residents; environmental impacts are huge: ocean breeze is blocked by buildings and exacerbated the urban heat island effect.
- National and TMG politicians, bureaucrats and industry have a strong network, but what about the citizens?

<u>Testable Hypotheses</u>

Research questions: What is the role of civic networks in mitigating UHI in Tokyo? To what extent are local citizens involved in local organizations working on UHI problem, environmental or city planning issues? How and to what extent is each local organization connected with other local organizations? How and to what extent are local organizations connected with extra-local organizations, including industries and local government, which affect the decision-making process of UHI mitigation? Is there an association between the strength of civic networks and the effectiveness of UHI mitigation policies?

Methods: interviews & organization survey, comparative case study design; four municipalities: Sumida, Minato, Setagaya and Nerima.

The Role of Civic Networks in Mitigating Urban Heat Island

Kazumi Kondoh
Department of Sociology
Washington State University

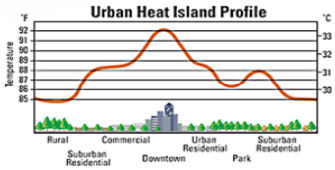
The Global Carbon Project Conference
April 4, 2005
Tsukuba, Japan

Tokyo Metropolitan Government

- A regional administrative unit
- 2,186.90 square km or 0.6 % of the total area of Japan
- Population: 12 million

Urban Heat Island (UHI)

- Urbanized areas are warmer than their surrounding rural areas
- Caused by a large-scale conversion of land from natural landcovers to artificial landcovers (e.g., concrete buildings, asphalt roads, parking lots etc.), and
- Energy dependent lifestyle

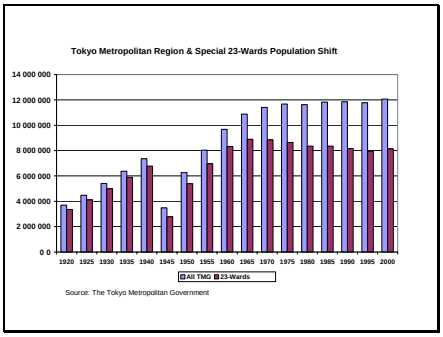


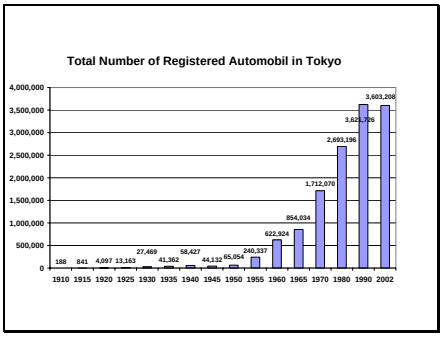
Negative consequences include:

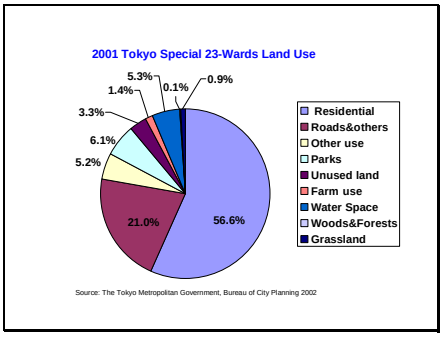
- Changes a local climate (temperature increase, changing precipitation patterns & wind patterns)
- Changes urban ecosystem
- Deteriorates air quality
- Increases public health risk (heat-related illness & respiratory illness)

Implications for the carbon management

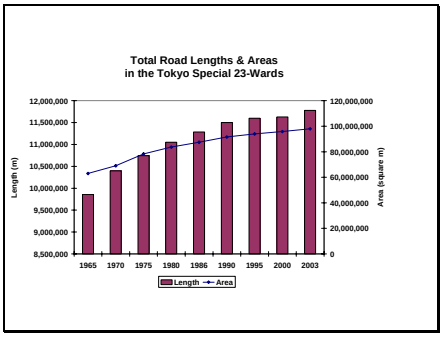
- Rising temperatures increase energy consumption for cooling indoor environments
- Reducing energy consumptions mitigates UHI & global warming
- Conserving & creating green spaces mitigate UHI & global warming







TMG			National Government
2001	Created 120 weather monitoring stations	2001	
Apr	Adopted the Environmental Preservation Ordinance mandatory requiring greening-up rooftops	May	Prime Minister Koizumi set up Urban Renaissance Headquarter (URH)
		July	URH announced the Urban Renaissance Priority Project Areas (URPPA) 7 areas in TKO
Apr	Gov. Ishihara created Council for the Urban Revitalization Project		



TMG		National Government	
2002 Jan	Revised the TMG Environmental Master Plan	2002 Mar	Enacted the Urban Renaissance Law
Aug	Set Up the Heat Island Countermeasure Promotion Council (HICPC)	Sept	Set Up the Council for the UHI Countermeasures
2003 Mar	Adopted Heat Island Action Plan (HIAP)		
2004		2004 Mar	Adopted Guidelines for UHI Countermeasures

Characteristics of TMG's UHI mitigation policies

- Multi-agency efforts, powerful agencies (Bureau of City Planning, Bureau of Transportation etc. played the central roles)
- Engineering solutions are emphasized.
  - Roof-top gardens
  - Reflective pavements, Water-retaining pavements on the surface of roads
  - Energy efficient buildings
- Little effort is made for controlling building and population densities and changing lifestyle
  - Instead, TMG have promoted a large scale unsustainable urban renewal projects

Research Objectives

- To examine the role of civic networks in mitigating UHI in Tokyo

Research Questions

- To what extent are the local citizens involved in local civic organizations working on the UHI problem, environmental or city planning issues?
- How and to what extent is each local organization connected with other local organizations?
- How and to what extent are local organizations connected with extra-local organizations including industries and local governments that affect the decision-making process of the UHI mitigation policies?
- Can the variation of UHI and city planning policies among municipalities be explained by the level of civic networks?

Shiodome Shio-Site Project

- 30.7 ha Tokyo Bay Waterfront Development
- It was an open-space area located in the center of Tokyo
- It is designated as an URPPA Project area
- As of 2003, twelve high-rise buildings were constructed
- Estimated population in 2007
  61,000 workers & 6,000 residents
- Environmental Impacts of this project
  For example: Ocean breeze is blocked by a set overcrowding high-rise buildings and exacerbates the degree of UHI in nearby communities

- Methods
  - Multiple-method (interviews & an organization survey), comparative case study design.
  - Four municipalities--Sumida, Minato, Setagaya and Nerima were selected based on my preliminary research
  - Cases are selected from the same region to control cultural, social and political influences.

MICHAEL OBERSTEINER

Biographical Statement

Michael Obersteiner is currently working in the Forestry Project of IIASA where he is the principle investigator and scientific coordinator of the INSEA (Integrated Sink Enhancement Assessment) project.

Dr. Obersteiner joined the Forestry Project in 1993 as a Guest Research Assistant. Since 2002 he has been a Research Scholar dealing with multiple research topics, including global risk management, real option theory, dynamic systems theory, terrestrial ecosystem management, information technology and structural change of the global forest-agri sector and carbon analysis. Dr. Obersteiner received his Ph.D. from the Institute of Forestry, at the University of Agriculture and Forestry in Vienna, Austria. He is also a Ph.D. candidate at the department of mathematical economics at Novosibirsk State University in Novosibirsk, Russia. In addition, he graduated as a Diploma Economist (M. phil. in Economics) in the Joint Ph.D. Program in Economics, from both Columbia University (New York, USA) and the Institute for Advanced Studies in Vienna, Austria. Before coming to IIASA, Dr. Obersteiner was a visiting scientist at the Institute for Economics and Industrial Organization, the Siberian Branch of the Russian Academy of Sciences in Novosibirsk, Russia working on forest industry modeling. Prior to this he was a Fullbright Research Assistant at the College of Forest Resources at the University of Washington in Seattle, Washington, working in the area of eco-physiological responses of plant stress.

In addition to his research at IIASA, Dr. Obersteiner is a Research Economist with the Department of Economics and Finance at the Institute for Advanced Studies in Vienna, Austria. Dr. Obersteiner has been a consultant to a number of national and international organizations, including *inter alia* the European Commission, OECD, and national governments. He is author of over 100 scientific papers and consultancy reports in the above mentioned fields.

Pre-Workshop Thought Piece

A Caricature of European-US Climate Risk Management
Transatlantic Philosophical Rifts and Bifurcating Epigenic Coding of Social Networks

Approaches on how to manage the global carbon cycle crucially depend on how scientists and policy makers perceive risks and uncertainties associated with the perturbation of the carbon cycle. Art 3.3 of the convention is a typical negotiation text in the sense that it is ambiguous, and yet fully comprehensive covering almost all strategic postures possible to manage climate change related risks. It is worth repeating the Principles section of the UNFCCC detailing that "The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not

be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties."

Analysing this text, we find that Parties should firstly take precautionary action (one point to Europe). Yet, in the following sentence precautionary action is conditioned on a cost-effectiveness clause which in the third sentence can be interpreted as a mean value based cost/benefit analysis weighing preventive mitigation measures against (1) adaptation costs and (2) opportunity costs with respect to possible foregone economic growth due to investments deviated to mitigation actions (two, but secondary, points to North America).

Given deviating belief of what the nature of the risks and opportunities are, as well as whether these risks and their associated uncertainties can be quantified ex ante, researchers and policy makers defend different approaches on how to deal with the fact that mankind has and will perturb the global carbon cycle (see Figure 1). Ceronsky et al. (2005) find that the way people set up the cost/benefit analysis drives the negotiation process under the UNFCCC and other internationally coordinated actions mitigating global risks. Those who believe that the risks from climate change are reversible and that the associated uncertainties of those risks are quantifiable want to engage in a process of adaptive management. If there is ignorance (no knowledge) about the nature of the reversible risk or the occurrence of a new risk, the Proactive Principle demands protecting people's freedom to experiment, innovate, and progress. The Proactive Principle and the Adaptive Management Paradigm, as supported by North Americans, implies several imperatives when restrictive measures are proposed: Assess risks and opportunities according to available science, not popular perception; account for both the costs of the restrictions themselves, and those of opportunities foregone; favor measures that are proportionate to the probability and magnitude of impacts, and that have a high expectation value even if value free quantification is impossible or very difficult. Europeans, on the other hand, are more concerned in their decision making about extreme events and irreversible damage. In the case when damages appear to be of a irreversible nature or at least as very serious and when these damages can scientifically be quantified ex ante, then minimization algorithms on a measure of the down side risk should be applied. The value at risk (VaR) calculation employed by banks, guarding against bankruptcy risk by international regulation, could be such a risk measure. VaR approaches could also be implemented in an adaptive manner if the probability of occurrence of a serious and irreversible event can be ruled out. Finally, the Precautionary Approach, which is more in line with the Hippocratic oath (*First of all, do no harm*, or, *Better do nothing than cause harm),* is mainly favoured and implemented by European law makers. This principle is often invoked when the consequences are considered great enough that they may require significant technological and/or economic changes, even when the uncertainties regarding likely consequences remain high or in the situation of complete lack of knowledge.

		Risks & Opportunities	
		Reversible	*Irreversible*
Uncertainty	*Quantifiable*	Adaptive Management	Minimize Value at Risk
	Ignorance	Proactionary Principle	Precautionary Principle/Gambling

Figure 1: Management responses to different qualities of risks and uncertainties.

Kagan (2002) argues that the different responses of Europeans and Americans to major strategic and international challenges are not simply due to differences in the current administrations, but rather results from (i) a power gap and (ii) differing ideologies. Applying Kagan's theory to climate policy and employing terrorism policy as a point of comparison, we argue that the power gap between Europe and America is unable to explain the differences in climate policy. In contrast, the ideology gap may indeed have some explanatory value. Furthermore, we argue that two additional feature are critical--the costs and benefits imposed by climate change and terrorism prevention and the process by which such costs and benefits are evaluated--differ between America and Europe.

In the presentation I will focus on this process and illustrate how relevant science and policy networks interact and, to some extent, mutually reinforce each other in an isolated manner on both sides of the Atlantic.

Presentation Summary

A CARICATURE OF THE TRANSATLANTIC DIFFERENCES OVER RISK MANAGEMENT

Michael Obersteiner
(Reporter: Elizabeth Malone)

Main Points

- Because of long-term relationships and high number of participating parts and high level of anonymity/reciprocity/ efficiency of interaction, carbon is mostly networks and institutions; common resource management is the principal need, i.e., carbon constraint not a money problem.
- Adaptive dynamic modeling (population dynamics governed by Prisoner's Dilemma rules) suggests that common resource management will oscillate between almost complete defection (tragedy-of-the-commons process until disaster is seen to be near) and cooperative management that includes altruists & adaptive checkers.
- Risk (reversible v. irreversible) and uncertainty (quantifiable v. ignorance) can prompt management responses of adaptive management, preemption, proaction, or precaution.
- EU and US different strategies are rooted in post-WWII history. EU focuses on economic power/diplomacy in an international regime, the US on military power and unilateral freedom to act. EU analyses emphasize lost benefits, US sure costs, alternative/ immediate uses for investment, and backstop technologies. EU uses a 3-4% discount rate

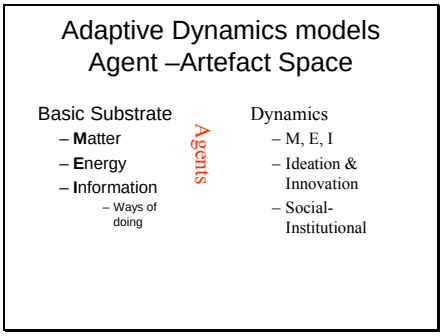
and supports equity via foreign aid (>0.8% of budget); US uses 7% discount rate and supports equity at a lower rate of foreign aid (0.14%).

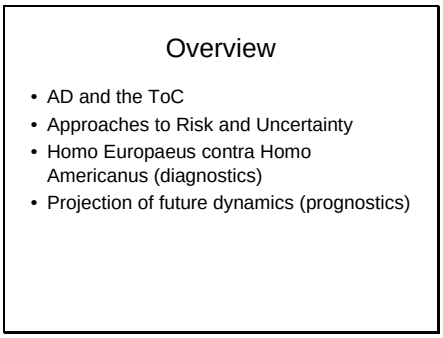
Testable Hypotheses

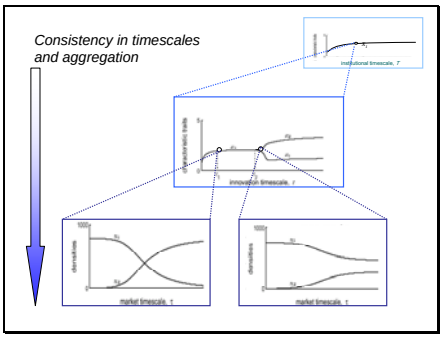
The history of US (defector) participation will show oscillation between dominance and more cooperative behavior.
The EU will strengthen its leadership role in climate change issues because it has a comparative advantage in international regime participation.

Implications for URCM Networks

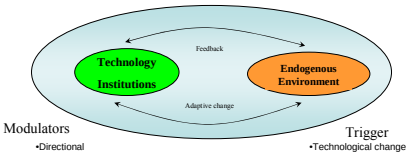
Game theory (especially reiterated games) can yield insights into likely national behavior in the climate change regime.
Constructed ignorance (e.g., in the US) is necessary to avoid climate change action, so strategies to address constructed ignorance are important.
The emphasis on costs obscures larger problems of networks and institutions.







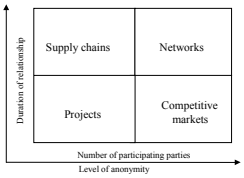
Adaptive Dynamics



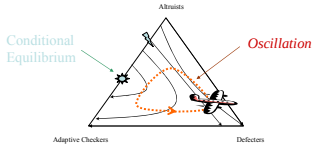
Modulators
- •Directional
- •Anticipative/reactive
- •Rational (conditional)
- •Institutions and social structures
- •Moral concepts

Trigger
- •Technological change
- •Market Liberalization
- •Wars, Acts of Terror
- •Natural Catastrophes

Vectorization of Network properties



Agent-types in Common Resource Management



Co-operation
Maintenance of resource

Market defection
Destruction of resource

- Power and Ideology gap – "Institutional time line"
- Cost / Benefit tools – "Innovation timescale"
- Media Coverage – "Market time scale"

Tragedy-of-the-Commons^{3H}

- High stake
  - Mitigation & Adaptation
  - Potential Losses
  - Long time spans
- High uncertainty
  - Physico-chemical and ecological
  - Socio-, techno- economic
- Heterogeneity
  - Impacts
  - Historical contributions
  - Ability to pay
  - Risk aversion
  - Goals

Power Gap

Kagan: Let the Comparative Advantage due to different resource endowments play out

EU, Venus, Kant	US, Mars, Hobbes
•Economic Power and Diplomacy, which is rooted in Post-WWII history	•Military Power, which is rooted in Cold-War

Management responses to Risk and Uncertainty

		Risk	
		Reversible	*Irreversible*
Uncertainty	*Quantifiable*	Adaptive Management	Preemption V aR
	Ignorance	Proactionary Principle	Precautionary Principle

Note: Risk = Hazard x Vulnerability – Frequency x Impact

Ideology Gap

International Regime •Democratic and more equitable international setting	•Freedom to act •Policeman
Measurement of CB •Emphasis on lost benefits	•Cost are sure •Schelling •Backstop technologies

Differences in the Valuation

…ideology gap cont.

Intergenerational equity Discounting (UK 3.5%, DEU 3%, NDL 4%)	Discounting of 7%
Geographic (social) equity Foreign Aid (Equity proxy): > 0.8%	Foreign Aid: 0.14%

Projection

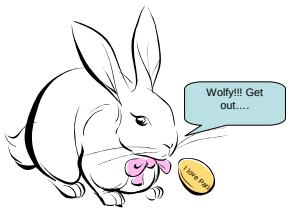
….today's mega risks are truly global and full of noise….

Status •CC is the first policy field EU is leading	•Excessive Budget Deficit •Lost relationship capital
•Learn •Buy its way to be contagious	•Continue with "shock and awe" with maybe careful Bismarkian reconstruction (Gaddis) •Speaking more softly

Media coverage

•Florida storm well covered and connection to CC made.	•Florida storms without connection to CC •Little coverage on EU heat wave.

…first signs of soft talk…



The magic loop….which is based on strategic advantage

Strategic position –MultiNationalism –Largest Economy nurtures multilateralism	Strategic position –Military SuperPower reenforce power and freedom to act => unilateralism
•CanNot Break Tabus (sovereign NationState) or Commit Sins (e.g. Ignores adaptation) •Institution building takes a long time => incrementalism	•Ignorance (CC) and hyperstatements (Iraq) of particular risk •Coercive action is prepared ex ante and needs to be exercised = Threshold events

Early Report on Regional Carbon Management

HIROYASU SUGIHARA

Biographical Statement

Hiroyasu Sugihara is Senior Economist in Research Center of Regional Policy, Research Institute of Capital Formation, Development Bank of Japan.

His areas of focus have included sustainability science, environmental policy, environmental accounting, and environmental management etc. as shown in his works:

Carbon Portfolio Analysis in Japan, Regional Policy Research vol.14, Research Center of Regional Policy (2005) (JW: First author, in English/Japanese);
An Estimation of Carbon Stocks Using GIS in Japan, Regional Policy Research vol.11, Research Center of Regional Policy (2005) (JW: First author, in Japanese);
Global Environmental Issues and Local Responses: Creating the Network Economies between Nature and Economy, Economy Society Policy No.391, November 2004, Cabinet Office（in English/Japanese）;
EcoBudget by ICKEI-Local Governments for Sustainability in Masao Kawano (ed.) *Environmental Accountings,* Ministry of Environment (2005, forthcoming) (in Japanese);
The Regional Management System for Environment and Development, Environmental Information Science Vol.30, No.4, 2001, Center for Environmental Science (in Japanese);
"Iriai": Commons in Japan in Hirofumi Uzawa (ed.) *Social Common Capital: Cities and the Commons*, University of Tokyo Press (1994) (in Japanese).

Pre-Workshop Thought Piece

Network is a key for both economic externality and environmental externality. → Flow
Network is a key for both innovative *milieu* and natural *environment*. → Stock
Network is also a key for activity scale.

For both Positive approach (analysis, ex post, backward-looking) and Normative approach (policy, ex ante, forward-looking).

