



Programme on
Ecosystem Change and Society

Stockholm Resilience Centre
Sustainability Science for Biosphere Stewardship



Stockholm
University



ABSTRACTS

OPEN SCIENCE CONFERENCE PECS II

NOVEMBER 7-10 2017
OAXACA CITY
MEXICO

CEDUA

EL COLEGIO
DE MÉXICO



CONABIO

LEUPHANA



Casa abierta al tiempo

UNIVERSIDAD DE GUADALAJARA
CENTRO UNIVERSITARIO DE LA COCOT

INECOL

CIIDIR

PAOT



SwedBio

CONACYT



futurearth
research for global sustainability

FUNDACIÓN
Alfredo Harp Helú
OAXACA

OCV

Oaxaca

SECTUR

CIGA

giz



Oaxaca



COESPO

Oaxaca



SEMADESO

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welcome!

PECS

The Programme on Ecosystem Change and Society (PECS) was launched in 2011. The principal approach of PECS research is an in-depth understanding of the social-ecological dynamics at landscape scale in a wide variety of situations. PECS uses a broadly set of conceptual frameworks and tools that eventually leads to comparisons of place-based, long-term social-ecological case studies, and reveals general principles for sustainable resource management. Since 2014, PECS is officially part of Future Earth, the newly created global research platform that aims to provide the knowledge and support to accelerate our transformations to a sustainable world.

PECS 2017

The first Open Science Conference of PECS was held in South Africa in November 2015. PECSII- 2017 will advance from the momentum and insights gained during the PECS 2015. Eighteen transdisciplinary projects and five cross-cutting working groups have been endorsed within PECS projects, which together cover a wide range of social-ecological case-studies around the world.

Research across these case studies is adaptive and transdisciplinary and combines different knowledge systems and perspective. These features will ultimately, and ideally, allow for the guiding research questions of PECS to be co-designed and co-evolved together by researchers and stakeholders.

PECSII- 2017 will host more than 300 participants from more than 30 countries, from academic, governmental and societal organizations.



WELCOME TO PECS-II

Dear Friends

Welcome to the Second Open Science Conference of the Programme for Ecosystem Change and Society (PECS), in Oaxaca, Mexico, November 7-10 2017 (PECSII). The emphasis this year is on “Transdisciplinary place-based research for global sustainability”. As a network of place-based research, PECS strives to foster interactions and gaining insights from comparisons across sites. Place-based research allows for a better understanding of global social-ecological dynamics, and how transformations towards sustainability are often triggered at the local scale through the co-construction of local solutions.

PECSII will build on previous PECS efforts to synthesize across sites and will highlight recent advances towards more successful transdisciplinary place-based research. Early PECS efforts were aimed at establishing a conceptual and methodological framework and at fostering the endorsement of projects as well as the establishment of working groups. Workshops held in Stockholm in 2013 and in Montpellier in 2014 led to a PECS special issue in Ecology and Society. The first PECS Opens Science Conference in 2015 in South Africa expanded the community and the range of projects and working groups, and was instrumental for quick starting new research approaches and fostering synthesis publications.

PECSII will welcome 350 participants from nearly 200 organizations, including research institutes, schools, universities, environmental NGOs, governments, consultants, as well as organizations of rural producer, of indigenous groups, of civil rights defenders and artists, from 35 countries spanning all continents.

We are looking forward to our very intense three-day program that is designed to foster debate, the discussion of new insights, the development of conceptual and methodological approaches, and the strengthening of a global community of practice. Plenary sessions, symposia, flash workshop, innovative and immersive sessions, speed talk sessions and posters sessions are all set up in ways to promote active exchanges among participants.

We have also set up additional activities to unravel interactions in a wide range of contexts. Pre- and post-meeting workshops and courses, field trips, and cherry picked cultural activities will further nourish our interconnections.

Enjoy this wonderful academic setup developed for you and by you and please make sure to take advantage of the wonders that the city of Oaxaca offers.

Albert Nörstrom

Executive Director of PECS

Patricia Balvanera

Chair of the Local Organizing Committee of PECSII

ORGANIZERS



PROGRAMME ON ECOSYSTEM CHANGE AND SOCIETY

The Programme on Ecosystem Change and Society (PECS) is a Future Earth project that aims to integrate research on the stewardship of social-ecological systems, the services they generate, and the relationships among natural capital, human wellbeing, livelihoods, inequality and poverty.

INSTITUTO DE INVESTIGACIONES EN ECOSISTEMAS Y SUSTENTABILIDAD

UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO.



The Institute for Ecosystem and Sustainability Research (IIES-UNAM) mission is to conduct scientific research, human resources training and links with society, aimed at understanding environmental problems related to the management of socio-ecological systems, from optical disciplinary, multidisciplinary work, interdisciplinary and transdisciplinary. They contribute to building sustainable societies capable of providing fair and just, material and cultural satisfactions without affecting the capacity for renewal of ecosystems and respecting the natural processes that sustain life on the planet.

STOCKHOLM RESILIENCE CENTRE- STOCKHOLM UNIVERSITY



Stockholm Resilience Centre is internationally recognized for its transdisciplinary research. It advances the understanding of complex social-ecological systems and generates new insights and development to improve ecosystem management practices and long-term sustainability.

CENTRO DE ESTUDIOS DEMOGRÁFICOS URBANOS Y AMBIENTALES- EL COLEGIO DE MÉXICO.



The Research Institute of Natural Resources (INIRENA-UMSNH) is a unit of the Universidad Michoacana de San Nicolás de Hidalgo dedicated to scientific research, training human resources, and the transfer and dissemination of knowledge and technology generated for the benefit of society. The scientific community of INIRENA contributes to the understanding, management and conservation of natural resources of Mexico and in particular of the state of Michoacan.



RED TEMÁTICA DE SOCIOECOSISTEMAS Y SUSTENTABILIDAD

It is a platform supported by CONACyT to promote and strengthen collaboration between academics, civil society organizations, decision makers, private sector and local actors, regarding the study of Mexico's socio-systems and their sustainability. Its final objective is the generation of new knowledge, useful in the search of management alternatives, governance and public policies for the co-construction of sustainability from an inter and transdisciplinary perspective.



COMISIÓN NACIONAL PARA EL USO Y CONOCIMIENTO DE LA BIODIVERSIDAD MEXICAN FEDERAL GOVERNMENT.

The Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO) is a permanent inter-ministerial commission of the Federal Mexican government, created in 1992. It has the primary purpose of coordinating, supporting and executing activities and projects designed to foment understanding of biodiversity within Mexico and the surrounding region. As a governmental agency CONABIO produces and collates biodiversity data and assessments across Mexico's varied ecosystems. It also either administers or guides a range of biological conservation and sustainability projects with the intention of securing benefits to Mexican society as a whole.



INSTITUTE FOR ETHICS AND TRANSDISCIPLINARY SUSTAINABILITY RESEARCH LEUPHANA UNIVERSITY

The Institute for Ethics and Transdisciplinary Sustainability Research (IETSR) at Leuphana University is located at the interface between natural sciences and social sciences. The transdisciplinary research approach of the institute features the following three central aspects: a consequent concentration on challenges and problems that are relevant for sustainability. A theoretically and methodologically sound access to these challenges; as well as. The design of collaborative learning processes with an intensive mutual exchange between scientists of different disciplines and actors from politics, economics, and civil society.



UNIVERSIDAD AUTÓNOMA METROPOLITANA.

The Universidad Autónoma Metropolitana (UAM) is a public university founded on 1974 on the idea of innovation. With a strong link to our social environment, our flexibility has helped us maintain our place in the vanguard of higher education.



CENTRO UNIVERSITARIO DE LA COSTA, UNIVERSIDAD DE GUADALAJARA.

The Center of the Coast is part of the University of the State of Jalisco, with an international perspective and dedicated to training professionals with critical, analytical and knowledge generating capacity that contributes to the development and growth of the region's economic and social environment. Extension, technological development and teaching with innovative educational programs of quality.



INSTITUTO DE ECOLOGÍA, A.C.

The mission of INECOL is to generate, transfer and socialize scientific and technological frontier knowledge on ecology and biological diversity, contributing to the innovative solution of environmental, agricultural and forestry problems. To train new talents for science and technology as well as professionals of excellence, and to offer highly specialized professional services in the field of ecology.



CENTRO INTERDISCIPLINARIO DE INVESTIGACIÓN PARA EL DESARROLLO INTEGRAL REGIONAL UNIDAD DURANGO

CIIDIR- Durango is dedicated to the search for solutions and alternatives for the problems of the services and productive sector of the Region through the implementation of projects research, external service and training of human resources.



PROCURADURÍA AMBIENTAL Y DEL ORDENAMIENTO TERRITORIAL DE LA CIUDAD DE MÉXICO.

PAOT is a decentralized public agency whose purpose is the defense of the rights of the inhabitants of Mexico City to enjoy an environment suitable for their development, health and welfare, through the promotion and monitoring of compliance with legal provisions in environmental matters and land use.



JARDÍN ETNOBOTÁNICO DE OAXACA, CENTRO CULTURAL SANTO DOMINGO.

The Jardín Etnobotánico de Oaxaca has the objective to show the abundance and peculiarities of the Oaxaca's flora, traditional crops, and rescue the knowledge of indigenous people about the flora of their region.



UNIVERSIDAD AUTÓNOMA BENITO JUÁREZ DE OAXACA

The Autonomous University Benito Juárez of Oaxaca (UABJO) is a decentralized institution of the state with its own legal personality and a wide educational offer, is commonly known as the Maxima Casa de Estudios de Oaxaca, being the most offered in the State.



INSTITUTO TECNOLÓGICO DE OAXACA TECNOLÓGICO NACIONAL DE MÉXICO

The Instituto Tecnológico de Oaxaca is part of the Instituto Tecnológico Nacional de México (TecNM). The TecNM consists of 266 institutions, of which 126 are Federal Technological Institutes, 134 Decentralized Technological Institutes, four Regional Centers for Optimization and Equipment Development (CRODE), an Interdisciplinary Center for Research and Teaching in Technical Education (CIIDET) and one National Center for Research and Technological Development (CENIDET). The Instituto Tecnológico de Oaxaca offers nine undergraduate and five graduate degrees and has 6750 students.



PROYECTO MIXTECA is a project that promotes the adoption of criteria to improve natural resources' management, to help stakeholders when taking decisions. This project integrates biodiversity and conservation in natural resources use and planning of Mixteca Region development, it uses tools of ecosystem services and offers different options of sustainable life. The goals of this project are: to manage conservation areas critical ecosystems, to ensure relevant species within conservation areas and to foster institutions to adopt ecosystem services criteria when deciding conservation budget.

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SPONSORING

*We are grateful for all institutions that offered financial support,
donations or contributed
to the organization of PECS-II*



SWEDBIO

SwedBio is a knowledge interface on resilience & development at Stockholm Resilience Centre. Its mission is to enable knowledge generation, dialogue and exchange between practitioners, policymakers and scientists for development and implementation of policies and methods – which contribute to poverty alleviation, equity, sustainable livelihoods and social-ecological systems rich in biodiversity that persist, adapt and transform under global change.



CONSEJO NACIONAL DE CIENCIA Y TECNOLOGÍA

Consejo Nacional de Ciencia y Tecnología (the National Council of Science and Technology) (abbreviated CONACYT) is Mexico's entity in charge of the promotion of scientific and technological activities, setting government policies for these matters, and granting scholarships for postgraduate studies.



COORDINACIÓN DE LA INVESTIGACIÓN CIENTÍFICA, UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO

The Scientific Research Coordination of the National Autonomous University of Mexico has as objectives: promote and strengthen scientific research, the scientific decentralization, support the dissemination and exchange of ideas, and the results and experiences that contribute to the development of science and technology in Mexico.



FUTURE EARTH

Future Earth is a major international research platform providing the knowledge and support to accelerate transformations to a sustainable world. Launched in 2015, Future Earth is a 10-year initiative to advance Global Sustainability Science, build capacity in this rapidly expanding area of research and provide an international research agenda to guide natural and social scientists working around the world. But it is also a platform for international engagement to ensure that knowledge is generated in partnership with society and users of science.



FUNDACIÓN ALFREDO HARP HELÚ

Under the motto "our commitment is with Mexico", Alfredo Harp Helú carries out one of the most comprehensive and recognized philanthropic works of our country. Since the early 1990s, a model of philanthropy has been promoted that does not only react to aid applications, but proactively takes actions that have a significant and measurable impact on society, guided by a long-term vision.



OFICINA DE CONVENCIONES Y VISITANTES DE OAXACA

The Office of Conventions and Visitors (OVC) of the State of Oaxaca is a governmental non-profit organization; focused on the development, professionalization, commercialization and tourism promotion of the State in the national and international scope through the attraction and attention of Congresses, Conventions, Fairs and Exhibitions that increase the activity of Tourism of Meetings with the objective of increasing the economic spill in some cities of the State of Oaxaca.



CONSEJO OAXAQUEÑO DE CIENCIA Y TECNOLOGÍA

The Oaxacan Council of Science and Technology (COCYT) is a Decentralized Public Organism of the Government of the State of Oaxaca.



AYUNTAMIENTO DE LA CIUDAD DE OAXACA

The government of the municipality of Oaxaca is responsible for the operation of the City of Oaxaca.



CENTRO DE INVESTIGACIONES EN GEOGRAFÍA AMBIENTAL, UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO

The Centre for Research in Environmental Geography (CIGA-UNAM) objectives are: i) to conduct research on Environmental Geography in emerging and cross-cutting themes in specific geographical areas; ii) developing training programs for human resources in collaboration with other local academic units; and iii) linking research and teaching with the specific needs of social and institutional sectors, particularly at local and regional level, without losing an international academic perspective.



DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT

As a provider of international cooperation services for sustainable development and international education work, we are dedicated to building a future worth living around the world. GIZ has over 50 years of experience in a wide variety of areas, including economic development and employment, energy and the environment, and peace and security.



UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION

UNESCO is responsible for coordinating international cooperation in education, science, culture and communication.



COORDINADORA ESTATAL DE PRODUCTORES DE CAFÉ DE OAXACA, CEPCO is a regional organization of coffee producers based in Oaxaca State, it was founded in 1989 to group small local producers of coffee and currently CEPCO is head of 34 local organizations. The main objective of this group is to commercialize our partners' coffee directly in a national and international scales, in order to cope with price crisis. Since 1993 CEPCO has been promoting production, transformation and commercialization of sustainable organic coffee.



SECRETARIA DEL MEDIO AMBIENTE, ENERGIAS Y DESARROLLO SUSTENTABLE

SEMAEDES0 is the state ministry of Environment, Energy and Sustainable Development.



COMISION ESTATAL FORESTAL GOBIERNO DEL ESTADO DE OAXACA

COESFO is the governmental office in charge of fostering forestry activities.

ORGANIZING COMMITTEE



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LOGISTIC SUPPORT



Intermeeting is in charge of the logistic planning and organization of the event. They have been organizing conferences, expositions and conventions for 19 years



Mariana Martinez Balvanera is a Spatial Story Teller based in Amsterdam and Mexico City. She designed PECSII webpage, and PECS logo.

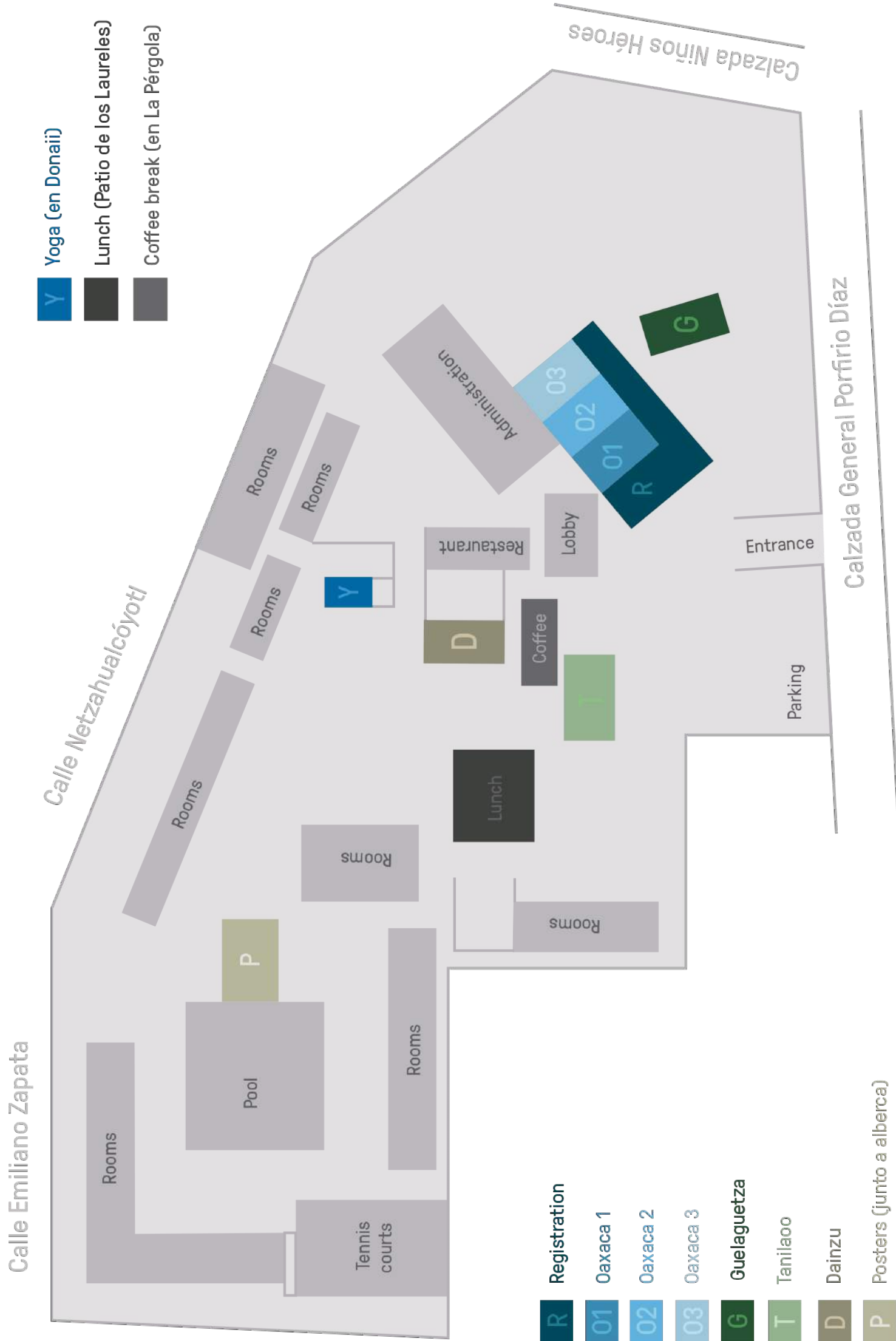


Angela Arita is a Designer and Artist who undertook the graphic design of our program.

PROGRAM AT GLANCE

November 6	November 7	Wednesday November 8	Tuesday November 9	Friday November 10	November 11, 12, 13
		7:00 - 8:00 Yoga	7:00 - 8:00 Yoga	7:00 - 8:00 Yoga	
		8:00 - 18:30 Registration	8:00 - 14:00 Registration	8:00 - 14:00 Registration	
9:00 - 17:00	9:00 - 17:00	8:30 - 10:00 Plenary session: S. Díaz and V. Galaz The role of place-based research for global sustainability and how global drivers affect place	9:00 - 10:00 Plenary session: F. Berkes and X. Basurto Stewardship with local institution and governance: co-producing knowledge and scaling-up?	9:00 - 10:00 Plenary session: E. Bennet and J. Merçon Opportunities in the Anthropocene	9:00 - 17:00
Preconference courses and workshops (only registered participants)	Preconference courses and workshops (only registered participants)	10:00 - 10:30 Coffee Break	10:00 - 10:30 Coffee Break	10:00 - 10:30 Coffee Break	Preconference courses and workshops (only registered participants)
Field Trips	Field Trips	10:30 - 12:00 Symposia: Collaborative pathways to ecosystem stewardship; socioecological dynamics of payments for hydrological services programs. Towards realistic positive futures for the planet. Tackling complexity by increasing complexity. Local and global drivers of transformation towards sustainability in Latin America. The role of sense of place in social-ecology systems.	10:30 - 12:00 Symposia: Feedbacks and cross scale interactions driving land system change. Socio-cultural valuation of ecosystem services. Putting transformative adaptation into action. Urban sustainability transformations. Social-ecological regime shifts. Social-ecological evaluation of conservation and development policies.	10:30 - 12:00 Symposia: Marine systems in the anthropocene. Governance challenges for climate adaptation in protected areas management. Biocultural diversity and resilience. Technology in social-ecological systems. Transformation of social-ecological systems-pathways Innovative & immersive sessions: Place-based research with gender and feminist approaches.	Field Trips
Cultural activities	Cultural activities	12:00 - 12:30 Coffee Break	12:00 - 12:30 Coffee Break	12:00 - 12:30 Coffee Break	Cultural activities
	12:00 - 17:30	12:30 - 14:00 Symposia: Making change happen Flash workshops: (How) Can the ecosystem services framework foster agroecological transitions for sustainability. Natural assets- where do science and policy need to go? What have we learned about poverty and ecosystem services? No more silos. Innovative & immersive sessions: Community responses in time of crisis.	12:30 - 14:00 Speed talk sessions: Integrating the social and the ecological-scenarios, planning and management. Access, equity and perceptions of value. People, landscapes and multiple ecosystem service. Innovative and local approaches to sustainability challenges. Governance and community level natural resources management. Climate, land use and water management.	12:30 - 14:00 Symposia: Equity and environmental change in an urbanizing world. Operationalizing tools and strategies for sustainable cities. Ecosystem services for unpacking the value of protected areas. Flash workshop: Speaking a transdisciplinary language. Innovative and immersive session: Special issue session: Educating locally-international sustainability education.	
		14:00 - 15:00 Lunch	14:00 - 15:00 Lunch	14:00 - 15:00 Lunch	
	17:00 - 20:00	15:00 - 17:00 Innovative & immersive sessions: The sustainability hype; Hacking sustainable diets; Science transformation and the transformation of science; Just benefit flows; Blue and green infrastructure in support of well-being? Video: Gereba	15:00 - 17:00 Innovative & immersive sessions: Fulfilling the promise of ecosystem service science. Diverse epistemologies for global sustainability. Chef and cooks as change-makers in the food system. Crossing the boundaries- place-based governance at the land-sea interface. Sustainability and transdiscipline in practice Video: Coffee and honey	15:00 - 16:30 Innovative & immersive sessions: Social tipping points. What can multiple values bring to the table? Tradeoffs-interactive training game. Mixed reality, virtual reality and augmented reality. Board game to community and validate with stakeholders Video: The dynamics of land deals in Africa	
	Opening Ceremony (Centro Cultural San Pablo)	17:00 - 18:00 Poster sessions: Resilience and adaptation in a changing world. Marine and coastal social-ecological systems. Co-management and social capital. Co-production of knowledge and transdisciplinarity	17:00 - 18:00 Poster sessions: Ecosystem services in social-ecological systems. Innovative methodological tools. Social-ecological production systems. Resilience and adaptation in a changing world	16:30 - 17:30 Closing plenary	
		18:30 - 20:00 Cultural activities and yoga	18:30 - 20:00 Cultural activities and yoga	18:30 - LATE Closing party (Jardín San Felipe 310)	

MAP OF THE VENUE- HOTEL MISIÓN DE LOS ÁNGELES



OAXACA CITY



CULTURAL ACTIVITIES

	Cost	8 Nov	9 Nov	10 Nov	11 Nov	12 Nov	13 Nov	14 Nov	15 Nov	16 Nov
Yoga (30 people, Donaji, Hotel Mision Los Angeles)	Free	7:00-8:00 19:00-20:00	7:00-8:00 19:00-20:00	7:00-8:00	7:00-8:00 19:00-20:00	7:00-8:00 19:00-20:00	7:00-8:00	7:00-8:00 19:00-20:00	7:00-8:00 19:00-20:00	7:00-8:00
Museum of Filatelia (30 people)	Free							18:30-19:00	18:30-19:00	
Museum of Textil (20 people)	Free							17:00-18:00	17:00-18:00	
Museum of San Pablo Cultural Center	Free	18:30-19:00	18:30-19:00					18:30-19:00	18:30-19:00	
Etnobotanical Garden (30 people)	Free				17:00-18:00					
Mezcal tasting, Mezcaloteca (13 people)	270 pesos	20:00-20:45	19:00-19:45		18:00-18:45	19:00-20:45		20:00-20:45	19:00-19:45	
Coffee tasting, Cafetería La Organización (15 people)	150 pesos	19:00-20:00	19:00-20:00		19:00-20:00	19:00-20:00		19:00-20:00	19:00-20:00	

FIELD TRIPS

(Only for pre-registered participants)

Programme	6 November	7 November	11 November	12 November	13 November
Ixtlán	8:00 - 18:00				
Monte Albán		8:00 - 18:00			8:00 - 18:00
Mitla & Hierve el Agua		7:00 - 19:30			7:00 - 19:30
Amatlán			7:00 - 17:00		
Yanhuitlán, Tamasulapan & Amapola			7:30 - 19:30		
Bici Tour - Valle Central				8:00 - 14:00	

PRE & POST- CONFERENCE SESSIONS

(Only for pre-registered participants)

Place	Room	6 November	7 November	11 November	12 November	13 November
Biblioteca San Pablo	Nicolás Rojas			A Closer Look at Co-production: What works, when, where and how? (Carina Wyborn, Melanie Ryan, Josie Chambers) 9-17 hrs		
Centro Cultural San Pablo	Coro	Transformative Adaptation Research Alliance (TARA) Workshop (Matthew Colloff) 9-17 hrs			Evaluación y mapeo de servicios ecosistémicos... Aplicación del protocolo ECOSER (Pedro Laterra) 9-17 hrs	
	Capilla					Net-Map – una herramienta para el Análisis de Redes Sociales (Barbara Schroeter & Adriana Aguilar) 9-11 hrs
Casa de la Ciudad				Nature's Values: from diverse conceptualizations to practical application (Unai Pascual, David González) 9-17 Hrs		
Hotel	Tanilao	PRESS CONFERENCE 10-12	PECS Scientific Committee Meeting, 9-15 hrs			
	Dainzu			Creating a Typology of Collaborative Governance (Michael Schoon), 9-17		
	Guelaguetza			Promoting Socioecosystem and Transdisciplinary Research (Manuel Maass, Adriana Flores & Agustín Robles) 9-13 hrs	Taller de monitoreo socioecológico de largo plazo de la Red de Socioecosistemas y Sustentabilidad (Manuel Maass, Adriana Flores & Agustín Robles) 9-17 hrs	
	Guelaguetza			Taller de la Red Mexicana de Investigación Ecológica de Largo Plazo (Mex-LTER) (Manuel Maass, Adriana Flores & Agustín Robles), 15-19 hrs		
	Tanilao			Reunión de diseño del Programa Interinstitucional de Doctorado en Socioecosistemas y Sustentabilidad en México (Luis Bernardo Vázquez, Gilberto Velázquez, Luisa Fernanda Palacios) 10-14 hrs		
	Donaji			Reunión para la creación del LANSyAS (Oscar Briones & Miguel Martínez) 9-17 hrs		
Ixtlán de Juárez				Two-day multi-actor dialogue workshop on biocultural diversity and resilience of social-ecological systems		



Abstracts

I. Plenary sessions

PLENARY SESSION 1

The role of place-based research for global sustainability and how global drivers affect place

November 8th, 2017; 8:30- 10:00 hrs

Oaxaca 1 y 2



Dr Sandra Myrna Díaz

Associate Professor at the Department of Biological Diversity and Ecology, Universidad Nacional de Córdoba.

Permanent Research Fellow (Principal Senior Investigator)

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Whose nature? Towards and increasingly pluralistic stewardship of ecosystems and their benefits to people

Abstract: The mutual influences between biodiversity and ecosystems on the one hand, and a good quality of life on the other, have featured prominently in research and policy agendas in the past two decades. Our approach to these links has evolved as more disciplines and social actors are brought to the table. On the basis of a large-scale environmental assessment (IPBES) and cases at a finer scale, I will discuss the advances and challenges of explicitly considering differences and asymmetries in knowledge systems, interests and power.

Bio: She got her BA in Biology at Universidad Nacional de Córdoba, Argentina in 1984, she also graduated as Ph D. in Biology from the same University in 1989. She is focused on terrestrial plant community and ecosystem ecology, functional biodiversity, plant functional traits, links between functional biodiversity, ecosystem processes and ecosystem services, global change ecology, comparative ecology of plant traits. She is been working as researcher at the Intergovernmental Panel on Climate Change and was awarded with the Nobel Prize in 2007 as member of this group. She is a core member of the American National Science Foundation, as well as Editor has been Editor in Chief of the Vegetation Science since 2003. She has volunteered 30 national meeting (Argentina) and 60 internationally. She has been awarded in 1995 with the "Ten Outstanding Young People" of the Trade Association of Córdoba Award, in 1998 "Lorenzo Parodi" of the Argentine Society of Botany, 2002 Guggenheim Fellow, J. S. Guggenheim Foundation, USA, 2005 Zayed International Prize for the Environment, as a member of the Millennium Ecosystem Assessment and 2007 Taborda Award 2007 to Outstanding Achievement in Scientific Research of the Association for the Improvement of Education.



Dr Victor Galaz

Associate Professor at Stockholm Resilience Centre, Stockholm University
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Big Money, Big Change? Exploring Financial Drivers of Social-Ecological Change

Abstract: Financial actors and capital play a key role for extractive economic activities around the world, as well as in current ambitions to stay within a just and safe operating space. In this talk, I will explore the complex role of capital flows for social-ecological change with global repercussions, and focus on the role of financial secrecy and tax evasion. I will also elaborate the role and responsibility that we as social-ecological scholars have in the context of "green finance" for sustainability.

Bio: Dr. Galaz is one of Stockholm Resilience Centre's deputy science directors, a position he has held since 2015, which entails securing that our unique and successful research organization and culture continues to flourish. His research deals with the governance challenges associated with planetary boundaries and the Earth system, including complex social-ecological systems and globally networked risks. In the latest years, he has studied the importance of global networks.

PLENARY SESSION 2

Stewardship with local institutions and governance: co-producing knowledge and scaling-up?

November 9th, 2017; 8:30- 10:00 hrs

Oaxaca 1 y 2



Dr Fikret Berkes

Distinguished Professor and Canada Research Chair. Natural Resource Institute University of Manitob

Email: fikret.berkes@umanitoba.ca

Place-based knowledge informing global sustainability: science and indigenous knowledge partnership

Abstract: PECS is place-based social-ecological systems research. Indigenous and local knowledge (ILK) is needed, as place-based knowledge, for several reasons. First, sustainability requires collaboration across governance levels (e.g., co-management) as well as through spatial and temporal scales. Second, ILK is a knowledge-practice-belief complex; hence, ILK can be the basis of local and planetary stewardship. Third, ILK provides for local adaptations – but even more appropriately, ILK is a source of adaptive capacity. Fourth, ILK is needed for the co-production of knowledge: the collaborative process of bringing a plurality of knowledge sources and types together to address a defined problem. Unpacking the definition, collaboration involves deliberation and social learning. Co-production of knowledge is about knowledge plurality and multiple epistemologies. It is problem-oriented, and aims to produce “new knowledge” to address the problem.

The presentation illustrates knowledge co-production through three cases: (1) Swedish biosphere reserve knowledge co-production; (2) knowledge co-production with the Greenland shark; and (3) using ILK to complement climate change science. The cases highlight the importance of using multiple epistemologies, and the concept of “bridging” knowledge while respecting the integrity of each kind of knowledge, rather than “synthesizing” or “integrating” different kinds of knowledge, with the risk of using it out of context. The cases lead to the conclusions that knowledge co-production

1. Helps increase the range of knowledge available to address a problem;
2. Engages multiple epistemologies;
3. Brings in the human dimension; communication, participation, social learning; local empowerment; and
4. More broadly, it fosters participatory research for learning together, leading to co-production of knowledge.

Bio: Fikret Berkes studied Science at McGill University, Montreal in 1968, and got his Ph D at Marine Sciences Center at McGill University in 1973. He is former Director of the Natural Resources Institute, and two-term Tier 1 Canada Research Chair in Community-based Resource Management. He has served as the President of the International Association for the Study of the Commons (IASC) and led several national and international projects. He completed his PhD at McGill University, and then taught at Brock University before joining the University of Manitoba in 1991. Berkes is a world leader in the area of social-ecological systems. His research bridges social sciences and natural sciences, and deals with commons theory, social-ecological resilience, and traditional ecological knowledge. His two books on social-ecological systems (Navigating Social-Ecological Systems (Cambridge University Press, 2003, and Linking Social and Ecological Systems, Cambridge University Press, 1998) have helped a reconceptualization of ecosystems as including people. His book, Sacred Ecology (Routledge 2012), now in third edition, is for many the standard book on indigenous knowledge. It is widely used both by academics and practitioners. Berkes has some 250 peer-reviewed publications and over 48,000 Google Scholar citations. He has participated in the Millennium Ecosystem Assessment, the UNDP Equator Initiative in conservation-development, Arctic Climate Impact Assessment (ACIA), and IPBES. His recent honors and awards include the IUCN International Union for Conservation of Nature CEESP Inaugural Award for Meritorious Research (2016); IASC Elinor Ostrom Award for Senior Scholar (2015); and the ESA Ecological Society of America Sustainability Science Award (2014) for the book Sacred Ecology.



Dr Xavier Basurto

Division of Marine Science and Conservation Nicholas School of the Environment, Duke University

Email: xavier.basurto@duke.edu

Local institutions and the governance dilemma of 'scaling-up'

Abstract: The commons and the social-ecological systems of which they are part of are no longer locally isolated phenomena. The historical work of anthropologist Eric Wolf puts in doubt if they ever were. His work gives credence to the idea that comprehending local institutions' governance—even before European expansion (pre-1400s)—cannot be appropriately achieved without accounting for their cross-scale linkages to non-local actors and political processes at work in other temporal and spatial scales. Current studies of social-ecological systems pay significant attention to the role of scale and cross-scale linkages. Scale is often framed as a source of opportunities and threats to the functionality of place-based local institutions and their capacity for stewardship. In this opportunity I examine scale as a new dilemma facing place-based research in the context of calls for urgent action for planetary stewardship in the Anthropocene. The dilemma of 'scaling-up.' On the one hand, there is strong impetus to understand what are the enabling local conditions for robust place-based stewardship. On the other hand, there is a strong desire to understand how such enabling local conditions can be scaled-up or replicated at larger spatial and temporal scales as a way to 'get closer' to planetary stewardship. In this presentation, I examine the dilemma of 'scaling-up' using examples from my own work with small-scale fisheries governance in Mexico. I conclude that participatory research engaging indigenous and local knowledge can address such dilemma, yet in my experience, requires shifting discourse and framings about 'scaling-up.'

Bio: Dr. Basurto holds a BS in Marine Resources Management by Instituto Tecnológico de Estudios Superiores (1996), Mexico, a Master in Science and Public Administration by the University of Arizona 2001 and 2004 respectively, and also he received a Ph. D. in Management in 2007 by the same university. He is interested in the fundamental question of how groups (human and non-human) can find ways to self-organize, cooperate, and engage in successful collective action for the benefit of the common good, therefore he strives to understand how the institutions (formal and informal rules and norms) that govern social behavior, interplay with biophysical variables to shape social-ecological systems. His academic and professional training is based on a deep conviction that it is through integrating different disciplinary perspectives and methods that we will be able to find solutions to challenging dilemmas in natural resources management, conservation, and environmental policy. After being trained as a marine biologist, and after he completed a M.S in natural resources studying small-scale fisheries in the Gulf of California, Mexico, he realized the need to bring social science theories into his work on common-pool resources sustainability. He spent two years working with Elinor Ostrom, 2009 co-winner of the Nobel Prize in Economics, at the Workshop for Political Theory and Policy Analysis of Indiana University.

PLENARY SESSION 3

Opportunities for transitioning to a safe and just operating space in the Anthropocene

November 10th, 2017; 8:30- 10:00 hrs

Oaxaca 1 y 2



Dr Elena Bennett

Associate Professor at McGill University, Canada

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Imagining a Better Future: Seeds of a Good Anthropocene

Abstract: There is growing consensus that global development is on an unsustainable trajectory. However, the global change community has produced very few positive visions of more desirable, just, and sustainable future global possibilities for society and nature, or how these might be achieved. In the rare non-negative visions of the future, the potential of such futures and the pathways towards achieving them are not clearly articulated. Together, this abundance of negative visions of the future and a lack of clearly articulated positive visions may inhibit our ability to move towards a positive future for the Earth and humanity. I will talk about our efforts to develop a suite of alternative, plausible visions of futures that are socially and ecologically desirable, just, and sustainable by identifying elements of a Good Anthropocene currently in existence ("seeds of Good Anthropocenes"), and how we are exploring how these 'seeds' can lead to larger social-ecological transformations.

Bio: Dr. Elena Bennett, received her BA in Biology and Environmental Studies from Oberlin College in Ohio in 1994, earned her MSc in Land Resources in 1999 (U. Wisconsin) and her PhD in Limnology and Marine Sciences in 2002 (U. Wisconsin). She is co-chair of the Future Earth global research project ecoSERVICES, which aims to set the research agenda for ecosystem services for the coming decade. She is also CLA for the Americas assessment of IPBES and LA for the global assessment. Dr. Bennett is a Leopold Leadership Fellow (2012), and has been a Trottier Public Policy Professor (2013-2014). At McGill, she has won awards for undergraduate teaching, graduate supervision, contributions to campus sustainability, and contributions to local community sustainability. In 2012, she was selected to be one of two representatives of the Royal Society of Canada at the Summer Davos meeting of the World Economic Forum held in Tianjin, China. In 2015, she was named one of six NSERC Steacie Fellows.



Dr Juliana Merçon

Full Professor at Instituto de Investigaciones en Educación, Universidad Veracruzana. Co-coordinator of the Socio-ecosystem Network of CONACyT (National Council of Science and Technology, Mexico)

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Transdisciplinary collaboration for sustainability: Barriers, opportunities, and critical considerations for scaling out and up

Abstract: In a world largely ruled by economic and political powers that are not aligned with the sustainability paradigm, scientific knowledge may be necessary for the construction of more resilient social-ecological systems but it is far from sufficient. Effective changes towards a good Anthropocene require a concerted effort between different types of knowledge holders, practitioners, and policy makers for the co-production of new forms of understanding and action. What are the factors that favor and hamper such transdisciplinary effort? Which strategies can strengthen transdisciplinary collaboration? These are some of the questions we asked 38 transdisciplinary teams in a series of workshops organized by the Socioecosystems and Sustainability Network in Mexico. During my talk, I will share their insights and invite the audience to reflect upon differences between transdisciplinary perspectives in the global North and South. Understanding such differences might be key to the construction of more just and sustainable pathways in our globalized world.

Bio: Dr. Juliana Merçon holds a Ph. D. in Philosophy by the University of Queensland, Australia, a Ph. D. in Education by the State University of Rio de Janeiro, Brazil. She also has a master degree in Psychology by the University of Brasília, Brazil and she is expert on agroecology by the International University of Andalucia, Spain. Currently she focuses on developing projects concerned with participatory approaches in agroecology, territorial co-management, transdiscipline and sustainability. She has collaborated in 38 socio-environmental projects in 21 states of Mexico to analyze factors that strive and tackle collaboration among different sectors, as well as, the analysis of traditional knowledge about water, agriculture and forest inside indigenous and mestizo communities at the state of Veracruz, Mexico. She has been focused on relationships between culture and sustainable environmental practices with local and traditional knowledge.

II.

Symposia

Symposium:

Collaborative pathways to ecosystem stewardship: challenges, opportunities and the spaces in between (PSYMP-9)

November 8th 2017 (10:30-12:00)
Room: Oaxaca 1

Chairs: Michael Schoon (michael.schoon@asu.edu)¹, **Georgina Cundill Kemp** (gkemp@idrc.ca)²

¹Arizona State University, School of Sustainability; ²International Development Research Centre Agriculture and Environment

Countries worldwide face the need to simultaneously redress past injustice, support social transformation and nurture the emergence of stewardship. Many have opted for co-management arrangements between governmental agencies, NGOs and local communities as a means to achieve these goals simultaneously. Experiences of collaborative governance appear to have differed significantly between developed and developing countries. However, in the thirty or so years since co-management began to be practiced worldwide, there has not been a systematic multi-country assessment of the practical experiences of collaborative governance as a viable option for ensuring more equitable access to ecosystem services as part of broader development imperatives. In addition, recent systematic assessments of collaborative governance have shed light on the complexities of collaboration, but they have not explicitly focused on the enablers and barriers in different contexts. Therefore, this session has two goals. The first goal is to see how collaborative practices are implemented and work toward ecosystem stewardship and improved human well-being at multiple locations around the globe. The second goal is to work toward improving outcomes through advancing our knowledge along this theory-praxis interface, seeking grounded theory capable of influencing and strengthening practice in specific places, and building the state of science with regard to collaboration more generally. The objectives of this session are to 1) explore lessons from around world about what forms of collaboration tend to nurture the emergence of stewardship, 2) share lessons on different types of collaborative processes, 3) discover the necessary conditions for achieving successful outcomes across these diverse collaborative processes.

Presentations:

Exploring enablers and barriers of landscape-scale collaborative stewardship initiatives in South Africa: Voices from the landscape (1001)

Jessica Cockburn^{1*}, Georgina Cundill², Sheona Shackleton¹, Mathieu Rouget³

¹Rhodes University, Department of Environmental Science; ²International Development Research, Centre Agriculture and Environment; ³University of KwaZulu-Natal School of Agricultural, Earth and Environmental Sciences

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Worldwide, local collaborative stewardship initiatives are recognized as potential pathways to achieving social-ecological sustainability. In South Africa, there is evidence of a shift from conservation-focused initiatives towards more integrated landscape-scale approaches which seek to address the sustainable development needs of the country, while simultaneously fostering responsible stewardship of land, water and biodiversity. These initiatives work towards multiple social-ecological outcomes, and pay attention to building collaboration between diverse stakeholders. In this research, we initiated a transdisciplinary knowledge co-production process with local-level practitioners, to understand the enablers and barriers of these collaborative stewardship initiatives, and to gain an understanding of the challenges of building collaboration for stewardship. A multiple case study approach was taken, using narratives to share lessons across 6 sites representing a diversity of social-ecological contexts in South Africa. Data were generated through site visits, and by supporting learning and exchange between the case studies. We developed a relational, systems-thinking conceptual tool to aid us in analyzing the enablers and barriers faced by these different stewardship initiatives, and to develop recommendations for practice. Some of the challenges of building collaboration include insufficient collaborative capacity at the local level, the difficulties of developing shared visions among stakeholders with diverse interests, and the need for tangible benefits for stewards from stewardship actions. Our relational, systems-thinking approach highlighted the need to develop specialized social facilitation skills among practitioners, and emphasized the importance of long-term relationship building, along with a focus on the empowerment of stewards, as enablers of successful stewardship.

Collaborative schemes to promote food production in African agroecosystems - insights from Kenya (1007)

Chinwe Ifejika Speranza^{1*}, Boniface Kiteme²

¹University of Bern Institute of Geography; ²Centre for Training and Integrated Research in ASAL Development (CETRAD), Nanyuki, Kenya

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Food production in various African agro-ecosystems is often challenged by multiple factors, ecological and non-ecological. In a backdrop of widespread poverty and persisting land degradation, addressing these challenges is often beyond the capacity of individual farmers and sometimes the local communities. Collaborative schemes are thus proposed as ways to strengthen the capacity of local actors in addressing social-ecological barriers to food production such as infertile soils, soil erosion, and water scarcity as well as limited access to extension services, agricultural credit and inputs. Based on case studies in two regions of Kenya (Makueni County and Mt. Kenya Region), we explore how collaborative schemes address the challenge of promoting and securing food production, and sustaining vital ecosystem services. We identify the forms of collaboration, the driving factors and explore how they contribute to agroecosystem stewardship and implications for sustainable management of agroecosystems. Data on land management practices, collaborative governance initiatives and resource conditions was collected through household surveys, key informant interviews, focus group discussions and literature reviews. Preliminary results reveal a high level intention and willingness to collaborate in improving environmental and natural resources conditions, but also tensions stemming from long and deep seated competition for scarce natural resources, especially water. We use this double edged revelation to draw the key implications for fostering collaborative governance towards improved environmental stewardship.

Towards local governance of marine resources and ecosystems on Easter island: are there spaces for collaboration?

Jaime Aburto^{1*}

¹Departamento de Biología Marina, Universidad Católica del Norte, Coquimbo, Chile

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On Easter Island (EI), fisheries regulations are implemented top-down by the central fisheries authority located at ~4000 km to the east. Given the cultural differences between western worldviews and the Polynesian culture of EI, there is a lack of local compliance with the central fisheries governance and regulations. In 2014, the local community on EI started a bottom-up process to improve marine resources conservation and management at local level, initiating a local governance transformation process and the creation of a sea council. A collaborative and participatory process was conducted with a local organization to identify the factors that could favour and/or undermine the formation of the sea council. Among factors that could hinder the implementation of a sea council are the lack of representativeness of public institutions, which is a major challenge. Public institutions are designed to ensure compliance with central government strategies, but the decisions do not represent the worldview of islanders, hindering instances of collaborative governance with the central government. The participatory process highlighted governance mismatches that are important to consider in attempts to pursue more effective fishery governance on EI, including potential collaboration among local stakeholders, central government and external agencies such as NGOs and Universities. Centralized governance systems do not respond rapidly to locally observed social and ecological dynamics. By contrast, a local decision-making system based on traditional laws and local governance can more rapidly respond to observed changes. A local governance system, in line with traditions and culture is needed to navigate resource management and conservation on Easter Island.

Participative and collaborative farming to promote the agriculture transition towards sustainable social-ecological systems at agroecosystems (76)

Marina García-Llorente^{1*}, Carmen Haro², Irene Iniesta-Arandia³, Alejandro Benito¹

¹Madrid Institute for Rural Development, Agricultural and Food Research (IMIDRA) Applied Research and Agricultural Extension Department; ²Universidad de Valladolid; ³Universidad Autónoma de Madrid Social-Ecological Systems Lab

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European policies call for a rural renaissance based on fostering innovation and business opportunities in those marginalized areas for the period 2014-2020. At the same time, from the bottom-up level there is an increasing interest in society in topics related to development at local scales, food sovereignty, food short chains, organic farming, community home gardens, and social farming between others. In this communication we present some of the initiatives running in Madrid towards a transition of the conventional agricultural model at local scales. Firstly, we will provide a first screen of examples of food transition systems conducted in Madrid. Secondly, we present a place based-research of collaborative farming to study in-deep its capacity to enhance the human connection to nature, to contribute to participants' personal life satisfaction, empowerment and ecosystem service valuation. This empirical case, constituted an action-research study located in a municipality at 38 km to Madrid, with one of the best agrarian periurban areas of Madrid. More than 60 participants are running two agrarian plots of 3000m² and 5500m² respectively, following the principles of collective agriculture, social inclusion, organic production, and co-generation of knowledge. Data gathering has been done through annual workshops in the period 2015-2017 with the participants. We hope to contribute to the design of an alternative model to be scaled up to other municipalities which lastly will contribute to the dynamism and renaissance of these areas.

Symposium:

Exploring the socioecological dynamics of payment for hydrologic services programs: opportunities and challenges for enhancing watershed sustainability (PSYMP-20)

November 8th 2017 (10:30-12:00)
Room: Oaxaca 2

Chair: Heidi Asbjornsen (heidi.asbjornsen@unh.edu)¹

¹University of New Hampshire, Institute for the Study of Earth, Oceans, and Space

Hydrologic services are arguably one of the most critical and highly threatened ecosystem services for sustaining human societies. Payment for Hydrological Services schemes (PHS) have gained popularity in recent years as a policy tool for linking downstream water users to upstream water producers through economic incentives to promote watershed sustainability. The experiences gained from the implementation of PHS across diverse social, economic, cultural, and environmental contexts worldwide over the past several decades provide a unique opportunity to explore the lessons learned and to identify best management practices for designing PHS and monitoring their social and ecological impacts. This session brings together speakers from a broad range of disciplines, geographic regions, and local contexts to discuss the challenges and opportunities for using PHS to enhance watershed sustainability and the consequences, trade-offs, and interactions within socioecological systems. By synthesizing these discussions, this session seeks to identify emerging principles and social and ecological indicators of PHS success that can provide a baseline for developing guidelines for PHS design and approaches for monitoring their performance in achieving watershed sustainability. Finally, by promoting discussion by scientists and diverse stakeholders, this session will assess opportunities for better linking science and policy to enhance decision making processes. The objectives of this session are to 1) explore the impacts, challenges, and opportunities of using Payment for Hydrologic Services programs (PHS) to enhance watershed sustainability and the implications for cost-benefit trade-offs within diverse socioecological systems, 2) identify emerging principles underlying the effectiveness of PHS in achieving watershed sustainability goals across diverse political, cultural, socioeconomic, and environmental contexts, 3) discuss development of guidelines for designing PHS and monitoring key social and biophysical indicators of PHS performance to support adaptive decision-making within local context and 4) identify approaches for engaging diverse actors in transdisciplinary research on PHS as a foundation for effectively translating science into policy.

Presentations:

Putting Suppliers on the Map: A participatory approach to giving voice to upstream actors of water funds (1009)

Kelly Meza Prado^{1*}, Leah Bremer², Sara Nelson³, Amalia Morales⁴, Pedro Moreno⁴, Kate Brauman⁵

¹University of Minnesota, Institute on the Environment Natural Capital Project; ²Stanford Woods Institute for the Environment Natural Capital Project; ³University of Minnesota, Department of Geography Environment and Society; ⁴Agua por la Vida and la Sostenibilidad Asobolo; ⁵University of Minnesota's Institute on the Environment Global Landscape Initiative

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Water funds are a type of investment in watershed services programs where groups of watershed stakeholders invest in source water protection--represent a rapidly growing approach to watershed conservation and water security. In Latin America, alone, there are over 20 operating programs, with many more in the pipeline. However, despite their rapid growth, little research attention has focused on the perceptions and perspectives of upstream actors (the "suppliers" of ecosystem services) who carry out source water protection on their land. Understanding and documenting these perceptions and perspectives is critical both from an equity perspective, as well as from a durability perspective as water funds are unlikely to be effective over the long-term without support from local land stewards who feel they are benefitting in a meaningful way. To address this gap, we carried out interviews and participatory mapping with farmers, educational centers, and local communities in the "Water for Life and Sustainability" water fund in Valle del Cauca, Colombia. Interviews focused on participant motivations in participating in the water fund, perceived benefits and risks, perceptions of climate change, and the role of water funds in the Colombian peace process. We brought together the stories, photos, videos, and participatory maps collected in the field and created a web-based tool that visualizes and communicates the perspectives, ideas, and experiences of upstream actors. This work highlights the critical role of upstream actors in the co-production of ecosystem services, as a pioneer effort to put the "suppliers" of ecosystem services on the map.

Spatial impact evaluation of payment for watershed services programs in Veracruz, Mexico (1036)

Jacob Salcone^{1*}, Kelly Jones¹

¹Colorado State University, Human Dimensions of Natural Resources

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Land-use decisions and forest management practices of households in upstream areas of water basins have an impact upon water quality and the timing of flows downstream. Payments for Watershed Services (PWS) schemes endeavor to match the stewards of upstream ecosystems with the beneficiaries of their services, thereby using a voluntary, market-based approach to efficiently improve conditions for both parties. However, many PES evaluations have not been able to show a definitive impact to ecosystem service provision, conservation, or rural poverty. According to a national-scale evaluation of payment for watershed service schemes (PWS) in Mexico (Alix-Garcia, 2014), poorer households have used payments to increase their number of livestock and increase production of cash crops. This outcome may indicate that payments can lead to intensification of land uses or leakage to other areas within a water basin. Using a combination of satellite spatial data coded into eight land-use categories and household-level data on agricultural activities and participation in PWS programs, this paper determines the effect of PWS upon land-use and considers whether or not intensification or leakage of land-uses is occurring in two watersheds in Veracruz, Mexico. Using propensity score matching to construct a control group, and difference-in-differences

to estimate a treatment effect, this study evaluates net land use changes since the initiation of the program in two sub-basins of the Antigua River. Results will be available by November, 2017.

