Forest Landscapes and Global Change

New Frontiers in Management, Conservation and Restoration

Abstracts

Edited by
João Carlos Azevedo
Manuel Feliciano
José Castro
Maria Alice Pinto

IUFRO Landscape Ecology Working Group
International Conference

Bragança · Portugal
September 21 to 27, 2010

Forest Landscapes and Global Change
New Frontiers in Management, Conservation and Restoration

Title: Book of abstracts of the IUFRO Landscape Ecology Working Group International Conference: Forest Landscapes and Global Change - New Frontiers in Management, Conservation and Restoration.

Editors: João Carlos Azevedo, Manuel Feliciano, José Castro & Maria Alice Pinto

Published by: Instituto Politécnico de Bragança
Apartado 1038, 5301-854 Bragança, Portugal
http://www.ipb.pt

Printed by: Serviços de Imagem do Instituto Politécnico de Bragança

Number of copies: 350

Depósito legal nº 315525/10

ISBN: 978-972-745-111-1

Cover design: Atilano Suarez, Serviços de Imagem do Instituto Politécnico de Bragança

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Instituto Politécnico de Bragança, Portugal
September, 2010

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Welcome message

We, the local hosts, welcome you to the biannual IUFRO Landscape Ecology Working Group International Conference, in Bragança, Portugal, from 21 to 27 of September. We welcome you also to the city of Bragança and to the Instituto Politécnico de Bragança, Portugal.

This 2010 conference, organized by the IUFRO Landscape Ecology Working Group (8.01.02), the Mountain Research Centre (CIMO), and the Polytechnic Institute of Bragança (IPB) is dedicated to the theme *Forest Landscapes and Global Change - New Frontiers in Management, Conservation and Restoration*.

The conference will be attended by more than 300 participants from 46 countries. Most are from Europe (62%), followed by North, Central and South America (28%), Asia (7%), Africa (3%) and Oceania (1%).

The 2010 IUFRO Landscape Ecology Working Group International Conference witnesses the global growth of scientific interest in forest landscape patterns and processes, and the recognition of the role of landscape ecology in the advancement of science and management. This conference offers a venue to explore the challenges faced by scientists and practitioners by broadening the context of landscape ecology to emerging physical, social and political drivers of change, which strongly and rapidly influence forest systems and their services. During this conference, we address these topics via 300 presentations: in three keynote addresses, 12 symposia, 18 oral sessions, and two poster sessions.

For the organizing committee, CIMO and the Polytechnic Institute of Bragança putting together a conference of such magnitude in Bragança was an enormous challenge, and we hope that our response was successful. Above all, it is a great privilege for us to host this outstanding group of scientists, to contribute to the development of landscape ecology, and to foster a debate on real issues that influence not just landscape ecology but the society at large.

In this context, we thank you very much for your participation in this conference and your contribution to the advancement of research and applications in landscape ecology. Finally, we hope you enjoy your time with us in Bragança, in the Polytechnic Institute and in our Research Centre.

The organizing Committee
João Azevedo
José Castro
Manuel Feliciano
Maria Alice Pinto

Message from the Chair of the IUFRO Landscape Ecology WG

Twenty years ago, Dr. T. Crow and Prof. B. Anko initiated a proposal to establish a new working party (WP) within the Division 8 of IUFRO, known as landscape ecology. Back then, the field was in its most rapid growth period with many unknowns. Quite a few scholars challenged us about whether this young discipline was science. This challenge was partially important because landscape ecology has strong components and commitments to managers and policymakers. Today, landscape ecology is matured with solid principles and implementations in resource management. Many members of the WP made significant contributions to advance this field for its recognition. At the first international conference in 1990, there were a small handful of participants. After the announcement of this conference, over 400 abstracts were submitted. By August 6, 2010, there were 233 registered individuals from 44 countries.

Previous bi-annual conferences had been held in the United States, Japan, Italy, Canada and China. In the last decade, the WP also paid much attention to publishing the papers presented at our bi-annual conferences. Several books and special issues based on these conferences have been published. The WP is now soliciting proposals for future conferences. Please contact any of the committee members during the conference to discuss your interests and plans. One particular effort made by conference organizers and the WP committee is to support students. We believe that student participation is vital for both the science of landscape ecology and the growth of the WP. In 2008, we offered travel fellowships to over 28 graduate students and in 2010 we were able to support the same number of students.

We would like to offer special thanks to Dr. Thomas Crow for his leadership since 1990. The Working Party has grown to have a permanent Webpage, a listserv to promote communication, an online registration and a committee structure that is composed of regional coordinators and liaisons with the International Association of Landscape Ecology (IALE). As of July, 2010, there are 475 members in the WP database. The journal of Landscape Ecology reserves a special page for us to publish important developments from the WP. Since 2008, the WP started sponsoring summer short courses and regional workshops for researchers, students and managers. To keep our communication beyond this conference, I strongly encourage you to subscribe to a membership via our Webpage and share your experiences, new developments, personnel changes, etc. via the WP's listserv.

While growing, we face new challenges. The increasing influence from global change is, no doubt, a major one. The science of landscape ecology can no longer be independent of the changes surrounding us. An equally important issue is from the increasing demands of people and intensified activities. These challenges are the primary reasons for us to have the theme of this conference as "Forest Landscapes and Global Change: New Frontiers in Management, Conservation and Restoration". Through face-to-face interactions during the conference, I am very confident that everyone will be stimulated for new initiatives under this theme. However, we hope the stimulations will go beyond the conference and are translated to your daily actions after returning to your home.

The WP appreciates the kindness of Instituto Politécnico de Bragança to organize this conference. We also owe a lot to the members of the Organization Committee, Scientific Committee and the Scholarship Committee for their quality work over the past 48 months. Without the financial and in-kind support of many organizations, we would not be able to have this great conference.

Jiquan Chen
Chair, IUFRO8.01.02

Organization

IUFRO Unit 8.01.02 Landscape Ecology
Instituto Politécnico de Bragança
CIMO-Centro de Investigação de Montanha (Mountain Research Center)

Supporters

Câmara Municipal de Bragança
Sociedade Portuguesa de Ciências Florestais
Sociedade Portuguesa de Ecologia da Paisagem
IUFRO-IALE Working Group

Sponsors

Câmara Municipal de Bragança
Câmara Municipal de Vinhais
Paisagem Protegida da Albufeira do Azibo
Parque Natural de Montesinho
Junta de Freguesia de Rio de Onor
Casa Meneres
Fundação para a Ciência e a Tecnologia (Fundo de Apoio à Comunidade Científica)

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Bojie Fu, Chinese Academy of Sciences, China
Raffaele Lafortezza, University of Bari, Italy
Guillermo Martínez Pastur, Centro Austral de Investigaciones Científicas, Argentina
Jean Paul Metzger, Universidade de São Paulo, Brazil
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José Castro, Instituto Politécnico de Bragança, Portugal
Manuel Feliciano, CIMO & Instituto Politécnico de Bragança, Portugal
M. Alice Pinto, CIMO & Instituto Politécnico de Bragança, Portugal

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Andreia Brandão, Instituto Politécnico de Bragança, Portugal
Ângela Vilela, Instituto Politécnico de Bragança, Portugal
Cidália Lino, Instituto Politécnico de Bragança, Portugal
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João Rua, Instituto Politécnico de Bragança, Portugal
Marta Ferreira, Instituto Politécnico de Bragança, Portugal
Telmo Dias, Instituto Politécnico de Bragança, Portugal
Virginia Rodrigues, Instituto Politécnico de Bragança, Portugal

Keynote speakers

Francisco Castro Rego, Universidade Técnica de Lisboa, Portugal

Dr. Francisco Castro Rego is an Associate Professor at the Instituto Superior de Agronomia (ISA), Universidade Técnica de Lisboa, Portugal, and the Coordinator of the Baeta Neves Applied Ecology Research Center, Lisbon. He received his "Licenciatura" in Forest Engineering in 1978 from ISA, Portugal, his PhD in Forestry, Wildlife and Range Management from the University of Idaho, USA, in 1986, and his "Agregação" in Landscape Ecology from ISA in 1999. His research has been focused primarily on fire ecology and management. Francisco Rego has directed several MS and PhD students in fire and landscape related subjects and is the author of many scientific publications in these and other fields. Since 1982, he has been involved in research teams and projects in Portugal and abroad. Currently, he is the international coordinator of the EU project Fire Paradox and the representative of Portugal in the Committee of the Forests, their Products and Services Domain (EU-COST). Dr. Rego was Director of the Forest Research Station in Lisbon (1996-2000), Coordinator of the National Commission for Forest Fires in Portugal (2001-2002), Director of the Portuguese Forest Service (2005-2007), and a member of the Directive Council of the European Forest Institute since 1998, as well as its Vice-Chairman, and Chairman (2002-2004).

Monica G. Turner, University of Wisconsin-Madison, USA

Dr. Monica G. Turner is the Eugene P. Odum Professor of Ecology in the Department of Zoology, University of Wisconsin-Madison. A native New Yorker, Turner received her BS in Biology in 1980 from Fordham University, Bronx, NY, graduating summa cum laude. She obtained her PhD in Ecology in 1985 from the University of Georgia, spent seven years as a research scientist at Oak Ridge National Laboratory, and joined the faculty of UW-Madison in 1994. Turner's research emphasizes the causes and consequences of spatial heterogeneity in ecological systems, focusing largely on ecosystem and landscape ecology in forested systems. Current research areas include studies of the interactions of disturbance regimes (fire and insects), vegetation dynamics, and nutrient cycling in the Greater Yellowstone Ecosystem; effects of historic and contemporary land-use patterns on southern Appalachian landscapes; and land-water interactions in north temperate landscapes. She has published over 185 scientific papers, has authored or edited six books, and is co-editor in chief of the journal, Ecosystems. Turner was elected to the US National Academy of Sciences in 2004, and in 2008 she received both the ECI Prize in Terrestrial Ecology and the Ecological Society of America's most prestigious recognition, the Robert H. MacArthur Award. For a complete CV, please visit http://landscape.zoology.wisc.edu/.

Malcolm L. Hunter, Jr., University of Maine, USA

Dr. Malcolm "Mac" Hunter is the Libra Professor of Conservation Biology in the Department of Wildlife Ecology at the University of Maine. He earned his B.S. in Wildlife Science at UMaine in 1974 then went to Oxford University as a Rhodes Scholar where he received his Ph. D in Zoology. He joined the UMaine faculty in 1978 and has pursued research on a wide range of organisms and ecosystems-- amphibians, birds, plants, mammals, lakes, streams, peatlands, grasslands, and especially forests. He has produced six books, including four on conservation biology and managing forests for biodiversity. His interests are also geographically broad; he has worked in 28 countries, mainly in Africa and the Himalayas. He has served in many public service roles such as advising White House committees on biodiversity and spotted owls and as President of the Society for Conservation Biology, a professional organization with 13,000 members in 140 countries.

Workshop

September 20, 2010
Organized by Peter Vogt, Joint Research Centre, Ispra, Italy

Guidos (http://forest.jrc.ec.europa.eu/download/software/guidos) is a free software toolbox for spatial pattern analysis and generic image processing routines. It includes a powerful image viewer and a full featured GIS environment. The software is available for Linux, Mac, MS-Windows, as a Linux liveCD system, and can even run from an external USB-flashdrive. Guidos has been used for landscape pattern-, connectivity-, and fragmentation analysis and is in operational use at the European Commission, the US-ForestService, and the US-EPA.

The workshop will address the following topics:

1) Introduction and motivation for a new way of pattern analysis
2) MSPA: Morphological Spatial Pattern Analysis - what it is and how it works
3) Guidos: demonstration of program features, MSPA and other processing options
4) Hands-On examples using a training data set: a) data preparation for MSPA processing; b) different types of MSPA and network connectivity analysis and effects on the interpretation of the results; c) data post-processing: exporting to GeoTiff and/or GoogleEarth overlays, post-processing in Quantum GIS
5) Discussion, suggestions for new features/improvements, help with user-supplied data sets, etc.

Field trips

There will be 4 simultaneous field trips in the conference. Buses will leave from the main gate of the IPB Campus at 14:00 on Thursday, September 23, and will return at 18:30. Registration is required.

Chestnut landscapes: from the orchards to the woods
Guided by Orlando Rodrigues, Instituto Politécnico de Bragança
Sponsored by the Camara Municipal de Vinhais (Municipality of Vinhais)

More than two thousand years ago the Romans brought sweet chestnut trees (*Castanea sativa*) to the Iberian Peninsula for providing staple food for slave labor in mines. From then on the species has gradually spread all over the country. Bragança is one of the best producing regions in Portugal. Although threatened by diseases (ink and blight diseases), sweet chestnut remains an important component of the economy of the region.

The landscape of the region is also deeply marked by the presence of sweet chestnut, either as fruit orchards or as timber woodlands or even as ancient coppices producing materials of various sizes for several uses.

This field trip takes place in a time of the year of great beauty when chestnut trees and the landscape start showing their fantastic fall tones. In this field trip we will see how agro-forestry chestnut systems are managed in the region. In addition, we will discuss the future of forest and agricultural landscapes dominated by this specie, including issues related to the importance of sweet chestnut and agro-forestry systems to the biological diversity and economic and social development of the region.

Romeu, a cork oak love story
Guided by José Castro, Instituto Politécnico de Bragança
Sponsored by Casa Meneres

More than a century ago, Clemente Meneres, a Portuguese business man, made a journey that would change his life, the Portuguese cork industry, and the forest landscapes of the Trás-os-Montes region. He was looking for cork trees to expand his trading activity throughout the world: Brazil, North Africa and Middle East. It was love at first sight when he saw a very small settlement called Jerusalém do Romeu. There, in 1874, he bought his first cork oak woodlands made of scarce, very small, and over managed trees. This was the beginning of a story of improvement of the cork oak forest of Romeu with new and carefully conducted silvicultural methods that turned this site into a place of high natural and cultural value. The cork activity in Jerusalem do Romeu involved the creation of a large farm, the development of a whole new village, even the construction of railway, now abandoned despite their immense heritage value and social significance.

During this field trip we will visit the cork oak forests of Jerusalém do Romeu and appreciate the values that made them one of the Natura 2000 (PTCON0043, 4,768ha) sites in Portugal and Europe. We will also visit a Museum of Curiosities of the history of these forests and will enjoy some gourmet products produced in Jerusalém do Romeu.

Nogueira oak woodlands, looking back in time
Guided by Carlos Aguiar, Instituto Politécnico de Bragança
Sponsored by the Paisagem Protegida da Albufeira do Azibo (Azibo Lagoon Protected Landscape)

The black oak (*Quercus pyrenaica*) woodlands of Serra da Nogueira occupy currently near 10,000 hectares but their history is lost in time. Unlike other nearby mountain areas, where primeval forest systems almost disappeared and their landscapes are currently dominated by introduced coniferous species, the Serra da Nogueira was able to preserve an important area of black oak woodlands that allows us today to guess how landscapes in this region looked like a few millennia ago.

This field trip will be an occasion to visit the landscapes of the Nogueira Mountains, discuss their nature, structure, functioning and their most relevant natural values. An important part of the fieldtrip will be dedicated to serpentine soils dominated by holm-oak woodlands and extremely rich in endemic plant species. It will also be an opportunity to stress the role of the environmental factors in the evolution and resilience of these natural woodlands so scarce in the European forest landscapes, as well as conservation related issues considering this area as part of the Montesinho-Nogueira Natura 2000 site (PTCON0002, 108,010ha).

Rio de Onor, a land of honored people
Guided by the staff of the Parque Natural de Montesinho (Montesinho Natural Park)
Sponsored by the Junta de Freguesia de Rio de Onor (Rio de Onor Parish) and Parque Natural de Montesinho

Rio de Onor is an icon of European ethnography and it has been studied by several specialists over the past century. It is a very small and well preserved village located right on the Portugal-Spain border line, half Portuguese (Rio de onor), half Spanish (Rihonor de Castilla). Until recently, the communal livelihood of Rio de Onor was unique. It was a community that shared their land but also shared labor in the peak season, organized the collective use of a narrow vegetable garden, shared the traditional firewood bread oven, the breeding bull, among other activities.

Today the village of Rio de Onor is no larger than a few dozen households but the landscape around is still deeply marked by a past of great character. The field trip will be an opportunity for experiencing the remains of this past communal culture and socialize with the friendly people from this village, divided by political borders which were not enough to stop their common traditions.

To get there, we will cross one of the most relevant areas of the Montesinho Natural Park, particularly for the conservation of large mammals such as Iberian wolf and deer.

Post Conference Tour
September 25 to 27, 2010
Organized by Viagens Abreu.

Description
Tours of simultaneously scientific, social, historical, and cultural significance have long been a tradition in IUFRO Landscape Ecology conferences. This year's conference tour will be dedicated to the landscapes of the Douro River Valley. The first day will explore the history and diversity of the landscapes of the Bragança district and the International and Upper Douro River Valley. It will include a tour throughout the Miranda Plateau and visits to the International segment of the Douro River and the Côa Valley Archaeological Park (Prehistoric Rock-Art Sites in the Côa Valley, UNESCO World Heritage Site since 1998). The second day will be fully devoted to the Alto Douro Wine Region (UNESCO World Heritage Site since 2001) which constitutes one of the most remarkable cultural landscapes in the world. The tour will cross the Port wine country in a boat cruise in the Douro River where spectacular and memorable views of the landscape will be captured. The last will be the Port wine day. The tour will make a final trip, by train, to Porto and will include visits to the historical downtown of Porto (UNESCO World Heritage Site since 1996) and Port cellars in Vila Nova de Gaia.

