



BOOK OF ABSTRACT

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I. SESSION DESCRIPTION

ID: T5a

Title of session:

Participatory Modeling for ES assessment

Hosts:

	Title	Name	Organisation	E-mail
Host:	Prof.	Paulo Sinisgalli	University of Sao Paulo	psinisgalli@usp.br
		Bruno Meirelles	University of São Paulo	bruno.meirelles@usp.br
Co-host (s):		Iuri Amazonas, Vitor Zanetti	University of Sao Paulo and Technological Institute of Aeronautic	iuriamazonas@gmail.com ; vitorz@gmail.com

Abstract:

Participatory modelling (PM) is undergoing a process of maturation and the growing diversity of researchers in the field has led to divergent perspectives on the concepts and goals of both participation and modelling. Initially addressed to business administration issues, the field of modelling have been gradually incorporated to environmental studies and recently to the assessment of Ecosystem Services. However, the uncertainty, complexity and uniqueness of small-scale ecosystems increase the challenges of building models that represent ecosystem processes and have a friendly-user outputs. To face these challenges, several methods such as Collaborative Learning, Cognitive Mapping, Group Modelling Building were established to endeavour participation of different stakeholders in data gathering, methodology, discussion and communication of results. At this universe of methods, PM is considered a generic term characterized by stakeholders involvement in modeling efforts or decision-making processes involving stakeholders that uses modelling tools. Possible advantages of having different stakeholders participating are the increasing in transparency and consequently in trustness by



those involved; the expansion of inputs by using local knowledge and various mental models; and the augment of achieving of consensus of convergent values related to the use or preservation of resources. The session will focus on case studies or methodological development which provides a link with scientists and stakeholders to improve the understanding of the role of ecosystems services and guide decisions using different modelling approaches.

Goals and objectives of the session:

The session aims to debate the advances and challenges to increase participation in the assessment of Ecosystem Services and how different modeling approaches have evolved to link scientific and non-scientific knowledge.

Planned output / Deliverables:

A framework of cases studies, bibliographical reviews or methodological analysis addressing how participation have evolved in the field of ES assessment by the use of modeling techniques.

Related to ESP Working Group/National Network:

[Thematic working group- TWG 5 - Modeling ES](#)

II. SESSION PROGRAM

Date of session: Thursday, 25 October 2018

Time of session: 10:30-12:10

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
10:30-10:40	Iuri	Amazonas	Universidade de São Paulo	Planning with young farmers: a participatory modeling approach as a tool to promote agroecosystems in family farming.
10:40-10:50	Rita Cássia Santos	de Souza	Universidade Federal Rural do Rio de Janeiro	Participatory Environmental Diagnosis as a tool to evaluate the provision of ecosystem services in urban areas - case study in Angra dos Reis - RJ



Time	First name	Surname	Organization	Title of presentation
10:50-11:00	Lucia	Almeida	Universidad Nacional Autónoma de México	Evaluation of Ecosystem services by participatory methodologies in Conservation Soil of Mexico City
11:00-11:10	Cristobal	Jullian	Universidad Austral de Chile	Patterns of ecosystem services supply across farm properties: Implications for ecosystem services-based policy incentives
11:10-11:20	Bruno	Meirelles	University of São Paulo	Ecosystem based management model for coastal areas using MIMES.
11:20-11:30	Demerval Aparecido	Gonçalves	Technological Institute of Aeronautics	Land cover changes forecasting and inferences on the ecosystem services in the North Coast of São Paulo State
11:30-11:40	Vivian	Ochoa	Instituto Alexander von Humboldt	Sinergias y conflictos espaciales entre la conectividad del paisaje y los servicios ecosistémicos en el área del cañón del río Cauca
11:40-11:50	Albaluz Ramos	Franco	Universidad Pedagógica y Tecnológica de Colombia	Acuerdos en el cambio de uso del suelo para la provisión de agua en 4 municipios de Boyacá, Colombia
11:50-12:00	Clarita	Bustamante	Instituto de Investigación de Recursos Biológicos Alexander von Humboldt	Sensibilidad socioambiental de los paisajes colombianos al turismo de naturaleza

III. ABSTRACTS

The abstracts appear in alphabetic order based on the last name of the first author. The first author is the presenting author unless indicated otherwise.