Finding the global in the local mechanisms for payments for ecosystem services national program in Mexico (102)

Elizabeth Shapiro-Garza^{1*}, Ruxandra Popovici¹, Alex Pfaff², Paola Bauche Petersen³

¹Duke University, Nicholas School of the Environment; ²Duke University Sanford School of Public Policy; ³FONNOR, A.C. Regional Coordinator

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Payments for ecosystem services (PES) initiatives provide financial incentives to land owners to manage in ways that produce ecosystem services such as greenhouse gas sequestration, biodiversity conservation or cleaner and more plentiful water downstream. In 2008, the federal government of Mexico through their National Forestry Commission implemented an innovative program that provides matching funds to organizations wishing to develop local PES initiatives. The primary motive of this program is to allow a highly centralized national government to support PES mechanisms adapted to local contexts and conditions. The primary objective of this research was to extract generalizable principles of the functions and institutions necessary to establish a local PES initiative. Through the application of a comparative case study methodology we conducted semi-structured interviews, archival analysis, and participant observation to collect qualitative and quantitative data related to twelve local PES initiatives enrolled in the national program. We found that there were common functions and institutions that were necessary in order for the PES initiative to succeed (e.g. an organization to aggregate user fees/payments; an intermediary organization to serve as broker; clear rules and actions in place to monitor outcomes, etc.). We also found that some of these functions were more effectively and efficiently performed by a centralized organization while others were best enacted by local organizations and actors. While these results are generalizable to the global context, we discuss how local context determines the specific institutions that can best enact local initiatives for PES.

Payment for watershed ecosystem services: practices and lessons from China (1046)

Lin Zhen^{1*}, Huimin Yan¹, Yunfeng Hu², Guihuan Liu³, Bingzhen Du⁴

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Payment for watershed ecosystem services is essential for maintaining the supply of fresh water resources and sustaining substantial livelihood of people living in the area. Over the past decades, China has been initiated series payment schemes for the watersheds of different spatial scales, gathered lots of best practices, and the guideline for paying watershed ecosystem services has been developed for long term management of watershed. This presentation aims to introduce the history and main progress of Chinese watershed payment schemes, practices and lessons, and the future plans. It will also introduce two pilots in Dongjiang watershed across Jiangxi and Guangdong provinces, and Hongkong, as well as Jiulongjiang watershed in Fujian province respectively, in order for the audience to understand more specifically the payment schemes applied in these areas.

Impacts and challenges of environmental restoration on hydrological services in dryland area - biophysical processes and socioeconomic perspectives (1018)

Lulu Zhang^{1*}, Kai Schwärzel¹

¹United Nations University, Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES)

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China has invested in environmental restoration for ecosystem services for decades. Vegetation restoration (notably afforestation) has been implemented with a grain-and-cash compensation in ecological fragile area, such as the Loess Plateau region in NW China. Such large-scale afforestation to combat soil erosion resulted in a satisfactory output - the sediment load of the Yellow River on the Loess Plateau has decreased significantly. In contrast to the improved soil services, the hydrological services, such as streamflow and baseflow of the main tributary of the Yellow River and soil water availability for plants, have decreased. This intensifies the water use conflicts (e.g., between upper and lower streams) and threatening the food security and regional development due to water shortage. To improve and balance the water and soil related ecosystem services, both measures and payment schemes for soil and water services need to be revised. Based on the field observations and statistical and hydrological modelling, our study in the middle reaches of the Yellow River identifies the main driving forces in reducing the hydrological water services and makes projections of impacts on hydrological services under continuation of the current measures. To reverse this trend, we propose alternative options to increase the water related services. In addition, the shortcomings of the current eco-payment will be discussed and the necessary elements that need to be included in the design of future payment scheme are raised.

Science and tools for investing in watershed services: Lessons learned from PHS decision support (1063)

Adrian Vogl^{1*}, Peter Hawthorne², Kelly Meza Prado², Leander Raes³, Stacie Wolny¹, Benjamin Bryant¹, Jorge Leon⁴

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There is growing support for Payments for Hydrologic Services (PHS), particularly as the focus on water provides diverse actors with a neutral platform for engagement around a basic and universal right. However, designing PHS programs that overcome the challenges of efficiency, trust, transparency, and equity presents a significant collective action problem. Design approaches that adopt a multiple benefits framework and incorporate ecosystem services trade-offs and beneficiaries are needed to address these challenges. Our experience has shown that decision support tools that integrate data and stakeholder preferences can increase buy-in and legitimacy of the design process. This talk will build on 8+ years of experience from the Natural Capital Project (NatCap) and its partners to design tools for prioritizing investments in watershed restoration, based on modeling ecosystem services, their distribution, and trade-offs between beneficiaries. Through stakeholder engagement in designing PHS programs in Kenya, Colombia, and Costa Rica, we have identified common needs including: allow for multiple benefits and trade-offs, explicitly account for where benefits accrue and to whom, and provide outputs that allow stakeholders to explore options and trade-offs based on how preferences and priorities are expressed. Our experiences illustrate the importance of co-producing ecosystem services information as part of an iterative research-application process. Delivering science that combines best available local data and knowledge, and explicitly accounts for distributional issues, will allow decision-makers to evaluate where and how PHS programs can be effective and equitable institutional mechanisms to achieve water security goals in the face of climate change.

Symposium:

Toward realistic, plausible, positive futures for the planet (PSYMP-13)

November 8th 2017 (10:30-12:00)

Room: Oaxaca 3

Chair: **Jan Kuiper** (jan.kuiper@su.se)¹

¹Stockholm Resilience Centre, Stockholm University

The world has entered the Anthropocene in which the social and ecological are increasingly entangled in surprising and novel ways. Resilience is the capacity of social-ecological systems to adapt or transform in the face of these dramatic changes. Building resilience in a world of surprise and novelty require methods that bring multiple futures into current decision making, and scenario planning is an approach that has been increasingly used in research and science/policy processes, in particular places and in international assessment such as IPBES. Scenarios are plausible stories about how the future of a social-ecological system might unfold. Scenario planning can be an important tool in social-ecological transformations because it forces people to think explicitly about alternative situations, consider key uncertainties and create an understanding that a different order of things is possible. We will bring together leading scholars from diverse disciplines to create a novel overview of the multiple roles scenarios can have in social-ecological transformations. We aim to produce at least a synthesis paper outline the state of the art and research frontiers in social-ecological scenarios, and potentially a journal special feature, which could include contributions from audience members. Our session will promote synthesis by asking our presenters to address a shared set of questions on: How are social-ecological scenarios useful? What research and activities are needed to improve the practice of social-ecological scenario exercises? And what are the research frontiers for social-ecological scenarios. We will engage the session participants by asking them to vote on the answers given by the presenters, as well as using their synthesis to open a facilitated synthesis discussion that will draft a preliminary road map of research and activities to enhance social-ecological scenario practice.

Presentations:

Bright Spots: Seeds of good Anthropocene (1088)

Elena Bennett^{1*}, Albert Norstrom², Garry Peterson², Oonsie Biggs³, Joost Vervoort⁴

¹McGill University, McGill School of Environment; ²Stockholm Resilience Centre; ³Centre for Systems in Transition; ⁴Oxford University, Environmental Change Institute

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Society is bombarded by dystopian visions of future collapse and degradation. But the future does not have to be bleak. In fact, we can point to an emergence of experiments in new thinking, innovative ways of living, projects aiming for change that bodes well for the future. As people become aware of threats to society and nature, many are increasingly engaging in strategies to create a more just, prosperous, and ecologically diverse world - "good Anthropocenes". Inspirational visions can be a key component of transformations to sustainability, helping to shape the very reality that they forecast. But thus far, most efforts to imagine positive global emerge from the same handful of ideas about the future, which overestimate the power of conventional strategies to create real change, resulting in scenarios that are very similar to the status quo, or feature fantasy pathways to unrealistic utopias. We propose that global scenarios can be diversified by using these "experiments" in new ways of thinking, doing, and being, to build scenarios from the ground up. We discuss how this might be done, what kinds of social-ecological scenarios it could help develop, and how they might be more useful than existing global scenarios.

Integrating scenarios and ecosystem service modeling approaches to explore possible outcomes of decisions (1099)

Anne Guerry^{1*}, Katherine Arkema¹

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Scenarios are powerful tools for exploring the future. Bringing together stakeholders to articulate different plausible futures elicits diverse visions and values for the future and enriches dialogue among stakeholders in any decision-making process. We will discuss our experience creating spatially-explicit scenarios with stakeholders in development planning decisions in coastal systems in the US, Canada, Belize, and The Bahamas. Next, we will discuss our use of those co-created scenarios to explore the possible outcomes of those scenarios "representing alternative management choices" across a wide range of ecosystem services. We will close with reflections on: How are social-ecological scenarios useful? What research and activities are needed to improve the practice of social-ecological scenario exercises? And what are the research frontiers for social-ecological scenarios.

Participatory Social-Ecological Scenario Planning is an increasingly commonly used tool in place-based research. I will review challenges and opportunities for scenario planning in place based social-ecological research. In particular I will argue that scenario planning is well suited to integrating across knowledges, and it can focusing on-going research while enhancing cross-disciplinary communication. However the practice of scenario planning is fragmented, with an over-emphasis on the creation, rather than the use and evaluation of scenarios. Furthermore, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is calling for new approaches to scenario planning to better include biodiversity and ecosystem services in international decision-making. These issues and opportunities suggest that now is the time to aim to creation a social-ecological scenarios community of practice that enables scenario practitioners to build on and improve existing scenario approaches.

Positive futures for Mediterranean wetlands biodiversity and ecosystem services (116)

Ilse Geijzendorffer^{1*}, Flavio Monti², Alejandra Morán-Ordóñez³, Nigel Taylor⁴, Özge Balkiz⁵

¹Tour du Valat, Research Institute for the conservation of Mediterranean Wetlands Mediterranean Wetlands Observatory; ²MEDWET; ³In Forest Joint Research Unit (CTFC-CREAF), Centre for Ecological Research and Forestry Applications; ⁴Tour Du Valat, Research Institute For The Conservation Of Mediterranean Wetlands; ⁵Doğa Koruma Merkezi Vakfı

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Reporting for policy-science platforms (e.g. IPBES) relies on the use of published data to identify current and future trends for biodiversity and ecosystem services across biomes. Generated reports tend to ignore or underrepresent small social-ecological systems due to either their size or limited data availability. Data gaps or a lesser spatial extent of these systems do not, however, mean that they are less important or relevant for human-wellbeing and biodiversity conservation. Wetlands only occupy 9% of the land globally, but they provide proportionally significantly more ecosystem services, which are also of high importance (e.g. water provision, hazard protection). Especially in regions such as the Mediterranean Basin where wetland habitat extent is decreasing while the human population is increasing, the importance of wetlands for ecosystem services and biodiversity is increasingly disproportionate. Meanwhile, ongoing social and political instability in the region means progress towards Sustainable Development Goals is not a trivial challenge. This study uses a systematic literature review to identify the pathways, conditions and criteria for positive developments of Mediterranean wetlands under the current global change context. This information is used to develop specific recommendations towards positive futures (e.g. water security, safe coasts). These recommendations are not primarily directed to global platforms, but rather to national governments, NGOs and local citizens' organizations. These parties are most directly concerned with the benefits from a sustainable development path and the safeguarding of related ecosystem services and biodiversity.

Priorities for social-ecological scenario research

Jan Kuiper^{1*}

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Since the publication of the Millennium Ecosystem Assessment the use of social-ecological scenarios in sustainability research has increased remarkably. Scenarios have proven to be useful to both incorporate complexity, bridge disparate knowledge systems, and address uncertainty across a wide variety of contexts. With IPBES further encouraging the use and development multiple social-ecological scenarios, their popularity is likely to increase further. However there is a fragmented community of practice around social-ecological scenarios. To start to connect this community we have conducted a horizon scan of emerging issues in social ecological scenario research. We used a Delphi process that asked a diverse groups of social-ecological scenario researchers and practitioners to identify key questions that are novel, missing, addressable, and have global implications. Synthesis and clustering of these responses resulted in several sets of questions, revealing what people in this community consider to be the real priorities and frontiers in this field. We will present and discuss these results to assess the feasibility, novelty and likely effects.

Symposium:

Tackling complexity by increasing complexity. Rethinking knowledge processes through place-based transdisciplinary research (PSYMP-8)

November 8th 2017 (10:30-12:00)

Room: Guelaguetza

Chairs: **Elizabeth Clarke** (clarke@leuphana.de)¹, **Maraja Riechers** (Riechers@leuphana.de)²

¹ Leuphana University, Facultät Nachhaltigkeit (Faculty of Sustainability); ²Leuphana University, Leverage Points for Sustainability Transformation

Transdisciplinary research aims at overcoming gaps and barriers between actors from different knowledge fields and societal domains in the face of pressing sustainability challenges. Given this ultimate aim, place-based transdisciplinary research allows for continuous cooperation between actors that allows for integrative research and mutual learning to generate knowledge that serves societal transformation. However, there is still much to learn and understand about processes of knowledge production in our endeavours to leverage change for a globally sustainable future. Much of how we understand, how we know, what we know and how we express knowledge as action, is tacit; that is, hidden deep beneath the surface as assumptions, held beliefs etc. In this symposium we propose to facilitate the sharing of processes to create knowledge through place-based transdisciplinary research by exploring the various conceptualizations of, and discourses around, knowledge in transdisciplinary sustainability research. Examples include concepts such as mutual learning, knowledge integration, collective knowledge, or knowledge to action, with a view to gaining a deeper understanding of what constitutes transformative knowledge for global sustainability. We can draw approaches, such as complexity theory, to examine how a place-based focus can be combined with holistic framing, along with theory and practice, and parts and wholes, to leverage the seeming contradiction and tension between seeming polar opposites dichotomies. The objectives of this session is to 1) Gain a deeper understanding of how place-based transdisciplinary research contributes to broader perspectives on knowledge for global sustainability, 2) Share and review understandings and practices associated with knowledge production and use in place-based Td research for global sustainability, 3) Explore the deliberate increase in complexity through the juxtaposition of different and even opposing ways of understanding and problem solving and 4) Gain insights into theoretical and conceptual framings, tools and processes for knowledge practices.

Presentations:

From Resilience Assessment to Resilience Planning: Lessons from Australian regional natural resource management (125)

My Sellberg^{1*}, Paul Ryan², Sara Borgström³, Albert Norström¹, Garry Peterson¹

¹Stockholm University, Stockholm Resilience Centre; ²Australian Resilience Centre; ³Royal Institute of Technology (KTH) Department of Sustainable Development, Environmental Science and Engineering

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Resilience thinking has been highlighted as an alternative to conventional natural resource management. However, there are few evaluations of the outcomes of one of its most common practical applications - resilience assessment. To address this gap, we synthesized insights from practitioners that have applied resilience assessment in strategic planning across nine regional natural resource management organizations in Australia. This is the first synthesis of lessons from across these regions, despite representing one of the world's most widespread and long-term applications of resilience thinking. We conducted semi-structured interviews with key informants and reviewed their strategic planning documents. Our results showed that a resilience approach contributed to organizations establishing more adaptive, local, and collaborative approaches to strategic planning, indicating that the resilience approach holds its promise of increasing ability to govern changing social-ecological systems. Implementing a resilience approach involved navigating a complex context of creating support among staff, engaging external actors, and figuring out how to make resilience practical. To really embed a resilience approach implied embarking on a longer-term change process, involving both internal and external actors, and required relatively stable multi-level institutional support. We believe that the insights from our cases also will apply to the implementation of resilience in other contexts, and present four suggestions for others who wish to apply resilience thinking. We also found that the capacity of resilience practice to address transformations for global sustainability could be substantially improved by operationalizing resilience theory on transformations, and connecting to other applied work on transformation.

Potentials of cultural differentiations for transdisciplinary sustainability research (19)

Andra Horcea-Milcu¹

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Transdisciplinary sustainability research is developing as a cooperative, problem and solution oriented form of research in which heterogeneous actors are involved. A premise is that knowledge, values, interests and perspectives of these actors should be included in the research in order to generate knowledge that is socially robust, that improves a given - unsustainable - situation, or that stimulates mutual learning processes. This parallels a discussion about interculturality that is based not only on ethnicity or nationality, but on different groups and sub-groups within a society and their diverse ways of knowing, being, acting, and reflecting. Being determined by cultural differences, transdisciplinary research has to be considered a cultural practice in which a variety of meanings is produced, exchanged, and negotiated. An overall potential lies in the understanding of the "constitution of differences". In the presentation cultural differentiations will be developed as an analytical perspective that is applied to the design and implementation of transdisciplinary case studies in sustainability research. Conceptual approaches will be complemented by examples from empirical research and practical experiences in transdisciplinary case studies. Taking cultural

differentiations into account allows for making underlying assumptions, self-understandings, power relations, and neglected perspectives visible. Although these appear on the case level, they refer to overall political and societal constellations. Transdisciplinary case studies can contribute to global (cultural) sustainability by reflecting existing premises and power relations and the formation of new ways of research.

Transdisciplinary process facing severe droughts: lessons learned in Mexican tropical drylands (42)

Ana L. Burgos^{1*}, Rosaura Paez Bistrain¹, Saray Bucio Mendoza¹, Alba M. Ortega Gómez², Rocío Aguirre¹

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Weather emergencies could generate opportunities for the implementation of transdisciplinary processes (TPs). A TP was impelled for facing a severe drought in vulnerable rural territories in Mexican tropical dry lands (Bajo Balsas, Michoacán). This work presents the methodological and operative frameworks behind the TP, and analyzes results and lessons learned. The TP gathered five sectors: communities, NGO, academics, government and media. Since October 2015 to February 2017 eight inter-sectorial meetings were made for the integration and follow-up of a Contingency Plan with immediate actions. The results included: major efficiency in the assistance programs application, increase in the information fluxes, and a better understanding of systemic effects of drought. After the critical period of drought, all sectors approved the continuation of the TP to face territorial problems during 2017. Some lessons learned are: a) the internal communication in governmental agencies is weak, ii) all stakeholders have strong difficulties to think the future of the territory at middle term (scenarios), iii) the media are essential for the activation of governmental sector, and iv) specific informative products are required for the optimum development of meetings and the information dissemination of advances. The NGO and the academic sector had the best conditions to impel the TP. But while the former suffered financial restrictions, the latter showed an insufficient involvement of researchers in inter-sectorial relationships. The previous presence of intraterritorial networks and extraterritorial was a key factor; it could be a requirement for the better implementation of TPs facing weather emergencies in vulnerable territories.

Experiences of a policy-maker in a Transdisciplinary Network (98)

Luisa María Calderón Hinojosa^{1*}, Sandra Luz Malagón García², Yanin Rodríguez Velazquez³

¹Senado de los Estados Unidos Mexicanos, Comisión de Reforma Agraria y Frente Parlamentario Contra el Hambre de América Latina y El Caribe; ²Universidad Nacional Autónoma de México, Instituto de Investigaciones en Ecosistemas y Sustentabilidad; ³Red Transdisciplinaria de Desarrollo Sustentable, Project Manager

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Transdisciplinary research aims at overcoming gaps and difficulties between actors from different knowledge fields and societal domains. As a policy-maker, member of the Chamber of Senators of the Honorable Congress of the Union of Mexico in charge of the Parliamentarian Front Against Hunger of Latin America and the Caribbean, in this session I want to talk about my experience with these obstacles and the solutions in some specific cases, like Transdisciplinary Network of Sustainable Development. Working with other policy-makers, researchers, farmers and indigenous artisans, I have been able to identify some obstacles, such as: language, customs and as a priority issue, trust. The main goal of this session is to present this gaps and the solutions we found, and the challenges we have not been able to overcome. This hearing pretends to show the view as policy-maker working in cooperation between actors that allow for integrative research and mutual learning, and open the discussion about the approaches, processes and methods that engage, strengthen or weaken the links between researchers and policy-makers.

Making ecosystem science matter: stakeholder-engaged research through co-design and keystone ecoservice concept (164)

Roxane Maranger^{1*}, Jean-François Lapierre¹, Timothée Poisot¹

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Despite huge efforts on the part of many large scientific programs, the timing from recognition of an environmental issue to an actionable solution is 25 years on average. Part of the problem is that ecosystem science - which is at the foundation of helping to resolve major environmental issues- is often undermined 1) by the promise of quick fixes through technology (regardless if they will work) and/or 2) limited by the ability of scientists be involved in a process that leads to actionable sustainable solutions. Furthermore, given the complexity of ecological sciences, scientists often lack the ability to deliver a clear message to serve collective conservation goals. In the current climate of the social innovation and open science movements, we suggest a process that combines both through a social-ecological innovation system called RéseauLab, which we are currently testing in the Laurentian region of Quebec. Although at the early stages, facilitated co-creation workshops have identified scientific knowledge product needs of several regional partners, while multi-disciplinary scientific synthesis is generating these products using the best available knowledge at the time. Knowledge gaps are identified and the process is iterative, based on design principles. Regional social innovators are key to the process as they help identify the highest social-ecological leverage points to effect change, which streamlines actionable sustainable scientific solutions. We will provide a concrete example around water quality and biodiversity maintenance at the regional landscape scale, showing how this approach has the potential to accelerate sustainability while generating high quality fundamental research.

Symposium:

Local and global drivers of transformation towards sustainability in Latin America: Cases from place-based research on social-ecological systems (PSYMP-3)

November 8th 2017 (10:30-12:00)

Room: Tanilao

Chairs: Bruno Locatelli (B.Locatelli@cgiar.org)¹, Paula Juárez (pjuarez@redtisa.org)²

¹Cirad F&S; ²Universidad Nacional de Quilmes, Instituto de Estudios sobre la Ciencia y la Tecnología

According to the PECS working group on "Seeds of a good Anthropocene", our future is often represented by dystopian representations combining environmental degradation and social inequality. Proposing and discussing positive social-ecological futures can help discussing changes in the way people interact among them and with nature. Some good examples of social-ecological transformation towards sustainability exist in Latin America and are interesting case studies to understand the local and global drivers of such transformations. This session will present place-based research on processes of social-ecological transformation in Latin America. Presentations will describe the processes and their social, ecological and economic outcomes. With explicit conceptual frameworks, presentations will analyze how local and global drivers facilitate or hinder transformation and how social, economic and biophysical drivers interact. Case studies will include a discussion on the future of the studied transformations, the transferability of findings to inform global sustainability research, and the up-scaling of local successful transformation processes. This session will 1) present case studies of local place-based research on processes of social-ecological transformation in Latin America, 2) analyze the role of local and global drivers in facilitating or hindering transformation and 3) discuss the transferability of findings to inform global sustainability research and the up-scaling of local successful transformation processes.

Presentations:

Toward a sustainable Gulf of Mexico: lessons from transnational scientific research and collaborations in Parque Nacional Caguanes, Cuba (1093)

Victoria Ramenzoni^{1*}, Mark Besonen¹, David Yoskowitz¹

¹ *Harte Research Institute/Texas A&M University-Corpus Christi SocioEconomics and International Operations*

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Drawing from a Socio-Ecological approach, this presentation characterizes the key lessons from ongoing transnational collaborations to develop sustainable ecotourism options at Parque Caguanes, Sancti Spiritus, Cuba. The initiative includes researchers from Harte Research Institute for Gulf of Mexico Studies (Texas A&M University-CC), Universidad de La Habana, Caguanes National Park, and local communities. The main objectives are: 1) to share knowledge and experiences related to wetland's conservation and restoration within the context of local sustainable development and ecotourism; 2) to identify practices that might enhance the success of proposed programs in multi-stakeholder and multi-cultural scenarios; and 3) to discuss the complexities of transdisciplinary, cross-institutional, and transnational partnerships. The presentation describes the dynamics behind collaborations that, seemingly environmental in nature and locally circumscribed, have wider implications extending to the international, political, economic, and diplomatic arena. It is a unique case study for it shows how different perspectives and narratives can find a common ground, that while not devoid of renegotiation, can guide future sustainability efforts among the US, Mexico, and Cuba. It also identifies that common visions of sustainability sometimes are easy to forge at higher institutional scales, but encounter conflict when downscaled. Finally it describes the reality of local sustainable development in Cuba and how it contrasts with larger rhetorics.

Agroecological Strategies and Social Learnings: Case of the Peasant Movement of Santiago del Estero in Argentina (1031)

Florencia Trentini^{1*}, Paula Juarez¹, Lucas Becerra¹

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This article presents the conceptual framework of the TRANSIT Theory Project - an academic consortium of European and Latin American universities - and uses it to analyze the case of the peasant movement of Santiago del Estero (MOCASE) in Argentina, focusing on: 1) the agroecological strategies carried out in terms of a social innovation agent (for example, the development of the peasant university and a agroecological school), and 2) the construction of narratives of change and social learnings oriented to empower peasants and generate a collective identity of the peasantry from a agroecological perspective. The theoretical approach of "Transformative Social Innovation" is defined as "changes in social relations, involving new ways of doing, organizing, framing and/or knowing, which challenge, alter and/or replace established (dominant) institutions in a specific socio-material context". This new approach refers to the ability to design and implement new forms of social interaction that enable people and social groups to carry out strategies and deploy narratives that, under certain conditions, lead to a transformative change that give rise to modifications in social and/or environmental dynamics. As the result of the analysis, this work presents final remarks in order to conceptualize the capabilities of social innovation that this local movement have achieved in terms of inclusive sustainable development, where agroecological knowledge, food production and distribution and territorial development are key.

The Stories of the Chagra: Traditional Ecological Knowledge transformations as lessons towards sustainability in indigenous territories in the Colombian Amazon (11)

Valentina Fonseca Cepeda^{1*}, Sebastián Restrepo Calle¹

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Chagras are shifting cultivation systems developed in the Colombian Amazon that reflect social-ecological feedbacks between indigenous peoples and the rainforest. Its maintenance responds to the traditional ecological knowledge (TEK) about Amazonian ecosystems dynamics, expressed in productive practices, institutions and cosmogonies, defining the way in which indigenous peoples inhabit their territory. Socioeconomic and biophysical drivers of change have been transforming TEK, causing variations in structure and function of *chagras*, as well as indigenous livelihoods. This study carried out in the Ticuna indigenous community of El Vergel, aims to compile elements of TEK transformations and its relation with rainforest management practices in the last forty years (1976-2016), in order to build a better understanding of social-ecological dynamics in the Amazon region. It combines quantitative data from the characterization of the social and ecological components of *chagras*, and qualitative ethnographic data describing TEK levels. Findings reveal that main changes are related to composition of landraces, size of production area, spatial distribution of crop areas, maintenance of phases required for its management, and world views. Although TEK has been modified, some productive practices persist and innovation emerges as an adaptive response to change, resulting in different ways of forest use. The *chagra*, as a complex adaptive system that mirrors changes in TEK, turns out to be a key entity that needs to be taken into account in current quests for sustainable uses of the Amazon rainforest.

Use of resources for food per person as indicator of sustainability: comparing the heterogeneity of diets and agricultural systems of Mexico (3)

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Food security is one of the biggest challenges of humanity. Transition countries will face the strongest challenges due to fast socioeconomic, dietary and agricultural changes. Future strategies should focus on systematic and integrative solutions: promoting both sustainable and resilient production systems and sustainable consumption patterns. To design these strategies, we need to understand the various relationships and trade-offs among the drivers and impacts of the food system. Mexico shows strong heterogeneity of these drivers and impacts due to socioeconomic inequality, cultural diversity, agricultural management practices and diverse agroclimatic conditions. In this study, we calculate the use of cropland per capita and use it as an indicator of environmental impact which includes both the demand and supply side of the food system. We analyze the extreme scenarios of Mexico: from basic diets of the poorest-rural population to affluent diets of the richest-urban population; and from small-scale extensive production systems to large-scale intensive production systems. This approach is innovative in two ways: 1) it connects farm-scale case studies to discuss their potentials and impacts to national food security, 2) it shows the strong impact of diets and its potential to reach food security. Our results show that extensive systems require two times more land than intensive systems (irrigated); and affluent diets require 80% more land than basic diets. We discuss the trade-offs among systems and we show the strong role of diets in reducing the environmental impact of the food system and to reach a sustainable food system.

Symposium:

The role of sense of place in social-ecological system dynamics: exploring the empirical evidence from place-based studies (PSYMP-25)

November 8th 2017 (10:30-12:00)

Room: Dainzu

Chair: Vanessa Masterson (vanessa.masterson@su.se)¹

¹Stockholm University, Stockholm Resilience Centre

Sense of place has been shown to be a key factor in adaptation to large ecosystem changes and transformations, and there is increasing but scattered evidence of the relevance and complexity of these relationships. Our recent review article indicates advances in assessing the importance of both place attachment and place meanings for motivating stewardship, learning and ecosystem governance. In this session we bring these explorations of sense of place into dialogue with one another, and begin to synthesize insights for resilience and sustainability to outline future research possibilities in PECS-related research. The presentations, and discussion are structured around the following areas identified in our review paper, where an in-depth focus on the key dimensions of sense of place will advance a comparative place-based empirical understanding of stewardship and transformation in social-ecological systems: 1) The contribution of place meanings and attachment to initiating and maintaining social-ecological traps, as well as to transformative change for stewardship; 2) Whose place meanings are favored and why - and implications of these power dynamics for SES systems; 3) A dynamic ecological perspective on sense of place; 4) The influence of chronic versus acute changes on sense of place; and 5) Scaling up stewardship behavior from the individual to the global. This session aims to explore the development of place-based empirical research that assesses sense of place and the implications for sustainability through a social-ecological lens. The objectives of the session are to 1) explore what we know about the role of place attachment and place meanings for stewardship behavior and transformation from place-based empirical research, and 2) synthesize these insights through discussion.

Presentations:

Sense of place in maintaining social-ecological system dynamics: insights from the Eastern Cape, South Africa (1064)

Vanessa Masterson^{1*}, Maria Tengö¹, Marja Spierenburg², Carl Folke¹

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Sense of place has been shown to be an important factor supporting adaptive capacity, but attachment to particular place meanings may also be implicated in maintaining potentially undesirable social-ecological states. We explore the role of sense of place in maintaining particular human-nature connections which contribute to trap conditions in the rural Eastern Cape South Africa. In the former Transkei, the Apartheid political system created interdependence between small-holder agriculture and labor migration, where rural homesteads relied on remittances from labor migrant household members. Social-ecological trap conditions persist here with a declining contribution of agriculture to livelihoods and subsequent land degradation, and where the practice of circular migration remains common. Our qualitative approach combines interviews with rural residents and their urban household members, photo voice in focus group discussions, and participatory observations. We show how the rural landscape and ecosystems are imbued with meanings of home, and ancestral belonging, as well as negative meanings of backwardness and underdevelopment. Attachment to these place meanings is framed by cultural expectations and desires and reinforced by biocultural rituals and a place-based social contract between the living and the ancestors. We show how particular place meanings constrain people's perceived response options in this system, contributing to maintenance of circular urban-rural migration and social-ecological trap conditions. However, place meanings also illuminate biocultural connections and ecological knowledge of urban migrants which could provide the seeds for inclusive stewardship of the landscape e.g. new institutions for forest governance.

The role of place making in collective action for transforming water resources management in a social-ecological trap (1026)

Johan Enqvist^{1*}, Ailbhe Murphy¹, Maria Tengö¹

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With global trends of expanding cities and increasingly urban populations, sustaining ecosystems that support human wellbeing in cities is both increasingly challenging and urgent. Local residents can take on important roles in the stewardship of parks, trees and water bodies in their neighborhoods; in Bangalore, local "lake groups" have partnered with public authorities to improve monitoring of restored lakes. By partly decentralizing management and drawing attention to lakes' importance for groundwater supply, these groups contribute important change agency in a governance situation locked in unsustainable command-and-control practices. This study investigates how place making processes form a part of urban environmental stewardship, by focusing on five different lake groups. In each, three to six members were interviewed and surveyed to measure place attachment and place meanings that were associated with their specific lake, both at present and as they recall about when they first got involved. Preliminary findings show that over time, members generally develop a more complex understanding of what kind of place their lake is. Many are shaped by their own childhoods, recreating places or types of vegetation from where they grew up. Other desirable traits are defined by what has come under threat from the developing city: greenery, cooling, free-flowing water, and organic, non-sanitized life. A third layer includes appreciation for these places as part of national or cultural pride, where independence from the British and ownership of Indian soil is celebrated. Articulating these values also shapes how the broader community interacts with lakes, and can help foster a more complete understanding of the benefits they provide for urban dwellers.

The politics of place meanings in a transformation: insights from farm workers in the conversion of farmland to "conservation" land in the Eastern Cape, South Africa (1023)

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Over the past decades, there has been an increase in South Africa in conversions of commercial (mainly white-owned) farms to wildlife-based production and conservation. These conversions have severe socio-economic but also socio-cultural impacts on farm workers and dwellers, i.e. those who call these farms home but are living on other people's land. Contrary to what farmers and land owners claim, these conversions do not result in more employment opportunities, and are often accompanied by evictions of farm workers and dwellers. Contestations occur between these groups - but also among game farmers and "conventional" farmers about the place meanings attached to the various parts of the Eastern Cape, and what the future of the landscape should be. Game farmers and land owners often claim that the conversions are a restoration of the area as it was before the first white settlers arrived, thereby erasing the memories of pre-colonial histories of pastoralism and agriculture. Farm workers who are evicted during the transformation process lose their homes - including sometimes ancestral graves and ritual places - as well as access to land for cultivation and livestock. Based on the findings of a 5-year research project, involving a number of students and which entailed multiple in-depth (ethnographic) case studies conducted on (game) farms and in rural townships, as well as interviews with members of government departments and civil society organizations, this presentation will focus on the contestations over the Eastern Cape landscapes affected by conversions to game farming, and the ambivalent responses by government institutions (at national and provincial level) to these contestations. It will demonstrate how this particular transformation of the landscape serves to actively exclude certain groups - which then stands in the way of the social transformation needed to address the legacies of apartheid.

Place, risk and resilience: adaptation in rapidly changing coasts (1051)

Chloé Guerbois¹, Katrina Brown², Tara Quinn², François Bousquet³, Lucy Faulkner²

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Coastal communities around the world are crucibles of change: shifting patterns of settlement and migration, new developments and new land uses, and climate change impacts such as sea level rise and weather extremes are reshaping place based risks and peoples' resilience. We wanted to understand peoples' perceptions of these changes, the risks posed by them, and their own capacities to respond and transform in response, through the lens of place. This paper presents findings from the MAGIC (Multi-scale Adaptation to Global change in Coastlines) project, where primary research using a mixed methods approach was undertaken at sites in Cornwall UK, Languedoc France, and the Garden Route in South Africa. We investigate the interactions between place meanings, place attachment, and perceptions of risk and resilience to coastal change. Place attachment and place meanings are highly diverse and articulated in many different ways, shaping attitudes to chronic and acute social ecological change. Our findings demonstrate that mobility is a key demographic process shaping community configurations of place attachment and is significant in how people experience certain changes and risks, in the adaptations they are likely to undertake, and in determining the possibilities for transformation.

Rooted Cosmopolitanism: Can Sense of Place Scale Up? (1055)

Corrine Knapp^{1*}

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Sense of place has often been understood as a local phenomenon that encourages local stewardship. Given the increasingly global drivers of change including climate change and land use, it is increasingly important for actors to work on stewardship across scales. In this paper, we explore whether sense of place has influenced employees of conservation non-profits that work for change at larger scales. We interviewed employees of four international conservation non-profits, Conservation International, World Wildlife Fund, Greenpeace, and The Nature Conservancy, to understand their motivations for conservation and whether sense of place has influenced their desire to work at larger scales for conservation outcomes. We assessed their early experiences of place, their current relationship to the place in which they reside, and how these experiences motivated their work. This paper will help to understand whether the career directions of international conservation leaders were influenced by sense of place at a local level, and whether sense of place might act as a motivator of stewardship at larger scales. This project has implications for broadening the definition of sense of place, how it is understood to function across scales, and how it might be able to be mobilized for stewardship efforts.

Symposium: Making change happen? Transformations in the Anthropocene (PSYMP-28)

November 8th 2017 (12:30-14:00)
Room: Oaxaca1

Chair: Tobias Luthe (luthet@ethz.ch) ¹

¹ ETH Zurich, HTW Chur Engineering Design, Living Environment

Considering the many global environmental problems that we face today, and that human activity is emerging as a major force shaping the Earth system, it is becoming clear that we need to facilitate, catalyze and identify opportunities for transformations to sustainability. This needs to happen at a rate and scale that the challenges of the Anthropocene call for. A variety of models and frameworks for analyzing transformations to sustainability have emerged in recent years across various academic disciplines and areas of study, including: social-ecological resilience, social-technological transitions, Earth system governance, international development, social movements, and research focusing on social innovation. These have all helped to make important advances in the rapidly emerging field of sustainability science. This session will explore some of the frontiers in this research field. Presentations will span a wide range of topics that relate to sustainability transformations, such as catalyzing transformative change through a next mode of TD science, local to global pathways in world's mountains, biocultural systems in the Pamir mountains, and the role of experimental and Real-world Labs in driving transformational change. We will discuss how such place-based laboratories can stimulate transformational change on a regional to global scale, and how the mountain context can be extrapolated to downstream locations – urban, rural, sea shores.

Presentations:

Transformative science for society: The next evolution of transdisciplinary science for sustainability? (91)

Robin Reid^{1*}, Corrine Knapp², Maria Fernandez-Gimenez³, Kathleen Galvin⁴, Julia Klein¹, Anthony Cheng³

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In the last 50 years, globalization has increased teleconnections across places and scales, leading to more complex, interconnected, and urgent problems that require new approaches to problem-solving and knowledge production. We use case studies to explore the first steps towards a new scientific approach in Kenya, Mongolia and the US. Our objective is to describe the next evolution of transdisciplinary science to better promote transformations towards sustainability, which we call "transformative-science-for-society". Our work suggests that this new science-with-action must focus directly on how to catalyze transformative social change place-by-place, integrating the ideas and practices of transdisciplinary science with community building/development. This new type of science is developed and implemented not in halls of science, as some transdisciplinary work is today, but in self-organized, place-based arenas bridging science and society that create full co-learning and democratized processes with diverse stakeholders. These arenas then purposely build the capacity of all stakeholders to act together to promote transformative social change. Our case studies integrate diverse forms of knowing and knowledges at multiple scales into collective "sense-making" with local and indigenous peoples, policy makers, scientists, business people, and others. This ensures a broad range of understandings and interpretations form the foundation of the actions and adaptations taken by actors across landscapes and scales. The approach contributes to the resilience of place-based social-ecological systems by avoiding top-down, one-size-fits-all approaches. Uniting these ideas and practices allows this new science to become truly transformative, by accelerating the capacity of all stakeholders to learn and act more effectively.

Local to Global Pathways towards Sustainability in the World's Mountains (96)

Julia Klein^{1*}, Catherine Tucker², Anne Nolin³, Robin Reid⁴, Jessica Thorn¹, Cara Steger⁵

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Mountain social-ecological systems (SES) deliver critical ecosystem services (ES) to over half of humanity. Key questions include: What will global mountain SES look like in a future where episodic and sustained global changes impact land, water and livelihoods? Will they be resilient and continue to deliver vital ES or will they be vulnerable to climate change and unsustainable policies? What transformations will be required to address future challenges and which adaptation pathways can lead to healthy and desired futures? Here we use 57 case studies from mountains worldwide to highlight the unique combination of characteristics and paradoxes that create challenges for mountain SES and to identify key elements of a conceptual model. We present results from a literature review of 55 quantitative mountain SES model studies to examine their purpose. We also developed site-based Bayesian Network (BN) models for multiple sites (here we focus on Switzerland, Tibet, Ethiopia, and the US) to identify trajectories of change and actions to move towards desired futures. Across the 57 sites, some of the most important cross-scale drivers and ES are shared, while others exhibit distinctive configurations according to the mountain SES' economic orientation and

land use. We posit that SES modeling can be an effective tool for addressing mountain challenges, when they include a transdisciplinary approach and expand beyond the current focus on understanding system dynamics. Finally, we describe the process through which we arrived at a more synthetic understanding of mountain adaptation pathways from examining site-based BN models that consider local contexts.

Transformative biocultural systems (23)

Jamila Haider^{1*}, Maja Schlüter¹, Steven Lade¹

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Areas of high biological and cultural diversity, so-called biocultural diversity, are increasingly recognized as sources of resilience to local and global change. Biocultural diversity often co-occurs with poverty, resulting in targeted development interventions that aim to increase human well-being, but can involve tradeoffs for the biocultural diversity that characterizes the place. Drawing on recent work in dynamical systems modelling of poverty traps, we show how different kinds of poverty alleviation pathways will have different effects on physical, natural and cultural capital and in different social-ecological contexts (defined by poverty-environment relationships), including biocultural systems. The models show how transformative pathways may be necessary to alleviate poverty and conserve biocultural diversity. The presentation dives into the biocultural context with an in-depth case from the Pamir Mountains, Tajikistan. Over the past 25 years, since the collapse of Soviet Union, the Pamirs have undergone significant social and ecological changes. Transitioning from what could be characterized as a "biocultural refuge" to an area that is increasingly influenced by globalization, visions of future development pathways are held in tension amongst different actors. Most notably, conflicting value systems seem to constrain viable visions for transformation. We use participatory observation through cooking as an empirical methodology and present four different visions for development captured by a local Pamiri artist. The discussion will center around properties and mechanisms of transformation in the different pathways.

Real world laboratories as place-based experiments for informing global sustainability (37)

Tobias Luthe^{1*}, Melanie Rottmann²

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Real-world laboratories (RwL) are part of a dynamic family of sustainability research settings, i.e. living laboratories, urban labs, or social innovation labs. They share the idea to use experiments in real-world settings to understand and shape societal transformation towards sustainability. RwL create spaces for transdisciplinary research, developing and experimenting with potential solutions to sustainability challenges. They provide opportunities for informing global sustainability through place-based research, and help define context-specific pathways towards sustainability. On the case of the RwL MonViso Institute (MVI) in the Italian Piedmont mountains, demonstrated on a number of concrete examples and experiments, we explore the RwL approach for improving the understanding about social-ecological transformations and how they differ from current modes of research. We pinpoint challenges and opportunities to inform the transfer to global sustainability from place-based, context-specific pathways towards sustainability, applying the RwL concept of combining transformation, experimentation, transdisciplinary (TD) collaboration, long-term orientation, transferability, learning and reflexivity. The interdependency of these characteristics is showcased by

different experimental settings at the MVI, for example with University groups engaging in TD research on-site, or a hemp plantation as incubator for a place-based circular economy. We critically reflect, present and cognitively evaluate results and effects with local stakeholders and international audiences on a global scale. Finally, we reflect on the MVI design as RwL applied to different scales of transformations. The specific challenges and benefits imposed on the MVI RwL, given its location, provide insights into labs as boundary objects and on their typologies to connect sustainability research across scales.

The role of experimental Labs in socio-ecological transformations for sustainability (81)

Christina Zurbriggen^{1*}, Mariana Gonzalez², Maria Mancilla³, Sebastian Gatica⁴

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This paper aims to analyze the role of experimental Labs in promoting a reflexive culture that facilitates new ways of addressing complex socio-ecological problems and transforming new ideas into practical action that will eventually lead to the emergence of new values. Labs are conceived as creative spaces that bring together diverse stakeholders to help them understand the challenges at stake from a system perspective. At the same time, Labs enhance interfaces through a creative, dynamic and adaptive learning process, characterized by transdisciplinary co-creation of knowledge, interactivity and experimentation. This paper will discuss the role of Labs, considering the following dimensions: purposes, principles, participants, structures and practices. Based on these dimensions, the aim is to conceptualize their role in contributing to socio-ecological transformations for sustainability. Also, it will be focused on key areas for experimentation and transformation in public policies for sustainability: future framing of the challenges for sustainability; understanding knowledge generation in action for decision-making; and experimentation of new public policies towards a sustainable development. Specifically, the paper will analyze the design of the Labs: Social-Ecological Lab in South American Institute for Resilience and Sustainability Studies SARAS, Bella Vista Uruguay and other experiences in the world.

Symposium:

Feedbacks and cross-scale interactions driving land system change in a globalized world (PSYMP-12)

November 9th 2017 (10:30-12:00)

Room: Oaxaca 1

Chairs: Ariane de Bremond (ariane.debremond@cde.unibe.ch)¹, Tomas Vaclavik (tomas.vaclavik@ufz.de)²

¹Bern University Centre for Development and Environment (CDE)-Global Land Programme (GLP); ²UFZ - Helmholtz Centre for Environmental Research Department of Computational Landscape Ecology

Land systems – understood as coupled social-ecological systems – and their dynamics are decisive for sustainable development outcomes in terms of both the environment and human wellbeing. This is reflected in the Sustainable Development Goals (SDGs) that emphasize the need (i) to achieve food security and improved nutrition, (ii) promote sustainable agriculture and economic growth, and (iii) encourage sustainable use of terrestrial ecosystems and halt biodiversity loss. However, achieving these critical goals, e.g. by increasing agricultural yields through intensification or cropland expansion, is associated with a range of environmental and social externalities and feedbacks that occur across different spatial scales. Dynamics in one place increasingly depend on drivers that emerge from distant other places or from higher levels of spatial scale. Conversely, growing demands and a global revalorization of land are leading to intensified competition over land in distant places. Flows of goods, capital, people, information and policies can lead to phenomena such as large-scale land acquisitions, green grabbing, displaced deforestation, or cascading land use, etc. Such distant interactions often lead to competing claims on land systems implying trade-offs, conflicts among actors, and negative sustainability outcomes in terms of the environment and human wellbeing. Yet, such distant interactions may also bear the potential for governance innovations, help to overcome political obstacles and provide scope for pathways towards more sustainable development. Addressing these cross-scale connections and feedbacks in social-ecological systems is necessary to provide applicable solutions for sustainable land management. This symposium will investigate the link between global change processes and local realities that affect sustainable land management. It aims to bring together different research initiatives and efforts working to conceptualize, understand and assess cross-scale & telecoupled dynamics in land systems from various perspectives.

Presentations:

Transferability of place-based research in land system science (1058)

Tomas Vaclavik^{1*}

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Much of our knowledge about land use and ecosystem services in interrelated social-ecological systems is derived from place-based research. While local case studies and assessments of ecosystem services provide valuable insights, it is often unclear how relevant their findings are beyond the study areas. Drawing generalized conclusions from local observations and applying them to other places in the world requires that we identify patterns of human-environment interactions that are similar to those represented by the case study. Here, we extend the previously developed concept of land system archetypes to investigate the transferability of findings from twelve regional projects of the German Sustainable Land Management Program. For each project, we characterize its land system archetype based on a synthesis of more than 30 global datasets on land-use intensity, environmental conditions and socioeconomic indicators. We estimate the transferability potential of project research by calculating the statistical similarity of locations across the world to the project archetype, assuming higher transferability in locations with similar land systems. Using specific examples from the local case studies, we highlight the advantages of our approach and discuss the differences between local realities and information captured in global datasets. The proposed method provides a blueprint for large research programs to assess potential transferability of place-based studies to other geographical areas and to indicate possible gaps in research efforts.

Trade-offs between intensification, expansion, biodiversity and food security - an integrated global approach (1068)

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Agriculture is the predominant land-use and covers 70% of the suitable global land surface. Consequently, the impacts of agriculture on the environment and climate have dramatically increased and are of global relevance. Both, intensification and expansion of agriculture became a major driver in exceeding the sustainable limits of the planetary boundaries, being responsible for climate change, biodiversity loss, and degradation of land and freshwater. The question on how to increase agricultural outcome is crucial not only to ensure food security for an increasing number of almost 10 billion people in 2050, but also for retaining biodiversity and mitigating climate change. Our study aims at identifying global and trade-offs between intensification, expansion, biodiversity and food security. We present an approach that couples a biophysical crop growth model with a global equilibrium model. Thus, it is possible to consider socio-economic drivers of land use change, such as population and demography change, consumption patterns, dietary change, economic policies, global trade etc., while taking biophysical potentials and constraints for expansion and intensification respectively into account. The results identify high pressure regions for future expansion and intensification respectively. To delineate the top pressure regions, the hottest hotspots where biodiversity is potentially most threatened by either intensification or expansion are shown. The gained insights can be used to prioritize areas for expansion, intensification or protection. The identification of the hot spots allow for focusing on these areas for more detailed regional or local research and assessment.

A typology to operationalize the telecouplings concept for studying land system change (1085)

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In an age of globalization, the telecouplings concept has considerable promise to understand land system changes that are increasingly driven by distant factors. As a way to move towards the operationalization of the concept in land use science, we propose a typology of telecouplings based on (1) major feedback loops (e.g., commodity trade) and (2) main land system change outcomes (e.g., deforestation). These two characteristics define a matrix of telecouplings archetypes into which we can fit case studies, and which could be a starting point for a more systematic assessment of studying causal mechanisms in telecoupled systems. In addition, we propose a systematic approach to description and empirical study of telecoupled systems based in five key steps: (i) definition of the focal land-use system and identification of properties related to the land use outcome; (ii) identification of the dominant feedback loops; (iii) identification of the telecoupling archetype of reference; (iv) conceptualization of the feedback networks; and (v) assessment of data availability. We highlight that feedbacks in telecoupled systems should be measured and monitored as a way to incorporate metrics of distant factors into the causal analysis of a land use process. More information on the relative importance of the factors and processes coupling systems over large distances, and the prevalence of different telecoupling archetypes will help to identify general principles governing processes of land change in a highly interconnected world, and to develop modeling approaches that can assess the effectiveness of policies to steer telecoupled systems onto desired pathways.

Tax havens, ecological change and global sustainability (9)

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The "Panama Papers" have offered a glimpse into the usually opaque world of tax havens and their role in the global economy. While the political, economic and social implications related to tax haven jurisdictions are known, their ecological dimensions have until now been largely ignored. This stems from the systematic lack of data, and the complex links between financial flows, opaque supply chains, and social-ecological change on the ground. This paper addresses this gap by examining the links between the use of tax haven jurisdictions by companies, and resource extraction from two key global commons - the Amazon rainforest and global fisheries resources. The cases are complementary, and build on different data sources as a means to a) quantify flows of capital transferred via tax havens to a number of selected companies operating in the Amazon biome, and b) assess mechanisms by which the use of tax havens have detrimental impacts on social-ecological systems with global repercussions. Our paper includes a first systematic assessment of the use of tax haven jurisdictions, the degradation of critical global environmental commons, and the severe problems posed for scholars, policy-makers and investors. We also discuss how the environmental dimensions of the use of tax haven jurisdictions can be put at the center of current international policy discussions and reform proposals, and included in current studies of social-ecological change assumed by scholars in the PECS community.

Meeting global land restoration targets: what would the world look like? (58)

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To counteract negative externalities of unsustainable land management on human well-being there has been increased interest in land restoration. This is reflected in the targets of the Sustainable Development Goals, Convention on Biological Diversity, United Nations Framework of the Convention on Climate Change and United Nations Convention to Combat Desertification. Rather than looking at restoration at the local level, we took a global perspective to understand the potential- and aggregated consequences of meeting these targets. We extracted and analyzed policies from these commitments that target land restoration and protection. We translated them into a global land change model, the main objective being to investigate their influence on land cover and land system change and their impact on ecosystem services (ES) and human well-being. Combining methods such as policy review, spatial analysis and land change modeling, we built a restoration scenario and compared it with two plausible pathways of socio-economic development in the absence of these policies. We found that meeting global restoration targets could increase tree cover by 4 million km² and forest carbon storage by 50 Gt, allowing protecting 18% of the terrestrial area for biodiversity and ES and increasing the relative share of nature around urban areas. Gains in tree cover would cause a contraction of crop, pasture- and bare land due to cropland intensification and wide-scale replacement of grassland and grassland-mosaics, by forests and forest-mosaics. While West Africa and India show most land system changes, land system architectures differ across regions, creating both land- sparing and sharing.