Itinerary

September 25
7h00: Bragança to Miranda do Douro (by bus)
8h30: Start of the Environmental boat cruise In Miranda do Douro
11h10: Guided visit to the historical center city of Miranda do Douro and monuments
12h45: Lunch at a regional restaurant with overview to the Miranda do Douro dam; regional food and performance by the traditional dancing group Pauliteiros de Miranda
14h20: Departure to Vila Nova de Foz Côa (by bus)
15h30: Visit to the Côa Valley Archaeological Park and museum
19h00: Check it at the Youth Hostal and Lodge in Vila Nova de Foz Côa
20h30: Dinner at the Youth Hostal; performance of a music group from the region

September 26
8h30: Departure to Barca D'Alva (by bus)
10h30: Boat Cruise from Barca D'Alva to Peso da Régua. Appetizers and lunch will be served on board; stops in Pocinho, Barragem da Valeira, Pinhão and Barragem de Bagaúste.
19h00: Arrival at Peso da Régua; transfer to Régua Douro Hotel and check in.
20h30: Dinner at Hotel Régua Douro; performance of a music group of the region

September 27
8h00: Visit and participation in the vintage in a port wine farm; description of the wine making process and history of port wine
10h30: Train trip from Peso da Régua to Porto
11h50: Arrival at the São Bento Station in Porto and transfer to Vila Nova de Gaia
12h10: Visit to Port wine cellars and port wine tasting
13h20: Lunch in a typical restaurant in the Ribeira area
15h20: Transfer to the Avenida dos Aliados Avenue
15h45: End of the Post Conference Tour

Venues

The conference will take place at the Teatro Municipal de Bragança (September 21) and ESA - Escola Superior Agrária and ESTiG - Escola Superior de Tecnologia e Gestão Buildings in the *Campus de Santa Apolónia*, the main campus of the Instituto Politécnico de Bragança (remaining days) (see map below). Lunches will be served at the IPB Cafeteria (Cantina Alternativa do IPB) also located on *Campus* (see map below).

Internet and computer access

Wireless internet is available campus wide to participants of the conference. Please ask for access codes at the Information Desk. IPB is part of the Eduroam European network.

A computer room will also be available to participants of the conference.

Transportation

The organization will provide buses from and to hotels recommended by the conference (Hotel S. Lázaro, Pousada de S. Bartolomeu, Hotel Ibis and Pousada da Juventude. Check for schedules at your hotel and at the Information Desk. Alternatively, taxi service is available upon request:

Praça de Táxis Av. João Cruz
Telephone: 273 322 138

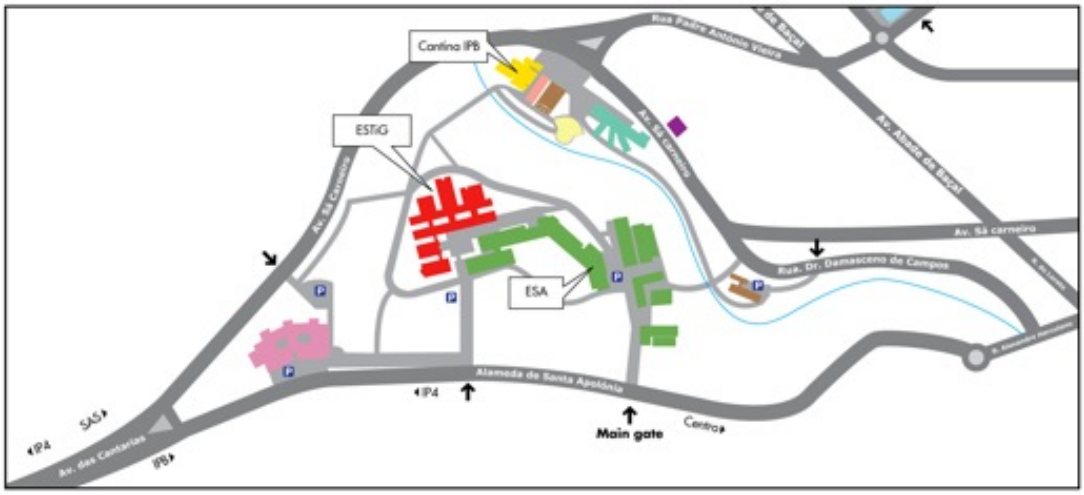
Praça de Taxis da Estação Rodoviária
Telephone: 273 322 007

Food and refreshments

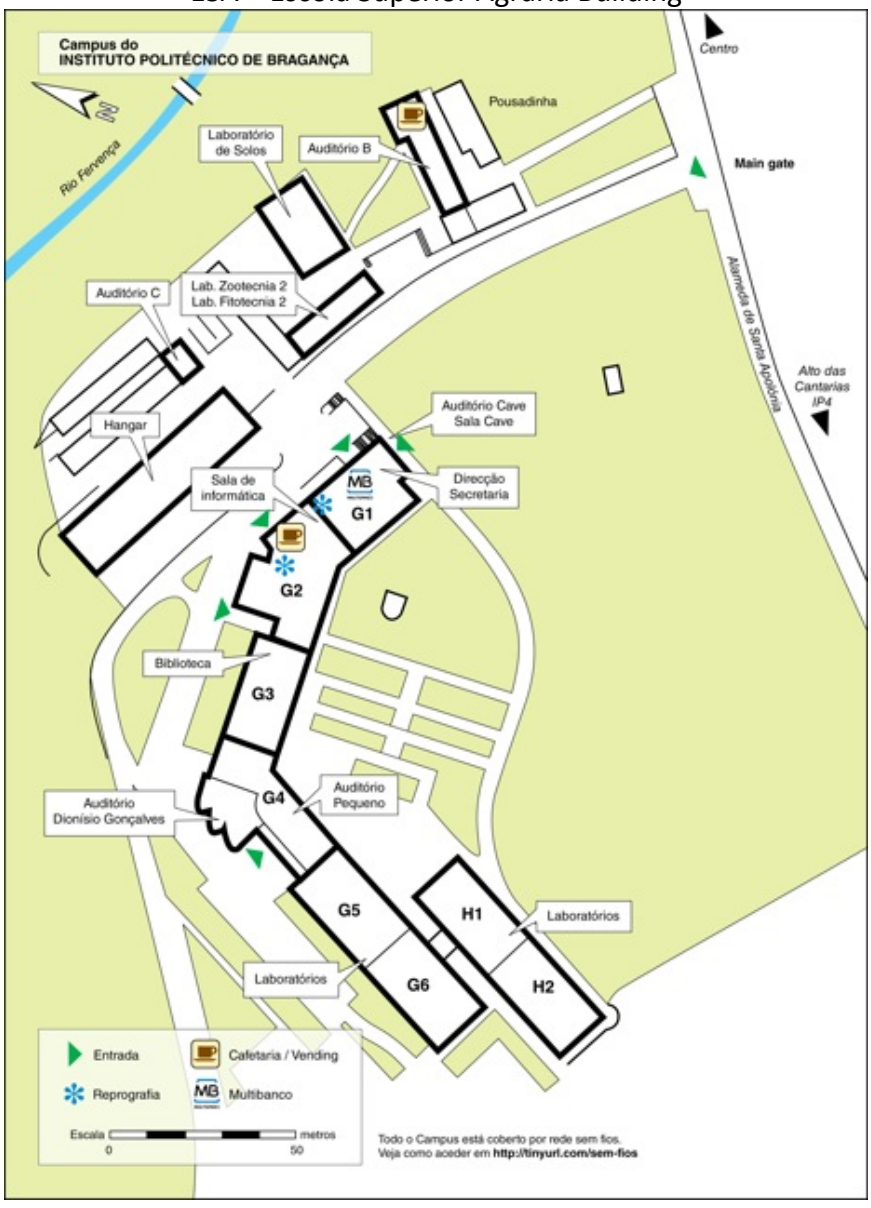
A welcome lunch will be served at the Teatro Municipal de Bragança in the first day of the conference. Lunches, in the remaining days of the conference, will be served at the IPB Cafeteria (Cantina Alternativa do IPB) located at the *Campus de Santa Apolónia* (see map below).

Morning and afternoon coffee breaks will be available at the Teatro Municipal de Bragança (September 21) and outside the Auditoriums Hall (G4 in the map below) at the Scholl of Agriculture of the Polytechnic Institute of Bragança (remaining days).

Campus de Sta. Apolónia



ESA – Escola Superior Agrária Building



Sessions

Poster

Two poster sessions are scheduled for Wednesday and Friday evening in the Laboratories Hall (G6 to H1 in map above). Please consult the detailed program for subjects, titles and authors.

Posters for the first session may be attached Wednesday morning and should be removed by Thursday lunchtime. Posters for the Friday session may be attached Thursday afternoon and removed before the end of the conference.

Posters should be attached using Velcro stickers available at the Information Desk (G4 in the map above). Poster limit dimensions are 1m (width) x 1.2m (height).

Oral and symposia

Oral sessions will be held at the Auditório Dionísio Gonçalves and Auditório Pequeno (ESA - Escola Superior Agrária) and at the Auditório Alcínio Miguel (ESTiG – Escola Superior de Tecnologia e Gestão) (see map above). Symposia sessions will be at the Teatro Municipal de Bragança (September 21) and Auditório Dionísio Gonçalves (remaining days).

Oral sessions will be organized according to the topics and schedule indicated in the program below. Each session is comprised of 15-minute presentations (maximum) including questions and answers. Symposia sessions are also comprised of 15-minute presentations but in this case there will be an additional 30-minute period for debate at the end of the sessions.

Session chairs

If you are chairing a session, please arrive approximately 30 minutes early to ensure that all presentations are ready, and that the scheduled presenters are accounted for. The Chair should alert speakers when 3 minutes remain, and, if necessary, 1 minute remains. If time runs out, the presenter will be asked to leave the podium without taking questions. If a presenter finishes early the Chair should help the previous presenter to field questions and answers. In the event of a cancellation, the Chair should announce a pause in the session so that talks remain on schedule. At the end of the session the Chair should fill the form available at the auditorium and return it to the Information Desk (G4 in the map above).

Program

General

Sep 20	Instituto Politécnico de Bragança
All day	Registration (Escola Superior Agrária, by Auditorium Dionísio Gonçalves)
All day	GUIDOS Workshop (Escola Superior Agrária - Sala Correia Araújo)

Sep 21	Teatro Municipal
8:00	Registration
9:00	Official Opening Ceremony
10:00	Coffee Break
10:30	Plenary Session: Dr. Francisco Rego
11:30	Plenary Session: Dr. Monica G. Turner
12:30	Welcome lunch
14:00	**Symposium 1**: Quantifying the effects of forest fragmentation: implications for landscape planners and resource managers
16:00	Coffee Break
16:30	**Symposium 2**: Measures of landscape structure as ecological indicators and tools for conservation planning and forest management
19:00	Music Concert by Galandum Galundaina

Sep 22	Instituto Politécnico de Bragança		
	Auditório Dionísio Gonçalves	**Auditório Pequeno**	**Auditório Alcinio Miguel**
9:00	**Symposium 3:** Landscape assessment tools for adaptive management of tropical forested landscapes	Thematic session: Management 1	Thematic session: Biodiversity 1
10:30	Coffee Break		
11:00	**Symposium 4**: Network theory to conserve and reconnect forested landscapes	Thematic session: Monitoring 1	Thematic session: Disturbances 1
12:30	Lunch (IPB cafeteria)		
14:00	**Symposium 5**: Landscape genetics	Thematic session: Management 2	Thematic session: Biodiversity 2
15:30	Coffee Break		
16:00	**Symposium 6**: Road ecology: improving connectivity	Thematic session: Tools 1	Thematic session: Disturbances 2
17:30	Poster Sessions: Biodiversity, Disturbances, Management & Scaling (Laboratories Hall)		
18:30	IUFRO 8.01.02 Business Meeting (Correia de Araújo Room)		

Sep 23	Instituto Politécnico de Bragança		
	Auditório Dionísio Gonçalves	**Auditório Pequeno**	**Auditório Alcinio Miguel**
9:00	**Symposium 7**: A landscape approach to sustainable forest management: the challenge to adaptive management and the maintenance of biodiversity value	Thematic session: Management 3	Thematic session: Biodiversity 3
10:30	Coffee Break		
11:00	**Symposium 8**: Ecosystem services from forests at the watershed scale	Thematic session: Pattern 1	Thematic session: Disturbances 3
12:30	Lunch (IPB cafeteria)		
14:00	Field trips		
21:00	Conference Banquet (Registration required; Restaurante Geadas)		

Sep 24	Instituto Politécnico de Bragança		
	Auditório Dionísio Gonçalves	**Auditório Pequeno**	**Auditório Alcinio Miguel**
8:30	Plenary Session: Dr. Malcolm Hunter		
9:20	**Symposium 9**: Management and conservation of Mediterranean forest landscapes	Thematic session: Biodiversity 4	Thematic session:Pattern 2
10:50	Coffee Break		
11:20	**Symposium 10**: Global change and transitions in forest landscapes	Thematic session: Tools 2	Thematic session: Pattern 3
12:50	Lunch (IPB cafeteria)		
14:00	**Symposium 11**: Interfaces and interactions between forest and agriculture in rural landscapes		
		Thematic session: Tools 3	Thematic session: Urban 1
15:30	Coffee Break		
16:00	**Symposium 12**: From abandoned farmland to self-sustaining forests: challenges and solutions		
18:00	Poster Sessions: Monitoring, Pattern, Tools & Urban (Laboratories Hall)		
19:00	Closing ceremony		

Auditório Dionísio Gonçalves, Auditório Pequeno and Correia de Araújo Room are located at the Escola Superior Agrária Building
Auditório Alcinio Miguel is located at the Escola Superior de Tecnologia e Gestão Building (see map above)

Symposia

Symposium 1: Quantifying the effects of forest fragmentation: implications for landscape planners and resource managers
Organized by Raffaele Lafortezza & Jan Bogaert
Sep 21 Teatro Municipal

Time	Authors	Title
14:00	ZORA URECH	TAKING IN ACCOUNT LOCAL PEOPLE'S LIVELIHOOD SYSTEMS FOR A BETTER MANAGEMENT OF FOREST FRAGMENTS
14:15	RAFFAELE LAFORTEZZA, DAVID A. COOMES, VALERIE KAPOS & ROBERT M. EWERS	BioFrag: A NEW INDEX ASSESSING LANDSCAPE FRAGMENTATION AND ITS ECOLOGICAL EFFECTS
14:30	K. WATTS, P. HANDLEY, P, SCHOLEFILED, A. E. EYCOTT & A. PEACE	CHANGES IN THE FUNCTIONAL CONNECTIVITY OF WOODLAND HABITATS ACROSS THE GREAT BRITAIN BETWEEN 1990 AND 2007
14:45	STOYAN C. NIKOLOV, VERA ANTONOVA, VLADA PENEVA, KIRIL VASSILEV, DRAGAN CHOBANOV, YORDAN KOSHEV, YORDANKA MINCHEVA & STAMEN STANCHEV	SKI PISTES AND BIODIVERSITY: THE EFFECTS OF FOREST FRAGMENTATION AND LANDSCAPE MATRIX ON SIX MODEL GROUPS OF ORGANISMS IN BULGARIA
15:00	ROBERT C. CORRY, ROBERT D. BROWN & R. LAFORTEZZA	FRAGMENTATION PATTERNS OF HIGH-QUALITY FORESTS IN ONTARIO
15:15	J. BOGAERT, Y.S.S. BARIMA, I. BAMBA, L. IYONGO WAYA MONGO, J. NDAYISHIMIYE, T. MASHARABU, S. ALONGO LONGOMBA, S. KUMBA	LANDSCAPE DYNAMICS IN CENTRAL AND WEST AFRICA: CAUSES, CONSEQUENCES AND QUANTIFICATION

Symposium 2: Measures of landscape structure as ecological indicators and tools for cons. planning and forest management
Organized by J. Alberto Gallardo-Cruz & Stefan Schindler
Sep 21 Teatro Municipal

Time	Authors	Title
16:30	J. ALBERTO GALLARDO-CRUZ & STEFAN SCHINDLER	A META-ANALYSIS ON THE RELATION BETWEEN LANDSCAPE STRUCTURE AND BIODIVERSITY ALONG ENVIRONMENTAL GRADIENTS
16:45	J. LUIS HERNÁNDEZ-STEFANONI, JUAN MANUEL DUPUY, FERNANDO TUN-DZUL & FILOGONIO MAY-PAT	EFFECTS OF LANDSCAPE STRUCTURE AND STAND AGE ON WOODY SPECIES RICHNESS AND BIOMASS IN A TROPICAL DRY FOREST
17:00	EMILIO R. DIAZ-VARELA, CARLOS J. ALVAREZ-LÓPEZ, MANUEL F. MAREY-PÉREZ & PEDRO ÁLVAREZ-ÁLVAREZ	MULTISCALE ANALYSIS OF LAND USE HETEROGENEITY AND DISSIMILARITY AS A SUPPORT FOR PLANNING STRATEGIES
17:15	LUIS TAPIA DEL RIO & LUIS RODRÍGUEZ LADO	POTENTIAL DISTRIBUTION OF NESTING SITES FOR GOLDEN EAGLE (Aquila chrysaetos) USING NESTING LOCATIONS IN A TRANSITIONAL ECOLOGICAL AREA IN NORTHWESTERN SPAIN
17:30	KOSTAS POIRAZIDIS, ARISTOTELIS MARTINIS, STEFAN SCHINDLER, PANAGIOTIS KORDOPATIS, KONSTANTINA ZOGRAFOU & PANAGIOTIS LATTAS	EFFECTS OF BIG FOREST FIRES ON LANDSCAPE FRAGMENTATION: THE CASE OF PELOPONNESUS (GREECE), 2007.
17:45	EVELYN UUEMAA, TÕNU OJA, EVELI SISAS, RAMON REIMETS & ÜLO MANDER	SPATIAL GRADIENTS OF LANDSCAPE METRICS AS INDICATORS OF HUMAN INFLUENCE ON LANDSCAPE