1. *Type of submission:* **Abstract**

T. Thematic Working Group sessions: T5 Ecosystem Services Modelling: participatory and decision making process

Evaluation of Ecosystem services by participatory methodologies in Conservation Soil of Mexico City

First author(s): Lucia Almeida, Julieta Jujnovsky

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Cities depend on surrounding ecosystems to satisfy their population necessities, it is the case of Mexico City, which has 87,297 ha of forest and farming areas, under social property, known as Conservation Soil of Mexico City (SC-CDMX). Despite its importance, due to the biodiversity and ecosystem services it provides, the SC-CDMX is constantly threatened by the land use change, irregular urban sprawl, illegal logging, induced fires and soil lost. Owing to this problem and the necessity of a long term conservation of the ecosystem services the SC-CDMX provides, the Environment Secretary of Mexico City has created an instrument for its protection, conservation and restoration: "The Retribution Program for the Conservation of Ecosystem Services", that considers the rural communities as key actors in conservation. In order to this, there have been established Community Ecological Reserves. With the objective of evaluate the water infiltration, carbon storage and biodiversity maintenance in this areas, participatory methodologies have been developed. These methodologies were designed in a way that the local actors, with no academic formation, can co-generate field data on the ecosystem services state with simple tests. The application of the methodologies needs an adaptation period, in which the local actors will learn how to apply them, so modifications can be made if necessary. Although, when the adaptation period passes, this will provide the rural communities a tool that allows them to evaluate periodically this ecosystem services that are generating in their reserves as well as a tool of environmental management of their territory.

Keywords: land use change, irregular urban sprawl, environmental management, Conservation Soil of Mexico City



2. Type of submission: **Abstract**

T. Thematic Working Group sessions: T5 Ecosystem Services Modelling: participatory and decision making process

Planning with young farmers: a participatory modeling approach as a tool to promote agroecosystems in family farming

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A transition to agroecology is being implemented in Santa Rosa de Lima–SC–Brazil, aiming to improve socio–environmental aspects of family farming, mainly involved with organic dairy production. Within this movement there is an effort to empower young farmers and to encourage more environmentally friendly practices, also to diversify their activities and raise the incomes of small farmers. The work presents a participatory modeling approach carried out with young children of farmers, through the construction of causal looping diagrams that represent their reality. To better illustrate, it presents the results of the workshop with these young farmers, and the model created based on these results. The model simulates the dynamics of a local property, aiming at understanding how the implementation of agroecological techniques in the properties of family farming changes its dynamics. In our view, the process of creating a model that represents the reality of a community and helps to deepen the understanding of its complexity begins with the involvement of the community, in as many steps as possible, during the model development. Engaging stakeholders reveals some ideas about the context and system being modeled that only the local community can provide. We conclude reinforcing the role of youth in family succession and the management of agricultural properties in Brazil and the need for their inclusion in decision–making processes. Due to the dynamism, mastery of the new communication tools and medium–long–term planning capacity, the promotion of social learning activities with youth demands the construction of bottom–up initiatives aimed at community empowerment that deal with local issues such as the management of hydrographic basins, scaling up to global issues, as climate changes.

Keywords: agroforestry, Voisin Silvipastoril, social learning, socioecological systems, system thinking.



3. Type of submission: **Abstract**

T. Thematic Working Group sessions: T5 Ecosystem Services Modelling: participatory and decision making process

Sensibilidad socioambiental de los paisajes colombianos al turismo de naturaleza

First authors(s): Clarita Bustamante, Johan Manuel Redondo

Other author(s): Olga Lucía Hernández, Aída Giraldo, Adriana Arcos, Diego José Rubiano, Freddy Ochoa, Alejandra Osejo, Talía Waldrón, Emerson Pastás, Diana Morales, Constanza Olaya, Florina Jacobs, Leonardo Garavito, Natalia Atuesta,

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A causa de su diversidad biológica, Colombia es reconocida internacionalmente por su elevado potencial en atractivos naturales. Actualmente, tanto el estado, como la cooperación internacional, financian Programas y Proyectos con enfoque territorial que pueden potenciar el turismo de naturaleza como alternativa sostenible y competitiva para los territorios, como aporte fundamental a la generación de alternativas sostenibles y a la construcción de la paz.

Este escenario demanda análisis que permitan el desarrollo económico desde el ámbito rural y desde la riqueza en recursos naturales que posee el país, para generar productos turísticos de naturaleza, que se rijan por principios de sostenibilidad e inclusión social, basados en la comprensión de la compleja red de intercambio y de conexión de las comunidades locales, con el territorio.