The simultaneous effects of land-use intensification on biodiversity and production: A global meta-analysis

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How to manage land to secure the production of goods while protecting biodiversity is a hotly debated question in environmental science. Land-use intensification is increasingly being used to boost agricultural production and is recognized as a major threat to biodiversity. However, little is known about the simultaneous effects of land-use intensification on biodiversity and yield. In order to close this knowledge gap, we conducted a global meta-analysis synthesizing 115 studies on the responses of biodiversity and yield to land-use intensification on the same patches of land. We classified land-use intensification in order to compare its effects across production systems and along a gradient of intensification. Intensification is successful in significantly increasing yield (+20.3%), but in almost all situations it inexorably results in a loss of biodiversity (-8.9%), thereby confirming the fundamental trade-off between agricultural production and biodiversity conservation. We were unable to identify win-win situations in which intensification increases yield and biodiversity. More precisely, we find that the higher the yield gain, the larger is the simultaneous loss in biodiversity. Nevertheless, we identify situations in which biodiversity is much less affected by land-use intensification and increases in yield are still achieved (win-no-harm). While, for example, wood production systems might hold some potential for sustainable intensification (+18.6%, -1.6%) the results of this meta-analysis challenge such approaches for being universally applicable. The remaining unexplained variation in this synthesis, underlines that solving questions on future land-use intensification needs further quantitative studies that incorporate both perspectives of land managers and conservationists.

Symposium:

Socio-cultural valuation of ecosystem services: status quo and future directions (PSYMP-1)

November 9th 2017 (10:30-12:00)

Room: Oaxaca 2

Chairs: **Tobias Plieninger** (tobias.plieninger@ign.ku.dk)¹, **Claudia Bieling** (claudia.bieling@uni-hohenheim.de)¹

¹University of Copenhagen, Department of Geosciences and Natural Resource Management

Socio-cultural valuation is an important complement to biophysical and economic valuation of ecosystem services that enables a fuller characterization of diverse ecosystem values in research and practice. Socio-cultural approaches can be applied at various stages of ecosystem planning and management, e.g. in problem framing, mapping, assessment, and decision-making. They examine the importance, preferences, needs or demands expressed by people (i.e. individuals and groups) towards nature, and articulate plural values through qualitative and quantitative measures other than monetary or biophysical units. Assessment and mapping of perceptions, values, attitudes, and beliefs provide meaningful insights regarding the contributions of ecosystem services to human well-being. In particular, they facilitate understanding of the relevance of ecosystem services for local stakeholders, allowing cultural sensitivity and recognition of trade-offs in ecosystem services valuation between different user groups, such as between tourists and local residents. However, the normative nature and heterogeneity of valuation by various stakeholders provides methodological challenges, and socio-cultural approaches do not yet constitute a formalized methodological framework. We invite presentations on recent progress in the socio-cultural assessment and mapping of ecosystem services through quantitative and qualitative approaches, e.g. through Delphi panels, public participation GIS, or photo elicitation. In particular, we intend a discussion on the benefits and challenges of different approaches for representing cognitive, emotional, ethical responses to nature, alongside ways of expressing preferences, needs, and the desires of people in the frame of ecosystem services. Our goal is to bring this together in a methodological framework that can guide the selection and application of various socio-cultural valuation approaches in different contexts and for different purposes. To achieve this aim, we propose three main questions that could flexibly guide each presentation: 1. How do socio-cultural approaches help to broaden the valuation scope and capture multiple values that complement other valuation methods? 2. In what contexts and for what purposes are socio-cultural valuation methods particularly useful? 3. How can socio-cultural methods help to bring different voices and stakeholders into the decision-making process?

Presentations:

Using social media photos to explore the relation between cultural ecosystem services and landscape features across five European sites (1003)

Tobias Plieninger^{1*}, Elisa Oteros-Rozas, Berta Martín-López², Nora Fagerholm³, Claudia Bieling⁴

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Cultural ecosystem services play an outstanding role in the contribution of landscapes to human well-being. Online data shared on social networks, particularly geo-tagged photos, are becoming an increasingly attractive source of information about cultural ecosystem services. Landscape photographs tell about the significance of human relationships with landscapes, human practices in landscapes and the landscape features that might possess value in terms of cultural ecosystem services. Despite recent advances, some challenges remain to be explored: (a) how to assess a broad suite of cultural ecosystem services, beyond aesthetic beauty of landscapes, (b) how to identify the landscape features that are relevant for providing cultural ecosystem services and (c) how to determine trade-offs and synergies among cultural ecosystem services. This paper presents an approach for eliciting the importance of cultural ecosystem services and the landscape features underpinning their provision across five different sites in Europe through a content analysis of 1,404 photos uploaded to the Flickr and Panoramio platforms. Four bundles of landscapes features and cultural ecosystem services showed the relation of recreation with mountain areas (terrestrial recreation) and water bodies (aquatic recreation). Cultural heritage, social and spiritual values were particularly attached to landscapes with wood-pastures and grasslands, as well as urban features and infrastructures. A positive though weak relationship was found between landscape diversity and cultural ecosystem services diversity. The results can be of interest both for the elicitation and comparison of landscape values across European cultural landscapes.

Bridging the gap between ecosystem services valuation, sustainability and justice (127)

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A key challenge for sustainability is developing institutions that effectively prevent or compensate for the unaccounted socioenvironmental costs of economic growth. Despite progress in our ability to calculate these costs, their integration to company balance sheets and macroeconomic accounts remains elusive, unless claimed through court cases or unless state regulations mandate their internalization. Which values and institutions should be used to prevent these costs remains a continued source of controversy. The dominant approach in nature valuation frames external costs as market failures, calling for their internalization in the price system through "market-based instruments". Critical scholars, on the other hand, have criticized this approach on the grounds that it fails to inform ecological thresholds and that privileges access to nature's benefits for those with ability to pay. This presentation explores the hypothesis that economic valuation can be tailored to better serve purposes of environmental sustainability and justice. We call attention to the literature in institutional theory and ecological economics that frames socioenvironmental costs as "cost-shifts" through which some economic actors capitalize benefits by shifting costs to other regions, other species and future generations. Using insights from case studies, we show ways through which valuation can inform liability claims for socioenvironmental damages, serving both deterrence and corrective justice roles. We conclude pointing to legal and economic concepts and frameworks that can contribute to bridge the gap between nature valuation, environmental sustainability and justice.

Using free listing interviews for the socio-cultural valuation of ecosystem services (1020)

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Ecosystem services are understood as the contributions of the natural environment to human well-being. Despite this seemingly straightforward definition, many conceptual as well as methodological questions remain open, particularly for the non-material aspects captured under the concept of cultural ecosystem services. The objective is to introduce an empirical study of how different groups of people in four landscapes in Central Europe value their places in terms of contributions to personal well-being. The study builds on interviews with 262 respondents, focusing on a central open-ended question. The method parallels so-called free listing interviews that are common in anthropology and involves no predefined conceptual understanding of the matter in question. When asked for how the local landscape contributes to their well-being, respondents frequently pointed to biophysical landscape features and experiences with the places in question, rather than describing ecosystem services in the common definition. Looking at different respondent groups, very little differences were found for socio-demographic variables, but responses from the four places differed profoundly. Also the level of experience with and activity in a place was decisive, no matter if this was about hiking or working the land as a farmer. Many findings of this study can't be brought in line with the ecosystem services concept. To better capture people's understanding and thinking, particularly experiential aspects, but also tangible ecosystem features need to be better acknowledged. In methodological regards, this study underlines the relevance and strength of inductive approaches to ecosystem services valuation.

Do the poor benefit more? Patterns of ecosystem service benefit distribution and poverty in coastal Kenya and Mozambique (144)

Tim Daw^{1*}, Tomas Chaigneau², Bjorn Schulte-Herbrüggen¹, Chris Sandbrook³, Katrina Brown⁴, Sarah Coulthard⁵, Christina Hicks⁶, Dominique DeMille⁷, Caroline Abunge⁸, Andrew Wamukota⁹

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It is a common truism that poor people are the most dependent on ecosystem services. Surprisingly, few empirical data have shown the benefits to poor and non-poor individuals from different types of ecosystem services. We evaluate the relationship between the probabilities of an individual benefiting from an ecosystem service, and of being poor in a survey of >2000 individuals in 8 coastal communities in Kenya and Mozambique. Benefits are assessed for various ecosystem services, and multidimensional poverty is evaluated through material lifestyle, meeting basic human needs, income, and life satisfaction. Evaluating multidimensional poverty immediately uncovers complexities. For example fishing households are less likely to be income poor than their neighbors but more likely to have poor material styles of life. Patterns in poverty and ES-use raise critical questions of interpretation that are fundamental for poverty alleviation from ES. When the poor benefit more from ES, does this indicate ES providing critical life-support in the absence of alternatives, or that benefits from ES-based livelihood are too meagre to improve their wellbeing? Where non-poor benefit more from an ES, is this evidence of elite capture, or of beneficiaries lifting themselves out of poverty based on ES? Finally, poverty-ES correlations may be due to other confounding factors of location, tradition or lifestyle choices of individuals. We use qualitative observations and data on access mechanisms to explore the possible mechanisms behind the patterns observed.

Cross-scale connections among stakeholders of freshwater ecosystem services in the San Marcos River watershed: A PECS WaterSES social-ecological system case study (29)

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Central Texas is the fastest growing region in the USA. Caught in the middle of this emerging mega-region is the San Marcos River watershed, which provides a suite of ecosystem services to one of the fastest growing cities in the USA, a rapidly growing University student population, and over a million tourists each year. In order to assess the supply and demand of ecosystem services provided by the San Marcos River and its watershed, we conducted 3,193 surveys among these three stakeholder groups. The results from our 49-question survey revealed that use, preference, and value of ecosystem services were significantly influenced by educational and life experiences among all stakeholders. The highest usage of the river was by nonstudent residents, with a median annual visitation of 30 days. Students visited 10 days/year and tourists 6 days/year. We found that as temporal use of the river increased at the regional scale, a negative feedback occurred where people at the community scale (particularly residents) avoided the river. A positive feedback occurred where as individual use of the river increased, so did their value and preference of particular ecosystem services. Overall, our findings demonstrate that within this social-ecological system, actors at the individual, stakeholder, community, and regional scales interact to define the supply and demand of ecosystem services. Our study provides insight into the dynamic effect of rapid regional growth on an already sensitive social-ecological system and the multiple feedback loops generated during this process.

Health clinic gardens as social-ecological systems: Resource diversity and stakeholder perceptions on ecosystem services (25)

Ancia Cornelius¹, Marie Du Toit¹, Sarel S. Cilliers¹

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Health clinics were developed in South Africa to provide free primary health care for underprivileged communities. Gardens are often developed at the clinics to contribute towards food and nutrition security of the larger community. A study was done on 105 health clinic gardens in the North-West Province of South Africa to determine the natural, physical and social resources as well as the perceptions of different stakeholders on the ecosystem services and disservices provided by the gardens. A diversity of stakeholders which share professional interests and are able to solve certain problems through mutual engagement, forming a community of practice, is involved in the gardens. Natural resources were determined in terms of plant diversity, utilitarian plant diversity, life forms, and growth forms. Physical resources include information on water, fertilizers, garden tools, availability of propagation material and area available. Social resources include stakeholder diversity and abundance, hours spent in gardens and level of knowledge. Stakeholder perceptions on ecosystem services and disservices were determined by questionnaires. The information from all the studies was numerically scored and the clinic gardens with the highest scores were regarded as those in which best practices were followed. Several aspects of these clinic gardens will be discussed that could contribute to resilience-building strategies such as learning to live with change and uncertainty, nurturing diversity for reorganization and renewal, and combining different types of knowledge for learning. Health clinic gardens are communities of practice which are sources of social cohesion and learning, knowledge-sharing, civic engagement and environmental stewardship.

Symposium:

Putting transformative adaptation into action (PSYMP-4)

November 9th 2017 (10:30-12:00)

Room: Oaxaca 3

Chair: Matthew Colloff (Matthew.Colloff@anu.edu.au)¹

¹Australian National University, Fenner School of Environment and Society

Several conceptual frameworks have been proposed to enable transformative adaptation to global change, as a basis for sustainable development. Some of these frameworks stem from ongoing projects, whose members are developing partnerships to make their concepts operational, and so move from the theoretical domain towards the practicalities of engagement and implementation. As the practicalities of engagement and implementation play out in different contexts, there is the opportunity for other researchers and practitioners to learn by exploring and determining common features of projects that may be transferable. The scope of the session is relatively open, but would include topics such as: how conceptual frameworks have helped or hindered implementation of transformative adaptation; how to co-create new ways of thinking, learning and acting about adaptation; re-framing decision-making via the interaction of values, rules and knowledge; exploring tools and heuristics that we need but don't currently have; and where issues of power and gender are situated in the implementation of adaptation. This session will bring together the experiences of researchers involved in implementing transformative adaptation. We anticipate projects and case studies will be from a range of scales, contexts and stages of development. The intent is to explore which attributes of projects may be specific, and which might be generalizable and transferable to other projects and contexts. By so doing, we aim to move beyond showcasing concepts to putting transformative adaptation into action and exploring the challenges of operationalization.

Presentations:

What is transformative adaptation to global change and how might we do it? (50)

Matthew Colloff^{1*}, Sandra Lavorel², Russell Gorddard³, Berta Martín-López⁴, Bruno Locatelli⁵, Michael Dunlop³, Lorrae van Kerkhoff¹, Russell Wise³

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Transformative adaptation is a process by which actors anticipate and respond to changes to their social-ecological system caused by biophysical, social and economic drivers. The responses, which may be incremental or transformational, or a sequenced mixture of both, ultimately leads to the social-ecological system being transformed by shifting it to a different trajectory than what might eventuate without such a response. Transformative adaptation is thus a way of thinking and acting that is transformative in concept, objectives and scope, but is achieved through sequenced combinations of incremental and transformative actions. So how might we do it? We outline an approach based on three elements developed by the Transformative Adaptation Research Alliance (TARA) that can be adapted to particular adaptation contexts: (1) use of adaptation services; those ecosystem services that help people adapt to environmental change by providing options for the future, recognizing changes will occur in societal perspectives on ecosystem configurations, management and use; (2) the values, rules and knowledge perspective (vrk) for identifying barriers and re-framing societal decision-making contexts in order to enable transformative adaptation and (3) the adaptation pathways approach for planning and sequencing the actions required for transformative adaptation and that integrate adaptation services and the vrk perspective. Uniting these elements allows exploration of interactions between changing biophysical systems and co-evolving societal systems in order to enable deliberation, reflexive learning, decision-making and co-production. The TARA approach provides a means for achieving changes in institutions and governance needed to support transformative adaptation.

Transformative adaptation and protected areas conservation under climate uncertainty in Colombia (1032)

Claudia Munera Roldan^{1*}, Lorrae Van Kerkhoff¹, Carina Wyborn², Michael Dunlop³, Nigel Dudley⁴, Oscar Guevara⁵, Carolina Figueroa⁶

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Climate change is bringing new challenges for conservation of biodiversity as ecological conditions change. Conservation and management of protected areas under uncertain climate change, would require a different approach in the traditional vision of preserving ecological features as representation of "unchanging heritage assets". This requires understanding the role of climate variability in the potential transformation of the ecosystem composition, landscapes, structure, and related services. For this, new abilities may be required in order to incorporate long term change and uncertainty into the planning tools and decision making processes, so managers are ready to understand, react and accept the changes in the ecosystems they protect as climate changes. The Conservation Futures project looks to introduce innovative strategies to develop capacities that help protected area planners and managers mainstream anticipatory climate adaptation ("climate smart") thinking in conservation policy and management. The project builds on a multi stakeholder process of thinking, ideation and implementation as well as on the adaptation pathways concept, where the

values, rules and knowledge (VRK) has a dynamic interplay to help understanding how adaptation decisions are embedded in the existing context. The project has been developing and trialing a conceptual "methodology" that may be used in other contexts and places to help developing a future-oriented biodiversity conservation governance that anticipate and embrace change as an inevitable part of policy, planning and management. Here we will present preliminary results of the implementation of the methodology in Colombia where we are working collaboratively with WWF Colombia and *Parques Nacionales Naturales de Colombia*. We will discuss opportunities to transfer the conceptual methodology into other countries or contexts.

Nature-based versus technological approaches to adaptation to climate change in the Peruvian Andes: Different values, rules and knowledge (1011)

Bruno Locatelli^{1*}, Martin Laurenceau², Ronal Cervantes Zavala³

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Decisions on how to adapt to climate change depend on decision-makers' knowledge and values. As decision arenas are often composed of stakeholders with sometimes conflicting worldviews, decision outcomes depend on power relationships, formal and informal rules and governance arrangements around decision processes. In the Peruvian Andes, several programs for adaptation to climate change aim at improving water supply during droughts, perceived to be increasingly severe and frequent. Within mountain landscapes, myriad wetland ecosystems play an important role in storing water and buffering the effects of drought on downstream water users but this role may be reduced by wetland degradation caused particularly by overgrazing. In this context, adaptation can follow different pathways in a gradient between two contrasting stereotyped alternatives. One alternative relies on technology and infrastructure through dam building to substitute technological water regulation for hydrological ecosystem services. The other alternative focuses on ecosystem management to restore and protect wetland ecosystem services but seems to be rarely considered by decision makers. Decisions have major implications on ecosystem services (e.g., scenic beauty, carbon sequestration or wild plant supply) and equity (e.g., when dams benefit mostly urban and powerful actors). This study proposes a critical analysis of decision contexts on adaptation and water management in the Peruvian Andes. We assess the implications of adaptation options on ecosystem services and equity. We identify different doctrines and preferences for technological or ecosystem-based options and relate them to stakeholder worldviews. We also explore whether some options are favored by the decision rules and power relations.

An heuristic approach to transformative coproduction of knowledge for change (1025)

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For transformational change in place-based initiatives, we need to co-create new ways of thinking, learning and acting to work with the complexity and diversity of the systems we are trying to change. This is particularly so given that place-based initiatives play a central role in opening up emergent possibilities through a strong connection to context. The co-creation process of thinking, interpreting, learning and acting requires holistic thinking and making tacit knowledge explicit. To open up co-creation, creativity and emergence in two place-based projects in Lao PDR and Romania, I apply a theoretically based heuristic framework of five epistemic domains. The material, cultural, values-related, relational and aesthetic - are not separate or foundational entities, but an assemblage or

representation of the spectrum of the ways in which humans are able to understand the world. The material domain describes the things we can see, feel, touch, hear and taste. The cultural domain includes the assumptions, shared understandings and expectations that we share with the "cultural communities" we are part of, and which may not be accessible to those from other groups. The third domain is values-related, including ethics, ideals, principles, and standards. The fourth is relational which is about our connections to the human and non-human actors in systems. The final domain (which is often neglected) is the aesthetic. This relates to perspectives on beauty and ugliness, of design and visions. It relates to the less tangible factors that contribute to human wellbeing, and other emotions such as happiness, hope, calmness, excitement and contentment.

Emerging lessons from CARIAA: Gender, water security and mobility as entry points for cross-scale adaptation planning in climate change hotspots (140)

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Climate change hotspots are regions of the world where large numbers of vulnerable people live and where climate change impacts are expected to be high. Generating new forms of knowledge that can support appropriate policy and practice at multiple scales in these regions is critical. This was the motivation behind a seven year transdisciplinary research project that connects with more than 450 scientists and practitioners in three key climate hotspots across Africa and Asia: in semi-arid regions, delta systems, and glacier-fed river basins. The project, entitled "Collaborative Adaptation Research Initiative in Africa and Asia" (CARIAA) connects insights across 17 countries and more than 45 institutional partners in academia, civil society, government and the private sector. With an ambitious design intended to support collaboration and learning across these networks, countries and knowledge systems, this initiative is generating cross-scale learning from multiple place-based studies. In this paper, we share a meta-synthesis of key findings across hotspot regions to highlight how multifaceted issues around gender and development, human mobility, and water resource management provide entry points to develop not only appropriate place-based adaptation interventions, but also to inform multi-scale governance interventions that connect, as an example, National Adaptation Plans and the Sustainable Development Goals (SDGs) to local places. Moreover, the multiple opportunities to integrate development and human well-being into climate policy discourse provides leverage points to scale-up and scale-out interventions for impact.

Symposium:

Urban sustainability transformations in the context of climate-driven extreme presentations in US and Latin America (PSYMP-19)

November 9th 2017 (10:30-12:00)

Room: Guelaguetza

Chair: Timon McPhearson (timon.mcphearson@newschool.edu)¹

¹ The New School Environmental Studies

We will focus on discussing the complexity of urban systems and the need to explicitly link desired resilience with sustainability goals. We will explore a social-ecological-technological systems (SETS) approach and the need to integrate across SETS domains to develop plausible, context-dependent sustainability transformations. The role of ecosystems is a critical component of sustainability transformations. Yet transformations pathways are not dependent solely on ecological functioning. Rather, human activity and values together with technical and infrastructural components are critical to understanding context specific transformations. This broad approach is also needed to understand the delivery of a broad suite of ecosystem services as part of solutions for climate change adaptation and resilience building. Planning and decision-making for resilient, improved urban futures can be supported by innovative qualitative and quantitative scenarios. We will explore how scenarios and a SETS approach can be tools for exploring urban vulnerabilities as well as transformations toward more resilient futures. The objectives of this session are to 1) introduce a social-ecological-technical systems (SETS) approach to understanding complex urban systems, 2) highlight the role of ecosystems in cities and the characteristics of cities as arenas for sustainability transformations and 3) showcase scenarios as a platform for planning urban futures which are more livable, resilient, and just.

Presentations:

Cross-City Spatial Comparison of Green Infrastructure Distribution in the US and Latin America (1028)

Lauren McPhillips^{1*}, Chingwen Cheng², Timon McPhearson³, Nancy Grimm⁴

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Green infrastructure plays a critical role in building urban resilience. As extreme weather events become more frequent and intense in the face of climate change, green infrastructure has been identified as an important strategy for climate change adaptation and disaster risk reduction. In the Urban Resilience to Extremes Sustainability Research Network (URExSRN), we are comparing the distribution, characteristics, and potential services of green infrastructure in the form of vegetated green spaces in several cities across the US and Latin America. To characterize green space, we used high-resolution land cover data derived from satellite imagery in each city. We compared the spatial distribution of green patches across the cities and also compared it to spatially explicit data on socioeconomic and biophysical characteristics. Preliminary data indicate that Phoenix (USA) and Hermosillo (MX) have less than half the green space of the other cities (<12% by area), though there is still substantial variability in coverage of more humid cities (28-56%; including Baltimore USA; Miami USA; New York USA; Portland USA, San Juan, PR; Syracuse USA; Valdivia Chile). Distribution of green space varies. While it's fairly evenly distributed in Syracuse, less equitable distribution of green space in other cities (e.g. Miami) implies that certain communities have less access to ecosystem services and associated benefits. By learning how green spaces have been implemented differently across different cities we can inform future planning and build more resilient cities.

A Social-Ecological-Technological Systems (SETS) Approach to Urban Ecosystem Services (1040)

Elizabeth Cook^{1*}, Olga Barbosa¹, Marta Berbés-Blázquez², Chingwen Cheng², Nancy Grimm², David Iwaniec², Timon McPhearson³

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The ecosystem services (ES) concept, referring to the benefits people receive from the environment, has helped to reframe the importance of nature in cities. Cities increasingly consider ES and employ ecological-based designs to enhance ecosystem functioning, service provisioning, and ultimately urban livelihoods. Yet, the ES concept often ignores the importance of other urban system components that contribute to service provisioning and consumption. We argue that ES are not simply a product of ecosystem structures and functions. Rather, ES are co-produced by people, ecosystems, and technological infrastructure. In other words, urban ES are produced and consumed through the interaction of the social, ecological, and technological systems (SETS) in cities. We demonstrate through examples that all services are fundamentally dependent on all three SETS components. The SETS approach to ES does not decrease the value of the contribution of ecosystems to ES production, but rather highlights the important value of social and technological components of urban systems. This approach is beneficial for planning, policy, and management because it explicitly acknowledges the multiple components of urban systems to maximize benefits of ES in cities, and it brings diverse sectors and perspectives to the table. We emphasize the need for a more integrated, transdisciplinary approach to understanding how SETS affect ES production, demand, access, and consumption. Finally, we argue that the SETS approach is a critical step forward for advancing ES conceptual framework and on-the-ground action that seeks to use ES as a key part of building urban resilience, sustainability, and human well-being.

A social-ecological-technical systems approach to understanding urban complexity and building climate resilience (1041)

Nancy Grimm^{1*}, Charles L. Redman¹, Mikhail V. Chester¹, Elizabeth M. Cook², David M. Iwaniec¹, Timon McPhearson³, Thaddeus Miller¹, Tischa Muñoz-Erickson⁴

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Urban areas, their inhabitants and their infrastructure are often concentrated in exposed areas like coasts and drylands and thus vulnerable to extreme events. Climate change is driving increasing frequency and magnitude of such events, thus threats to people and infrastructure in cities is one of the prime manifestations of the interaction between these two major components of global change. We present a conceptual framework for urban social-ecological-technological systems (SETS) that integrates three domains: social/equity/governance, environmental/ecological, and engineering/built environment/technology issues. We assert that socioecological systems and socially sensitive engineering approaches that fail to incorporate the third dimension may reduce resilience to climate-related disaster. The Urban Resilience to Extremes Sustainability Research Network is exploring: 1) potential solutions such as green infrastructure and safe-to-fail design, 2) modifications of ecosystem services approaches and vulnerability and resilience assessment under a SETS framing, and 3) participatory visioning of sustainable, resilient futures to guide urban transformation. A SETS approach enriches these activities through sensible balancing of the three domains, evaluating tradeoffs among them and opportunities for emergence that can support transformation. The infrastructure of the future must leverage ecosystem services, improve social wellbeing, and exploit new technologies in ways that benefit all segments of urban populations and are context specific. These contexts are defined not only by the biophysical environment but also by culture and institutions of each place. The SETS conceptual framework is being applied in ten diverse western hemisphere cities to co-develop, with city practitioners, visions of resilient SETS infrastructure for an uncertain future.

Scenarios of alternative water governance in vulnerability to water risks in Mexico City (1010)

Hallie Eakin^{1*}, Luis Bojorquez-Tapia², Andres Baeza-Castro³, Fidel Serrano², Marco Janssen¹

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Scientific and policy communities alike now acknowledged that enhancing urban resilience and sustainability is ultimately a complex social and political process. Exploratory modeling of system change is an analytical tool intended to provide stakeholders with material that can challenge their assumptions about the drivers of change and expected future states of a socio-ecological system. Resulting scenarios are used to provoke reflection and learning within a stakeholder community, and thus potentially alter how such actors view the possibilities for intervening in a system. We present here an exploratory modeling approach to support transdisciplinary inquiry about the social-hydrological risk in Mexico City. A dynamic model of social-hydrological risk in the city was developed in collaboration with the stakeholders to simulate the interaction of climatic, hydrological, infrastructural subsystems with water managers' and residents' decision-making. The approach represented the decision-criteria and the actions of residents and water managers in an agent-based model embedded within the larger social-environmental-technical dynamic systems model. Vulnerability outcomes -water scarcity, water quality and flooding -resulted from coupling biophysical

processes and infrastructural states with actors' preferences. In collaboration with the stakeholders, we created scenarios that represented how the decision-makers mental models played out in their intervention into the system dynamics and thus the distribution of vulnerability in the city. Our aim was to challenge stakeholders to evaluate not only what the city might look like under altered biophysical or social conditions, but also but also to "try on" a distinct set of decision priorities and examine the implications on vulnerability outcomes.

Visions and Strategies for Guiding Urban Transformations (1048)

David Iwaniec^{1*}, Elizabeth Cook², Marta Berbes-Blazquez¹, Melissa Davidson¹, Tischa Munoz-Erickson³, Timon McPhearson⁴, Nancy Grimm¹

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We present a framework for co-developing scenarios of positive visions. The Urban Resilience to Extreme Presentations Sustainability Research Network (UREx SRN) engages with local stakeholders in nine cities in North and Latin America to explore alternative desirable, plausible scenarios. Through a series of workshops with local partners, we co-develop scenarios to explore urban sustainability and resilience solutions and challenges, such as extreme climatic Presentations, population growth, urbanization, and changing resource availability. We evaluate potential implications and tradeoffs among scenarios with sustainability and resilience assessments and modeled outputs of future climate, population, land use, and spatial distributions of resources and infrastructure. We demonstrate that the transdisciplinary co-production of scenarios of positive visions and future pathways can enhance urban decision-making capacity.

Transformative change in social-ecological-technological systems

Marta Berbes-Blázquez^{1*}, David Iwaniec¹, Darren Wahl, Elizabeth Cook²

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Current and projected climatic trends highlight the need for transformative change to stay within a safe operating space for humanity. In the absence of strong international agreements, many municipal governments are leading the efforts to build resilience to climate change in general and to extreme weather Presentations, in particular. However, it is notoriously difficult to guide and activate processes of change in complex adaptive systems such as cities. Participatory scenario planning with city professionals and members of civil society provides an opportunity to co-produce positive visions of the future. However, not all visions are created equally. In this presentation, we introduce a framework for characterizing transformative change in social-ecological-technological systems based on insights from systems thinking (Meadows), social innovation (Westley) and resilience thinking (Biggs). We then apply the framework to analyze scenario visions created in participatory workshops in the cities of Valdivia (Chile) and San Juan (Puerto Rico) for which urban flooding is a common threat. Our analysis allows us to compare not just alternative visions, but also key pathways (and potential obstacles) that participants identified in fulfilling their future goals, as well as implicit and explicit tradeoffs.

Symposium:

Social-ecological regime shifts: implications for the sustainable development goals (PSYMP-18)

November 9th 2017 (10:30-12:00)
Room: Tanilaoo

Chair: Kristine Maciejewski (krismacski@gmail.com)¹

¹Stellenbosch University, Centre for Complex Systems in Transition

Regime shifts can be defined as large, persistent changes in system structure and function. These changes affect the supply of ecosystem services, can have major impacts on human economies, security and wealth. Regime shifts are often difficult to anticipate and costly to reverse, and are a source of growing concern, especially with increasing human demands and rising impacts on ecosystem services. The Regime Shifts Database (RSDB) was created to synthesize, compare and share scientific knowledge about regime shifts across a wide variety of social-ecological systems (www.regimeshifts.org). In this symposium, we will introduce this online database and how environmental tipping points could undermine potential for achieving the SDGs developed by the Sustainable Development Agenda by 2030. During this session, we will present several of these syntheses documented in the database, including woody encroachment, the shift from grassy savanna to wooded savannas, a synthesis of regime shifts in the Arctic, and present a framework for exploring plausible new feedbacks between critical transitions in social-ecological systems. The session will be structured around the presentation of 4 speakers of 10-15 minutes each, followed by a facilitated discussion structured around central themes of social-ecological regime shifts.

Presentations:

The Regime Shift Database and link to the Sustainable Development Goals (1069)

Kristine Maciejewski^{1*}, Oonsie Biggs¹

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The Regime Shift Database (www.regimeshifts.org) synthesizes a diverse set of environmental tipping points that may hold consequences for ecosystem services and human wellbeing. Regime shifts were extracted from this online database to explore how potential tipping points could undermine potential for achieving the SDGs, the Sustainable Development Goals developed by the United Nations to end all forms of poverty, fight inequalities and tackle climate change by 2030. The regime shifts were analyzed in terms of the biomes and land use types to identify which SDGs would be most impacted. The regime shifts mostly occurred in the marine and coastal biome and the land use type most affected by the regime shifts included fisheries, extensive livestock production, and large-scale commercial crop cultivation. The zero hunger SDG was therefore most compromised by the regime shifts, followed by decent work and economic growth, responsible consumption and life below water. Biome coverage and global population numbers were used to identify which world regions were most at risk and the implications of the regime shifts for achievement of the SDGs.

Cascading effects of critical transitions in social-ecological systems (1070)

Juan Carlos Rocha G.^{1*}

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Critical transitions in nature and society are likely to occur more often and severe as humans increase their pressure on the world ecosystems. Yet it is largely unknown how these transitions will interact, whether the occurrence of one will increase the likelihood of another, and whether these potential teleconnections (social and ecological) correlate critical transition in distant places. Here we present a framework for exploring three types of potential cascading effects of critical transitions: forks, domino effects and inconvenient feedbacks. Drivers and feedback mechanisms are reduced to a network form that allow us to explore drivers' co-occurrence (forks). Sharing drivers is likely to increase correlation in time or space among critical transitions but not necessarily interdependence. Domino effects occur when the feedback processes of one regime shifts affect the drivers of another, creating a one-way dependence. Inconvenient feedbacks were identified by mapping new circular pathways on coupled networks that have not been previously reported. The method serves as a platform for hypothesis exploration of plausible new feedbacks between critical transitions in social-ecological systems; it helps to scope structural interdependence and hence an avenue for future modelling and empirical testing of regime shifts coupling.

A survey of the livelihood impacts of social-ecological regime shifts: The case of woody encroachment in South Africa (1056)

Linda Luvuno^{1*}, Reinette (Oonsie) Biggs¹

¹Stellenbosch University, Conservation Biology and Entomology

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Regime shifts can alter the ecosystem services provided by an ecosystem as sets of species with particular traits are replaced by species with different traits which functionally provide different services. One of the prevalent regime shifts of this century in many parts of the world is woody encroachment, which is the shift from grassy savanna to wooded savannas. Woody encroachment is reported to negatively impact biodiversity, tourism, eco-hydrology, grazing, and agriculture. As a result of these impacts, a lot of effort has been invested into understanding the drivers of woody encroachment and capture some of the impacts of the bush encroachment as an ecological/ecosystem issue on biodiversity and grazing capacity, with very few studies focusing on the impact of bush encroachment on local land users, their livelihoods and how these in turn influence their management strategies. The objective of this study is to determine the impact of bush encroachment on ecosystem services and human well-being in Hluhluwe, South Africa. Semi-structured interviews were conducted with members of the communities, commercial farmers and conservation managers to understand how people perceive woody encroachment, how it has impacted their lives and the cost of tree clearing. This talk presents preliminary results from the survey which include loss of agricultural land, high costs of clearing, increased wood for energy, reduced game viewing, increased pests and land abandonment. The local communities are the most vulnerable because they cannot substitute purchased goods and services for the lost ecosystem services provided by the grassy savanna.

Social-ecological regime shifts in the Arctic: Strategies for building resilience (1101)

Garry Peterson^{1*}, Juan Carlos Rocha¹

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The Arctic is currently being transformed by climate change, resource extraction, and changes in governance. These changes were recently analyzed by the Arctic Council's Arctic Resilience Report that identified the potential for large shifts in ecosystems services that affect human well-being in the Arctic, analyzed how drivers of social-ecological change can interact alter social-ecological resilience, and how people can adapt and respond to these changes. This work required the development of novel approach to the comparative analysis of the resilience of Arctic social-ecological systems. I present and discuss these approaches that combine a systematic analysis of drivers, dynamics, and consequences of potential Arctic regime shifts. We identified 19 tipping points (or "regime shifts") that can and have occurred in Arctic marine, freshwater and terrestrial ecosystems. These regime shifts affect the stability of the climate and landscape, plant and animal species' ability to survive, and Indigenous Peoples' subsistence and ways of life. Furthermore, a comparative case based analysis of the traits connected to the social-ecological resilience of particular places, showed that the loss of the ability to local people self-organize their responses to change was a key feature leading to loss of resilience. I conclude with a discussion of how these approaches could be adapted and applied to analyze the resilience of other regions.

Symposium: Social-ecological evaluation of conservation and development policies: an empirical approach (PSYMP-14)

November 9th 2017 (10:30-12:00)
Room: Dainzu

Chairs: Driss Ezzine de Blas (ezzine@cirad.fr)¹, Sophie Avila (savila@iiec.unam.mx)²

¹CIRAD FORESTS; ²UNAM IIEC

Policy evaluation research has traditionally favored quantitative approaches. These quantitative techniques can be based (i) on econometric analyses to infer the causality chain triggered by the implementation of a policy or; (ii) be based on a control-treatment approach based on the selection of the best possible counterfactual in order to capture the impact of a policy on a target variable. However, such quantitative approaches have difficulties into integrating qualitative dynamics –such as the influence of governance and institutions– and understand the intertwined and complex nature of interactions between Social-Ecological System (SES) variables affected by those policies. As a result, purely quantitative policy evaluation is not able to capture cascade effects and non-linear interactions between primary and secondary SES variables. We define primary variables as those directly affected by the policy, while secondary variables are those directly affected by primary variables and indirectly affected by the policy. Cascade effects occur when primary variables affect secondary variables in such a way that the causality chain leads to unexpected outcomes or to an unexpected pathway for an expected outcome. To discuss such framework the present symposium confronts empirical studies that analyse the effects of conservation and development policies on human-nature systems trajectories. Our objective is, more in particular, to discuss how to decline the SES framework into a selection of second and third-level key system variables whose interactions are affected by conservation and development policies.

Presentations:

Social-Ecological Evaluation of Conservation and Development Policies: An Introduction (1089)

Driss Ezzine-de-Blas^{1*}, Sophie Avila-Foucat²

¹CIRAD FORESTS; ²UNAM IIEC

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Policy evaluation research has traditionally favored quantitative approaches. These quantitative techniques can be based (i) on econometric analyses to infer the causality chain triggered by the implementation of a policy or; (ii) be based on a control-treatment approach based on the selection of the best possible counterfactual in order to capture the impact of a policy on a target variable. However, such quantitative approaches have difficulties into integrating qualitative dynamics -such as the influence of governance and institutions- and understand the intertwined and complex nature of interactions between SES variables affected by those policies. As a result, purely quantitative policy evaluation is not able to capture cascade effects and non-linear interactions between primary and secondary system variables. This introduction discusses how to identify the system variables of interest, its interactions and the combination of methods to describe them.

Ecotourism effects on rural households economy and the role of conservation and development policies in Oaxaca coastal communities (1013)

Sophie Avila-Foucat^{1*}, Karla Rodriguez², Alejandra Ramírez³

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Communities are considered socio-ecological systems and the asset based approach is useful for describing its dynamics. In this paper, SES is formalized based on assets relationships, stressors and shocks, as well as describing the governance system. Ecotourism has been proposed as a conservation and development policy in Mexico. Thus, in this paper we analyze the role of ecotourism in the socio-ecological system, and the social network analysis related to this activity. The study is carried on at a household level in coastal communities of Oaxaca. Quantitative and qualitative methods are used. Firstly, the socio-ecological system is described, secondly, ecotourism effects on their income and the determinants of household's decision to participate into ecotourism are presented using an econometric model and results show that community organization, environmental awareness, land, and government transfers are significant variables. Secondly, a social network analysis is used to show the differences in two communities. Even if ecotourism is important for diversification of rural household's economy and part of environmental and tourism sector programs, there is no specific program for community based ecotourism initiatives, neither a policy coherence between existing programs.

Exploring farmers responses to policy instruments for better provision of Ecosystem Services: insight from participatory simulation in coffee agro-forestry system Costa Rica and Nicaragua (1019)

Jean-François Le Coq^{1*}, Sandrine Freguin-Gresh², Nicole Sibelet³, Bruno Rapidel⁴, Nils Ferrand⁵

¹CIRAD Actors resources territories in Development; ²CIRAD ART-Dev; ³CIRAD Innovations; ⁴CIRAD System; ⁵IRSTEA Geau

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Numerous policy instruments have been proposed to promote the provision of ecosystem services (ES) by agro-ecosystems. However, the design of sound incentive schemes is still a challenge, partly because of the difficulty to adapt it to the particularities of agro-ecosystem and socio-economic conditions. To respond to this challenge, we developed and tested a new approach to explore the possible effects of policy instruments on farmers' adoption of practices leading to enhance the ES provision in coffee agroforestry systems. We applied this approach in two watersheds in Centro America, where coffee plantations provide both ES and disservices. First, we conducted semi-structured interviews to coffee producers to analyze the diversity of their production systems and current responses to existing policies. Second, we developed a specific role-playing game (RPG) to simulate the effects of three instruments: the enforcement of the current regulatory environmental law, the setting of a specific Payment for Environmental Services; the development of green credits and environmental certification of products. We found that existing instruments are currently not effective in the regions but farmers would be responsive to some of the new incentives. Simulations showed that positive incentives would be the most effective to reduce environmental impacts without decreasing coffee production while an increased enforcement of the law impacts would negatively affect coffee production. After discussing the feasibility of the implementation of these incentives and the interests and limits of RPG method, we argue that it facilitates the co-design of sound incentives to overcome the challenges of multiple ES provision in agro-ecosystems.

The "commodification" of nature: an anthropological look at the Payment for Environmental Services (1002)

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The paper poses the anthropological question "What does man returns to the nature or how he takes care of the nature?" Until the 20th century, man received goods from nature or levied them in counterpart of rituals that guaranteed the sacred and compulsory nature of the rules of management and preservation of natural resources. The extension and globalization of the merchant exchange put an end to it. Facing the inevitable and accelerated degradation of the environment, states and international organizations have been unable to set up a global regulatory environment organization. States and firms only agree on policies of commodification of nature that quickly become carbon market, compensation fund for pollution in the USA and their financialization. There is also a "commodification" of nature through certain forms of payment programs for environmental services (paying landowners and producers for services rendered by nature). Faced with the drifts of speculation in the carbon or biodiversity markets what kind of anti-utilitarian policy alternatives can be proposed? I propose to extend the hypothesis of Ostrom - about management of the common resources by the collective of farmers (peasants, fishermen, foresters) on the basis of practices of gift and reciprocity - to a hypothesis on the production of local public goods by groups or associations of rural people. The paper has two parts: 1) a theoretical return about reciprocity between man and nature 2) an analysis of the commodification of nature through green economy and payment for environmental services policies.

An evaluation of the impact of ecosystem management for climate change adaptation in the Oaxaca Sierra Norte (1065)

Armando Sánchez^{1*}

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This article aims at assessing the impacts of ecosystem management on the adaptation to climate change in the Sierra Norte of Oaxaca in Mexico. The population of the Sierra Norte carries out a great variety of activities such as agroforestry and coffee production. To analyze the adaptation strategies we conducted a household survey in selected communities in Oaxaca. We use cross-sectional econometric models to determine the more successful adaptation strategies. The results suggest that the households' ability to adapt to the occurrence of extreme Presentations, such as floods and droughts, has been relatively successful and depends to a large extent on the characteristics of the household, the institutional environment, and the participation of producers in collective organizations.

Governance of the marine extractive reserve Prainha do Canto Verde (Ceará, Brazil): contribution to socio-economic incentives (1022)

Diana Alexandra Tovar Bonilla^{1*}, Jehovah Meireles¹, Luciana Queiroz¹

¹Universidade Federal do Ceara Departamento de Pos-Graduação em Geografia

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Market-based responses to address common-pool resource management issues have grown in the theory and practice as the increase on research focused on Payments for Environmental Services (PES) suggests (Engel et al., 2008). However, few results and numerous critics call into question its efficacy (Muradian et al., 2010). As an alternative, since the 1980s the Ostrom (1990) studies in Socio-Ecological Systems (SES), found that collective action could guarantee a sustainable management of common-pool resources. The Marine Extractive Reserve (RESEX) Prainha do Canto Verde (Ceará, Brazil) is an example of common governance and community resistance in the struggle to maintain the territory against major threats. The RESEX is characterized by the presence of 310 households, it is composed by a morphological unit of a coastal plain landscape with a complex and dynamic environment geosystem. The traditional local fishing is its main activity and hold *Bolsa Verde* and *Seguro Defeso* programs that could be considered as PES schemes. This research seeks to analyze the fishing resources governance of the RESEX Prainha do Canto Verde by observing the concurrence between state, community and the government programs *Bolsa Verde* and *Seguro Defeso*. Following the SES methodological framework (Poteete et al., 2012) semi-structured interviews were conducted with key participants, and 39 households were surveyed, the fieldwork also included participant observation and workshops with the local community for mapping ecosystem services. We preliminary find a strong influence from the community rules to ensure the effectiveness of the government incentives for the sustainability of the fishing resources.

Socio-ecological approach on the evaluation of Public Programs in the Conservation Soil of Mexico City (1074)

Lucía Almeida-Leñero^{1*}, Alya Ramos¹, Lucero Cetina¹, Julieta Jujnovsky¹

¹Facultad de Ciencias, Universidad Nacional Autónoma de México, Departamento de Ecología y Recursos Naturales

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The ecological balance of the city depends on the peri-urban area known as Conservation Soil (SC) due to the great amount of ecosystem services (ES) it provides. The city's government. The city's government has implemented different instruments of environmental public policy aiming to ES maintenance, which merge owners of the land in the development of conservation activities in exchange for economic support. ¿Are these programs successful public policies in preserving ES and promoting social development? An external quantitative and qualitative evaluation of two programs was done to identify environmental and social achievements and limitations. We developed a historical analysis of the programs, an evaluation of land use change, and an analysis of social perception through interviews and workshops with actors involved. Land use change was evaluated at SC-CDMX scale using a multi-temporal cartographic comparison with the software IDRISI, and measuring percentage of land use change in randomly chosen parcels using GIS. Our results showed that one program is more focused on the social aspect, whereas the other seems to achieve the ES maintenance by the conservation of the forest cover. Despite very limited economic resources; both programs represent one of the principal sources of income for the beneficiaries. In Mexico, the evaluation of social development programs rarely considers their environmental impacts. This is the first assessment of both programs with a socio-ecological approach establishing a baseline for future evaluations and improvements in one of the largest cities in the world.

Symposium:

Marine systems in the Anthropocene

(PSYMP-16)

November 10th 2017 (10:30-12:00)
Room: Oaxaca 1

Chair: Magnus Nyström (magnus.nystrom@su.se)¹

¹Stockholm University, Stockholm Resilience Centre

The human imprint on the biosphere has become so extensive that many scholars consider Earth to have entered a new planetary epoch – the Anthropocene. This presents a situation where people, places, cultures and economies are becoming progressively nested across geographic locations and socioeconomic contexts. Driven by current economic paradigms and consumption patterns, land-based resources are becoming increasingly scarce. Attention is therefore shifting rapidly towards the oceans as engines for sustaining future human needs. Propelled by a wide range of actors – from individuals to transnational corporations, banks, investors and other financial actors – intensification of competing claims is to be expected, which will lead to inevitable conflicts and trade-offs. This new reality necessitates a re-evaluation of how marine ecosystems are perceived, studied, and as well as managed and governed. This session will integrate different perspective on what the Anthropocene means for marine systems. In this session the dynamic interplay between biophysical and socioeconomic drivers across scales will be disentangled, the roles of international trade and finance explored, and the major claims behind the ongoing "Great Blue Acceleration" uncovered. Novel ways of engagement and governance strategies for improved marine governance will be shared and discussed.

Presentations:

The Blue Acceleration: racing for the oceans to secure global human support (1072)

Magnus Nyström^{1*}, Jean-Baptiste Jouffray¹, Albert Norström¹

¹Stockholm University, Stockholm Resilience Centre

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Driven by current economic paradigms and consumption patterns, land-based resources are becoming increasingly scarce. As a consequence, attention is rapidly shifting towards the oceans as engines for sustaining future human needs. This talk frame the unfolding situation as a "race" for three broad claims related to 1) food, 2) material, and 3) space. Propelled by a wide range of actors - from individuals to transnational corporations - we argue that these claims cannot add up. Subsequently, trade-offs between different claims and actors are foreseeable. This poses great challenges for the future sustainability of the oceans and calls for a global governance of marine systems that integrates multiple sectors and accounts for the diversity of actors involved. This talk will unpack and discuss the extent to which the United Nations Sustainable Development Goals and their targets (Goal 14 in particular: Conserve and sustainably use the oceans, seas and marine resources) can address the anticipated intensification of competing claims for the oceans.

Understanding interacting drivers of change in marine systems: exploring the interplay between proximate and distal drivers (1077)

Albert Norström^{1*}, Magnus Nyström¹, Jean-Baptiste Jouffray¹

¹Stockholm University, Stockholm Resilience Centre

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Understanding how direct - or proximate - drivers influence marine systems remains a key challenge. However, the social-ecological dynamics of marine systems in the Anthropocene are seldom just local or place-specific, but are influenced by multiple global drivers with complex connections to other places. Proximate drivers are embedded in, and determined by, broader socioeconomic processes such as trade, finance, human migration and technological advances that operate and interact at a global scale. These "indirect or distal" interactions add dimensionality and complexity to the global marine social-ecological system. We synthesize recent work on different marine systems around the world to highlight how distal interactions are increasingly defining marine social-ecological dynamics. And discuss some ways forward on how to capture and study these complex social-ecological interconnections.

Exploring novel and collaborative governance strategies for guiding global marine futures (1061)

Stefan Gelcich^{1*}, Francisca Reyes-Mandy², Monica Rios¹

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Marine ecosystems are in global decline. New transformational changes in governance have been advocated to cope with overfishing, pollution, climate change, and other drivers of degradation. Here we explore the outcomes of a governance transformation which develops new multilevel and polycentric participatory forms governance and which has resulted in a revolutionary national system that creates multi-stakeholder arenas aimed at achieving ecosystem based management. The presentation specifically assesses the extent to which the capacity for stewardship of coastal social-ecological systems is enhanced through the implementation of this policy. It performs an early assessment of the policy and identifies opportunities for enhancing continuous innovation cycles

aimed at achieving sustainability. Results highlight that fisheries management "silver bullets" do not exist and provide insights on the importance of early assessments and stewardship capacity as a response variable from governance transformations.

Benefits from ecolabels and other market incentives in developing country fisheries (67)

José Alberto Zepeda Domínguez^{1*}, Mario Antonio Vergara Rodarte¹, María José Espinosa Romero², Jorge Torre Cosío², Antonio Gomez², Alejandro Espinoza Tenorio³, Daniel Alberto López López³

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Eco-labels have been developed to face the difficulties faced by States in managing fisheries. They promote the voluntary adoption of sustainable practices, through market differentiation of sustainable products. Despite their theoretical benefits, experience have shown that each standard performs uniquely depending upon the case, the country and the market of the product. In fisheries sector, Mexico has the largest and longest experience in some of this programs within the developing countries. The objective of this work is to explore benefits associated to some of the most worldwide extended schemes (Marine Stewardship Council -MSC-, Fair Trade -FT- and Seafood Watch -SFW-). We conducted 50 interviews to key players from six fisheries involved in these programs. We asked about the main outcomes from each process: drivers, obstacles, benefits and challenges. MSC was the most pursued standard, but also had the highest rate of "withdrawn". The SFW is the shallowest standard and the one who less guarantee sustainability but is the cheapest program. FT is the newest program, its outcomes are mainly focused on social justice. We found that most of these processes have not generated the financial revenues expected, but other economic benefits, such as the increasing of political capital, have presented for sure. The most mentioned obstacle to get involved was the price of the process of any of the standards. If financial revenues is the main driver, the product must be for human consumption and sold in a market that values the sustainability.

Emergence of a global science-business initiative for ocean stewardship (1073)

Jean-Baptiste Jouffray^{1*}, Henrik Österblom¹, Carl Folke¹, Johan Rockström¹

¹Stockholm University, Stockholm Resilience Centre

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Seafood represents a critical source of micronutrients and protein for a malnourished and growing world population. It is also an increasingly traded and sought after commodity on international markets, amidst multiple sustainability concerns associated with declining wild stocks and a rapid growth of aquaculture. While substantial literature has focused on how science interacts with policy, relatively little is known about interactions between science and business. Here, we describe (1) the process of identifying "keystone actors" in the seafood industry, namely globally operating corporations engaged in fisheries and aquaculture, with a unique ability to influence change and take on a leadership role in ocean stewardship, (2) how we actively engaged with these actors, to design and develop solutions to the seafood sustainability challenge and (3) how this co-production process led to the establishment of a unique global ocean initiative, where science and business collaborate towards the United Nations Sustainable Development Goals. This study contributes to developing the limited understanding of large-scale private actors within the sustainability science literature and argues that scientists can play an important role in facilitating transformative change. The approach presented here holds substantial promise and may be replicated in multiple sectors.