Symposium 3: Landscape assessment tools for adaptive management of tropical forested landscapes
Organized by Jean-Laurent Pfund & Laurène Feintrenie
Sep 22 Auditório Dionísio Gonçalves

Time	Authors	Title
9:00	ERIC PENOT	SOCIO-ECONOMIC DIAGNOSIS OF A SMALL REGION USING AN ECONOMIC MODELING TOOL (OLYMPE): AN APPROACH FROM HOUSEHOLD TO LANDSCAPE SCALES TO ASSIST DECISION MAKING PROCESSES FOR DEVELOPMENT PROJECTS SUPPORTING CONSERVATION AGRICULTURE IN MADAGASCAR.
9:15	VALENTINA ROBIGLIO	SHIFTING CULTIVATION LANDSCAPES IN TRANSITION: UNDERSTANDING THE SPATIAL TRENDS OF AGRICULTURAL MOSAICS TO MAINTAIN ENVIRONMENTAL SERVICES AT TROPICAL FOREST MARGINS
9:30	LAURÈNE FEINTRENIE, ISWAN ROLAND, MADE AGUSTAVIA, JEAN-CHRISTOPHE CASTELLA & JEAN-LAURENT PFUND	A KNOWLEDGE BASE TO COMPARE MULTI-DISCIPLINARY AND MULTI-SCALE DATA FOR IMPROVED LANDSCAPE MANAGEMENT
9:45	MANUEL BOISSIERE, IMAM BASUKI, AMANDINE BOUCARD & KHAMSAO MOUAXENGCHA	ENGAGING LOCAL PEOPLE IN BIODIVERSITY MONITORING FROM THE START – OUR EXPERIENCE IN LAOS
10:00	JEAN-LAURENT PFUND & SUSANNAH RAFFE	INFORMING LANDSCAPE MANAGEMENT: KEEP SIMPLE AND LOOK FOR FRIENDS

Symposium 4: Network theory to conserve and reconnect forested landscapes
Organized by Marie-Josee Fortin & Santiago Saura
Sep 22 Auditório Dionísio Gonçalves

Time	Authors	Title
11:00	MARIE-JOSEE FORTIN	SPATIAL GRAPH THEORY TO ASSESS ANIMAL MOVEMENT AND LIMIT DISEASE SPREAD IN FRAGMENTED LANDSCAPES
11:30	SANTIAGO SAURA	NETWORK THEORY GOES BEYOND TOPOLOGY: PLACING CONNECTIVITY IN A BROADER CONTEXT OF CONSERVATION MANAGEMENT ALTERNATIVES
11:45	ÖRJAN BODIN & SANTIAGO SAURA	RANKING INDIVIDUAL HABITAT PATCHES AS CONNECTIVITY PROVIDERS: INTEGRATING NETWORK ANALYSIS AND PATCH REMOVAL EXPERIMENTS
12:00	FERENC JORDAN	QUANTIFYING KEY ELEMENTS OF LANDSCAPE GRAPHS: MATCHING AVAILABLE TOOLS TO DIVERSE PROBLEMS
11:15	PETER VOGT	LINKING FOREST SPATIAL PATTERN ANALYSIS WITH NETWORK THEORY
12:15	SAMUEL DECOUT, SANDRA LUQUE, STEPHANIE MANEL & CLAUDE MIAUD	CONNECTIVITY LOSS IN HUMAN DOMINATED LANDSCAPE: OPERATIONAL TOOLS FOR THE IDENTIFICATION OF SUITABLE HABITAT PATCHES AND CORRIDORS ON AMPHIBIAN'S POPULATION

Symposium 5: Landscape genetics
Organized by Maria Alice Pinto
Sep 22 Auditório Dionísio Gonçalves

Time	Authors	Title
14:00	MARIA ALICE PINTO, JOHN S. JOHNSTON, JOÃO C. AZEVEDO, ANDREIA BRANDÃO, INÊS MOURA, IRENE MUÑOZ, PILAR DE LA RUA & JOHN C. PATTON	A LANDSCAPE GENETICS APPROACH TO UNRAVEL THE COMPLEX EVOLUTIONARY HISTORY OF THE IBERIAN HONEY BEE HYBRID ZONE
14:15	STEPHANE JOOST	GEOME : TOWARDS AN INTEGRATED WEB-BASED LANDSCAPE GENOMICS PLATFORM
14:30	E.L. LANDGUTH, S.A. CUSHMAN, M.K. SCHWARTZ, K.S. MCKELVEY2, M. MURPHY, G. LUIKART & BRIAN HAND	QUANTIFYING THE LAG TIME TO DETECT BARRIERS IN LANDSCAPE GENETICS
14:45	STEPHEN F. SPEAR, NIKO BALKENHOL, MARIE-JOSEE FORTIN, BRAD H. MCRAE & KIM SCRIBNER	USE OF RESISTANCE SURFACES FOR LANDSCAPE GENETIC STUDIES: CONSIDERATIONS FOR PARAMETERIZATION AND ANALYSIS
15:00	CARLOS FERNANDES, FERNANDO ASCENSÃO, MAFALDA BASTO, RUI REBELO, ANTHONY CLEVENGER, STEVEN KALINOWSKI, ELOY REVILLA SANCHEZ, BRADNEAR MCRAE & MARGARIDA SANTOS-REIS	FOREST FRAGMENTATION AND WILDLIFE POPULATION CONNECTIVITY IN SOUTHERN PORTUGAL: A COMPARATIVE LANDSCAPE GENETICS APPROACH

Symposium 6: Road ecology: improving connectivity
Organized by Fernando Ascensão & Simone Freitas
Sep 22 Auditório Dionísio Gonçalves

Time	Authors	Title
16:00	JUAN E. MALO & CRISTINA MATA	ROADS AND RAILWAYS SPLIT UNGULATE POPULATIONS TRIGGERING THEIR GENETIC DIFFERENTIATION
16:15	BEATRIZ TERRONES, SARA MICHELLE CATALÁN, AYDEÉ SANJINÉS, ENCARNACIÓN RICO & ANDREU BONET	DETECTING VULNERABLE SPOTS FOR ECOLOGICAL CONNECTIVITY CAUSED BY MINOR ROAD NETWORK IN ALICANTE, SPAIN
16:30	CARLOS IGLESIAS, CRISTINA MATA & JUAN E. MALO	INFLUENCE OF TRAFFIC NOISE ON VERTEBRATE CROSSING OF ROADS THROUGH UNDERPASSES
16:45	CLARA GRILO, DYANA RETO, JOANA SOUSA, HUGO MATOS, INÊS LEITÃO, PAULA PINHEIRO, MÓNICA COSTA, FILIPE SILVA, FERNANDO ASCENSÃO, JOÃO BERNARDO, RUI LOURENÇO, ANA MARQUES & MARGARIDA SANTOS-REIS	ROAD EFFECTS AND MITIGATION: RESPONSES OF OWLS AND CARNIVORES
17:00	CLÁUDIA O. M. SOUSA, SIMONE R. FREITAS & JEAN PAUL METZGER	THE INFLUENCE OF ROADS ON NATIVE VEGETATION AND RESERVES DISTRIBUTION IN SÃO PAULO STATE, BRAZIL

Symposium 7: A landscape approach to sustainable forest management:
the challenge to adaptive management and the maintenance of biodiversity value
Organized by Sandra Luque
Sep 23 Auditório Dionísio Gonçalves

Time	Authors	Title
9:00	JUAN MANUEL CELLINI, GUILLERMO MARTÍNEZ PASTUR, ELEONORA BASSINO, MARÍA VANESSA LENCINAS & MARCELO BARRERA	LANDSCAPE PLANT DIVERSITY DISTRIBUTION RELATED TO ENVIRONMENTAL GRADIENTS AND HUMAN IMPACT ACTIVITIES IN SOUTH PATAGONIA
9:15	MARJA KOLSTRÖM, TERHI VILÉN & MARCUS LINDNER	IS IT POSSIBLE TO COMBINE ADAPTATION TO CLIMATE CHANGE AND MAINTAINING OF FOREST BIODIVERSITY?
9:30	SANDRA LUQUE	THE CHALLENGE TO ADAPTIVE MANAGEMENT AND THE MAINTENANCE OF BIODIVERSITY VALUE
9:45	JOAQUIN SOLANA, YASNA ROJAS, MAURICIO RUIZ-TAGLE & FERNANDO GARCIA-ROBREDO	MODELLING BIODIVERSITY INDEXES TO APPLY IN FOREST LINEAR PROGRAMMING MODELS. A CASE STUDY IN A SECOND-GROWTH NOTHOPHAGUS FOREST.

Symposium 8: Ecosystem services from forests at the watershed scale
Organized by Sónia Ribeiro
Sep 23 Auditório Dionísio Gonçalves

Time	Authors	Title
11:00	SÓNIA CARVALHO-RIBEIRO & TERESA PINTO-CORREIA	FORESTS IN LANDSCAPES: MODELLING FOREST LAND COVER PATTERNS SUITABILITY FOR MEETING FUTURE DEMANDS FOR LANDSCAPE GOODS AND SERVICES
11:15	KEN SUGIMURA, HIROSHI TANAKA, HISATOMO TAKI, TOSHIYA MATSUURA, KIMIKO OKABE, SHUNICHI MAKINO & KAORU MAETO	EVALUATION OF BIODIVERSITY RELATED ECOSYSTEM SERVICES OVER FORESTED LANDSCAPES-A CASE STUDY IN JAPAN
11:30	JOÃO PEDRO NUNES, JOSÉ JAVIER CANCELO, MARIA ERMITAS RIAL, MARUXA MALVAR, FILIPA TAVARES, DIANA VIEIRA, FREDERIKE SCHUMACHER, FRANCISCO DÍAZ-FIERROS, ANTÓNIO DINIS FERREIRA, CELESTE COELHO & JAN JACOB KEIZER	IMPACTS OF WILDFIRES ON CATCHMENT HYDROLOGY: RESULTS FROM MONITORING AND MODELING STUDIES IN NORTHWESTERN IBERIA
11:45	TERESA PINTO-CORREIA	BUILDING INDICATORS ON THE SOCIAL VALUES OF FORESTS – THE LANDSCAPE APPROACH
12:00	DANIELA RIBEIRO, ANDREJ PAUŠIČ & ANDRAŽ ČARNI	IMPACT OF LANDSCAPE INDICATORS ON SPATIAL DISTRIBUTION OF FORESTS IN NE SLOVENIA

Symposium 9: Management and conservation of Mediterranean forest landscapes
Organized by Francisco Moreira
Sep 24 Auditório Dionísio Gonçalves

Time	Authors	Title
9:20	FILIPE BARROSO, HELENA MENEZES & TERESA PINTO-CORREIA	THE ROLE OF PUBLIC GOODS IN THE MANAGEMENT OF THE MONTADO: EXTERNALITIES OR DRIVERS?
9:35	DIANA SUROVÁ	ASSESSING USERS PREFERENCES IN THE CORK OAK MONTADO
9:50	PAULO M. FERNANDES, CARLOS LOUREIRO, MARCO MAGALHÃES & PEDRO FERREIRA	TESTING THE FIRE PARADOX: IS FIRE INCIDENCE IN PORTUGAL AFFECTED BY FUEL AGE?
10:05	MIGUEL N. BUGALHO, ORLANDO BRANCO & LUÍS NEVES SILVA	PAYMENT FOR ECOSYSTEM SERVICES: A NOVEL TOOL FOR THE CONSERVATION OF MEDITERRANEAN EVERGREEN OAK WOODLANDS?
10:20	VANDA ACÁCIO	LANDSCAPE DYNAMICS IN THE CORK OAK MONTADO: ROLE OF BIOPHYSICAL AND SOCIAL VARIABLES
10:35	FRANCISCO MOREIRA, PEDRO VAZ, FILIPE CATRY & JOAQUIM S. SILVA	MANAGING MEDITERRANEAN LANDSCAPES FOR REDUCING FIRE HAZARD: PATTERNS OF FIRE PREFERENCE AND AVOIDANCE BY DIFFERENT LAND COVERS

Symposium 10: Global change and transitions in forest landscapes
Organized by Tom Evans & Mateus Batistella
Sep 24 Auditório Dionísio Gonçalves

Time	Authors	Title
11:20	JULIANA SAMPAIO FARINACI, DEBORA PIGNATARI DRUCKER & HUMBERTO PRATES DA FONSECA ALVES	POPULATION AND FOREST COVER CHANGE IN SÃO PAULO COAST, SOUTHEASTERN BRAZIL
11:35	MATEUS BATISTELLA, JULIANA SAMPAIO FARINACI, ROBERTO LUIZ DO CARMO, TOM P. EVANS & EMILIO F. MORAN	DYNAMICS OF REFORESTATION IN COUPLED SOCIAL-ECOLOGICAL SYSTEMS: THE STATE OF SÃO PAULO, BRAZIL
11:50	LEANDRO REVERBERI TAMBOSI, PAULA KOELER LIRA & JEAN PAUL METZGER	EFFECTS OF FOREST REGENERATION DYNAMICS ON THE STRUCTURE OF THREE BRAZILIAN ATLANTIC FOREST FRAGMENTED LANDSCAPES
12:05	SANDRA R. BAPTISTA	METROPOLITAN LAND-USE DYNAMICS AND TROPICAL FOREST COVER CHANGE: AN INTERNATIONAL COLLABORATIVE RESEARCH AGENDA
12:20	TOM EVANS, KELLY CAYLOR, SEAN SWEENEY, MATEUS BATISTELLA & JULIANA FARINACI	COMPARISON OF LOCAL-LEVEL DRIVERS OF REFORESTATION IN INDIANA (USA) AND SÃO PAULO (BRAZIL)

Symposium 11: Interfaces and interactions between forest and agriculture in rural landscapes
Organized by Emilie Andrieu, M. Deconchat & A. Ouin
Sep 24 Auditório Dionísio Gonçalves

Time	Authors	Title
14:00	MARTIN HERMY	LESSONS FROM THE PAST TO THE FUTURE. FUTURE NEEDS FOR FOREST PLANTS
14:15	P. GONÇALVES, S. ALCOBIA, L. SIMÕES & M. SANTOS-REIS	EFFECTS OF MANAGEMENT ACTIONS IN MAMMAL DIVERSITY AND ABUNDANCE IN A MEDITERRANEAN AGROFORESTRY SYSTEM
14:30	AUDE VIALATTE, RICHARD BAILEY, CYNTHIA GAUTHIER, CHLOÉ VASSEUR, GUILLAUME GAUTHIER & ANDREAS PRINZING	HOW AGRICULTURAL LANDSCAPE CONTEXT INFLUENCES THE DISTRIBUTION OF FOLIAR OAK GALLS IN THE FOREST CANOPY?
14:45	A. OUIN1, M. DECONCHAT, P.MENOZZI, C.MONTEIL, L.RAISON, A. ROUME, J.P.SARTHOU, A. VIALATTE & G.BALENT	DO WOODED ELEMENTS IN AGRICULTURAL LANDSCAPE CONTRIBUTE TO BIOLOGICAL CONTROL IN CROPS?
15:00	E.ANDRIEU, A. SOURDRIL, G. DU BUS DE WARNAFFE, M. DECONCHAT & G.BALENT	WHEN FORESTS ARE MANAGED BY FARMERS
15:15	D. GENIN, Y. AUMEERUDY-THOMAS, G. BALENT & G. MICHON	A FRAMEWORK FOR CHARACTERIZING CONVERGENCE AND DISCREPANCY IN RURAL FOREST MANAGEMENT IN TROPICAL AND TEMPERATE ENVIRONMENTS

Symposium 12: From abandoned farmland to self-sustaining forests: challenges and solutions
Organized by Vânia Proença, João Honrado & and Henrique Miguel Pereira
Sep 24 Auditório Dionísio Gonçalves

Time	Authors	Title
16:00	CARLOS AGUIAR	WHERE HAVE ALL THE FORESTS GONE, LONG TIME PASSING
16:15	JOÃO HONRADO, JOAQUIM ALONSO & JOÃO CABRAL	VEGETATION DYNAMICS, ECOSYSTEM PROPERTIES AND NATURAL VALUE IN CHANGING MOUNTAIN LANDSCAPES
16:30	CHRISTINE ESTREGUIL & GIOVANNI CAUDULLO	HARMONIZED MEASUREMENTS OF SPATIAL PATTERN AND CONNECTIVITY: APPLICATION TO FOREST HABITATS IN THE EBONE EUROPEAN PROJECT.
16:45	VÂNIA PROENÇA, JOÃO GUILHERME & HENRIQUE M. PEREIRA	NATURALLY REGENERATED FORESTS AND SPECIES DIVERSITY PATTERNS IN MULTI-HABITAT LANDSCAPES
17:00	JOSÉ Mª REY BENAYAS	RESTORATION OF BIODIVERSITY AND ECOSYSTEM SERVICES IN CROPLAND. FURTHER RESEARCH IS NEEDED BUT ACTION IS DESPERATELY NEEDED
17:15	HENRIQUE MIGUEL PEREIRA	REWILDING ABANDONED LANDSCAPES IN EUROPE