Presentation Summary

TOWARDS REGIONAL CARBON MANAGEMENT SYSTEM – CREATING NETWORK ECONOMIES BETWEEN NATURE AND ECONOMY

Hiroyasu Sugihara
(Reporter: Michael Obersteiner)

Main Points

Kazumi Kondoh, Jeffrey Broadbent, Erich Schienke, Hiroyasu Sugihara

- Positive approach has been the legacy of the past but normative approaches are important for the future.
- Focus is on carbon stocks rather than flows motivated by large labile stocks like wetlands.
- Networked economies is the guiding principle for the organization of regional carbon projects. Agglomeration economies and external economies. Vectors are group, time and space.

- Sens's concept of sustainability and capability. Capability map of forest ecosystem carbon is presented – reflects the physical potential over time
- The sum of POETICs data produces sustainability maps.
- Three concrete examples of regional carbon management in Japan were presented.

Testable Hypotheses

Sustainability tests through modeling.

Implications for URCM Networks

Regions: Motivated by global issues and brings it down to the region.

Cities: Reflected by data e.g. transport infrastructure

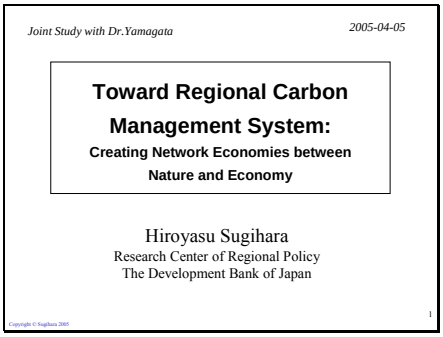
Carbon: Stocks are the important issue mainly due to its vulnerability to climate change, such as wetlands. NIES model shows carbon potentials.

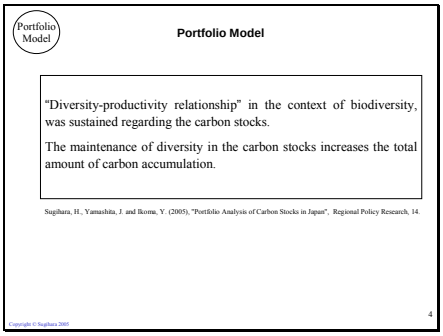
Culture: Legal issues are included

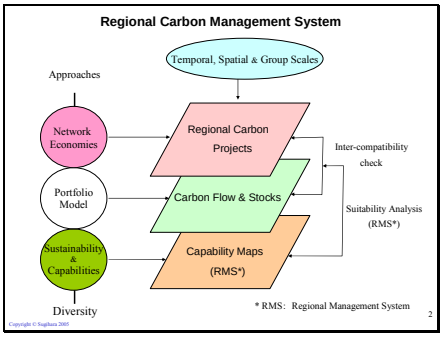
Climate: Part of the data sets, includes also impact assessment.

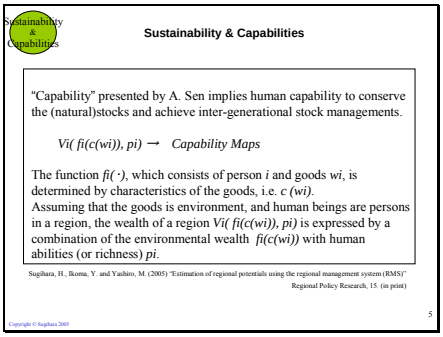
Change: Focus on the value of diversity in development.

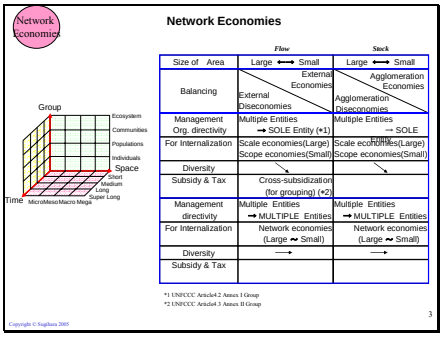
Consequences: Illustrated in its physical potentials.










Network Economies
Network Economies
Flow
Stock
Size of Area
Large ⟷ Small
Large ⟷ Small
Balancing
External Economies
External Diseconomies
Agglomeration Economies
Agglomeration Diseconomies
Management Org. directivity
Multiple Entities
→ SOLE Entity (+1)
→ SOLE entity
For Internalization
Scale economies(Large)
Scope economies(Small)
Scale economies(Large)
Scope economies(Small)
Diversity
Subsidy & Tax
Cross-subsidization (for grouping) (+2)
Management directivity
Multiple Entities
→ MULTIPLE Entities
Multiple Entities
→ MULTIPLE Entities
For Internalization
Network economies (Large ~ Small)
Network economies (Large ~ Small)
Diversity
Subsidy & Tax
*1 UNFCCC Article4.2 Annex I Group
*2 UNFCCC Article4.3 Annex II Group
Group
Ecosystem
Communities
Populations
Individuals
Space
Short
Medium
Long
Super Long
Time
Micro
Meso
Macro
Mega
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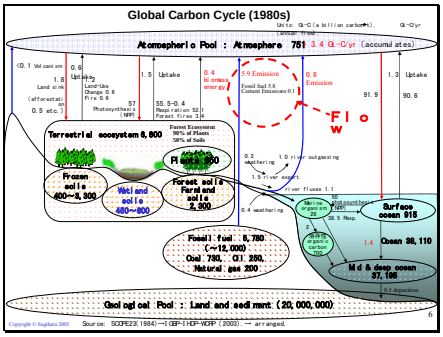
Global Carbon Cycle (1980s)
Atmospheric Pool : Atmosphere 751
Terrestrial ecosystem 6, 800
Forest Ecosystem
90% of Plants
50% of Soils
Plants 600
Detritus 1, 200
Frozen soils 400~3, 300
Wetland soils 400~800
Forest soils Farmland soils 2, 900
Fossil fuel : 5, 780 (~12, 000)
Coal : 780, Oil : 280, Natural gas 200
Surface ocean 918
Ocean 38, 110
Mid & deep ocean 37, 195
Geological Pool : Land and sediment (20, 000, 000)
Flow
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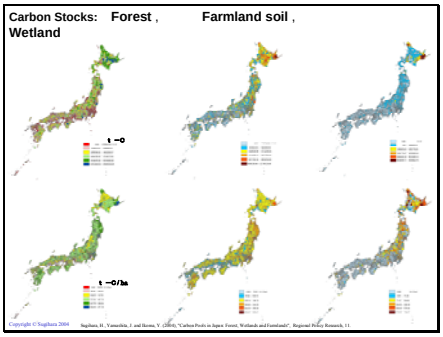
Carbon Stocks: Forest , Farmland soil , Wetland
t −C
t −C/ha
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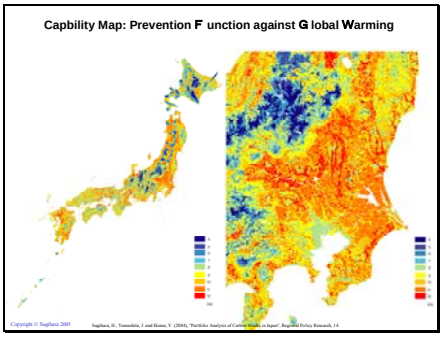
Sugihara, H., Yamashita, J. and Ikoma, Y. (2004), "Carbon Pools in Japan Forest, Wetlands and Farmlands", Regional Policy Research, 11.


Capbility Map: Prevention Function against Global Warming
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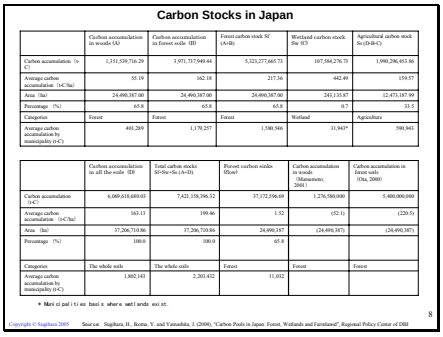
Sugihara, H., Yamashita, J. and Ikoma, Y. (2004), "Portfolio Analysis of Carbon Stocks in Japan", Regional Policy Research, 14.


Carbon Stocks in Japan
Carbon accumulation in woods (A)
Carbon accumulation in Forest soils (B)
Forest carbon stock S(f (A+B)
Wetland carbon stock Sw (C)
Agricultural carbon stock Sa (D-B-C)
Carbon accumulation (t-C)
1,331,539,716.29
1,971,757,949.44
5,323,277,665.73
107,584,276.73
1,990,296,451.86
Average carbon accumulation (t-C/ha)
55.19
162.18
217.16
442.49
159.57
Area (ha)
24,490,387.00
24,490,387.00
24,490,387.00
243,135.87
12,473,187.99
Percentage (%)
65.8
65.8
65.8
0.7
33.5
Categories
Forest
Forest
Forest
Wetland
Agriculture
Average carbon accumulation by municipality (t-C)
441,289
1,179,257
1,580,546
31,943*
590,943
Carbon accumulation in all the soils (D)
Total carbon stocks Sf+Sw+Sa (A+D)
Forest carbon sinks (flow)
Carbon accumulation in woods (Matsumoto, 2001)
Carbon accumulation in forest soils (Ota, 2000)
Carbon accumulation (t-C)
6,089,618,689.03
7,421,158,396.32
37,172,596.69
1,276,580,000
5,400,000,000
Average carbon accumulation (t-C/ha)
163.11
199.46
1.52
(52.1)
(220.5)
Area (ha)
37,206,710.86
37,206,710.86
24,490,387
(24,490,387)
(24,490,387)
Percentage (%)
100.0
100.0
65.8
Categories
The whole soils
The whole soils
Forest
Forest
Forest
Average carbon accumulation by municipality (t-C)
1,802,143
2,201,432
11,022
* Municipalities where wetlands exist.
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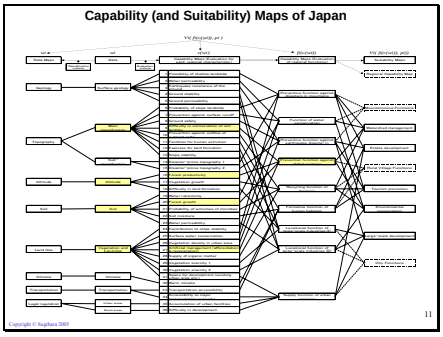
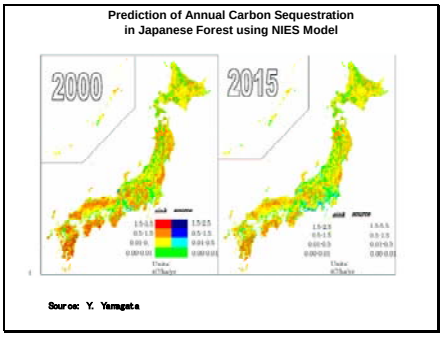
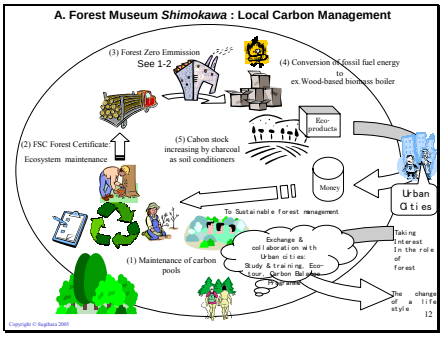
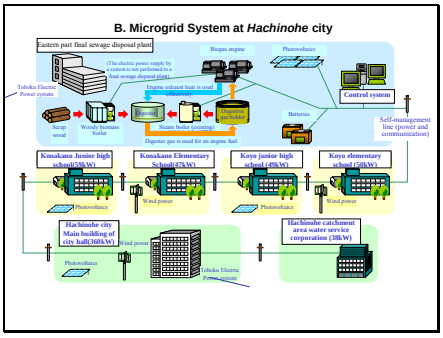
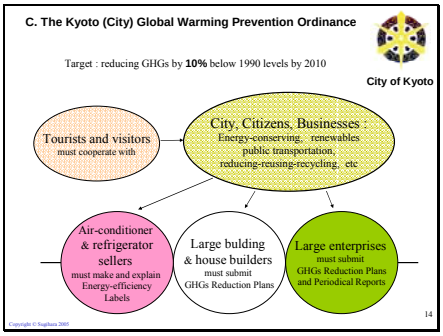
Source: Sugihara, H., Ikoma, Y. and Yamashita, J. (2004), "Carbon Pools in Japan Forest, Wetlands and Farmland", Regional Policy Center of DBJ
8


Capability (and Suitability) Maps of Japan
Copyright © Sugihara 2005
11


Prediction of Annual Carbon Sequestration
in Japanese Forest using NIES Model
2000
2015
Source: Y. Yamagata


A. Forest Museum Shimokawa : Local Carbon Management
(3) Forest Zero Emmission
See 1-2
(4) Conversion of fossil fuel energy to ex.Wood-based biomass boiler
Eco-products
(2) FSC Forest Certificate
Ecosystem maintenance
(5) Cabon stock increasing by charcoal as soil conditioners
Money
Urban Cities
To Sustainable forest management
Exchange & collaboration with Urban cities: Study & training, Eco-tour, Carbon fix project, etc
Taking Interest In the role of forest
The change of a life style
(1) Maintenance of carbon pools
12


B. Microgrid System at Hachinohe city
Eastern part final sewage disposal plant
Biogas engine
Photovoltaics
Control system
Batteries
Self-management line (power and communication)
Konakano Junior high school(250kW)
Konakano Elementary School(42kW)
Koyo junior high school (49kW)
Koyo elementary school (50kW)
Photovoltaics
Wind power
Hachinohe city Main building of city hall(380kW)
Hachinohe catchment area water service corporation (38kW)


C. The Kyoto (City) Global Warming Prevention Ordinance
Target : reducing GHGs by 10% below 1990 levels by 2010
City of Kyoto
Tourists and visitors
must cooperate with
City, Citizens, Businesses :
Energy-conserving, renewables
public transportation,
reducing-reusing-recycling, etc
Air-conditioner & refrigerator sellers
must make and explain Energy-efficiency Labels
Large bulding & house builders
must submit GHGs Reduction Plans
Large enterprises
must submit GHGs Reduction Plans and Periodical Reports
14

STEPHAN SCHOLZ

Biographical Statement

I am currently a PhD Candidate in the Department of Sociology at the University of Arizona. I hold an MA in Sociology from the University of Arizona and a BA in Sociology/Anthropology from Carleton College with a concentration in Environmental Studies. My interests are in environmental sociology, world population, world systems and social network analysis. As a research assistant with the Global Carbon Project I am involved in trying to integrate sociological and physical science models of climate change.

My master's thesis incorporated a network measure of centrality in global civil society to show that institutions independently impact environmental conditions on a cross-national level. I presented a draft of this paper at the American Sociological Association annual meeting in 2003, at which time I met Penelope Canan. Subsequent teaching experience as a world population instructor has exposed me to the broad array of environmental sociology theories. At the Global Carbon Project I am assisting in combining these theories into a policy relevant, comparative framework.

To help our thinking in this endeavor I am also collaborating in a conceptual analysis of biomass energy production in rural Japan. Small towns like Furano, Hokkaido have abundant forest resources, which, if used innovatively in something like a biomass gasification plant, would result in net savings to Japan's carbon budget with potential profits to local economies. A variety of stakeholders such as city governments, local unions, research institutes, tourism industries and industrial manufacturers are implicated in the possible construction of such biomass plants. Structural analysis of the overlapping networks among these stakeholders should demonstrate independent effects on their stated willingness to pay for and participate in such energy programs.

Pre-Workshop Thought Piece

Knitting Sustainable Carbon Markets through Social Network Analysis

As a relatively young social science, sociology is often concerned with the production and interpretation of a fundamental knowledge base. Methodologies that actively attempt to restructure the actions of real world actors are therefore underdeveloped and approached with trepidation because they walk the fine line of scientific objectivity. The mitigation of human induced climate change, however, drastically requires the implementation of applicable sociological methods. Social network analysis (SNA) occupies a unique position to make this type of contribution. In a prototypical case study of Hokkaido, the Global Carbon Project hopes to use SNA to knit a sustainable network of market actors around the production of a biomass sequestration economy. SNA can present stakeholders with actionable pictures of their connections and adds value to economic analysis by tackling the problem of transaction costs.

Sociology and economics have been growing together as evidenced by increasing publication rates in their respective sub-fields of New Economic Sociology and New Institutional Economics. These fields have been converging around the concept of transaction costs, which are high in situations of uncertain information, low trust and unarticulated routines. As Mark Granovetter originally pointed out, the distinctive contribution of economic sociology should not grow out of a critique of the rational actor per se, but out of the analysis of the expectational and situational structures that economic actors rely on for the reduction of uncertainty in decision making processes. His concept of embeddedness bridges the divide between under socialized and over socialized actors and embeds them in networks of connection dependent information flows (Granovetter 1985). Subsequent studies of embedded economic actors have shown how particular mixes of internal and external organizational ties influence innovative behavior.

However, there have been very few attempts to use SNA to explicitly knit economic actors together into robust and ecologically sustainable markets. The work of Krebs and Holley coming out of the Appallachian Community Development Network is an exception, and Hokkaido's struggling forest economy presents another opportunity to do so around the establishment of a carbon credit generating biomass facility. Krebs and Holley outline a four stage process in community development that evolves from scattered clusters to stable core/periphery structures (Krebs and Holley 2002). The Global Carbon Project is hoping to learn from and implement such an approach in Hokkaido.

Granovetter, Mark. "Economic Action and Social Structure: the Problem of Embeddedness." American Journal of Sociology, 91 (1985), 481-93.

Krebs, Valdis and June Holley. "Building Sustainable Communities through Network Building". www.orgnet.com, 2002.

Presentation Summary

SUSTAINABLE FMBECS MARKET IN HOKKAIDO

Stephan Scholz, Florian Kraxner, Yoshiki Yamagata
(Reporter: Michael Obersteiner)

Main Points

Stephan Scholz

- Sustainable development is defined by a combination of social networks, economics and ecology.
- Forest management, biomass energy and carbon sequestration market is presented and the large potential is quantified. The economic, social and ecological factors are outlined.
- Transaction costs represent one of the theoretical concepts that bridge economics and sociology.

- Reduction of transaction cost through social networks.
- Innovation diffusion is accelerated through networked economies.

Testable Hypotheses

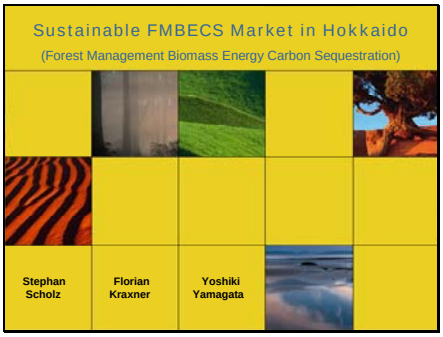
How to knit a network.

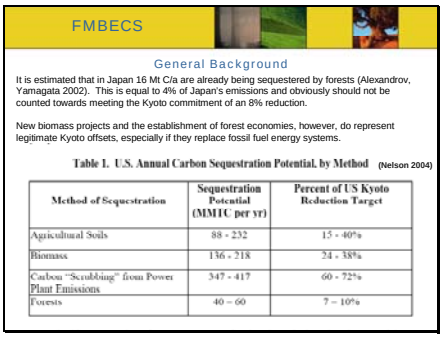
Implications for URCM Networks

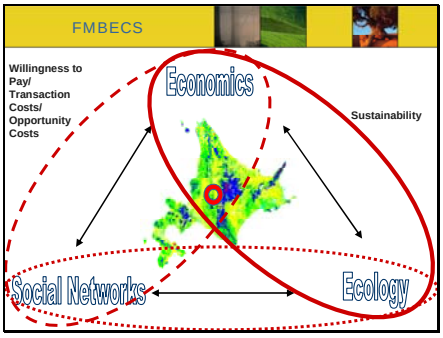
Bottom up management approach for biomass projects such as in Hokkaido.
Biomass energy would develop rural areas and sequester carbon.