Symposium:

Governance challenges for climate adaptation in protected areas management (PSYMP-15)

November 10th 2017 (10:30-12:00)

Room: Oaxaca 2

Chair: Claudia Munera (claudia.munera@anu.edu.au)¹

¹The Australian National University, Fenner School of Environment and Society

Conservation of biodiversity via protected areas and livelihoods dependent upon the environmental services provided by them, are facing growing challenges in dealing with climate change. Biodiversity management under uncertain climate change, would require a different approach in our vision of protected areas as representation of unchanging heritage assets. Although these transformations may be opportunities for protected areas managers, but they must be ready to understand, react and accept ecological transformation as climate changes. This require new abilities that help to incorporate long term change and uncertainty into the policies and planning tools, with implications in the decision making process from local, regional, national and even international level. A traditional approach to climate adaptation follows a learning, cycle pattern, based on response to change as it happens rather than anticipating future changes. Climate adaptation needs governance processes that are prepared for future changes to the climate, focusing on what we can do now to reshape our social, political and practical abilities to anticipate possible changes and respond as changes happen. We frame the "decision context" in the values, rules and knowledge that form the foundation from which we make decisions, plan, and manage for conservation. The main objective of the symposium is to discuss and identify with participants about new ways of thinking about the future of conservation under climate change. We also want to identify those links, barriers and opportunities that may support long term conservation policy, planning, management, towards a "transition" to have a more climate smart decision-making for conservation considering the governance challenges posed by climate change. Finally, we want to identify the key issues to design a learning framework that helps to shape knowledge, rules and values in the decision making context.

Presentations:

Adaptation pathways: enabling multi-level learning (1030)

Michael Dunlop^{1*}, Paul Ryan², Claudia Munera Roldan³, Lorrae Van Kerkhoff³, Carolina Figueroa Arango⁴, Javier Castiblanco⁴, Melissa Abud Hoyos⁴, Russell Gorddard¹

¹Commonwealth Scientific Industrial Research Organisation, Australia Land & Water; ²Australian Resilience Centre; ³Australian National University Fenner School of Environment and Society; ⁴WWF Colombia Conservation Futures Project

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Climate change has the potential to lead to significant changes in ecosystems and transform the way people relate to and interact with them. This talk reports on our experience developing engagement processes to help managers incorporate future transformation into their planning. We approach this fundamentally as a governance problem concerned with how managers and their agencies make different decisions, although the people we work with predominantly focus on ecological management and its outcomes. We draw on the concept of a manager's "decision context" being characterized by societally-sanctioned values, rules and knowledge, and the idea that adaptation to uncertain futures is a continuous process of navigating a "pathway" that creates future options and avoids mal-adaptive near-term options. Working with multiple ecological management agencies in Australia and Colombia we have evolved a workshop process that addresses adaptation as a governance issue. The process first helps participants understand the consequences for management of future transformations. Managers then explore the barriers to adaptation and their multiple societal sources. Finally, they scope initiatives they could implement now that would help stimulate multi-level learning to enable future changes in management. Managers' report these processes help them understand the challenges of future transformation and the governance imperative in adaptation. However, the processes also reveal the extent to which implementing initiatives to drive "learning to manage differently", as opposed to "learning to do better", is difficult within existing institutions. This highlights the pressing need for adaptation processes that purposeful address capacity building and multi-level learning.

Knowledge and environmental governance: challenges of managing for the future (1104)

Lorrae van Kerkhoff¹, Claudia Munera

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The complexity of relationships between research-based knowledge and action are highly context dependent, and this affects efforts to build more effective environmental governance. The challenges of designing interventions (projects, programs) to inform decision-making are exacerbated in climate adaptation, where specific implications of climate change are inevitably uncertain in particular places and situations. While project- or program-based methodologies can embed knowledge-generating activities in specific contexts (such as co-design and transdisciplinary research), these approaches can meet challenges in efforts to "scale up" successful small-scale activities. Knowledge governance is a systematic approach for understanding 1. How knowledge-based processes operate in the broader social, political and cultural context of a place, such as societal expectations of transparency or the role of evidence in political accountability; 2. How governance arrangements such as formal rules, or institutional arrangements such as "boundary" organizations, facilitate or hinder relationships between research-based knowledge and decision-making; and 3. How specific interventions to influence these relationships may challenge or conform to existing norms and institutions. Drawing on qualitative analysis of interview data and participatory workshops, this presentation will demonstrate the application of the knowledge governance framing to climate adaptation for protected areas in Colombia. We show that embedded

institutional structures in policy and planning make flexible, adaptive management difficult, but this exists within a broader context that values evidence-based decision-making, works effectively with civil society boundary organizations, understands the climate challenge and is open to new ideas. We conclude with a hopeful prospect of management change to enable more “climate smart” conservation.

Pathways to adaptation in the French Alps (34)

Sandra Lavorel^{1*}, Matthew C. Colloff², Russell Gorddard³, Marine Gabillet¹, Caroline Devaux¹, Baptiste Nettier⁴

¹ Centre National de la Recherche Scientifique, Laboratoire d'Ecologie Alpine; ² Australian National University Fenner School; ³ CSIRO Land and Water; ⁴ Irstea Développement des Territoires de Montagne

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Mountain livestock socio-ecosystems may be considered as critically vulnerable due to their biophysical and socio-economic marginality, or resilient after a long history of climate variability. Future pathways towards adaptation to climate change and socio-economic uncertainty will depend mountain societies' ability to mobilize climate adaptation services - i.e. the properties of ecosystems enabling the resilience of current ecosystem services, the emergence of novel services, or their transformation to novel ecosystems. In the southern French Alps, livelihoods and the maintenance of a biodiverse, multifunctional landscapes strongly depend on tight interactions between farming and tourism. Local and regional stakeholders share a dominant vision for a future of sustainable local development, while the cessation of agriculture and resulting rewilding are rejected. Reaching the desired vision requires adaptation services including the resilience of fodder production supported by dominant plant traits and functional diversity within grassland types, soil carbon sequestration or the ability for functionally overlapping grassland types to transform in response to climate and management change. However, for these adaptation services to be expressed and support actual adaptation requires identifying social facilitating factors and barriers. Tipping points towards maladaptation may occur with successions of dry summers and snow-poor years, but are most likely to be triggered by changes in social values of the larger society that supports livelihoods through markets for mountain products and flexible subsidies, disrupted transport and virtual connectivity, lack of technical innovation and uptake or local conflict. These initial findings will initiate the co-building of sustainability pathways with residents and regional decision-makers.

Adaptation in Place: learning how to adapt marine NRM (171)

Rachel Williams^{1*}, Alistair Hobday²

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This paper explores the role(s) of place in transdisciplinary knowledge co-production for sustainability and highlights that different types of "places" may be appropriate at different stages in the co-production of knowledge and in different contexts. We draw on two cases of developing adaptation strategies for the management of iconic marine species off the coast of Tasmania, Australia, under a changing climate. The partners in the projects were a CSIRO marine scientist and State Government natural resource managers in Tasmania. The iconic species under consideration in the two case studies were the shy albatross and cetacean mammals respectively. The data underpinning this paper was gathered through a series of interviews with the researcher and NRMs during the course of their work together, focusing particularly on eliciting new insights they were aware of having about the process of adapting and the contextual factors that enabled that learning to occur. In both instances, effective collaborative relationships were established between the scientist and the NRMs. In the albatross case, knowledge co-production was facilitated through the shared experience of fieldwork in the off-shore albatross colony as well as through office-based discussions. For the cetacean mammals work, much of the knowledge-coproduction occurred through office- computer model-based discussions. This was the pre-existing area of knowledge overlap and both parties were also considerably newer to each other's domain knowledge i.e. cetacean mammal ecology and climate adaptation. We suggest the importance of matching "place" to the nature of the mutual learning that is required in a particular context

Symposium:

Biocultural diversity and resilience of social-ecological systems (PSYMP-6)

November 10th 2017 (10:30-12:00)
Room: Oaxaca 3

Chairs: **Barbara Ayala-Orozco** (bayala@cieco.unam.mx)¹, **Julieta A. Rosell** (julieta.rosell@ieciologia.unam.mx)², **Juliana Merçon** (julianamercon@gmail.com)³

¹ Universidad Nacional Autónoma de México, Instituto de Investigaciones en Ecosistemas y Sustentabilidad; ² Universidad Nacional Autónoma de México, Instituto de Ecología; ³ Universidad Veracruzana, Instituto de Investigaciones en Educación

In a world of accelerated environmental change, biocultural diversity could play a key role in maintaining the resilience of social-ecological systems. Biocultural diversity includes the diversity of life, human cultures and languages, and emerges from the close interactions among biological and cultural diversity. Communities who depend directly on natural resources have developed practices, institutions, and knowledge to adapt to social and environmental changes, and many of these communities hold precious knowledge of how biocultural diversity can enhance the ability of societies to cope with present and future changes. Unique opportunities emerge from collaborative learning among indigenous leaders, academics, government officials, and social actors around the connections between biocultural diversity and resilience, as ways to identify and foster good governance for social-ecological systems. The main objective of this symposium is to discuss new understandings about the role of biocultural diversity in boosting the resilience of social-ecological systems in the Anthropocene, and to envision governance alternatives aimed to foster the maintenance of biocultural diversity. Key speakers including indigenous leaders, academics, government officials, and social actors will present provocative questions during presentations for a short dialogue with participants. The symposium will close with a 30 min discussion.

Presentations:

Introductory words for the symposium

Niceforo Urbiet^{1*}

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Why biocultural diversity and resilience? (1080)

Patricia Balvanera^{1*}, Elena Lazos-Chavero²

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In a world of accelerated global environmental change, biocultural diversity plays a crucial role in maintaining the resilience of social-ecological systems. Rural communities have developed practices, institutions, and knowledge to adapt to social and environmental changes. Understanding the very specific ways in which biocultural diversity contributes to the resilience of social-ecological systems will inform on pathways towards strengthening resilience within the Anthropocene. This talk is the introduction to a three day process, starting with this symposium, in which practitioners from indigenous and non-indigenous communities, scientists and policy makers around the world will gather to explore the importance of biocultural diversity, its current threats, and its implications for the stewardship of social ecological systems. In this talk I will present the key conceptual underpinning of what we mean by resilience of social-ecological systems, biocultural diversity, and what we currently know of their interlinkages. I will speak to the current threats to the long-term maintenance of biocultural diversity, to the new opportunities offered by the Anthropocene, and will set the stage for a co-learning opportunity. I will particularly emphasize lessons the importance of the setting, Oaxaca, one of the areas of the world with the most prominent biocultural diversity. I will present examples of the role of different actors towards the resilience of social-ecological systems based on its biocultural diversity, of governance alternatives that promote biocultural diversity, and will highlight its key role in boosting the resilience of social-ecological systems in the Anthropocene.

How do you speak about people, nature and change? Responses from the languages of Oaxaca (1107)

Alejandro de Avila Blomberg^{1*}

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The city and state hosting PECS II are a good place to think about biological diversity and cultural variation since both dimensions reach here their maximum in Middle America, itself a global hotspot. Oaxaca stands out in the inventories of plants, animals and fungi recorded in Mexico, as well as the list of languages still spoken today. Most significantly, Oaxaca is exceptional in this country and continent insofar as over 70% of the land and natural resources are owned collectively, mainly under communal tenure. Most of the people who hold rights over these forested landscapes identify themselves as members of specific indigenous communities, shaped by distinct cultural histories. Pronounced linguistic variation is correlated with an early origin of agriculture in the region, evidenced by archaeological as well as genetic data from domesticated species such as maize, squash, agaves and cochineal. Local languages have developed a rich lexicon to name and order the diversity of life, and they have coined terms and ways of speech to communicate about swidden fields, soil management, ecological succession, and other processes through which people engage with

nature. Communal governance is rooted in the linguistic practices of each locality. Although assembly-wide deliberation and decision making remain poorly documented, communal statutes devoted to land, forest and water rights provide insights into the dynamics of collective thought and emotion that underlie the resistance to mining and energy enterprises, the most salient adversaries of agro-ecological systems today.

The Constitution and the biocultural heritage (1105)

Xavier Martinez Esponda^{1*}

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Mexico has a very important biocultural heritage that belongs to indigenous peoples and comparable communities (e.g. peasants, Afro-descendant communities, etc.), and through which they manifest and exercise important human rights (i.e., cultural identity, access to traditionally managed natural resources, participation in decision-making) that the Mexican State must respect, promote, protect, and guarantee. However, these obligations by the Mexican authorities have been systematically violated, by action or omission, in such a way that, in our opinion, there is a systematic pattern of violation of human rights, the effect of which is the erosion of this biocultural heritage. While Mexico is by definition a guarantor and pluricultural State, the actual situation in the rural areas of the country is the clearest example of the referred pattern and of the contradiction between reality and constitutional paradigms. At the Mexican Center of Environmental Law (CEMDA) we have participated in several strategic litigations advising indigenous peoples and peasants who seek to protect their biocultural heritage, and what we have found is that, historically in Mexico the legislation and the Public policy have fostered the dominant paradigm. The described erosion must end and for this purpose it is proposed to use the law, and particularly the human rights regime, as a democratic tool that can contribute to the construction of lasting peace processes.

Symposium:

The role of technology in social-ecological systems

(PSYMP-10)

November 10th 2017 (10:30-12:00)

Room: Guelaguetza

Chair: Omar Masera (omasera@gmail.com)¹

¹National Autonomous University of Mexico, IIES

In recent years, scholars (Anderies 2014; Redman and Miller 2015) within the field of social-ecological systems (SES) have highlighted the importance of technology in processes of societal change, and the need for the field to engage explicitly with the role of technology in order to realize the transformation to a sustainable Anthropocene. In parallel, scholars of sociotechnical systems (STS) have argued for the value of bridging across these two fields, while being aware of important conceptual differences (Smith and Stirling 2010; Stirling 2011). Understanding the role of technology in mediating processes of ecological change is critical to effectively addressing questions of scale and power. Further, technologies enable and give durability to human practices affecting natural environments. Technological change is strongly context dependent and produces ambivalent and uncertain outcomes. In order to successfully bridge SES and STS scholarship, we recognize the importance of deep theoretical engagements in combination with empirical, place-based research and methodological development. It is likely that the importance of collaborating across the two fields goes beyond each field adding pieces together. Possibly, integration and translation across these domains will lead to qualitative and fruitful changes in the theoretical and methodological approaches of both fields. The session aims to gather researchers and other stakeholders with an interest in discussing the role of technologies in social-ecological systems (SES) – as mediating human-environment interactions with consequences for ecosystem resilience, human well-being, institutional development and evolution, and distribution of wealth and political influence. The objective is to enhance collaboration between the SES and socio-technical systems (STS) fields and identify motivations for integration across fields, share research experiences, theoretical and methodological challenges. Further, to identify steps we need, and are able, to take in order to address complex nexus challenges that arise from technology-society-nature interactions.

Presentations:

Peri-urban transformations, ecosystem services and human well-being in India. Transdisciplinary research in support of pathways to sustainability (1021)

Fiona Marshall^{1*}, Jonathan Dolley¹, Ritu Priya²

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Through a series of place based transdisciplinary studies in rapidly urbanizing contexts in India, we have been examining relationships between context specific socio-technical configurations, ecosystem dynamics and health and livelihoods of the peri-urban and urban poor. We have sought to reveal the social and political infrastructure which creates and reinforces certain types of peri-urban reordering and the implications thereof. We have examined the dominant visions and narratives for environmental management which are associated with particular urban infrastructures and governance arrangements; and explored the dynamics on the ground in terms of how ecosystem quality and access is affected and the its implications in terms of livelihoods and inequalities. We have also explored the possibilities for alternative development pathways that integrate environment, health and other development targets & synergies across the urban-rural continuum. The recognition of alternative pathways, and the mechanisms through which they might be achieved requires close attention to linked socio-technical and socio-ecological dimensions, and to how context specific socio-technical configurations interplay with issues of access and utilization of ecosystems services. Attention to power relations, politics and the possibilities for alliance building across disciplines sectors and scales provide important meeting point for STS and SES perspectives. Ongoing work, focusses on the role of place based community engaged transdisciplinary research in supporting processes of wider transformative change. Again the need to bridge STS, SES perspectives and the politics of alliance building are central to mechanism for reframing debates, building the legitimacy of subaltern knowledges and working towards structural transformative change.

The technological dimension in the socioecosystem concept (1091)

Manuel Maass^{1*}

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From a socio-ecosystem perceptive (i.e. viewing the world as an integrated human-bio-physical system), technology had played a major role in our cultural and biological evolution. Humans not only have the capability of creating technology by establishing "status function" to objects through tool making (like some other animals), but also can do it through the use of an "act of speech", which means the use of symbolic language as a tool to declare functions to objects and to create protocols and procedures. When objects crated with human technology loose its original purpose (or "status function"), they don't disappear, but become part of the ecosystem. Its incorporation usually occurs in unintended ways and unaware to its original developer. Also, these incorporations frequently occur in large quantities and fast speeds, limiting ecosystems to process and absorb them, affecting its structure and functioning. Therefore, while technology enhances human capability to get ecosystem resources and services, it also affects ecosystem capabilities to produce those resources and services. These trade-offs don't show immediately and in order to properly evaluate their net effect, long-term, side-based and trans-disciplinary research is needed.

Technology and social-ecological systems research - motivations for theoretical and methodological integration across fields (1029)

Helene Ahlborg^{1*}, Ilse Ruiz Mercado², Sverker Molander¹, Omar Masera²

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In recent years, scholars within the field of social-ecological systems (SES) have highlighted the need for the field to engage explicitly with the role of technology in mediating processes of ecological change. This is critical in order to effectively address questions of complexity, scale and power. Also scholars of sociotechnical systems (STS) have argued for the value of bridging across these two fields, while being aware of important conceptual differences. Our focus in this paper is on the co-constitutive nexus of society-technology-nature. The objective is to argue for the importance of research on socio-technical-ecological systems (STES) rather than SES and STS separately. Hence, we address researchers in both fields. The paper is a theoretical contribution based primarily on literature review, but in order to exemplify the arguments, we draw on our own empirical work in the field of sustainable energy as well as others people's work on food production and agro-ecological systems. We organize the paper around six reasons why "technology" should be integrated into SES studies: (1) the interface and mediation aspect, (2) ambivalence, (3) the agency aspect, (4) the question of scale, (5) the question of governance and politics, and (6) the question of epistemology and framing. We also highlight potential conceptual conflicts and mistranslations. We conclude that the importance of collaborating across the two fields goes beyond each field adding pieces together and that integration and translation across these domains will lead to qualitative change in the theoretical and methodological approaches of both fields.

Infrastructure Governance and Institutional Misfit in Delta Socioecological Systems (1045)

Kimberly Rogers^{1*}, Eduardo S Brondizio², JPM Syvitski³

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Built infrastructure designed to enhance socioeconomic development within the constantly shifting landscapes of Delta Socioecological Systems (SES) often transcends institutional boundaries. Static, state-governed infrastructure such as embankments and irrigation systems are difficult to maintain on physically dynamic delta surfaces; as a result, these systems can locally fail under stress from river migration and storm surges, resulting in the loss of arable land. Water management in river basins further impacts the sustainability of agriculture on delta SES by reducing the delivery of freshwater and sediment to deltaic floodplains. Rural farming communities in deltas are dealing with the collective impact of upstream infrastructure that restricts downstream flows, and failing infrastructure governance on deltaic surfaces. Vulnerability to this convergence is likely to increase in delta SES under threat of stochastic and gradual climate change. This paper examines how rural communities are locally interacting with a failing infrastructure system in a delta SES where exogenous physical and institutional dynamics are shifting with climate change: the Ganges-Brahmaputra (Bengal) Delta in Bangladesh. A nested Institutional and Analysis and Development Framework (IADF) is used to (i) identify critical overlaps between multi-scalar physical processes, infrastructure, and institutions in the Bengal Delta and its river basins, and (ii) diagnose how failure of the coupled infrastructure system is impacting rural farming communities. The IADF guided focus group discussions with smallholder farmers in coastal Bangladesh, revealing that spatially variable physical processes heterogeneously impact infrastructure performance and thus, how local institutions collectively mitigate and manage the effects of failing, large-scale infrastructure.

Perceptions of climate change among Patagonian coastal fishermen (1016)

Hebe Vessuri^{1*}, Ana Cinti², Cristina Flores³

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Conceptual framing: With the aim of exploring collaboration between the SES and STS fields we study the perceptions of climate change among subsistence fishermen in coastal Patagonia and their interactions with scientists. Objectives: To discuss the contribution of local observations, knowledge and practices to understanding the pervasiveness of climate change in ecosystems and societies. Methods: qualitative, case based, context dependent, and reflexive. Results/Discussion: There is need for bridging across the STS and SES fields to engage explicitly in order to realize the transformation to a sustainable future through empirical, place-based research. Emphasis is laid on the social aspects of environmental change research, that is, the social construction of knowledge through co-production between scientists and local population, the cultural and temporal embedding of the researcher, and the reflexivity of social knowledge. This calls for particular forms of participatory research and assessment that integrate lay experts in academic research programs.

Symposium:

Transformations of social-ecological systems: pathways towards sustainable resilience in Mexico (PSYMP-23)

November 10th 2017 (10:30-12:00)
Room: Tanilaoo

Chair: Amy Lerner (amy.m.lerner@gmail.com)¹

¹Universidad Nacional Autónoma de México, Laboratorio Nacional de Ciencias de la Sostenibilidad

Mexico is one of the world's richest countries in biodiversity and diversity of traditional knowledge. However, as in many other middle or low-income countries, strategies for dealing with challenges such as inequality, urbanization, water shortage, and social exclusion of native groups are insufficient or lacking. There is a growing need to better understand different social-ecological systems in Mexico, and identify possibilities for exploring different pathways for transformation, requiring new approaches in research, governance, and management. This symposium gathers several young scholars from the new graduate program in Sustainability Science at the National Autonomous University of Mexico (UNAM). The presentations discuss some of the emerging social-ecological challenges in Mexico, opportunities for preferred transformations, and the potential for transdisciplinary science in Mexico. Themes will include rural and urban hydrological risk, urban growth and wetland transformation, and vulnerability in informal settlements. The cases provide an overview of some complex social-ecological management and governance problems in Mexico, as well as examples of adaptation strategies by local populations. The symposium will conclude with a discussion of how transdisciplinary science can contribute to sustainability and resilience in the Mexican context, and how to encourage transformations of governance and management towards more desired social-ecological states.

Presentations:

Supporting resilient urban freshwater production in the Anthropocene: applying the Resilience Assessment tool to Mexico City (1053)

Maria Schewenius^{1*}, Sarah Cornell¹, Amy Lerner²

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In the current era, the Anthropocene, all the main earth system processes are impacted by humans. Cities and the resource demands by urban inhabitants are key drivers of change, while simultaneously impacted by changes. As cities depend on surrounding ecosystems and the services they produce, it is increasingly important to support the functions of ecosystems in and around cities, while allowing for cities to grow and develop. Wetlands and forests produce and support crucial water-related ecosystem services, such as fresh water and biological diversity. However, there is a need for developing tools capable of managing the complexity of urban social-ecological systems that can be applied to cities and the surrounding landscapes. The presentation focuses on the first steps of application of the tool Resilience Assessment to an aquifer, crucial for provisioning of potable water, outside of Mexico City. Few empirical studies of Resilience Assessments have been done on cities and urban dynamics. The presentation will focus on how application of Resilience Assessment can contribute to implementation of the city's resilience strategies for freshwater provisioning, as the city grows and simultaneously experiences the challenges of climate change. The presentation will detail challenges to- and contributions by the Resilience Assessment application to an urban context. It will also provide a critical discussion on the meaning of sustainable water provisioning in the social-ecological context of Mexico City. Insights will contribute to develop the Resilience Assessment handbook for practitioners, as well as to a forthcoming international platform for collaborations and learning about Resilience Assessments.

Promoting transformative pathways to sustainability: The Transformation-lab in the Xochimilco social-ecological system (1038)

Lakshmi Charli-Joseph^{1*}, J. Mario Siqueiros-García², Hallie Eakin³, David Manuel-Navarrete³, Rebecca Shelton³, Beatriz Ruizpalacios⁴

¹Instituto de Ecología, Universidad Nacional Autónoma de México Laboratorio Nacional de Ciencias de la Sostenibilidad; ²Instituto de Investigaciones en Matemáticas Aplicadas y en Sistemas, Universidad Nacional Autónoma de México; ³Arizona State University, School of Sustainability; ⁴Universidad Nacional Autónoma de México, Posgrado en Ciencias de la Sostenibilidad

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Experiments to create spaces for social transformation are multiplying. These experiments aim at transcending traditional spaces for rational deliberation, planning and participatory decision-making. Agency is considered in the literature as crucial to foster transformation towards sustainability. However, the focus has been placed more on the capacities needed for the agents of change, than the mechanisms and processes to build agency. We present here an intentional intervention -a "transformation laboratory" (T-Lab) - devised to discover and mobilize agency in relation to a stagnant sustainability challenge: the ongoing urbanization of a culturally, ecologically and historical wetland in Mexico City. The T-lab is designed to stimulate endogenous transformation at multiple levels (individual, collective, social-ecological), through identifying and building individual and collective agency in a small group of diverse actors involved in the use and management of the Xochimilco urban wetland. Through enabling participants to reformulate their connections to the system, to others in the system, and to themselves, the system could be transformed from the inside out. Transformation, in this sense, is essentially about how changes in perception about the system's

dynamics and about oneself translate into changes in social roles and agency. We describe methods that help agents see the potential of their position and role within the social-ecological system and the power of identifying the practices they share with others within specific social networks, and spaces of action. Particularly, we present a new methodology developed for this project called "Agency Network Analysis", and how it was implemented.

Thresholds for resilience changes of *Chinampas* Socio-Ecological System (C-SES): an agent based approach (1062)

Patricia Pérez Belmont^{1*}, Amy M. Lerner¹, Marisa Mazari Hiriart¹

¹ Pontificia Universidad Católica de Chile, Núcleo Milenio Centro de Conservación Marina, Estación Costera de Investigaciones Marinas

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The remains of Xochimilco wetland in the southern urban area of Mexico City are a socio-ecological system, which has been transformed since pre-Hispanic times. Historically, changes in the hydrological system and the continuous demand of products from the *chinampas* (ancestral agricultural techniques), have been the main drivers of regime shifts during the last 700 years. Currently, profound modifications in the ecological and social structure can be seen due to management and institutional failures, cultural fragmentation, water and soil pollution, changes in land use, disorganized tourism, and urbanization, among others. To understand the system's future pathways towards sustainability, the dynamics between social and ecological variables need to be addressed to determine the drivers and thresholds that can maintain its actual state or favor a regime shift. The productive land-use as *chinampas* is rapidly changing to urban use, recreational uses or abandonment. This change is affecting several ecosystem services and other dynamics such as water quality and quantity. In order to address the dynamics of landscape change, we present a potential structure for an Agent Based Modelling tool to model future scenarios to explore the drivers and thresholds that can generate regime shifts and create a new adaptive cycle that can foster pathways to sustainability.

Challenges of building sustainable resilience through waste management in peri-urban landscapes: A case of the Xochimilco wetland in Mexico City (1050)

Beatriz Ruiz Palacios^{1*}, Amy Lerner¹

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The Xochimilco wetland in the peri-urban fringe of Mexico City is undergoing rapid change and degradation due to management and institutional failures, changes in lifestyles and patterns of consumption, the coexistence of urban and rural livelihoods and changes in land use, among others. It is a socio-ecological system with dynamics of its own, different from the urban or rural systems, that presents challenges for the provision of urban waste management services and the maintenance of ecosystem services in the face of growing production of waste. Improving local waste management may contribute to reduce the degradation of the socio-ecological system and urban infrastructure, promote virtuous circles in the behavior of individuals towards waste disposal and contribute to promote sustainable resilience of the system. This paper will explore institutional arrangements in municipal waste management in a community in Xochimilco, which is under processes of urbanization and ecosystem degradation, and the influence perception has over behavior of residents in terms waste management in the peri-urban fringe. Qualitative research reveals that residents see other actors as responsible for waste management and react to the landscape in the strategies they choose. These spaces pose potential challenges and opportunities for possibly inserting mechanisms to adapt to new urban realities, which are increasingly common in an urbanizing world. Through the use of participatory methodologies, we propose to foster the creation of local categories for waste

management strategies and associated social, economic and ecological problems, to advance transformation in behavioral patterns and organization towards waste.

Understanding collective adaptation in conditions of water scarcity: the case of Iztapalapa, Mexico City (1042)

Bertha Hernández Aguilar^{1*}

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Global environmental change can impact particularly marginalized and vulnerable populations of megacities who struggle from diminished access to resources, conditions of poverty, and social inequalities. This presentation will discuss how the residents of Iztapalapa, one of the largest boroughs of Mexico City, respond to water scarcity problems by spending their already scarce resources, including time and money, on collective action to combat water stress. Mexico City exhibits deficits in water availability and hydrological infrastructure directed related to water management. This paper analyzes how residents collectively organize to gain access to water given these conditions. Some of the actions involve residents organizing in social protests intended to pressure government authorities, capturing rainwater, and sharing their own water within communities. However, when eliciting the priorities and motivations for actions related to water, residents also include other political motivations in order to mobilize some social groups. The discussion evaluates the conditions and motivations underlying the collective actions that could contribute to transformative adaptations of the sustainable management of water in urban areas. Using a social-ecological systems perspective, resilience approach, and social network theory, we demonstrate how collective action could potentially foster a transition to long-term sustainability through shared motivations as a social group to elicit collective transformation.

Transforming water access in the Sierra Huichol: Water as a pathway towards sustainability (1071)

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Despite a near-universal consensus on water access being an inalienable human right, for millions of people around the world this right has not been achieved. The sixth objective of the Sustainable Development Goals proposed by the UN is to ensure access to water and sanitation for all, which will be a challenge for many countries throughout the world, including Latin America. The problem of water vulnerability will be a challenge for many countries -especially developing ones- because there is an intricate relationship between water scarcity, poverty and marginalization. The communities most affected by poverty and water problems are often rural and indigenous as well. In this paper we will present two indigenous communities located in the Sierra Madre, in Northwest Mexico, where women and children spend on average one to three hours a day carrying water and families live with under 20 liters per person per day. The implementation of rainwater harvesting systems to solve the water scarcity situation in these communities has a variety of consequences for the well-being of the population. The case study presented here will be based on field research conducted primarily with households and individuals. The intent of the field-based methods is to gather in-depth knowledge about Socio-Ecological System changes. This discussion highlights some of the implications and impacts of the potentially transformative action of achieving access to clean water through the installation of rainwater harvesting systems in rural indigenous communities in Mexico.

Symposium: Equity and environmental change in an urbanizing world (PSYMP-21)

November 10th 2017 (12:30-14:00)
Room: Oaxaca 1

Chair: Dr. Bonnie Keeler (keeler@umn.edu)¹

¹University of Minnesota, Natural Capital Project

In a rapidly urbanizing world, the decisions we make about how to plan and manage cities will determine not only the fate of habitats and species, but also the health and wellbeing of billions of urban residents. The emerging focus on quantifying and valuing urban ecosystem services (ES) has the potential to increase awareness of the benefits of nature and create new markets for conservation. However, there are lingering questions and critiques about the urban ES approach, mainly how issues of equity, distribution, and power are accounted for in ES assessments. This symposium will explore frontiers in the application of urban ES assessments around the world with a focus on how researchers and practitioners have accounted for inequality, representation of diverse voices, and the social demand for ES from different communities. Presenters represent applications of environmental research around the world, from urban communities of color in the United States struggling with watershed degradation and pollution to growing cities in Latin America leveraging conservation to protect water supplies. The session will touch on issues of inequality, governance, segregation and poverty as they intersect with the growing movement to enhance the value of nature in the city. Cities are complex social-ecological systems where environmental change and human wellbeing are intricately linked. The objective of this symposium is to explore how researchers are advancing our understanding of the provision and value of urban ecosystem services (ES), especially through the incorporation of cultural, social, and governance factors.

Presentations:

Clientelism, Corruption, Poverty, and Informality: the governance of land and ecosystem services in Mexico City's conservation zone (139)

Beth Tellman^{1*}, Chrissie Bausch², Amy Lerner³, Enrique Castelan⁴, Alison Acosta⁴

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Informal urbanization drives land change in the developing world, often on land that provisions ecosystem services critical to urban sustainability, such as water infiltration, flood retention, and microclimate regulation. To be effective, governance of these ecosystem services must grapple with the informal character of urbanization in the world's fastest growing cities. Mexico City has a high percentage of informal urbanization, in part due to an unmet housing demand for the urban poor. Informal institutions and practices, including clientelism and corruption, have arisen to meet these needs and result in urbanization on conservation land at the southern fringe of the city on social property. Can programs like payments for ecosystem services and rural development initiatives curb this urban informal growth? This paper leverages theory in institutional economics and the action situation of the Institutional Analysis and Development (IAD) framework to explain why patterns of informal urbanization on conservation land persist. Analysis of the action situation is supported by over 70 interviews with residents, government agencies, land owners, and farmers from 2014-2017 and government documents describing programs for conservation and rural development. We find that informal urbanization is not "disorganized chaos" but rather has an institutional structure with actors responsible for its creation and entrenchment. Current incentives to mitigate urbanization cannot compete politically or economically with the benefits that actors accrue from urbanizing conservation land. Benefits to land-owners and local governments to preserve forest and agricultural land uses in the conservation zone must substantially increase to compete with informal land markets.

Incorporating cultural ecosystem services into urban wetland management: The case of Xochimilco, Mexico City (1039)

Amy Lerner^{1*}

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Urban areas include open spaces that not only provide urban ecosystem services such as regulating and provisioning, but also cultural ecosystem services for residents. Although less studied, cultural ecosystem services are increasingly important to understand and measure to foster stewardship and involvement of local communities in the management of open space throughout cities. In Mexico City, one of the most iconic protected areas is the Xochimilco wetland, which is the remnants of a traditional wetland agricultural system, UNESCO World Heritage Site, RAMSAR wetland site, and National Protected Area, and simultaneously suffers from degradation from intensive use for tourism and urban growth. This presentation discusses the role of cultural ecosystem services in the management of Xochimilco, and particularly as the area has transformed from agricultural to non-agricultural livelihoods. The future of the system depends on continued agricultural activities and tourism within the canals, which are linked to the cultural values and identities of residents and users of the system. However, this cultural identity needs to be valued by younger generations so that traditional activities can be preserved in the future. In this presentation, multi-generational interviews reflect on the perception of cultural ecosystem services, how they can be encouraged for the future

sustainability of the system, and how they are congruent, or not, with other types of ecosystem services that the system provides.

Inequities in the provision, tradeoffs and synergies of urban vegetation ecosystem services (1035)

Cynnamon Dobbs^{1*}, Marcelo Miranda¹, Jaime Hernandez²

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Urban vegetation, both public and private, is critical for the provision of ecosystem services and therefore the maintenance of the well-being of urban inhabitants. Even though vegetation is recognized as beneficial for society the access to that vegetation is influenced by the social context of the urban habitants. This becomes more profound in highly dynamic urbanizing areas where planning regulations are weak or not able to advance as quickly as urban sprawling, like in Latin American cities. We used the socio-ecological framework and network theory to explore environmental inequities existing in Santiago, Chile where social inequities are particularly evident. We assess and map five ecosystem services derived from urban vegetation in 8 communes of Santiago following a socio-economic gradient. We chose services encompassing different ecological functions i.e. air pollution removal, recreation, microclimate regulation, water regulation, connectivity for animals and people, applying urban forestry models, remote sensing, fragmentation models and social data. Findings showed that the communes that are less affluent tend to have less provision of ecosystem services for most of the studied services. Spatial tradeoffs were found between recreation and water regulation services in less affluent communes, while synergies were found between water regulation and connectivity in wealthier communes. Connectivity showed tradeoffs with recreation. In general services are the lowest towards the south of Santiago, while increasing towards the mountains. The ecosystem services concept is useful to improve planning towards reducing environmental inequities leading to cities that are better for all habitants and not only for the socially fortunate

The Inequality Effect: Links between Income Inequality, Biodiversity Loss and Ecosystem Services in South African municipalities (1017)

Maike Hamann^{1*}, Reinette Biggs¹, Belinda Reyers²

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In recent years, interest in inequality as a driver of global socio-economic change and upheaval has risen dramatically. However, less research emphasis has been placed on understanding inequality as a driver of environmental change and degradation. Often, the impacts of inequality are conflated with the effects of poverty, or overconsumption, and untangling these linkages can be challenging. In this presentation, results of an ongoing review of the relationship between inequality and the biosphere are highlighted, with particular emphasis on the mechanisms through which inequality (in its various forms) impacts the biosphere, and vice versa. This theoretical overview sets the scene for a more in-depth discussion of income inequality and biodiversity loss in South Africa, one of the most unequal countries on the planet. We used a biodiversity intactness index to test whether and how strongly biodiversity loss is linked to a number of ecosystem service and human well-being indicators - including income inequality - at the municipal scale. We found that overall, biodiversity intactness has declined by an average of 18.3% since pre-industrial times, but seems to have stabilized over the last 20 years. However, once biodiversity intactness drops below 60%, inequality becomes a significant predictor of biodiversity loss, potentially exacerbating an already challenging situation for the poor who depend on biodiversity and ecosystem services for their livelihoods. Our findings indicate that the relationship between biodiversity, ecosystem services and human well-being is highly varied

within South Africa, emphasizing the need for more thorough investigations into these linkages at sub-national scales.

Urban racial segregation in the US and implications for ecosystem services research (1043)

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The ecosystem services approach has become a crucial tool in the sustainability toolkit, allowing NGOs, governments and environmental managers to account for the value that natural systems deliver to human systems and to nudge human systems toward sustainable practices through the creation of conservation markets. As this approach gains prominence, however, there is a growing awareness of its inability to account for the way ecosystem services interact with - and possibly amplify - socio-economic inequality. In this presentation, I outline the state of the art in urban studies regarding the geographical dimensions of urban inequality with particular attention to the causes and consequences of racial segregation in US cities, and consider the implication for ecosystem services research and methods. I propose some future directions for human-environment systems research that accounts for and attempts to remediate uneven and unequal urban environments.

Accounting for equity in the supply and value of urban ecosystem services (1049)

Bonnie Keeler^{1*}, Perrine Hamel², Timon McPhearson³, Katie Arkema², Graham MacDonald⁴

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There is a growing movement to value and incorporate urban ecosystem services in the planning and management of sustainable cities in order to improve air and water quality, reduce the urban heat island, mitigate storm surge and coastal flooding, sequester carbon, and enhance mental health, cultural and social services. However, there has been a lack of critical evaluation of the potential for urban nature to provide these services, especially in the context of the broader social and governance systems that also affect the delivery and value of these benefits to urban residents. As a result, we know little about the generalizability of findings across spatial and temporal scales, regions, or typologies of cities. These gaps leave city leaders without consistent and reliable information to compare the costs and benefits of nature and how nature's benefits accrue to different groups. We review the evidence for where the real value of nature lies in cities. We find that the value of urban ES are not constant, but highly variable by social, ecological, and technical context. Our review also revealed that how nature is managed and prioritized has real distributional consequences for households and communities. These impacts are often not sufficiently studied or understood in urban ES analyses. Our work reveals key insights into the use and value of urban ES and identifies strategies that advance urban sustainability and equity by most efficiently and effectively leveraging the value of natural capital in cities.

III.

Flash workshops

Flash workshop:

(How) can the ecosystem services framework foster agroecological transitions for sustainability (PWKSP-8)

November 8th 2017 (12:30-14:00)

Room: Oaxaca 2

Chair: Nicolas Dendoncker (nicolas.dendoncker@unamur.be)¹

¹Leibniz-Centre for Agricultural Landscape Research (ZALF) Institute of Socio-Economics

Agroecology can foster the resilience of rural territories. Agroecological practices are based on optimizing ecosystem services at the landscape, farm, and parcel scales. The potential of integrated ecosystem service assessments to support this transition remains largely underexplored, although their ability to build shared territorial perspectives is widely recognized. Our objective is to discuss how the ecosystem service framework can support the understanding, design and steering of agroecological transitions. After briefly presenting some conceptual frameworks that aim at linking ES and agroecology, we plan a world-café structured around three specific questions listed below, to draft a generic list of recommendations on how to use the ES framework for agricultural transformations. A position paper will follow-up. The overall question that will be asked in this workshop is “what is the potential of the ecosystem service framework to support agroecological transitions”? We propose to break up this question into three parts: 1) what is the potential of the ecosystem service framework to support the understanding of agroecological transitions? What is the specificity of agroecological systems in terms of ES? How can this be assessed? How can we use the ES concept to evaluate a system being transformed to agroecology? 2) What is the potential of the ES framework to support the design of agroecological transitions? Specifically, how can agroecological systems be designed to optimize ES delivery for landscape actors? 3) What is the potential of the ES framework to support the steering of agroecological transitions? Specifically, can an integrated and participatory ES valuation help foster agroecological dynamics at the landscape level? We aim at gathering an as broad as possible range of participants, coming from a diversity of background and countries. Participants could come from science, civil society or policy, and have an interest for ES and/or agricultural issues. The idea is to gather a broad diversity of viewpoints in order to ensure the genericity of the recommendations. The session is expected to lead to a position paper that will be coordinated by the sessions’ leaders. Ideally, participants should be willing to go through the writing process that will follow the session, but this is not a prerequisite for participation.

Flash workshop:

Natural assets – Where do science and society need to go? (PWKSP-9)

November 8th 2017 (12:30-14:00)

Room: Oaxaca 3

Chairs: Hannah Moersberger hannah.wittman@ubc.ca¹, Ariane de Bremond², Cornelia Krug³, Davnah Payne³, Eva Spehn³, Bob Scholes⁴

¹University of British Columbia Institute for Resources, Environment And Sustainability/Land and Food systems; ²Bern University, Centre for Development and Environment (CDE)-Global Land Programme (GLP); ³Bern University, Institute of Plant Sciences; ⁴University of the Witwatersrand

Future Earth is currently developing a Knowledge-Action Network (KAN) on “Natural Assets”. The network aims to facilitate and enable co-designed, integrated, action-oriented research and synthesis towards the sustainable and fair stewardship of terrestrial, freshwater, and marine ecosystems that underpin human well-being. The notion of Natural Assets has different meanings for different people and communities. For this reason, Future Earth endeavors to co-develop a conceptual framework such that various scientific communities and societal actors can effectively work together to mobilize and further agendas for transformative research and action. We invite participants to join this process of co-designing an innovative, integrated and inclusive conceptual framework for the Natural Assets Knowledge-Action Network, and thereby contribute to on-going efforts by Future Earth and the KAN development team to lay the foundation for future activities and for tackling pressing societal challenges. Development team members will be on hand for this event. This session builds on the outcomes of a Future Earth Natural Assets workshop held at the University of Bern, Switzerland, in September 2017, which marked the first of a series of such workshops. Co-organized by the Swiss Future Earth Global Research Projects (GLP, GMBA, bioDISCOVERY, and PAGES), the Swiss Academy of Sciences, and the Future Earth Secretariat, this workshop brought together respected scholars from across the sciences to develop a shared understanding of the Natural Assets conceptual framework, as an input into the KAN development process.

Flash workshop:

What have we learned about poverty and ecosystem services from diverse empirical assessments of human wellbeing? Implications for SES dynamics (PWKSP-11)

November 8th 2017 (12:30-14:00)
Room: Tanilaoo

Chair: Tomas Chaigneau (t.w.b.chaigneau@exeter.ac.uk)¹

¹Exeter University, Environmental Sustainability Institute

We will assemble representatives of a new wave of ecosystem service (ES) research that not only measures supplies or benefits from ESs, but that explicitly and empirically measures, assesses or analyses multidimensional human wellbeing through a contrasting range of methods and data. The workshop will reflect on how different conceptual and methodological approaches to wellbeing illuminate particular aspects of the ES-wellbeing relationship and insights into the mechanisms of social-ecological system dynamics. The session will draw on research from the Ecosystem Services for Poverty Alleviation (ESPA) programme and the Southern Africa Partnership on Ecosystem Change and Society (SAPECS). Quantitative, qualitative, objective and subjective methods across many case studies highlight the plethora of links between ES and WB. But what does this mean with regards to social-ecological system trajectories, resilience and opportunities for poverty alleviation? The many links between ecosystem services and wellbeing, may not be important for the poor, or may differ for those that need it most. Through presentations of different case studies and output from a recent ecosystem service/wellbeing GRAID workshop, we will investigate the main gaps in wellbeing and ecosystem services research and the challenges that occur when carrying out such work. The session will reflect on how different conceptual and methodological approaches to wellbeing illuminate particular aspects of the ES-wellbeing relationship and insights into social-ecological system dynamics. We will also discuss the processes through which ecosystem services are thought to contribute to different dimensions of wellbeing and the consequent implications of this for the biosphere and social ecological systems. This therefore will lead us into a conversation around the dynamic nature of the ecosystem services and wellbeing relationship. The workshop will involve presentations of output from a recent GRAID workshop on wellbeing (Vanessa Masterson, Maria Tengö, Tim Daw) and three case studies from Eastern and Southern Africa

operating at different scales: Tomas Chaigneau: Understand the processes through which ecosystem services contribute to wellbeing – ESPA SPACES project. Susanne Vetter: Culture inextricably entwined with nature: cultural ecosystem services and wellbeing in the Eastern Cape, South Africa. Odirilwe Selomane: The usefulness of existing survey data in quantifying ecosystem services contribution to wellbeing across space and time. Each case study will have 10 mins to present their findings and think specifically about the topics mentioned above. We will then provide an overview and synthesize these findings to help encourage a 15 min discussion at different round tables hosted by each of the participants. The discussions may span a variety of topics and a few questions may be asked as probes including interrogating the relationship between the methodology and the findings. What are the blind spots and insights from each of these methods? Which approaches can offer us a perspective on feedbacks and system dynamics and poverty alleviation pathways.

Flash Workshop:

No more silos: re-connecting researchers, policy makers, ecosystems and society (PWKSP-3)

November 8th 2017 (12:30-14:00)

Room: Dainzu

Chair: Christo Fabricius (christo.fabricius@nmmu.ac.za)¹

¹Nelson Mandela University, Sustainability Research Unit

The workshop's objectives are to 1) critically evaluate the evidence that connected, co-created solutions lead to more sustainable pathways for ecosystems and society; and 2) learn about approaches, processes and methods that may strengthen or weaken the linkages between researchers, policy makers, ecosystems and society. The workshop will address two main questions: 1) Do co-created solutions lead to transformative pathways to sustainability for ecosystems and society? How does this happen? 2) Which engagement approaches, processes and methods strengthen or weaken the linkages between researchers, policy makers, ecosystems and society? The workshop will consist of speed talks and posters, interspersed by a small number of thought-provoking conceptual presentations to set the scene and frame the subsequent interaction. The vision is that the workshop will contribute to a book or alternatively a Special Issue (or both) on 'breaking down the silos: processes and methods to close the gap between researchers, policy makers and society'. Any scholar, researcher, policy maker, resource user or community worker with an interest in collaborative processes will be glad they attended this workshop. Authors with stories to share or who have comparative data about methods, processes and approaches and their outcomes are welcome to attend.

Presentations:

Dismantling silos: a conflict resolution perspective (1037)

Lyn Snodgrass^{1*}

¹*Nelson Mandela University, Political and Conflict Studies*

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Fragile democracies characterized by extreme poverty, deepening inequality and rising unemployment face increasing anthropocentric demands on marine and coastal resources to meet basic human needs in the developing world. Resource stressed marine and coastal ecosystems are under pressure for accelerated socio-economic development to meet not only basic human survival and security needs but opportunities for wealth creation and well-being. Socio-economic development processes imply fundamental changes in resource access, allocation and decision-making processes that make power struggles, and contestation inevitable in such vulnerable ecosystems. The interconnectedness of human development and ecosystems in an era of unprecedented social, economic and technological change means that socio-ecological crises are increasing in scale and frequency. Social-ecological resilience that involves the capacity for humans to adapt - sustain, innovate and improve development - and transform in the face of rapid and unexpected change in social-ecological systems, is essentially about managing and resolving intractable conflict. Research proposes that the ongoing exploration of possible solutions for intractable socio-ecological conflicts must navigate the social complexity of diverse, strongly held perceptions, values, world views and different interpretations of the challenges. The findings conclude that intractable, destructive conflict demands non-linear, systems thinking approaches that address social-ecological fragmentation through rich, robust multi-stakeholder dialogue in gaining a shared, deep understanding of the problem dimensions. Towards this end participatory and inclusive conflict resolution processes involve democratic spaces where diverse stakeholders - scientists, policymakers, civil society and business - and indigenous knowledge systems are engaged.

The role of adaptive management in defragmenting conservation knowledge (1024)

Dirk Roux^{1*}

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Agencies responsible for managing protected areas face many social-ecological issues that are inherently unpredictable, ambiguous and constantly evolving. Adaptive management is commonly advocated as an appropriate approach to learning and decision making in such uncertain contexts. SANParks has variably applied a version of adaptive management, called Strategic Adaptive Management (SAM), over the past 20 years across 19 national park and to a range of complex conservation issues. A key aim of SAM is to promote co-learning and shared understanding of issues among knowledge partners, including scientist, managers, policy makers and stakeholders. In this paper we use experiences gained from implementing SAM to critically reflect on whether and to what degree its use has promoted co-learning to bridge potential knowledge silos. By overlaying the main components of SAM (visioning, setting objectives, developing thresholds of potential concern, scoping management options, and monitoring and evaluation) with the four steps of the experiential learning loop (reflecting, conceptualizing, experimenting, experiencing), we assess the degree to which SAM succeeded in facilitating sharing of conceptual understandings and experiences among key knowledge partners. We highlight co-learning mechanisms that evolved along SANParks' journey with SAM, e.g. regional ecologists with explicit mandates to function as bridging agents, science-management forums, and use of systems models as boundary objects. We reflect on successes and shortcomings associated with each SAM component, for example that participative scoping of management options provided opportunities for reflection and experimentation. Overall,

bureaucratic and legal compliance traps seem to constrain the potential of SAM to promote systemic learning.

Grasping vulnerability transfers in global change adaptations combining fun-mindfulness exercises and serious games (1033)

Chloé Guerbois^{1*}, Bruno Bonte², Cédric Simi², Geraldine Abrimi², François Bousquet³, Olivier Barreteau²

¹Nelson Mandela University, Sustainability Research Unit; ²IRSTEA UMR G-EAU; ³CIRAD UMR GREEN

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Biodiversity hotspots exposed to increasing anthropogenic and climatic uncertainties, coastal areas provide excellent laboratories to study global change adaptations. Integrated coastal zone management, set-up as a replicable process, often fail to address challenging wicked issues. Indeed, simultaneous adaptations occurring at different scales or in different activity sectors often result in maladaptations such as vulnerability transfers that impede global sustainability. Addressing these transfers raise conceptual and practical issues. To tackle these, we ran participatory workshops in South Africa, with contrasted and often segregated stakeholders. The workshops started with fun care-giving and mindfulness exercises, to encourage dialogues and co-learning. Participants were then invited to play on a participatory device representing the multi-scale and multi-sector governance of coastal systems. Inspired by Anderies et al.'s (2004) Robustness Framework, the device was designed as a serious game in which players manage public infrastructures in response to contrasted environmental scenarios. In order to represent the decentralized aspect of the governance, each player was responsible for a given sector of activity with clear objectives at given scale and had to cooperate with the others to shape collectively future conditions on their territories. A simple algorithm computed the social, economic and environmental evolutions of the territory based on players' decisions. Combining experts' knowledge (practitioners and scientists) in the design of the game through pre-workshop interviews allowed to build a place-based game meaningful to local stakeholders. Serious games provide realistic boundary objects to grasp cross-sectoral and multi-scale vulnerability transfers around global change adaptations.

Knowing when to break down silos: principles for enhancing the transformative capacity of social-ecological systems (1034)

Christo Fabricius^{1*}, Bianca Currie¹

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The notion of silos or insularization implies barriers to cooperation, information flow and trust in social systems, or energy and gene flow in ecological systems. Most scholars assume that silos are bad and that repairing connectivity in social-ecological systems strengthens resilience. While this assumption might be correct, it remains unclear whether well-connected systems are more adaptive than poorly connected ones. In this paper we draw on robustness-vulnerability theory, resilience, landscape ecology and social network theory to understand why certain systems lack transformative capacity, while others don't. Based on case studies, we develop principles and build a framework for enhancing the transformative capacity in social-ecological systems, using silos as a metaphor.