Oral sessions

Management and sustainability 1 **Chaired by Patrick Charles Goebel**

Sep 22 Auditório Pequeno

Time	Authors	Title
9:00	CRISTIAN ECHEVERRIA, ADRIAN NEWTON, JOSE MARIA REY-BENAYAS, JENNIFER SCHULZ & LAURA NAHUELHUAL	SUSTAINABLE LANDSCAPES IN CHILE?
9:15	ESMAEIL KOUHGARDI & MEHRDAD AKBARZADEH	ROLE OF PLANTED FORESTS AND TREES OUTSIDE FORESTS IN SUSTAINABLE FOREST MANAGEMENT IN IRAN
9:30	LENIR APARECIDA MAINARDES DA SILVA & EDINA SCHIMANSKI	THE CERTIFICATION OF FOREST MANAGEMENT AND ITS CONTRIBUTION TO THE RIGHTS OF WORKERS
9:45	MARINE ELBAKIDZE[1], PER ANGELSTAM, KJELL ANDERSSON, MATS NORDBERG, YURIJ PAUTOV	DOES FOREST CERTIFICATION CONTRIBUTE TO BOREAL BIODIVERSITY CONSERVATION IN SWEDEN AND NW RUSSIA?
10:00	R. GREGORY CORACE, III, P. CHARLES GOEBEL & DAVID M. HIX	IMPLEMENTING ECOLOGICAL FORESTRY CONCEPTS AT US FISH AND WILDLIFE NATIONAL WILDLIFE REFUGES IN THE NORTHERN LAKE STATES, USA

Management and sustainability 2 **Chaired by Rebecca Kennedy**

Sep 22 Auditório Pequeno

Time	Authors	Title
14:00	ERNESTO ESCALANTE, MARIA DO SAMEIRO PATRÍCIO, VALENTIN PANDO & FELIPE BRAVO	BIOMASS YIELD AND CARBON SEQUESTRATION: A POTENTIAL FROM SPAIN'S FORESTS (ON CENTRAL AND IBERIAN MOUNTAIN RANGE SYSTEMS)
14:15	JOSU G. ALDAY, CAROLINA MARTÍNEZ-RUIZ & FELIPE BRAVO	ARE PLANT FUNCTIONAL TRAITS DETERMINING SPECIES RESPONSE TO HARVEST TREATMENTS?
14:30	LAURA POGGIO, ALESSANDRO GIMONA, MARIE CASTELLAZZI & IAIN BROWN	SPATIAL MODELLING OF FOREST LANDSCAPE STRUCTURAL CONNECTIVITY
14:45	REBECCA S.H. KENNEDY	POTENTIAL FUTURE EFFECTS OF FIRE AND VEGETATION DYNAMICS, CLIMATE CHANGE, AND MANAGEMENT ON ECOSYSTEM SERVICES – WILDLIFE HABITAT AND CARBON SEQUESTRATION IN FORESTS OF THE PACIFIC NORTHWEST, USA
15:00	SHADANANAN NAIR	ANTHROPOGENIC AND CLIMATE CHANGE IMPACTS ON THE WESTERN GHATS MOUNTAIN FORESTS OF INDIA
15:15	Y. SERENGİL, E. PAOLETTİ, A. AUGUSTAİTİS, A. BYTNEROWİCZ, N.GRULKE, A.R. KOZOVİTZ, R. MATYSSEK, G. MÜLLER-STARCK, M. SCHAUB, H. SHANG, D.WEİNSTEİN & G. WİESER	ADAPTATION OF FOREST ECOSYSTEMS TO AIR POLLUTION AND CLIMATE CHANGE: A GLOBAL UPDATE

Management and sustainability 3 **Chaired by Thomas Panagopoulos**

Sep 23 Auditório Pequeno

Time	Authors	Title
9:00	EDINA SCHIMANSKI, LENIR APARECIDA M. DA SILVA & SANDRA SCHEFFER	THE IMPORTANCE OF ENVIRONMENTAL EDUCATION TO RESTORE AND PRESERVE NATURAL AND CULTURAL HERITAGE: THE CASE OF PIRAI DA SERRA – SOUTH OF BRAZIL
9:15	KELELENG OSSOHOUNAM & DJONDO PATRICK	HUMAN IMPACTS ON LANDS RESOURCES IN WEST-AFRICA AND BEYOND
9:30	MARC ELGIN M. DELGADO & FRANK CANTERS	MAPPING TREES PREFERRED BY FARMERS: PARTICIPATORY ASSESSMENT AND LAND SUITABILITY EVALUATION FOR IMPROVED AGROFORESTATION OF DEGRADED FORESTLANDS IN CLAVERIA, SOUTHERN PHILIPPINES
9:45	PER ANGELSTAM & MARINE ELBAKIDZE	MULTI-LEVEL GOVERNANCE AND SPATIAL PLANNING FOR SUSTAINABLE FOREST LANDSCAPES IN NORTHWEST RUSSIA: KOVDOZERSKY MODEL FOREST
10:00	TOMÁŠ VRŠKA, KAMIL KRÁL & DUŠAN ADAM	WHERE AND WHY THE CZECH OLD-GROWTH FORESTS SURVIVED IN THE CULTURAL LANDSCAPE
10:15	THEODORE HOWARD	IMPLICATIONS OF BIOMASS ENERGY HARVESTING FOR FORESTED LANDSCAPES IN THE NORTHEASTERN UNITED STATES

Biodiversity conservation and planning 1 **Chaired by Margarida Santos-Reis**

Sep 22 Auditório Alcinio Miguel

Time	Authors	Title
9:00	AMEHA TADESSE, ZEWDU ESHETU ,TESFAYE BEKELE & DEMEL TEKETAY	IMPACT OF Prosopis juliflora (Sw. DC.) INVASION ON PLANT BIODIVERSITY AND SOIL PROPERTIES IN MIDDLE AWASH NORTHEASTERN, ETHIOPIA
9:15	AMY E. EYCOTT, GAVIN B. STEWART, LISETTE M. BUYUNG-ALI, DIANA E. BOWLER, KEVIN WATTS & A.S. PULLIN	THE IMPACT OF THE MATRIX ON SPECIES MOVEMENT: SYSTEMATIC REVIEW AND META-ANALYSIS
9:30	CHRISTOPHER M MCLEAN & ROSS A BRADSTOCK	THE EFFECT OF FIRE REGIMES AND LOGGING ON TREE HOLLOW DYNAMICS AND ARBOREAL MARSUPIALS IN AUSTRALIAN EUCALYPT FORESTS
9:45	JOEL HARTTER, SADIE J. RYAN, JANE SOUTHWORTH, ABRAHAM C. GOLDMAN, MICHAEL W. BINFORD & COLIN A. CHAPMAN	FORTRESSES AND FRAGMENTS: IMPACTS OF FRAGMENTATION IN A FOREST PARK LANDSCAPE
10:00	JOSÉ M.GARCÍA DEL BARRIO, DAVID SÁNCHEZ DE RON, MARTA ORTEGA & RAMÓN ELENA-ROSSELLÓ	UNDERSTANDING VASCULAR PLANT SPECIES DIVERSITY AT LANDSCAPE LEVEL. SPATIAL RELATIONSHIPS BETWEEN ALPHA AND BETA DIVERSITY IN FORESTED LANDSCAPES.
10:15	LUÍS M. ROSALINO, DULCE FERREIRA, INÊS LEITÃO & MARGARIDA SANTOS-REIS	WOOD MICE CONSERVATION IN A CHANGING MEDITERRANEAN AGRO-FOREST LANDSCAPE: THE IMPORTANCE OF REFUGES

Biodiversity conservation and planning 2 **Chaired by Jean-François Mas**

Sep 22 Auditório Alcinio Miguel

Time	Authors	Title
14:00	ANA PROHASKA, CYNTHIA A. FROYD, ALTHEA L. DAVIES & KATHERINE J. WILLIS	INCORPORATING LONG-TERM NATURAL VARIABILITY INTO CONSERVATION PLANNING: A CASE STUDY OF ECOLOGICAL RESTORATION OF THE CALEDONIAN FOREST, SCOTLAND
14:15	CÂNDIDA MENDES & EDUARDO DIAS	PEATLAND DISTRIBUTION ANALYSIS ON AZOREAN TERRESTRIAL PROTECTED AREAS
14:30	CARMO SILVA, SANDRA ANTUNES, NUNO OLIVEIRA & FILIPA GOUVEIA	USING BUSINESS AND BIODIVERSITY TO PUT CONSERVATION INTO PRACTICE: THE HERDADE DO ESPORÃO CASE STUDY
14:45	JEAN-FRANÇOIS MAS, AZUCENA PÉREZ VEGA, KEITH CLARKE & VÍCTOR SÁNCHEZ-CORDERO	MODELING LAND USE/COVER CHANGE AND BIODIVERSITY CONSERVATION IN MEXICO
15:00	JEAN-SIMON MICHAUD, NICHOLAS C. COOPS, MARGARET E. ANDREW & MICHAEL A. WULDER	CHARACTERIZING SPATIOTEMPORAL ENVIRONMENTAL VARIATION THROUGHOUT ONTARIO USING REMOTE SENSING DERIVED INDICATORS
15:15	CHRISTIAN TEMPERLI, ANTONI TRASOBARES, CHÉ ELKIN, HARALD BUGMANN	ASSESSING TRADE-OFFS IN ADAPTIVE FOREST MANAGEMENT FOR MULTIPLE ECOSYSTEM GOODS AND SERVICES UNDER CLIMATE CHANGE USING LANDSCAPE SCALE MODELING

Biodiversity conservation and planning 3 **Chaired by Santiago Saura**

Sep 23 Auditório Alcinio Miguel

Time	Authors	Title
9:00	E. FERNÁNDEZ-NÚÑEZ, A. RIGUEIRO-RODRÍGUEZ & M.R. MOSQUERA-LOSADA	EIGHT YEARS OF DEVELOPMENT OF A SILVOPASTORAL SYSTEM: EFFECTS ON FLORISTIC DIVERSITY
9:15	JUAN MANUEL CELLINI, GUILLERMO MARTÍNEZ PASTUR, ELEONORA BASSINO, MARÍA VANESSA LENCINAS & MARCELO BARRERA	LANDSCAPE PLANT DIVERSITY DISTRIBUTION RELATED TO ENVIRONMENTAL GRADIENTS AND HUMAN IMPACT ACTIVITIES IN SOUTH PATAGONIA
9:30	KEVIN M. POTTER & BARBARA S. CRANE	RANKING FOREST TREE GENETIC RISK ACROSS THE SOUTHERN APPALACHIANS: A TOOL FOR CONSERVATION DECISION-MAKING IN CHANGING TIMES
9:45	LUCIANO M. VERDADE, CARLA GHELER-COSTA & FERNANDO CESAR C. AZEVEDO	CONSERVATION VALUE OF AGRICULTURAL LANDSCAPES OF SÃO PAULO, BRAZIL
10:00	LUIS SANTOS-DEL-BLANCO, ANA I. DE-LUCAS & ELENA HIDALGO	EXTENSIVE PATTERNS OF CLONALITY IN P. ALBA AND P. X CANESCENS IN SPAIN: IMPLICATIONS FOR RIPARIAN LANDSCAPES AND ECOSYSTEMS MANAGEMENT
10:15	MARIA VICTORIA NUÑEZ MARTI, MARIA DOLORES VELARDE CASTOLFI-SALVONI & ANTONIO GARCIA ABRIL	CRITERIA FOR LANDSCAPE INTEGRATION OF REFORESTATIONS IN THE MEDITERRANEAN REGION: IDENTIFICATION OF BEST PRACTICES IN THE COMMUNITY OF MADRID

Biodiversity conservation and planning 4 **Chaired by João Azevedo**

Sep 24 Auditório Pequeno

Time	Authors	Title
9:20	ROSEMERI SEGECIN MORO & CARLOS HUGO ROCHA	A METHODOLOGICAL PROPOSAL FOR RESTORATION OF FORESTS IN SOUHTERN BRAZIL
9:35	TINKA SACK	TOWARDS A WESTERN BAROQUE: BIODIVERSITY IN A HETEROGENEOUS LANDSCAPE
9:50	FLÁVIO BERTIN GANDARA & PAULO YOSHIO KAGEYAMA	GENETIC STRUCTURE OF Cedrela fissilis Vel. (Meliaceae) POPULATIONS, AN ENDANGERED TROPICAL TREE SPECIES, IN BRAZIL
10:05	ALES POLJANEC & ANDREJ BONCINA	CHANGES IN STRUCTURE AND COMPOSITION OF FOREST STANDS AT REGIONAL AND NATIONAL LEVEL IN THE LAST FOUR DECADES - A CONSEQUENCE OF ENVIRONMENTAL, NATURAL OR SOCIAL FACTORS?

Monitoring 1 **Chaired by W. Keith Moser**

Sep 22 Auditório Pequeno

Time	Authors	Title
11:00	ALBERTO L. TEIXIDO, LUIS G. QUINTANILLA, FRANCISCO CARREÑO & DAVID GUTIÉRREZ	IMPACTS OF CHANGES IN LAND USE AND FRAGMENTATION PATTERNS ON ATLANTIC COASTAL FORESTS IN NORTHERN SPAIN
11:15	CRISTINA BRANQUINHO, PEDRO PINHO, ESTEVE LLOP & MARIA JOÃO PEREIRA	LICHEN DIVERSITY AS AN ECOLOGICAL INDICATOR OF LAND-USE CHANGE
11:30	FRANCISCO JAVIER GOMEZ, MARTI BOADA & DIEGO VARGA	LAND USE CHANGES AND MIXED FOREST DYNAMICS. THE CASE OF MONTIFERRU MOUNTAINS (SARDINIA, ITA) (1956-2006)
11:45	HARIFIDY RAKOTO RATSIMBA, LALANIRINA GABRIELLE RAJOELISON, FETRA MIHAJAMANANA RABENILALANA, JAN BOGAERT & ERIC	MULTI-SCALE ANALYSIS OF CARBON STOCKS AND DEFORESTATION MONITORING – CASE OF THE EASTERN TROPICAL HUMID FOREST OF MADAGASCAR
12:00	SANDRA MARIA SCHEFFER & EDINA SCHIMANSKI	THE PROCESS OF URBANIZATION AND THE ENVIRONMENT - the case of irregular land occupation in the city of Ponta Grossa - PR - Brazil
12:15	W. KEITH MOSER, JOSEPH Z. FAN & MARK H. HANSEN	USING NATIONAL FOREST INVENTORIES TO EVALUATE THREAT PROBABILITIES: RISK-MAPPING NON-NATIVE INVASIVE PLANT PRESENCE IN NORTHERN US FORESTS

Disturbances 1 **Chaired by Ajith Perera**

Sep 22 Auditório Alcinio Miguel

Time	Authors	Title
11:00	LUIS GALIANA & CRISTINA MONTIEL	LANDSCAPE CHANGES AND WILDFIRE BEHAVIOUR: NEW FIRE SCENARIOS IN SPAIN
11:15	MARTIN-QUELLER, GIL-TENA & SANTIAGO SAURA	WOODY PLANT DIVERSITY IN MEDITERRANEAN LANDSCAPES: THE ROLE OF AGROSILVICULTURAL DISTURBANCES AND NON-STATIONARITY
11:30	RITA DURÃO, MARIA JOÃO PEREIRA, MANUEL RIBEIRO, CRISTINA BRANQUINHO & AMILCAR SOARES	ASSESSING FOREST FIRE RISK IN PORTUGAL - A GEOSTATISTICAL APPROACH
11:45	THOMAS CURT & JULI PAUSAS	COULD CHANGES IN FIRE REGIME ALTER THE LANDSCAPE PERSISTENCE OF CORK OAK-SHRUBLAND MOSAICS? A SIMULATION APPROACH IN SOUTHERN FRANCE
12:00	JOÃO TORRES , JOÃO GONÇALVES1, LUIS TORGO & JOÃO HONRADO	FIRE AND LANDSCAPE: A MULTI-SCALE ASSESSMENT OF A COMPLEX RELATION
12:15	F. ASCENSÃO, C. GRILO, D. RETO, J. FILIPE, A. CLEVENGER & M. SANTOS-REIS	HIGHWAY VERGES: SAFE REFUGES OR EFFECTIVE BARRIERS FOR SMALL MAMMALS?