En este trabajo se desarrolló una metodología de análisis sistémico que desde: a) La identificación de la presencia en el territorio colombiano de criterios y variables asociadas a las dimensiones biológica, física, de estructura social y cultural, a escala 1:100.000 mediante el uso de fuentes de información secundaria con que cuenta el país, b) El análisis de los condicionamientos socioecológicos del territorio y c) La construcción, a partir de talleres con expertos, de las redes de implicaciones en la que se consideran los impactos directos, las consecuencias indirectas y



los efectos acumulativos (aditivos y sinérgicos) de la implementación del turismo de naturaleza, se identifican zonas potenciales para su desarrollo comunitario y empresarial.

Entre los resultados preliminares obtenidos se presentan áreas potenciales identificadas, así como el análisis de la red compleja de implicaciones, de manera que, se hacen explícitas las prioridades, las tipologías y los lineamientos de gestión, asociados a zonas y características específicas del territorio colombiano para la implementación de proyectos de turismo de naturaleza, así como las consecuencias potenciales de estos sobre los sistemas socioecológicos.

Keywords: Turismo de Naturaleza, dimensiones, redes de implicaciones, análisis de sensibilidad socioambiental, potencialidad

4. *Type of submission:* **Abstract**

[T. Thematic Working Group sessions: T5 Ecosystem Services Modelling: participatory and decision making process](#)

Participatory Environmental Diagnosis as a tool to evaluate the provision of ecosystem services in urban areas – case study in Angra dos Reis, RJ

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This study is developed in Bracuí, Angra dos Reis, south coast of the Rio de Janeiro State. The region has an intense occupation dynamics that involves the appropriation of extensive coastal areas by the real estate capital, invasions, constructions in preservation areas and landfill on mangrove. In this context, a neighborhood called Itinga emerged, as the result of a process of invasion and squatter started in the 70's, under a settlement approved in 1954, but only partially implemented. Currently, the community lacks public services and is still exposed to all kinds of urban and environmental risks. In face of this, a Participatory Environmental Diagnosis (PED) was



carried out in 2016, which involved bibliographical surveys, interviews, records and field trips, where ecosystemic data, potentialities and conflicts were collected. This work aims to verify the potential of the PED to evaluate the provision of ecosystem services in the area and also to subsidize mechanisms for valuation of those services. Among the results, we highlight the species lists; the presence of endemic species, such as black-hooded antwren (*Formicivora erythronotos*); the presence of crops in the households; the refuge sites favored by natural pools (which contribute to hydrodinamism); and the identification of priority areas for conservation. There are also cultural aspects such as the correlation with Quilombo Santa Rita do Bracuí, evidenced by historical references, traditional knowledge and family kinship. The main problems identified were sewage pollution and deforestation. These results suggest a potential linkage between DEP and the identification of ecosystem services provision, as well as their degradation. Future steps includes the selection of indicators to characterize the services in order to generate an ecosystem assessment methodology in urban and peri-urban areas. Thus, it will be possible to contribute to define strategies for the land use/natural resources planning and management in these areas.

Keywords: Ecosystem services, participation, environmental diagnosis, management of land use, urban areas

5. *Type of submission:* **Abstract**

[T. Thematic Working Group sessions: T5 Ecosystem Services Modelling: participatory and decision making process](#)

Acuerdos en el cambio de uso del suelo para la provisión de agua en 4 municipios de Boyacá, Colombia

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La gobernanza del territorio requiere una constante comunicación entre los actores sociales que efectúan los cambios del uso del suelo y los gobernantes que administran dichos cambios. La academia debe ser el puente entre ellos y proporcionar herramientas que permitan elegir las



mejores opciones, garantizando la continuidad de los servicios ecosistémicos que perciben las comunidades rurales.

Con ayuda del Sistema de Optimización de Inversiones en Recursos (RIOS), se hace una evaluación de las coberturas vegetales más convenientes para proyectar la continuidad de la provisión de agua a los acueductos rurales de 4 municipios de Boyacá (Miraflores, Pauna, Togüi y San Mateo):

1. Se realiza un reconocimiento de los actores sociales que intervienen en los cambios de cobertura original de los bosques andinos presentes en las zonas, con ellos se formaliza un diálogo que permite identificar:

- Beneficiarios de la provisión de agua
- Necesidades de mejora o dificultades de abastecimiento a los acueductos
- Oportunidades para el establecimiento de programas de restauración, conversión de actividades productivas y proposición de nuevas áreas protegidas.