Flash workshop:

Just benefit flows: understanding who benefits from ecosystem services for equitable, resilient and sustainable development (PWKSP-10)

November 8th 2017 (15:00-17:00)
Room: Guelaguetza

Chair: Jeanne Nel, Nadia Sitas, and Natalia Perez Harguindeguy

¹El Colegio de la Frontera Sur, Departamento de Agricultura, Sociedad y Ambiente

Benefits from ecosystem services flow through diverse pathways, and are not necessarily distributed equitably across social-ecological systems. Benefits might flow to influential or politically-strong groups rather than to more marginalised rural communities. They may be accessed in situ, or contribute substantially to development needs that are a far distance away. Identifying those who benefit from ecosystem services and understanding how benefits are distributed among individuals and stakeholder groups, and across spatial and temporal scales, is a prerequisite for equitable, resilient and sustainable development. The ecoSERVICES community, a core project of Future Earth, would like to draw together PECS members to tackle the following objectives: 1. Explore methods for assessing winners and losers of ecosystem service benefits, and the power dynamics that shape such social-ecological trade-offs 2. Explore methods that ensure that local dynamics of ecosystem service benefit flows are not lost in global assessments (e.g. IPBES and SDGs).

The workshop will be structured around four positioning presentations, followed by small group discussions in world café format. The positioning presentations will provide contextual background through: two local examples of ecosystem benefit flows and power asymmetries (Tim Daw and Georgina Cundill); some thoughts on addressing social power relations in ecosystem service assessment (Unai Pascual); and perspectives on the challenges of incorporating social relations in ecosystem service assessments across scales (Berta Martín-López).

Flash workshop:

Operationalizing tools and strategies for sustainable cities in small to medium sized cities (PWKSP-13)

November 10th 2017 (12:30-14:00)

Room: Oaxaca 2

Chair: Luis-Bernardo Vazquez (lbvazquez@ecosur.mx)¹

¹El Colegio de la Frontera Sur, Departamento de Agricultura, Sociedad y Ambiente

Latin America is the world's most urbanized continent but still experiences urban growth and sprawl. Following the global trend, the development is mostly taking place in small to medium-sized cities, which also have the least resources to deal with the growth and the increasing environmental burden. The cities are often located in highly biodiversity- and culturally rich areas, as are the examples of San Cristóbal de las Casas, México; Fortaleza, Brazil; and Santa Marta, Colombia. Several tools such as Green Area Factor, Environmental Impact Assessment, and Resilience Assessment; and strategies such as public-private partnerships, conscious urban design (nudging), and inclusive planning processes exist to support the transformation to more sustainable and resilient cities. However, implementation is often lacking beyond large- or megacities. Responding to the Conference's overarching theme of context-specific pathways to sustainability, the proposed session invites experts on tools and strategies in small to medium-sized cities primarily in Latin America. The workshop aims to identify key tools and strategies for supporting the transformation to more sustainable, resilient urban development trajectories in Latin America. It wants to encourage discussion on how the size and social-economic-ecological context of cities may influence the suitability of tools and strategies for implementation, and identify context-specific constraints and adaptation strategies for supporting implementation. The workshop will be structured around a series of speedtalks, plenary discussions and break-out group discussions. We will end by creating a joint vision, presented as text or drawing, of a sustainable, resilient city in the future, along with key points on what is missing today in the toolbox.

Presentations:

Green Maps for Changing Communities (1081)

Wendy Brawer^{1*}, Nathalie Castiaux², Paulina Uribe Morfín³

¹Green Map System Global Office; ²Signos Irapuato AC-Ágora de Cultura Ambiental Guanajuato AC; ³Universidad de Guadalajara, Educación Ambiental

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Objectives: Introducing a community-based sustainability mapping process that is designed to be adapted to meet local needs by local project leaders. Today, in 65 countries, hundreds of locally-made Green Maps connect community members to ecological, social, cultural and green living resources. Linked by a shared set of icons that identify, promote and link 170 different kinds of sites, each Green Map provides a unique perspective that guides residents and visitors to take action, make better choices and contribute to the health, vibrancy and sustainability of their community. Led by grassroots and youth groups, nonprofits, creatives, universities and local governments, both the process and the resulting maps have had notable impacts on nearly 1000 cities. Examples from Irapuato Mexico, Habana Cuba and Curitiba Brazil will be featured at this workshop. Participants will consider ways to utilize Green Mapmaking as part of an ongoing campaign, to resolve conflict and to build capacity while creating powerful printed and interactive maps.

Contribution of the Quantity and Quality of Green Infrastructure for the construction of Resilience in Small and Medium-Sized Cities: A case from Mexico's Pueblos Mágicos (1096)

Laura Elisa Quiroz Rosas^{1*}, Rafael Calderón Contreras¹

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Current population growth represents a threat to the provision of ecosystem services. This growth is most evident in medium and small cities; which, on the one hand, hold territorial reserves at risk of quickly changing the land use toward urbanization, and on the other, developers' interests to construct medium and high-value housing lead to gentrification and speculation. These issues lead to non-sustainable practices that represent a peril to the construction of urban resilience. This situation is accentuated in medium and small-sized cities involved in tourism promotion programs such as *Pueblos Mágicos* -Magical Towns- (A Federal Program that was launched in 2001 in Mexico). The program has brought deep urban and demographic changes that pose a risk to the provision of ecosystem services in those urban areas. The aim of this presentation is to highlight the quality and quantity of green infrastructure as an important strategy for the construction of urban resilience in medium and small cities. By adopting the analytical framework of social-ecological systems the case studies selected are used to illustrate the perils and potential of the green infrastructure to provide healthy ecosystem services and the extent to which this potential can be translated into public policies of resilience and sustainability. The presentation relies on a mixed-methods methodology based on remote sensing and Geographic Information Systems aiming at assessing the quantity and quality of green infrastructure as providers of ecosystem services in the states of Mexico and Morelos.

Adolescents as factors of change towards the sustainability of the city of Irapuato, Guanajuato through environmental education and the green map (1076)

Paulina Uribe Morfin^{1*}, Nathalie Castiaux²

¹Universidad de Guadalajara, Educación Ambiental; ²Ágora de Cultura Ambiental Guanajuato AC

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In Mexico, the participation of adolescents in decision-making, planning, preservation or transformation of cities towards sustainable development and resilience is a challenge. It is limited by poor educational quality, poverty, corruption, violence, inequity, poor health programs. Improvements in these aspects depend on strategies linked to very local social, historical and environmental contexts that generate social innovation. Our goal is to contribute to a culture of participation and equity through the environmental education of the adolescents of the city of Irapuato, Guanajuato through the tool of green map (greenmap.org). Adolescents are in a transformative stage of life and can introduce cultural changes that will reverse the development model of Irapuato towards a more sustainable one. The integration of its findings in the Irapuato Green Map (<http://www.opengreenmap.org/en/greenmap/rio-silao-y-ciudad-irapuato>) stimulates dialogue and favors the construction of its identity in the city, Promoting social participation and a better exercise of their citizenship.

Resilience assessment: a useful approach to navigate urban sustainability challenges (1078)

My Sellberg^{1*}, Cathy Wilkinson¹, Garry Peterson¹

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Cities and towns have become increasingly interested in building resilience to cope with surprises, however, how to do this is often unclear. We evaluated the ability of the Resilience Assessment Workbook to help urban areas incorporate resilience thinking into their planning practice by exploring how a resilience assessment process complemented existing planning in the local government of Eskilstuna, Sweden. We conducted this evaluation using participant observation, semi structured interviews, and a survey of the participants. Our findings show that the resilience assessment contributed to ongoing planning practices by addressing sustainability challenges that were not being addressed within the normal municipal planning or operations, such as local food security. It bridged longer term sustainable development and shorter term crisis management, allowing these two sectors to develop common strategies. Our study also highlighted that the Resilience Assessment Workbook could be made more useful by providing more guidance on how to practically deal with thresholds and trade-offs across scales, as well as on how to manage transdisciplinary learning processes. This is the first in-depth study of a resilience assessment process, and it demonstrates that the Resilience Assessment Workbook is useful for planning and that it merits further research and development.

Flash workshop:

Ecosystem services as a conceptual frame for unpacking the value of protected areas: emerging themes and policy opportunities (PWKSP-4)

November 10th 2017 (12:30-14:00)

Room: Oaxaca 3

Chair: Alta De Vos (a.devos@ru.ac.za)¹

¹Rhodes University, Environmental Science

The session will draw on research from different contexts to highlight major themes that have emerged from trying to understand ecosystem service flows from protected areas. It will reflect on the implications of these highlighted themes for how protected areas are managed, as well as how they contribute to social-ecological resilience from local to global scales, and help to achieve sustainability targets. Questions addressed might include: 1. what is the role of protected areas to keep the planet ticking? 2. What are the benefits and drawbacks of using the ecosystem service framework to highlight the value of protected areas to society? 3. How do benefits from protected areas flow across scales to different stakeholders? 4. How can policy and park management plans better incorporate ecosystem services (particularly cultural ecosystem services)? 5. How can protected area research inform ecosystem service categories and measurement of ecosystem services towards sustainability targets? The overall objectives of the workshop will be to: 1. Synthesize lessons from social-ecological protected area research that have used the ecosystem service frame to unpack the value of protected areas 2. Explore different perspectives on the role of protected area in attaining ecological sustainability, and meeting sustainability targets 3. Identify emerging themes and explore the implications of identified themes and lessons for management and policy 4. Develop an agenda of social-ecological ecosystem-service focused protected area research 5. Explore potential platforms for achieving said research agenda. The workshop will be structured around a set of short synthesis talks, focusing on the role of protected areas as providers of ecosystem services in different contexts: e.g. Southern Africa, Europe, Australasia, North American, Asia, Marine, Urban. A facilitated dialogue with the audience will lead to a synthesis of emerging themes, policy/management implications and an agenda for collaborating across contexts.

Presentations:

Ecosystem Services as a lens for understanding the value of protected areas (1005)

Graeme Cumming^{1*}

¹ James Cook University, ARC Centre of Excellence in Coral Reef Studies

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Protected areas are fundamental to biodiversity conservation. Despite historically being created with many different objectives, and spanning a wide range of human use intensity and ecosystem protection, all protected areas share at least one common goal. As the earth's human population grows, however, protected areas are increasingly having to compete with other land uses and justify their value to society. Recent developments in conservation science emphasize the interdependence of people and ecosystems and the importance of social and economic feedbacks for ecological sustainability. Ecosystem services offer an interface concept that both forces and facilitates inter- and transdisciplinary assessment of goods, services, and benefits from ecosystems to societies and economies. In this talk, which introduces the symposium, I will frame the subsequent presentations on protected areas and ecosystem services using five focal questions: (1) what is the broader contribution of protected areas to society? (2) What are the benefits and drawbacks of using ecosystem services to highlight the value of protected areas to society? (3) How do benefits from protected areas flow across scales to different stakeholders? (4) How can policy and park management plans better incorporate ecosystem services? And (5) how can protected area research inform ecosystem service measurement and science-based policy? I will not seek to answer these questions, but rather, to use selected examples from southern Africa and Australia to highlight their complexity and demonstrate the difficult conceptual problems raised by understanding the influences of space, scale and networks on protected area sustainability.

Ecosystem services as a conceptual frame for unpacking the value of protected areas: emerging themes and policy opportunities from southern Africa (1027)

Alta De Vos^{1*}

¹ Rhodes University, Environmental Science

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In this presentation, I reflect on southern African case studies to explore the potential of the ecosystem service concept to frame the relevance of protected areas to society, and to promote conservation goals. Two key themes emerge: Freshwater flows as a connecting service, and the relevance of spatial variation for the delivery of cultural ecosystem services. Water flowing through PAs contributes to the development of place attachment and benefits derived from intellectual and recreational services. It underpins cultural ecosystem service bundles, as well as national water security and economic activity, whilst water flows from upstream sources outside of PAs impact tourism and wildlife. Our work highlights the social-ecological nature of even remote PAs, and shows the complexities in governance that emerge from the lateral and longitudinal connectivity of freshwater systems. Within the cultural services theme, case studies explored a variety of scale-dependent trade-offs in measuring cultural ecosystem services to diverse beneficiaries, and managing for them. Whereas these trade-offs cast uncertainty over the usefulness of the ES framework for PA management, I argue that an ecosystem service lens highlights benefits and services not otherwise observed, which, when applied correctly, may facilitate political support for PAs and help to build cross-scale connections and feedbacks needed to increase PA resilience. Our work offers insights into how the ecosystem lens can be applied to improve cross-scale connectivity to cultural services provided by PAs, and shows that the use of the ecosystem service lens is contingent

upon its careful application within a context that recognizes PAs as complex adaptive social-ecological systems.

Implementation of the Ecosystem Services Approach in German Biosphere Reserves (1006)

Tobias Plieninger^{1*}, Manuel Woltering, Hubert Job

¹*University of Copenhagen, Department of Geosciences and Natural Resource Management*

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To safeguard ecosystem services has been defined as a central goal for large protected areas in several international agreements. This study investigates the importance of the ecosystem services approach for biosphere reserves in Germany. The ecosystem services approach can be useful in various fields for large protected areas, e. g. as approach in communication, fundraising, monitoring, planning and management. The analysis of the evaluation reports of the currently 15 UNESCO biosphere reserves in Germany shows a high variation in the degree of implementing the ecosystem services approach. The biosphere reserves at the North Sea coast are leading, possibly as they are subject to the trilateral agreement on the Wadden Sea, as the evaluation reports are fairly new, and they have better equipped management, being biosphere reserves and national parks at the same time. Important barriers of the implementation of the ecosystem services approach may arise from limited resources and from the administrative allocation of reserve management to environmental ministries, which is in conflict with the cross-sectoral character of the ecosystem services approach.

Ecosystem Services in the Eye of the Beholders and their Local Community (1103)

Xavier Basurto^{1*}

¹*Duke University, Nicholas School of the Environment*

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In this presentation I explore the relationship between the range of ecosystem services marine protected areas (MPAs) can provide and the processes of user engagement (e.g., participatory, top-down, co-management or bottom-up) enacted to design and implement regulations around MPAs. I argue that there is a strong relationship between the process of user engagement in place to govern the MPA and the types and bundles of ecosystem services that will be available for resource users and other members of civil society to benefit from the MPA. I assume that ecosystem services are seen from the eye of the beholder, and that many ecoservices are necessarily social constructions built on common understandings. Relatedly, ecosystem services also constitute public goods and common-pool resources, which can suffer from under-supply and overexploitation, and their adequate provision requires successful collective action, a major societal challenge that can often only be overcome through the design of inclusive processes of stakeholder involvement.

Flash workshop:

Speaking a transdisciplinary language: pathways for knowledge integration in socio-ecological change research (PWKSP-7)

November 10th 2017 (12:30-14:00)
Room: Tanilaoo

Chair: Gabriela Alonso-Yanez (galonsoy@ucalgary.ca)¹, Lily House-Peters (Lily.HousePeters@csulb.edu)², Marcella Ohira (marcella@dir.iai.int)³

¹University of Calgary, Werklund School of Education; ²University of California - Long Beach Department of Geography; ³Inter American Institute for Global Change Research Capacity Building

The primary objective of this workshop is to actively engage participants in conversations to promote learning on transdisciplinary (TD) approaches to integrating science and policy for sustainability. The growing focus on producing actionable socio-environmental science has led to a rise in collaborative research, requiring the integration of both scientists from a range of disciplines and non-academic stakeholders, such as policy- and decision-makers. The workshop will enable participants to experience scenarios faced by members of scientific and non-scientific communities when collaborating with diverse sectors and institutions. The workshop curriculum will focus on pathways for knowledge integration (i.e. achieving common vocabulary, concepts, and understandings) and introducing tools and best-practices to guide transdisciplinary team interactions to facilitate the production of science and policy for action-oriented sustainability outcomes. These tools will include hands-on activities for guiding effective collaboration and building empathy among diverse team members. The workshop will address the following topics: 1. Reasons why transdisciplinary research is important for global sustainability 2. Sharing successful examples of transdisciplinary projects 3. Working with adaptive team capacities, such as intercultural competencies and design thinking. The objectives of the workshop will be achieved through participant-centered pedagogical strategies focused on current, real-world case studies that require transdisciplinary collaborations. Often presented as a problem or scenario, case study stories will provide context to understanding abstract ideas, skills, and competencies by offering more tangible ways for participants to understand the relevance of the workshop content. The facilitators will use the design thinking principles to invite participants to frame questions, analyze problems, and make sense of results through diverse perspectives. This systematic focus on transdisciplinary work and actionable knowledge will be central to the sessions. The workshop is targeted at early to mid-career scientists in the humanities and social, natural, and engineering sciences, governmental, NGO, and community organization staff, and private sector employees. We strive to ensure representation of a diversity of roles in decision-making and research.

Presentations:

How to foster transdisciplinary projects through capacity building (1084)

Marcella Ohira^{1*}, Gabriela Alonso-Yanez², Lily House-Peters³

¹Inter-American Institute for Global Change Research, Capacity Building Division; ²University of Calgary, Werklund School of Education; ³California State University, Department of Geography

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The Inter-American Institute for Global Change Research (IAI) is an inter-governmental organization established by 19 countries of the Americas to foster global change research. Its mission is to develop the capacity of understanding the integrated impact of past, present and future global change on regional and continental environments in the Americas and to promote collaborative, well-informed actions at all levels. To address the complexities of global change science and to foster science-policy interactions, the IAI has designed and implemented innovative capacity building programs that encourage inter and transdisciplinary communication and collaboration. These programs have addressed a variety of policy relevant themes such as climate and health, water and food security as well as disaster risk reduction engaging both scientists and stakeholders. This session will share some examples of transdisciplinary projects, best practices, successes and obstacles as well as lessons learned, based on the IAI experience.

Collaboration as a learning process: lessons from education and design thinking (1087)

Gabriela Alonso-Yanez^{1*}, Lily House-Peters², Marcella Ohira³

¹University of Calgary, Werklund School of Education; ²California State University, Department of Geography; ³Inter American Institute for Global Change Research Capacity Building

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Over the last two decades, research on collective work has considerably expanded our understanding of the effectiveness of teamwork and the conditions that enable successful collaboration. Likewise, the emerging fields of social learning and design thinking have provided conceptual and methodological approaches to enable and improve collaboration in areas of work that require convergence and coordination among multiple stakeholders. This previous body of work is particularly relevant for the collaborative processes underlying global change and sustainability science initiatives. Such initiatives often invite a range of non-scientific stakeholders to participate at various stages in the project process development, from problem framing to producing deliverables. Teams currently addressing global change and sustainability are required to develop tools that facilitate productive dialogue for science and action relevant not only for academics but crucially also for non-academic knowledge users. In this interactive session, the facilitators will invite participants to take part in a hands-on activity designed to engage the audience in a conversation about the set of circumstances that make it possible to establish effective teams and productive collaborations in the context of place-based sustainability initiatives.

The Key Roles of Transdisciplinary Collaboration for Achieving Global Sustainability Targets (1082)

Lily House-Peters^{1*}, Gabriela Alonso-Yanez², Marcella Ohira³

¹ California State University, Long Beach Geography; ² University of Calgary, Werklund School of Education; ³ Inter-American Institute for Global Change Research
Director for Capacity Building

*Author for correspondence; Email: lily.housepeters@csulb.edu

Stemming the effects of pressing global sustainability problems, such as climate change, biodiversity loss, and water and food insecurity demands transdisciplinary collaboration - team-based research conducted by scientists from diverse disciplines working together with non-scientist stakeholders to develop new conceptual, methodological, and practical innovations that integrate across and move beyond discipline-specific approaches to solve a common problem. Achieving innovative and effective outcomes from transdisciplinary research collaboration continues to be an elusive goal, with many teams facing significant challenges and obstacles that derail their efforts. This presentation draws on findings from a review of 28 recent empirical case-studies (2010-2017) of transdisciplinary collaborations focused on social-ecological systems and sustainability research. The research follows contemporary shifts in the team science and organizational psychology literatures toward theorizing process-based dynamics of collaboration. The findings highlight the key roles of three collaboration processes - communication, boundary object negotiation, and knowledge co-production - to advance understanding of how processes of epistemic integration and convergence actually occur in research collaborations and the implications for achieving breakthroughs in sustainability research.

IV. Innovative & Immersive Sessions

Innovative & Immersive Session:

Community responses in times of crisis: from theory to practice (PIIS-14)

November 8th 2017 (12:30-14:00)
Room: Guelaguetza

Chairs: Ilse Geijzendorffer (ilse@tourduvalat.org)¹, Evangelia Drakou (e.drakou@utwente.nl)², Elisa Oteros-Rozas

¹Tour du Valat, Research Institute for the Conservation of Mediterranean Wetlands, Mediterranean Wetlands Observatory; ²University of Twente, Enschede Department of Geo-information Processing; University of Copenhagen, Department of Geosciences and Natural Resource Management

The ongoing global crisis - biodiversity, financial, political -drives and transforms socio-ecological systems. The established top-down governance systems considered to safeguard public goods and human well-being, have not demonstrated to be necessarily a safe bet for society. Within the failing top-down approaches, local bodies and civil society groups pro-actively step up to fill the inability of the governance systems to safeguard their livelihoods and manage natural resources sustainably. Through autonomous, bottom-up, self-organized initiatives, such societal groups drive transformations that generate alternative dynamic socio-ecological systems. While such systems have been studied in the past, the reality of the current context generates real life evidence of new types of responses and adaptation mechanisms. Can such initiatives answer a long-term need? How can we harness them to understand and transform high-level strategies and power relationships? Can existing knowledge capture the dimensions of these new initiatives? Which are the new research questions to ask? In this open (fishbowl) dialogue session, participants will share their real life examples of alternative responses to failing top-down governance mechanisms of socio-ecological systems. They will demonstrate how under different types of ongoing crises (biodiversity, financial, political), self-organized local level responses, can steer transitions and trigger adaptation mechanisms that allow for sustainable futures of socio-ecological systems. Participants will show evidence of post-crisis societal responses and transformations across spatial, temporal and administrative scales. We will collectively reflect on the base of video-interventions by invited initiatives and of participants' experiences. The evidence collected, combined with available knowledge will help identify remaining knowledge gaps and define new research questions.

Innovative & Immersive Session:

The sustainability hype: climate change, nanites, and nuclear zombies (PIIS-3)

November 8th 2017 (15:00-17:00)

Room: Oaxaca 1

Chair: Sebastian Thomas (sebastian.thomas@unimelb.edu.au)¹

¹University of Melbourne, Office for Environmental Programs

This session brings leading experts and practitioners together to explore complex sustainability dilemmas and social-ecological challenges and opportunities. The audience is engaged, enlightened, and amused, and the Hypothetical format produces unique data that inform transformative sustainability science research. Scenario and role-playing activities have been used as learning tools for decades and centuries – experiential learning has a long tradition in the medical, legal, business, and other disciplines. Since 2016 we have pioneered a novel, integrative approach to teaching and sustainability research built on existing pedagogies and cutting edge science. The "Hypothetical" is a panel discussion in which participants take on the roles of important actors in an unfolding scenario that explores ethical and practical conundrums in the context of sustainability crises – climate change, governance, migration, resource security, and technology are all key features of our storylines. The Hypothetical is challenging, humorous, and sometimes confronting, and directly engages audience members through online tools – they are active participants in the unfolding drama. The Hypothetical is a powerful teaching tool, but also a novel and valuable investigative format, in the context of normative, anticipatory, and transformative sustainability science research. To date participants in our hypotheticals have included the Chief Scientist at Melbourne Water, the Chair of Sustainability Victoria, director of corporate services at the State Environmental Protection Agency, a prominent journalist from the Guardian, a sustainability entrepreneur, Director of the Melbourne Sustainable Society Institute, and other VIPs. Participants should be people with high-level professional expertise and experience in diverse areas – from academia, industry and business, government, and civil society. The participants should also be comfortable in public forums, and willing to engage in a remarkable activity that is not always entirely serious, and very spontaneous.

Innovative & Immersive Session:

Hacking sustainable diets (PIIS-16)

November 8th 2017 (15:00-17:00)
Room: Oaxaca 2

Chair: Juan Rocha (juan.rocha@su.se)¹, Laurie Beth Clark (lbclark@wisc.edu)², Michael Peterson²

¹Stockholm University, Stockholm Resilience Centre; ²University of Wisconsin-Madison, Department of Art History

The purpose of this session is opening a dialogue between experts, chefs and conference participants around the question: what is a sustainable diet? What is a "sustainable diet" is a multi-layered problem that includes securing minimum standards for health (e.g. reducing malnutrition and obesity), reducing impacts on the environment, while still making profitable and scalable business solutions for farmers and food industry. Although there is a heated debate between different belief systems (e.g. organic, fair trade, minimalistic diets, or cultural preferences), there is no agreement on what constitutes sustainable diet, or what would be good proxies of sustainability when it comes to food production and consumption beyond market instruments and fashion. A hackathon fulfils two purposes: gathering people creativity to solve a problem, but also redefining a problem by discussing it. Discussing the problem transforms our own perspective of it, sheds light on how others interpret it, and collectively develop a shared understanding. The session will have two different venues. First we will have a deep conversation within the conference program where scientist, artist, and chefs will discuss their takes on how a sustainable diet looks like. It will require a conference room with a panel setting. Second, at the conference dinner we will run a transformation lab. Each person will receive with their dinner a paper table cloth with questions about their perceptions on food and what make it sustainable. Participants will be invited to contribute their perspectives on an online platform and the results will be shared on the closing ceremony. We believe our activity promotes cultural diversity by inviting everyone to the dinner dialogue and opening a channel for sharing thoughts, tips, and recipes for sustainable diets. Potential experts on our deep conversation include: Elena Bennett, Laura Pereira, Laurie Beth Clark, Michael Peterson, Becky Chapin-Kramer, and a chef to be confirmed. We believe our activity promotes cultural diversity by inviting everyone to the dinner dialogue and opening a channel for sharing thoughts, tips, and recipes for sustainable diets. Everyone is welcome to participate in both the deep conversation and the T-lab. We believe everyone is an expert in their own kitchen. By knowledge sharing perhaps we can get closer to the question: what is a sustainable diet? The artist consortia Spatula & Barcode from University of Wisconsin will help us run the T-lab. Previous experiences by the professors / artist can be found at www.spatulaandbarcode.net

Innovative & Immersive Session:

Science for transformation and the transformation of science (PIIS-6)

November 8th 2017 (15:00-17:00)
Room: Oaxaca 3

Chair: Robert (Bob) Scholes (Bob.Scholes@wits.ac.za)¹

¹University of the Witwatersrand

Science (broadly defined), has played a prominent role in making the case for transformation of the society-nature interaction. It could also conduct the research which informs society about possible transformed states which could be sustainable, and by what pathways they might be reached. In the process, however, science may itself be transformed, either intentionally (how does it need to change in order to fulfil the above roles, and to survive the transition with critical values intact) or as an unintended consequence of the new regime. This workshop will explore and generate ideas about how organized science (academies in particular), could reconfigure in order to be resilient and effective in the 21st Century. The outcome will be an input, among others, to the Inter-Academy Panel Working Group on "Improving Scientific Input to Global Policymaking: Strategies for Attaining the Sustainable Development Goals". We welcome a diverse set of participants, including but not restricted to: experienced scientists ("academicians") with a deep knowledge of how science has been organized in the 20th century; young scientists whose careers will extend far into the 21st century; specialists in new modes of social organization driven by ICT; political economists with a feeling for how change is effected; behavioral scientists with ideas about decision-making; philosophers and historians of science.

Innovative & Immersive Session: Green and blue infrastructure in support of human well-being? (PIIS-9)

November 8th 2017 (15:00-17:00)

Room: Tanilaa

Chair: Erik Andersson¹

¹Stockholm Resilience Centre, Stockholm University

We want to take a fresh look at alleged nature-based solutions from a social-ecological systems perspective. Explicitly accounting for cross-scale and cross-boundary interactions, should provide insights into the system interactions that either facilitate the realization of benefits or render the 'solutions' inert. Green and blue infrastructure and its role in resilience building and for human well-being in an increasingly urbanized world need more global attention. Our hope is that this session can help build momentum within PECS and make it one of the platforms for critically thinking about the nature of cities. This session will highlight three broad concerns that need to be addressed when planning and managing green and blue infrastructure: 1) Multifunctionality and perceived values, how and under what conditions are benefits provided by green and blue infrastructure appreciated by people; 2) Accessibility and equitability, the factors influencing the distribution of realized benefits among urban residents; 3) Resilience, in the sense of how we can ensure the continuation of the flows of benefits to beneficiaries over time. We believe these concerns to be universal, but the factors most important for their realization will be widely different. We hope to expand on our experiences from Europe, Africa and North America and discuss which contextual factors that are most relevant in different settings. We want to generate new ideas (and collaborations) for how to think about cities and embedded green and blue infrastructure. This will be a deep conversation session introduced and framed by a first presentation by Erik Andersson. The session is then open to presentations from participants based on experiences from working with green and blue infrastructure as part of SES. The presentations will be followed by a challenge to the audience - what are the key factors for unlocking ecosystem services and how do their relative importance change with local/regional context? Format and design of the discussion will be adapted to the group size. We want a diversity of perspectives, confirmed so far are presentations from New York (Timon McPhearson) and Durban (Patrick O'Farrell), and we hope to attract presenters (and participants) from as many countries and different contexts as possible, and representing different approaches and knowledge traditions. We believe the three concerns will resonate with practitioners as well as scholars, and hope to have both groups represented among the first speakers and of course in the discussion.

Innovative & Immersive Session:

Fulfilling the promise of ecosystem service science: lessons from real world practitioners (PIIS-21)

November 9th 2017 (15:00-17:00)

Room: Oaxaca 1

Chair: Elena Bennett (elena.bennett@mcgill.ca)¹

¹McGill University

In this session, we will facilitate a discussion between ecosystem service (ES) scientists and environmental management practitioners to better understand the challenges associated with ES tools and concepts that are currently available, and to learn how ES science can better meet environmental manager's needs. The concept of ES has generated interest from governments for its potential to enhance decision-making about the environment. However, the potential of ES frameworks to aid in complex environmental decision-making has not been fully realized. In this session we will examine the issues that have inhibited the progress of ES from a theory to a practical management tool. Theoretical critiques of ES science are not new; however, little has been written about the practical barriers to ES-based decision-making. To identify these barriers, we have invited ES practitioners, representing diverse institutions and contexts (in Canada, the US and Mexico), to speak about challenges that they have faced using ES as a management tool, along with other insights they have gained from on-the-ground experiences implementing ES science. The panelists will be: Renée González Montagut, Conservation Director, Mexican Fund for the Conservation of Nature. Gillian Kerr, Government of Alberta, Ministry of Municipal Affairs. Andrea Mackenzie, General Manager, Santa Clara Valley Open Space Authority. Ciara Raudsepp-Hearne, McGill University. Becky Chaplin-Kramer, Lead Scientist, Natural Capital Project. We will facilitate a dialogue between ES scientists and practitioners to explore the following questions: What is the value of ES for decision-makers? What types of decisions, projects and policies can ES science usefully inform? What approaches and tools, from models to simple indicators, have proven to be most useful for practitioners? What concepts and frameworks have been easiest to work with? Where is more guidance necessary for ES implementation and on what tools and approaches should scientists focus their efforts in order to support practitioners in the short term? This session is geared towards ES scientists who are interested in how ES research can better meet the needs of practitioners, and it is also geared towards practitioners who are interested in helping direct ES research towards practical application. We expect participants to engage in a discussion around the value of ES concepts to environmental decision makers; which ES models and concepts are most amenable to practical use; and how can future ES science be directed to best suit the needs of environmental managers.

Innovative & Immersive Session:

Diverse epistemologies for global sustainability – a deep conversation about how different ways of knowing the world can matter for transformation (PIIS-22)

November 9th 2017 (15:00-17:00)
Room: Oaxaca 2

Chair: Maria Tengö (maria.tengo@su.se)¹

¹Stockholm University, Stockholm Resilience Centre

We invite to a deep conversation around the role of diverse knowledge systems, in particular systems-oriented, biocultural, and relational ways of understanding the world, to inform local to global sustainability pathways. How may the richness of place-based studies help to identify solutions and leverage points for transformations toward more sustainable pathways, from a diversity of ways of knowing and understanding the world? While multiple epistemologies, including local and indigenous knowledge systems, may contribute to fruitful collaborations at local or regional levels, it is less common that such diversity informs research about global sustainability transformations and governance. We are inspired by a Multiple Evidence Base approach that acknowledges integrity and complementarity across diverse knowledge systems, to contribute different pieces of the sustainability puzzle. We invite participants to reflect on and discuss how to constructively and fairly engage with diverse epistemologies, to inform sustainability pathways and transformation also beyond the local. We set out to facilitate a deep conversation around the role of diverse knowledge systems, including systems-oriented, biocultural, and relational ways of understanding the world, to inform local to global sustainability pathways. In particular we want to elicit and probe a) what arenas or issues may offer constructive points of convergence between local and regional initiatives and, possibly, global processes, and how they may be created; and b) how epistemological agility, e.g. a capacity to understand and respect a diversity of ways of knowing the world, may contribute the way we may study and engage with transformations toward sustainable trajectories. A set of speakers will provide short entry points to spur the discussion: Christo Fabricius, Nelson Mandela University, South Africa. Juliana Merçon, *Universidad Veracruzana*, Mexico. Maria Mancilla Garcia, Stockholm Resilience Centre, Sweden. Simon West/Jamila Haider/Vanessa Masterson, Stockholm Resilience Centre, Sweden. We welcome participants with experience from working in a transdisciplinary mode and who are willing to share their reflections and listen with an open mind.

Innovative & Immersive Session: **Chefs and cooks as change-makers in the food system:** **leveraging the innovation potential of indigenous** **knowledge and traditional food for creating a more** **sustainable and just food system (PIIS-1)**

November 9th 2017 (15:00-17:00)
Room: Oaxaca 3

Chairs: Laura Pereira (pereira.laura18@gmail.com)¹, Rafael Calderón-Contreras
(rcalderoncontreras@yahoo.com)²

¹ Stellenbosch University; ² Universidad Autónoma Metropolitana, Ciencias Sociales

This innovative session aims to bring food practitioners from the global South together to discuss the importance of local and indigenous knowledge and foods for meeting sustainability and human wellbeing objectives. Instead of relying on academic inputs, the session will comprise of actual practitioners in the food system that are acting to change the status quo, hence them being referred to as "change-makers". The session will culminate in a discussion about how to raise the profile of this work within the academic community and potentially draft the outline of a transdisciplinary research project for which funding could be applied. In the first half, chefs from South Africa and Mexico will be asked to share their work as change-makers in their local food systems, highlighting the importance that local indigenous foods and traditional knowledge play in creating a more sustainable food system. There will also be the chance to sample and experiment with local, indigenous ingredients from Mexican gastronomic landscapes. Participants will then be able to ask these practitioners questions about their work. It is envisioned that an academic paper will result from these inputs. The second half of the session will be a brainstorming session on setting up a research project on the topic of traditional foods, indigenous knowledge and the role of chefs as change-makers in the food system. The session will focus on defining research questions, potential funding sources and a list of those interested in taking the project forward. We welcome all participants, but would welcome especially those with a background of working with indigenous knowledge and indigenous groups. Anyone with a passion for finding innovative solutions for making the food system more just and more sustainable would also be encouraged to participate.

Innovative & Immersive Session:

Crossing the boundaries: stories of a place-based approach to multi-ecosystem governance at the land-sea interface (PIIS-20)

November 9th 2017 (15:00-17:00)
Room: Guelaguetza

Chair: Angelina Sanderson Bellamy (angelina.sanderson@su.se)¹

¹Stockholm University, Stockholm Resilience Centre

This "deep conversation" considers the little made connection between land-use governance and coastal zone management, asking participants, "Why are marine ecosystems rarely part of the land-use policy conversation?" It is established that agriculture, forestry, and urbanization cause increased marine pollution via runoff through the watershed, so a multi-sectoral approach to governance considering both terrestrial and marine ecosystems should be the norm. The objective of this session is to gather case study evidence from delegates of where absence / presence of sectoral policy integration impacts place-based sustainability for marine environments. The goal with the case study evidence collected in this session is to identify priorities for developing a set of best practices for achieving a broader integration of sectoral policy. Our discussion will address the problem of agreeing a set of principled priorities to guide decisions about trade-offs between conflicting objectives. Attendees to this session, and those in two other proposed sessions (under the theme of Crossing the Boundaries; one session coordinated by Matias Piaggio/SARAS and the other coordinated by Ariane de Bremond/GLP) will be invited to contribute to a peer-reviewed special issue in the journal "Ecosystems" around the theme of pathways to best practice on multi-ecosystem governance. Contributions will be encouraged based on theoretical work and empirical case studies from around the world. A blog post summarizing the session for a public audience will be written for Speak Up for The Blue (<http://www.speakupforblue.com/>). For this exercise to be effective, more voices need to be heard from those working on either solely terrestrial, solely marine, or indeed, multi-ecosystem governance. Participants can be academics, NGO workers, industry representatives, or from any other relevant sector. Preferably, they will be of a good mix of genders and will represent every continent. While participants can attend this as a stand-alone session, they may also be attendees of two proposed coordinated sessions under the theme of Crossing the Boundaries (one session coordinated by Matias Piaggio/SARAS and the other coordinated by Ariane de Bremond/GLP).

Innovative & Immersive Session:

Sustainability and transdiscipline in practice: tropical ecosystem conservation and restoration (PIIS-28)

November 9th 2017 (15:00-17:00)

Room: Tanilaoo

Chair: **Evodia Silva-Rivera** (esilva.rivera@gmail.com) ¹

¹University of Veracruz, Instituto de Investigaciones en Educación

Many traditional management practices are associated with ecosystem succession processes - both the result of a historical co-evolutionary relationship between people's culture (their life projects and 'understanding of living well') and their environment. This session is oriented at the enhancement of studies looking at non Western cultures' capacity to endure socio-ecological transformations as a powerful means to counteract the present planetary crisis. This session will motivate an analytical dialogue on the value of traditionally managed ecosystems (understood as resilient socio-ecological systems that maintain biodiversity and natural cycles) for conservation and sustainability science. We aim to discuss approaches that aim at bridging scientific knowledge with other forms of knowledge, including a critical stance of conventional science towards a more complex and integrated perspective of reality. During the session we will introduce conceptual cross disciplinary frameworks such as traditional ecological knowledge, participatory research, and productive diversification and will bring forward the fundamental role of traditional and indigenous cultures in conservation and sustainability. We aim to produce a synthesis draft derived from the collective discussion in relation to tropical ecosystem conservation and restoration. Four speakers will provide short presentations to start the discussions: Evodia Silva Rivera, Instituto de Investigaciones en Educación. Citlalli López Binnqüist, Centro de Investigaciones Tropicales. Juan Carlos López-Acosta, Centro de Investigaciones Tropicales. Juan Carlos Sandoval-Rivera, Instituto de Investigaciones en Educación. Preferably, but not exclusively, our session welcomes academics, teachers, and professionals (with no age limit) interested to learn more from Mexican grassroots experiences related to sustainability, agroecosystem conservation and restoration in tropical megadiverse regions; belonging to universities, research centers, and governmental and non-governmental organizations.

Innovative & Immersive Session: Informing place-based research through gender and feminist approaches to social-ecological transformation (PIIS-15)

November 10th 2017 (10:30-12:00)
Room: Dainzu

Chair: Irene Iniesta-Arandia (irene.iniesta@uam.es)¹, Federica Ravera (federica@uevora.pt)¹

¹ Universidad Autónoma de Madrid Social-Ecological Systems Laboratory

This special session would bring several speakers who are applying feminist approaches in GEC research and explore the state of the art and new paths of research. The space created by the differentiated experiences of gender and feminist researchers applied to GEC research provides an important space for dissemination of empirical research based on intersectional approaches. At the same time, such a space can explore theories, approaches and a diversity of qualitative and quantitative research methods applied. The speakers will be initially invited to converse about their place-based research and then to answer to such questions (and other that will emerge from the interaction with the public): 1) Edna Wangui (Department of Geography, Ohio University, USA) 2) Beth Bee (Department of Geography, Planning, and Environment, East Carolina University, USA). 3) Maria Fernández-Giménez (Department of Forest and Rangeland Stewardship, Colorado State University, USA). 4) Bruno Locatelli (CIRAD/CIFOR Lima, Perou). 5) Isabel Díaz-Reviriego (Internet Interdisciplinary Institute, Spain). The quick talks will be followed by a Fishbowl dialogue that will allow having an in-depth conversation. The dialogue will be organized around a number of key questions, such as: Why is it relevant and necessary to address a feminist perspective in resilience, vulnerability and adaptation research of social-ecological systems? What types of research methodologies have you found to be particularly useful to uncover issues related to a feminist approach upon first entering communities to conduct place-based research in GEC? Why have these methodologies been more useful than other methodologies? Which avenues should be taken into account and further explored in combining gender/feminist research and adaptation and resilience to GEC towards sustainable stewardship? Anyone wanting to join the fish bowl and discuss the key questions posed is welcome

Innovative & Immersive Session: Educating 'glocally': place-based research in international sustainability education (PIIS-5)

November 10th 2017 (12:30-14:00)
Room: Dainzu

Chair: Leonie Bellina (leonie.bellina@izew.uni-tuebingen.de) ¹

¹International Centre for Ethics in the Sciences (IZEW)

This special session is intended to foster intensive and creative exchange on possibilities and challenges of sustainability education that includes place based transdisciplinary research (PBTd). Connecting such study programs transnationally, and especially between "Global South" and "North", offers opportunities to develop a "glocal" understanding: experiencing the geographic, political, and cultural specificities of sustainability issues and transformation pathways, as well as the global connections and trajectories of those issues. The second objective is to seed an international network of researchers, educators, and students interested in building such innovative PBTd-education formats and connect then south-south and south-north. The session will address three elements in depth: 1) educating differently: a place-based, transdisciplinary curriculum 2) making it work: a local and virtual, transnational teaching-learning-environment 3) developing global sustainability: engaging social-environmental justice across differences. Examples from the Global Classroom, a curriculum-reform project based on "glocal" education through connecting PBTd in international student-research teams, will serve as starting points for the group exchange. Goals of the session are to: - exchange different conceptions, conditions, and needs for PBTd - combine knowledge towards developing successful education that includes PBTd - discuss conditions for meaningful transnational, especially GS-GN collaborations in such education - start a network that increases opportunities for international collaborations between participants and universities. We welcome everyone who is interested in place-based sustainability education, transnational research/education projects, and in particular meaningful South-North collaborations. In particular: - educators practicing research based (sustainability) teaching & learning - researchers doing place-based transdisciplinary research, involving/supervising students - students involved in research-based learning - curriculum developers and program directors interested in HESD that includes research-based education and international programs/collaborations. Questions regarding and experiences with approaches to decolonizing collaborative knowledge production towards informing global sustainability efforts more equitably, and how to educate in such a manner, are explicitly invited.

Innovative & Immersive Session:

Social tipping points (PIIS-10)

November 10th 2017 (15:00-16:30)
Room: Oaxaca 1

Chair: Jacopo Baggio (jacopo.baggio@usu.edu)¹, Michael Schoon (michael.schoon@asu.edu)²

¹Utah State University, Environment and Society; ²Arizona State University, Global Institute of Sustainability

The currently diverse conceptualizations of social tipping points (STPs) limit our understanding of this social-ecological system feature. Building on an analysis of these definitions, this session will present case studies of STPs and create space for the discussion of STP knowledge gaps. These include how to incorporate cognitive scales into analyses in addition to social, spatial and temporal scales, whether there are scale limits to the usefulness of the STP concept, and what sources of data allow sufficient parameterizations? This session will further research by an interdisciplinary group to demonstrate how they can be utilized to build deliberate transformational capacity. The session will allow the organizers (an interdisciplinary group already collaboratively researching STPs, from within academic institutions) to expand our collaborations to include a wider range of stakeholders, with the result of deeper, transdisciplinary engagement. A series of four speed presentations will introduce utilizations of the STP concept from different geographical and scale perspectives. To maximize participation three breakout groups will be created, to enable discussions to occur in parallel around themes emerging from the presentations, i.e. the relationship with cognition, interactions with scale, and methods of studying STPs. Closing as the whole group will allow all participants to learn what others discussed and give feedback. The session will support network-building, with the intention of identifying a range of case studies that could be synthesized within a special issue, and potential networks and research questions for future projects investigating the potential for STP theory to help build deliberate transformational capacity. We welcome academics, decision-makers, policy-advisors, and representatives of international initiatives and organizations with experiences/studies to share regarding social tipping points i.e. rapid, non-linear change in social dynamics, nested within a social-ecological system framing, or simply an interest in this concept and how it can be applied to building deliberate transformational capacity. Early-career researchers welcomed, and particularly those with case studies from a range of geographical, institutional, and disciplinary contexts.

Innovative & Immersive Session:

What can multiple values bring to the table?

Experiences across regions of the world (PIIS-27)

November 10th 2017 (15:00-16:30)
Room: Oaxaca 2

Chair: David González Jiménez (david.glez.2990@gmail.com)¹

¹Universidad Nacional Autónoma de México, Instituto de Investigaciones en Ecosistemas y Sustentabilidad

A kaleidoscopic approach to values is relevant for the representation of multiple worldviews, the integration of multiple values of nature and the recognition of conflicts among approaches to nature as well as their policy responses. Thus, within this innovative session we will introduce the IPBES approach to multiple conceptualizations of values, and reflect about the opportunities and obstacles for incorporating the idea in biodiversity and ecosystem services assessments across regions of the world. The discussion will open the floor for contributions of participants to bring their own expertise into the table and take the discussion further allowing the recognition of the relevance of the multiple conceptualizations of values approach in the broader socio-ecological context. The key objectives will be to introduce participants to the idea of multiple conceptualizations of values as proposed by IPBES, to highlight how the concept of multiple values has been useful across different regions of the world and to reflect on the opportunities and obstacles for incorporating the idea of multiple conceptualizations of values in biodiversity and ecosystem services assessments. We welcome anybody interested in the idea on multiple worldviews, nature's benefits to people, multiple conceptualizations of values and valuation or the relationships between values and policy support tools.

Innovative & Immersive Session:

Tradeoff! Interactive training game (PIIS-7)

November 10th 2017 (15:00-16:30)
Room: Oaxaca 3

Chair: Henry Borrebach (borrebach@stanford.edu)¹

¹Stanford University, Natural Capital Project

Attendees to this session will be led in playing one of the Natural Capital Project's training games, Tradeoff! The game is designed to introduce players to the concept of trade-offs and synergies, and in making informed development decisions utilizing natural capital information. Game-play also simulates a collaborative decision-making activity where multiple, heterogeneous values (across sectors) are represented. Session attendees will form teams and play the game, followed by discussion of the game and its possible application in various field contexts. Attendees will: Play the Tradeoff! Game in full. Learn about the concepts of trade-offs and synergies. Simulate using ecosystem service information in a decision-making process. Learn about how the game can be used for education and stakeholder engagement. Discuss the pros and cons of how Tradeoff! Introduces these concepts to its players. Our game is designed to be playable by participants from a wide range of backgrounds. We anticipate that practitioners, academics, and students will be interested in playing, and in learning how they can use the game with their own project teams, students, and/or communities.

Innovative & Immersive Session:

Mixed reality, virtual reality, and augmented reality – the hows and whats on merging sustainability science with immersive technology (PIIS-23)

November 10th 2017 (15:00-16:30)
Room: Guelaguetza

Chair: Maria Schewenius (maria.schewenius@su.se)¹

¹Stockholm University, Stockholm Resilience Centre

Mixed Reality (MR) technologies such as Virtual Reality (VR) and Augmented Reality (AR) went mainstream during late 2016 and are increasingly used in the field of scientific visualization. What we have seen up until now is only the tip of the iceberg, as the development of MR, and the growing interest in the scientific community is projected to continue at increasing speed. Traditional ways of presenting and visualizing science is thereby being joined by novel communication options that hold new powers to reach existing and new audiences. The proposed session aims to guide a critical assessment of the possibilities with, and the role and responsibility of these novel technologies in research and science communication. The session will begin with an overview of how the technology scene is changing, using recent examples of how MR has been used in science communication, and a global series of VR hackathons called *The Anthronaut Experience*. It will continue with a discussion on the potential of making VR and other emerging MR technologies integral parts of research on sustainability science – and possible pitfalls or limitations. In harnessing the vast and global interest for novel communication technologies, the session aims to discuss a blueprint design manual of their use in sustainability science, and outline possibilities of future collaborative Presentations. It sets out to gather sustainability science researchers, VR filmmakers, representatives from cities and local governments, and organizations specializing in e.g. human rights or environmental protection. The session also invites small to large technology companies with a proven interest in VR, AR, and sustainability, and representatives from the general public, primarily groups that tend to be excluded from decision-making processes.

Innovative & Immersive Session:

A board game of Mexico City's socio-hydrological system to communicate and validate an agent-based model with stakeholders (PIIS-23)

November 10th 2017 (15:00-16:30)

Room: Tanilaoo

Chairs: Rebecca Shelton (shelton.rebecca.e@gmail.com)¹, Hallie Eakin (Hallie.Eakin@asu.edu)¹

¹Arizona State University, School of Sustainability

This session will demonstrate a board game designed to help research teams communicate the complexities of dynamic social-hydrological modeling with vulnerable residents in Mexico City. The game is designed to be played by residents who are affected by flooding and scarcity, and simulates their decision-making in response to chronic hydrological stress. For the research team, the game serves to validate the assumptions about agents' actions and decisions that are represented in an agent based model; for the players, the game can serve as a tool for reflection on decision-processes and the potential costs and benefits of private and collective action to address vulnerability. First, we will introduce participants to the problem context that inspired the game -- namely, the challenge of both validating our understanding of urban residents' decision making as well as communicating the complexities of a dynamic socio-hydrological model of risk (entailing the integration of agent-based modeling and biophysical models) that we have developed for Mexico City. Second, after explaining the game's purpose and features, we will allow session participants to experience the game directly. Participants will then discuss their experience, and the insights they gained on constraints and opportunities for local-level vulnerability reduction from playing the game. Finally, we will provide a brief overview of the contribution of the game to knowledge co-production between researchers and stakeholders based on our experience of implementing the game with residents vulnerable to flooding and scarcity in Mexico City. We invite researchers who are using complex models to represent socio-ecological systems and would like to learn about how to innovatively communicate these models with and policy and decision makers who are interested in creative methods for validating their assumptions about stakeholder decision-making regarding risk reduction.

V. Speedtalks

Speedtalk session:

Integrating the social and the ecological: scenarios, planning and management

Chair: **Zuzana Harmackova**

November 9th 2017 (12:30-14:00)

Room: Oaxaca 1

Presentations:

(PECS project - Conserving Central India) Reconciling conservation and social goals when resettling people from protected areas - A case study from central India (031)

Amrita Neelakantan^{1*}, Ruth DeFries¹

¹ *Columbia University Ecology, Evolution and Environmental Biology*

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Resettlement of people from protected areas remains an established conservation policy. However, there are gaps in our understanding of the impacts of resettlement on conservation and human well-being. The current Indian resettlement policy is explicit in its goal to conserve tiger habitats by voluntary resettlement of people including monetary compensations. Our study explores the impacts of resettlement, for people and conservation, at the new settlement locations surrounding Kanha National Park (NP) in India. We measured food security at the household scale as a meaningful and multi-dimensional metric of human well-being, while also measuring direct pressures from resettled households on non-protected forests in the landscape. We surveyed all households resettled under the current policy (approximately 600), around Kanha NP. In addition, we collected baseline data at each of the new settlement locations by surveying 550 non-resettled neighboring households. Our findings suggest that resettled households and their non-resettled neighbors are similar in Food Consumption Scores (FCS) or in household Coping Strategy Index (CSI). Food security is not similar across the landscape and there exist food insecurity hotspots. We found that across all households higher diversity in home gardens is associated with higher food security. We are currently conducting analyses on the extent and patterns of forest use at the new settlement locations. Finally, we will discuss implications, from our findings, for the management of regional conservation and social goals around Kanha NP (a PECS endorsed project - conserving central India).