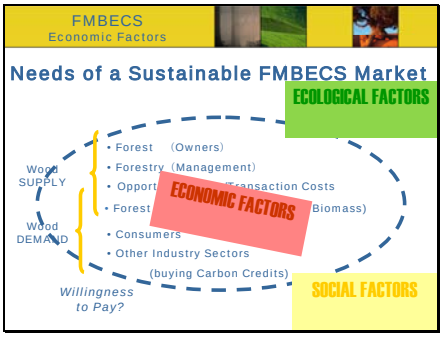
Relevant Literature

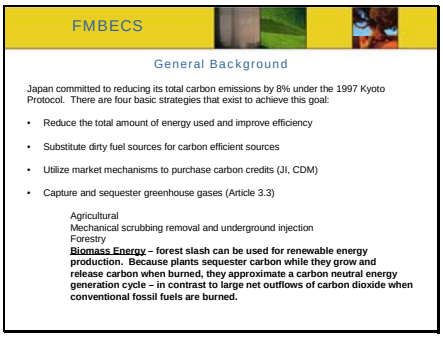
Canan, Penelope and Nancy Reichman. 2002. Ozone Connections: Expert Networks in Global Environmental Governance (Greenleaf).

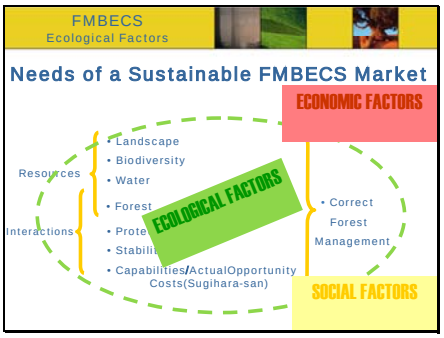


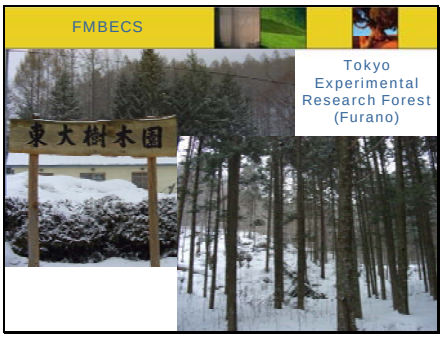


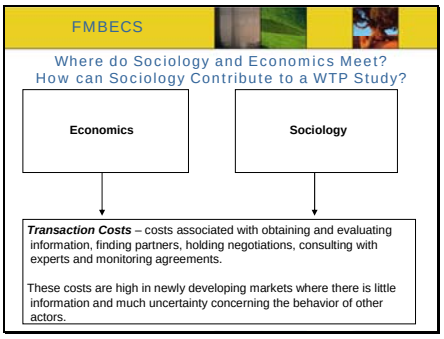

FMBECS
Willingness to Pay/ Transaction Costs/ Opportunity Costs
Economics
Sustainability
Social Networks
Ecology


FMBECS
Economic Factors
Needs of a Sustainable FMBECS Market
ECOLOGICAL FACTORS
Wood SUPPLY
• Forest (Owners)
• Forestry (Management)
• Opport Transaction Costs
ECONOMIC FACTORS
• Forest Biomass)
Wood DEMAND
• Consumers
• Other Industry Sectors
(buying Carbon Credits)
Willingness to Pay?
SOCIAL FACTORS


FMBECS
General Background
Japan committed to reducing its total carbon emissions by 8% under the 1997 Kyoto Protocol. There are four basic strategies that exist to achieve this goal:
• Reduce the total amount of energy used and improve efficiency
• Substitute dirty fuel sources for carbon efficient sources
• Utilize market mechanisms to purchase carbon credits (JI, CDM)
• Capture and sequester greenhouse gases (Article 3.3)
Agricultural
Mechanical scrubbing removal and underground injection
Forestry
Biomass Energy – forest slash can be used for renewable energy production. Because plants sequester carbon while they grow and release carbon when burned, they approximate a carbon neutral energy generation cycle – in contrast to large net outflows of carbon dioxide when conventional fossil fuels are burned.


FMBECS
Ecological Factors
Needs of a Sustainable FMBECS Market
ECONOMIC FACTORS
Resources
• Landscape
• Biodiversity
• Water
• Forest
ECOLOGICAL FACTORS
Interactions
• Prote
• Stabili
• Capabilities/ActualOpportunity Costs(Sugihara-san)
• Correct Forest Management
SOCIAL FACTORS


FMBECS
東大樹木園
Tokyo Experimental Research Forest (Furano)


FMBECS
Where do Sociology and Economics Meet?
How can Sociology Contribute to a WTP Study?
Economics
Sociology
Transaction Costs – costs associated with obtaining and evaluating information, finding partners, holding negotiations, consulting with experts and monitoring agreements.
These costs are high in newly developing markets where there is little information and much uncertainty concerning the behavior of other actors.

FMBECS

FMBECS

How to Solve Transaction Costs and Reduce Uncertainty?

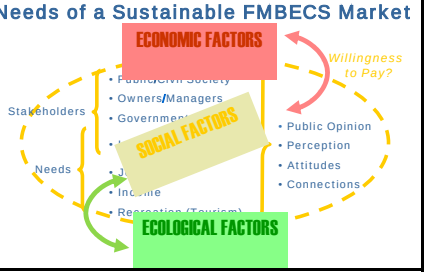
Sociology emphasizes the creation of ***social networks*** that transmit trustworthy information.

When actors don't know how to evaluate information or how to behave in a market they rely on social networks.

The more developed the social network, or the more connected an actor is, the lower the transaction costs.

FMBECS
Social Factors

Needs of a Sustainable FMBECS Market



FMBECS

Why do Social Networks Matter?

The structure of ties between organizations and ties within organizations can reduce the transaction costs and improve the efficiency of a market. Networks create innovative behavior because they increase information flow develop trust.

In Hokkaido the transaction costs for an innovative FMBECS market can be analyzed and hopefully reduced through a social network analysis of the relevant stakeholders.

FMBECS

Examples of Social Network Effects

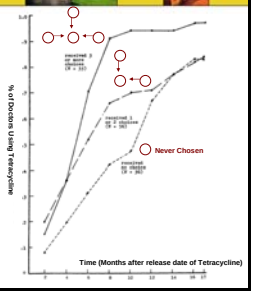
1. **Diffusion of an innovation: (Coleman, Katz et. al. 1957)**

Coleman studied the adoption Of tetracycline by physicians.

Data was collected 15 months after the drug was released.

85% of all physicians in 4 small Mid-western cities were interviewed.

The dependent variable (what He was trying to explain) was time of adoption (when the doctors first started prescribing tetracycline)



FMBECS

Examples

3. Network ties and survival amongst 25 clothing manufacturers in NYC (Uzzi 1997)

The right mix of embedded and arm's length ties were also seen to have an effect on the success and survival of clothing businesses in New York City.

Embedded ties quickly transmit rich information about markets therefore they improve survival.

This only happens up to a point, however, as embedded ties don't give access to a wide variety of information.

FMBECS

Examples:

2. Network Ties and Bank Loans: (Uzzi 2000)
Organizations seeking loans from banks did the best when they had a mix of embedded and arm's length network connections.

Embedded Ties
(Close Relationships)

- Trust
- Fine grained information transfer
- Joint problem solving arrangements
- Problem: Lack of information flow from outside of the network

Example: Buying a used car

Arm's Length Ties
(Weak Relationships)

- Reduced "cost" of maintaining the relationship
- Diverse information
- Problem: Lack of detailed information and trust

Example: Finding a job

FMBECS

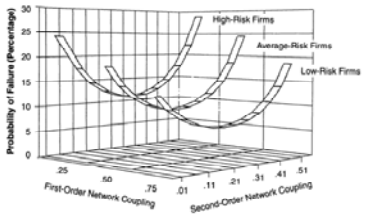


Figure 5. Predicted Effects of Embeddedness on Failure (Uzzi 1997)

FMBECS

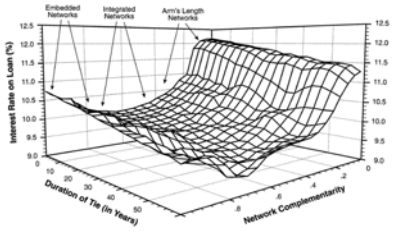


Figure 1. Social Embeddedness and the Firm's Cost of Financial Capital: U.S. Nonagricultural Firms, 1989 (Uzzi 2000)

FMBECS

Constructing (Knitting) a Network

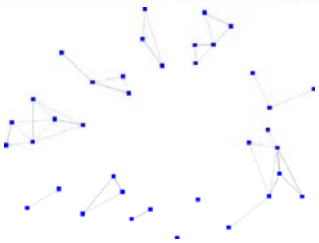
Based on social network studies how can a successful network be created?

1. Know the network. Improved connectivity starts with a map.

   Who are playing leadership roles in the community? Who is not, but should be?
   Who are the experts in this area?
   Who are the sensei that others ask for advice?
   Which businesses already have the right structure of embedded and arm's length ties?
   Where are the key connections missing?

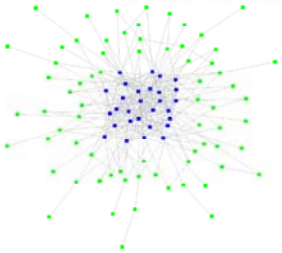
2. Knit the network through four stages. (Krebs, Holley 2002)

FMBECS



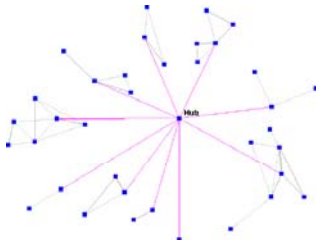
Knitting a Network (Stage 1): Scattered Clusters (Krebs 2002)

FMBECS



Knitting a Network (Stage 4): Core/Periphery Network (Krebs 2002)

FMBECS



Knitting a Network (Stage 2): Single Hub and Spoke (Krebs 2002)

FMBECS

Methodology: Ego Network Data and Snowball Sampling of Local Forest Owners

1st Order:

Ego networks consist of a focal actor (ego) and the actors to whom ego is directly connected (alters), plus the ties among the alters.

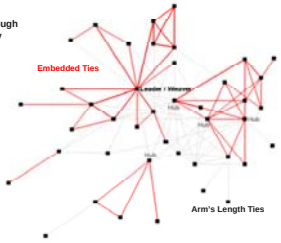
2nd Order:

Each alter in an ego network has his/her own network of connections.

Within the scope of this study forest owners may be the only stakeholders who can be surveyed. Ego networks are good at measuring social capital, but not in mapping a complete, closed network.

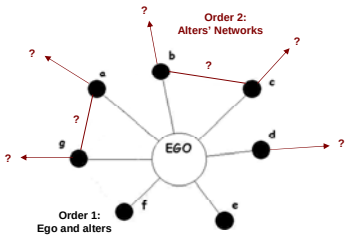
FMBECS

"Connect through your similarity and innovate through your diversity"



Knitting a Network (Stage 3): Multi Hub Small World (Krebs 2002)

FMBECS



FMBECS

Who are the Stakeholders?

What are the Connections?

Social Network Analysis:

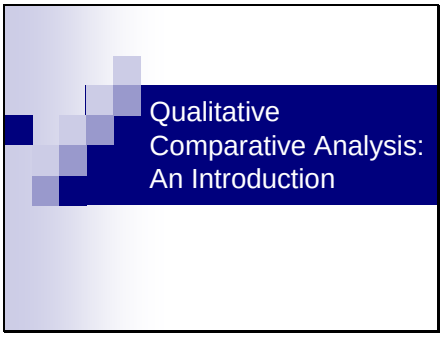
How can social networks influence industrial WTP?

Does forest owner embeddedness influence their perception of biomass energy production?

Vignette Survey Study (Yasushi Shogi):

What influences consumer WTP?

STEPHAN SCHOLZ, JOHN SONNETT



Binary and Fuzzy Set Data

- In Boolean algebra there are two conditional states, presence (1) or absence (0).
- In most comparative case studies the phenomena being studied are not arrayed on a continuous interval scale, therefore not much information is lost in such a coding scheme. Even so, recent reformulations by Ragin have made QCA more fine grained by incorporating fuzzy sets in the creation of fs/QCA.
- Fuzzy sets refer to a labeling scheme that is ordinal, such that:

  0 refers to 'not in this set'
  low numbers below .5 refer to 'not really in this set'
  0.5 represents neither in nor out of the set;
  higher numbers represent 'more in than out of this set'
  1.0 refers to 'fully in this set'.

Introduction to QCA

- QCA was developed for the analysis of small and moderate N (5 – 50) data sets.
- Social scientists tend to avoid work in this realm in favor of either qualitative analyses of a few cases or quantitative work on a very large number of cases.
- Charles Ragin's method of qualitative comparative analysis addresses this gap by formalizing comparative research through the generalization of qualitative case study methods. This process focuses on the discovery of necessary and sufficient conditions for producing particular outcomes.
- In set theory, variables are conceived of in terms of set membership, and relationships between sets are modeled as combinations of conditions.

Truth Tables

- Once the data have been coded into nominal (or interval) scale variables they can be sorted into different combinations of values on the independent variables. Each combination of values on the independent variables is represented as one row in a truth table.
- Each row can then be assigned a set membership score on the outcome based on the scores of the cases that share that particular configuration of input variables.
- Truth tables have as many rows as there are logically possible combinations of values on the causal variables. If there are four binary independent variables, for example, the truth table will contain 16 rows, one for each possible combination of presence/absence independent variables.

Traditional Statistics

- Traditional statistical research is different because it looks for the net effects of variables across a large set of cases. It does not consider how variables might combine into unique configurations of sufficiency and necessity.
- Ragin advises gathering a small N of cases, comparing them deliberately using various types of evidence, summarizing the intermediate results in a table, reducing the table using Boolean logic, iterating, and then drawing conclusions. He doesn't give a specific protocol but this is a summary of how one might proceed.

Truth Tables

Condition X1	X2	X3	X4	Outcome Y	Number of Instances
0	0	0	0	0	6
0	0	0	1	0	4
0	0	1	0	1	8
0	0	1	1	0	5
0	1	0	0	1	9
0	1	0	1	0	7
0	1	1	0	1	7
0	1	1	1	1	5
1	0	0	0	1	3
1	0	0	1	1	4
1	0	1	0	0	10
1	0	1	1	0	13
1	1	0	0	0	11
1	1	0	1	1	5
1	1	1	0	0	8
1	1	1	1	1	6

Boolean Minimization:

Military Regime Failure

Condition A	B	C	Regime Failure F	Number of Instances
0	0	0	0	9
1	0	0	1	2
0	1	0	1	3
0	0	1	1	1
1	1	0	1	2
1	0	1	1	1
0	1	1	1	1
1	1	1	1	3

A = Conflict between older and younger military officers
B = Death of a powerful dictator
C = CIA dissatisfaction with the regime

SUCCES = CORP LEFT PROP +
(AT, DK, FI, DE, NO, SE, CH)

GDP SOS LEFT PROP +
(BE)

GDP SOS CORP PROP
(NL)

= PROP(CORP LEFT + GDP SOS LEFT + GDP SOS CORP)

Boolean Minimization

In the above example the outcome of regime failure can be captured by the statement:

F = Abc + aBc + abC + ABc + AbC + aBC + ABC

Where ADDITION implies logical OR and MULTIPLICATION implies logical AND.

This equation can be minimized by combining and eliminating redundant expressions. For example:

Abc combines with ABc to produce Ac
AbC combines with ABC to produce AC
Ac combine with AC to produce A

Finally we are left with *F = A + B + C*. A,B and C are all sufficient causes but none of them are necessary.

	GDP	gdp	SOS	sos	CORP	corp	LEFT	left	PROP	prop
GDP	0	0	5	1	5	1	5	1	6	0
Gdp	0	0	1	1	2	0	2	0	2	0
SOS	5	1	0	0	5	1	5	1	6	0
Sos	1	1	0	0	2	0	2	0	2	0
CORP	5	2	5	2	0	0	6	1	7	0
corp	1	0	0	0	0	0	1	0	1	0
LEFT	5	2	5	2	6	1	0	0	7	0
left	1	0	1	0	1	0	0	0	1	0
PROP	6	2	6	2	7	1	7	1	0	0
prop	0	0	0	0	0	0	0	0	0	0

Table2: Co-occurrence of Conditions (Redding and Viterna Data)

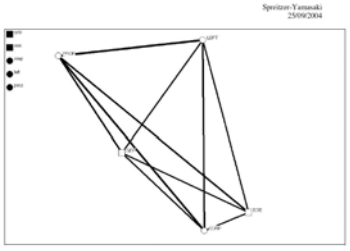
PNB	SOCS	CORP	LEFT	PROP	SUCCES	Instances
0	0	0	0	0	0	3 (JP, NZ, AUS)
1	0	0	0	0	0	2 (CAN, USA)
0	0	0	1	0	0	1 UK
0	0	0	0	1	0	1 IT
1	1	0	0	0	0	1 FR
0	1	0	0	1	0	1 IR
0	0	1	1	1	1	1 FI
1	0	1	1	1	1	1 CH
0	1	1	1	1	1	1 AT
1	1	0	1	1	1	1 BE
1	1	1	1	1	1	3 (DK, West DE, SW)
1	1	1	0	1	1	1 NL

(Spreitzer, Yamasaki 2004)
(Redding, Viterna)

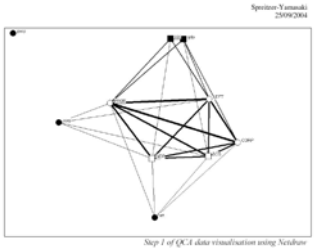
Hypothetical QCA of Forest Owners in Furano

Stakeholders (Forest Owners)	Social Capital (Advice, Trust)	Economic Capital (Income)	Cultural Capital (Perception of government)	Ecological Capital (Capability)	Outcome (Willingness to Innovate)
1	1	1	1	0	1
2	0	1	0	0	0
3	1	0	0	1	1
4	1	1	1	0	1
5	0	0	1	1	1
6	0	1	0	0	0
7	0	0	0	1	0

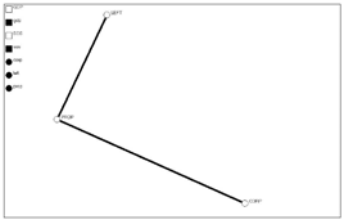
O = S + C



Step 2 of QCA data visualisation using Netdraw



Step 1 of QCA data visualisation using Netdraw



Step 3 of QCA data visualisation using Netdraw

Some Final Thoughts for the GCP

Within cases of regional carbon management such as Hokkaido QCA/Network visualization can be used to present information in more accessible ways.

Across cases (RC6 framework) comparisons on relevant outcomes such as carbon footprint intensity or community development failure can be made using QCA.

These cases can be drawn from current studies or from a coding of historical and archival data (Oklahoma Dust Bowl ?).

Network Views of Cultural Content and Media Analysis

ELIZABETH MALONE

Biographical Statement

Elizabeth L. Malone's research interests focus on developing studies that integrate disparate worldviews, data sources, and scientific approaches, particularly global change issues. Social network analysis is one such integrating methodology, applied in her dissertation to link participants in the global climate change debate. Her work has contributed to linkages among global environmental change, globalization, economic development, equity, and sustainability. She edited, with Steve Rayner, *Human Choice and Climate Change*, a four-volume assessment of social science research relevant to global climate change, jointly authoring, with Steve Rayner, the summary volume and an invited paper for *Nature* on the conclusions. Malone has participated in the assessment activities of the Intergovernmental Panel on Climate Change, most recently giving a keynote address to a joint meeting of authors from Working Groups II and III. She earned a Ph.D. in Sociology at the University of Maryland.

Pre-Workshop Thought Piece

Representing Change in Social Networks

Data analysis approaches have tended toward revealing eigenvector characteristics such as the centrality of actors, the between-ness of cliques and actors, and so on. Average path length, density, and other values help to describe networks in mathematical ways. These are largely static and descriptive analyses. Similarly, the number of ties and even comparative roles of actors do not provide tools to analyze changes in links or in the social network.

"Event" ties, as opposed to affiliation ties (e.g., "likes" or "gets advice from") exhibit the same static-ness and raise other questions. Can we infer from the presence of people at the same parties or on the same corporate boards that they are linked by these "events" and thus constitute a social network? If more events occur, can we conclude that the ties have changed?

In short, social network analysis lacks approaches for analyzing and strategizing change. We need to use SNA tools in different ways in order to help increase the issue relevance (and, possibly the policy relevance) of social network analysis.