2. A partir de dicha información, se proyectan escenarios de cambio en las coberturas vegetales actuales a 3, 5 y 10 años. Los modelos que el software arroje, serán socializados para elegir las actividades de cambio que más se acomoden a las necesidades expresadas.

3. Los resultados de la interacción serán elevados al gobierno local por medio de un manual técnico, que se espera, sea adoptado por la administración y sirva de soporte para las decisiones de ordenamiento territorial.

Este trabajo hace parte del macroproyecto “Valoración de servicios ecosistémicos a partir de componentes esenciales para la biodiversidad Norandina: hongos, abejas, aves silvestres y recurso hídrico, como una estrategia de conservación de los bosques andinos de Boyacá” y se encuentra en la etapa inicial de ejecución.

Keywords: Cambios de uso del suelo, provisión de agua, actores sociales, RIOS, ordenamiento territorial.



6. Type of submission: **Abstract**

T. Thematic Working Group sessions: T5 Ecosystem Services Modelling: participatory and decision making process

Land cover changes forecasting and inferences on the ecosystem services in the North Coast of São Paulo State

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The scarcity of natural resources is often caused by human actions or the increase of different demands and has been the focus of discussions on several occasions, and the subject of studies by researchers seeking to understand the patterns of the processes that lead to that. There is a strong relationship between land cover and ecosystem services and through LUCM modeling it is possible to estimate the behavior of variables that measure the quality and quantity of certain ecosystem services over time.

Considering the history of 28 years of development of the municipalities of the North Coast of São Paulo State, a LUCM model was performed to forecast annual changes from forest areas to anthropic uses for the 2016 to 2044. The driving forces considered for the changes were slope, drainage network, protected areas, highways and anthropized areas.

Ubatuba, Caraguatatuba, Ilhabela and São Sebastião compose the North Coast of São Paulo State, a region with 320,000 inhabitants whose economy is mainly based on tourism activities, responsible for a floating population that can reach 1.5 million, and on the oil and natural gas industry, which significantly contributes to the state of SP being the second largest in the country's oil production.

One of the ecosystem services associated with forest cover is the increase of the amount of rain water infiltrated in the soil in relation to the same area without the cover, reducing the runoff and consequent the loss of soil, road degradation, flood risk and other inherent problems.



The annual forecast of forest change associated with soil types, were able to indicate the susceptible areas to loss or decrease of the ecosystem service provision and estimate the runoff increase. This information is relevant to new developments, land use legislation and mitigation actions.

Keywords: LUCC Model, ecosystem service, runoff

7. Type of submission: **Abstract**

T. Thematic Working Group sessions: T5 Ecosystem Services Modelling: participatory and decision making process

Patterns of ecosystem services supply across farm properties: Implications for ecosystem services–based policy incentives

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In developing countries, the protection of biodiversity and ecosystem services (ES) rests on the hands of millions of small landowners that coexist with large properties, in a reality of highly unequal land distribution. Guiding the effective allocation of ES–based incentives in such contexts requires researchers and practitioners to tackle a largely overlooked question: for a given targeted area, will single large farms or several small ones provide the most ES supply? The answer to this question has important implications for conservation planning and rural development alike, which transcend efficiency to involve equity issues. We address this question by proposing and testing ES supply–farm area relationships (ESSAR) around three basic hypothesized models, characterized by constant (model 1), increasing (model 2), and decreasing increments (model 3) of ES supply per unit of area or ES “productivity”. Data to explore ESSAR came from 3,384 private landholdings located in southern Chile ranging from 0.5 ha to over 30,000 ha and indicators of four ES (forage, timber, recreation opportunities, and water supply). Forage provision best fit model 3, which suggests that targeting several small farms to provide



this ES should be a preferred choice, as compared to a single large farm. Timber provision best fit model 2, suggesting that in this case targeting a single large farm would be a more effective choice. Recreation opportunities best fit model 1, which indicates that several small or a single large farm of a comparable size would be equally effective in delivering this ES. Water provision fit model 1 or model 2 depending on the study site. The results corroborate that ES provision is not independent from property area and therefore understanding ESSAR is a necessary condition for setting conservation incentives that are both efficient (deliver the highest conservation outcome at the least cost) and fair for landowners

Keywords: equity, market incentives, agro–environmental schemes, farm productivity, conservation policy

8. *Type of submission: **Abstract***

T. Thematic Working Group sessions: T5 Ecosystem Services Modelling: participatory and decision making process

Ecosystem based management model for coastal areas using MIMES.