Tracing Tomato Teleconnections: What the consumer doesn't know about the tomato on his plate (043)

Maria Jose Ibarrola Rivas^{1*}, Antonio J. Castro², Leopoldo Galicia¹, Thomas Kastner³, Sanderine Nonhebel⁴, Francis Turkelboom⁵

¹Instituto de Geografía, UNAM Departamento de Geografía Física; ²Idaho State University Biological Sciences; ³Senckenberg Biodiversity and Climate Research Centre (BiK-F); ⁴University of Groningen Center for Energy and Environmental Sciences, IVEI; ⁵Research Institute for Nature and Forest (INBO) Research Group Nature and Forest

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Food imports have and will keep increasing due to the increase of global demand of affluent consumption. Intensive production systems are causing environmental and other impacts in the exporting countries. The food consumption-production system has been disconnected due to urbanization and the growing trend for food imports. The local environmental and social impacts of food production are not evident for consumers. In this paper, we study differences in remote impacts caused by the consumer choices in relation to tomatoes. We use the teleconnection framework to connect drivers and impacts of tomato production at different scales (global demand of tomatoes < local context of tomato's production and consumption) and regions (Mexico, Spain and the Netherlands as the exporting countries). We study the local drivers (environmental, social, economic, political and history) and impacts (environmental, economic and social) of the producing countries. These are discussed in relation to the availability of local resources in both the exporting and the importing countries. This study shows an example on how to connect and discuss the global-local sustainability related with local contexts and impacts of regions in different countries which are connected by a global driver: i.e. the global demand for tomatoes.

Towards a sustainable Southern Transylvania: Recognizing existing contributions to reach sustainable visions and empowering stakeholders (048)

David Lam^{1*}, Andra Milcu-Horcea¹, Joern Fischer¹, Daniel Lang¹

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We present our experiences of working with a wide range of stakeholders towards a commonly agreed sustainable vision for Southern Transylvania. This vision was developed in a transdisciplinary scenario planning process, and is based on understanding local social-ecological system dynamics. To better understand plausible pathways towards the desired future, we explored existing and anticipated contributions by different stakeholders in workshops and interviews. The resulting data generated an understanding of how different stakeholder contributions address various system elements now and in the future. We analyzed existing contributions, and also used back casting to identify additional contributions still required to reach the desired vision. Existing contributions focused on different topics (i.e. nature, culture, tourism) and targeted different aspects of sustainability. Despite a wide variety of existing contributions, our analysis revealed system elements that are currently not prioritized. Such gaps, in turn, highlight where more attention and adaptation is needed to support the local transformation. Furthermore, our analysis showed challenges that stakeholders face working along transition pathways, notably when they initiate contributions that either fit or challenge the prevailing local and global regime. We argue that recognizing existing contributions and achievements empowers stakeholders on pathways towards their desired vision. Moreover, viewing contributions in the context of future pathways enables stakeholders to realize that transformations can capitalize on and validate a diversity of complementary stakeholder contributions. For transformation-oriented case studies, our research underlines the importance of recognizing existing stakeholder contributions to diverse local and global transformation pathways and the empowerment that comes with this recognition.

Social-ecological implications of a large carnivore recovery: understanding attitudes toward recolonizing wolves in Germany (057)

Ugo Arbieu^{1*}, Marion Mehring², Nils Bunnefeld³, Ilka Reinhardt⁴

¹Senckenberg Biodiversity and Climate Research Centre Research Area 3; ²Institute for Social-Ecological Research, Frankfurt am Main, Germany; ³University of Stirling, Stirling, United Kingdom; ⁴Lupus Institute for Wolf Monitoring and Research, Spreewitz, Germany

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The return of large carnivores in human-dominated landscapes in Europe can affect people's livelihoods and well-being, resulting in potential conflicts and hindering human-carnivore coexistence. Wolves have been successfully recolonizing parts of Germany since the early 2000s and while the monitoring of their return is ongoing, very little is known on people's attitudes and tolerance towards the wolf in Germany. Attitudes can be influenced by factors such as socio-economic drivers or the level of knowledge on wolf ecology, which effects are still being debated. Moreover, other factors potentially also affecting attitudes have been neglected so far, and little is known on the role of information sources and the actual exposure to wolves in shaping people's attitudes. Here we conducted a phone survey aiming at identifying and quantifying the attitude of the general public towards wolves in Germany, with three specific objectives: 1) providing a baseline of people's attitudes towards wolves in Germany, 2) understanding how context-specific drivers such as socio-demographic factors, knowledge on wolf ecology, sources of information on wolves and exposure to wolves can affect attitudes, and 3) assessing how attitudes vary on spatial and temporal scales. We provide a new statistical framework inspired from community ecology to address the complexity and diversity of attitudes. With this new framework, we intend to identify potential conflicts between people with diverging backgrounds and attitudes towards the return of wolves in human-dominated landscapes, and to provide the basis for sustainable wolf-human coexistence in Germany.

When we cannot have it all: Ecosystem services trade-offs in real-life planning contexts (062)

Francis Turkelboom^{1*}, Sander Jacobs², Michael Leone², Eszter Kelemen³, Marina García-Llorente⁴, Francesc Baró⁵, Pam Berry⁶, Mette Termansen⁷, David N. Barton⁸, Erik Stange⁸

¹Research Institute for Nature and Forest (INBO) Research Group Nature & Society; ²INBO Research Group Nature & Society; ³Environmental Social Science Research Group (ESSRG); ⁴Madrid Institute for Rural, Agricultural and Food Research and Development (IMIDRA) Department of Applied Research and Agricultural Extension;

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Local planners and decision makers have to deal with trade-offs and conflicts between stakeholders as part of planning and management of landscapes, natural resources and/or biodiversity. To make trade-off research come closer to the daily practice of spatial planning and management, we propose an operational framework for ES trade-offs which put the concerned stakeholders, their land-use/management choices and their impact on ES at the center. We used this framing to analyze 24 cases of real-life ES trade-offs from around the world. They cover a wide range of trade-offs encountered when ecosystems are used, such as: land-use change, change of management practices, technical versus nature-based solution, use of natural resources, and management of species. The ES trade-offs we studied featured a complexity that was far greater than what is usually described in the ES literature. Provisioning and cultural ES are the most targeted ES in trade-offs, but the most impacted are the provisioning ES. A better understanding of the role of stakeholders helps to analyze the trade-offs, such as: their needs, their level of power and concern, ecosystem use, and interactions. There is a clear relation between the level of concern and responses. About half of the responses are process-oriented actions, such as awareness raising activities, meetings, training, negotiation. The other half of responses concern activities to modify

the trade-off, such as new regulation, action plan, enforcement, interventions and commissioning of research. However, a strategy to cope with the trade-off was in place in only 39% of the cases.

Managing ecological disturbances: Learning and the structure of social-ecological networks (069)

Jacopo Baggio^{1*}, Vicken Hillis²

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Ecological disturbances (i.e. pests, fires, floods, biological invasions etc.) are a critical challenge for natural resource managers. A Land managers, or individuals with the authority to act on a specific part of the landscape, play a key role in altering the rate and extent of disturbance propagation. Ecological disturbances propagate across the landscape, while management strategies propagate across social networks of managers. Often, these related processes of diffusion are studied separately. Here we use an agent-based model to examine the joint diffusion of ecological disturbances and management strategies across a multiplex, social-ecological network that allows us to account for the fundamental role of social-ecological feedbacks. We examine the management of ecological disturbances as a function of learning on a social-ecological network. Our results show that managers who imitate other successful managers and have access to accurate information are most effective at controlling disturbance. However, we also find that when the ecological network is sparsely connected, structural properties of the social-ecological network such as inter-layer assortativity and clustering play a key role in controlling disturbances.

Effective management of protected areas to deliver benefits in a landscape (082)

Janis Smith^{1*}, Patrick O'Farrell¹, Dirk Roux²

¹CSIR (Council for Scientific and Industrial Research) and Stellenbosch University Biodiversity and Ecosystem Services; ²South African National Parks Scientific Services

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Protected areas have been viewed for decades as the cornerstones of biodiversity conservation. The main focus has been on conserving terrestrial biodiversity using a traditional protection strategy of restricting access and activities within these areas. Freshwater biodiversity has seldom been given explicit consideration in the location and design of protected areas, as evidenced by the poor levels of representation and protection for freshwater ecosystems in South Africa. Landscapes surrounding protected areas often help conservation areas maintain flows of water, nutrients, organisms and energy, which span both protected areas and the landscapes surrounding them. Protected areas should not function independently, but should form part of a broader social-ecological system. Emerging understanding highlights the importance of working both within and outside the protected areas, and demonstrates the benefits of contextualizing protected areas as components of a social-ecological landscape. We used a variety of mapping approaches to explore how shifting park boundaries to natural features such as hydrological function and can benefit both people and protected areas. Area based approaches were used to analyze hydrological function for different park boundary sizes using buffer and sub-catchment based approaches. We found that expanding protected areas based on hydrological features benefit both the protected area and people in the surrounding landscape. This allows people to not only benefit hydrologically having protected areas in a landscape, but to reconnect to nature through protected areas.

Strategizing rather than coping: considering one's options in case the fish leave (089)

Louise Gammage^{1*}, Astrid Jarre¹, Charles Mather², Marcus Haward³

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Small-scale fishers, and the communities they support, face a range of social and ecological challenges that undermine their ability to sustain livelihoods. Traditional hand line fishers in South Africa's southern Cape region are no exception. This presentation reports on an interactive and iterative scenario planning process taking place in the small-scale fishing community of Melkhoutfontein. Recent research has found that this low- to middle income community at intermediate levels of adaptive capacity, cope with the multiplicity of stressors related to long-term changes on land, in the sea and in policy & regulation whilst suggesting that a scenario-based approach when responding to change would more appropriate. Scenario planning presents an opportunity for various stakeholders to consider pathways for future responses to changes whilst enhancing adaptive capacity through a process of social learning. Initial steps of this scenario planning process included the development of structured decision-making tools such as causal diagrams where stakeholders mapped out drivers of change in an iterative process. The causal diagram development process served as the first step of the scenario planning process. Future scenario "stories" were subsequently constructed by research participants in a series of workshops. These scenarios not only provided a snapshot of possible futures under certain conditions, but more importantly, encouraged social learning within the group of participants. We reflect on the initial results from the research and on the feasibility of scenarios as a tool to promote and secure a more sustainable future for Melkhoutfontein and similar fishing communities on South Africa's south coast.

Resilience of small-scale fisheries: Scaling up case-based evidence (143)

Zuzana Harmácková^{1*}, Albert Norström¹, Garry Peterson¹

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The resilience of social-ecological systems represents a fundamental precondition of sustainability at multiple spatial and temporal scales. However, while the theoretical framework of social-ecological resilience has been developed in the past two decades, practical examinations of the specific features influencing resilience have been scarce so far. The aim of this study is to apply resilience theory on an array of place-based case studies, assessing specific features of complex social-ecological systems that promote systems' resilience and transformative potential. The presentation will build on preliminary results, focusing on small-scale fisheries as representative examples of local- to regional-scale social-ecological systems defined around a single key natural resource and its exploitation. The study analyses existing case-study based data, identifying which features of social-ecological systems were the most influential for building social-ecological resilience, and to what extent these factors differed across various social-ecological contexts and conditions. The methodological approach is based on QCA (qualitative comparative analysis), a statistical procedure allowing to identify which combinations of factors are likely to promote the outcome of interest, in this case, loss of resilience, resilience or transformation. Building on the experience of applying the research approach on an array of social-ecological case studies in the Arctic, this study focuses on comparing the resilience outcomes of selected case studies on small-scale fisheries across different regions. By comparing evidence from place-based research, this analysis synthesises what features of social-ecological systems influence resilience and transformation across cases, and thus generates findings relevant on multiple spatial scales.

Assessing socio-ecological resilience to natural disasters in a tropical mountain in Africa (183)

Nakileza Bob^{1*}, Bamutaze Yazidhi¹

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This paper explores the linkages of the social and ecological agro-mountain system to natural disasters in typical tropical mountain in Uganda in Africa. The recent wave of natural hazards culminating into disasters where over 400 people perished was an outcome of interactions and environmental changes at local level compounded by those at regional and global scale. Data and information on hazards and disasters in Mt Elgon was gathered through field surveys and detailed participatory observations. Further information on pre- and post-disaster actions was obtained through interviews and five focus group discussions with purposively selected local communities in landslide disaster affected areas. Results revealed that community memory, social networking, awareness campaigns and tree planting initiated by Community based organization and Non-governmental organizations such as Uganda Red Cross were effective in post-disaster resilience building. External agencies played a key role in providing relief aid and international networking. Prior to the recent landslide and flood disasters there existed few initiatives and low level of coordination amongst organizations dealing in disaster related problems. It remains unclear, however, to what extent or how these factors individually contributed to the resilience of this coupled system to disasters. Underpinning local processes and pathways can inform actions at national and global scale.

Speedtalk session: Issues of access, equity and perceptions of value

November 9th 2017 (12:30-14:00)

Chair: My Sellberg

Room: Oaxaca 2

Presentations:

Spatial subsidies, environmental justice and ecosystem services in the conservation of migratory species (188)

Laura López-Hoffman^{1*}, Juanita Sundberg²

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A central goal of political ecology is to reveal the hidden costs of biodiversity conservation efforts and to identify winners and losers. In this paper we use a new approach from ecological economics spatial subsidies to examine issues of environmental justice in the conservation of migratory species. In North America species such as the monarch butterfly (*Danaus plexippus*) and the Mexican free-tailed bat (*Tadarida brasiliensis*) migrate annually in large numbers over significant distances between sites in the United States, Canada, and Mexico. As these animals travel, they often provide substantial recreational benefits and critical ecosystem services. Because of the dynamics of migration, there may be mismatches between the areas that most support a migratory species population viability and long-term ability to provide services and the locations where the species provides most services. These mismatches may create environmental justice challenges as people in the areas receiving the benefits often provide insufficient or no compensation to support conservation activities in areas with the most critical habitat. In effect, people in the locations that most support a given species may be subsidizing the provision of ecosystem services in other locations. We use the spatial subsidies approach to determine the degree to which the ability of people to enjoy the ecosystem services of butterflies and bats in one location depends on habitat in other location. By using this approach, we identify environmental justice issues at various scales a from rural vs. urban areas to across international borders that otherwise might remain invisible.

Empowerment through Ecosystem-based Adaptation - Evidence from Sri Lanka (046)

Stephen Woroniecki^{1*}, Christine Wamsler¹, Emily Boyd¹

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I present an investigation of how ecosystem-based adaptation (EbA) actions may contribute to social change, particularly the empowerment of marginalized groups. I first tease out the contextual dynamics of a social-ecological system, and ask how those dynamics play out for the agency of marginalized groups. Then I ask how ecosystem-based interventions may interrupt, reinforce, or contest these dynamics with consequences for empowerment. Two EbA interventions are investigated that address climate impacts for dry-zone agricultural communities in Sri Lanka. I bring together participatory methods, narrative interviews, and a household survey to understand livelihood dynamics, institutions governing access, and social-ecological relations. I explicitly differentiate between different actors and livelihood groups and their ecosystem dependencies through an inductive quantitative analysis whilst the qualitative methods provide triangulation and an in-depth understanding of power relations and institutional change. The results show that the social outcomes of ecosystem-based interventions can be evaluated as the dynamic product of altered institutions, livelihoods, and ecosystems. I conclude transformational research must pay more than lip service to how the forms of engagement with communities (e.g. participation; knowledge exchange and policies across scales) affect local institutions, with consequences for different groups' access to ecosystem services and associated achievements in wellbeing. Furthermore project planners and researchers should integrate recognition of the rights claims and collective actions of vulnerable groups to meaningfully and permanently alter their conditions of access to ecosystem services, amidst large subjective aspirations and needs.

Rethinking democracy in community natural resources management: gender, equity and environmental governance in Oaxaca, Mexico (052)

Violeta Gutiérrez Zamora^{1*}, Raitamaria Mäki², Fátima Cortés Zarate³

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Community-based natural resources management (CBNRM) has been one of the cornerstones of collaborative governance approaches aiming towards more democratic, equitable and ecologically sustainable environmental management. Across countries in the Global North and South it has been acknowledged that gender differentiated roles, knowledges and skills in forest use and management generate different responsibilities and benefits between women and men. However, little attention has been paid to the changes on the dynamics of gender-based social inclusion and exclusion in communities where forest management transformations have occurred. In this paper we discuss the association between democracy and equity in natural resources management in forest-dependent communities in Oaxaca, Mexico (two in Chinantla and one in Southern Sierra regions). The three communities are under CBNRM and *usos y costumbres* self-government systems but differ on forest utilization scopes. Through ethnographic methods we have identified how external incentives for women's participation in natural resources management have changed the dynamics of inclusion and exclusion that take place at multiple levels of decision making. We found that in these communities women have gained more access to economic benefits from forest conservation and forest exploitation but top-down proposals for gender equity and natural resources management have instead constrained spaces for women's involvement in decision-making. In conclusion, we claim that new approaches are needed for democratic decision-making processes and gender equity in CBNRM. By analyzing internal dynamics of inclusion and exclusion in communities, proposals could go beyond the involvement of women in "economic benefits" and seriously reconsider the rights of women.

Equity and accessibility of cultural ecosystem services from the protected areas of Mediterranean Chile (090)

María José Martínez-Harms^{1*}, Kerrie Wilson¹, Brett Bryan²

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Experiences with nature through visits to protected areas are an important cultural ecosystem service that have the potential to strengthen pro-environmental attitudes and behavior. Understanding the accessibility of protected natural areas and likely preferences for enjoying the benefits of nature visits are key factors in identifying ways to improve the equability of access and inform the planning for future protected areas and their management. We develop, at a regional scale, a novel database of visits to protected areas in the Mediterranean region of Chile using geotagged photographs and assess the equality of the visits using the home locations of the visitors. We find that 20% of the population of the region make 80% of the visits to protected areas. Wealthier people tend to travel further to visit protected areas while people with lower incomes tend to visit protected areas that are closer to home. Larger protected areas and those that are more biodiverse are the most visited. Our study has important policy implications: by providing information on the current spatial flows of people to protected areas, we demonstrate the need to expand the protected area network, especially in lower income areas, to improve equitable access to the benefits provided by nature.

The social history of the changes in the access and management of the communal rangelands and effects on rural people's well-being in the Eastern Cape Province, South Africa (113)

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Large parts of the Eastern Cape are made up of the former homelands which are predominantly rural with people who are subsistence livestock farmers. Since the establishment of the homelands a shift in access and management of the communal rangelands has been occurring. This has been linked to the current degraded state of the communal rangelands resulting in poor livestock quality and consequently people's well-being. Technologies to reverse degradation have ignored the social dynamics influencing rangeland management and have been implemented as "one size fits all" using a Top-down approach rendering them ineffective. Therefore to give communal farmers a voice this study explores the social history of the changes in the access and management of the communal rangeland and how these have affected people's lives. Using narratives obtained from semi-structured and structured interviews and focus group discussion from key informants and the community, a journey is taken from pre - during - post the introduction of the betterment planning which imposed a grazing camp rotation system to rural communities. A thematic analysis was used to generate themes from these narratives whereby people's perceptions of the changes in grazing quality, factors influencing these changes and their effects on livestock quality and people's well-being showed a shift in people's social and cultural norms, climatic factors as well as governmental at local and regional level. These need to be taken into consideration when planning for rangeland management strategies in rural settings where rangelands are used as a common resource.

Co-managing complex social-ecological systems in Bangladesh: An empirical evidence in community based fish culture in the public and private floodplain (153)

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Social-ecological systems are made of complex and adaptive social and ecological elements in the floodplain involving social actors. In this study, a social-ecological system is viewed as a system that comprises multiple natural resources systems and multiple governmental and community entities and interactions. Diverse forms of access and ownership complicate the management where floodplains that are leased to fisher's groups are appropriated by wealthy and influential people, with the benefits from fish culture accruing to only a few members of the fisher's groups. A community based fish culture project has effectively implemented benefit sharing arrangements in 3 floodplain management and analyzed on the basis of research carried out in 2010-2013. This study results in an integration of qualitative and quantitative data, following the stakeholders representing the various institutions and organizations, land owning fishers, and landless seasonal fishers. The interactions found between downstream to upstream geographic areas and different scales, multiple natural resource disturbances, multiple actors within both government and community and multiple institutions for managing these disturbances and conflicting interests that affect sustainability of the natural resources systems individually and the social-ecological system as a whole. The outcomes demonstrate a significant increase of benefits to the different stakeholders through the sharing of benefits derived from their involvement in the fish culture project. The willingness of people from different classes to work together, the adoption of a new technology, the benefits of cooperation, and the embedded of local institutions are shown to be important results for policy making purposes.

Out of sight, out of pocket: The value of water-related ecosystem services provided by an undervalued protected area section to diverse downstream stakeholders (155)

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Protected areas are social-ecological systems that provide important ecosystem services to society, but are increasingly under pressure to be economically sustainable. In some cases, tourism can provide income, but other protected areas are more inaccessible and may be considered a drain on already scarce resources. An example of this is the Soetkraal area, and indigenous forest and fynbos section of the Garden Route National Park, South Africa. Soetkraal generates no income and is costly to manage, yet alien clearing efforts around a major tributary is critical for ensuring water supply to downstream users. In this study, we attempt to highlight the linkages between Soetkraal and the society that depends on its services, linkages that are presently not well understood or appreciated. First, we estimate the quantity of water supplied to downstream areas as a result of protection. Next, we use surveys and expert workshops (representing diverse stakeholders and knowledge systems) to identify ecosystem services received from Soetkraal, and the benefits derived from these services. We then explore scenarios of water supply, and associated effects on ecosystem services, under different management regimes. Our results show that the Soetkraal area contributes valuable water-related services to downstream users, and that benefits derived from these services are critical to the well-being of downstream users. Our study highlights how cost, benefits and risks under different policy scenarios may play out at multiple scales, and has important implications for how we understand the relationship between the sustainability of protected areas and the wellbeing of societies.

The means determine the end in pursuing integrated valuation in practice (181)

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In environmental valuation, although it is well recognized that the choice of method heavily affects the outcome, little is known on how existing valuation methods actually elicit the different values. Through the assessment of real-life applications of valuation, this study tracks down the suitability of 21 valuation methods for 11 value types and assesses the methodological requirements for their operationalization. We found that different valuation methods have different suitabilities to elicit diverse value-types. Some methods are more specialized than others, but every method has blind spots, which implies risks for biased decision-making. No single valuation method is able to capture the full spectrum of values of nature. Covering the intrinsic, relational and instrumental value dimensions requires careful selection of complementary valuation methods. This study also demonstrates that performing such an integrated valuation does not necessarily entail more resources, as for every value dimension, methods with low to medium operational requirements are available. With this study, we aim to provide guidance for selecting a complementary set of valuation methods in order to develop integrated valuation in practice that includes values of all stakeholders into environmental decision-making. Moreover, the 'diverse method requirement' for valuation has repercussions for assessments on larger scales, and could form a criterion to check validity of value conclusions from global or subglobal assessments or natural capital accounting attempts.

Ecosystem based Adaptation for smallholder farmers: perception of benefits (179)

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Many smallholder farmers use Ecosystem-based Adaptation (EbA) practices (e.g. shade trees in coffee plantations, or live fences) to improve the sustainability of their farming systems and to help crops adapt to climate change, yet little is known about the benefits and drawbacks of EbA practices that smallholder farmers perceive. In order to better understand how and why farmers use EbA practices, we characterized EbA practices commonly found on coffee and basic grains agroforestry systems (shaded coffee, dispersed trees in annual crops, forest fragments, riparian forests, and live fences) in 6 landscapes of Central America, using farmers' structured interviews. Specifically, we documented farmer perceptions of the benefits and drawbacks of individual EbA practices in 300 farms in Costa Rica, Guatemala and Honduras. Our study finds that the prevalence and type of EbA practices present on individual farms were related to farmer socioeconomic conditions, including farmer experience and access to training. Farmers indicated that the main benefits of EbA practices were avoiding erosion, improving soil fertility and organic matter, and regulating temperature, among others. The drawbacks of establishing and maintaining some of these practices, are the cost of maintenance and the intensity of labor required. Our study highlights key factors that influence the adoption and use of EbA by smallholder farmers, and provides insights into how governments, donors and development agencies could more effectively promote the broad-scale use of EbA practices in agricultural landscapes.

Speedtalk session: People, landscapes and multiple ecosystem services

November 9th 2017 (12:30-14:00)

Chair: **Megan Meacham**

Room: Oaxaca 3

Presentations:

Ecosystem service assessment, tradeoff and synergies analysis and ecosystem service bundles identification in four European silvopastoral landscapes (1014)

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Wood pastures are complex social-ecological systems which are product of a long-term interaction between society and the landscape in which it is embedded. Traditionally characterized by multifunctional low-intensity management that enhanced a wide range of ecosystem services (ES), current farm management has shifted from traditional towards more intensified farm models. This paper will assess the coproduction of ES in four study areas dominated by wood pastures, located in three countries: Spain, Sweden and Romania. Based on 220 farm surveys and using multivariate techniques, we will characterize farm management using 30 quantitative farm management indicators, biophysical factors and sociocultural factors. The results will help to understand the synergies and tradeoffs associated with the farm management, analyzing how biophysical and sociocultural factors influence the range of management styles. We will also identify how different management styles foster and promote different management outcomes that reflect bundles of ES. The outcomes of this study will be useful to understand the dynamics between the agroecosystem and the society in wood pastures, which potentially will have many policy implications on farmers and policy makers in order to highlight and promote system-based policies.

Unpacking ecosystem service bundles: key considerations for the assessment of ecosystem service bundles (126)

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Ecosystem service bundles is a useful concept for understanding the social-ecological dynamics of ecosystem services. Social-ecological interactions have been shown to generate interrelated suites of ecosystem services that are clustered across landscapes. Specific ecosystem architectures related to specific sets of social systems produce reoccurring sets of ecosystem services suggesting that ecosystem services analysis might be simplified, rather than complicated, by considering ecosystem services bundles. Given the potential utility of the concept of ecosystem services bundles, as well as the recent surge in interest, it is timely to take stock and reflect on what has been achieved to date, as well as what critical gaps in our understanding remain. Hence, in this paper, we seek to 1) examine how ecosystem service bundles have been investigated in different studies; 2) reflect on the strengths and weaknesses of existing work on ecosystem service bundles; and 3) highlight key issues that are critical for learning across cases. We first provide a brief overview of existing approaches to studying ecosystem service bundles. We then synthesize four conceptual themes relevant to improving future research on ecosystem service bundles -- namely 1) the chain of production, 2) unit of analysis, 3) scale, and 4) drivers and mechanisms. We conclude by outlining priorities for future research.

Exploring the effects of Social-Ecological dynamics on stakeholder preferences on relationships between ecosystem services: a PECS-WaterSES analysis (137)

Cristina Quintas-Soriano^{1*}, Jodi Brandt², Dainee Gibson¹, Jenna Narducci², Caryn Vaughn³, Katrina Running⁴, Marina García-Llorente⁵, Colden Baxter¹, Antonio J. Castro¹

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Facing the challenges of environmental and social changes, sustainable management of ecosystem services (ES) is a worldwide priority to maintain human well-being, especially in regions experiencing water scarcity and governance issues. Here, as part of the PECS-WaterSES project (www.pecwaterses.com), we use four place-based research sites that represent different social-ecological dynamics and watershed management scenarios to analyze patterns, perceptions and preferences regarding ES. We conducted over 2,000 face-to-face questionnaires to explore the societal demand regarding ES across four sites in arid southern Spain, the south-central Great Plains of Oklahoma (US), and the Portneuf and Treasure Valleys, Idaho (US). These sites have different climates, and social-ecological and cultural dynamics, but are all experiencing new regional, societal demands for limited water resources. We examine how ecosystem services bundles emerge from diverging social preferences toward ES under different watershed management scenarios. Additionally, we explore socio-cultural factors determining differences in social perceptions among the four sites. We hypothesize that social demand for ES are strongly influenced not just by the social-ecological-cultural context but also by the different social-ecological dynamics and watershed management decisions over time.

Social mapping of ecosystem services supply: a case study in the semi-arid western United States (138)

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Despite widespread recognition that stakeholders' social values should guide environmental decision-making, it too often remains absent from ecosystem service (ES) assessments. Spatially explicit information that incorporates the perceptions of different stakeholders would provide a rich basis for the development of sustainable and equitable land management strategies. In this study, we engage the general public to identify and map a range of ES, and we spatially explore social perceptions towards those services. Based on over 1,000 face-to-face surveys, we analyze the spatial distribution of ES social values and determine the relationship between social values and stakeholder groups. Our study includes two watersheds in Idaho (US), which have similar biophysical characteristics but whose social-ecological dynamics have diverged over the past 100 years. To achieve our goal, we (1) map the social values for ES supply through social perceptions using different indicators (intensity, diversity and bundles), (2) identify spatial patterns in the perceptions of ES for stakeholder groups with different socio-demographic backgrounds, and (3) compare how stakeholders from two divergent social-ecological systems perceive ES provision. The results reveal overlapping hotspots for the ES valuation, as well as particular patterns in the perceptions of these bundles of ES. Finally, we argue that mapping social values of ES can complement more traditional ES mapping approaches, and helps to incorporate public participatory process in decision-making.

Using anthromes to frame local conservation research and bridge towards global sustainability (169)

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Anthromes link human and natural systems by characterizing ecological patterns in terms of human populations and their use of ecosystems. We use anthromes to frame place-based conservation planning and to understand social-ecological dynamics of conserving biodiversity and ecosystem services (ES). The objectives of this project were to better understand dynamics of populated forest anthromes, focusing on the urbanizing Piedmont ecoregion, USA, to understand consequences of simplifying coupled human-natural systems associated with forest and urban growth. We linked local quantitative and qualitative data with spatially explicit modeling. We used InVEST to map variation in biodiversity and ES across six stakeholder-defined land use scenarios to identify context specific pathways to regional land use sustainability. The results illustrated tradeoffs and opportunities between alternative futures across multiple systems and scales. For example, while forest restoration was economically and intrinsically valued by stakeholders and provides the most biodiversity and ES benefits, modeling showed that even increasing forest cover by 5% is ecologically and socially difficult while meeting other goals. Consideration of alternative scenarios highlighted opportunities. For example, the "As-Usual Scenario" showed an opportunity to protect a locally threatened species. Perhaps most interesting, when data were shared with local decision makers, legacy effects of past programmatic goals resulted in conservation decision making only weakly informed by these data. By connecting place-based data and scenarios, we were better able to assess where biodiversity conservation and ES retention would successfully occur in shifting anthromes; but the process showed the need for greater local engagement to adopt change.

Fire and Floods, Cultural Landscapes in the Amazonian Floodplains (163)

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Fires and floods, although they are opposite phenomena in nature, create the most common disturbances that alter the dynamics of ecosystems. The occurrences of these phenomena are often linked to natural origins, [but can also be the result of] anthropogenic alterations. As is seen with uncontrolled fires set for commercial agriculture. Such is the case in the great Beni plains within the Amazon River basin in Bolivia, where fires are often set for the purposes of regenerating grasslands and controlling shrub species. Flooding, on the other hand, is one of the most dramatic phenomenon that affect both the human population and natural resources there. These two phenomena determine the richness and complexity of the savanna ecosystems in the Beni region. An anthropogenic fire that prepares the land for cattle ranching, along with seasonal floods, will ultimately render the disruption of the local landscape, destroy entire habitats, and diminish biodiversity. In spatial terms, both (fire and floods) generate a great landscape of savannas that cannot be understood without considering this interplay between geographic conditions and human impact on the environment. The work aims to address this relationship between the environment and human behavior, and offer a perspective on its resilience, as we examine the impact of these phenomena on the ecosystem over time. The present-day diversity of this ecoregion reveals an ever-evolving exchange between humans and the environment.

Socio-ecological analysis of uptake of agro-environmental practices in intensive agriculture in Quebec (166)

Sylvia Wood^{1*}, Jean-François Bissonnette¹, Vijay Kolinjivadi¹, Caroline Simard¹, Alejandra Zaga¹, Charlene Kermagoret¹, Ann Levszque¹, Chloe L'Ecuyer Sauvageau¹, Matthieu Beaumont¹, Jerome Dupras¹

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The intensification of agriculture in Southern Quebec has led to multiple ecological issues such as the increase of non-point source pollution, the eutrophication of waterbodies, the loss of forest cover and biodiversity, amongst others. Moreover, the environmental consequences of intensive agriculture, as well as the economic benefits, have been unevenly distributed across resource users. Government programs and policies developed in response to encourage the adoption of agro-environmental practices (AEP) have met with varying degrees of social and environmental success. The ANCRAGE research project takes a multidisciplinary, place-based approach to study perceptions, efficiency and barriers to uptake of AEP among farmers and embedded institutions in Southern Quebec. The aim of this project is to inform the next generation of incentive approaches to achieve social, economic and environmental aims in intensively managed agricultural landscapes. Using a socio-ecological systems framework, we integrate ecosystem service modeling, cost-benefit analysis with socio-institutional field approaches to identify barriers and opportunities for improved uptake of AEP. While the potential for provision and economic benefit of multiple ecosystem services (i.e. bundles) is high from AEP in Quebec, a number of perceptions amongst farmers and strong focus on private over social benefits currently limit uptake. Based on preliminary results we suggest a number of potential routes to explore in terms of policy approaches to encourage widespread AEP adoption in the context of southern Quebec. Lessons from this study and approach are relevant for examining efficiency and efficacy of agro-environmental schemes in many other contexts.

Using household data to disaggregate ecosystem services dependence (169)

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The way that people benefit from, access and use ecosystem services is affected not only by the biophysical factors such as availability, but also by a range of socioeconomic characteristics. These characteristics are known to reveal hidden trade-offs, highlighting winners and losers in ecosystem services availability and provision. In this paper, we selected five classes of household socioeconomic characteristics including gender of household head, household income, household size, property ownership, and land-use type (farming, urban, traditional) to determine whether and how they influence household dependence on ecosystem services. The four ecosystem services examined included freshwater from springs and rivers, locally sourced natural building materials, and firewood for cooking and heating. Despite relatively low overall levels (approximately 10%) of dependence on these ecosystem services, regression analyses highlight that households in traditional and farming areas, female-headed, low income and large households depend more on ecosystem services than their counterparts. When the combined effects of variables are explored we find that land use class amplifies, and in some cases reverses the influence of these characteristics on direct ecosystem services dependence. These findings suggest the importance of considering socio-economic variables in ecosystem service assessments, but further they stress the need to capture and analyse the multiple dimensions of socio-economic factors and their combined effects relevant to ecosystem service access and use.

Speedtalk session: Innovative and local approaches to sustainability challenges

November 9th 2017 (12:30-14:00)

Chair: **Amanda Jiménez Aceituno**

Room: **Guelaguetza**

Presentations:

A payment by any other name: Starkly different perceptions of Costa Rica's PES from participants to managers (187)

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Debates about Payments for Ecosystem Services (PES) center around the promise (according to some) and peril (according to others) of conservation as a transaction. Many of the extensive and well-reasoned theoretical debates about the impacts implicitly assume that PES programs are understood as such by participants as transactions of payment for services but research has not investigated the perceptions of PES by those involved. We studied Costa Rica famous PES program in the traditional cattle ranching region of Guanacaste via 43 in-depth interviews with program managers, local experts and PES participants. We found substantial differences in the ways that different groups understood the payments and their purpose. Whereas the head office saw the program as simple financial transactions, most participants saw their payments as a type of help or assistance. This finding that market logics did not fully transfer from program leadership through local managers to actual participants shows how participants might experience PES programs not as payments for services per se, but as acknowledgement for land stewardship or an additional form of rural assistance. Our results suggest that program intermediaries (those representing the program to participants) played a key role in translating the program language and logic to participants. Our findings add important nuance to debates about the meanings and impacts of PES programs and point to the important role of intermediaries in adapting national programs to fit with local contexts.

Lessons for native maize conservation from transdisciplinary arts-based research with indigenous farming communities in Oaxaca (012)

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Maize is one of the most important crops in the world in terms of both production and consumption. In the center of its origin, Mexico, maize is the major staple food and covers half of all farmland. In addition to its ecological and economic importance, maize is a key element of Mexican cultural identity. The biodiversity of maize has been developed by farmers over thousands of years of cultivation and offers an important resource for global food security by providing a base for developing new varieties that can tolerate emerging pests, diseases and changing climatic conditions. Native maize conservation, is, however, currently threatened by a range of factors, including: the substitution of landraces by conventional seeds, changing market demands, emigration out of farming, and genetically modified crops. We have performed place-based research to better understand the challenges facing native maize conservation in particular farming communities. In two indigenous communities in Oaxaca, we invited community members to first create artworks representing the role and changing history of native maize in their lives. We then discussed their artworks in focus groups as a way to specifically explore the differences among gender, age and community background with regard to the perceptions of the challenges. We then held common community meetings to discuss, prioritize and select strategies to collectively implement for native maize conservation. This presentation will describe the method, the differences revealed across the different groups and conclude with lessons learned from this transdisciplinary research for agrobiodiversity conservation more generally.

Developing a sustainable eco-enterprise for community benefit and climate resilience in Taveuni, Fiji (079)

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Fiji is facing significant climate change impacts that are both episodic (storms, king tides, flooding and landslides) and ongoing (sea level rise, salinization, erosion, ocean temperature increases, biodiversity changes). Adaptation and resilience initiatives are critical, yet governments of Pacific Island nations including Fiji struggle to implement long-term adaptation measures rather than reacting to individual events. This paper presents a transdisciplinary research project involving a community-oriented social enterprise (Going Green Enterprises Ltd), an international NGO partner (Climates), and a research organization (the University of Melbourne). The central objective of the project is to develop a benefit-sharing scheme for climate resilience activities, utilizing the funds derived from a sustainable sea cucumber harvesting program, an industry that has been subject to overfishing and governance challenges. The project is structured as follows: (1) we apply a participatory systems-based political ecology research methodology to describe and map factors and relationships in the social-ecological system of Taveuni, Fiji; (2) building on this participatory process, we describe appropriate livelihood opportunities based on the sea cucumber fishery and other identified initiatives; (3) we identify financing models (including international opportunities such as the Green Climate Fund, inter alia) and economic scenarios; (4) we evaluate integrated resilience activities that can be conducted through the livelihood initiatives and using future revenue streams. This locally led transdisciplinary research project will provide communities with a benefit-sharing scheme built from their own values and aspirations, and contribute to ongoing local sustainable development and resilience building.

How can we get back forests? Operationalizing payments for ecosystem services in Brazil's sugarcane belt (088)

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Many Brazilian landscapes exhibit strong forest losses - up to 80% or more have been reported in extreme cases. These deficits do not refer to % land cover, but to the forest areas that are legally required based on the Brazilian forest code (FC), which are 80% in the Amazon and 20% elsewhere. With the objective to provide incentives for reforestation, we initialized a payment for ecosystem services (PES) scheme in Rio Claro, a municipality within the sugarcane belt of Sao Paulo state, Brazil (PES-RC). The draft design of PES-RC is compared with characteristics of successful PES cases in Latin America (PES-LA). With the objective to identify the factors most relevant for PES-RC the systematic comparison was performed by analyzing four major characteristics: identity of traded ecosystem service; spatial scale; type of transaction involved between ES providers and beneficiaries; and the involved actors. The biophysical characteristics, institutional arrangements and financial options of PES-RC were assessed using participatory methods. We found an agreement between PES-RC and the successful cases of PES-LA regarding the traded ES (water) and the PES spatial scale (local). However, stakeholders' opinions diverge from PES-LA concerning the type of transaction (cash preferred in PES-RC; in-kind in successful PES-LA) and the involved actors. Our results raise the question whether either stakeholder opinions or the characteristics of successful cases should be prioritized when planning and operationalizing new PES schemes. We argue that stakeholder participation should be considered as an additional success criterion for public policies directed towards PES implementation.

Tools for organizing civil society in sustainability projects (099)

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Unfortunately in Mexico there is a minority inclined to do volunteer work. According to the Public Register and INDESOL, there were around 30,000 OSC in Michoacán, this meaning there is one for every 4000 citizens. This data is supported by *Índice Global de Participación* (2015), where Mexico is in the 78th place of volunteer participation of 215 countries counted. Never the less, Mexico is well known for its kindness and solidarity as shown in other statistics of *Índice Global de Participación*, Mexicans landed in the 10th of the world showing good will to help a stranger in need. With these data and our experience, working in *Juntos Hagamos Comunidad* a NGO, we think it is not an issue of want helping each other but a lack of resources to do it; starting with poor organization to generate high impact projects, as well as the difficulties of organizing groups of young leaders, just like us. That is why we created a guidebook in a game layout, to help civil movements get organized, especially young groups with limited resources with genuine interests to improve their community. This handbook is based in various leadership and communitarian organization theories. It is important to us to present our experience in a forum like yours, because the organized civil association is the key to achieve structural changes in the relationship with and between the ecosystems.

Seeds for a good Anthropocene: analyzing context-specific initiatives with high potential to contribute to more sustainable social-ecological futures (131)

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Achieving sustainability in the Anthropocene requires radical changes to how human societies are currently organized. Thus, a key question is how to find plausible pathways of development that can contribute to more sustainable social-ecological futures. The Seeds for a good Anthropocene project has identified diverse existing initiatives that have the potential to catalyze more radical transitions to a sustainable future. The project (<http://goodanthropocenes.net>) has collected examples of "seeds" that identified social-ecological bright spots all around the world. However, we hypothesize that some of these seeds are well-versed to accomplish some sustainability goals but not others. We use the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) to screen a set of the seeds and identify what types of sustainability goals are being addressed. We believe that combining SDG achievement in relation with the seeds database will provide a better understanding on how some context-specific initiatives can guide sustainable pathways. As a first initial analysis we focused on African based initiatives, and analyze how these initiatives contribute to the achievement of the SDGs, specifically, evaluating: a) which kind of goals and targets are being addressed by the initiatives; b) which synergies and tradeoffs appear among the goals and targets within the different initiatives; and c) which characteristics define groups of seeds addressing similar goals and targets. Finally, applying novel analytical frameworks on sustainability transformations, we will build understanding on the features of initiatives that have a higher transformative potential, and analyze the contexts that best support these initiatives.

Collaborative research and traditional ecological knowledge for landscape restoration in northern Veracruz, Mexico (151)

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Although there is a strong debate about the ways in which traditional knowledge can effectively connect with scientific knowledge in the search for solutions to the socio-ecological crisis, it is a key issue to develop methods to connect these two types of knowledge with each other in favor of ecosystem restoration and conservation. The latter is relevant in rural areas with a strong indigenous influence expressed in cultural attributes such as language, costumes, gastronomy and land use. Based on a collaborative study developed in the Totonac territory from northern Veracruz, we built an integrative methodology that incorporated restoration science with traditional knowledge. The objective was to generate research that would be relevant and useful for local people, in response to their social, economic, environmental and political concerns. Previous research shows that Totonac people and their descendants face a complex social and environmental scenario, which involves multiple economic and political challenges, such as the oil industry, expansive agricultural industry, cattle ranching, high impact tourism and urban development. The combination of these issues has resulted into indirect health problems like malnutrition and obesity, as well as water and soil pollution among others. Data collected through open interviews, focus groups, participatory workshops and field walks revealed that Totonac descendants identified various agroforestry elements that concur with the description of a vanilla plantation model. These findings point at the key role that traditional knowledge could have in solving some of the most fundamental sustainability questions in bioculturally diverse landscapes in the tropics.

An integrated assessment of an indicators proposal for Payment for Ecosystems Services. The challenge to quantify the effects of ecosystem services in a Mexico City case study (176)

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The Payment for Ecosystems Services (PES) has been the economic tool, which tries to resolve the maintenance of ecosystem services through a payment formalized into Public Policy. In México it has been used at a local scale in areas with key ecosystems for hydrological services, in this study case the forest southwest of Mexico City. Ten years after PES application, there has never been an integral assessment (considering economics, social and ecological aspects) of the efficacy and sustainability of this program. This work has the objective, based on a socio-ecosystem approach, to present and evaluate ecological, economic and social indicators of PES performance for a study case in Mexico City. The indicators proposal has twelve indicators (three each for economic, social, biophysical and ecological aspects), where the central problem to build the set was accessing information and filling data gaps. This integrated assessment identified PES effects, where: the economic effect were negative because the economic activities against the conservation produce more benefits for more families; the social effects are positive in the Community's perception and they could be positive if there are local organization and agreements between local actors and; the ecological effects reside in good quality water, also forest and soil need direct actions to improve their condition and thus, to raise the conservation of the water service

Global North Indigenous Community Knowledge Sharing with Global South - a model for the Indigenous Peoples' Platform (180)

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Comparing and contrasting place-based climate adaptation and resilience methods in two indigenous communities - the Blood Tribe in the global north (Canada) the Nama Tribe in the global south (South Africa), we will exemplify the importance of knowledge sharing between indigenous communities which will contribute to commitments under the Paris Agreement and build a unique and best practice model / method for the new UNFCCC Indigenous Peoples Platform. Outcomes will lead to important knowledge on relationships with the natural world (social, cultural, ecological perspectives); barriers to climate adaptation & resilience; gaps in knowledge/ education/tools); new methods/tools for protecting socio-ecological knowledge; information exchanges between indigenous community members; and new skills to support on-going climate change plans. Our method shows how the benefits of knowledge sharing between these communities could be applied by other indigenous communities as well as non-indigenous stakeholders in their efforts to address climate change.

Using Fishermen Knowledge and recovering the boat: Bycatch in Peruvian artisanal fishery (136)

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Artisanal fisheries typically are data poor and assessing its relative sustainability is difficult. Bycatch is one of the main conservation issues. All turtle species and 77% of albatross species are in IUCN Red List. Because of data-poor fisheries, researchers have used knowledge of local fisherman to understand interactions of fisheries with ecosystems. An interview survey was conducted in ports of Peruvian coast to know spatial patterns and by-catch rates of marine megafauna of longline fishery targeting Mahi-mahi and its relation with vessels characteristics and fishing operations. Our results were compared with published and governmental information to assess Fishermen Knowledge (FK). Bycatch has been studied through observations on board and monitored 1% of vessels while 14% was assessed in this study. Location of fishing areas reported by a governmental institution and this study were similar. Big vessels (higher capacity, longline longitude and number of hooks) travelling long distances do not catch seabirds. Nevertheless, those vessels would catch turtles away from the coast, especially Green Turtle. Meanwhile, small vessels would catch turtles in southern and close to coast, especially Loggerhead Turtle. Also, fishermen reported as bycatch of cetaceans which was intentional catch. We could assume original fishermen report if we had not had previous reports about low cetacean bycatch. Bycatch is not monitored and FK is important in absence of standard information. Interview survey offers a possibility of obtaining a minimum estimate for by-catch frequency. FK help us to produce timely and scientifically defensible research to address conservation issues.

Speedtalk session: Governance and community level natural resource management

Chair: Jean- Baptiste Jouffray

November 9th 2017 (12:30-14:00)
Room: Tanilaoo

Presentations:

Assessment of adaptive capacities to deal with climate change in two Michoacán municipalities (186)

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Societies are being exposed to stresses of rapid and unpredictable environmental change and therefore they need to build open, flexible governance institutions with learning capacity. Government institutions are responsible for contemporary environmental management; therefore this research seeks to understand the key factors that enable or limit their adaptive capacity to deal with climate change. The study's main objective is to assess institutional adaptive capacities for responding to environmental climate change in two Michoacán municipalities, and the significance of key institutional factors in the construction of the capacities. The key institutional dimensions to be considered are: the learning capacity of the institutions, the potential for autonomous change, and fair governance. To investigate the institutional context, a content analysis of major public policy instruments was carried out, including the Climate Change Program and the Climate Change Law of the State of Michoacán. To analyze institutional adaptive capacities, semi-structured interviews were performed with public officials at state and municipal levels, with representatives of local environmentally-relevant associations, and with communities that interact with the municipal government. The documentary analysis shows the relevant roles of the municipalities and the links that they must promote at the state level. An example of these links is the relationship between governance institutions and society which is apparent in state law and state programmes, but becomes an empty phrase because it lacks effective mechanisms, and furthermore, the scope of participation is unclear. The results show the capacities and vulnerabilities of state and municipal government institutions to address climate change.

Monterrey Water Fund Conservation Plan: An Integrated Science-Based Tool for the Water Security Decision-Making Process (1108)

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With a population of over four million, Monterrey, Mexico is located in an area naturally prone to hydro-meteorological events: hurricanes-floods and droughts. The objective of the Monterrey Water Fund (FAMM) is to protect upstream ecosystems, and groundwater infiltration areas to guarantee the quality and quantity of the water supply for Monterrey, while reducing the risk of disaster due to flooding events. The Conservation Plan (CP) offers an action guide and a set of useful tools for decision-making intended to prioritize areas and investments to maintain and increase hydrological ecosystem services (source water protection and flood mitigation). Hydrological, soil and cover models (InVEST, HEC-HMS, RUSLE, TNC Hydrological Calculator, HadGEM2, etc.) were used in a multicriteria analysis to assess the aptitude of the landscape with respect to hydrological performance. The area of influence of the FAMM plays a key role in runoff control and aquifer recharge. It is important to protect it and avoid degradation, through conservation actions to improve soils and vegetation. Results show how protecting ecosystems reduces runoff and erosion and increases replenishment potential. Nevertheless, to achieve maximum flood mitigation, natural and built infrastructure are needed together.

Sustainable River landscapes through nature-based solutions? Contribution from governance approaches (022)

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Nature-based solutions (NbS) are inspired by characteristics and processes from nature and contribute to increase sustainability and resilience in social-ecological systems. The concept is new in science and has to prove of value in comparison to similar concepts used so far like e.g. green or blue infrastructure, ecological engineering or ecosystem-based approaches. In river landscapes, examples for NbS are, amongst others, the restoration of floodplains and wetlands, the creation of marginal strips, the construction of wooden structures and the transformation of arable land into grasslands or forest. NbS can in part replace grey infrastructure, while often delivering a broad spectrum of ecosystem services and being more cost-effective than technical alternatives. Appropriate landscape planning and governance can help creating, planning, and implementing strategies for river restoration and sustainable landscape development, however, it is not explored yet, how. Therefore, the aim of this contribution is to conceptualize how governance approaches could contribute to fulfil requirements of the realization of NbS and to synthesize governance instruments through which NbS could be realized. Our findings are based on the development of a conceptual framework and a systematic literature review on NbS and governance. We discuss which governance principles should be considered in the design and implementation of governance mechanisms for realizing NBS and conclude with some recommendations for further research and practical experimentation for testing governance approaches on NbS.

Ecosystem services-based approaches in Mexican policy-making practice: Chiapas case study (033)

M. Azahara Mesa-Jurado^{1*}, Julia Martin-Ortega², Paula Novo-Nuñez³, Alejandro Espinoza-Tenorio¹, Miguel A. Diaz-Perera⁴, Jeronimo Saragos¹, Ana Garay⁵

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Ecosystem services-based (ES) approaches have attracted attention both at scientific and policy arenas. Instruments such as payments for ES are gaining popularity, with Latin America being at the front run. However, some voices have started raising concerns regarding the negative consequences of mainstreaming this essentially anthropocentric approach to natural resources management and conservation. Natural resources and services" commodification and homogenization of worldviews specifically have been mentioned as possible risks of an economic approach to ecosystem management. While this has been discussed profusely at the theoretical and conceptual level, this has not yet been investigated in depth in a place-based approach. Mexico is following, at least in its legal framework, an ES approach to support decision-making processes and policies. However, it is still unclear how these approaches are being incorporated into policy-making practice and to what extent social and cultural aspects will be reflected on those. This research aims at understanding how the notion of ES is used in Mexican environmental policy-making, especially with regards to the management of water resources, and to what extent the ecosystem services-based approach is associated with increasing degrees of commodification. Drawing on a case study in Chiapas, we explore the integration of ecosystem services-based approaches in policy development at the local level through stakeholder interviews and focus groups. We discuss results in the context of the global trend of mainstreaming Ecosystem Services in the environmental management discourse.