An examination of how people communicate in a debate can reveal *bases* for social network links instead of the links themselves. For example, if two politicians favor a policy and use the same reasons for favoring it, their agreement on these two issues may be considered at least potential social links. The "set" of conservative policymakers in a legislature could be considered a social network based on the set of agreed assumptions about how government should work and policy preferences. Similarly, within the scientific community the scholars who use a particular methodology (e.g., social network analysis or comparative historical

analysis) or work on an issue (e.g., globalization, racism, climate change) often link themselves via conferences, sections within professional organizations, and so on. But even those not linked via explicit events or organizations have potential links to scholars who use the methodology or focus on the problem of interest.

As people take part in a conversation or debate, certain features of their arguments could be the basis for links, things-in-common that could lead to agreements among them. The professions or professional status of social network members could provide such a basis; two chemists, for example, share at least a partial vocabulary and educational background. Or debaters may agree that only empirical evidence (to take one example) can be brought to bear on a certain issue. People may hold beliefs in common about how the world is or ought to be. Finally, they may propose, for the same or for different reasons, similar courses of action.

Examining a set of rhetorical elements like these reveals the bases for agreements or disagreements among people who are engaged in an issue such as regional carbon management. This approach, then, provides a way to see partial and potential agreements and to define changes that could be attempted to come to agreement – in short, to define mechanisms of change among social networks.

People with one or two links can use those as springboards toward agreement. Although participants in the climate change debate tend to have more links with people who make similar arguments, they also exhibit multiple ties with rhetors who make dissenting arguments. Social network analysis can help identify things-in-common among debaters and help in developing strategies for coming to agreement.

Presentation Summary

RHETORICAL ELEMENTS AS SOCIAL NETWORK LINKS AND POTENTIAL PATHWAYS OF CHANGE

Liz Malone
(Reporter: Catherine Dibble)

Main Points

- Search for common ground in the rhetorical debates related to climate change.
- To what extent can social network analysis across families of climate change arguments provide insights for effective understanding and constructive agreements?
- Method: select 100 documents, extract key words and phrases, group into 11 families of arguments based upon within versus across variation.

Testable Hypotheses

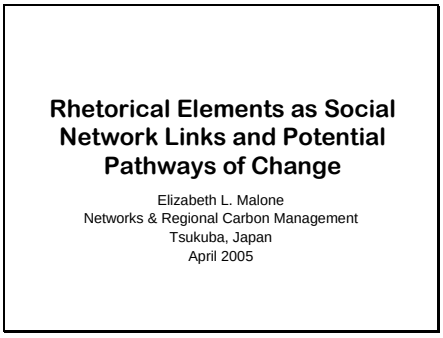
Is it possible to identify “core” versus “periphery” arguments?
Does the social network analysis of proponents of the various arguments indicate key areas of understanding that could be used to provide bridges for communication?

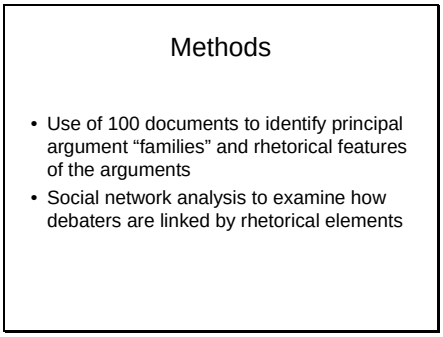
Implications for URCM Networks

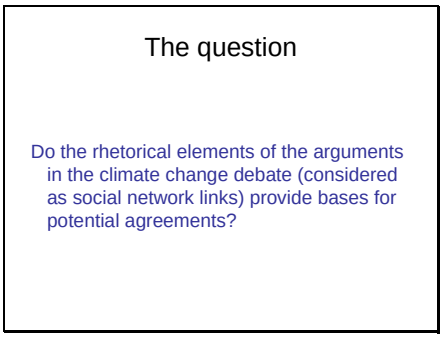
Such analyses may provide insights regarding common bases for core arguments, in order to facilitate the development of effective policy agreements for local, regional, and global carbon management.

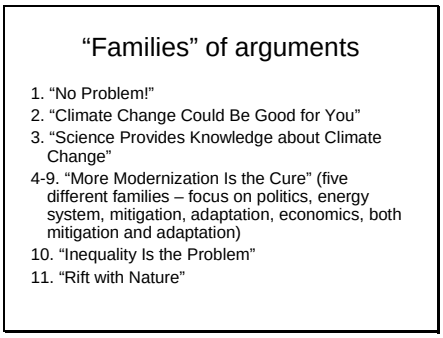
Caniglia — Arguments may either enable or constrain effective agreements. Core arguments may constrain rather than enable. Ask: "where would be the constraints to [forming] coalition[s]"

Malone — Helpful for people not to "black box" (verb) other families of arguments. Helpful for people to see whatever commonality they may share.









Points in *this* argument

- The climate change debate constitutes a social network.
- "Event" links may be cultural (discursive).
- An argument may constitute a subnetwork.
- Links within and across subnetworks may be rhetorical:
  - A shared basis for authority
  - Agreement on what evidence counts
  - Shared view of nature and human-nature relationship
  - Agreement on specific actions to take.

Analysis

- The major role of science in raising the issue, analyzing causes and impacts, etc. affects questions of authority, evidence, and worldview.
- Worldview may be the strong link in argument families; other rhetorical elements can be considered weak links.
- Focusing on ties formed by proposed actions may be a good strategy for coming to (or toward) agreement.
- The worldview that humans can manage nature, devise "green" technologies, and address negative consequences is in the mainstream of the debate. (Can voices who don't hold this view be heard?)

Example: Family 5

Author	Organization	Evidence Types	Worldview	Actions
POL, TRA	GOV, IND	DAT	MOD	EDU, NRG
SCI	RES	SCT, DAT	MOD	TEC, RCH, NEG
SCI	GOV	PAN	ECO	NRG
ENV	NGO	DAT	MOD	EMI, KYO
SCI, ENV	NGO	PAN	ECN, PLY	EMI, TEC, ETR, EQU, SUS
--	GOV	CAS, DAT	MOD	EMI, TEC
ENV	RES	DAT, PIX	MOD	TEC
--	NGO	SCT	NAT	EMI, TEC, SUS, FND, RCH
--	GOV	SCT, PAN	MOD	TEC
ENV	NGO	DAT, THE	MOD	TEC

Findings (general)

- Families have many elements in common, but much in-family divergence exists, also.
- The climate change debate space is a dense social network, with many ties across families.

Example: rhetorical links

Ashford

Member of Family 3, "Science Provides Knowledge about Climate Change" (total of 9 members)

Links with Family 3 members: scientist (6 members total); uses data and models as evidence (5 members total); and advocates education, monitoring, and research (7 members advocate one or more of these).

Links outside Family 3: 36 other scientists (all other families); 43 uses of data/models (all other families) as evidence; 20 instances of one or more proposed actions that Ashford also proposes (eight other families)

An individual-level analysis

Ashford, who advocates non-aggressive and relatively low-cost actions, may use weak links to

- Explicitly *associate* his arguments with those made in other families – e.g., pointing out the need for education, monitoring, and research to accomplish the more aggressive goals of the "More Modernization" arguments
- Show how his evidence, other types of evidence, and results from other models/data can reinforce each other
- Provide additional arguments about the need to study and monitor in order to establish if something has happened and, if so, whether or not that something can be defined as climate change.

JOHN SONNETT

Biographical Statement

I am currently a PhD Candidate (degree expected November 2005) in the Department of Sociology at the University of Arizona. I hold an MA in Sociology from the University of Arizona and a BA in Russian Studies from the University of Virginia. My primary interests are cultural sociology, research methods, environmental sociology, globalization-political economy, and science studies. In my research I have sought to combine network and comparative methods to help generate new insight on cultural phenomena.

In my dissertation, I am exploring the ways in which diverse social actors construct knowledge about global climate change across media arenas, including political and popular news, professional science and science popularization, environmental magazines, and business and petroleum industry journals. I employ a mix of quantitative and qualitative methods, including Qualitative Comparative Analysis and Correspondence Analysis, which enable me to map macro-structures of discourse and link these patterns to individual texts. I presented a draft chapter titled "Fear, Uncertainty, and Risk: Boundary Concepts in Environmental Discourse" at the 2004 annual meeting of the American Sociological Association and this paper is currently in preparation for journal submission. In this paper, I show how conceptualizations of risk differ systematically across media arenas and how this variation affects the definition of the problem, for example, "global warming" corresponds to political and economic fears whereas "climate change" corresponds to scientific assessments of uncertain risk.

I am also currently conducting research with an interdisciplinary team at the University of Arizona's Institute for the Study of Planet Earth. A paper currently under review, "Discursive Framing of Drought in the Desert Southwest," compares newspaper reporting about drought in New Mexico and Arizona. In this paper, we show variations in the temporal and spatial scales in which drought is conceptualized and link these variations to the physical and political contexts of the two states. We use correspondence analysis to show how discourses changed over a three-year period of deepening drought. A second study, currently in progress, examines discourses about wildfire perception and policy over a five-year period. In this study we link discourses in New Mexico and Arizona with national level discourse as represented in the New York Times and the Los Angeles Times.

In addition to my research on environmental issues, I have also published several papers on culture, methods, and political economy. A sole-authored article in *Poetics: Journal of Empirical Research on Culture, the Media and the Arts* examines intersections of symbolic boundaries around musical tastes. In this paper I describe the diversity of taste patterns and find that when standard sociodemographic variables are measured as configurations they are poor predictors of these patterns. A chapter with Charles Ragin (forthcoming in *Vergleichen in der Politikwissenschaft*, Sabine Kropp and Michael Minkenberg, eds.) examines limited diversity and counterfactual cases in comparative analysis. We show how the clustering of empirical cases can be measured with the configurational approach of Qualitative Comparative Analysis and how counterfactual cases can be systematically identified and

incorporated into analyses with this method. A paper with Albert Bergesen in *American Behavioral Scientist* maps the regional and industrial structure of Global 500 corporations. We show the development of the tri-polar world economy since the 1950s and use network analysis to map competition between the U.S., Europe, and Asia in finance, production, and service sectors, providing the basis for theorizing the rise of Asian capitalism within the context of world systems theory.

Pre-Workshop Thought Piece

Configuring Entities in Social Network Analysis

Conventional analysis of one-mode social networks examines the complexity of relations among an array of actors. This complexity includes patterns in network ties beyond simple direct connections between nodes, and may include the analysis of several types of relations within a single network. Recent work in cultural analysis has built on this model to examine two-mode networks, relating heterogeneous entities such as actors and cultural categories. This work has used lattices to show logical relations between the two types of entities, such as between categories and practices in social welfare relief (Mohr & Duquenne 1997), and has been extended to tripartite lattices such as of actors, projects, and events (Mische & Pattison 2000).

While current approaches to social network analysis have expanded the types of relations considered, they tend to retain a unidimensional conception of network entities or nodes. One promising direction for expanding the conception of entities in network analysis is through the incorporation of the combinatorial logic of Qualitative Comparative Analysis (QCA; Ragin 1987; Ragin & Sonnett 2004). In QCA, empirical cases are described by configurations of conditions measured as sets. Cases are coded by whether they display a relevant condition (e.g. "1") or do not (e.g. "0"), and can be coded within this range for fuzzy-set analysis. The goal of the analysis is to identify combinations of conditions which lead to an outcome of interest, formalizing the analytic strategy of case-oriented qualitative research.

Several points of contact have been established between QCA and social network analysis (Spreitzer & Yamasaki 2004), including the use of network attributes as causal conditions and the decomposition of QCA results into a one-mode network, where the tie between two conditions is the number of times those two conditions co-occur across configurations which lead to the outcome. Another approach uses two-mode network analysis to represent relations between causal configurations and multiple outcomes, such as the relationships between configurations of sociodemographic characteristics and musical tastes (Sonnett 2004). In this approach, both cases and outcomes can be represented by combinations of conditions. This approach complexifies network entities while retaining the simplicity of conventional two-mode network analysis, enabling the use of methods such as correspondence analysis for visually representing network structure.

This approach to network analysis has potential application in policy implementation because it can be used to represent complex data in a relatively simple relational model. Such models

might be useful for introducing a degree of reflexivity in stakeholder discussions, for example by visually representing relations between configurations of stakeholder conditions (i.e., economic resources, social network positions) and dimensions of willingness to pay or participate in policy implementation. Representing actors as configurations of conditions would help to specify the relevant characteristics of actors which link them to variations in perceptions.

Mohr, John W. and Vincent Duquenne. 1997. "The Duality of Culture and Practice: Poverty Relief in New York City, 1888-1917." *Theory and Society*, 26/2-3:305-356.

Ragin, Charles C. 1987. *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. Berkeley: University of California Press.

Ragin, Charles C. and John Sonnett. 2004. "Between Complexity and Parsimony: Limited Diversity, Counterfactual Cases, and Comparative Analysis." COMPASS Working Paper 2004-23.

Sonnett, John. 2004. "Musical Boundaries: Intersections of form and content." *Poetics*, 32/3-4:247-264.

Spreitzer, Astrid and Sakura Yamasaki. 2004. "Beyond methodological tenets: The worlds of QCA and SNA and their benefit for policy analysis." COMPASS Working Paper 2004-27, www.compasss.org.

Presentation Summary

MAPPING GLOBAL CLIMATE CHANGE IN MULTIPLE MEDIA ARENAS

John Sonnett

(Reporter: Catherine Dibble)

Main Points

John Sonnett

Uses keywords from articles in Scientific, Political/Popular, Environmental Movement, and Oil Industry literatures to map onto axes of "risk" and "uncertainty."

Axes in his diagrams are really diagonal in his diagram, not orthogonal to the text. Risk (which might also be called fear) increases from NW to SE, Uncertainty increases from NE to SW.

Testable Hypotheses

When correspondence analysis is applied to the distribution of *aggregated* keyword frequencies mapped onto subspaces, which dimensions account for the greatest % of variance? ("Risk" and "Uncertainty" accounted for 45% of overall variance.)

Implications for URCM Networks

Similar to Malone's talk: understanding families of arguments may provide insights to support understanding, communication, and effective agreements.
Caveat: keywords have different meanings in different contexts, and combinations of keywords within specific articles may be important.

Prepared for the Global Carbon Project Conference on
Networks and Regional Carbon Management, April 2005,
Session on "Network Views of Cultural Content and Media Analysis"

Mapping Global Climate Change in Multiple Media Arenas

John Sonnett
Department of Sociology
University of Arizona
Tucson, AZ 82705 USA

Risk: Between Uncertainty and Fear

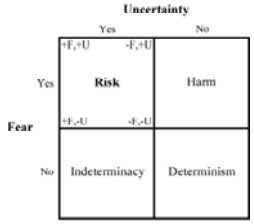


Figure adapted from Rosa (1998)

Networks and Media Analysis

- How to represent fields of discourse using SNA? —relational approach
- How to represent discursive content of specific texts? —configurational approach
- How is the risk of global climate change conceptualized across various media arenas?

Methods

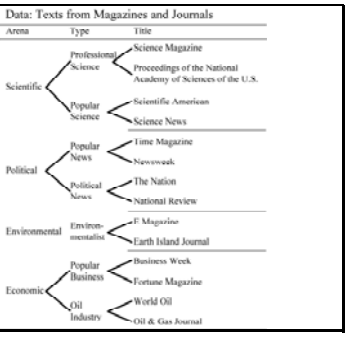
- Discursive fields can be mapped through keywords
  - Actor Network Theory, Concept mapping
- Correspondence Analysis—relational
- Qualitative Comparative Analysis—configurational

Media Arenas

- Scientific
- Political/popular
- Environmental movement
- Oil Industry

Data

- U.S. periodicals and magazines, 1997-2002
- Online databases: Lexis-Nexis,
  InfoTrac OneFile, EbscoHost EJS
- Keywords:
  "global warming*", "climate change*"
  also searched
  "greenhouse effect*", "greenhouse gas*"



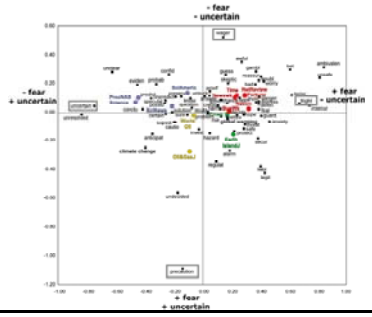


Table 1 (excerpt). Number of Articles containing Keywords, 1997-2002

	BusWeek	Enrth	Emag	Fortune	Nation	NatRev	NewsWk	OilGas	PNAS	SciAm	Scientc	SciNew	TimeMag	Wrldoil
climate change	250	115	54	131	34	141	72	486	139	51	222	84	151	28
global warming	163	155	98	51	105	67	150	230	82	62	146	91	155	34
fear	32	27	22	15	26	16	34	44	11	15	13	10	41	3
uncertain	18	3	8	3	10	6	13	72	65	21	119	16	14	10
risk	36	51	29	20	31	19	31	60	39	15	33	25	44	8
alarm	9	20	13	7	15	11	13	49	7	7	17	5	11	4
ambivalen	1	0	1	0	4	2	3	1	0	0	0	0	2	0
answer	17	23	25	17	37	19	32	47	33	25	41	20	36	11
anticipat	6	8	8	5	9	3	4	40	29	10	18	13	10	2
anxiety	4	0	1	1	10	4	4	10	1	1	0	3	6	0
asTul	1	2	0	1	0	1	1	0	1	2	0	4	2	0
bad	29	27	30	17	39	31	62	34	22	12	24	12	47	8
believ	49	56	51	28	55	40	66	111	43	28	61	20	66	15
bet	9	6	4	10	4	8	9	3	5	2	3	2	7	1
cautio	15	10	12	8	20	8	7	48	21	11	40	17	20	2
certain	42	24	47	25	47	32	47	104	95	44	137	38	53	18
chance	32	12	23	11	32	7	35	46	19	10	30	13	41	5
concru	32	39	26	8	22	17	34	91	100	30	105	44	25	9
confid	17	8	7	9	12	14	17	21	29	10	49	6	21	4
credib	5	10	15	6	22	6	15	22	10	9	21	4	14	1
danger	26	65	52	21	45	26	46	31	21	28	23	13	54	6
decide	38	36	33	27	55	31	65	98	26	19	41	23	64	12
dehei	33	48	39	16	47	35	41	43	17	14	26	11	48	5
dishless	1	2	0	1	2	2	4	2	0	0	1	1	7	1
doubt	19	15	15	10	29	27	39	63	23	15	45	10	26	7
evidem	31	34	30	9	33	27	27	68	120	47	134	45	37	12
expect	52	52	40	23	45	21	68	168	100	37	130	40	66	20

table continued…

Risk is Determined:

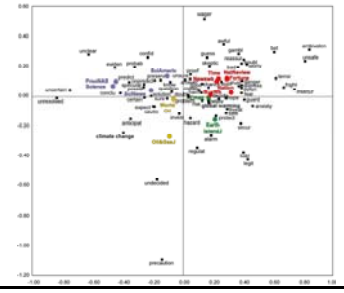
Wager (*vt.*) "To stake or hazard (something of value) on the issue of an uncertain event or on some question to be decided, to bet."

Risk is Constructed:

Precaution (*n.*) "As a quality or mode of action: Caution exercised beforehand to provide against mischief or secure good results: prudent foresight."