Disturbances 2 **Chaired by Louis R. Iverson**

Sep 22 Auditório Alcinio Miguel

Time	Authors	Title
16:00	NATALIE ZURBRIGGEN, HEIKE LISCHKE & PETER BEBI	MODELLING FEEDBACKS BETWEEN AVALANCHES AND FORESTS UNDER A CHANGING ENVIRONMENT IN THE SWISS ALPS
16:15	LIBBY WILLIAMSON, CHRIS JOHNSON, DALE SEIP & KATHERINE PARKER	IMPACTS OF INDUSTRIAL DEVELOPMENT ON HABITAT SELECTION AND MOVEMENT ECOLOGY OF WOLVES (Canis lupus) AND WOODLAND CARIBOU (Rangifer tarandus caribou) IN THE SOUTH PEACE REGION OF BRITISH COLUMBIA
16:30	P. CHARLES GOEBEL, CHARLES W. GOSS, LANCE R. WILLIAMS & VIRGINIE BOUCHARD	HOW IMPORTANT ARE RIPARIAN FORESTS TO AQUATIC FOODWEBS IN AGRICULTURAL WATERSHEDS OF NORTH-CENTRAL OHIO, USA?
16:45	RICHARD A FLEMING, ALLAN L. CARROLL & JEAN-NOËL CANDAU	HOW CLIMATE AND FOREST MANAGEMENT CAN OPERATE THROUGH LANDSCAPE STRUCTURE TO AFFECT THE ERUPTIVE POTENTIAL OF A FOREST INSECT POPULATION
17:00	TENG-CHIU LIN, KUO-CHUAN LIN, JEEN-LIANG HWONG, HSUEH-CHING WANG & CHAO-HSIEN FU	IMMEDIATE EFFECTS OF TYPHOON DISTURBANCE AND ARTIFICAL THINNING ON UNDERSTORY LIGHT ENVIRONMENTS IN TWO SUBTROPICAL FORESTS IN TAIWAN
17:15	LOUIS R. IVERSON, ANANTHA PRASAD, STEPHEN MATTHEWS & MATTHEW PETERS	MERGER OF THREE MODELING APPROACHES TO ASSESS POTENTIAL EFFECTS OF CLIMATE CHANGE ON TREES IN THE EASTERN UNITED STATES

Disturbances 3 **Chaired by Guillermo Martínez Pastur**

Sep 23 Auditório Alcinio Miguel

Time	Authors	Tile
11:00	ANGELA LOMBA, R.H.G. JONGMAN, R.G.H. BUNCE, FRANCISCO MOREIRA & JOÃO HONRADO	HOW EFFECTIVE ARE FOREST STANDS AS BIODIVERSITY REFUGES IN INTENSIVE FARMLAND? A TEST OF PATCH, NEIGHBORHOOD AND MATRIX EFFECTS ON FOREST PLANT DIVERSITY IN NORTHERN PORTUGAL
11:15	GUILLERMO MARTÍNEZ PASTUR, ROSINA SOLER ESTEBAN, MARÍA VANESSA LENCINAS & LAURA BORRELLI	INDIRECT ESTIMATION OF LANDSCAPE USES BY Lama guanicoe AND DOMESTIC HERBIVOROUS THROUGH THE STUDY OF DIET COMPOSITION IN SOUTH PATAGONIA.
11:30	KAMIL SENGONUL & YASEMIN OZTURK	SEPTEMBER – 2009 FLOODS IN ISTANBUL (MISUSE OF LAND AND URBANIZATION)
11:45	KATHERINE L. MARTIN & P. CHARLES GOEBEL	IMPACT OF HEMLOCK DECLINE ON SUCCESSIONAL PATHWAYS AND ECOSYSTEM FUNCTION AT MULTIPLE SCALES IN FORESTS OF THE CENTRAL APPALACHIANS, USA
12:00	NICK MITCHELL & GERTRUD SCHAAB	A SPATIO-TEMPORAL METHODOLOGY FOR QUANTIFYING DISTURBANCE IN EAST AFRICAN RAINFORESTS
12:15	DAVID R. GRAY	DETECTING THE SPATIAL SCALE AT WHICH CLIMATE AND FOREST COMPOSITION INFLUENCE SYNCHRONY OF INSECT OUTBREAKS

Tools of landscape assessment and management 1 **Chaired by Yusuf Serengil**

Sep 22 Auditório Pequeno

Time	Authors	Title
16:00	DAVID C. CHOJNACKY & STEPHEN P. PRISLEY	COMBINING MAP-BASED AND GROUND-BASED DATA: MAPPING FOREST LANDSCAPE ATTRIBUTES AS STRATA WITHIN DOUBLE SAMPLING FOR STRATIFICATION DESIGN
16:15	FRÉDÉRIK DOYON & PHILIPPE NOLET	MODELING FOREST VEGETATION CHANGE UNDER CLIMATE CHANGE BETWEEN THE TEMPERATE AND THE BOREAL FOREST IN SOUTHERN QUEBEC USING LATITUDE-SHIFTED TRANSITION MATRICES
16:30	JOHANNA BREYER, PETER BUNTING, RICHARD LUCAS & DANIEL CLEWLEY	INTERPRETATION OF FOREST VERTICAL STRUCTURE AND ASSOCIATED BIRD HABITAT PREFERENCES FROM AIRBORNE LIDAR
16:45	JONATHAN S. RUSSELL, ELLIE E. PREPAS, GORDON PUTZ, DANIEL W. SMITH & JIM GERMIDA	DEVELOPING MODELS AND PROCESSES TO AID DECISION SUPPORT FOR UNDERSTANDING LAND MANAGEMENT CHANGES IN THE CANADIAN BOREAL FOREST
17:00	JOSÉ GASPAR, BEATRIZ FIDALGO, DAVID MILLER, LUÍS PINTO & RAÚL SALAS	VISIBILITY ANALYSIS AND VISUAL DIVERSITY ASSESSMENT IN RURAL LANDSCAPES
17:15	YUSUF SERENGIL, MUHITTIN INAN, MEHMET OZCAN, UMIT KILIC, SINAN COKOYOGLU & BETUL UYGUR	DEVELOPMENT OF A STREAM CORRIDOR SURVEY METHODOLOGY TO LINK WITH WATERSHED VULNERABILITY IN ISTANBUL

Tools of landscape assessment and management 2 **Chaired by Beatriz Fidalgo**

Sep 24 Auditório Pequeno

Time	Authors	Title
11:20	ALDA MATOS, PAULA CABO, ANTÓNIO FERNANDES & ISABEL RIBEIRO	ECONOMICAL VALUATION OF ENVIRONMENTAL GOODS AND SERVICES
11:35	BEATRIZ FIDALGO, RAUL SALAS, JOSÉ GASPAR, LUÍS PINTO, HUGO OLIVEIRA, ANDREIA COSTA & JORGE FREIRE	SPATIAL CHARACTERIZATION OF LANDSCAPE FUNCTIONS AND SERVICES TO SUPPORT LOCAL LANDSCAPE PLANNING
11:50	VÍCTOR AVILA-AKERBERG, LUCIA ALMEIDA-LEÑERO & JORGE MEAVE DEL CASTILLO	FOREST QUALITY IN THE VICINITY OF MEXICO CITY: ASSESSMENT TOWARDS SUSTAINABLE FOREST MANAGEMENT
12:05	MARIA LUIZA PORTO, HORST HEINRICH WENDEL, JAIRO JOSÉ ZOCCHE,GILBERTO GONCALVES RODRIGUES,MARISA AZZOLINI & ROGÉRIO BOTH	NATURALNESS AND DIVERSITY OF BIOTOPS: THEIR IMPACT ON LANDSCAPE QUALITY - A MATHEMATICAL MODEL
12:20	TERESA BATISTA, PAULA MENDES & LUISA CARVALHO	THE THIRD DIMENSION IN LANDSCAPE METRICS ANALYSIS APPLIED TO CENTRAL ALENTEJO PORTUGAL
12:35	LARS KOSCHKE, CHRISTINE FÜRST, CARSTEN LORZ, SUSANNE FRANK & FRANZ MAKESCHIN	USING A MULTI-CRITERIA APPROACH TO FIT THE EVALUATION BASIS OF THE MODIFIED 2-D CELLULAR AUTOMATON: PIMP YOUR LANDSCAPE

Tools of landscape assessment and management 3 **Chaired by José Castro**

Sep 24 Auditório Pequeno

Time	Authors	Title
14:00	EZEQUIEL ARÁOZ	CLIMATE AND LAND USE INTENSITY SHAPE FOREST-MEADOW ECOTONES IN SUBTROPICAL MONTANE SYSTEMS
14:15	MARC DECONCHAT, AUDREY ALIGNIER, PHILIPPE ESPY & SYLVIE LADET	IDENTIFICATION AND CHARACTERIZATION OF FOREST EDGE SEGMENTS FOR MAPPING EDGE DIVERSITY IN RURAL LANDSCAPES
14:30	MICHAL REHOR & VRATISLAV ONDRACEK	APPLICATION OF MODERN, NON TRADITIONAL RESTORATION METHODS ON BROWN COAL LOCALITIES OF CZECH REPUBLIC
14:45	DAMASA MAGCALE-MACANDOG NIÑO B. VIDAL, ARNOLD SALVACION & BLESILDA GONZALES	UNDERSTANDING THE PATTERNS OF PROCESSES OF LAND COVER CHANGE IN CALACA, BATANGAS, PHILIPPINES USING PARTICIPATORY RURAL APPROACHES AND GIS MAPPING
15:00	ANTONELLO MIGLIOZZI, FRANCESCO CONA, ANTONIO DI GENNARO, ANTONIO MINGO, A. SARACINO & STEFANO MAZZOLENI	LAND-USE MANAGEMENT AND CHANGES IN CAMPANIA REGION (SOUTHERN ITALY): EXAMPLES FROM TEN REGIONAL STATE FORESTS

Urban Forestry 1 **Chaired by Giovanni Sanesi**

Sep 24 Auditório Alcinio Miguel

Time	Authors	Title
14:00	CLIVE DAVIES	MULTI-FUNCTIONALITY IN URBAN FORESTS IN EUROPE
14:15	GIOVANNI SANESI, GIUSEPPE COLANGELO, GIUSEPPE CARRUS, FRANCESCO FERRINI, FABIO SALBITANO, PAOLO SEMENZATO & RAFFAELE LAFORTEZZA	URBAN FOREST AREAS, BIODIVERSITY AND WELL-BEING: A CASE STUDY IN ITALY
14:30	IRJA LÖFSTRÖM , MIKKO KURTTILA, LEENA HAMBERG & LAURA NIEMINEN	PUBLIC PARTICIPATION, BIODIVERSITY AND RECREATIONAL VALUES IN URBAN FOREST PLANNING IN FINLAND
14:45	ARTUR GONÇALVES, ANTÓNIO CASTRO RIBEIRO, LUÍS NUNES & MANUEL FELICIANO	GREEN SPACE INFLUENCE ON THERMAL COMFORT – STRUCTURED STUDIES IN THE CITY OF BRAGANCA (PORTUGAL)

Patterns and processes 1 **Chaired by Jean Paul Metzger**

Sep 23 Auditório Pequeno

Time	Authors	Title
11:00	CRISTIAN ECHEVERRIA, LUCIANA CRISTOBAL, THOMAS KITZBERGER, GUILLERMO MACHUCA, ROBERT MANSON, RAUL RIVERA & RAUL VACA	DINAMICS IN THE SPATIAL PATTERNS OF DRYLAND FOREST IN LATIN AMERICAN LANDSCAPES
11:15	ELIANE S. MEIER & NIKLAUS E. ZIMMERMANN	ESTIMATING SHIFTS IN SPECIES DISTRIBUTIONS: INFLUENCE OF MACRO-CLIMATE AND LOCAL PROCESSES
11:30	FERNANDO PEÑA, CARLOS BERTRAN, JAIME TAPIA, ENRIQUE HAUENSTEIN, DANIEL ROZAS & MIGUEL ESCALONA	DYNAMIC SPACE-TIME AND FUTURE TRENDS OF CHANGE IN LANDSCAPE UNITS OF COASTAL WATERSHEDS IN LA ARAUCANÍA REGION OF CHILE.
11:45	FETRA MIHAJAMANANA RABENILALANA, LALANIRINA GABRIELLE RAJOELISON, JEAN PIERRE SORG, JEAN LAURENT PFUND & HARIFIDY RAKOTO RATSIMBA	MULTI-TEMPORAL ANALYSIS OF FOREST LANDSCAPE FRAGMENTATION IN THE NORTH EAST OF MADAGASCAR
12:00	W. KEITH MOSER	LANDSCAPE CHANGE INTO THE FUTURE: PROJECTIONS OF FOREST STRUCTURE AND COMPOSITION IN THE NORTHERN UNITED STATES OVER THE NEXT 60 YEARS
12:15	JOANA VICENTE, HENRIQUE PEREIRA, JOÃO GONÇALVES, ÂNGELA LOMBA, CHRISTOPHE RANDIN, ANTOINE GUISAN & JOÃO HONRADO	IS DISSIMILARITY IN ALIEN PLANT SPECIES COMPOSITION BETTER EXPLAINED BY ENVIRONMENTAL, DISPERSAL OR GEOGRAPHICAL DISTANCE? OR DOES DISTANCE REALLY MATTER?

Patterns and processes 2 **Chaired by João Honrado**

Sep 24 Auditório Alcinio Miguel

Time	Authors	Title
9:20	ANDA RUSKULE, OLGERTS NIKODEMUS, ZANE KASPARINSKA & RAIMONDS KASPARINSKIS	PATERNS OF AFFORESTATION PROCESS IN ABANDONED AGRICULTURE LAND IN LATVIA
9:35	BARBARA BOŻĘTKA	RECENT RELATIONS BETWEEN FORESTRY AND AGRICULTURE IN POLAND- THE RURAL LANDSCAPE ON THE AXIS OF OPENNESS AND ENCLOSURE
9:50	MARC ELGIN M. DELGADO & FRANK CANTERS	RELATING SPATIAL PATTERNS OF AGROFORESTRY SYSTEMS TO SOIL EROSION IN THREE DEFORESTED WATERSHEDS OF CLAVERIA, SOUTHERN PHILIPPINES
10:05	PATRÍCIA RODRIGUES & HENRIQUE M. PEREIRA	LANDSCAPE CHANGES IN CASTRO LABOREIRO PARISH (NW PORTUGAL): FARMLAND ABANDONEMNT AND FOREST REGENERATION.
10:20	JAMI NETTLES, MOHAMED YOUSSEF & JULIAN CACHO	EVALUATING THE FIELD-SCALE WATER USE OF CELLULOSIC BIOFUEL CROPS
10:35	P.GONZÁLEZ-MORENO, J.L.QUERO, F.J. BONET, L.POORTER & R. ZAMORA	THE INFLUENCE OF SPATIAL STRUCTURE ON NATURAL REGENERATION AND BIODIVERSITY IN MEDITERRANEAN PINE PLANTATIONS: A NESTED LANDSCAPE APPROACH

Patterns and processes 3 **Chaired by Yude Pan**

Sep 24 Auditório Pequeno

Time	Authors	Title
11:20	YUDE PAN, RICHARD BIRDSEY, KEVIN MCCULLOUGH & CRAIG WAYSON	ECOSYSTEM PRODUCTIVITY OF THE CONTINENTAL US FORESTS: DATA-BASED ESTIMATION
11:35	D. TONTI1, G. CHIRICI, C. ESTREGUIL, K. OEHMICHEN, K. TROELTZSCH, K. WATTS & M. MARCHETTI	MODELLING THE IMPACT OF LANDSCAPE FRAGMENTATION ON FOREST ECOLOGICAL FUNCTIONALITY
11:50	GEORGI ZHELEZOV	EVALUATION OF THE ECOSYSTEM SERVICE IN THE FOREST FORMATIONS OF BIOSPHERE RESERVE “SREBARNA”, NORTHEASTERN BULGARIA
12:05	HASSANE MOUTAHIR, JUAN F. BELLOT, ANDREU BONET, MANUEL J. BAEZA & ISSAM TOUHAMI	APPLICATION OF REMOTE SENSING TO ASSESS THE IMPACT OF WILDFIRES IN THE NATURAL VEGETATION RECOVERY AND LANDSCAPE STRUCTURE IN THE MEDITERRANEAN FOREST OF ALICANTE PROVINCE
12:20	JORGE LEÓN-MUÑOZ, CRISTIAN ECHEVERRÍA & JOSÉ LUIS IRIARTE	RELATIONSHIPS BETWEEN NITROGEN CONCENTRATIONS AND THE SPATIAL PATTERNS OF WATERSHEDS LOCATED IN A NORTH PATAGONIAN LAKE BASIN IN SOUTHERN CHILE
12:35	PEDRO PINHO, MARIA-AMÉLIA MARTINS-LOUÇÃO, CRISTINA MÁGUAS & CRISTINA BRANQUINHO	CONNECTION OF ECOLOGICAL PROCESSES ACROSS SPATIAL SCALES: LINKING NITROGEN CONCENTRATION IN LICHENS WITH AMMONIA EMISSIONS AND DEPOSITION AT A REGIONAL SCALE