Socio-ecological Resilience on the Western Slope of Colorado, USA: How communities respond and adapt to conflicts over natural resource use (092)

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Land use issues have a significant impact on the social and ecological resiliency of the legacy mining communities in the Western Slope region of Colorado, USA. These communities struggle to find alternative livelihoods while navigating opposing interests from powerful stakeholders such as the tourism and the hydraulic fracking industry. Further complicating the matter is that communities themselves are not homogenous. Some community members' voices are unheard or undervalued, despite evidence that community participation increases the likelihood of more robust natural resource management strategies. Social learning has the power to generate new and shared knowledge, increasing the likelihood of sustainable and collaborative natural resource management in the face of economic uncertainty. Identifying the mechanisms through which social learning and participation occurs is crucial in a time where national policy and local politics often result in polarizing views, with seemingly little room for finding common ground. Through an in-depth case study approach, this study examines how residents of Garfield County, Colorado successfully lobbied for the cancellation 25 drilling leases in the Thompson Divide. Results suggest that watchdog organizations emerge as empowering organizations who can provide a platform for sharing ideas and producing knowledge that was considered credible by both locals and outsiders. In addition, these watchdog organizations despite being viewed by many as agenda driven and biased emerge as

important bridging organizations who not only galvanize community members to engage in single and double-loop learning, but also to translate communities' ideas and values into powerful rhetoric that influences policy-makers at a federal level.

Towards implementation of the ecosystem services concept - An iterative participatory approach (108)

Katja Malmborg^{1*}, Elin Enfors Kautsky¹, Albert Norström¹, Lisen Schultz¹, Sara Andersson¹

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There is a growing recognition by national governments that action to secure the supply of ecosystem services is urgently needed. As part of its overarching environmental policy, Sweden has stipulated that the value of ecosystem services should be generally known in society and integrated in economic and political decisions by 2018. Yet, how this implementation of the ecosystem services concept should be achieved is still not clear. In our study, we work with municipalities, civil society organizations, and public and private businesses in the Helge catchment in southern Sweden to analyze the supply and demand of a range of provisioning, regulating and cultural ecosystem services. Building on the ecosystem service bundles literature, we assess the landscape-level synergies and trade-offs between services using publicly available data. In an iterative process including workshops and interviews, we set the priorities for which ecosystem services would be assessed, discussed the three distinct ecosystem service supply profiles detected, and explored the implications of the clear trade-offs found between provisioning and regulating services. We believe that the iterative participatory process strengthened our analysis in making it more relevant and representative of local decision-makers' understanding of the catchment. We also believe that the workshops became a valuable learning opportunity for both stakeholders and researchers for understanding trade-offs and synergies, both with regards to ecosystem services and between different interest groups. We believe that processes like this can help decision-making that will support long-term sustainability for multiple users.

Uncertainty can help protect the commons in the face of climate change (124)

Caroline Schill^{1*}, Juan Carlos Rocha²

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Climate change is likely to trigger abrupt and potentially persistent changes in the structure and function of tropical marine ecosystems. Such regime shifts can threaten the livelihoods of millions of people reliant on small-scale fisheries. Adaptation is vital for such people to cope with the effects of climate change. Yet, understanding of the individual and collective behavior of fishers whose livelihoods highly depend on marine ecosystems is limited. We focus here on situations in which local collective action is critical to avert or reverse uncertain, yet potentially catastrophic ecosystem change. We conducted field experiments with Colombian small-scale fishers (N= 256) using a dynamic common-pool resource game designed to test the effect of different degrees of scientific uncertainty about climate-induced thresholds in stock dynamics on fishing behavior. We conducted the game in four communities in the Caribbean. We find that groups facing uncertain thresholds are likely to adapt in the sense that they sustain higher stock levels compared to groups that are not confronted with any thresholds. However, catch inequalities in the game, and social and ecological community-level attributes appear to mitigate or even eliminate the effect; illustrating a potentially over-riding influence of community effects in determining game outcomes. Our results suggest a more positive outlook regarding the challenges of climate change compared to previous experimental evidence that suggests a negative relationship between environmental uncertainty and sustainable use of

common resources. Instead we conclude that in certain circumstances uncertainty can help protect the commons in the face of climate change.

The Round table of fisheries multi-level governance: Examples from Mexico's (157)

Alejandro Espinoza-Tenorio^{1*}, José Alberto Zepeda Domínguez², Manuel Zetina Rejón², Mario Vergara Rodarte², Francisco Arreguín Sánchez², Germán Ponce Díaz², Pablo del Monte Luna²

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Fisheries management claims for a scheme that balances the power among government, society and economics; such scheme is called fisheries governance (FG). To develop public policies that facilitates the implementation of FG a general structure of the system needs to be identified. The aim of this study was to identify patterns in the FG's social structure. Through topological analysis we analyzed six small-scale and two industrial Mexican representative fisheries. Based on interviews to key players, topological stakeholder maps were done, centrality was calculated and interpreted as leadership indicator. Results showed that all the formally recognized stakeholders are present, although they play different social roles in each fishery. All the systems showed that federal agencies and producer associations can be considered part of a single group with different companions according the fishery. Depending upon the level of organization into each fishery the local stakeholders (middlemen, boat owners and fishing cooperatives) were more or less important. The most important technical agent were boundary organizations and NGOs involved in fisheries management were more influent than those exclusively involved in environmental protection. State and Local (municipalities) agencies didn't seem to be playing leadership roles in no one case. The round table contains all the guests but some of them can play a more important role and some of them played a more important role than is currently recognized. Also we found this method is useful to identify key players and their interactions, key aspect to achieve FG as generalized scheme.

Illegal fishing under a territorial user rights for fisheries policy in Chile (174)

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Illegal fishing poses a major threat for the conservation of marine resources worldwide. However, there is still limited empirical research that quantifies illegal catch levels. This study uses the Randomized Response Technique to estimate the proportion of divers, and the quantities extracted of illegal "loco" (*Concholepas concholepas*, an endemic gastropod) managed through a Territorial User Rights for Fisheries system (TURFs) in Chile. Results show that illegal fishing is widespread along the TURFs system, with official reported landings accounting for only 14- 31% of the total loco extraction. Quantitative estimates suggest that ignoring the magnitude of illegal fishing and only considering official landings statistics can conduct to serious misleading conclusions about the status and trends of a TURFs managed fishery. We found evidence of unions authorizing their members to poach inside TURFs, highlighting the need to design TURFs system in a way that government and fishers' incentives and objectives are continually adapting to be in line and not at odds. In the same way, government support for enforcement is key for the TURFs system to secure the rights that are in place. This study provides insights on how to improve governance of TURFs in Chile and around the world.

Speedtalk session:

Complex issues of climate, land use and water management

Chair: Jan Kauiper

November 9th 2017 (12:30-14:00)

Room: Dainzu

Presentations:

Socio-ecological dynamics linked to hydrological ecosystem services provision in seasonal-dry forests in southern Mexico (007)

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Socio-environmental systems evolve through time as a product of complex and multiple-scale interaction of socioeconomic, political and biophysical factors. The long-term provision of ecosystem services (ES) depends on these intricate dynamics. The importance of seasonal dry forests for providing a wide array of ES has been historically underestimated, including hydrological ES. Understanding the socio-environmental dynamics of these systems is therefore relevant. The landscape in the Oaxacan portion of the Tehuantepec Isthmus is comprised by a heterogeneous mosaic of land uses, mainly labor lands, human settlements, and seasonal dry forests. We analyzed the influence of a set of socioeconomic factors (1985-2015 land-use/land-cover change, cattle density, income, social marginalization, roads presence, and population distribution), and of biophysical factors (slope, altitude, precipitation, and the distribution of the hydrological network) on the provision of hydrological services. The latter was measured through the reflectance values which indicate land-surface humidity. All variables were made spatially explicit and were analyzed using a stochastic cellular-automata model (SCAM). Agricultural and human-settlements expansion has accelerated during the last two decades, replacing mainly seasonal-dry forests, particularly on lowlands with strong negative effects on the provision of hydrological ES. The SCAM revealed as a robust and efficient method of analysis, that allowed analyzing simultaneously the influence of static and dynamic socio-environmental variables, and developing future scenarios. Given the current change trends in the study area, if ongoing socio-environmental dynamics persist, the model predicts a mid-term reduction of hydrological ES provision.

Combined effects of climate and land use change on the provision of ecosystem services in example regions of the rice agro-ecosystems in Southeast Asia (039)

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Rice is the most common staple food for more than 3.5 billion people and the sustainable production of a sufficient amount of rice is at threat, since climate and land-use change alter the conditions for production. To estimate the changes in rice production and three additional ecosystem services (ESS) provided by rice-producing systems, we make use of the dynamic global vegetation model LPJmL, run under a set of climate and land-use change scenarios. Our study focuses on seven study areas in Southeast Asia - three in the Philippines and four in Vietnam. We developed three site-specific land-use-change scenarios and combined these with two climate-change scenarios. Our results suggest that not all current services can be provided in the same amounts in the future. As a result of synergies and trade-offs between ecosystem services in the study regions, we estimate a decrease in rice yields (-30%), carbon storage (-20%) and carbon sequestration (-12%) until 2099 under current land use pattern. However, the amount of available irrigation water is projected to increase in all scenarios by 10-20%. Moreover, we find that the effects of land-use change may partially offset the negative climate impacts in regions where land-use expansion is possible. In conclusion the sufficient production of rice under future climate change might only be possible by expanding agricultural rice area at the expense of natural vegetation. Our study represents an important step forward in understanding the complex interaction between climate change, land-use change and the effects on four ESS.

Assessing and mapping supply and demand of flood regulation: broadening understanding through a systems perspective (041)

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Although major strides have been made in the quantification of ecosystem services to date, there has been a lack of approaches and information to quantify and map supply and demand of flood regulating services in a linked and useful way. This paper introduces and illustrates an approach to characterize and spatially connect the flood regulating ecosystem service from supply to demand. The approach used includes a resilience perspective in which a people centered priority is adopted which fits the inequality and development challenges experienced by many developing countries. Supply and demand of the flood regulating service was spatially defined using widely available and regularly updated data to ensure that changes in the system can be captured over time. The spatial location of the supply of the flood regulatory service was determined using a risk based model with outputs classified into service providing, connecting and benefitting areas. Demand for flood regulation was estimated by relating the flood hazard to exposure and social and economic resilience of downstream areas. To illustrate how humans shape the demand for regulating services, the approach was applied in two urban watersheds in South Africa. A clear spatial distinction was shown in the demand for flood regulation, with generally low demands in the urban wards, and high demand in the peri-urban wards. The approach allows for disaggregation to explore underlying features, as well as the regular updating of new data to account for the dynamic nature of the social and ecological components of these areas.

Use of short-term territorial scenarios in weather emergencies: a study case in the Bajo Balsas (Mexico) (044)

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Territorial scenarios (TS) are complex constructions about the future that conform useful tools to support the planning, the adaptation and the formulation of public policies. In this research, TS were built to accompany a transdisciplinary process facing a severe drought related to El Niño 2015 in the Bajo Balsas, a marginalized dry region in Mexico. This work discusses the use of TS at short term as a useful tool for the integration of scientific knowledge, the communication and the stimulation of actions of different stakeholders facing weather emergencies. TS were built for the Bajo Balsas when an early alert was announced as soon as scarce rainfalls were detected. They were generated by an inter-disciplinary group and then presented in a multi-actoral space. Four TS were established at short term (one year): With La Niña Phase (LNP) and coordinated actions (S1); without LNP but with coordinated actions (S2), with LNP but without coordinated action (S3); without LNP neither coordinated actions (S4). Possible changes in pre-selected key variables indicated the serious consequences that could appear in S3 and S4. Since the Bajo Balsas is a marginalized territory with water deficit and low incomes, the lack of coordinated actions could reinforce the negative dynamics already presents in the system. In S1 and S2, negative impacts of drought could be mitigated if temporal employment programs and a better community organization for water administration are implemented. In this case, the TS building helped the fast integration of knowledge and eased the communication with multiple stakeholders.

Water scarcity and governance across freshwater Social-Ecological Systems (WaterSES): a Program on Ecosystem Change and Society (PECS) perspective (068)

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Environmental and social change in water-scarce regions across the globe pose significant challenges to the well-being of social-ecological systems (SES). WaterSES is a sponsored working group within the Program for Ecosystem Change and Society that promotes transdisciplinary, place-based comparative research to identify appropriate operational scales for SES stewardship and management. WaterSES aims to understand and compare the social-ecological dynamics of water scarcity across international research sites with conflicting local and regional water needs and governance, including sites in Spain, South Africa, Sweden, China, and Oklahoma, Texas, Alabama and Idaho in the US. WaterSES goals are (1) synthesize data collected across research sites to identify novel and pressing SES science questions, (2) identify data needed to make cross-site comparisons to identify sustainable policy solutions at a range of spatial scales and contexts, (3) target cross-institutional funding opportunities at the national and international level. Here we present and discuss the preliminary results of these goals based on an international WaterSES workshop.

Analyzing scale, quality and diversity of green infrastructure and the provision of Urban Ecosystem Services: A case from Mexico City (073)

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Fostering urban resilience requires a social-ecological systems approach that considers the ecological and social feedbacks of cities. In this paper we argue that Urban Ecosystem Services (UES) could increase urban resilience; and that resilient UES depends directly on the quantity, quality and diversity of the green infrastructure that produces them. The case of the western boundaries of Mexico City is used to map and assess these issues. We classified the different settings of green infrastructure as Service Providing Units (SPUs) and identified their provision of UES through remote sensing techniques; the Normalized Difference Vegetation Index (NDVI) combined with fieldwork verification in two scales of analysis, the local and regional. The results reveal that the vast majority of green infrastructure has low quality, hindering the provision of the UES required for building Mexico City's resilience. At the regional scale, the growing pressures of urban development and the consequent reduction of SPUs threatens the delivery of provisioning ecosystem services while at the local scale, the low quality of SPUs threatens the provision of regulating ecosystem services. We argue that addressing these challenges could improve the design and implementation of environmental decision-making and urban policy towards more resilient urban social-ecological systems.

Ecosystem service supply and use: Links between strategic water source areas and urban water security (093)

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Strategic water source areas (SWSAs) are those areas that have a relatively high natural runoff in the region of interest, which is made accessible for supporting the region's population or economy. These areas can contribute substantially to development needs that are often far away from the source. Water supply was mapped using natural mean annual runoff (MAR) calculated from mean annual precipitation at a 1" x 1" sub-catchment resolution. Areas representing 50% of the MAR for South Africa, Lesotho and Swaziland were highlighted as potential SWSAs based on their water supply. Water use was then assessed for several major urban centers using urban water yields summarized to water supply system scale. The yield originating from SWSAs was calculated by summing the yield of dams and water transfer schemes linked to these areas. Population size of major urban centers for water supply systems were also quantified along with their Gross Value Added (GVA) using the 2011 national population census data. Twenty-two strategic water source areas were identified. Collectively, these areas contribute 50% of the region's water supply from 8% of the land surface area. They support at least 51% of South Africa's population and almost 64% of the country's economy. These areas are vital for water and food security and also provide the water used in generating most of the electricity. Yet they have low levels of formal protection. Mapping the supply and use of provisioning ecosystem services made explicit the connections and benefits of SWSAs to downstream users and economies.

Understanding the social and ecological impacts of biofuel production in rural communities (160)

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Biofuels are being promoted as a global necessity to meet climate change targets through the replacement of fossil fuels. In South Africa, the urgent need to provide jobs to rural communities is a major driver of agricultural development and intensification and biofuel production could provide a means to improve human well-being and decrease poverty. However, our understanding of local social-ecological relationships in rural communities where biofuels are likely to be promoted needs to be better understood. Here, we highlight potential changes to social-ecological systems when agricultural practices shift from small scale farming to large scale farming practices and the introduction of new crops. We draw on lessons from existing biofuel studies in South Africa in Kwa Zulu Natal and the Eastern Cape Province. We discuss the potential shift from "green loop", systems characterized by high direct dependence on local ecosystems, to "red loop" systems, systems where basic needs for food, are supplied from elsewhere. This presentation demonstrates a proactive approach for anticipating likely changes to social-ecological systems and the impacts of habitat transformation on biodiversity and ecosystem service provision (e.g. water use). These lessons are critical to understanding community resilience as the recently developed Atlas for Bioenergy production in South Africa provides an opportunity to increase the growth of this economic sector.

Low phosphorus buffering capacity and long legacies in watersheds threaten water quality (170)

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Phosphorus impairment of surface waters remains a concern worldwide. Given the urgency to better manage landscapes for food production and water quality, it is crucial to increase our understanding of the long term dynamics of P storage and fate in watersheds. Here, we examine the capacity of watersheds to buffer P transfers to surface water and quantify the timescales involved with P legacies. To achieve this, we reconstructed 110 years of P fluxes in 23 watersheds that spanned a large gradient of P enrichment by synthesizing agricultural, urban and water quality datasets. Our analyses suggested that P was preferentially retained within watersheds until a threshold of 2.6 Tonnes P km⁻² was reached. Beyond that point, P transfers to surface water increased drastically. This low threshold of watershed P buffering capacity was exceeded as early as in the 1920's in some of our watersheds. We also show that, with no more P surplus (balanced P inputs and outputs), ~1500-2000 years might be needed to deplete the anthropogenic P stocks that have built during the last century back to a level of low risk for P transfers to surface water. This work clearly demonstrates how rapidly human activities surpass the optimal P retention capacity of watersheds and how long it takes for watersheds to return to this baseline threshold. Hence new strategies to reconcile the trade-offs between food production and water quality around legacy P are urgently needed.

VI. Posters

Poster SESSION 1:

Resilience and adaptation in a changing world, Part 1

November 8th 2017 (17:00-18:30)

Pool Area

Chair: Irene Iniesta Arandia

Posters:

Climate hotspots: Exploring triple win co-benefits towards conservation, wellbeing and adaptation planning (141)

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Climate change hotspots are regions of the world where large numbers of vulnerable people live and where climate change impacts are expected to be high. Generating new forms of knowledge that can support appropriate policy and practice at multiple scales in these regions is critical. This was the motivation behind a seven-year transdisciplinary research project that connects with more than 450 scientists and practitioners in three key climate hotspots across Africa and Asia: in semi-arid regions, delta systems, and glacier-fed river basins. The project, entitled "Collaborative Adaptation Research Initiative in Africa and Asia" (CARIAA) connects insights across 17 countries and more than 45 institutional partners in academia, civil society, government and the private sector. With an ambitious design intended to support collaboration and learning across these networks, countries and knowledge systems, this initiative is generating cross-scale learning from multiple place-based studies. In this paper, we share a meta-synthesis of key findings across hotspot regions to highlight how multifaceted issues around gender and development, human mobility, and water resource management provide entry points to develop not only appropriate place-based adaptation interventions, but also to inform multi-scale governance interventions that connect, as an example, National Adaptation Plans and the Sustainable Development Goals (SDGs) to local places. Moreover, the multiple opportunities to integrate development and human well-being into climate policy discourse provides leverage points to scale-up and scale-out interventions for impact.

The role of ecosystems in driving and supporting transformative adaptation responses (28)

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The effects of climate change and other global anthropogenic and environmental changes are exacerbating the already fragile conditions of several people and ecosystems around the world. In order to deal with these complex changes, there is a growing interest in understanding how to transform social-ecological systems to reduce risks and support resilience. Natural or well-managed ecosystems can overcome changes and continue to deliver multiple ecosystem services that help people adaptation. However, it remains unclear how changes in ecosystems and their management affect climate resilient pathways. We reviewed the literature for studies that described the impacts of climate change (e.g. droughts, floods, changes in species) on social-ecological systems and their responses. We focused on the roles of ecosystems in driving or supporting responses to changes and the factors leading to transformative responses. Among several adaptation strategies, changes in management and uses of ecosystems, such as forest, agriculture, and wetlands, were often reported. Especially people relying on land uses for livelihood adopted transformative responses because natural resources were particularly affected by climate change or were already scarce. Whether ecosystems were part of transformative responses depended on contextual factors (e.g. governance arrangements, actors' values and power, human assets and knowledge). An improved understanding of states and interactions of social-ecological systems and alterations under climate change can help planning forward-looking and regionally suited ecosystem-based interventions. While decisions might be necessary on where preserving ecosystems and where transformations are inevitable, considering ecosystems in adaptation efforts would help to deliver multiple benefits for people and nature.

Changes in the regional stagnation condition after an extreme drought in Mexican dry tropic (60)

Saray Bucio Mendoza^{1*}, Alba María Ortega Gómez², Ana L. Burgos Tornadú¹, Rocío Aguirre¹, Rosaura Páez Bistrain¹

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Exists a condition of stagnation by low productivity in the primary sector and lack of water in the region of Bajo Balsas that is correlated with marginalization, poverty, low value added, inequity, low schooling and low life expectancy. The severe drought caused since 2015 by intense El Niño in this region brought a great pressure on the Socio Ecological System (SES) forced it to reorganize itself. The objective of this work was to analyze the possible changes in the stagnation condition after an extreme drought in the Bajo Balsas region. To do so, it was applied surveys to 200 families from the entire region in three times to evaluate the evolution in some economic indicators like incomes and spending, the implementation of innovations and the relationships of exchange information, under the null hypothesis that the stagnation condition got worse. It was found that the ecological disturb affected severely the family economy because they lost 80% of the harvest, put up with a dramatically reduction of incomes and an increase of expenditures on food and health. Information exchange relationships were strengthened and became better, and the implementation of innovations increased in the management of natural and material resources. This results added to the unfavorable

structural conditions of the region suggests that the stagnation deepened but at the same time, this event motivated the people to organize themselves and look for new ways of doing things, increasing the system resilience for future events.

Resilience to water stress in the Valle de Toluca Socioecological System (100)

Citlalli Aidee Becerril-Tinoco^{1*}

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Problems related to the drinking water supply service in cities are not necessarily caused by water availability or limited water resources. Scholars show that such water problems are also caused by the way in which different institutions, authorities and governing groups are organized to manage, deal and supply the drinking water service. This kind of problems is better known as water stress and is characterized because this is originated by anthropic sources rather than a natural water availability problem within a territory. There is an encountered availability-limited contradiction and it is important to analyze this problem throughout a framework that acknowledge the interaction between sociocultural and biophysical elements. Therefore, this presentation aims to take into account the socioecological systems approach (SSE) to analyze resilience in the Valle de Toluca Region in order to face the problem of water stress in the cities of this region. Three variables were observed in this study to find and face disruptions: connectivity, diversity and feedback. It is important to mention that the Valle de Toluca SSE is located in a groundwater rich area; nevertheless, the region has insufficiency in the drinking water supply service. A theoretical and analytical framework based on the analysis on socioecological systems and the resilience of population might contribute to better comprehend this problem.

Sustainable building materials (134)

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The manufacture of conventional building materials has negative effects on the environment. They consume lots of natural resources and energies. It is therefore necessary to develop and characterize environmentally friendly materials. The use of waste as a raw material is an alternative. In the present study, sugar cane bagasse ash (SCBA), fly ash (FA) and silica fume (SF) were used as a partial Portland Cement (PC) replacement to produce hydraulic concrete and as partial clay (CI) replacement to produce fired bricks. The properties of the concretes in fresh and hardened states were studied. In the fresh state, slump, volumetric weight, air content and temperature were estimated while, in the hardened state, compressive strength was investigated; the plastic properties and properties after firing of bricks were studied. The plastic properties were obtained through the Atterberg consistency limits while, after firing, compressive strength and tensile strength were estimated. All tests were performed according to American Society for Testing and Materials (ASTM) standards. The results indicate that with the combination of 20% CV and 10% SCBC and 70% PC it is possible to develop sustainable concretes and with the combination of 20% CBC, 10% HS and 70% CI it is possible to develop sustainable fired bricks.

Poster SESSION 2: Marine and coastal social-ecological systems

Chair: **Stefan Golcich**

November 8th 2017 (17:00-18:30)
Pool Area

Posters:

DPSIR framework for assessing social-ecological transformation in the Bay of Bengal Large Marine Ecosystem of Bangladesh (1094)

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Using DPSIR (Drivers, Pressures, States, Impacts, and Responses) framework as analytical lens, this study assessed the ecological and social transformation in the Bay of Bengal Large Marine Ecosystem of Bangladesh. To collect empirical data, secondary data were analyzed and interviews were conducted with different stakeholders. In addition, community perceptions were consulted to elicit how different changes are felt and affected the services on which they depend. The findings revealed long-term changes in sea surface temperature, ocean acidification, cyclones and sea-borne depression and fisheries production in the Bay of Bengal Large Marine Ecosystem. These ecological changes coupled with social, demographic and economic drivers in the coastal system of Bangladesh. These changes have negative impacts on the ocean productivity and ecosystem services, on which millions of people depend for their livelihoods. The respondent communities reported the degrading natural environment and decreasing well-being status. As a response, dependent communities put intense pressure for resource exploitation and the existing governance structure has proven largely ineffective in addressing the issue of sustainability. The situation is particularly alarming since it could hamper the government's policy of enhancing blue economy for socio-economic development of the country. Reversing this situation will require transformation in governance structure, one that will focus on restoring ecological diversity through conservation initiatives (e.g. MPAs), and fostering economic diversity given the rapidly changing social-ecological context of the Bay of Bengal Large Marine Ecosystem of Bangladesh.

Shocks and stressors perception in a social-ecological system: Empirical analysis of two coastal communities in Oaxaca, Mexico (32)

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Community resilience is confronted to several shocks and stressors, having different effects in the system. Thus, it is important that households express the main factors affecting their livelihoods in order to assess subsequent effect in the social-ecological systems. Shock is an extreme event of big pressure that is unpredictable and originated outside of the focal system and stressor is a continuous event of gradually cumulative pressure. The aim of this study is to identify natural and socioeconomic shocks and stressors in two rural communities (Escobilla y Ventanilla) in coastal Oaxaca, Mexico. A semi-structured interview was carried out on to 112 households (86%), the questions were made for a period from 2012 to 2016. The interview features the stressors and shocks of the community, their cope strategies and a comparison between them. Results show that the main social shock is the strike of the education sector (2016) and the natural ones are the hurricane (2012) and the swell (2015). The most common natural stressors in both communities were the lack of waste management (Ventanilla 69%, Escobilla 36%) and dryness (Escobilla 51%, Ventanilla 34%). Besides, unemployment in Escobilla (71%) and seasonal employment in Ventanilla (59%) were the socioeconomic stressors that most affect the communities. Hurricane was reported as the biggest shock. An interesting finding is that Escobilla community perceived that stressors affect them more than hurricanes. The analysis suggests that it is possible to distinguish between socioeconomic and natural stressors and shocks, and that they have different effects within the community resilience.

Traders' potential to increase social-ecological fit in a small-scale fisheries fish chain (117)

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In small-scale fisheries, fish buyers (i.e. traders) can play a key role to deal with the social-ecological variability of a multispecies fishery. However, most research has focused on the ability of fishers, within diverse institutional arrangements, to respond to changes for the sustainable management of fisheries resources. Our study aims to understand the role of traders and assess their capacity to deal with ecological interdependencies, as compared to fisher's capacity alone. We developed a network methodology applied to a study case in the Gulf of California, Mexico, to define different social and ecological patterns of interdependencies in terms of social-ecological fit (or lack thereof). Lack of social-ecological (or institutional) fit constitutes a social-ecological trap that impedes fisheries sustainability. This methodology allowed empirically quantifying if and to what extent fishers, traders, and fish species' interactions constituted a desirable level of social-ecological fit. Surveys, interviews and participatory observation were used to map an empirical network consisting on market relationships. The network includes fishing resources, fishers, and traders operating across scales. The network quantitative analysis showed that traders increase social-ecological fit, whereas fishers would be locked in the social-ecological trap. In addition, traders engage in diverse institutional arrangements with fishers and with other traders. We conclude that in certain contexts, traders have a higher potential than fishers to contribute to social-ecological sustainability. The trader's system has a high capacity to deal with changes. Conversely, fishers might be trapped by biophysical, economic and/or cultural constraints, partly mediated by institutional arrangements with traders.

Linking people's knowledge, values and attitudes towards marine ecosystems (182)

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Marine, coastal and ocean development has gained impetus around the globe and in particular along African coastal states. In South Africa Operation Phakisa: Unlocking the blue economy has turned attention towards utilizing marine and maritime resources and at the same time attention is being drawn to building resilience addressing wicked problems e.g. climate change, poverty alleviation and governance structures. A socio-ecological systems framework approach was adopted to explore marine and coastal socio-ecological systems in Algoa Bay, situated in the Eastern Cape, South Africa a Bay with a rich history steeped in culture and diversity (biological and cultural). To understand how people within the Nelson Mandela Bay Municipality value the marine and coastal environment, their knowledge of phytoplankton and services provided, governance knowledge, attitudes towards the future of the socio-environment landscape and value positions that would identify pro-environmental behavior of the communities surveyed. Data was collected using face to face administered questionnaires allowing for both quantitative and qualitative data to be collected. Language was used as a proxy for culture. Attitude towards the future showed a general pessimistic view towards the environment and society. Most viewed the ecosystem as being in crisis, that there will be an increase in power struggles and inequality and that society will transform with a general breakdown in traditional systems. Area and age seemed to be determinants in relation to how the respondents answered the futures questions.

Mismatch in Socio-Ecological Connectivity between two fishing communities in the Midriff Islas Region, Gulf of California, Mexico (65)

Jose Alberto Zepeda Domínguez^{1*}, Adrian Munguía Vega², Mario Antonio Vergara Rodarte¹, Jorge Torre Cosío³, María José Espinosa Romero³, Alvin Suarez Castillo³, Fernanda Perez Alarcon³, Imelda Amador Castro³

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To face the growing overexploitation of marine resources, the integrated management of Socio-Ecological Systems (SES) is pursued. The degree of spatial and/or temporal coupling between the SES components can affect the effectiveness of the marine resources management tools. The goal of this work is to explore the effects on the management of a small scale fishery depending on the level of internal connectivity and the degree of coupling between the SES components. The marine ecosystem of the Midriff Islands Region was interpreted as the resource system and studied by modeling the larval flow; The resource units were the leopard grouper (*Mycteroperca rosacea*) stock, their connectivity was assessed by genetic flow and kinship; The fishermen of different localities were the actors, the kinship and their interactions of communication and leadership gave measures of their connectivity; Coordination among regulatory institutions was used as basis to assess the connectivity of the governance system. Strong ecological connections between the fishing zones of both localities determine a mutual interdependence in the grouper resource. Each fisherman eventually affects fishermen from both communities to varying degrees. Kinship relationships, both from the grouper resource and from the fishermen, are stronger within the smaller community. However, there are weak or non-existent social connections between fishermen from different communities; institutions show little or no coordination. This methodology could improve conservation. The lack of alignment between the subsystems is due to the absence of regulatory institutions that recognize the patterns of socioecological connectivity and their spatiotemporal dynamics.

Governance as a component of a socioecosystem: case studies around ecotourism on the coast of Oaxaca (72)

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Governance is a component that influences the dynamics of relationships that occur in a socioecological system, relationships that are in constant process of feedback and mutual influence. This research tries to understand how the relations between rural communities and governmental and nongovernmental organizations, enhance the governance with respect to an economic activity classified as sustainable: ecotourism. A comparative study was carried out between two rural communities of the Oaxaca coast in Mexican Pacific. Both communities began to organize themselves to carry out ecotourism in similar time and conditions. The methodology used is the social networks analysis, which allows the characterization of relations among communities and other state and non-state actors. The results show that the evolution in the offer of tourist activities is different between the two communities, condition that suggest the consolidation of the ecotourism. In addition, there are social impacts around the community organization that is given to carry out ecotourism. These results allow us to identify the relationships derived from the interactions between the social system and the natural system of a coastal socioecosystem.

Poster SESSION 3:

Co-management and social capital: lessons from around the world

Chair: Tuyeni Mwampamba

November 8th 2017 (17:00-18:30)
Pool Area

Posters:

A bottom-up approach for stream ecological rehabilitation in cooperation with local workers of a social cooperative (Buenos Aires, Argentina): socio-ecological framework and rehabilitation effectiveness (30)

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Participative ecosystem restoration approaches at the urban space usually collide with traditional top-down approaches where the design and execution of the work are done by the governance without local community participation. Here we present an experience (2015-2016) held in cooperation with workers of a social cooperative associated to a National Program from Argentina related to the ecological rehabilitation of an urban stream through the management of the riparian vegetation and the re-introduction of native macrophytes. The aims of the work were 1) to evaluate the socio-ecological framework in which the work is supported, and 2) to assess the effectiveness of the intervention through the use of different biological indicators. The methodology involved a set of participatory action-research tools, semi-structured interviews and a BACI design associated with water and macrophyte sampling at the intervention reach and two controls reaches. The socio-ecological approach evidenced the importance of sanitary and community values of the intervention for the cooperative workers and unfolded the territorial network that could possibly affect the work, particularly the overlapping with another cooperative, and the relationship with local and regional governments. After 3 months, we obtained 30% of survival in transplanted macrophytes, a significant increase in periphytic algal biomass and a turnover of periphytic functional groups, indicative of biological changes at the stream reach; however, we did not detect an effect on nutrient retention. We discuss these results in terms of socio-ecological thresholds, and analyze the strengths and limitations of the co-participative work to overcome socio-ecological traps arising from the socio-territorial context.

Mexican Network of Socio-ecosystems and Sustainability (178)

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The attention of the environmental problematic for the construction of the sustainability requires of the understanding of the complex interactions between ecosystems and society. Understanding socio-ecosystems, those arising from these interactions, is only possible through an inter- and trans-disciplinary perspective, in which there is a close collaboration between members of different sectors, disciplines and institutions. Thematic research networks are platforms that facilitate these cooperation processes. The Mexican Network of Socio-ecosystems and Sustainability (RedSocioecoS) has promoted the close collaboration between academia, decision-makers and civil society organizations, to generate knowledge for the development of sustainable development alternatives that maximize the social and economic well-being of Mexico without detriment on the functioning and biodiversity of its natural systems. In three years of activities, RedSocioecoS has promoted the construction of knowledge with different sectors of society through the development of transdisciplinary meetings and the publication of synthesis products; Has established dialogues with decision-makers to inform the design of public policies and seek joint strategies towards sustainability; Has promoted the development of research and teaching projects; And has facilitated international cooperation through the development of academic events and stays. The presentation of the RedSocioecoS in PECS-II will encourage the establishment of cooperation ties with the participants of the event to strengthen the attention of the socio-ecosystems through the construction of knowledge and its application in the design of public policies.

Collective Action, Cloud Forest Governance and Prospects for Sustainability: The Case of the Montaña Camapara Reserve in Western Honduras (110)

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Cloud forests provide valuable ecosystem services including water provision and carbon sequestration, and frequently shelter high biodiversity. As most are experiencing degradation, it is crucial to understand contexts in which such systems may be governed sustainably. The Montaña Camapara Reserve of western Honduras offers an example of a locally managed cloud forest reserve, which was created through collective action of local water committees that depend on the mountain springs. The forest is threatened by incursions from expanding coffee plantations and subsistence farmers seeking land. Using the Social-Ecological Systems Framework (Ostrom 2009), this study examines the apparent successes and challenges for the reserve's governance and sustainability. The objectives include: (1) identifying key social variables associated with the reserve's formation, (2) identifying biophysical variables and conditions characterizing the reserve, (3) examining the synergies and tradeoffs shaping reserve management and implications for human wellbeing, and (4) assessing the efficacy and limitations of the evolving governance regime for sustaining the reserve and its springs. Methods include interviews with local and regional actors, participant observation of water committee meetings, forest mensuration in the reserve, land use/land cover change analyses, and archival research. Analyses indicate that broad-based collective action built effective coalitions conducive to reserve creation through consensus-building and conflict mediation. Currently, contexts of climatic variability, extreme weather events and market transformations are placing stress on the reserve's existing governance mechanisms and infrastructure for water delivery. The discussion examines local approaches to forest and watershed management, lessons learned, and implications for effective cloud forest governance globally.

Community-based management of wild bird trappers in Mexico (24)

Blanca Roldán-Clara^{1*}, Víctor Manuel Toledo¹

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The use of wild birds as pets has been a historical tradition in Mexico since Prehispanic times and bird trade is still common nowadays. However, it is unknown how management system takes place in locations where birds are trapped. The objective of this presentation is to describe the capture management system in Sierra Madre Oriental where Slate-colored Solitaire (*Myadestes unicolor*) is harvested. We used qualitative research techniques (2013-2016): Ethnographic immersion, participatory observation and semi-structured interviews, in two communities from Puebla and Veracruz. The most important results are that trappers manage the wild bird resource by means of establishment of consensual internal rules that are enforced by following the instructions given by the leaders through self-control behavior and self-vigilance. Members of the community from Puebla apply social sanctions consisting in shaming the offenders by public exposure. Another measure is to exert territorial use rights for preventing use of local birds by foreign trappers. Community only traps birds out of the breeding season and prefer fledgling and first year birds. This community-based management is parallel to governmental regulations that bird trappers also should follow. It would be advantageous that the government recognizes the community-based management bird trappers demonstrate to follow in each step of the bird harvest. Our research for the first time provides a comprehensive description of bird harvest in Mexico showing evidence of local community-based management in places where wild birds are captured.

An implementation framework for social learning in environmental management (53)

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Social learning is a collaborative approach to assist society to cope with complex social-ecological problems. Preconditions and outcomes of social learning are known but implementing the process is often a challenge. A rubric of criteria to assess social learning processes are presented and include processes being interactive; collaborative and co-creative; trust building; transparent; experiential and cyclical; reflexive and flexible. These principles guided the interrogation of two social learning workshops in environmental governance taking place in the Knysna Municipality of South Africa. A content analysis of semi-structured interviews with workshop participants corroborated the inquiry. While similar, the workshops had different outcomes, one resulting in social learning and co creation of solutions, the other leaving participant's malcontent. The criterion helps to understand why demonstrating its usefulness as a framework for monitoring collaborative learning in social ecological systems governance.

Farmer's values from social and ecological landscape attributes: understanding management decisions (109)

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Nature and its benefits are embedded in a plurality of values, understand these values to nature is one of the key aspects of sustainability science and policy. Although it is not yet clear which approaches are useful to understand values in particular contexts. In the search of a more pluralistic valuation of the landscape and the environment we search for farmer's values in a region where the high intrinsic value of the ecosystems has been widely recognized. Also, how can we understand a kind of value from a valuation technique in a broader context and do not fall in to narrow interpretations of the value. We use a choice experiment including the attributes of forest cover, superficial water, terrain slope and type of property. In addition, we include some socio-demographic and management practices questions. We conduct 199 surveys with 6 decision events per survey. The results can be represented in a ranking, in the form of coefficients and in terms of willingness to pay. These different results have various meanings of value. The most important attribute was the provision of superficial water. Also, there were important differences in the valuation by gender and type of community. Some of the elicited values in the form of preferences reflect the maximization of the productive management strategy recognizing the instrumental values of nature while others represent relational and shared values by the community. Consider these differences on values are important for environmental governance and policy design in rural communities.

Poster SESSION 4:

Co-production of knowledge and transdisciplinarity

Chair: **Maria Tengo**

November 8th 2017 (17:00-18:30)
Pool Area

Posters:

Tensions between two models of knowledge-making Convergence (NSF) and Co-production (Future Earth), for the sake of Humanity... and the planet (184)

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Using the conceptual frameworks of epistemology and philosophy of science, we decided to perform a comparison analysis exercise of two current models of knowledge creation, Convergence and Co-production. This poster aims to show the differentiations between these two approaches Convergence and Co-production and discuss how very distinctive models of knowledge co-exist in our socio-economic system, and how different rationales backs them. Through review and analysis on documentary material, mainly academic publications we looked, for the two models in question, at the following aspects: motivation, purpose, paradigms, background, epistemic work/understanding, rationale/logic, main fields, main concepts, perspectives (World, Nature, systems), institutions, methods, modes of scientific knowledge, research model, type of science, speed, development model/type, interests, actors, governance model/type, supporters, approaches (economic, ethical, legal, social, environmental), expected outcomes (economic, ethical, social, environmental), evaluation system, politics, challenges and opportunities. We confirmed that among the different models of knowledge production in the west, the case of Convergence and Co-production, are in some aspects distant with different logics and criteria behind them. Although not the perfect model, since the challenges are vast, we consider that the Co-production of knowledge model, used by Future Earth is a more suitable paradigm if we are to deal with global sustainability, including the recognition of the dependence of humankind on the biosphere and the other forms of knowledge not "scientific".

Sustainability science addresses complex real-world problems by combining scientific and societal bodies of knowledge in heterogeneous project teams. However, having more actors with diverse disciplinary and professional backgrounds in one team, can make communication and integration more difficult. One major challenge is to set up a shared problem understanding to find solutions towards a sustainability transformation. Here, I introduce a novel participatory method based on design prototyping for creating a shared vision and raising the level of integration within transformative place-based research processes. Design is perceived as a discipline that transforms the existing into desirable states and thus becomes transformative. Design creates co-produced artefacts representing coded knowledge; their tangibility provides an alternative to text and spoken words and they level hierarchies, power, and rhetorical abilities. The presented work studies the integrative functions of design artefacts and shows how they can be used as a method within transformative and place-based transdisciplinary processes to set up a shared problem understanding and communicative base for knowledge co-production and transfer. I will explain the method and discuss the experiences I gained in two transdisciplinary real-world case studies in Transylvania/Romania and Lower Saxony/Germany. The proposed design-based method extends the methodological framework for integration and participatory collaboration within transformative processes, by bridging different communicative skills, knowledge cultures, languages and methodological backgrounds. Consequently, the introduced approach facilitates cognitive, communicative, social and technical integration among the involved actors. This designerly approach for co-creating transformative processes actively contributes to solution-oriented, socially robust knowledge, as needed in sustainability sciences.

Community technicians: an essential actor in the co-research to face weather emergencies (54)

Rosaura Páez Bistrain^{1*}, Saray Bucio Mendoza¹, Ana L. Burgos¹, Rocio Aguirre¹, Alba M Ortega Gómez²

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The knowledge society requires the search for new schemes to co-generate reliable knowledge between science and society through different formats and applications in different contexts. In rural communities of dry tropic in Michoacán (Mexico), the figure of Community Technician (CT) was developed and applied as a part of a scientifically based intervention model for rural development. The objective of this work is to assess the figure of CT in the co-generation of data and social appropriation of knowledge, particularly for facing weather emergencies. In 2015, the Bajo Balsas region suffered an agricultural drought related to a high-intensity El Niño event. A methodological framework was applied to a pre-existing network of CTs in 16 communities. Along 17 months, 16 CTs in coordination with an NGO and academics, developed 6 activities: i) implementation of a survey to the recovery of local memory about historical episodes of drought; ii) Self-diagnosis in the 16 communities, iii) a workshop led by technicians to interpret the self-diagnosis and to assess the water risk, iv) design and application of 200 family surveys in three moments after the drought; v) participation in inter-sectorial meetings and, vi) local dissemination of information. The job of the CTs was effective to obtain reliable data and rapid assessment, generate scenarios, establish ways to mitigate the immediate effects of the drought, and to improve the flow of information to communities. The CT must be considered an essential actor to increase the coping capacity to weather emergencies in vulnerable rural territories.

Trust bonds in the practice of transdisciplinary networks. Case of study: pottery in Santa Fe de la Laguna (45)

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Transdisciplinary research acknowledges disagreement can be composed by different features: social, psychological, cultural, politics; it is compelling that the groups and its members could synergistically coexist (Montero, M., 2004) to achieve the construction of diagonal processes of knowledge. In the communities, outsiders are likely no to understand their practices and customs of the inhabitants, resulting in boundaries and barriers between the community members and the external people. These boundaries could turn into something bigger and generate from misunderstandings and divergences, to the dissolution of the groups or the project itself. This is why the emphasis on the strong trust bonds among the members of the groups where we will work with and the crew members. This way we have clear indicators of what they want from us (Harris & Lyon, 2013). As Zucker (1986, in Harris & Lyon, 2013) points, the "process-based" trust is the consequence of an exchange expectation. In the case of study of Santa Fe de la Laguna, taking Maritza Montero's investigation (2004), we worked with enforcement and opening activities, accomplishing: 1) to reduce the uncertainty towards a foreign person, 2) to enhance their commitment to the project, 3) to increase their confidence against external people. This process assures the results become a part of the appropriated culture, not at all imposed; by the means of elements once unknown, they accomplish to use them and decide among them, keeping the essence of transdisciplinary research.

The partaking conditions and inclusive innovation in a transdisciplinary network (97)

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The partaking conditions are fundamentals for the practice of inclusive innovation in transdisciplinarity but in a lot of cases cannot be equal, discussion and argumentation practices are left restricted to whom are found in optimal circumstances to partake such process and knowing the rules, giving priority to certain aspects like type of discourse, ethnic and social economic group (Young, 1988; Cortassa, 2010). Based on these problems we recognize three fundamental lines to achieve the effective partaking were practiced in the transdisciplinary network of pottery in the rural community of Santa Fe de la Laguna, Michoacán, Mexico: The building of dialogue spaces, the interpretation and the mediation. The first refers to opening spaces to generate confidence to express the opinions from all the participants and that their knowledge were taken into account as an important part, relate less of their social or economic condition. The interpretation answers to the incommensurability of languages and standards, the concepts between rural communities, technologists and decision makers which are not shared, as also problems and solutions which they consider right for them. Last but not least, the mediation in the case of values and interests' conflicts, on which the case, strategies based on certain minimum range of satisfaction must be established by the participants based in values and interest of the participants in the network. The main goal of this session is present the conceptual framework and the results and future challenges of this study case.

Uncertainty and Noise in Environmental Networks: communication problems during the enrolment process of the Scolel Te project in Mexico (107)

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This paper analyses a carbon offset project called Scolel Te in Mexico under a network exchange theory approach. This paper tries to understand how exchange relationships emerge in the Scolel Te carbon project under uncertainty conditions which arise because there are communication problems among, and between, local and global actors. This paper shows that given a lack of formal communication channels in the network, local actors engage in informal communications to obtain reliable information about the project. The exchange of information in such informal network can help to clarify doubts, but noise (gossips and rumors) in the network can also amplify fears and spread wrong information. This in turn increases uncertainty around the project and prevents participation. Finally, the paper shows that relational mechanisms can help to reduce uncertainty in the project because it allows the use of personal social ties of key local actors in behalf of the project to ease the formation of trust relationships in the project. Keywords: Network, Environment, Carbon Offset Projects, Communication, Uncertainty.

Moving towards public policy-ready science: a social-ecological systems perspective for conservation and management in Argentina (27)

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Despite efforts in conservation, ecosystems continue to be degraded unabatedly. This fact forces us to reflect once again on the ways humankind relates to nature. There are two extreme stances towards the way conservation is performed (biocentric vs. anthropocentric), with a bunch of greys in between, but we believe it is necessary to overcome the false dichotomy posed by "intrinsic vs. utilitarian" values of nature in order to address new paradigms for conservation. The emergence and development of the social-ecological systems (SES) framework is a huge step towards the paradigm change needed in ecosystems conservation. The framework is based on a comprehensive understanding of how ecological and social components of ecosystems not only interact but interpenetrate each other as a whole. For us, one of the most essential characteristic of SES approach is that it conceives non-scientific and scientific knowledges as equals in the process of management and public policy formation. Adoption of the SES framework must also serve to make decisions about what science would be "public policy-ready", a science (either basic or applied) oriented at providing solutions or responses to societal needs and demands. We believe that decision making under the SES framework must be strongly encouraged in Argentina to attend and solve local social-ecological issues. Keeping this in mind, we present a critical analysis of the potential anchoring of the SES framework in Patagonia, Argentina, towards an environmental public-policy ready science.

Poster SESSION 5:

Ecosystem services in social-ecological systems

November 9th 2017 (17:00-18:30)
Pool Area

Chair: **Sander Jacobs**

Posters:

A Place-Based Investigation of Farmer Conservation the American Southeast: Linking Understanding and Management Intentions for Ecosystem Services (135)

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In contrast to research on the capacity of ecosystems to deliver beneficial services, less work has been conducted on associated social and human dynamics, particularly beyond simple economic valuation. Data are needed on whether or not individuals are aware of ecosystem services and how knowledge, attitudes, and intentions may interact with local efforts to implement management actions. In particular, few studies have examined how farmers perceive the benefits of ecosystem services and what costs they are willing to accept to utilize beneficial practices. The objectives of this study were to 1) evaluate how farmers in South Carolina, USA, conceptualize ecosystem services, 2) assess management practices associated with ecosystems services farmers intend to adopt, and 3) understand disconnects in knowledge, attitudes, and intentions. We used a mixed-methods approach, coupling semi-structured interviews with a stated preference experiment. We found that while most farmers possess a positive environmental attitude and a general understanding of the relationship between nature and agriculture and can articulate some benefits provided by ecosystems, few farmers explicitly described feedbacks or relationships between farm systems and planned and associated biodiversity. We found that farmers favor environmental stewardship with clear intentions to broadly adopt pro-environmental management behaviors; yet attitudes towards ecosystems responses suggests a social heterogeneity in preferences. Lastly, farmers may see little value in compensation for management choices. We surmise that most farmers would quickly adopt practices that enhance ecosystem services with education on mutually beneficial outcomes of managing nature for ecosystem services as well as increased perceived behavioral control.

Integrated evaluation of payment program effects for hydrological environmental services in Ajusco, Mexico City (172)

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This paper presents the results of the evaluation of the implementation effects of the federal program for Payment for Environmental Hydrological Services in Mexico, administered by the National Forestry Commission (CONAFOR) since 2003. The analysis was carried out under the theoretical framework of Capital Community (comprising three capitals: natural, social and financial), for the case study of the community of San Miguel and Santo Tomas Ajusco, located in the Conservation Land of the Mexico City. Methodologically it included the development in five stages (for an international, multidisciplinary and inter-institutional team): (i) compilation and systematization of available information; (ii) social analysis (based on interviews and surveys of key stakeholders); (iii) economic analysis (by environmental economic valuation methods); (iv) natural study (of hydro-climatological aspects); and (v) integration of results. From there, differences and convergences in the perception of the actors were identified, with a general tendency of perceived positive effects; in economic terms the effectiveness of the program was not seen; and in the environmental effects a great potential of providing the hydrological services in this zone was observed. What, considering deforestation scenarios, would require more attention, training, alignment of the public policy instruments in this territory and the implementation of long-term monitoring schemes.

Semi-natural habitats and Green Infrastructures to enhance wild bee populations and pollination services in Mediterranean oilseed crops (51)

Violeta Hevia^{1*}, José A. González¹, Henrique M.V.S. Azevedo-Pereira², Sílvia Castro², João Loureiro², Lucie Mota², Carlos Rad³, Paulo Sousa², Evan Marks³

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Most of the world's crops depend on pollination by bees. There is consistent evidence linking bee community composition with changes in the supply of pollination services and yield in agroecosystems worldwide. In a context of global agricultural intensification, patches of semi-natural habitats within agricultural landscapes might act as reservoirs of bees with positive effects on crop pollination, as these habitats provide food and nesting resources for wild bees. Thus, one of the most current pressing challenges for a sustainable agricultural production is the maintenance of areas with enough food resources and nesting places for bee pollinators within intensive agroecosystems, particularly in crops which are highly dependent on insect pollination, such as oilseed crops. Here, we present the results of a research showing the role of semi-natural habitats on maintaining bee communities, and their effects on seed production in adjacent sunflower fields. Further, we introduce an ongoing project of the European INTERREG-SUDOE program, titled "Pollinator Protection and Ecosystem Services in the SUDOE Region: the role of Green Infrastructure in the Sustainability of Oleaginous Agroecosystems (Poll-Ole-GI)". Within this project, we have designed specialized green infrastructure (GI) composed of a floral mixture of 12 plant species, selected in terms of their seasonal blooming sequence and their provision of nectar and pollen for a wide range of pollinators. Each GI also contained nest boxes designed to attract wild bees. Thus, the project is testing the role of this specialized GI in providing refuge and resources for pollinators, and its effects on oilseed crop production.

Hydrological ecosystem services loss in a fast growing urban area in the west of the Mexico City (103)

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Land use/cover change is one of the main socioecosystems disrupting factors. The rapid expansion of cities produces the loss of hydrological ecosystem services, increasing flood risk and decreasing the water quality and quantity. This study has the objective to explore the consequences on the hydrologic processes of rapid urban expansion and land cover change on rural and forest lands, driven by the development of a buoyant business district in the west of Mexico City. We analyzed the land use/cover change through a supervised classification of SPOT 5 satellite images of 2005, 2010 and 2014. The change in three land use classes: Urban, Agricultural/Bare soil, and Forest was used to assess the impact on the hydrological ecosystem services. Soil erosion was evaluated with the USLE method, and runoff was estimated through the Curve Number method. In nine years, the urban area increased its cover in 13%, and the Forest lost area to Agriculture/Bare soil in the upper lands. This provoked an increase from 38 to 46% in the area with erosion potential of more than 2.47 ton/ha/year. Similarly, this caused an increase from 13% to 18 % in the area that can contribute with more than 50 mm of runoff in the rainy season. The uncontrolled urban growth continues and soon it will cover a major extension of the study area, which will reduce even more the soil capacity to control runoff and erosion, which are the primary causes of flooding and siltation of the water disposal system.