(Oxford English Dictionary)

Figure 1. The Field of Risk Discourse for Global Climate Change, 1997-2002



"Evidence"

- Denying uncertainty makes life so much easier, as many have discovered when it comes to climate change. Between skeptics' insistence that global warming is just hot air and radical environmentalists' advice to start selling the beachfront property, responses to climate change tend to be predicated on claims of absolute knowledge. Who wants to deal with the messy reality? There is plenty of evidence that temperatures are rising and will continue to do so but lots of uncertainty about the details and amount of future change. *Scientific American, October 29, 2001.*
- …the Administration has given no hint that it perceives global warming as a serious problem. And such a stance carries a risk: While some uncertainty remains about the consequences of global warming, the overwhelming evidence suggests that the phenomenon is real. The probusiness Bush Administration should listen a little more closely to what some businesses are actually saying. *Business Week, April 23, 2001.*

Table 2. Number of Articles with Configurations of Keywords in 4 Media Arenas

Confidence, Evidence, Probability				
	EnvMvmt	Industry	Politics	Science
c.e.p	226	296	444	188
c.e.P	26	54	94	80
c.E.p	45	48	94	157
c.E.P	14	24	48	124
C.e.p	10	12	38	16
C.e.P	0	5	30	13
C.E.p	4	8	13	23
C.E.P	1	0	9	42

Bet, Trouble, Worry				
	EnvMvmt	Industry	Politics	Science
b.t.w	259	390	470	552
b.t.W	25	35	137	39
b.T.w	22	18	70	32
b.T.W	10	2	46	13
B.t.w	6	2	20	4
B.t.W	2	1	15	2
B.T.w	1	1	9	0
B.T.W	1	0	3	1

Anticipat, Cautio, Expect				
	EnvMvmt	Industry	Politics	Science
a.c.e	219	217	436	276
a.c.E	71	147	224	224
a.C.e	9	25	46	36
a.C.E	11	18	27	37
A.c.e	4	15	13	20
A.c.E	10	20	19	34
A.C.e	2	4	0	4
A.C.E	0	3	5	12

Protect, Safe, Secur				
	EnvMvmt	Industry	Politics	Science
p.sa.se	135	250	353	448
p.sa.SE	11	49	75	19
p.SA.se	22	28	51	37
p.SA.SE	3	8	27	2
P.sa.se	77	63	116	92
P.sa.SE	15	22	65	11
P.SA.se	41	17	45	23
P.SA.SE	22	12	38	11

Figure 1. The Field of Risk Discourse for Global Climate Change, 1997-2002

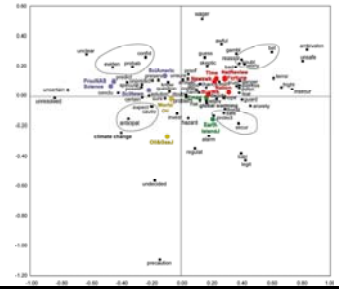
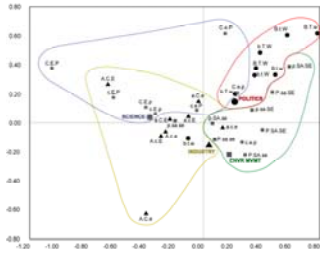


Figure 2. Configurations of Keywords



Conclusions

1) Naming the issue is framing the issue:
   - "Global Warming" is linked to fear of risk
   - "Climate Change" is linked to uncertainty of risk
2) Conceptions of risk differentiate media arenas:
   - Environmentalists and popular press differ on fear of risk
   - Oil industry and science differ on uncertainty of risk
3) Conceptualizing network nodes as configurations helps specify relations between keywords

CATHERINE DIBBLE

Biographical Statement

Catherine Dibble is an Assistant Professor in the Department of Geography at the University of Maryland. She uses her GeoGraph agent-based computational laboratory to model and optimize interventions for network-influenced processes such as epidemics of infectious diseases among highly mobile populations, long-run regional development and land-use changes, and social-ecological resilience at multiple scales. She has served on the International Steering Committee for the GeoComputation Conference Series since its inception in 1996, and has complementary expertise in network optimization, spatial evolutionary algorithms, and relevance filters. For 2005-2007, she will be serving on the US National Academies of Sciences (NAS) National Research Council (NRC) Committee on Organizational Models from Individuals to Societies.

Her academic background includes graduate work in formal micro-economic theory and international trade theory, public finance, and game theory (especially axiomatic bargaining theory, a formal structure for evaluating fairness in resource allocation problems) in the Department of Economics at the University of Rochester. Professional experience includes computer science and many years as a professional software designer, developer, and software- development department director (simulations, executive information systems, and national and international software patents for analysis of healthcare providers). She attended the 1995 Santa Fe Institute Complex Systems Summer School, and holds an M.A. in Economic Theory from the University of Rochester and a Ph.D. in Geography from the University of California Santa Barbara.

Pre-Workshop Thought Piece

Network Simulation, Analysis, and Optimization

Agent-based computational laboratories offer virtual worlds where it is feasible, safe, and affordable for us to model and optimize dynamic processes on richly structured social, organizational, and geographic network landscapes. Laboratory simulations allow us to learn from our mistakes far sooner than we might otherwise learn the hard way via dire or irreversible consequences in the real world. Ideally, virtual worlds help us to discover and evaluate practices that foster effective social-ecological resilience at multiple scales; more quickly, more feasibly, and more thoroughly tested in the laboratory than would otherwise be possible. The crucial challenge is to improve methods for refining models and fully exploring their behavior, in order to ensure that the lessons we learn reflect pragmatic realities rather than merely artifacts of one model or set of simulation results versus another.

We have been using several new network measures and simulation methods recently to evaluate the effects of organizational and geographic networks on dynamic social processes. We have some new methods related to search and optimization for simulation-based

scientific inference and practical policy, and for modeling and guiding social-environmental systems at multiple scales.

Links: Dibble and Feldman (2004) http://jasss.soc.surrey.ac.uk/7/1/7.html Community of Science Profile http://myprofile.cos.com/cdibble

Presentation Summary

NETWORK SIMULATION, ANALYSIS, AND OPTIMIZATION

Catherine Dibble
(Reporter: Stephan Scholz)

Main Points

Catherine Dibble

- How can we create general models that run histories of human and environmental interactions that optimize on some particular outcome?
- Genetic algorithms – optimization problems across space and time can be run using evolutionary algorithms. Space and time cause problems for the evolution of expert systems, but genetic algorithms are able to compare space and time at any scale.
- One problem is how to optimize organization networks for gathering and diffusing innovation. These two processes must be properly balanced.
- SNA has generally been empirical whereas physics modeling creates synthetic networks that can study processes based on perfect data and unlimited observations (runs).
- One of the interesting things to model is what happens to the evolution of a network when certain nodes are removed. This has applications in many realms from epidemiology networks in scale free networks with central hubs to policy formation on carbon mitigation. The point is to figure out the marginal contribution of different network components to outcomes or processes.

Testable Hypotheses

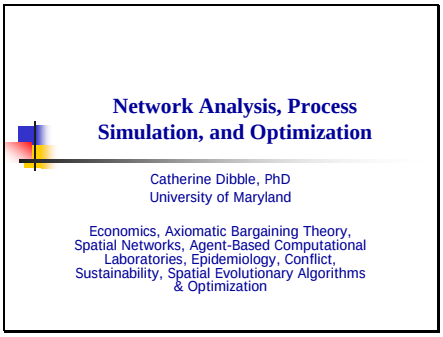
What happens when certain countries or actors are removed from climate change policy networks?
What happens to local environments based on social/economic/structural contexts?

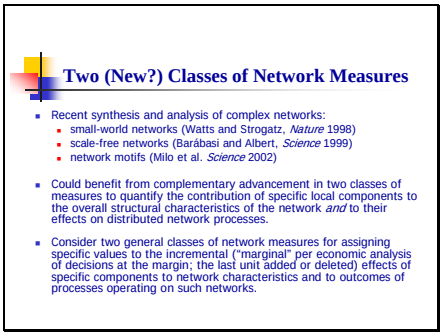
Implications for URCM Networks

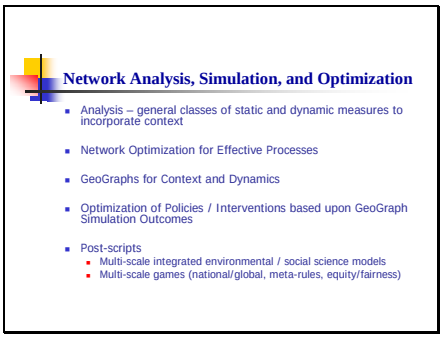
One key issue is the costliness of conducting traditional SNA. Simulations have unlimited cases and can be used as hypothetical scenarios for comparison across real world cases. This is like developing a theory of gravity in a vacuum but then getting real world measurements that involve friction.
Parsimonious and powerful presentation tools for policy makers.
More complex modeling of agent behavior based on social network characteristics and not just rational agent assumptions.
Regional modeling of social/economic contexts on environmental outcomes.

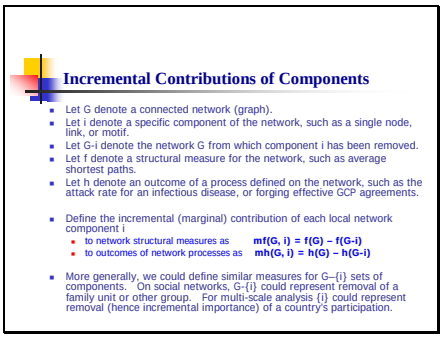
Relevant Literature

Dibble, Catherine. Beyond Data: Handling Spatial and Analytical Contexts with Genetics Based Machine Learning". Chapter 3, Spatial Evolutionary Modeling, Oxford University Press, 2001.

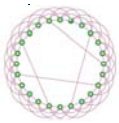








Networks in *Nature* and *Science*



Small-world Networks

short-cuts shrivel the world

Watts and Strogatz *Nature* 1998

"Scale-Free" Networks

hubs play crucial roles

Barabási and Albert *Science* 1999

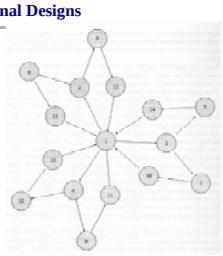
Genetic Algorithms and Process Simulations to Evolve Optimal Organizational Designs

Genetic Algorithm optimization of organizational network structure based on performance of multiple simulated processes.

Here, networks balance tradeoffs between diffusion and aggregation of information when maintenance of network links has a fixed cost.

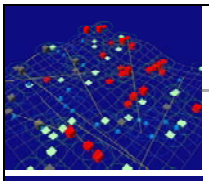
"Organizational Structure and the Behavior of Firms: Implications for Integrated Assessment"

(DeCanio, Dibble, Amir-Atefi *Climatic Change* 2001)

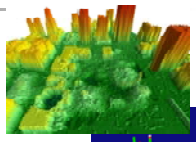


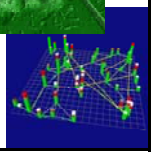
Agent-Based

- *Agent* is a generic term for any constituent entity whose behavior we wish to model, and for its representation within the model.
- For example, an agent may be, or may represent, a plant, an animal, or a person.
- Note! Even a group such as a family, a country, or a corporation may be regarded as a behavioral agent for purposes of understanding a given system, depending upon the model's scale and degree of generalization.
- Agent-based models are also called individual-based models, especially in ecology. But we mean the term to be more general than individuals.



Multi-Scale Synthetic and Remote Sensing GeoGraph Simulation Landscapes





Computational Laboratories

- **We define a computational laboratory as a well-specified agent-based simulation model coupled with complementary search and optimization tools, careful experimental design, and thorough testing and risk analysis.**
- Yet the usefulness of agent-based models extends beyond formal laboratory experiments:
  - to play with representations and dynamic behavior of a system ***for both positive and normative research***;
  - to compress time and space and support omniscient data collection in order to observe surprising phenomena;
  - to refine the model of the system or problem;
  - and to develop, test, and refine integrated normative policies.

Optimizing Interventions for Controlling Epidemics

Genetic Algorithm

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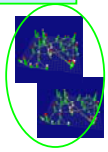
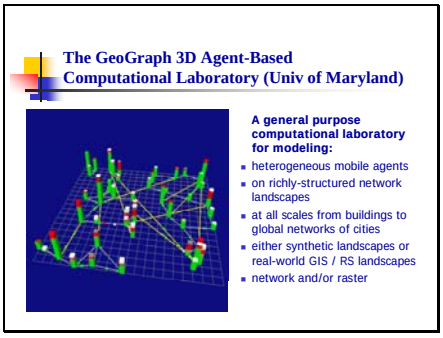
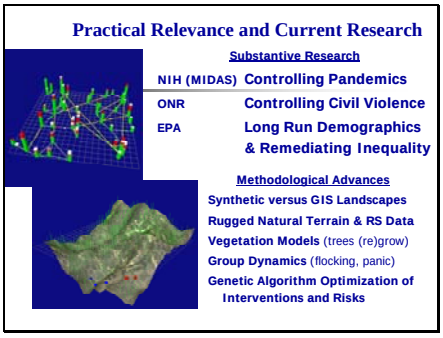
Intervention: types of control measures and geographic deployment of resources for each.



- Run many GeoGraph simulations ("epidemic histories") to evaluate each intervention.

1. A Genetic Algorithm (GA) evolves highly effective interventions, based on simulation results.
2. GA then assists with risk analysis by seeking best-case and worst-case outcomes for each of the best interventions.





JOSEPH CABRERA

Biographical Statement

I received a BA in Social Ecology from the University of California, Irvine in 1997. I then received an MA in Urban Planning from the City University of New York, Hunter College in 2000 followed by an MA in Sociology from the University of Arizona in 2002. I am now in the beginning stages of my dissertation planning and I expect to complete the Ph.D. in May of 2007.

My Master's thesis was a social psychological study of trust development. After beginning my graduate program in the area of social psychology I have since moved into the area of network analysis and the study of how networks effect nonprofits and other organizations that work with nonprofits. I am especially interested in how organizations network with one another to achieve successful cooperative outcomes. I have also just begun working with MATLAB to create simple computer simulated models of network integration.

Pre-Workshop Thought Piece

I am interested in studying the effects of inter-organizational ties on community service provision systems. Specifically, my work examines how ties between organizations working in juvenile rehabilitation systems (within a single community) can be structured to more successfully provide rehabilitation services to juvenile offenders. This problem is closely related to studies conducted in the areas of common resource properties and social dilemmas, in which the goal is to understand how groups with no centralized authority can effectively cooperate to solve public goods problems.

There have been very few studies examining inter-organizational effectiveness, these include (Lehman et al. 1994, Morrissey et al. 1994) and an informative study by Provan and Milward (1995) that examined systems of organizations working to provide mental health services in

four U.S. cities. Using a rich network and qualitative dataset Provan and Milward formulated what they call a "preliminary" theory of inter-organizational network effectiveness. Their theory makes a great contribution to understanding how network structures and contexts influence network effectiveness. Four propositions illuminate the relationship between inter-organizational systems and the effectiveness of outcomes. Network effectiveness is improved (1) as network integration (i.e. interconnectedness) increases, but only when integration is achieved through centralization of the network, (2) when mechanisms of external control are direct and not fragmented—thus, government funding is limited to one core agency that then disperses funds throughout the network as needed, (3) when networks operate in the context of system stability—thus, systems in which relationships are well established and understood, and (4) when networks operate in the context of higher levels of system-wide resources, such as external funding from the government or international agencies.

The Provan and Milward article provides a wonderful point to begin formulating a better understanding of how system interconnectedness and interorganizational networks effect community outcomes in service provision. My work seeks to test these findings in a different network setting (juvenile rehabilitation) and also to integrate findings from the common resource property literature into the model.

Presentation Summary

THE ORIGINS OF NETWORK INTEGRATION: A SIMULATION STUDY
Joseph Cabrera
(Reporter: Stephan Scholz)

Main Points

Joseph Cabrera

- How can we use simulations to model inter-organizational effectiveness? For example, the recent U.S. Olympic basketball team, although comprised of superstars, was ineffective due to lack of network cohesiveness. Joseph's interests are in service implementation networks that allow organizations to effectively treat mental health patients.

- Effectiveness is affected by monitoring and sanctioning or the creation of embedded networks. Embedded networks are the result of events that affiliate actors to each other.

- Joseph simulates weak link connections between organizations and subsequent integration. Organization size doesn't effect integration. Memory capacity is significant and negatively related.
- Cultural complexity (increasing facts) doubles integration time and therefore is also negatively related.
- As organizations become more complex and have more memory it takes longer to integrate.

Testable Hypotheses

Which method of reducing transaction costs is more effective: informal, embedded networks or institutionalized monitoring and sanctions? Can this question be modeled with regard to carbon footprint outcomes?

Implication for URCM Networks

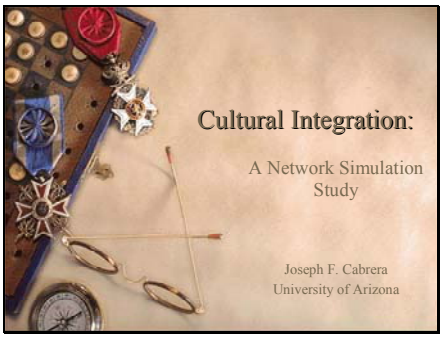
Perhaps the creation of affiliational events or organizations will knit network actors into cohesive, de-carbonized economies. Small scale, regional development will have to involve cooperation and increases in social capital.

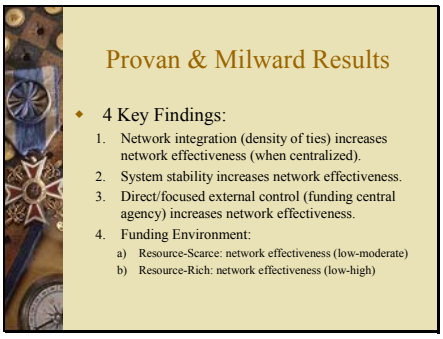
Relevant Literature

Burt, Ronald. 1982. *Toward a Structural Theory of Action*. New York: Academic Press.

Burt, Ronald. 1987. "Social Contagion and Innovation: Cohesion Versus structural Equivalence." *American Journal of Sociology 92*(6): 1287-1335.

Burt, Ronald. 1993. "The Social Structure of Competition". Pp. 65-103 in *Explorations in Economic Sociology*, edited by Richard Swedberg. New York: Sage.





Research Question

- How can people/organizations collaborate to achieve effective network outcomes?
  - Examples:
    - Team Sports
      - Soccer, Basketball, Ultimate Frisbee
    - Common Resource Property (Social Dilemmas)
      - Resources: water, ocean fish, and clean air
    - Service Implementation Networks
      - Healthcare, Homeless Care, Elderly Care, Mental Health Care, Juvenile Delinquency Rehabilitation

Provan & Milward Results

- 4 Key Findings:
  1. *Network integration (density of ties) increases network effectiveness (when centralized).*
  2. System stability increases network effectiveness.
  3. Direct/focuses external control (funding central agency) increases network effectiveness.
  4. Funding Environment:
     a) Resource-Scarce: network effectiveness (low-moderate)
     b) Resource-Rich: network effectiveness (low-high)

A Preliminary Theory of Network Effectiveness[1]

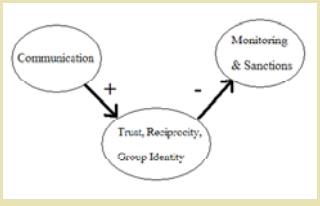
- Studies *Mental Health* Service Provision Networks (SPNs)
- 4 Cities (Albuquerque, NM; Akron, OH; Providence, RI; Tucson, AZ)
- Each service implementation (SI) network had an average of 40 organizations.
- The four SI networks varied in size, funding, and network structures.

1. Provan & Milward. 1995. "A Preliminary Theory of Interorganizational Effectiveness: A Comparative Study of Four Community Health Systems" *Administrative Science Quarterly*, 40(1): 1-33.

Why does integration improve network effectiveness?

- Common Resource Property literature:
  - Ostrom, Elinor. 1990. *Governing the Comomns: The Evolution of Institutions for Collective Action*, New York, NY: Cambridge U. Press.
  - Dawes, Orbell, & van de Kragt. 1986. *American Political Science Review*, 80: 1171-1185.
  - Farrell & Rabin. 1996. *Journal of Economic Perspectives*, 10: 103-118.
  - Frey and Bohnet. 1996. *Journal of Political Philosophy*, 4: 322-336.
  - Hackett, Schlager, & Walker. 1994. *J. of Environ. Economics and Management*, 27: 99-126.
  - Isaac & Walker. 1998. *Economic Inquiry*, 26: 585-608.
  - Miller, G. 1992. *Managerial Dilemmas. The Pol. Econ. of Hierarchy*. Cambridge U. Press.
  - Orbell, Dawes, & van de Kragt. 1990. *Ethics*, 100: 616-627.
  - Ostrom, et al. 1994. *Rules, Games, and Common-Pool Resources*. U. Michigan Press.
  - Salley, David. 1995. *Rationality and Society*, 7:58-92

Why does integration improve network effectiveness?



Fact Matrix

		Facts				
		A	B	C	D	E
People	1	1	1	1		
	2	1	1			
	3			1	1	1
	4					1

Cultural Interaction Model

- Adapted from K. Carley (1991)[2]
  - Examined group stability.

2. Carley, Kathleen. "A Theory of Group Stability" *American Sociological Review*, 56(3): 331-354.

- And Noah Mark (1998)[3]
  - Examined origins of differentiation.