Poster sessions

Biodiversity conservation and planning

Sep 22 17:30-18:30

Abst. #	Authors	Title
PB1	A. MONZÓN, A.L.CRESPÍ, P.FERNANDES, P. BARROS & C.ADRIANO	WHICH ARRANGEMENT OF LANDSCAPE FOR WILD RABBIT?
PB2	ANA TERESA PINTO, JOÃO PAULO CASTRO, FREDERICO FERNANDES & GRAÇA BARREIRA	THE LOMBADA NATIONAL GAME ZONE: FOREST MANAGEMENT PLANS FOR THE BALDIOS (COMMONS) AREAS
PB3	ANABELA MAGALHÃES, PAULO ALVES & TERESA ANDRESEN	THE IMPORTANCE OF BOTANICAL GARDENS IN URBAN LANDSCAPES: RELATIONS BETWEEN ECOSYSTEM FUNCTIONS AND PLANT FUNCTIONAL DIVERSITY
PB4	CARLOS FERNANDES, FERNANDO ASCENSÃO, MAFALDA BASTO, RUI REBELO, ANTHONY CLEVENGER, STEVEN KALINOWSKI, ELOY REVILLA SANCHEZ, BRADNEAR MCRAE & MARGARIDA SANTOS-REIS	FOREST FRAGMENTATION AND WILDLIFE POPULATION CONNECTIVITY IN SOUTHERN PORTUGAL: A COMPARATIVE LANDSCAPE GENETICS APPROACH
PB5	CLÁUDIA CARVALHO-SANTOS, ROB JONGMAN, JOAQUIM ALONSO & JOÃO HONRADO	FINE-SCALE MAPPING OF HIGH NATURE VALUE FARMLANDS: NOVEL APPROACHES TO IMPROVE THE MANAGEMENT OF RURAL BIODIVERSITY AND ECOSYSTEM SERVICES
PB6	DANIELA B. S. LINS, MARTA ORTEGA, RAMON ELENA-ROSSELLÓ & ROZELY F. SANTOS	SPATIAL HABITAT SUITABILITY PARAMETERS OF A STRATEGIC-SPECIES FOR CONSERVATION DECISION
PB7	ERIKA TETETLA-RANGEL, J. LUIS HERNÁNDEZ-STEFANONI & JUAN MANUEL DUPUY	RELATIONSHIP BETWEEN LANDSCAPE STRUCTURE, CLIMATE AND RARE WOODY SPECIES RICHNESS IN TROPICAL FORESTS OF THE YUCATAN PENINSULA, MEXICO
PB8	F. TORRES MANSO, M. TIBÉRIO, L. ROXO, A. MONZON, A. MARTA-COSTA & C. FONSECA	A LANDSCAPE MANAGEMENT PLAN FOR NATURA 2000 "MONTEMURO SITE"
PB9	IMMA CATALANO, ANTONELLO MIGLIOZZI, A.MINGO, SILVIA SGAMBATO & G.GRAZIA APRILE	WOOD MACROLICHEN LOBARIA PULMONARIA ON CHESTNUT TREE CROPS: THE CASE STUDY OF ROCCAMONFINA PARK (CAMPANIA REGION - ITALY)
PB10	J. OMAR LÓPEZ-MARTÍNEZ, J. LUIS HERNÁNDEZ-STEFANONI, JUAN MANUEL DUPUY, FERNANDO TUN-DZUL & FILOGONIO MAY-PAT	ECOLOGICAL FACTORS INFLUENCING BETA DIVERSITY AT TWO SPATIAL SCALES IN A TROPICAL DRY FOREST OF THE YUCATÁN PENINSULA
PB11	JOÃO GONÇALVES, JOÃO TORRES & JOÃO HONRADO	UNCOVERING CHIMPANZEE (Pan troglodytes) LANDSCAPE PATTERNS OF OCCUPANCY THROUGH A COUPLED GRAPH THEORETICAL AND HABITAT SUITABILITY MODELING APPROACH
PB12	JORGE PALADINO CORREA DE LIMA	ECOLOGICAL RESTORATION OF "CHICO MENDES" PARK ECOSYSTEM IN RIO DE JANEIRO
PB13	JULIEN RENAUD, VINCENT BRETON & SANDRA LUQUE	A COMBINED METHOD USING EXPERT KNOWLEDGE AND REMOTE SENSING FOR HABITAT INTERPRETATION AND MAPPING: A NATIONAL LEVEL EFFORT TO MAP TEMPERATE FOREST HABITATS IN FRANCE
PB14	MARGARITA TSIBULNIKOVA	ECONOMIC ESTIMATION IN PLANNING OF USING OF PRESERVATION OF NATURAL LANDSCAPES
PB16	MARIA CONCEIÇÃO RODRIGUES, PAULA SEIXAS ARNALDO & JOSÉ ARANHA	CONTRIBUTION TO THE CHARACTERIZATION OF GENTIANA PNEUMONANTHE L. AND MACULINEA ALCON L. DISTRIBUTION IN THE ALVÃO NATURAL PARK
PB17	MARISE BARREIROS HORTA, CARLA ARAÚJO SIMÕES, EDUARDO CHRISTÓFARO DE ANDRADE & LUCIANA ELER FRANÇA	LANDSCAPE STRUCTURE OF A CONSERVATION AREA AND ITS SURROUNDINGS IN MINAS GERAIS STATE, BRAZIL
PB18	MATHILDE REDON & SANDRA LUQUE	TWO OWLS' SPECIES AS A SURROGATE FOR BIODIVERSITY VALUE IN THE FRENCH ALPS FORESTS
PB19	MEHRDAD AKBARZADEH & ESMAEIL KOUHGARDI	ECOTOURISM AND CONTROLLING FOREST STAND DAMAGES. CASE STUDY: VARZEGAN DISTRICT NORTH WEST OF IRAN
PB20	MIGUEL G.C. MARTINS & JOSÉ T. M. ARANHA	ELECTRICAL NETWORK HAZARD ASSESSMENT FOR THE AVIFAUNA IN PORTUGAL
PB21	NATALIA GABRIELA FRACASSI & DANIEL SOMMA	PARTICIPATORY ACTION RESEARCH CONCERNING THE LANDSCAPE USE BY A NATIVE CERVID IN A WETLAND OF THE PLATA BASIN, ARGENTINA
PB22	OLHA KHAULYAK, PER ANGELSTAM & MARINE ELBAKIDZE	INFRASTRUCTURES FOR HUMAN MOBILITY AND BIODIVERSITY CONSERVATION IN EUROPE'S WEST AND EAST: TOWARD INTEGRATED DECISION-MAKING FOR SUSTAINABLE LANDSCAPES
PB23	PATRÍCIA A. E. DIOGO & JOSÉ T. M. ARANHA	GIS ANALYSIS OF THE ANTIDOTE PROGRAMMA IN PORTUGAL
PB24	RAMÓN ALBERTO DIAZ-VARELA, PABLO RAMIL-REGO, MANUEL ANTONIO RODRÍGUEZ-GUITIÁN & CARMEN CILLERO-CASTRO	EXTENT AND CHARACTERISTICS OF MIRE HABITATS IN GALICIA (NW IBERIAN PENINSULA): IMPLICATIONS FOR THEIR CONSERVATION AND MANAGEMENT
PB25	RAMÓN ALBERTO DIAZ-VARELA, PEDRO ÁLVAREZ-ÁLVAREZ EMILIO DIAZ-VARELA & SILVIA CALVO-IGLESIAS	ASSESSMENT OF CONSERVATION STATUS IN MANAGED CHESTNUT FOREST BY MEANS OF LANDSCAPE METRICS, PHYSIOGRAPHIC PARAMETERS AND TEXTURAL FEATURES
PB26	ROSEMERI SEGECIN MORO & TIARO KATU PEREIRA	EVALUATING AN OLD SUSTAINABLE NATIONAL FOREST IN SOUTH BRAZIL TO DECIDE THEIR CONSERVATION STATUS
PB27	SARA MARQUES, CATARINA FERREIRA, ROGÉRIO RODRIGUES, JORGE CANCELA & CARLOS FONSECA	IMPACT OF ROADS ON UNGULATE SPECIES: A PRELIMNARY APPROACH IN PORTUGAL
PB28	SAUD L. Al-ROWAILY, MAGDY I. El-BANA & FAHAD A.R. Al-DUJAIN	VEGETATION COMPOSITION AND DIVERSITY IN RELATION TO ENVIRONMENTAL FACTORS IN THE DESERT WATERSHED, CENTRAL SAUDI ARABIA
PB29	SOFIA G. PLEXIDA & ATHANASSIOS I. SFOUGARIS	CONSERVATION OF PRIORITY BIRD SPECIES IN A PROTECTED AREA OF CENTRAL GREECE USING GEOGRAPHICAL LOCATION AND GIS
PB30	STOYAN C. NIKOLOV, GEORGI POPGEORGIEV, DIMITAR PLACHIYSKI, KOSTADIN VALCHEV, PETAR SHURULINKOV, GERGINA DASKALOVA & STEFAN AVRAMOV	LANDSCAPE-LEVEL HABITAT SUITABILITY MODEL FOR THE BALKANIC CAPERCAILLIE (TETRAO UROGALLUS RUDOLFI): A TOOL FOR EFFECTIVE CONSERVATION AT THE SOUTHERN EDGE OF SPECIES DISTRIBUTION
PB31	TALITA NOGUEIRA TERRA & ROZELY FERREIRA DOS SANTOS	LEGAL EFFICIENCY AND CUMULATIVE EFFECTS IN ENVIRONMENTALLY PROTECTED AREA

Disturbances

Sep 22 17:30-18:30

Abst. #	Authors	Title
PD1	ADISON ALTAMIRANO, CHRISTIAN SALAS & VALESKA YAITUL	HUMAN-CAUSED FOREST FIRE IN MEDITERRANEAN ECOSYSTEMS OF CHILE: MODELLING LANDSCAPE SPATIAL PATTERNS ON FOREST FIRE OCCURRENCE
PD2	ANDREW BIRT, ROBERT N. COULSON, MARIA D. TCHAKERIAN, RICHARD FELDMAN, DAVID CAIRNS, CHARLES LAFON, FRED M. STEPHEN, KIER KLEPZIG & JAMES M. GULDIN	CLIMATE CHANGE EFFECTS ON REGIONAL POPULATION DYNAMICS OF THE SOUTHERN PINE BEETLE.
PD3	BRUCE ALLEN, KATHERINE L. MARTIN, REBECCA R. SHARITZ & P. CHARLES GOEBEL	TESTING CONCEPTS OF COMPLEXITY IN NATURAL AND MANAGED FORESTS: LESSONS FROM SOUTHEASTERN BOTTOMLAND HARDWOODS
PD4	EVI WARINTAN SARAGIH, JAN BOKDAM & WIM BRAAKHEKEE	EFFECTS OF ENDOZOOCHOROUS SEED DISPERSAL ON THE SOIL SEED BANK AND VEGETATION IN THE WOODLAND AREA
PD5	JOÃO C. AZEVEDO, E. FERNÁNDEZ-NÚÑEZ, L .MIGUEL, A. AMADO, A. POSSACOS & C.F. AGUIAR	HERBACEOUS PLANT DIVERSITY ACROSS FIRE CREATED EDGES IN CONTINENTAL HOLM OAK WOODLANDS
PD6	KOSTAS POIRAZIDIS, KONSTANTINA ZOGRAFOU, PANAGIOTIS KORDOPATIS, DIONISIOS KALIVAS, MARGARITA ARIANOUTSOU, DIMITRIOS KAZANIS & EVI KORAKAKI	COMBINING MULTI-CRITERIA EVALUATION AND GEOSTATISTICS TO PREDICT POST-FIRE REGENERATION OF PINUS HALEPENSIS AT A REGIONAL SCALE
PD7	OVIDIU IACOBESCU, IONUT BARNOAIEA & ADRIANA ROXANA BARNOAIEA	THE INFLUENCE OF LAND DEGRADATION AND ECOLOGICAL RECONSTRUCTION ON LANDSCAPE STRUCTURE IN HILLY REGION OF NORTH EASTERN ROMANIA
PD8	RASA DOBRAVOLSKAITĖ	EFFECTS OF NON-NATIVE PLANT SPECIES ON FOREST COMMUNITIES IN LITHUANIA
PD9	THOBAYET ALSHAHRANI & FARES ALSEWALIM	IMPACT OF PLASTIC WASTES ON GROWTH OF Lasiurus scindicus HENR
PD10	THOMAS CURT	ASSESSING THE FIRE-RESISTANCE AND THE FIRE-RESILIENCE OF LANDSCAPES IN SOUTHERN FRANCE TO MITIGATE THE IMPACT OF CLIMATE CHANGE

Management and sustainability

Sep 22 17:30-18:30

Abst. #	Authors	Title
PM1	A. GIRMA, R. MOSANDL, HANY EL KATEB & F MASRESHA	RESTORATION OF LANDSCAPE WITH NATIVE TREE SEEDLINGS AND THEIR RESPONSE TO VARIABLE LIGHT CLIMATE: A CASE STUDY OF ENRICHMENT PLANTING IN ETHIOPIAN HIGHLANDS
PM2	ASSU GIL-TENA, LLUÍS BROTONS & SANTIAGO SAURA	DISENTANGLING RECENT CHANGES IN FOREST BIRD RANGES IN MEDITERRANEAN FORESTS (NE SPAIN): ASSESSING GLOBAL CHANGE IMPACTS AND GUIDING LANDSCAPE MANAGEMENT
PM3	ELENA VOLKOVA	THE REGIONAL ANALYSIS OF FOREST MANAGEMENT RISKS (BY THE EXAMPLE OF RUSSIAN NORTHERN AREAS)
PM4	ESMAEIL KOUHGARDI, ELAHE SHAKERDARGAH, MEHRDAD AKBARZADEH	VALUES OF MANGROVES AND ITS INTERACTION WITH MARINE ECOSYSTEM IN A NATURAL LANDSCAPE
PM5	FELÍCIA FONSECA & TOMÁS DE FIGUEIREDO	IMPACT OF TREE SPECIES REPLACEMENT ON CARBON STOCKS IN FOREST FLOOR AND MINERAL SOIL
PM6	IGNACIO SCHIAPPACASSE, LAURA NAHUELHUAL, FELIPE VÁSQUEZ & CRISTIAN ECHEVERRÍA	ESTIMATING NON-MARKET COSTS AND BENEFITS OF FOREST RESTORATION IN THE DRYLAND LANDSCAPE IN CENTRAL CHILE.
PM7	IGNACIO SCHIAPPACASSE, CRISTIAN ECHEVERRÍA, ROCÍO URRUTIA, MIGUEL CÁRCAMO, CECILIA SMITH-RAMÍREZ, LAURA NAHUELHUAL & ADRIAN C. NEWTON	POLICY RECOMMENDATIONS FOR CHILEAN DRYLAND FORESTS LAND-USE PLANNING
PM8	MARIA PATRICIO, LUIS NUNES, LORETO MONTEIRO & HELENA ALMEIDA	ADAPTABILITY OF NEW PROVENANCES OF QUERCUS SUBER IN TRÁS-OS-MONTES, PORTUGAL: ITS IMPORTANCE FOR THE SUSTAINABILITY OF THE FOREST SYSTEMS
PM9	MARIANA A. CARVALHAES, RENATA E. OLIVEIRA & JOÃO D. SANTOS	FOREST MANAGMENT AS A TOOL FOR LANDSCAPE RESTORATION IN THE BRAZILIAN ATLANTIC FOREST
PM10	MARINA CASTRO, JOSÉ FERREIRA CASTRO & ANTÓNIO GÓMEZ SAL	RELATIONSHIP BETWEEN ANIMAL BEHAVIOUR AND LANDSCAPE ATTRIBUTES IN NORTHEAST OF PORTUGAL
PM11	MARISE BARREIROS HORTA & EDWIN KEIZER	ASSESSMENT OF HUMAN AND PHYSICAL FACTORS INFLUENCING SPATIAL DISTRIBUTION OF VEGETATION DEGRADATION - ENVIRONMENTAL PROTECTION AREA CACHOEIRA DAS ANDORINHAS, BRAZIL
PM12	NATALIYA STRYAMETS, MARINE ELBAKIDZE, PER ANGELSTAM & ROBERT AXELSSON	UTILIZATION OF NON-WOOD FOREST PRODUCTS IN A TRANSITION ECONOMY: RURAL UKRAINIAN ROZTOCHYA REGION AS A CASE STUDY
PM13	THOMAS CORDONNIER, CHRISTOPHE CHAUVIN, CHRISTIAN GINISTY,JEAN-DENIS MATHIAS, FRANCIS BIGOT DE MOROGUES, JEAN-LUC DUPOUEY, PHILIPPE DREYFUS,NICOLAS ROBERT, XAVIER ROCHEL, SANDRA LUQUE & ARMELLE CARON	FROM METAPHOR TO ACTION : IMPLEMENTING VIABLE FOREST ECOSYSTEM MANAGEMENT IN LANDSCAPES. THE FORGECO PROJECT.

Scaling in landscape analysis

Sep 22 17:30-18:30

Abst. #	Authors	Title
PS1	DAVID SÁNCHEZ DE RON, LLUIS BROTONS, SANTIAGO SAURA & JOSÉ M. GARCÍA DEL BARRIO	HABITAT SUITABILITY MODELS FOR TWO SPECIES OF FOREST RAPTORS IN CATALUÑA. METHODOLOGICAL CONSEQUENCES RELATED WITH DIFFERENT SCALES AND DATA SOURCES
PS2	NAOKO FUJITA, NOBUSUKE IWASAKI & DAVID S. SPRAGUE	RESTORATION AND EVALUATION OF SATOYAMA/SHRINE FOREST LANDSCAPE ANALYZED WITH HABS(THE HISTORICAL AGRO-ENVIRONMENT BROWSING SYSTEM) AND A COLLECTION OF OLD PICTURES PAINTED IN THE MIDDLE 19TH CENTURY
PS3	RUI CORTES, SIMONE VARANDAS, SAMANTHA HUGHES, MARCO MAGALHÃES & AMÍLCAR TEIXEIRA	ENVIRONMENTAL DRIVERS OF BENTHIC COMMUNITIES: THE IMPORTANCE OF LANDSCAPE METRICS.