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During last decades of XX century most part of planning and policies regarding oceans and coastal areas were created by government authorities. These policies were mostly created under “command and control” perspectives and pollution control measures, so that licensing processes were derived from those actions. Nowadays, there is a different perspective that considers management of resources in a wider context, formed by several complementary forces, habits and behaviors. Considered as an advance when compared to Sector–based management or Spatial Management, the Ecosystem–based Management (EBM) considers economic activity (social subsystem) human features that occur inside a larger and finite natural system (ecological subsystem). This perspective also considers that these subsystems are coupled, because they affect and are affected by each other in complex dynamic relations (feedbacks). Thus, effective



management must recognize these links as well as the limits of combined social–ecological systems. In other words, the ecological subsystem must be managed in order to obtain continue yield of ecosystem services, on the short and long term; and for the social subsystem, adaptive governance seems to be the final purpose. Adaptive governance is considered as the governance that is able to properly work under a system that change across time. The behavior of ecosystems requires that the governance system adapt itself to its regular behavior, and under eventual changes also. In order to build a governance system adapted to an ecosystem, one needs to know how the ecosystem works. A model like MIMES (Multiscale Integrated Model of Ecosystem Services) can be an interesting tool in this task. Our MIMES model represent an attempt to link social variables with the ecological subsystem of Ubatuba. Primary results present the actual state of the model, the development of the ecological subsystem and its interfaces with dynamic GIS systems. Future development will include several outputs not yet embodied (e.g. resilience) and the analysis of different scenarios too.

Keywords: Dynamic model, ecosystem based management, coastal modelling, social–ecological systems

9. *Type of submission:* **Abstract**

T. Thematic Working Group sessions: [T5 Ecosystem Services Modelling: participatory and decision making process](#)

Sinergias y conflictos espaciales entre la conectividad del paisaje y los servicios ecosistémicos en el área del cañón del río Cauca antioqueño, Colombia

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El cañón del río Cauca en el departamento de Antioquia posee una alta biodiversidad, sustentada en remanentes de bosque seco tropical, bosque húmedo tropical y páramos. La zona presenta comunidades locales arraigadas a su territorio y con un desarrollo de megaproyectos de producción hidroeléctrica y minera, todos dependiendo de los servicios ecosistémicos que se



producen allí. Todas estas actividades humanas están modificando de forma acelerada los ecosistemas y la provisión de los servicios ecosistémicos, es por esto que se quiso establecer la relación entre áreas importantes desde la integridad del paisaje a través de la conectividad y áreas importantes para la provisión de algunos servicios ecosistémicos en el área de estudio, con el fin de dar lineamientos que tienda a la gestión efectiva de paisajes conservados y a su vez con una alta oferta de servicios ecosistémicos.

A través de variables proxies, se espacializaron áreas de concentración de servicios ecosistémicos (carbono, retención de sedimentos, polinización, alimento) y por otra parte se desarrolló un análisis de la integridad del paisaje, que definió áreas de núcleo, áreas para la conectividad y áreas para el uso sostenible. Luego se realizó la integración de estos dos análisis con el fin de definir áreas con conflictos y sinergias entre servicios y la conectividad del paisaje. Se presentan conflictos en mayor proporción en áreas con altos valores de servicios ecosistémicos y baja importancia en conectividad, seguida de áreas con bajos valores de concentración de servicios ecosistémicos y valores altos de potencial de conectividad. Las áreas con sinergias positivas (áreas con de alta importancia en servicios ecosistémicos y en conectividad) corresponden solo al 3,67% del total del área.

De acuerdo con los mapas de resultados se pueden proponer estrategias diferenciadas para el manejo del territorio, que pueden ir desde la preservación de ciertas áreas y ecosistemas hasta la restauración ecológica y productiva, que generen paisajes multifuncionales, para asegurar el cumplimiento de las funciones ecológicas que mantengan la producción y otros servicios ecosistémicos, así como detener la elevada deforestación en el área.

Keywords: conectividad, servicios ecosistémicos, río Cauca, Antioquia.