3. Mark, Noah. "Beeyond Individual Differences: Social Differentiation from First Principles" *American Sociological Review*, 63(3): 309-330.

Fact Matrix

		Facts				
		A	B	C	D	E
People	1	1	1	1		
	2	1	1			
	3			1	1	1
	4					1

Culture as Information

- Culture is understood as the type and amount of information known to a person or group.
- Assumption 1 of the model:
  - Cultural similarity increases probability of interaction (homophily).

Fact Matrix

		Facts				
		A	B	C	D	E
People	1	1	1	1		
	2	1	1			
	3			1	1	1
	4					1

Probability Matrix

		People			
		1	2	3	4
People	1	0.50	0.33	0.17	0.00
	2	0.50	0.50	0.00	0.00
	3	0.20	0.00	0.60	0.20
	4	0.00	0.00	0.50	0.50

The Model

- 4 Assumptions
  1. Homophily
  2. Interaction leads to exchange.

Probability Matrix

		People			
		1	2	3	4
People	1	0.50	0.33	0.17	0.00
	2	0.50	0.50	0.00	0.00
	3	0.20	0.00	0.60	0.20
	4	0.00	0.00	0.50	0.50

Exchanging of Facts

		Facts				
		A	B	C	D	E
People	1	1	1	1		
	2	1	1			
	3			1	1	1
	4					1

The Model

- 4 Assumptions
  1. Homophily

Exchanging of Facts

		Facts				
		A	B	C	D	E
People	1	1	1	1		1
	2	1	1			
	3			1	1	1
	4					1

Probability Matrix: Before Exchanging Fact E

		People			
		1	2	3	4
People	1	0.50	0.33	0.17	0.00
	2	0.50	0.50	0.00	0.00
	3	0.20	0.00	0.60	0.20
	4	0.00	0.00	0.50	0.50

Fact Matrix

		Facts				
		A	B	C	D	E
People	1	1	1	1		1
	2	1	1			
	3			1	1	1
	4					1

Probability Matrix: Before Exchanging Fact E

		People			
		1	2	3	4
People	1	0.44	0.22	0.22	0.11
	2	0.50	0.50	0.00	0.00
	3	0.33	0.00	0.50	0.17
	4	0.33	0.00	0.33	0.33

Fact Matrix: Creating a Fact

		Facts					
		A	B	C	D	E	F
People	1	1	1	1		1	1
	2	1	1				
	3			1	1	1	1
	4					1	

The Model

- 4 Assumptions
  1. Homophily
  2. Interaction leads to exchange.
  3. Facts can be created through interaction.

The Model

- 4 Assumptions
  1. Homophily
  2. Interaction leads to exchange.
  3. Facts can be created through interaction.
  4. People forget facts.

Fact Matrix: Forgetting

		Facts					
		A	B	C	D	E	F
People	1	1	1	1		1	1
	2	1	1				
	3			1	1	1	1
	4					1	

Probability Matrix: After Person 1 Forgets Fact A

		People			
		1	2	3	4
People	1	0.44	0.11	0.33	0.11
	2	0.33	0.67	0.00	0.00
	3	0.38	0.00	0.50	0.13
	4	0.33	0.00	0.33	0.33

Fact Matrix: Forgetting

		Facts					
		A	B	C	D	E	F
People	1		1	1		1	1
	2	1	1				
	3			1	1	1	1
	4					1	

Initial Conditions

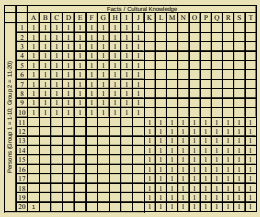
- Basic groups:
  - Organization size = 10 people
  - Cultural complexity = 10 facts
  - Memory = 10 rounds
  - Only 2 organization are simulated.
  - Initially one person from one organization shares one fact from the other organization.
  - All persons know all facts from their organization and none from the other organization.

Probability Matrix: After Person 1 Forgets Fact A

		People			
		1	2	3	4
People	1	0.44	0.11	0.33	0.11
	2	0.33	0.67	0.00	0.00
	3	0.38	0.00	0.50	0.13
	4	0.33	0.00	0.33	0.33

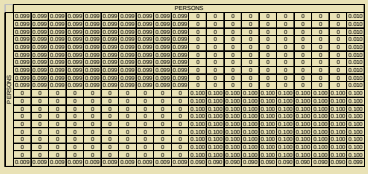
Initial Conditions:

Shared Facts



Initial Conditions:

Probability of Interaction



Research Questions

1. How does *group size* effect integration?
2. How does *memory capacity* effect integration?
3. How does *cultural complexity* effect integration?

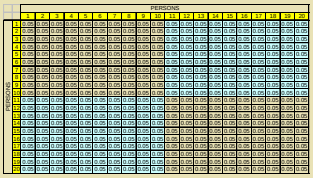
Trials

- Each simulation consisted of 30 trials of complete integration.
- Complete integration occurs when people in one organization have the same probability of interaction with people in their own group as those in the other organization.

The Variables

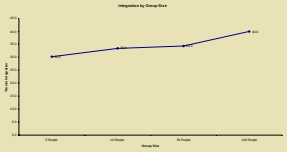
- Dependent Variable:
  - Time to Integration
- Independent Variables:
  - Organization Size
  - Memory Capacity
    - Number of rounds before fact forgotten.
  - Cultural Complexity
    - Number of facts in an organization.

Probability of Interaction after Integration



Results: Organization Size

Graph



Results: Organization Size

Regression

N = 120				
R^2 =.23				
Time	b	s.e.	t	p>|t|
Group Size	0.09	0.02	5.86	0.000

- Group size has a small positive relationship with integration.
- However, this relationship is small and fairly insignificant.

Results: Cultural Complexity

Regression

N = 150				
R^2 =.39				
Time	b	s.e.	t	p>|t|
Memory	0.23	0.02	9.75	0.000

- Cultural complexity has a positive relationship with time to integration.
- Organizations with more cultural complexity take longer to integrate.

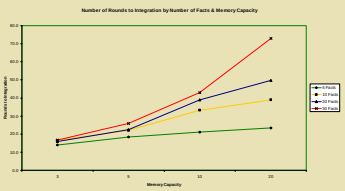
Results: Memory Capacity

Regression

N = 150				
R^2 =.38				
Time	b	s.e.	t	p>|t|
Memory	0.18	0.02	9.61	0.000

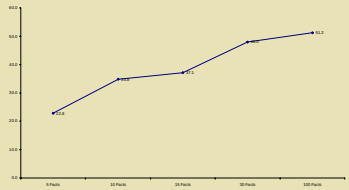
- Memory capacity has a positive effect on time to integration.
- Thus, organizations with higher levels of memory capacity take longer to achieve cultural integration.

Results: Memory/Cultural Complexity Interaction



Results: Cultural Complexity

Graph



Results: Memory/Cultural Complexity Interaction

N = 480				
R^2 =.74				
Time	b	s.e.	t	p>|t|
Memory	0.87	0.08	10.5	0.000
Complex	0.97	1.35	3.1	0.002
MemXComplex	1.73	0.12	14.8	0.000

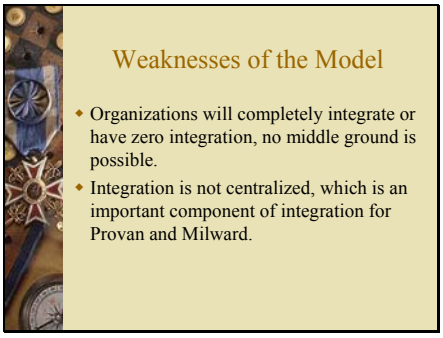
- There was a positive interaction between memory and cultural complexity.
- Thus, as memory and cultural complexity increase time to integration increased at an increasing rate.

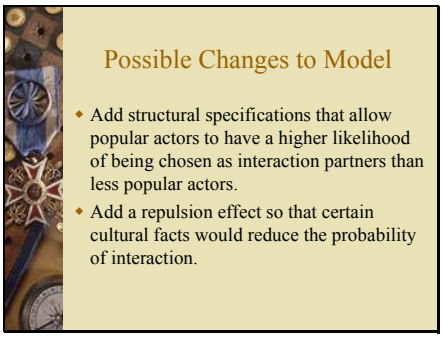
Results Summary:

- Organization size does not effect integration.
- Memory capacity is negatively related to integration.
- Cultural complexity is negatively related to integration.
- As organizations become increasingly more culturally complex and increase their memory capacities it takes significantly longer for them to become integrated.

Conclusions

- Integration (especially when centralized) positively influences network effectiveness.
- Increases in memory capacity and cultural complexity make integration more challenging.
- However, without restrictive factors—not in the model—integration occurs very naturally.
- Can increase integration by promoting cultural "translators" that bridge knowledge gaps.
- Would network integration lead to more effective carbon trading?





YOSHIKI YAMAGATA

Biographical Statement

Dr. Yoshiki Yamagata graduated from the University of Tokyo in 1985 with a major in system science. For the past 20 years he has worked in Tsukuba on various projects including: remote sensing, wetland monitoring, forest ecosystem modeling and carbon management.

He is currently the leader of the Carbon Sink Assessment Team of Climate Change Research Project at NIES. Internationally, Dr. Yamagata has served as a member of the GCP Scientific Steering Committee since 2001.

Pre-Workshop Thought Piece

My current main research interest is to develop coupled carbon management models by integrating ecological and social systems at global and regional scales. The purpose of this coupled model development is the assessment of policy options for achieving sustainable global/regional carbon management.

Based on 20 years research experience on modeling and monitoring terrestrial ecosystems, I participated on the IPCC as a lead author (Land Use, Land Use Change and Forestry) and as a expert member of the Japan negotiation team for the Kyoto Protocol COP since its creation.. As the carbon sink issue under the KP was both scientific and political, I came to realize the importance of filling the gap between pure science and pure policy.

I was invited to join the Global Carbon Project as a Scientific Steering Committee member since the beginning (2003). Before this, with Oran Young, I helped launch a Carbon Management Research Program under the Institutional Dimensions of Global Environmental Change（IDGEC） of IHDP (1999-2002). My main interest in the GCP is to establish a policy relevant Science by integrating both natural and social sciences. This policy relevant Science should be neither ignorant of policy nor influenced by political interests. While the IPCC is not a scientific research activity but a review of past research, the GCP can coordinate future research activities looking at long-term carbon management policy needs. On the other hand, as the GCP under ICSU is nothing but a research NGO, it is destined to suffer less budget.

I am currently leading a carbon sink assessment team to look at Kyoto-related scientific assessment including the analysis of long-term policy options related to carbon sinks. I also lead and plan research projects on regional/national/global level carbon management, with a special emphasis on the coupled model development for realizing sustainable carbon management activities.

My interest in the social network theory and its application is related to my new research project to achieve an innovative regional carbon management system for the northern island of Japan, Hokkaido. This project is about creating a sustainable local region by combining forest management and biomass energy use with a new local carbon crediting system that would link the separated sectors. I believe creating effective social networks of stakeholders in the region would be a key for the success of the project. I am looking forward to learning the theory and to studying together.

Presentation Summary

TOWARDS A CARBON BALANCED REGION: INTEGRATED MODELING APPROACH

Yoshiki Yamagata
(Reporter: Michael Obersteiner)

Main Points

Yoshiki Yamagata

- Presented the concept of global carbon management (find greater detail in the GCP's research outline ESSP no.1).
- Vision includes the interaction of innovation, market, assessment and regime with agent philosophy, network action and growth model at the center- at the regional scale.
- Harmonization with national policies and regimes (e.g. Carbon market).
- Approach: integrated modeling of the eco-human system aiming at long-term human welfare supporting and guiding the technology and institutional arrangement.

Implications for URCM networks

Regions: This is a truly regional approach aiming at zero emissions.

Carbon: Integrated carbon management including industry, energy and land-use sectors.

Change: Must include the motives of the agents i.e. human motives driven.

GCP 2005 International Workshop on Networks & Regional Carbon Management, April. 5-7, 2005, Tsukuba, Japan

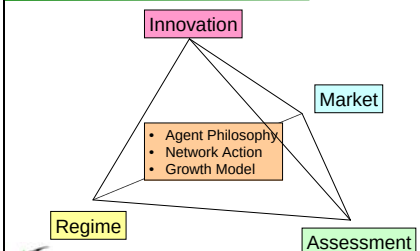
Toward a Carbon Balanced Region – Integrated Modeling Approach

Yoshiki YAMAGATA

Climate Change Research Project
National Institute for Environmental Studies
JAPAN
Contact: yamagata@nies.go.jp

Independent Administrative Institution
National Institute for Environmental Studies

Vision: Integrated modeling for regional carbon management



The challenge for modeling regional carbon management

- In modeling integrated regional eco-human systems, it is especially important to consider diverse regional human responses
- Overall success of regional carbon management should be judged in terms of long-term human welfare increase
- Regional carbon management regime could be realized through technological and institutional arrangements
- Valuable insights can be obtained by assessing different regional policies using the integrated modeling

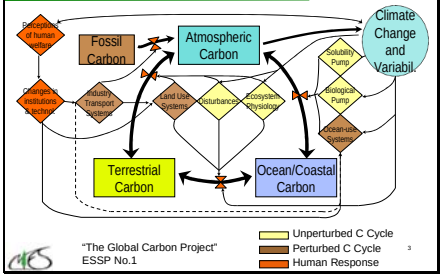
2

Integrated modeling approach for global carbon management

- This analysis aim to provide insights into what kind of carbon management regime will be formed using dynamic game model
- We model successive international negotiation process as differential games
- The model allow us to asses how nations try to optimize long-term human welfare under gradual and abrupt climate change
- Simulations reveal factors (risk averseness of agents etc.) that will influence carbon management regime formation

5

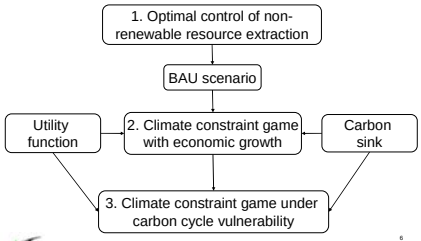
What is global carbon management?



"The Global Carbon Project" ESSP No.1

3

Analysis flow diagram



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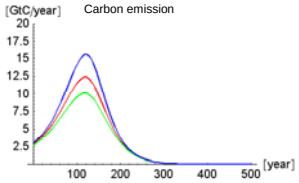
Analysis tool: Differential Game

- What is “Differential game”.
  - “Dynamic (differential) game theory can be viewed as a child of the parents game theory and optimal control theory.”[1]
  - Each player maximize (individual or total) welfare integrated over time with discount rate
- Purpose to solve the differential game
  - to find the Nash equilibrium paths or strategies
  - to find the conditions on which equilibrium exists

7

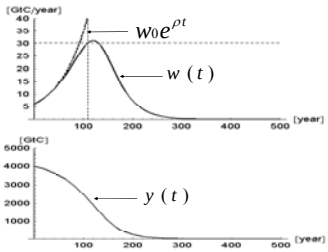
Dynamic Results of Games



- BLUE: Don’t consider damage (d=0)
- RED: Markovian Nash equilibrium
- GREEN: Cooperative solution

10

1. Solution of Non-Renewable Resource Extraction Optimal Control



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3. Climate constraint game under carbon cycle vulnerability

- Formulation
  - Dynamic system $\dot{x}(t) = u_1(t) + u_2(t) - S(x)$
    - x [GtC]: Atmospheric carbon concentration
    - u_1, u_2 [GtC/year] : each player’s emission
    - $S(x)$: Sink term, three types are considered
  - Utility function $F_i(u_i, x, t) = U(u_i) - dx^2$
    - $U(u)$: economic utility, three types are considered
    - d : Damage coefficient
  - then optimization problem of each player is

$$\text{Maximize} \quad \int_0^\infty e^{-rt}\left(U(u_i(t)) - dx(t)^2\right)dt$$
$$\text{subject to} \quad \dot{x}(t) = u_1(t) + u_2(t) - S(x(t)),\ x(0) = x_0.$$

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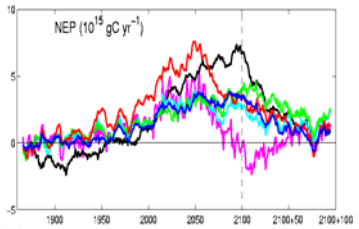
2. Climate constraint game with economic growth

- Global emission is divided into players
- Formulate climate constraint carbon management regime by differential game
- Use the solution of non-renewable resource optimization as BAU emission level (bliss point) of the game
- Calculate cooperative solution (global optimal solution) and Nash equilibrium solution of the game

9

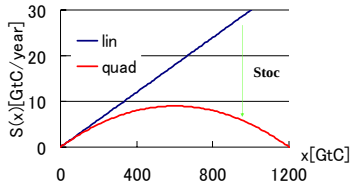
Predicted saturation of carbon sink



Cramer et al. (2000)

12

Sink saturation functions (cont.)



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Sink saturation functions

- [lin]: linear sink

$$S(x) = qx$$

- [quad]: quadratic sink

$$S(x) = (q - px)x$$

- [stoc]: stochastic sink
  - mode 1: $S(x) = qx$
  - mode 2: $S(x) = 0$
  - Probability to switch mode 1 to mode 2:

$$Q_{12}(x) = \lim_{\Delta \to 0} \frac{1}{\Delta} \mathrm{Prob}(\mathrm{mode}(t+\Delta) = 2 | \mathrm{mode}(t) = 1)$$
$$= \frac{1}{\tau}\left(\frac{q}{q-px} + W\left(-\frac{q}{q-px} e^{-q/(q-px)}\right)\right)$$

  - where $W=W(X)$ is the inverse function of $X=W \exp(W)$

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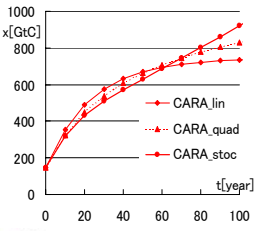
Effect of sink saturation functions on stable CO2 concentration



- In an early phase, stoc<quad<lin
  - Stoc: agent is afraid of changing into mode 2
  - Quad: reduce emission against less-sink in the future
- In a later phase, lin<quad<stoc.
  - Stoc:, no sink effect due to mode change
  - Quad: less-sink
  - Lin: much sink

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Conclusion and Discussion

- Carbon management regime formation is simulated using differential game
- Human response changes under gradual and abrupt climate change are analyzed
- More realistic model with regional heterogeneous agents need to be developed
- Social network analysis for creating cooperation based on scientific knowledge need to be modeled

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EXPO 2005

YUKIKO YOSHIDA

EXPO 2005 AICHI JAPAN

About the 2005 World Exposition, Aichi, Japan

Message from Japan: “Nature's Wisdom”

Yukiko YOSHIDA
CGER/NIES
April 6, 2005

Why “Nature's Wisdom”?

- Technology
  the key to finding answers
- Culture
  defining the future of technology
- A new balance between nature, technology and culture

↓

When I summarize it

For future vision of 21st century

Key word: Hybrid

(New and Old)

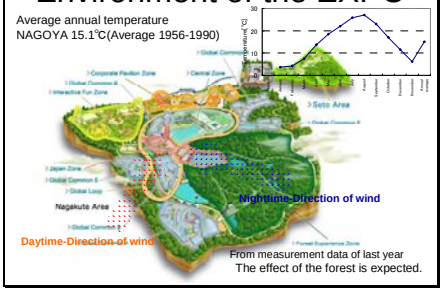
Development for Eco-Communities

Outline

- EXPO Overview
- Why “Nature's Wisdom”?
- Environment of the EXPO
- How to evaluate the environment?
- Attempt to solve environmental problems
- Thinking about earth and future

Environment of the EXPO

Average annual temperature
NAGOYA 15.1℃(Average 1956-1990)



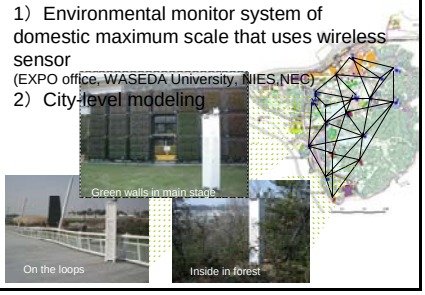
From measurement data of last year
The effect of the forest is expected.