Tools of landscape assessment and management

Sep 24 18:00-19:00

Abst. #	Authors	Title
PT1	ANA M.GERALDES	LANDSCAPE RUNOFF, PRECIPITATION VARIATION AND RESERVOIR LIMNOLOGY
PT2	ANA M.GERALDES & MARIA JOSÉ BOAVIDA	RESERVOIRS: MIRRORS OF THE SURROUNDING LANDSCAPE?
PT3	ANA MARIA CARVALHO, MARGARIDA RAMOS & AMÉLIA FRAZÃO-MOREIRA	CONNECTING LANDSCAPE CONSERVATION AND MANAGEMENT WITH TRADITIONAL ECOLOGICAL KNOWLEDGE: DOES IT MATTER HOW PEOPLE PERCEIVE LANDSCAPE AND NATURE?
PT4	ANTÓNIO CASTRO RIBEIRO	EVALUATION OF PEDOTRANSFER FUNCTIONS FOR PREDICTING SOIL WATER RETENTION IN PORTUGUESE SOILS
PT5	CELIA GARCÍA-FECED, SANTIAGO SAURA & RAMÓN ELENA-ROSSELLÓ	LANDSCAPE CONNECTIVITY ASSESSMENT FOR MEDITERRANEAN FOREST DISTRICT PLANNING
PT6	CLAUDIA M.C.S. LISTOPAD, JASON B. DRAKE, JOHN F. WEISHAMPEL & RON E. MASTERS	THE USE OF A PORTABLE LiDAR SYSTEM IN EVALUATING CANOPY STRUCTURE IN OLD-GROWTH AND SECONDARY-GROWTH MANAGED SOUTHEASTERN PINE FOREST
PT7	EUFRASIA-PILAR AGUIRRE YEVES, SILVIA MERINO DE MIGUEL & MIGUEL MARCHAMALO SACRISTÁN	STUDY OF RIPARIAN LANDSCAPE CHANGES USING AERIAL PHOTOGRAPHS AND GIS. THE CASE OF GUADARRAMA RIVER (CENTRAL SPAIN)
PT8	FERNANDO CASTILLO, MANOLO GARCÍA, RAQUEL LEONARDO, LIZA GARCÍA & IVONNE GÓMEZ	IMPORTANCE OF HABITAT PATCHES FOR THE MAINTENANCE OF LANDSCAPE CONNECTIVITY IN BAIRD´S TAPIR HABITAT IN GUATEMALA
PT9	J. ANASTASIO FERNÁNDEZ YUSTE, MANUEL VALLANO FLORIT, LETICIA CARRERO DÍEZ, CAROLINA MARTÍNEZ SANTAMARÍA & SILVIA MERINO DE MIGUEL	A PROTOCOL FOR ASSESSING RIPARIAN VEGETATION PATCHES AS ECOLOGICAL CORRIDORS. THE CASE OF THE GUADARRAMA RIVER IN CENTRAL SPAIN.
PT10	JEAN-FRANÇOIS MAS & AZUCENA PEREZ VEJA	ASSESSING "SPATIALLY EXPLICIT" LAND USE/COVER CHANGE MODELS
PT11	JOÃO C. AZEVEDO, VALENTIM COELHO, JOÃO PAULO CASTRO, DIOGO SPÍNOLA & EUGÉNIA GOUVEIA	SPATIAL DYNAMICS OF CHESTNUT BLIGHT DISEASE AT THE PLOT LEVEL USING THE RIPLEY'S K FUNCTION
PT12	LIDÓN RUBIO & SANTIAGO SAURA	WHEN IS THE ROLE OF HABITAT PATCHES AS CONNECTING ELEMENTS REALLY IMPORTANT? AN ASSESSMENT THROUGH THE ANALYSIS OF SIMULATED AND REAL-WORLD HABITAT PATTERNS
PT13	MANOLO GARCÍA, FERNANDO CASTILLO, RAQUEL LEONARDO, LIZA GARCÍA & IVONNE GÓMEZ.	ASSESSMENT OF CONNECTIVITY ELEMENTS IN BAIRD´S TAPIR HABITAT IN GUATEMALA.
PT14	MANUEL GOMES	FIRE - CRIME OR "AGRICULTURAL IMPLEMENT"
PT15	NAZI AVANI, HAMID JALILVAND & VAHID ETEMAD	INVESTIGATION ON MOUNTAIN LANDSCAPE PARAMETERS ON JUNIPER SPECIES GROWTH. CASE STUDY: FIROZKOOH REGION, TEHRAN
PT16	SERGIO GONZÁLEZ-ÁVILA & RAMÓN ELENA-ROSSELLÓ	ASSESSING MANAGEMENT SCENARIOS USING WILDFIRE SIMULATIONS AND LANDSCAPE INDICES
PT17	VLADIMIR CABOUN	NEW CLASSIFICATION AND UTILITATION OF FOREST FUNCTIONS IN LANDSCAPE

Patterns and processes

Sep 24 18:00-19:00

Abst. #	Authors	Title
PP1	ANDREA E. IZQUIERDO, H. RICARDO GRAU & T. MITCHELL AIDE	MODELING THE IMPACT OF RURAL POPULATION DYNAMICS ON LAND USE CHANGE IN THE ATLANTIC FOREST OF ARGENTINA (1970-2030)
PP2	CIPRIAN PALAGHIANU	THE USE OF VORONOI TESSELLATION TO CHARACTERIZE SAPLING POPULATIONS
PP3	EHSAN SAYAD	NUTRIENT RETRANSLOCATION IN PURE AND MIXED PLANTATIONS OF Populus deltoides AND Alnus subcordata
PP4	HOLLY HYNES, CANDACE PIPER & JIM GERMIDA	IMPACT OF TIMBER HARVESTING ON SOIL MICROBIAL DIVERSITY, ENZYME ACTIVITY AND NITROGEN FLUXES IN FIELD SITES OF THE BOREAL PLAIN, ALBERTA, CANADA
PP5	JIQUAN CHEN, RNAJEET JOHN1, NAN LU, GE SUN, CHANGLIANG SHAO, LINHAO LI, SHIQIAN WAN, KE GUO, QIAOZHEN MU, AND MAOSHENG ZHANG & JING XIE	CLIMATIC CHANGE AND ITS CONSEQUENCES ON GROSS PRIMARY PRODUCTION (GPP), EVAPOTRANSPIRATION (ET), AND WATER USE EFFICIENCY (WUE) ON MONGOLIA PLATEAU
PP6	LÍA MONTTI, RICARDO GRAU, LEONARDO PAOLINI, MARTA AYUP, AGUSTINA MALIZIA & VIVIANA ZAMORA	MODELING DISTRIBUTION OF INVASIVE TREE SPECIES IN RELATION TO CLIMATE AND LAND USE CHANGE ALONG NEOTROPICAL LANDSCAPES
PP7	MANOLO GARCÍA, FERNANDO CASTILLO, RAQUEL LEONARDO, LIZA GARCÍA E IVONNE GÓMEZ	THE EFFECTS OF LAND COVER CHANGES ON THE HABITAT MORPHOLOGICAL SPATIAL PATTERN AND POPULATION VIABILITY OF BAIRD'S TAPIR IN LAGUNA LACHUÁ NATIONAL PARK, GUATEMALA.
PP8	MELANIE KOLB	LAND USE AND COVER CHANGE IN SOUTHERN MEXICO: EVIDENCE FOR CHANGING TRENDS IN A HIGHLY DYNAMIC LANDSCAPE
PP9	NINA EVSEEVA & ZOJA KVASNIKOVA	ECOLOGICAL ASPECTS OF SOILS DEFLATION DEVELOPMENT IN AGROLANDSCAPES OF THE SOUTH-EAST OF THE WESTERN-SIBERIAN PLAIN
PP10	PAULA MATOS, PEDRO PINHO, ESTEVE LLOP & CRISTINA BRANQUINHO	CAN LICHEN FUNCTIONAL GROUPS BE A GOOD INDICATOR OF MACROCLIMATIC CONDITIONS OF A LANDSCAPE?
PP11	PETER STUBKJAER ANDERSEN, FILIPE BARROSO, TERESA PINTO-CORREIA, HENRIK VEJRE & LONE KRISTENSEN	SPATIAL LOCATION OF FARMERS AND LAND OWNERS OF DIFFERENT STRATEGIES: CASES FROM DENMARK AND PORTUGAL
PP12	SHAIESTE GHOLAMI, SEIED MOHSEN HOSSEINI, JAHANGARD MOHAMMADI & ABDOLRASSOUL SALMAN MAHINI	SPATIAL PATTERN OF SOIL MACROFAUNA BIODIVERSITY IN WILDLFE REFUGEE OF KARKHE IN SOUTHWESTERN IRAN
PP13	SIEW FONG CHEN, TADASHI MASUZAWA & YUKIHIRO MORIMOTO	A PHYSIOTYPE-BASED MODEL OF ECOREGIONS FOR THE NATIONWIDE ECOSYSTEM MANAGEMENT OF JAPAN
PP14	SUSANNE FRANK, CHRISTINE FÜRST, CARSTEN LORZ, LARS KOSCHKE & FRANZ MAKESCHIN	A REGIONALLY ADAPTABLE APPROACH OF BIODIVERSITY ASSESSMENT USING LANDSCAPE METRICS WITHIN THE 2D CELLULAR AUTOMATON "PIMP YOUR LANDSCAPE"
PP15	TAMARA HÖBINGER, STEFAN SCHINDLER & ANTON WEISSENHOFER	IMPACT OF CHANGING CULTIVATION SYSTEMS ON THE LANDSCAPE STRUCTURE OF LA GAMBA, SOUTHERN COSTA RICA
PP16	VIVIAN DALLAGNOL DE CAMPOS & SILVIA MÉRI CARVALHO	RISK AREAS FOR FLOODING IN HYDROGRAPHICAL BASIN OF ARROIO DOS PEREIRAS IN IRATI – PR – BRAZIL

Urban Forestry

Sep 24 18:00-19:00

Abst. #	Authors	Title
PU1	ANA CAROLINA RODRIGUES DE OLIVEIRA & SILVIA MÉRI CARVALHO	URBAN TREE INVENTORY AND SOCIO-ECONOMIC ASPECTS OF THREE VILLAGES OF PONTA GROSSA, PARANÁ/BRAZIL
PU3	ISABEL SILVA, ELSA ISIDRO, ANA LUISA SOARES & FRANCISCO MOREIRA	LISBON'S PUBLIC GARDENS, HOST PLACE FOR WORLD'S TREES
PU4	MANUEL FELICIANO, ARTUR GONÇALVES, ANTÓNIO CASTRO RIBEIRO & LUÍS NUNES	BENEFITS OF URBAN GREEN SPACES IN NOISE, AIR QUALITY AND THERMAL COMFORT: THE CASE STUDY OF BRAGANÇA
PU5	MARIA JOÃO PARADA, TELMO FONSECA, MARGARIDA ARROBAS & M. ÂNGELO RODRIGUES	NITROGEN-USE EFFICIENCY AND ECONOMIC EFFICIENCY OF SLOW-RELEASE N FERTILISERS APPLIED TO AN IRRIGATED TURF IN NE PORTUGAL

Monitoring landscape change

Sep 24 18:00-19:00

Abst. #	Authors	Title
PMo1	ADRIANA ROXANA BARNOAIEA	USING HEMEROBY CLASSIFICATION FOR ASSESSING THE DYNAMICS OF HUMAN IMPACT IN FOREST LANDSCAPES OF NORTH ROMANIAN CARPATHIANS
PMo2	ALICIA MORETTO, VERÓNICA PANCOTTO, JUAN CARLOS NÓVOA-MUÑOZ, XAVIER PONTEVEDRA-POMBAL & JULIO ESCOBAR	SOIL PROPIERTES AND FOREST QUALITY IN LENGA FOREST OF TIERRA DEL FUEGO, ARGENTINA: DOES A RELATION EXIST?
PMo3	AMINTAS ROSSETE & ROSELY SANCHES	FOREST FRAGMENTATION IN THE SOUTHERN BRAZILIAN AMAZON. CASE STUDY: MUNICIPALITY OF QUERENCIA, MATO GROSSO - BRAZIL
PMo4	ANDREZA ROCHA DE FREITAS & SILVIA MÉRI CARVALHO	THE IMPACT OF LEGISLATION ON THE DYNAMICS OF LAND USE THE RIVER BASIN CARÁ-CARÁ, PONTA GROSSA-PR/BRAZIL, IN PERIOD FROM 1980 TO 2007
PMo5	BOGUSLAWA BARAN-ZGLOBICKA & WOJCIECH ZGLOBICKI	FOREST PATCHES IN AGRICULTURAL LANDSCAPES (LOESS AREAS OF SE POLAND)
PMo6	GIUSEPPE PUDDU, RAFFAELE PELOROSSO, FEDERICA GOBATTONI & MARIA NICOLINA RIPA	LANDSCAPE TRANSFORMATIONS SEEN THROUGH THE HISTORICAL CARTOGRAPHY: SARDINIA AS CASE STUDY.
PMo7	HANNA HURYNA & JAN POKORNY	COMPARISON OF REFLECTED SOLAR RADIATION, AIR TEMPERATURE AND RELATIVE AIR HUMIDITY IN DIFFERENT ECOSYSTEMS
PMo8	HÉLDER VIANA & JOSÉ ARANHA	MAPPING INVASIVE SPECIES (Acacia dealbata Link) USING ASTER/TERRA AND LANDSAT 7 ETM+ IMAGERY
PMo9	HELDER VIANA, J. MESQUITA & JOSÉ ARANHA	ASSESSING MULTI-TEMPORAL LAND COVER CHANGES IN THE MATA NACIONAL DA PENEDA GERES NATIONAL PARK (1995 AND 2009), PORTUGAL - A LAND CHANGE MODELER APPROACH FOR LANDSCAPE SPATIAL PATTERNS MODELLING AND STRUCTURAL EVALUATION
PMo10	HELENA PINHEIRO, JOÃO P. CASTRO & JOÃO C. AZEVEDO	LANDSCAPE CHANGE AND CARBON SEQUESTRATION: THE CASE OF THE DEILÃO PARISH, NORTHEASTERN PORTUGAL
PMo11	INÊS DUARTE & FRANCISCO CASTRO REGO	LAND USE ALTERATION IN PORTUGAL. WHAT DID CHANGE BETWEEN 1990 AND 2005 AND WHAT ARE THE SCENARIOS?
PMo12	JOANA BELDADE & THOMAS PANAGOPOULOS	MONITORING AND INTEGRATING ESTHETICAL AND ECOLOGICAL VALUES AT THE CENTRAL ASIA LANDSCAPE CHANGE
PMo13	JOÃO PAULO CASTRO, EUGÉNIA GOUVEIA, DIOGO SPÍNOLA & JOÃO C. AZEVEDO	SPATIAL DYNAMICS OF SWEET CHESTNUT ORCHARDS IN A DISEASE-AFFECTED REGION
PMo14	JORGEANE SCHAEFER DOS SANTOS & CHRISTEL LINGNAU	LANDSCAPES IN TRANSITION - MONITORING IN AREAS OF LANDSLIDES
PMo15	JORIM SOUSA DAS VIRGENS FILHO & MAYSA DE LIMA LEITE	SIMULATION OF CLIMATE SCENARIOS FOR THE REGION OF CAMPOS GERAIS, STATE OF PARANÁ, BRAZIL
PMo16	JÓZEF SUPERSON, JAN REDER & WOJCIECH ZGŁOBICKI	THE DEFORESTATION OF LOESS UPLANDS OF SE POLAND AND ITS STAGES AS DOCUMENTED BY VALLEY DEPOSITS (CASE STUDY: BYSTRA RIVER VALLEY, LUBLIN UPLAND)
PMo17	KEVIN M. POTTER & CHRISTOPHER W. WOODALL	REGIONAL INDICATORS OF FOREST BIODIVERSITY IMPACTS FROM CLIMATE CHANGE IN THE EASTERN UNITED STATES
PMo18	LAURA BOISVERT-MARSH, SYLVIE DE BLOIS & CATHERINE PÉRIÉ	SPATIOTEMPORAL CHANGES AT THE NORTHERN LIMIT OF TREE DISTRIBUTION IN QUEBEC SINCE 1970
PMo19	MARIA CONCEIÇÃO RODRIGUES, PATRÍCIA SOARES, JOSÉ ARANHA & PAULA SEIXAS ARNALDO	CHARACTERIZATION OF A MACULINEA ALCON POPULATION IN THE ALVÃO NATURAL PARK (PORTUGAL) BY A MARK-RECAPTURE METHOD
PMo20	MARTA ORTEGA, VALENTÍN GOMEZ, JOSE MANUEL GARCÍA DEL BARRIO & RAMON ELENA-ROSSELLÓ	MONITORING VULNERABILITY OF THE SPANISH FOREST LANDSCAPES: THE SISPARES APPROACH.
PMo21	MAYSA DE LIMA LEITE & JORIM SOUSA DAS VIRGENS FILHO	IDENTIFICATION OF CLIMATIC TRENDS FOR SOME LOCALITIES IN THE SOUTH REGION OF CAMPOS GERAIS AND SURROUNDINGS, STATE OF PARANÁ, BRAZIL, THROUGH THE ANALYSIS OF HISTORICAL DATA OF RAINFALL AND TEMPERATURE
PMo22	MAYSA DE LIMA LEITE & JORIM SOUSA DAS VIRGENS FILHO	ANALYSIS OF RAINFALL IN THE VILA VELHA STATE PARK, PARANÁ, SOUTH OF BRAZIL, IN THE PERIOD BETWEEN 1954 AND 2001.
PMo23	MEHRDAD AKBARZADEH & ESMAEIL KOUHGARDI	REMOTE SENSING AND CHANGE DETECTION TO LAND-USE CHANGING(CASE STUDY: NORTH WEST OF IRAN)
PMo24	RAMÓN ALBERTO DIAZ-VARELA, SILVIA CALVO-IGLESIAS, MICHELE MERONI & ROBERTO COLOMBO	QUANTITATIVE ASSESSMENT OF TEMPORAL DYNAMICS IN ALTITUDINAL-DRIVEN ECOTONES IN A SECTION OF VALTELLINA ITALIAN ALPS
PMo25	SALEIT RON	STUDENTS' LONG TERM ECOLOGICAL RESEARCH (LTER-EDU) AT RAMAT HANADIV PARK
PMo26	TERESA CALVÃO	LANDSCAPE CHANGES IN A WATERSHED IN THE SOUTHWEST OF PORTUGAL
PMo27	VALENTINA ROBIGLIO, LAURA POGGIO, MARTIN TCHIENKWA, PETER MINANG & ROBIN MATTHEWS	FOREST LANDSCAPE CHANGES IN SOUTHERN CAMEROON
PMo28	VERÓNICA PANCOTTO, ALICIA MORETTO, MARTA CABELLO, LORENA ELIADES, ROMINA MANSILLA, JAZMIN VRSALOVIC, JULIO ESCOBAR & M. VANESSA LENCINAS	EFFECTS OF FOREST HARVESTING IN FUNGAL COLONIZATION OF LENGA LEAF LITTER DECOMPOSITION IN TIERRA DEL FUEGO, ARGENTINA