Valuing ecosystems services of maize production in Mexico: the need for an interdisciplinary approach (4)

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The ecosystem services approach is useful, and in some cases necessary, to evaluate the sustainability of management systems such as agricultural, livestock and forest systems. In Mexico, very scarce number of studies have analyzed the ecosystem services of these systems. We have identified and designed a framework to evaluate the ecosystem services of agricultural systems in Mexico. We have focused on maize production in Mexico. The most relevant ecosystem services were identified: production services (1: crop production, 2: nutrition, 3: water), support services (4. soil quality, 5. soil support), regulation services (6. soil fertility, 7. agro-biodiversity, 8. carbon storage, 9. hydrogen cycle) and cultural services (10. family cohesion, 11. cultural heritage, 12. Income). 3 production systems were analyzed based on the size of the farm: small (less than 1.5 ha), medium (5-10 ha) and large (more than 50 ha). Several data sources were used to value each ecosystem services for each system: statistical data from the national survey of agriculture, local case studies and general literature. With our approach, it is possible to integrate the 12 interdisciplinary ecosystem services in one analysis. With it, it is possible to discuss the sustainability of each production system and the trade-offs among them. This is the first study in Mexico to value ecosystem services in agriculture and to scale it up to a national scale. The results give insights for policy and strategy implementations for national food security by including not only production strategies but also social and sustainable solutions.

Ecosystem service importance and vulnerability at rural and agricultural areas and its links to human wellbeing indicators (77)

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Rural areas and agrarian landscapes are the source of most essential ecosystems services demanded by both urban and rural populations; food from farming, forestry, genetic materials, climate regulation, water regulation, pollination, soil fertility, mass stabilization and control of erosion rates, and the preservation of cultural heritage, aesthetic experiences, recreation, or spiritual interactions with nature are some examples. Ecosystem services have a direct and indirect repercussion on human wellbeing enhancing economy, cultural, ethnological, environmental, health or social values. However, rural areas in the context of globalization and urbanized societies are the great forgotten ones. In this study, we conducted a socio-cultural valuation of ecosystem services (with more than 200 face-to-face questionnaires in the period July 2016-May 2017) in the south-east rural region of Madrid (20 municipalities), which is characterized by its agrarian character. We also analyze which are the most vulnerable ecosystem services, the drivers of change behind, and its links to human wellbeing indicators (life satisfaction scale, connectedness to nature, social support perceived). We explore existing trade-offs and how wellbeing indicators are related to different categories of ecosystem services and with different lifestyles.

Distilling the role of ecosystem services in the SDGs (123)

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Achieving prosperity for all while protecting the environment is one of the most pressing global challenges of our time, and a central feature in the globally accepted UN Sustainable Development Goals (SDGs). We argue that managing for ecosystem services, which explicitly recognize the tightly coupled relationship between conservation and well-being, is an essential approach for achieving the broad range of goals embodied in the SDGs. However, the contributions of ecosystem services often remain unquantified and poorly linked to measures of well-being, leading them to be discounted during decision-making. Despite the central role of ecosystems in sustainable development, we currently lack synthesized knowledge clearly articulating where and how ecosystem services contribute to meeting specific SDGs. Here we present the results of a large-scale expert survey of researchers and practitioners on the potential contribution and importance of 16 ecosystem services to SDG targets. Experts judged ecosystem services could make important contributions to achieving at least 43 targets across 12 SDGs. Food and water provisioning, habitat & biodiversity maintenance, and recreation services contributed to the largest number of SDG targets across expert groups. Proper management of these services offers opportunities for synergistic outcomes across multiple SDGs. Differences, however, emerged in the importance of certain services (e.g. raw and genetic material provisioning, nutrient and erosion control) between expert groups. Together these suggest that there is a broad evidence base for considering ecosystem service management in efforts to achieve the SDGs, but highlight a potential mismatch between science and application of ecosystem service knowledge.

Poster SESSION 6: Innovative methodological tools

Chair: **Berta Martin-López**

November 9th 2017 (17:00-18:30)
Pool Area

Posters:

How can we evaluate the Scottish biophysical boundaries? (146)

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The work of Rockstrom et al. (2009) about Planetary Boundaries has been discussed and widened in many directions. One of these is to try to downscale the global boundaries at national level. Our work falls within this context: our aim is to find the boundaries for Scotland. A work in this sense has already begun (Sayers et al., 2014) but it is only a draft, with some uncertainties and gaps. We are trying to develop a methodology that will allow us to improve this model. First of all, we want to find if and in which Scottish environments there can be tipping points that can lead to regime shifts. We are analyzing the Stockholm Resilience Centre Database, which collects all the documented regime shifts, in order to understand which of them are relevant for Scotland. Then, with the help of modelling and Early Warning Signals, we want to see if there are systems close to reach tipping points. The next step is to understand how to choose the best variables and to set the boundaries, in systems which both show and do not show a "tipping point behavior". Works made in other countries (South Africa, Sweden, Switzerland...) can represent useful cues, but the Scottish context and the data availability will be the main constraints. Our work will help to understand how much Scotland contributes to the global framework of the Planetary Boundaries and if Scotland will be able to respect its commitments about the Sustainable Development Goals.

The conservation of biodiversity and ecosystem services is widely cited as one of the most important goals of this century. Protected area (PA) demarcation has become the most widely used and heavily relied upon tool for achieving these goals. Efficacy of PAs has been documented through case studies as achieving both prolific successes and impotent or even detrimental outcomes for conservation. Much speculation about the cause of neutral or negative impacts has been directed towards the failure of PA designs to adequately account for the dynamic aspects of local socio-ecological systems and how PAs affect them. The Western Ghats of India are among the "hottest-spots" of biodiversity on the planet and by that virtue, are internationally recognized as a world heritage site. This project is an extension of a gap analysis of PA networks in the region that uses endemic and threatened species as representative ecological units. By documenting the variety and frequency of human uses within PAs as well as the interactions of peoples with their management, we may begin to understand the feedbacks linking the social systems to the distribution of priority conservation areas. Using a mixed-methods approach, this project regenerated decades of data to produce a fine-scale 1x1 km biodiversity hotspot map and relates that to resource uses spatially. Results are in progress and show signs of revealing patterns in PA management types, vulnerable species distribution, and local peoples' resource uses.

The Accounting Approach of Natural Resource Liability for Defining Payment Scheme

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Natural resources asset balance-sheet is a new concept proposed in 2013 by the scholars and decision makers in China for the ecological civilization construction and sustainable development of China. Defining and accounting the natural resources liabilities are playing the most important role in the processes of compiling natural resources asset balance sheet. It is also an important tool for defining payment scheme for the governments at different levels. Therefore, it is imperative to explore the framework and approaches of natural resources balance sheet for all kinds of natural resources. In this study, we firstly illuminated the basic connotation of natural resources assets and liabilities by illustrating its economic properties, the preconditions of liabilities, and the routes of liabilities induced by overuse of natural resource. On this basis, we defined the categories of natural resources liabilities based on the quantitatively and qualitatively changes of renewable resources and non-renewable resources caused by excessive consumption by human. Finally, we proposed methods for natural resources liabilities accounting including land resources, water resources, forest resources and mineral resources. It is expected that this study could provide some suggestions for compiling the natural resources assets balancing sheet.

The Sustainability Hype: an integrated research and learning tool for complex social-ecological challenges (15)

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Developing and embedding future-oriented methods of knowledge production that embrace a diversity of worldviews, values and preferences are key challenges for sustainability science. Participatory scenario and role-playing activities methods encourage and facilitate the development of increased metacognitive ability, critical thinking skills, reflexivity, adaptive and transdisciplinary learning skills, systems-thinking comprehension, and ability to navigate wicked problems. This paper presents a novel approach to transformational sustainability science research that challenges assumptions and promotes the consideration of alternate perspectives. Building on pedagogical traditions, the Sustainability Hypothetical - or Hype - utilizes scenarios, narrative role-play, and knowledge-sharing to discover and unravel wicked problems. The Hype is a live and interactive panel discussion of a fictional future developed through a series of escalating "pivot points" each applying specific ethical, political, and practical pressures to the unfolding storyline. It is confronting and exposes hidden assumptions and values while also being humorous and engaging. The narrative is shaped by the panelists who are a diverse and transdisciplinary group of experts each assigned a specific roles and audience members who actively participate via digital-media. The experience then forms the basis for a reflective and critical discussion on the legitimacy and effectiveness of decision-making and key compromises made throughout the Hype. This paper provides a template for preparing, designing, and conducting a Hype, and for generating insights from the findings. An example from a post-graduate sustainability science course is used to describe and explain the framework is used here, but the template is designed to be adapted to any situation.

Study on Beijing's Land Change from 1990 to 2016 Supported by GEE Platform and CART Method (85)

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Supported by the Google Earth Engine (GEE) platform, a set of Landsat images from 1990 to 2016 were selected and applied for interpretation. The classification and regression tree method (CART) was then used to extract land information. The spatial pattern of land cover / use in 6 periods were analyzed, some important spatial-temporal changes for cropland, artificial surface, water body and grassland were discussed in depth, and the driven mechanism of land system was explored. The results were shown as: (1) The GEE platform brings together a wealth of long-term satellite data, and has outstanding advantages in data processing at regional and national scales. (2) The CART method supported by GEE can effectively deal with high-dimensional satellite data. The accuracy of 6 periods of land cover products is above 93%. (3) The main land use types in Beijing are cultivated land, woodland and artificial surface. During the period from 1990 to 2016, the artificial surface area increased by about 1371km² with an increase rate of 87%, and the forest area increased by about 1200 km² with an increase rate of 7%, while the cropland area decreased by 2431km² with a decrease rate of 40%. The artificial surface expansion always means the occupation of the arable land. (4) The regional climate change including precipitation, temperature and rainy days had positive effects on the area of water body and grassland, while the population growth, GDP development, macro-economy structure were closely related with the evolution of the artificial and the cropland.

Collaborative mapping around water issues in Andalusia: meaningful open data for inclusive management (84)

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Open government innovations aim at the implication and collaboration of citizens in the management of public goods through innovative technologies and procedures. The purpose of such initiatives is to improve the quality of decision-making. Giving access to information is the necessary condition to guarantee an open and transparent government. That said making data available online is not sufficient to effectively include citizens. It is also necessary that such information be of quality, relevant, up to date and responding to public needs, i.e. in formats that others can reuse. It is to this task that this article seeks to contribute. The paper discusses our experience in collaborative mapping around water related issues in Andalusia, the south of Spain. Indeed, we used digital mapping tools to open up debates and strengthen citizen participation in public policies. The use of such technological tools, allowed us to provide participants with a useful instrument to monitor water conflicts in their living area. Additionally, through the collaborative use of such tools, we created a reflection space for the co-creation of knowledge, which led us to the mapping of debates, initiatives and social movements actions around water management. This paper develops a thematic analysis in which difficulties and strengths of open data and open government in Andalusia are discussed and proposes some ways forward.

Integrating stoichiometric thinking into socio-ecological systems: relationships among ecology, wastewater infrastructure, environmental regulations, and human well-being (120)

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Many of the systems and processes ecologists study are strongly impacted, if not directly modified by, feedback between ecosystem properties and human behavior. Yet, unless researchers are actively pursuing "applied problems", anthropogenic effects are not frequently considered part of natural systems, even if the effects are relatively ubiquitous. Employing a socio-ecological lens and a stoichiometric framework when evaluating the structure and function of urban streams will allow scientists to examine the influence of interactions between ecological and social domains on in-stream processes. Here, I will examine how environmental regulations may influence decisions supporting changes in wastewater infrastructure that dictate the volume and stoichiometry of waste entering lotic ecosystems, and estimate the potential spatial and temporal extent waste has on in-stream communities and ecosystem processes. Applying a stoichiometric approach to the socio-ecological systems governing the world's watersheds will allow researchers and managers to develop element-specific models to understand how the feedback between environmental condition and human decision-making alter rivers and streams and the ecosystem services they provide.

Poster SESSION 7: Social-ecological production systems

Chair: **Antonio Castro**

November 9th 2017 (17:00-18:30)
Pool Area

Posters:

The Socio-ecological system of Mexican oregano: a proposal for sustainable development (152)

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In the sustainable management of natural resources, different ecological, social and economic factors intervene. Understanding the role and importance of these contributes to sustainable development (Kusters et al., 2006). The harvest of Non-Timber Forest Products (NTFP) has been seen as an alternative of conservation and development, since the impact of its use is less than that caused by other forest uses (Arnold and Ruiz-Perez, 2001). Mexican oregano (*Lippia graveolens*) is an NTFP with high commercial value (Huerta, 1997). In the Northwest of Yucatan, Mexico, it is harvested from wild populations during the rainy season (Calvo-Irabien, 2009). The ecological and socioeconomic factors that influence oregano harvest were analyzed. For this, oregano leaf production was estimated in 54 sampling plots. Harvest trips and structured interviews were conducted. In addition, and with the objective of designing a management plan, Multicriteria Analysis Methods, Geographic Information Systems and participatory mapping were incorporated. A production of 86 kg ha⁻¹ of dry leaf was found. In 77% of the households they harvest oregano, the income from this harvest is complementary and represents between 3% and 56% of households' annual income. A management plan for oregano was developed, with areas for harvesting and for regeneration. This plan allows the community to obtain permits for legal marketing, access to fair markets, government support and therefore an increase in the economic benefits derived from this NTFP harvest promoting the sustainable development of the community.

Assessment of Diversification Strategies in Smallholder Coffee Systems of Mexico (86)

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Smallholders growing coffee in Mexico and Nicaragua conserve high levels of biodiversity, yet face persistent food insecurity, which has been exacerbated by the recent outbreak of the coffee leaf rust, droughts and hurricanes (Bacon et al 2014). In response to these multiple hazards and opportunities emerging in the dynamic socio-ecological context, diversification strategies are an option for smallholder coffee producers and cooperatives to respond to these challenges. However, too little is known about which forms of diversification are likely to support smallholder resilience, livelihoods and improved diets. Our three-year, participatory action research (PAR) project aims to analyze how different diversification strategies affect food security, climate change resilience, livelihood performance and gender equity at the household, community and regional scales; and how this relates to the sustainability of coffee-based agrifood systems. Diversification is a major principle within agroecology-based transitions, informing efforts to manage risk, enhance soil fertility, optimize productivity, generate alternative income streams, and improve diets (Kremen et al. 2012). A livelihoods perspective links to specific household assets related to social, financial, cultural, political and natural dimensions, and complements a focus on farm diversification with an examination of links to broader institutions and off farm diversification (Scoones 2009). The first phase of the project will be conducted in June- 2017, consisting of focus groups, interviews, and 150 household surveys with smallholder coffee farmers in Chiapas, Mexico. My paper will present farmer typologies based on the findings of the 1st phase, focusing on socio-ecological aspects that impact farmer households' diversification decisions and outcomes.

Environmental performance of food systems in the Mount Kenya region (161)

Chinwe Ifejika Speranza^{1*}, Stephen Otieno², Horacio Augstburger³, Fabian Ottiger¹, Jackline Wakuyu², Anthony Ogolla², Edwin Ameso², Stellah Mukhovi², Johanna Jacobi³, Theresa Tribaldos³

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Food systems, from their production to consumption, play a critical role in increasing the pressures on natural resources and can affect the environment in various ways, through their resource use intensity, changes on land use and land cover that affect landscape diversity, agroecosystem diversity, and practices that contaminate the environment or practices perceived to cause disease. Food systems thus shape the conditions of natural resources such as soil, water, vegetation and biodiversity. The Mount Kenya region is characterized by highland areas of high natural resources potentials and lowlands with lesser potentials. These potentials are reflected in the industrial irrigated agriculture, large scale farms and ranches, and small-scale, mainly rain-fed agriculture in the region. Using a framework developed for assessing the environmental performance of food systems, we conduct a qualitative assessment of industrial, regional and local food systems in the Mount Kenya region to identify their impacts on ecosystem integrity and human well-being. Generally, small-scale food systems have a lower environmental impact while larger food systems have a higher impact but there are gradients in the types of environmental impacts. Thus between large-scale food systems, scale may be a lesser factor for adverse environmental impacts compared to crop type and their production and environmental requirements. We discuss how national and international governance and regulatory measures address environmental performance in Kenya and explore how a qualitative environmental performance can inform discussions on safe ecological boundaries. Finally, the implications for Kenya for progressing on the sustainable development goals are elaborated.

Agroforestry diversification in two campesino coffee production regions in Veracruz, Mexico (167)

Citlalli López Binnquist^{1*}, Rebeca Menchaca García¹, Odilon Sánchez Sánchez¹, David Moreno Martínez¹

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Agroforestry systems, specifically shaded grown coffee plantations have been recognized for their environmental benefits and their contribution to rural livelihoods. Though coffee price variability and the impact of diseases, Mexican coffee producers have managed to maintain their coffee plantations. However, during the last ten years the fungus (*Hemileia vastatrix*) has expensively affected coffee plantations. We present two cases that demonstrate the ecological importance of shaded coffee plantations and the local based initiatives carried out for maintaining sustainable agroecosystems. Using transdisciplinary approaches and in collaboration with women, men and youth groups we have identified and fostered the management of key cultural and economic species such as orchids, edible plants that grow within coffee plantations and new cultivars such as macadamia and wood trees. The work takes place in the Teocelo region and in the warm zone of the Sierra de Zongolica, in the center of Veracruz State, where coffee production constitutes the larger land use system and the main economic activity. One of the main findings from the theoretical and applied perspective, is the coffee producers' productive diversification strategy as part of their innovative and adaptive capacities, which is the basis of their livelihoods and the permanence of highly diversified agroforestry systems.

The operationalization of forest socio-ecosystem and effects determination of the payment Program for Environmental Services in Mexico in two contexts: peri-urban and rural (173)

Maria Perevochtchikova^{1*}, Sophie Veronique Avila Foucat², Gabriela de la Mora³, Jose Alvaro Hernandez Flores¹, Karla Juliana Rodriguez Robayo⁴

¹El Colegio de México A.C., Centro de Estudios Demográficos, Urbanos y Ambientales; ²Universidad Nacional Autónoma de México, Instituto de Investigaciones Económicas; ³Universidad Nacional Autónoma de México Centro Regional de Investigaciones Multidisciplinarias; ⁴Universidad Nacional Autónoma de México Instituto de Investigaciones Sociales

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The paper presents an exercise of the formalization and operationalization of the analytical framework of Socio-Ecological Systems (SES) proposed by Ostrom (2009), which incorporates Unit and System of Resources, Governance and Actors (with analysis of the first, second and third level variables). It is discussed whether such operationalization is relevant as an input to evaluate the effects of the Environmental Services Payment Program (PES), applied in Mexico since 2003 by the National Forestry Commission, as well as to conduct comparative research in different geographic, socio-economic and political contexts. The case study is carried out on a rural community of San Antonio El Barrio, Oaxaca, and another peri-urban of San Miguel and Santo Tomas Ajusco, Mexico City. It is based on the analysis of surveys and interviews applied in 2015-2016, and to the systematization and processing of available information on various socioeconomic and environmental aspects in the Geographic Information System. All this with the aim of characterizing the contexts and determining the differences in the impacts of the application of the PES program. Preliminary results show a high impact on the household economy, with a strong commitment to the conservation of the community forest, based on strict internal rules, compliance and territorial development in the first case, lacking a positive impact in economic and environmental terms in the second.

Seeing like a system: Exploring the power dimensions of regime shifts in ecosystem management (49)

Marta Berbes-Blazquez^{1*}, Garry Peterson², Martin Bunch³, Peter Mulvihill³, Berna van Wendel de Joode⁴

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The concept of regime shifts, has been used to analyze persistent, substantial reorganizations of social-ecological systems. Power relations and power differentials are key forces influencing processes of change in social-ecological systems but, for the most part, these forces have not been missing in the analysis and identification of drivers, thresholds and impacts of regime shifts. In this article we propose a typology of power and use it to characterize a regime shift from traditional to conventional agriculture in indigenous communities in the Bribri Territory in Costa Rica. Based on interviews with Indigenous farmers and key informants, our analysis reveals how different forms of power interact to establish a feedback loop pushing the advancement of conventional agriculture in the territory. The advancement of conventional agriculture increases the amount of non-Indigenous influences in the territory and it brings a series of health and environmental risks. An understanding of underlying power dynamics helps to identify feedbacks and leverage points that could challenge existing inequalities and improve well-being in Bribri communities. Our typology of power can easily be applied to other cases and should assist in the identification and analysis of social-ecological regime shifts.

Dynamics of global change in the agriculture and food sector: factors influencing a case study in Central Mexico (20)

Martha Bárbara Puente Uribe^{1*}, Leonardo Calzada Peña¹, María Fernanda Figueroa Díaz Escobar¹

¹Universidad Nacional Autónoma de México, Departamento de Ecología y Recursos Naturales

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The conceptual model of "socioecosystems" allows to understand the interaction between a strongly coupled set of components (biotic, abiotic, and social) that are conformed as a system. Also, it allows to understand the many processes of natural ecosystems transformation. One of the most important drivers of change is agriculture expansion for food production that, along with productive practices, lead to various forms of environmental degradation. Nevertheless, according to international organizations, the agricultural sector is fundamental for the development of nations, even when its contribution to the Gross Domestic Product is minor. This work aimed at analyzing the main global socioeconomic factors influencing the national-scale agricultural sector, and how national-scale socio-economic and political factors influence the local agricultural spatial dynamics and decision-making processes. Global socio-economic factors were documented through the analysis of published scientific literature, whereas local factors were investigated through the application of interviews to peasants and government officials working on conservation and agro-productive institutions. Our results allowed us to propose 11 socio-economic factors operating at different scales, that influence the spatial dynamics of agriculture. Also, these factors mediate the decision-making processes of various types of peasants, in different ways. Global/national-scale market dynamics and global/national-scale policies are relevant factors influencing the general trends of the local-level spatial dynamics and practices of agriculture.

Poster SESSION 8:

Resilience and adaptation in a changing world, Part 2

Chair: **Marja Spierenburg**

November 9th 2017 (17:00-18:30)
Pool Area

Posters:

Urban climate change adaptation and nature-based solutions: insights from participatory process in Czech cities (159)

Eliška Krkoška Lorencová^{1*}, Adam Emmer¹, David Vačkář¹

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Cities are complex socio-ecological systems that are particularly vulnerable to the impacts of climate change and also exposed to other trends that increase their vulnerability to climate change, such as urbanization and population aging and the concentration of substantial economic assets within the cities. Nature-based solutions (NBS) have been recently promoted as a useful approach to reduce the adverse impacts of climate change while providing broad range of nature's benefits. NBS approaches can play a significant role in societal adaptation to climate change and may increase resilience of cities. In order to support mainstreaming of adaptation and support of NBS in four Czech cities (Prague, Pilsen, Brno, Litomerice), we aim to integrate both science and stakeholder participation, knowledge co-creation to implement the adaptation strategy into the decision-making processes at local level. Stakeholder participation played a key role in the methodological approach adopted in this study, and provided information, which could feed into all components of climate change vulnerability assessment and feasibility of NBS. Two participatory workshops and a round-table discussion were organized for each case study city, providing invaluable insights. The stakeholder contributions mainly included input for the vulnerability analysis, such as prioritization of climate change-related risks, participatory mapping of vulnerable areas in the city. Moreover, preferences towards NBS were assessed by stakeholders. However, current institutional settings lack legal instruments and incentives to support wider use of NBS in Czech cities.

Socio-spatial analysis of residential water demand in Mexico City (185)

Arturo Ramos Bueno^{1*}, Maria Perevochtchikova², Heejun Chang³

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This paper talks about residential water demand a topic that has been lightly addressed in Mexico City, an urban area facing great challenges concerning water management and sustainability, as its infrastructure is operating under limited and in degraded catchment areas. As the Integrated Urban Water Management paradigm emerged, we consider it a great tool to analyze residential water demand into a sociotechnical system that includes dwelling level, as it is useful to give feedbacks to water utilities and also to state water policy and goals. First, we present residential water demand qualitatively analysis at the delegation level in Mexico City. Second, we selected infrastructure, demographic and socio-economic determinants to explain residential water demand, in raw terms and per capita basis, at the neighborhood scale for the year 2010. We integrated all our information using GIS technology. We performed an ordinary least squares regression, spatial lag, and spatial error models to include the spatial dimension to explain residential water demand. Finally, we present the Local Indicators of Spatial Association analyses to show the spatial relationship between water demand and four determinants explored. The most accurate model was the spatial error with a pseudo-squared R value of 0.46 for raw water demand and 0.63 in a per capita basis, showing residential water demand is related to socio-economic determinants particularly in central and western areas of the city

The role of institutions and property rights on multifunctionality of urban green infrastructure (35)

Edward Ott^{1*}, Diana Hummel¹, Francis Turkelboom², Dieter Mortelmans², Marion Mehring¹

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Urban centers rely heavily on the provisioning of ecosystem services such as e.g. clean water and air regulation, pollination or local climate regulation. Within this frame the importance of Green Infrastructure (GI) is becoming more paramount, since its inherent multifunctionality often proves advantageous over grey infrastructure approaches in delivering ecological, economic and social benefits and in reconnecting fragmented natural and semi-natural areas. However, the strategic planning and implementation of GI require major effort and concerted action on multiple levels, involving several actors and sectors, with often contrasting targets and expectations. This poster contributes to the discussion of what kind of integrated knowledge and governance are needed/required in order to maintain human well-being in urban areas as well as to conserve biodiversity. Institutions are key factors to sustainable development of societies, since they structure human-nature interactions. Especially in urban areas, where social and ecological conditions and requirements are frequently changing, existing institutions are constantly challenged. This creates a dilemma where frictions between institutional stability and adaptability emerge. It is therefore necessary to understand stability and change in institutional settings to develop adaptive institutions for effective GI governance. We aim to shed light on the institutional and governmental setup of GI management in urban areas. Applying a place-based approach, two European urban case study sites will be investigated. We will compare the urban areas of Trondheim (Norway) and Tallinn (Estonia) in regard to property rights (e.g. private, public, common, open access) and associated governance structures.

Exploring the resilience of a socio-ecosystem in Yucatan, Mexico, through a dynamic network model (64)

Luis Guillermo García Jácome^{1*}, Mariana Benítez Keinrad¹, Gabriel Ramos-Fernández², Bárbara Ayala-Orozco³, Martha Bonilla-Moheno⁴, Celene Espadas-Manrique⁵, Eduardo García-Frapolli³, Coral Eloisa Rangel Rivera²

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Resilience is the capacity of a socio-ecosystem (SES) to absorb disturbance while retaining certain properties of its function and structure. Given the large number of components in a SES and the complex interactions among them, network studies of social-ecological networks have provided profound insights into the study of resilience. However, theoretical studies of resilience from the network perspective have focused primarily on analyzing structural features of static networks. Boolean network models provide a qualitative representation of a system that allows the study of its dynamics and feedbacks by the integration of information about its components and interactions. We adopt this modeling approach to study Otoch Ma'ax Yetel Kooch (OMYK), a protected area in the northeastern Yucatan Peninsula that has been studied from the social and ecological perspectives for the past 20 years. We use socioeconomic data, land use and cover change analyses and data on vegetation and animal ecology to characterize the interactions between biological and social factors that constitute this SES. We use these interactions to build a network that describes the dynamics of this SES and then implement the network dynamics using a Boolean network model. We simulate and evaluate the SES behavior in different scenarios and use the model to postulate some variables and processes that have conferred or may confer future resilience to this protected area.

Individual cognitive abilities and group adaptability to changing social and environmental conditions (70)

Jacopo Baggio^{1*}, Lauren Merchant¹, Samantha Nabity², Jacob Freeman², Thomas Coyle³

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Most policy challenges—from persistent inequality to pollution control—revolve around social dilemmas. In this paper we test the effects of individual cognitive abilities on the capability of a group to solve a social dilemma in a social-ecological system (SES). Two cognitive capacities are considered critical for groups to solve complex problems associated with social dilemmas: general intelligence (g) and social intelligence (SI). G is critical to understand how a SES works and find the best strategy to manage resources under conditions of change. SI is critical to maintain social cohesion in spite of change. Theoretically, a mix of G and SI leads to higher group adaptability to change. To assess the relationship between functional intelligence diversity and group adaptability to changing social and ecological conditions in common pool resource dilemmas we conducted a set of behavioral experiments. All else being equal, we expect the likelihood of resource collapse increased and gross resource harvest declined after the perturbation. Groups with high average g scores had a lower rate of resource collapse. Groups with higher average SI were better at cooperating in devising strategies to harvest resources prior to and after the perturbation. More optimal harvest results and the minimization of resource collapse were more likely in groups with a mix of individuals with high g and high SI scores. Our results help us understand the effects of diverse individual cognitive abilities on the resilience of a social-ecological system under conditions of ecological change.

What is the role of culture in transformations towards sustainability in the Anthropocene? (128)

Uno Svedin^{1*}, Maria Tengö¹

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During the last one and a half decade, new framings have emerged about the human condition within a planetary development outlook, around the notion of the Anthropocene. Serious challenges for humanity have been put in the context of a deeply new situation in which humans as a species at global level have turned out to provide the main part of changing planetary conditions in fields like climate change, biodiversity loss etc. In many recent discussions, these challenges dominantly - but not totally - have been dwelling on the natural conditions and impacts. But as heavy and quickly increasing changes at planetary level are perceived with increasing consolidation, attention is rising to causal reasons with origin in human society. Among these, the "cultural aspects" are moving into a more pronounced role. But what are the aspects of these cultural facets of relevance in this regard? We will present ideas on the multiple dimensions of culture, and where and how they emerge in discussions around sustainability and resilience. The talk will address a few candidates within an Anthropocene context e.g. anthropocentric and bio-centric value issues and ethical norms, world views on what constitutes a sound development, what constitutes "a good life for humans", how to envisage a more fair distribution of living conditions. Based on this, we will discuss some potential roles of dimensions of culture in transformation towards sustainability from local to global, and how they may play out in different scenarios for the next fifty to a hundred years.

Climate change adaptation measures in agroecosystems: how to promote adaptation without compromise the provision of ecosystem services? (168)

Bárbara Viguera^{1*}, Francisco Alpizar¹, Milagro Saborío-Rodríguez², Celia A. Harvey³, M. Ruth Martínez-Rodríguez³, Raffaele Vignola⁴

¹CATIE iDEA; ²Universidad de Costa Rica, Escuela de economía; ³Conservation International Climate Change Adaptation in Farming Systems; ⁴CATIE CLADA

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The sustainability and resilience of small-scale agriculture in Mesoamerica relies on ecosystem services. Vice versa, agroecosystems can contribute to the provision of these. In the current context of climate change, the implementation of adaptation measures in agriculture is a priority in the Mesoamerican region. Not all adaptation strategies favor the provision of ecosystem services at the farm and landscape level; adequately targeting adaptation strategies and policies is essential to ensure the provision of long-term ecosystem services. We identify socioeconomic factors determining the decision of small farmers to implement changes in response to the observed changes in climate. Based on an extensive survey of agricultural households, we analyze the decisions of small farmers in three countries (Guatemala, Honduras and Costa Rica) and two typical cropping systems in the region (coffee and basic grains). We performed econometric analyzes considering (i) the decision to implement changes in farm management in response to changes observed in the climate, and (ii) the determining factors of four adaptation alternatives at farm level. Preliminary results show a significant gap between those who perceive changes in climate (94%) and those who implement changes in farms in response to these changes (30 ~ 50%). Conservation strategies are more common in both farm types than crop intensification and technical innovation. A multivariate probit determines which socioeconomic factors can be strengthened to achieve a more resilient agriculture and ensure the provision of ecosystem services. Our study complements the existing literature and contributes to understand the adaptation decisions made by farmers.

VII.

Videos

Video: Gerbera (PV-4)

November 8th 2017 (15:00-17:00)
Room: Dainzu

Organizer: **Maria Schewenius** (maria.schewenius@su.se)¹

¹Stockholm University, Stockholm Resilience Centre

The documentary aims to provide a place-based insight into the growing global issue of inequality between the resource rich and poor, and the vulnerability of the poor, but primarily the impressive resilience, and adaptive and innovative capacity vested in the Gereba community. Together with the simultaneously produced Virtual Reality experience *Voices of the Favela*, Gereba aims to reach groups who are normally not informed on the reality of informal settlements; spur discussions across otherwise segregated groups including departments within the official establishment; and empower the marginalized by letting themselves tell their story, available to a global audience. The poetically presented documentary brings the audience to the favela (informal settlement) of Gereba in Fortaleza, Brazil's fifth largest city. Members of the community, mainly consisting of catadores (waste pickers) living off recycling waste, tell their story. Gereba portrays the complex social-ecological interactions in the favela: the dependency on the same resource that pollutes the living environment, the social exclusion from the affluent centre of the very city whose garbage they recycle, and the degradation of the nearby river, now inadequate for human use. The issues presented in the documentary are shared by many of the more than 328 million people today living in slums. The documentary also shows on the adaptive capacity of the resource poor, who on a daily basis battle the globally emerging challenges such as solid waste management, access to potable water, and supporting a healthy living environment.

Video:

Coffee and honey – Biocultural diversity as a source of resilience in eastern Ethiopia (PV-1)

November 9th 2017 (15:00-17:00)

Room: Dainzu

Organizer: **Viveca Mellegård** (vivi.mellegard@su.se) ¹

¹ Stockholm Resilience Centre, GRAID

There are two main aims of the videos. One is to present a visual story that captures a resilience approach to sustainable development in order to communicate how theories of change play out in the everyday lives of people facing rapid changes. The second is to spark a more general conversation about ways in which film can shape development thinking and decision making. Ethiopia is booming - it has the second largest population in Africa and investments are pouring in to remodel an ancient civilization founded on agriculture into a modern, increasingly urbanized nation. What role can resilience thinking play at this crucial juncture? How can a social-ecological perspective shape the way agriculture and food systems develop? How can film and photography contribute to new approaches to sustainable development? Through stories about a small community of honey harvesters and small scale farmers in a remote forest in eastern Ethiopia, this series of short films flirts with some ways of visualizing the answers to some of these questions.

Video:

The dynamics of land deals in Africa (PV-2)

November 10th 2017 (15:00-16:30)

Room: Dainzu

Organizer: **Yvette Lambrecht** (yvette@substancefilms.co.za)¹

¹Substance Films Producer

The film seeks to examine all aspects of the issue of large-scale land-based investments in Africa. It contemplates both the positive and negative and gives voice to both. The film is looking to create greater awareness about the impact of large-scale land-based investments in Africa. Much academic research has been done on the topic, but this film brings the topic to a wider audience. Looking at several large-scale land deals in Mozambique, Tanzania and Zambia, this extraordinary documentary highlights the nuanced impacts of these investments. Small-scale farmers and producers, national government officials, and African policy-makers unpack the deals, showing that there are winners and losers when providing investors access to large tracts of land in Africa. For example, land deals impact differently on women and youth, and altering land regimes also impacts on access to other natural resources such as water, fish, and local indigenous vegetables. The various case studies discussed in the documentary raise issues that all stakeholders need to consider when making land deals.

VIII.

Pre & Post- Conference Sessions

Transformative adaptation research alliance (TARA) workshop

Chair: Matthew Colloff (Matthew.Colloff@anu.edu.au)¹

¹Australian National University Fenner School of Environment and Society

Facilitators:

Matthew Colloff¹, **Sandra Lavorel**², **Berta Martin-López**³, **Bruno Locatelli**⁴

¹Fenner School for Environment and Society, Australian National University, Canberra, Australia; ²Laboratoire d'Ecologie Alpine, CNRS - Université Grenoble Alpes, France; ³University of Lüneburg, Faculty of Sustainability, Institute of Ethics and Transdisciplinary Sustainability Research, Germany; ⁴Agricultural Research for Development (CIRAD), Center for International Forestry Research (CIFOR), Peru.

OBJECTIVES: This workshop provides an opportunity for existing, new and prospective members of TARA to come together, share their knowledge and learn about experiences of implementing transformative adaptation in a range of contexts, as well as to plan for future research and collaboration.

BACKGROUND: The workshop is proposed and will be organized by the Transformative Adaptation Research Alliance (<https://research.csiro.au/tara/>), an international network of researchers and practitioners dedicated to the development and implementation of novel approaches to transformative adaptation to global change. The workshop is intended to complement the application by TARA for a symposium at PECS II entitled "Putting transformative adaptation into action." Several members of TARA will be attending the conference and presenting their research. **DESIRED PROFILE OF PARTICIPANTS:** TARA members, and prospective new members are undertaking research and practice on transformative adaptation

Creating a typology of collaborative governance: linking case studies from around the world

Chair: Michael Schoon (michael.schoon@asu.edu)¹

¹Arizona State University

Facilitators:

Michael Schoon, Georgina Cundill

¹Arizona State University; ²International Development Research Centre

OBJECTIVES: To explore lessons from around world about what forms of collaboration tend to nurture the emergence of stewardship. To share lessons on different types of collaborative processes. To discover the necessary conditions for achieving successful outcomes across these diverse collaborative processes.

BACKGROUND: When people speak of collaboration, they often aggregate very different types of initiatives. Some may emerge organically; others through litigation; and still others through top-down mandates. These collaborations may take place at a range of scales. The level of collaboration may vary from minimal to joint decision-making. These and other contextual distinctions may result in very different outcomes. This group intends to uncover the conditions in which successful outcomes can be achieved under these various starting conditions. Recent systematic assessments of collaborative governance have shed light on the complexities of collaboration, but they have not explicitly focused on the enablers and barriers in different contexts. All of the workshop participants have engaged with understanding collaboration within individual cases. Our goal is to draw upon these many place-based studies to work (collaboratively) toward improving outcomes by identifying the underpinnings for success across diverse types of collaboration.

DESIRED PROFILE OF PARTICIPANTS: Anyone interested in joining the PECS working group and contributing cases and theoretical insights. In particular, we would be interested in perspectives from Latin America

Promoting socioecosystem and transdisciplinary research on LTER sites

Chairs & Facilitators: Manuel Maass (maass@cieco.unam.mx)¹, Adriana Flores², Agustín Robles³

¹Universidad Nacional Autónoma de México, Instituto de Investigaciones en Ecosistemas y Sustentabilidad; ²Universidad Nacional Autónoma de México, Centro de Investigaciones en Geografía Ambiental; ³Instituto Tecnológico de Sonora

A team of 15 social-ecological and site-based research groups within the ILTER community have been working to develop a coordinated effort to contribute to the understanding of how policies and technologies drive either towards or away from the sustainable delivery of ecosystem services. This effort is based on three tenets: trans-disciplinary research; cross scale interactions and dynamics; and an ecological stewardship orientation. The overarching goal of the collaborative project is to formulate management practices taking into account trade-offs between using and safeguarding ecosystems towards more sustainable solutions. To that end, we have defined a conceptual approach connecting ecosystem integrity, ecosystem services and stakeholder well-being. We propose this approach is key to analyze, understand and deal with the trade-offs among ecosystem services that are intrinsic to many management options. A recently published paper in *Ecology and Society* [21(3):31], within the "PECS special issue", describes the conceptual framework and the strategy we defined for this ILTER/PECS collaboration. It is an open initiative and we would like to take the opportunity to promote it within the PECS community. Our workshop will take place the next morning after the end of II PECS meeting, according to the following program:

Saturday November 11th

09:00 - 09:20 (20 min) "The ILTER/PECS initiative: Changes in biodiversity and trade-offs among ecosystem services, stakeholders and components of well-being" (Manuel Maass et al.).

09:20 - 09:40 (20 min) "Ecosystem Integrity: conceptual development, methods and implementation for environmental change monitoring (Miguel Equihua et al.).

09:40 - 10:00 (20 min) "Ecosystem Integrity and policy coherence for development" (Harlan Koff et al.).

10:00 - 10:20 (20 min) Long-Term Ecosystem Monitoring at ILTER (to be confirmed).

10:20 - 10:35 (15 min) Coffee break

10:35 - 12:00 (85 min) Study case presentations (open to submissions).

12:00 - 13:00 (60 min) Discussion (fostering collaboration with new groups).

Taller de la red mexicana de investigación ecológica de largo plazo (Mex-LTER)

Chairs & Facilitators: **Manuel Maass** (maass@cieco.unam.mx)¹, **Adriana Flores**², **Agustín Robles**³

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La red Mex-LTER está conformada por 11 grupos académicos repartidos en todo el país, comprometidos a realizar investigación ecológica a largo plazo (décadas) y anclados en sitios particulares por su interés ecológico a nivel nacional (*Burgos et al. 2005*). La Mex-LTER forma parte de la red internacional ILTER, conformada por más de 600 grupos académicos distribuidos en los 5 continentes realizando investigación socioecológica de largo plazo con la misión de “mejorar el entendimiento del ecosistema global y de informar soluciones a los actuales y futuros problemas ambientales”. La Mex-LTER se conformó en el 2004 y en los últimos años se ha estado promoviendo la incorporación de un enfoque más socio-ambiental en sus grupos académico. Este interés se alinea a una tendencia internacional a migrar de una investigación “ecológica” (LTER), a una investigación de corte “socio-ecosistémica” (LTSE). El taller tiene por objetivo reunir a los miembros de la Mex-LTER interesados en empujar esta línea de investigación en sus grupos académicos. En particular, lo que se busca es fomentar la participación de los grupos mexicanos en la iniciativa lanzada por la red ILTER para realizar un proyecto de colaboración que ayude a formular prácticas de manejo de tomando en cuenta las disyuntivas que surgen al intentar usar y conservar los ecosistemas de manera sustentable (*Maass et al. 2015*). El taller, aunque dirigido a los miembros de la Mex-LTER, está abierto a investigadores que estén interesados en conocer más de cerca los esfuerzos de la red por hacer una investigación más transdisciplinaria y de corte socioecosistémico. El taller se llevará a cabo el sábado por la tarde siguiendo el siguiente programa:

Se espera que los miembros de la Mex-LTER que participen en este taller, hayan asistido al taller previo (ILTER/PECS) celebrado durante la mañana del mismo día.

Taller de monitoreo socioecológico de largo plazo de la Red de Socioecosistemas y Sustentabilidad"

Chairs & Facilitators: Manuel Maass (maass@cieco.unam.mx)¹, Adriana Flores², Agustín Robles³

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La manera como se manejan y gestionan (usan, conservan, restauran) los ecosistemas, sus recursos y los servicios que brindan a la sociedad, no sólo varía dependiendo del tipo particular de ecosistemas de que se trata (bosque, selva, arrecife, pastizal, laguna costera etc.) sino también de la historia y experiencia que sus pobladores han adquirido a través de cientos, y en ocasiones, miles de años de interacción con su ambiente natural. Durante décadas, y en ocasiones siglos, los pobladores transforman e intervienen en los procesos naturales de los ecosistemas, mediante estrategias de manejo que sintonizan conforme van aprendiendo sobre la manera como los ecosistemas responden al manejo. Se trata de un proceso de co-evolución adaptativa humano-ambiental que ha conformado socioecosistemas que funcionan como un todo integrado. La diversidad biológica y la diversidad cultural van de la mano, y en México se ha generado una enorme diversidad de socioecosistema. Sistematizar esta diversidad de socioecosistemas y documentar, a largo plazo, su dinámica funcional integrada, no sólo permite conocer mejor la manera como se da este proceso de manejo adaptativo, sino que además permite identificar los factores claves que promueven el manejo sustentable de ecosistemas, sus recursos y los servicios que brindan. El taller tiene como objetivo diseñar y conformar una red de monitoreo de largo plazo de procesos y variables de corte socio-ambiental claves en el entendimiento de la dinámica de los socioecosistemas en México. La idea es reunir a académicos interesados en estos temas con el objetivo de identificar variables de interés común y acordar protocolos para un monitoreo sintonizado y conjunto. La convocatoria, lanzada en el marco de los trabajos de la red temática de CONACYT sobre Socioecosistemas y Sustentabilidad, está abierta a cualquier investigador de ciencias sociales o naturales interesados en participar en la conformación de la red de monitoreo socioecosistémico de largo plazo. El taller se llevará a cabo el lunes 13 de noviembre.

Net-Map – Una herramienta para el análisis de redes sociales

Chairs: **Barbara Schroeter** (Barbara.Schroeter@zalf.de)¹, **Adriana Aguilar**²

¹Leibniz-Centre for Agricultural Landscape Research (ZALF) Institute of Socio-Economics, ²CentroGeo PIU

En este taller introducimos el método *Net-Map* bajo el fondo de nuestra experiencia en un proyecto comunitario para la conservación de manglares en Costa Rica. Luego vamos a practicar como componer la guía de preguntas para la entrevista y simular una situación de entrevista *Net-Map* real. La aplicación de instrumentos políticos para la protección de los Servicios Ecosistémicos implica ciertos desafíos: ¿Cómo se pueden analizar, desarrollar e implementar estos instrumentos? ¿Cómo se mejora la motivación de los actores relevantes? ¿Cómo se logra la participación comunitaria que según la ciencia es prometedora? ¿Y cómo se logra construir un conocimiento conjunto y co-aprendizaje entre diversos actores sociales? Una herramienta para afrontar estos desafíos es el método *Net-Map*. *Net-Map* es una forma de Análisis Social de Redes participativa con la cual se analizan actores y sus redes. Se trata de una combinación de entrevistas cualitativas y mapeo participativo. Durante la entrevista el entrevistado está dibujando la red de los actores relevantes, anota sus motivaciones y evalúa la influencia de los actores con torres de influencia. El método permite un intercambio de información bidireccional, discutir los resultados a la vez, fomentar aprendizaje mutua y motiva a los participantes.

A closer look at co-production: what works, when, where and how?

Chairs: Melanie Ryan (mr688@cam.ac.uk)¹

¹Luc Hoffmann Institute

OBJECTIVES: The workshop aims to develop guiding principles for knowledge co-production. We will bring together people situated across the science policy practice interface (researchers, practitioners, policy etc) who have been involved in knowledge co-production projects to critically examine specific case studies to understand the conditions under which these initiatives have led to demonstrable societal outcomes. Specific objectives of the workshop are to: Identify lessons from the experience of practitioners of knowledge co-production. Identify and establish principles to guide future co-produced research. Provide the foundation and information necessary to produce academic and practice oriented publications/resources on the principles of co-production.

BACKGROUND: More than two decades of experience illustrate the value of collaborative approaches, underpinned by equitable distribution of power and authority, in managing social-ecological systems (e.g. Ostrom 1990, Berkes et al. 2003, Jasanoff and Wynne 1998). Building on these findings, the scientific community is increasingly turning to "knowledge co-production" (drawing on participatory action research, transdisciplinary research, science and technology studies and sustainability science) to build connections between knowledge production and decision-making (Mauser et al. 2013). Significant value has been placed on co-production, assuming that these collaborations will address complex challenges (Voorberg et al. 2015, van Enst et al. 2014, Langer et al. 2016). Despite growing calls for knowledge co-production, theory and practice remain fragmented across sectors and disciplines. This workshop will contribute to the development of a coherent empirical base to identify the capacities and principles to enable knowledge co-production that contributes to lasting sustainable development outcomes.

Evaluación y mapeo de servicios ecosistémicos y vulnerabilidad socio-ecológica para el ordenamiento territorial. Aplicación del protocolo ECOSER.

Chairs: **Pedro Laterra** (pedro.laterra@conicet.gov.ar)¹

¹Fundación Bariloche

Este curso tiene como fin último promover una visión crítica del enfoque de conservación basado en servicios ecosistémicos (SE), así como de sus herramientas y de sus principales instrumentos para su internalización en la toma de decisiones, haciendo especial énfasis en la aplicación de un protocolo colaborativo de evaluación y mapeo de servicios ecosistémicos y vulnerabilidad socio-ecológica para el ordenamiento territorial (ECO-SER, www.eco-ser.com.ar).

ANTECEDENTES: Existe un cúmulo de aproximaciones metodológicas para la evaluación y mapeo de servicios ecosistémicos (SE) de difícil utilización directa para la toma de decisiones a distintas escalas en los que raramente se considera la susceptibilidad de las dimensiones ecológicas y sociales frente a escenarios alternativos de usos de la tierra y del clima. Este curso se focalizará en el análisis espacialmente explícito de funciones y servicios ecosistémicos, su interacción y su captura por la sociedad, así como la vulnerabilidad socio-ecológica bajo distintos escenarios de pérdida de SE mediante la aplicación de la herramienta colaborativa ECO-SER. Actualmente, el sitio web de ECO-SER (ECO-SER, www.eco-ser.com.ar) cuenta con más de 200 usuarios registrados y existen varias aplicaciones del protocolo en distintos países de Latinoamérica.

Two-day multi-actor dialogue workshop on biocultural diversity and resilience of social-ecological systems

Chairs: **Juliana Merçon** (julianamercon@gmail.com)¹, **Julieta Rosell**², **Bárbara Ayala-Orozco**³, **Patricia Balvanera**³

¹Universidad Veracruzana; ²Universidad Nacional Autónoma de México, Instituto de Ecología; ³Universidad Nacional Autónoma de México, Instituto de Investigaciones en Ecosistemas y Sustentabilidad

Facilitators:

Juliana Merçon¹, **Julieta Rosell**², **Bárbara Ayala-Orozco**³, **Gerardo Alatorre**¹, **Isabel Bueno**⁴, **Loni Hensler**⁵

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OBJECTIVES: Discuss the role of biocultural diversity in the resilience of social-ecological systems through a collaborative learning approach. Foster knowledge generation through the dialogue and cross-fertilization among different actors (scientists, practitioners, local communities, and policy makers), cultures and ways of knowing. Assess how different perspectives and knowledge systems, practices, and institutions contribute towards the resilience of social-ecological systems (past, present, future). Weave networks across scales (local, regional, international) and sectors (academia, civil society organizations, local, indigenous and peasant groups, and government) related to the maintenance of biocultural diversity.

BACKGROUND: In a world of accelerated environmental change, biocultural diversity plays a key role in maintaining the resilience of social-ecological systems. Biocultural diversity includes the diversity of life, human cultures, and languages (Maffi 2005), and emerges from the close interactions among biological and cultural diversity. Communities who depend directly on natural resources have developed practices, institutions, and knowledge to adapt to social and environmental changes (Folke et al. 2003); and many of these communities hold precious knowledge of how biological and cultural diversity can enhance the ability of societies to cope with present and future global changes (Toledo 2003, Ruiz-Mallén and Corbera 2013). Considering the opportunities that can emerge from collaborative learning among practitioners from indigenous and non-indigenous communities, scientists and policy makers, this multi-actor initiative intends to contribute to increasing awareness about the links between cultural and biological diversity, as well as fostering good governance for social-ecological systems.

Workshop on "nature's values: from diverse conceptualizations to practical application"

Chair: Unai Pascual (unai.pascual@bc3research.org)¹

¹Basque Centre for Climate Change (BC3) Climate and Natural Environment

Facilitators:

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OBJECTIVES: The aim of the workshop is to develop a research proposal on the diverse conceptualizations of nature and its values as a joint effort between EcoServices and PECS, two of the Future Earth programmes, IPBES (The intergovernmental Platform on Biodiversity and Ecosystem Services), GIZ (the German Cooperation Agency) and Swedbio (a knowledge interface on resilience based at the Stockholm resilience Centre. This proposal will feed into the Natural Assets Knowledge Action Network of Future earth.

BACKGROUND: Natural assets are perceived and valued in starkly different and often conflicting ways. Initiatives at the knowledge-policy interface require a pluralistic approach to recognizing the diversity of values of nature. Practical implementations of novel valuation approaches where values across stakeholders may be hard to compare on the same yardstick are urgently needed. Better understanding ways towards bridging incommensurable values relative to nature conservation, social-ecological resilience and equity, and ways of achieving sustainable development goals within planetary boundaries are needed. This vision on valuation of natural assets also require recognizing and addressing power relationships across stakeholder groups that hold different value systems on human nature-relations. Since the 1992 Rio Summit, various scientific lenses have strived to enhance the understanding of values of natural assets, but mostly from a unidimensional perspective, e.g., with an economic or ecological value lens. The workshop is for invited participants only.

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