Overview

- **Location**
  Nagoya Eastern Hills
  (Nagakute Town, Toyota City and Seto City)
- **Duration**
  25 March - 25 September 2005
  (total of 185 days)
- **Expected number of visitors**
  approx.15 million
- **Organizer**
  *TOYOTA
  *Aichi Prefecture
  *Ministry of Economy, Trade and Industry, JAPAN

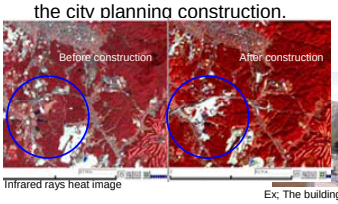
How to evaluate the environment?-1

1) Environmental monitor system of domestic maximum scale that uses wireless sensor
(EXPO office, WASEDA University, NIES,NEC)
2) City-level modeling



How to evaluate the environment?-2

- 3) Very difficult to count from heat image (The building shape is special.)
- 4) It becomes effective study in logic on the city planning construction.



Infrared rays heat image

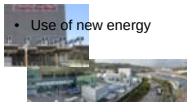
Ex; The building shape is special

Attempt to solve environmental problems

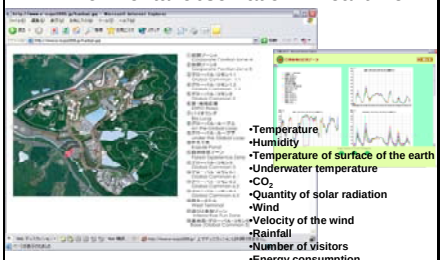
- Recycling system (3R)
  Reuse・ Reduce・ R ecycling
  （ Garbage, E n e r g y ）

- All the temporary buildings are constructed on the assumption of recycling.

- Use of new energy



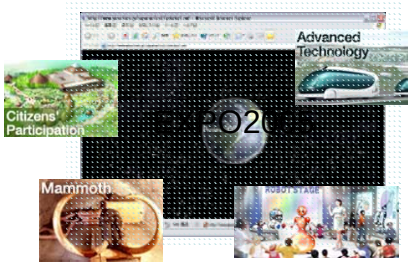
Environmental observation in real time



- •Temperature
- •Humidity
- •Temperature of surface of the earth
- •Underwater temperature
- •CO_2
- •Quantity of solar radiation
- •Wind
- •Velocity of the wind
- •Rainfall
- •Number of visitors
- •Energy consumption

http://ecoclub.expo2005.or.jp/check/c4-1.html

Thinking about the earth and the future



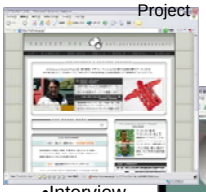
Related site（ for KIDs）

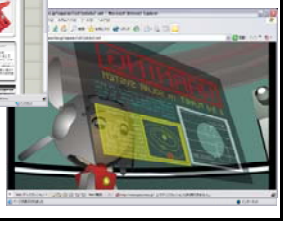
http://ecoclub.expo2005.or.jp/

Collaboration of artists, scientists and the public

Project CO_2 -Art, Science & Society-

http://co2.nies.go.jp





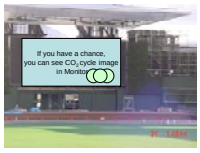
- Interview
- Animation
- Quiz
- GCP
- News

EXPO Web Site

- http://www.expo2005.or.jp/

Please enjoy your stay, and please think about the future for yourself.

- Thank you!!



Keynote Presentation

JEFFREY BROADBENT

Presentation Summary

PATHWAYS TO PARTICIPATION: GLOBAL NETWORKS AND NGO VOICE IN JAPANESE CLIMATE CHANGE POLICY MAKING

Jeffrey Broadbent
(Reporter: Stephan Scholz)

Main Points

- Broadbent tests four hypotheses to explain the rate of NGO participation in stakeholder advisory councils and policy formation committees. These four hypotheses are civil society growth, the boomerang theory, international NGO pressure, and the internal logic of the state.
- Data was taken from surveys of 162 Japanese domestic and international governmental organizations, non-governmental organizations and media companies.
- The results offer the most support for the civil society growth theory, and some support for the internal logic of the state. Internal logic of the state refers to the idea that states may decide to co-opt or include strong movements as a form of social control, whereas the civil society growth theory points to the growing influence of NGOs as a function of their domestic ties, and not their international ties.

Testable Hypotheses

After determining which NGOs have been included in advisory councils, and why, it would then be of interest to see if inclusion actually equals effective outcomes.

Implications for URCM Networks

NGO participation will be a crucial component of carbon mitigation. This study provides a case study and framework for determining how international and national level networks impact NGO effectiveness.

Relevant Literature

Fernandez, Roberto M. and Roger V. Gould. "A Dilemma of State Power: Brokerage and Influence in the National Health Policy Domain". American Journal of Sociology, Volume 99, Number 6 (May 1994): 1455 – 91.

Moody, James and Douglas R. White. "Social Cohesion and Embeddedness: A Hierarchical Conception of Social Groups". American Sociological Review, 2003.

GCP Research Agenda:問題提起

- POETIC – interaction of six factors
- In producing carbon usage at many levels:
- Family, organization, community,
- Government, nation, global systems.
- What factors affect "carbon politics" and
- bring about sustainable carbon use?
- How can we use network analysis
- In this kind of research?

.

Acronyms

- GO – Government of a nation
- IGO - International Governmental Organization (i.e., UN)
- NGO – Domestic Non-Governmental Organization (i.e., Japan Wild Bird Society)
- NPO – Non-Profit Organization (=NGO)
- INGO - International Non-Governmental Organization (i.e., Greenpeace)

Networks

- Reveal inter-actor relations & processes.
- Can indicate mechanisms of change
- But not often joined with theory
- Or with in-depth interviews about
- politics, power and policy-making.
- This paper integrates these aspects
- to study *NGO/NPO participation*
- *in climate-change policy-making*

Introduction

Public Participation as Global Norm

- UNCED Rio 1992 set new global norms
- Agenda 21: identified public/NGO participation
- As *crucial* for sustainable carbon practices.
- Nations responded in different ways.
- US ignored it; Japan tried to implement.
- Seems like a good idea, but raises questioins:
- What is participation? Does it really help?

"Participation"

- Voting is a form of participation, but
- Indirect through elected representatives.
- Agenda 21 advocates *direct participation*
- *in making policy* by stakeholder groups
- On advisory councils and other ways.
- Idea: giving voice to critical voices
- Will improve policy.
- NGOs as "moral stakeholders."

Hypotheses on Mechanisms
ＮＧＯ参加を増するメカニズムの仮説

NGO Participation in Japan

- Japanese government allows participation
- By groups on advisory councils (*shingikai*).
- Over 800 *shingikai*, 16,000 seats.
- Mostly business, academics & "Old Boys"
- During 1990s growth of environmental NPOs
- *Some* gained participation, but others not.
- Why did this selection occur?
- Was their participation trivial, symbolic or effective?

Theories

- Concern "ideal" social & cultural processes
- That distribute power & influence
- And produce outcomes, policies.
- In Conflict Theories – A dominates B using superior resources and strategies
- In Neo-institutional Theory – A persuades B based on legitimacy, norms, schema, habits
- Propose different elements of mechanisms

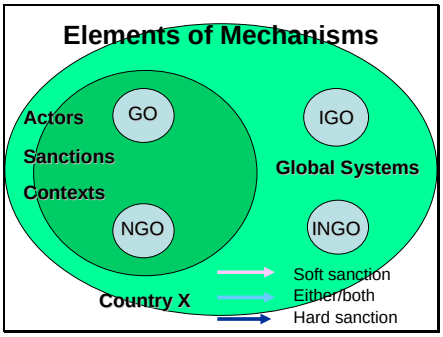
Research Question :問題提起

"During the 1990s, what mechanism(s) brought about the participation of some climate-change related NGO/NPOs in Japanese government climate change policy-making, but not others?""

Mechanisms

- Mechanisms* -- vectors of pressure
- (domination or influence) that
- maintain or change power structures.
- Mechanisms composed of elements:
  - *Actors* – units that act to exert pressure
  - *Sanctions* – hard and soft incentives
  - *Contexts* – larger "playing field" of resources,
    - institutions, culture, other actors.
- Hypotheses -- concern causal mechanisms
- & the elements composing them

*Tilly, Tarrow & McAdam 2001



第一仮説・ Hypothesis 1
Domestic Civil Society

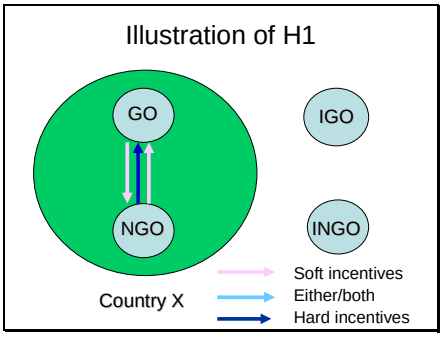
- Domestic NGOs become stronger on own*
- 国内ＮＧＯが自発的に強く なって。。
- Acquire resources (members, information)**
- NGOs pressure state to gain participation
- ＮＧＯ：両方かどちらか利用して政府に働きかける
- Example: the German Green party,
- Japan: Peoples' Forum 2001 市民フォーラム

*Putnam; Skocpol; **Zald & McCarthy

Hard Sanction (domination－権力)

- A uses resources to dominate B,
- change B's behavior against B's will.
- Examples: money, votes, violence
- Strategy: Instrumental, manipulative
- 例：投票する会員が多い
- "Conflict Theory"*
- Proxy: Political support network

*Tilly



Soft Sanction (Influence-説得)

- A *persuades* B to adopt new norms
- Examples: legitimacy, information, morals, norms
- 例：研究で新しい情報を作る能力
- Strategy: cooperation, mutual benefit
- Neo-Institutional Theory*
- Proxy: Vital information network

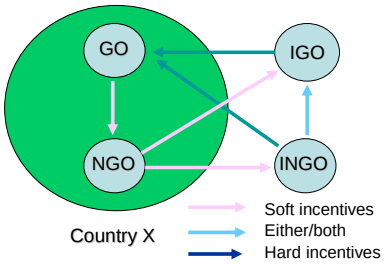
*Meyer

第二仮説・ Hypothesis 2
"Boomerang" ブメラン*

- Domestic NGOs appeal to INGO/IGO
- INGO/IGO apply hard (legal)/soft (embarrassment) sanctions to government.
- Domestic government concedes.
- Example: Anti-Narmada Dam movement
- FOE Japan publicly mocked Mitsubishi,
- got Japan to withdraw support

*Keck & Sikkink

Illustration of H2



第四仮設・ Hypothesis 4
Internal logic of state

- Domestic state has own policy
- Not created by Agenda 21
- To allow NGO participation
- under certain conditions
- For strategic reasons
- to maintain social control
- State-centric theory*
- Or following institutionalized rules.

*Skocpol, et al.

第三仮設・ Hypothesis 3
New "Soft" Global Norms*

- IGO, INGO and multi-national "protocols"
- Create new global norms
- These pass by diffusion, modeling, persuasion
- To domestic actors who learn new standards
- If state: officials allow more NGO participation
- If NGOs: become more legitimate & demanding
- If citizens: become more supportive of NGOs
- 国連・国際協定などで新国際規範の普及
- 国際協定で出来た新しい規範がそれを結んだ政府の役人などに説得力をもって政府が積極的に参加を認めるようになる。
- Ex: Global spread of Environmental Agencies

*Frank et al.; John Meyer, Richard Scott

Illustration of H4

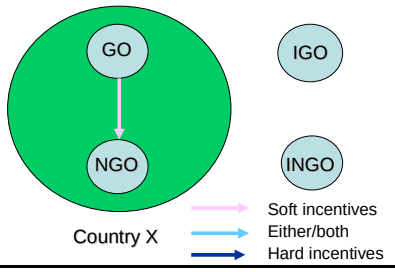
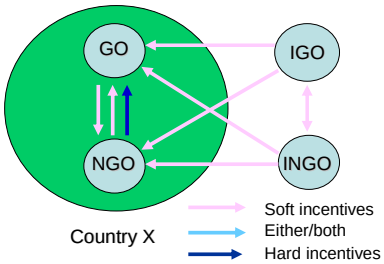


Illustration of H3



Predictions

第一仮説が正しい場合の予測:
If H1-*Domestic Civil Society* is correct

- Domestic NGOs with
- more resources (membership, budget),
- more domestic information ties and
- more domestic political support ties
- will gain more participation
- NGOは資源があればあるほど政治参加も増す

第二仮説が正しい場合の予測:
If H2-*Boomerang* is correct

- Domestic NGOs with more
- political support from INGOs and IGOs
- will gain more participation
- 正しければ、国際ＮＧＯを呼び出した国内ＮＧＯがうまく参加出来るはず

第三仮説が正しい場合の予測:
If H3-*New Soft Global Norms* is correct

- State officials will allow
- all NGOs more participation.
- すべてのＮＧＯは政治参加を増大する
- Or, NGOs most expressing
- the new global norm
- (most information ties to IGO/INGOs)
- will gain more participation.

第四仮説が正しい場合の予測:
If H4-*Internal Logic of State* is correct:

- Participation by other types of NGOs
- Will occur before 1992 Agenda 21.
- State use internal criteria to pick NGOs
- If conflict logic:
  - to co-opt NGOs posing political threat
  - and to seek other advantage
- If neo-institutional logic:
  - to pick "like-minded" compliant NGOs

研究方法・ Research Methods

Policy Network Approach

- Laumann & Knoke *Organizational State* 1985
- Knoke, Pappi, Broadbent & Tsujinaka
- *Comparing Policy Networks* 1996
- Broadbent proposal--Comparing Environmental Policy Networks, 1992
- Tsujinaka got funding, further specified:
- Tsujinaka & Ishio designed GEPON
- (Global Environmental Policy Network) Survey
- And fielded GEPON in Spring 1997

Respondent Organizations・回答者組織

- Interviewed 128 domestic organizations
- Not a “sample,” a “universe”-whole network
- All major organizations engaged in global climate change issue, Japan 1997
- １９９７年当時、気象変化に関して活発に声を上げる日本国内の団体
- Also asked about ties to 33 IGO/INGO
- Interviewed by survey company in 1997
- Supplementary interviews Broadbent 1999

Focal NGOs

- **CASA--National Citizens Meeting for Considering Global Environment and Air Pollution**
- **ED90-00--Earth Day 1990-2000**
- **JANIC--Japanese NGO Center for International Cooperation**
- **JASON--Japan's Save the Ozone Network**
- **JELC--Japan Eco-Life Centre**
- **PF2001J--People's Forum 2001, Japan**
- **UPPCAN--Used Paper Problem Citizens Action Network**
- **GPJ--Greenpeace Japan**

組織分類（ GEPON調査データ）
Types of Organizations (GEPON Data)

国内組織 Domestic Organizations

政府	Government	40
政党	Political Party	8
企業	Business	44
労働	Union	1
専門団体	Professional Group	2
市民社会	Civil society/NGO	17
政府機関	Quasi-Gov’tal Agency	7
マスコミ	Mass Media	9
小計	Total	128

調査対象ＮＧＯ

国内NGO

CASA　地球環境と大気汚染を考える
CUJ　日本語書者連合
ED90-00　アース・デイー 1990-2000
JANIC　ＮＧＯ活動推進センター
JASON　ストップ・フロン全国連絡会
JCCU　日本生活協同組合連合
JECO　日本・エコロジー・センター
JELC　ジャパン・エコライフ・センター
PARC　アジア・太平洋資料センター
PF2001J　市民フォーラム
UPPCAN　古紙問題市民行動ネトワーク
WBSJ　日本野鳥の会

国際 NGOの日本支部

GPJ　グリンピース・ジャパン
WWFJ　World Wide Fund for Nature-ジャパン

国際組織 International Organizations

国際NGO	International NGOs	11
国際政府的	International Gov’tal	14
政府機関	Quasi-Gov’tal Agency	6
企業	Industrial Organizations	2
小計	Total	33

- （ 総数　Grand Total　161）

質問内容・ Question Content

- Networks of information and support
- Reputation for influence
- Resources-membership, budget, information-providing capacity, organizational form
- Participation in policy-making events
- Degree of interest in different issues
- **国内の組織的資源、相互の情報交換と政治支援交換の関係（１２８国内団体、３３国際組織）、影響力のスコア、組織資源（会員数、予算、情報提供能力）、政策決定過程への参加、イシュー態度等**

Networks as Political Data

- Networks are not just “social”
- Network approach can provide new
- types of data, insights, & explanations.
- GEPON collected data on 2 kinds of networks
- *Political support* -- a “harder” resource because it can cause politicians to lose elections
- *Vital information* -- a “softer” resource relating to scientific knowledge, ideology & persuasion

Typology of NGO Participation

Two Types of Participation asked in GEPON

- Membership in an Advisory Council
  - Central Council for Environmental Pollution Control
- Helping to write legislation

Table: Four Types of Participation

Type	Membership	Help write
Influential	Yes	Yes
Political	No	Yes
Token	Yes	No
Excluded	No	No

Findings・結果

ＮＧＯ参加の分類

NGOの政策形成過程への参加の四つのタイプ

- 類型審議会委員への参加（ 中央環境審議会等）
- 法案作成への参加

【表1】

タイプ	審議会参加	法律策定
影響的	Yes	Yes
政治的	No	Yes
フォーマル	Yes	No
無参加	No	No

Findings Include・結果内容

- Typology of NGO Participation
- ＮＧＯ参加の分類
- Organizational Form of NGOs 国内ＮＧＯの4 組織的模様
- Network Images (Whole & Cluster)
- Table Comparing NGO Variables
- “Pathways to Participation”
- Reputations for Influence

*Qualitative Comparative Analysis (Ragin)

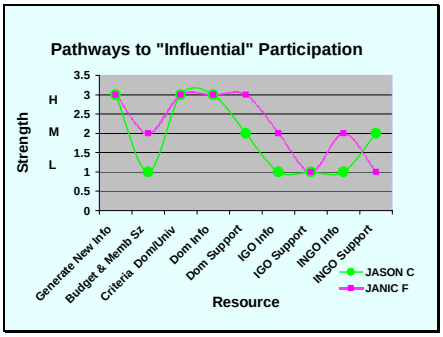
Organizational Form of NGOs 国内ＮＧＯの4 組織的模様

単独　　一つの組織だけ
Single unit NGO (domestic) (S)
支部　　地方支部を 持つ全国組織
NGO with chapters (domestic) (C)
傘　　多数の組織が議論・調整できる場
Forum (umbrella) NGO (domestic) (F)
国際　　国際ＮＧＯの国内支部.
Local branch (of international) NGO (B)

Network Images—Whole & Cluster

- Whole network: all connected organizations
- If many members, very complicated
- Useful data for statistical analysis
- Visual analysis reveals patterns
- One way: define sub-sets: clusters*
- Cluster: highly inter-connected “clique”
- View on image program**

* Network analysis with UCINet; **Mage



QCA Data Reduction

- Qualitative Comparative Analysis*
- Start with detailed statistical table
- Convert statistics to categorical variables (Low, Medium, High)
- Create comparative QCA table
- Table indicates factors affecting participation
- Factor combinations indicate “Pathways to Participation”

*Ragin

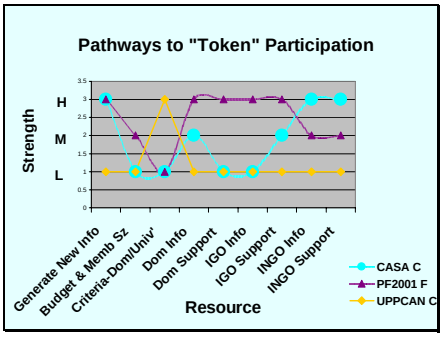
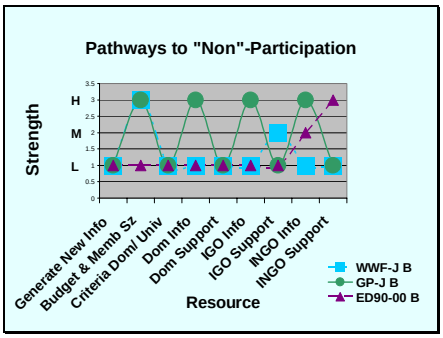


Table 2: Pathways to Participation

	Domestic Resources						International Networks				Degree of Participation		
Org Name & Founding Year	Type	Own Info	Bud &Mem	Japan Orien-tation	Dom Info	Dom Sup	IGO Inf	IGO Sup	IN GO Inf	IN GO Sup	Advis. Coun.	Help Write Legis	Type
JASON 95	**C**	**H**	**L**	**H**	**H**	**M**	**L**	**L**	**L**	**M**	**Y**	**Y**	**INF**
JANIC ‘87	**F**	**H**	**M**	**H**	**H**	**H**	**M**	**L**	**M**	**L**	**Y**	**Y**	**INF**
JCCU ‘51	C	H	H	H	H	L	M	L	H	L	Y	Y	INF
JECO ‘77	S	L	H	H	L	L	L	L	L	L	N	Y	POL
WBSJ ‘70	C	L	H	H	L	L	L	L	L	L	N	Y	POL
CASA ‘88	**C**	**H**	**L**	**L**	**M**	**L**	**L**	**M**	**H**	**H**	**Y**	**N**	**TOK**
PF2001 ‘93	**F**	**H**	**M**	**L**	**H**	**H**	**H**	**H**	**M**	**M**	**Y**	**N**	**TOK**
UPPCAN 93	**C**	**L**	**L**	**H**	**L**	**L**	**L**	**L**	**L**	**L**	**Y**	**N**	**TOK**
JELC ‘91	**C**	**L**	**L**	**H**	**L**	**L**	**L**	**L**	**L**	**L**	**N**	**N**	**N**
ED90-00 89	**B**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**M**	**H**	**N**	**N**	**N**
GP-J ‘89	**B**	**L**	**H**	**L**	**H**	**L**	**H**	**L**	**H**	**L**	**N**	**N**	**N**
PARC ‘73	S	L	M	L	M	L	M	L	M	L	N	N	N
WWF-J ‘71	B	L	H	L	L	L	L	M	L	L	N	N	N
CUJ ‘69	S	L	M	H	M	L	H	L	L	L	N	N	N

Key: S = domestic Single unit NGO; C= domestic NGO with Chapters; F = domestic Forum (umbrella) NGO; B= local Branch (of foreign) NGO; INF = Influential; TOK=Tokenism; POL=Political



Pathways (factors) to participation?

- Domestic, high new information, high domestic information ties, use domestic criteria, low IGO/INGO political support → Influential
- Domestic, two generate new information but use universalistic criteria → Token
- Domestic/foreign branch, no new information, domestic/IGO/INGO political support → Excluded

Reputation for Influence (RI)–Top Ten

- 102 EA-Global Environment Dept., Planning & Coordination Bureau
- 102 IPCC-Intergov'l Panel on Climate Change
- 95 UNEP-United Nations Environ'l Program
- 94 MITI-Enviro. Prot. & Industrial Loc. Bureau
- 92 Central Advisory Council for Environment
- 83 Japan Federation of Economic Organizations
- 79 MITI-Agency of Natural Resources & Energy
- 78 OECD-Environmental Policy Committee
- 77 Greenpeace International
- 76 EA-Air Quality Bureau

Does Participation Bring Influence?

PARTICIPATION BRINGS INFLUENCE?

ACRONYM	*RI*	*TYPE*	*NAME*
JASON	15	INF	Japan's Save the Ozone Network
JANIC	8	INF	Japanese NGO Center for International Cooperation
PF2001J	23	TOK	People's Forum 2001 of Japan
CASA	16	TOK	(National Citizens Meeting for Considering Global Environment and Air Pollution)
UPPCAN	6	TOK	Used Paper Problem Citizens Action Network
GPJ	37	NON	Greenpeace Japan
ED90-00	11	NON	Earth Day 1990-2000
JELC	9	NON	Japan EcoLife Centre

Measures of Influence

- Positional – hold formal office
- Decisional – who makes actual decisions?
- Reputational – experts identify influentials
- GEPON: reputational method (and others)
- Respondents of 103 domestic organizations
- Checked "very influential" organizations
- in Japanese climate change politics.
- List: 103 domestic, 33 international orgs.

Real Influence?

- The NGOs with the highest
- reputation for influence (RI)
- In the Japanese climate-change domain
- Did not attain the most participation.
- Both "tokens" had higher RI
- Than both "influentials"
- GPJ had higher RI than any domestic

Validity of Hypotheses

Hypothesis 1: Domestic Civil Society Theory

- *Supported.*
- Domestic NGOs with resources
- Generated *within* domestic civil society
  - Capacity to make new information,
  - More domestic information ties,
- Gained more participation.
- Shows growing strength of civil society

Hypothesis 2: "Boomerang" Theory

- *Not supported by data.*
- Domestic NGOs with political support ties
- to INGOs or IGOs did not participate.
- *But,* is this an adequate indicator?
  - Foreign pressure (外圧) could cause
  - inclusion of *non-demanding* NGOs.

Hypothesis 3: Global Soft Norms

- *Validity Unclear*
- Negative indicators:
  - NGOs with international ties not participate
  - Older NGOs participated before 1990s.
- Positive indicators:
  - Ministries (MOFA & EA) allow participation
  - Had many international ties
  - Known as "internationalist" (EA also?)
  - So, perhaps more affected by global norms

Hypothesis 4: Internal State Logic

- *Probably Supported*.
- Only NGOs with specific qualities
- Attained "full" participation (AC & help write)
- *But* -- What does this pattern indicate?
- A state "logic" of "choosing" NGOs?
  - NGOs participated before Agenda 21
- Or an NGO "logic" of rejecting "participation"?
  - Because *outsider tactics** more influential?

*Ishio

Reputation for Influence

- Another way to measure
- The influence of an organization n--
- Ask the policy-experts of each
- Organization on the survey
- To check off all those organizations
- having "a lot of influence over climate change policy"*
- (scores range from 102 to 4).

Discussion

Japanese NGO sector

- Is growing rapidly & gaining more participation
- But on state's terms.
- NGOs remain very weak financially
- Lack of much public or philanthropic support
- Now getting more grants (MOFA, JEC, Toyota)
- Environmental NGOs growing political influence

- "Participation" does not mean influence!
- "Cooperative" NGOs attain participation.
- "Outsider" tactics are more influential
- On the content of policy.
- Participation mutes critical voice.
- (In AC, policy writers are 40% OB*)

*Asahi Shimbun data

- Boomerang not effective
- because Japan not a developing country,
- not dependent upon foreign aid and loans that can be cut off for non-compliance.
- Global norms and examples from foreign NGOs and INGOs inspire and teach strategies to domestic NGOs

The Japanese state:

- Has "corporatist"* logic –
- Solicits participation by strong domestic groups
- But only if they are "cooperative."
- Some ministries tied to global actors
- But not determined by those networks & norms
- Only allow preferred NGOs participation.
- Excludes INGOs and their domestic branches

*Jepperson; Schofer and F-G

Conclusions

- Shows contradictions in Agenda 21
- The penetration and effect of new global norms depends heavily upon the domestic institutional structures.
- Global and domestic factors interact to produce a distinct pattern of change.
- Understanding of these distinct local institutions and patterns within a given country
- may help NGOs there to become more effective.

Future Directions

- Relate participation to policy output
- See what NGOs asked for “participation”
- Interview ministry officials in charge of AC
- Interview NGO representatives in AC
- See if having more international ties
- predicts using more global discourse (for orgs)
- See if ministries with more international ties
- allow more NGO participation.

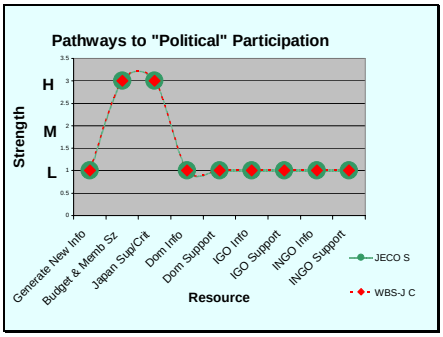
- Participation as defined here may not mean actual effect upon policy.
- Even if NGOs persuade the Environmental Agency of their ideas, the EA’s proposal often lose out to more powerful ministries & the LDP
- 参加と影響組織といってもそれはＮＧＯが国の政策に影響を及ぼす意味と違います。(環境省が弱くて）
- Also, Non-Participation need not mean the absence of an NGO’s effect upon policy. Outside critics may be more effective than inside mild reformers in forcing change.

Future Directions for Self

- Apply policy network method to other levels
- Comparative community carbon studies
- Investigate new dimensions of polity such as
- Distribution and connections of ideas and values

- The paper has demonstrated the utility of network data for the analysis of carbon politics
- The paper also articulated network analysis with general theory to derive empirical conclusions about power, structure & change.
- This kind of analysis of meso-level process
- can be applied to other multi-actor processes
- at community, region, nation or global levels

Appendices



Appendix B: Organizational Data

Org Name	Budget (in US Dollars)	Members		Dom Info	Dom Supp	IGO Info	IGO Supp	INGO Info	INGO Supp	Info Source
		Individual	Org							
CASA	$3,000-5,000	450	60	13	0	4	2	8	7	Scholar / Experts
CUJ	$30,000-100,000	6000	N/A	11	2	10	0	3	0	Other Orgs
ED90-00	$1,000-3,000	N/A	N/A	5	2	1	6	0	0	Other Orgs
GPJ	$100,000-300,000	5400	N/A	28	0	17	0	9	0	DK
JANIC	$30,000-100,000	900	100	17	4	8	0	5	0	Other Orgs
JASON	$10,000-30,000	30	40	16	3	3	1	3	2	Scholar / Experts
JCCU	$ >1,000,000	N/A	708	17	0	5	0	8	1	Scholar / Experts
JECO	$ >1,000,000	55,000	400	4	2	0	0	0	0	Members
JELC	$1,000-3,000	70	17	1	2	1	0	1	1	Ministries
PARC	$30,000-100,000	710	N/A	11	2	9	0	4	1	Ministries
PF2001	$30,000-100,000	N/A	500	31	5	12	7	5	2	Scholar / Experts
UPPCAN	$1,000-3,000	230	20	3	1	0	0	0	0	Members
WBSJ	$> 1,000,000	51,000	209	9	0	0	0	0	0	Ministries
WWFJ	$200,000-1million	20,000	1,000	3	0	4	2	2	1	Ministries

PARTICIPATION CREATES INFLUENCE?

ACRONYM	*RI*	*TYPE*	*NAME*
JCCU	**31**	**INF**	Japanese Consumers' Co-operative Union
JASON	**15**	**INF**	Japan's Save the Ozone Network
JANIC	**8**	**INF**	Japanese NGO Center for International Cooperation
WBSJ	**21**	**POL**	Wild Bird Society of Japan
JECO	**5**	**POL**	Japan Ecology Center
PF2001J	**23**	**TOK**	People's Forum 2001 of Japan
CASA	**16**	**TOK**	(National Citizens Meeting for Considering Global Environment and Air Pollution)
UPPCAN	**6**	**TOK**	Used Paper Problem Citizens Action Network
GPJ	**37**	**NON**	Greenpeace Japan
WWFJ	**27**	**NON**	World Wide Fund For Nature-Japan
CUJ	**20**	**NON**	Consumers Union of Japan
ED90-00	**11**	**NON**	Earth Day 1990-2000
JELC	**9**	**NON**	Japan EcoLife Centre
PARC	**5**	**NON**	Pacific-Asia Resource Center

Appendix C: Participation Data

Org Name	Advisory Committee Appointments						Writing Legislation					
	Gen.	Montreal	UNCED	ODA	Envi. Law	COP3	Gen.	Montreal	UNCED	ODA	Envi. Law	COP3
CASA	Y	N	N	N	N	N	N	N	N	N	N	N
CUJ	N	N	N	N	N	N	N	N	N	N	N	N
ED90-00	N	N	N	N	N	N	N	N	N	N	N	N
GPJ	N	N	N	N	N	N	N	N	N	N	N	N
JANIC	Y	N	N	N	N	N	Y	N	N	N	N	N
JASON	Y	N	N	N	N	N	Y	N	N	N	N	N
JCCU	Y	Y	Y	N	Y	Y	Y	N	N	N	N	N
JECO	N	N	N	N	N	N	Y	N	Y	Y	Y	N
JELC	N	N	N	N	N	N	N	N	N	N	N	N
PARC	N	N	N	N	N	N	N	N	N	N	N	N
PF2001	Y	Y	N	Y	Y	N	N	N	N	N	N	N
UPPCAN	Y	N	N	N	N	N	N	N	N	N	N	N
WBSJ	N	N	N	N	N	N	Y	N	N	N	N	N
WWFJ	N	N	N	N	N	N	N	N	N	N	N	N

CONCLUSIONS

The purpose of the social networks workshop was to explore possible applications of social network analysis to regional carbon management. With this goal in mind, the Global Carbon Project invited a mix of researchers representing the broad spectrum of network theory. Presentations covered topics ranging from traditional empirical studies to innovative agent simulations. After much discussion three broad themes emerged from the workshop.

1. Regional carbon management requires that social network analysis be less descriptive and more applied. For example, it is well documented that social capital can have positive effects on innovation, rural development, market behavior, and household income. However, very little has been written that shows how social capital can be generated or networks can be managed to achieve such an outcome. The conclusion reached at the conference is that innovative applications of technology, such as public participation geographic information systems, can be used as focal points around which new networks can be knit and social capital generated. In the case of Hokkaido, the Global Carbon Project hopes to implement such a method to assist in the development of a biomass economy.

2. Social network analysis is too empirical to have an impact on policy formation because policy makers typically privilege computer modeling scenarios. To address this deficiency, new types of genetic algorithm based simulations were presented and discussed. One of the basic network processes that can be modeled via these algorithms is the evolution of a network structure after certain nodes are removed. This has applications in many realms from disease outbreaks in scale free networks to policy formation on carbon mitigation. The point is to figure out the marginal contribution of different network components to outcomes or processes over time. The contribution of actors to an outcome varies by their position in the network, such as hubs in disease outbreaks that act as the central vectors. It may also be of interest to model what happens to international regimes and CO2 emissions when certain countries or actors are removed from climate change policy networks. These types of models can also examine the effects of regional level social and economic conditions on environmental outcomes. This is done by embedding genetic algorithms within geographic information systems to model the effects of network structures on resource usage.

3. Cases of rural and urban development need to be made comparable in order to recommend future pathways to decarbonization. Qualitative Comparative Analysis was discussed as a methodology that would add rigor to the process of case comparison in low to middle range sample sizes of 10 to 50. For example, it would be useful to compare the structure of rural development networks across multiple cases that lead to sustainable land use management. One negative case of social network failure was presented on dust bowl recovery in the great plains of the United States. Another area of application could be an analysis of international and national level networks on non-governmental organization (NGO) effectiveness. For example, in the case of Japan, it was found by Broadbent, Tsujinaka and Ishio that the most effective NGOs did not derive their success from international networks, but from local networks.

APPENDIX I: INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE RECOMMENDATIONS

Dear Mikiko:

It was a great pleasure to talk with you at Penelope Canan's workshop on social network analysis. As a follow-up to our discussion about scenarios, I wish to provide the following input that may be used for the IPCC Laxenburg workshop in June-July.

The SRES scenarios represent a large step forward in scenario design, especially in the use of storylines both to guide the development of and evaluate the results of future scenarios. However, the SRES scenarios are of only limited use in crafting scenarios that will be useful in assessments of vulnerability and adaptive capacity. Their limitations fall into two categories: the degree of aggregation and the small number of variables.

Just where scenarios are most needed in examining vulnerability and adaptive capacity -- the developing countries and especially LDCs -- the SRES scenarios are too aggregated and optimistic. Regions are simply too big for scenarios to be useful. Lumping Africa and Latin America makes even careful downscaling problematic. And the assumed growth rates for developing countries are unrealistic, as many commenters to the UNDP's Adaptation Policy Frameworks pointed out. Both these issues become magnified as scenario problems when one attempts to make century-long projections.

The small number of variables -- population and GDP per capita, with perhaps measures of technological progress and land use -- fail to account for many factors that have a material influence on development in general and vulnerability/adaptive capacity re climate change in particular. The Adaptation Policy Frameworks' Technical Paper on socioeconomic scenarios (Emilio LaRovere and I are the lead authors), describes five general categories of socioeconomic development essential for a realistic scenario: demography, economics, natural resource use, governance and policy, and culture. For any given area (region, country, sub-country area), a scenario likely would need to include multiple indicators. The way this might work at the global level is to specify a parsimonious set of indicators for use at the global and (more disaggregated) regional level; this parsimonious set can be enriched by other indicators as studies are performed for smaller areas, i.e., a "bottom-up" analysis conducted under the umbrella of a more "top-down" analysis.

Indicators for demographic analysis might include population size and density, age structure, location/urbanization, male/female ratio, migration rate, education (literacy rate), fuel used by households, housing with electricity, rate of poverty and extreme poverty, health characteristics (e.g., infant mortality), food security (e.g., diet, food sources).

Indicators for economic analysis (GDP per capita being a good indicator only in OECD-like countries) might include income, wealth, investment and savings, land tenure, food security, degree of industrialization and/or external market participation, infrastructure, labor force, and environmental impact of industrial activities.

Indicators for natural resource use (a category added at the strong recommendation of commenters) might include the amount/extent of natural resources, current uses and state of health or degradation (e.g., water quality, forest cover, deforestation rates, expansion/abandonment of agricultural lands, soil degradation, desertification), and the potential for further and different uses (considering sustainability).

Indicators for governance and policy might include environmental policies, extent of integration of economic and environmental policies, degree of government stability and/or civil strife, fraction of government budget devoted to social welfare, and planned state reforms (e.g., privatization, current and planned free-trade agreements).

Indicators for cultural analysis might include kinship and other networks of mutual aid, agricultural practices, degree of globalization, rate of consumerism, management of commons, and pathways of technological innovation/adoption.

The reference for this work is:

Malone, Elizabeth L. and Emilio L. LaRovere. 2005. "Assessing current and changing socioeconomic conditions." In *Adaptation Policy Frameworks for Climate Change: Developing Strategies, Policies and Measures*. Bo Lim, Erika Spanger-Siegfried, Ian Burton, Elizabeth L. Malone and Saleemul Huq, editors. Cambridge University Press, Cambridge, UK.

Best,
Elizabeth

Elizabeth L. Malone, Ph.D.
Senior Research Scientist
Joint Global Change Research Institute

APPENDIX II: WORKSHOP CARBON BUDGET

In an effort to be responsible carbon citizens we have calculated the following carbon footprint for the workshop. This is a basic footprint based on just direct emissions from airplane and automobile travel. Options for offsetting this amount include planting trees, improving household fuel efficiency or donating money to an organization such as the carbonfund.org that will invest it in carbon offset projects.

	Air Mileage	Travel to Tsukuba	Travel in Tsukuba	Travel to Hakone	Travel to Aiichi
Broadbent	13,089	55	40	75	479
Cabrera	10,000	55	40	75	479
Caniglia	12,618	55	40	75	479
Dibble	13,544	55	40	75	479
Frank Malone	13,544	55	40	75	479
Kondoh	10124	55	40	75	
Malone	13,544	55	40	75	479
Obersteiner	11,374	55	40		
Schienke	2,608	55	40	75	479
Sonnett	10,000	55	40	75	479
Sub-Total	**110,445**	**550**	**400**	**675**	**3,832**
Canan			40	75	479
Hartman			40	75	479
Iino		318	40		
Kainuma			10		
Kameyama			40		
Ojima			40	75	479
Scholz			40	75	479
Sugihara			40		
Usui Aoyagi			40		
Umemiya			40	75	479
Yamagata			40		
Yoshida			10		
Sub-Total	**0**	**318**	**420**	**375**	**2,444**

Total Air Mileage	**110,445 miles**	at .18 kg CO2/mile	**19,880 kg CO2**
Total Car Mileage	**9,014 miles**	at .36 kg CO2/mile	**3,245 kg CO2**
Total Conference CO2			**23,125 kg CO2**
Conference CO2/person			**1,051 kg CO2/person**

The car mileage figure is based on an average car returning 29mpg. Airplane emissions are very hard to estimate. The figure above is based upon long-haul flights in economy class for just CO2 emissions. However, there may be at least as much global warming effect from other aircraft emissions in the upper atmosphere, such as ozone created from NOx or condensation trails, as from CO2. Based on the estimation that a tree will sequester 650 kg of carbon over its lifetime, each conference participant would have to plant approximately two trees to offset their share of 1,051 kg of carbon dioxide emissions.

APPENDIX III: RELEVANT LITERATURE

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