Social program

Sep 21	
9:00	Official Opening Ceremony (Teatro Municipal)
12:30	Welcome lunch (Teatro Municipal)
19:00	Music Concert by Galandum Galundaina (Teatro Municipal)
Sep 22	
13:00	Lunch (IPB cafeteria)
15:00	City tour for spouses (Starts from the Praça da Sé)
Sep 23	
13:00	Lunch (IPB cafeteria)
14:00	Field Trips (Registration Required; Leaving from the IPB Campus main gate)
21:00	Conference Banquet (Registration required; Restaurante Geadas)
Sep 24	
13:00	Lunch (IPB cafeteria)
15:00	Closing ceremony (Auditório Dionísio Gonçalves - IPB)

All events are covered by the registration fee for all participants with the exception of the Conference Banquet
Registration is required for the Field Trips and the Conference Banquet

Abstracts

Keynote addresses

Keynote address **1**

EUCALYPTS AND FIRE: LANDSCAPE PROCESSES

FRANCISCO CASTRO REGO

Centro de Ecologia Aplicada Prof. Baeta Neves, Instituto Superior de Agronomia,
Lisboa, Portugal

Eucalypts and Fires have a long common history of dependence (or interdependence), that has been recognised by many pioneer authors in Australia, as A. Mount or Malcolm Gill, but the relevance of this association goes well beyond the regions of their origin, as many of the features observed in the ecology of the native forests are also significant for many other areas of the world where eucalypts have been introduced, mainly in plantations for the pulp and paper industry. The natural distribution of the genus *Eucalyptus* can be understood through the evolutionary and geological history of the southern hemisphere where a permanent competition exists in the border with the neighbouring genus *Acacia* in the drier end and with *Nothofagus* in the wet end. And the characteristics of the eucalypts that confer to the genus competitive advantages to its neighbours include many features related to the resistance to fire but also with the promotion of fire. Important characteristics linking trees and fire are associated with their bark interface. And as bark thickness is a very well known characteristic associated with bark resistance, the shedding of bark in large ribbons is another very important feature, often overlooked, that can be associated with the promotion of fire by long-range spotting. In many other regions of the world, as in Portugal, the significance of long-range spotting from eucalypts is very well known, and descriptions of spotting by bark firebrands are similar in the very intense wildfires in Australia and in Portugal, causing very significant problems in wildfire suppression. Spotting as a landscape process is considered in this presentation, from an ecological process in the Australian landscapes with native eucalypts to a concern as a wildfire hazard associated to plantations in many other regions. Dealing with the perspective of spotting requires an understanding of the process, and simulations and experiments in a vertical wind-tunnel in Australia gave important insights to the physics of the process. As an important landscape-scale process the issue of long-range spotting requires solutions at the landscape scale. The experience of Western Australia provides a unique demonstration of a large-scale and long-term approach with remarkable results. Lessons from those experiences are extremely valuable to inform fire and landscape management policies worldwide. The common history between eucalypts and fires can also illustrate the importance of understanding landscape ecology and to create landscape level solutions when dealing with processes that operate with similar long-range dispersal mechanisms.

Keynote address **2**

CLIMATE CHANGE, DISTURBANCE AND THE FUTURE OF NORTHERN FOREST LANDSCAPES

MONICA G. TURNER

Eugene P. Odum Professor of Ecology
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Disturbance is a key source of heterogeneity at multiple scales in forest landscapes. Climate and disturbance regimes are changing rapidly in many north-temperate and boreal forest landscapes and presenting forest managers with formidable challenges. In the Northern Rocky Mountains of North America, the frequency of large fires has increased in recent decades in association with warming temperatures, earlier spring snowmelt, and longer fire seasons. The extent and severity of bark beetle (Curculionidae: Scolytinae) epidemics have also reached unprecedented levels in the past 25 years. These disturbances are altering the age structure and recovery capacity of northern forest landscapes and altering regional carbon dynamics. Where regeneration niches are shifting, vegetation is changing abruptly following disturbance to species better suited to current climate. As a case study, I will discuss how climate, fire and bark beetles are affecting landscape patterns and processes in the Greater Yellowstone Ecosystem (Wyoming, USA), then identify priorities for future study. Established in 1872 as the world's first national park, Yellowstone National Park encompasses approximately 9,000 km2 and is the center of the Greater Yellowstone Ecosystem. During 1988, severe fires burned under conditions of extreme drought and high winds and affected ~36% of the park and surrounding lands. The fires created a post-fire mosaic of variable burn severity that resulted in substantial heterogeneity in vegetation and ecosystem processes. The most striking variation in postfire vegetation was in the density of lodgepole pine (Pinus contorta var. latifolia) regeneration, which ranged from zero to > 500,000 stems ha-1 and established the template for many ecosystem processes on the landscape. Recent bark beetle outbreaks have further altered landscape patterns of stand structure and ecosystem processes. Post-disturbance heterogeneity in stand age, structure, and composition; productivity; coarse wood abundance; microbial communities; and nutrient pools and transformations have important implications for the resilience of forest landscapes. The long-term dynamics of forest landscapes will depend on the spatial and temporal patterns of disturbance and recovery. Thus, future research in forest landscapes should address questions related to (i) disturbances as catalysts of rapid change in forest communities, (ii) ecological consequences of compound and linked disturbances, (iii) feedbacks from disturbance to other global drivers, and (iv) interactions between land use and disturbance. Studies of the 1988 Yellowstone fires revealed that large, severe disturbances are not necessarily catastrophic. However, it is critical to consider plausible future disturbance regimes and recovery trajectories to predict when and where forests may change qualitatively and to anticipate the future condition of forest landscapes.

Keynote address **3**

MAINTAINING BIODIVERSITY IN HIGHLY DYNAMIC FORESTED LANDSCAPES

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Forests are dynamic over the time scales of centuries (principally through cycles of disturbance and succession) and millennia (through shifts in the geographic ranges of species) and we are in a period of climate change that will shape both of these processes. Maintaining forest biodiversity in a period of unusual dynamism will require significant effort, but not necessarily radical new approaches to conservation. To organize our thinking about how to maintain forest biodiversity we can envision a conceptual triad that recognizes the three basic ways that we use forests: as natural ecosystems, primarily in reserves where human activities are minimized; as managed ecosystems where timber production and maintenance of biodiversity are both pursued; and as cultivated ecosystems such as plantations, where intensive management for maximum timber production is undertaken. First, in a system of forest reserves it will be important to represent the range of physical environments (e.g., in terms of topography, soils, and hydrology) because these are the arenas within which diverse, ever-changing communities will occur. Furthermore, a reserve system should maintain altitudinal and latitudinal connectivity to facilitate the range shifts of species, perhaps by capitalizing on riparian forest protection. Second, for forests that are managed for both timber and biodiversity, maintaining a diverse array of stand conditions (the paradigm of "Diversity begets diversity") will be fundamental. Ideally this will be complemented or enhanced by using timber management systems that attempt to emulate natural disturbances (the paradigm of "Using nature's template"). Climate change will probably alter these natural disturbance regimes but we must recognize that species will have evolved under past disturbance regimes and thus we should be conservative about emulating new disturbance regimes. Third, for forest plantations the opportunity to plant trees in new places could foster work to restore connectivity by creating new forests and to assist in the colonization of tree species that are shifting their geographic ranges. In summary, the unpredictable challenges of climate change will make maintaining biodiversity more important than ever, and demand that we pursue this goal vigorously while remaining flexible.

Symposia

(by alphabetic order of the first author)

Symposium 11: Interfaces and interactions between forest and agriculture in rural landscapes

DO WOODED ELEMENTS IN AGRICULTURAL LANDSCAPE CONTRIBUTE TO BIOLOGICAL CONTROL IN CROPS?

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The network of semi-natural elements in agricultural landscapes are supposed to enhance pest biological control based on natural enemies by providing alternative preys, nectar and pollen resources, and refuges against unfavourable winter and summer weather conditions. Woody elements: forest, small woods, hedges, isolated trees are part of this network providing crop protection ecosystem service. On the basis of two research studies held in DYNAFOR Lab in south West of France, we identify key features in woody elements contributing to biological control. The two studies took place in the Long term Ecological Research site Valley & Gascony Hills, characterised by small woods, hedges embedded in an agricultural mosaic made of crop and livestock farming system. The first study aimed at comparing aphids and one of their major natural enemies (hoverflies) abundance in two landscapes differing in woodlot density. During, 5 years (2003-2007) spring monitoring of aphidophagous hoverfly (larvae and eggs) and aphid abundances in 14 wheat fields were conducted. Compared with poorly woody landscapes, landscapes with 27% of wood land-cover seemed to shelter higher hoverfly abundance during one of the key-periods for the aphid population dynamics (early spring), thus providing them with higher potential regulation capabilities. Afterwards, the difference between hoverfly population abundances decreased during the season. The second study deal with carabid beetles overwintering in woods. Very few species of carabid beetles live in woodlots of South West France. Taking advantage of emergence traps, we showed that many carabid species mainly cited as “field” ones, including pest controlling species, overwinter in woodlots before colonizing fields. Within woodlot, distance from edge and vegetation structure was shown to influence abundance of overwintering carabids.

Symposium 11: Interfaces and interactions between forest and agriculture in rural landscapes

HOW AGRICULTURAL LANDSCAPE CONTEXT INFLUENCES THE DISTRIBUTION OF FOLIAR OAK GALLS IN THE FOREST CANOPY?

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Spatial distribution of organisms may be strongly affected by land cover and spatial heterogeneities at the landscape scale. But local habitat quality, comprising biotic and abiotic factors such as resource availability, vegetation composition or species interactions, may also strongly influence their spatial distribution. The relative importance of each of these spatial and qualitative factors still remains lacking, despite this knowledge is required notably to design appropriate configuration of habitats in optimized conservation, service or production perspectives. We used oak gall species (Hymenoptera: Cynipidae) distribution across a temperate forest to test whether landscape context, patch geometry, habitat quality, and edge effect influence the spatial distribution of species in the forest canopy. We sampled branches from 28 oaks situated in the Rennes forest (Britanny, France), which is surrounding by an agricultural landscape and split into parcels of oak or pine. Based on map analyses, oak patch areas were calculated, corresponding to continuous area of oak parcels and delimited by a non-oak matrix (pine parcels or agricultural landscape). Patch area and connectivity (= patch

geometry) as the distance between oaks to patch edge were calculated. The distance between each focal tree and the surrounding agricultural landscape (=landscape context) was also recorded, ranking from 0 to 2450m. Habitat quality was characterised by measuring the % dry matter content and C/N ratio of the sampled leaves. Mean abundance and richness of foliar oak galls and the percentage coverage of feeding traces were recorded for each studied tree. We show a clear effect of agricultural landscape on the oak gall community, distinct from edge effect, with higher foliar gall abundances in the proximity of the agricultural matrix. Habitat quality appears also as an important factor of the gall distribution in canopy. We discuss the relative importance of these spatial distribution factors and their links, as their potential implications for forest biodiversity management.

Symposium 6: Road ecology: improving connectivity

DETECTING VULNERABLE SPOTS FOR ECOLOGICAL CONNECTIVITY CAUSED BY MINOR ROAD NETWORK IN ALICANTE, SPAIN

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Applying land conservation planning allows to maintain and restore the ecological connections among natural remnants and protected areas in the territory. Roads increase the problem of habitat fragmentation, breaking large habitat areas into small, creating isolated habitat patches and decreasing connectivity in the territory. The aim of this work is the elaboration of ecological connectivity models for forest mammals in Alicante's province, using GIS. The method allows a connectivity diagnose of terrestrial landscape ecosystems, as well as the identification of vulnerable spots that have a critical importance for ecological connectivity. Application of connectivity models for the study of ecological processes and animal movements is an innovative tool of great utility. Connectivity models are based in the creation of a friction surface that indicates the relative cost of moving target species across the landscape. We identified the core areas of target species using potential distribution models and determined the main landscape factors that have more influence in the resistance to dispersion of forest mammals. With this information, we created a cost-distance surface and calculated the least-cost route between selected areas. Finally, we carried out an identification of landscape linkages and ecological corridors and its intersection with the minor road network.

Symposium 12: From abandoned farmland to self-sustaining forests: challenges and solutions

WHERE HAVE ALL THE FORESTS GONE, LONG TIME PASSING

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The paleopalinological diagrams produced in the past fifty years prove that the landscape of the Iberian Peninsula had a forest matrix during the major part of the Holocene. Forest cover regression is evident in NW Iberia pollen profiles since the IV mil. BC. Classical authors already indentify man's disturbance as the main driver of forest waning. A.X.P. Coutinho, a fundamental personage in the history of Portuguese botany and sylviculture, starts his degree thesis (1882) with the known F.R. Chateaubriand's quotation "Forests precede civilizations, and deserts follow them", affirming the thorny co-existence between forests and human land use. Historians generally relate forest cover decline with wood use and the expansion of arable land and animal

rearing. In Iberian Peninsula there is also a tendency to attribute a particular impact to the naval industry of the XV and XVI centuries. Based in a simple quantitative approach with data gathered in the first half of XX century, when an organic society (sensu E.A. Wrigley) prevailed in NE Portugal, I argue that nutrient mining in favor of arable soils nearby rural villages was the main driver of forest regression in the mountains of Northern Portugal.

Symposium 5: Landscape genetics

FOREST FRAGMENTATION AND WILDLIFE POPULATION CONNECTIVITY IN SOUTHERN PORTUGAL: A COMPARATIVE LANDSCAPE GENETICS APPROACH

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In the context of habitat fragmentation, it is increasingly recognized the importance of landscape genetics surveys of multiple species to assess how general versus taxon-specific are the influences of landscape features in the genetic structuring of populations, and infer the location and strength of corridors and barriers. A relevant application of research on genetic connectivity is the identification of corridors linking protected areas, since these are the most likely suitable habitat patches to persist into the future under environmental management policies. Here we present an ongoing comparative landscape genetics project studying four highly distinct forest-dwelling animal species in a area in southern Portugal containing three Natura 2000 sites of protected montado habitat, but undergoing significant habitat fragmentation elsewhere. Our goals are to investigate: 1) how habitat fragmentation and species' ecology combine to influence the population structure and connectivity of different species; 2) how can we use such data to preserve, restore or design ecological corridors of general importance for biodiversity conservation; 3) how well connected are the Natura 2000 study sites for the different species surveyed; and 4) the potential of comparative landscape genetics as an integrative approach in landscape ecology research and as a scientific tool in the management and conservation of communities and habitats.

Symposium 6: Road ecology: improving connectivity

INFLUENCE OF TRAFFIC NOISE ON VERTEBRATE CROSSING OF ROADS THROUGH UNDERPASSES

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Noise is a type of man-made disturbance that influences habitat use by vertebrates near roads and may reduce the effectiveness of the mitigation measures to alleviate population fragmentation. This study analyses the effects of noise on the use by vertebrates of 19 underpasses at a motorway. It employs generalized linear models to test the effect of three noise indicators, at the underpasses and in their vicinity, on the crossing frequency of eight animal species. The road noise indicators were obtained through modelling in accord with ISO 9613, such that the analyses employ data on time of day (diurnal/nocturnal) and height above the ground (10 or 40 cm) as appropriate for each species. The results show that the road crossings are subjected to high noise levels, averaging from 56.0±1.7 dB(A) within 200m of the road at night to 69.1±4.6 dB(A) around the

underpasses in daytime. Maximum levels close to 80 dB(A) were recorded. Nevertheless, there is no consistent response to noise by vertebrates and both positive and negative correlations with noise variables were obtained for different species. This suggests that the use of underpasses by vertebrates is determined more by habitat characteristics than by the levels of noise suffered in them.

Symposium 12: From abandoned farmland to self-sustaining forests: challenges and solutions

HARMONIZED MEASUREMENTS OF SPATIAL PATTERN AND CONNECTIVITY: APPLICATION TO FOREST HABITATS IN THE EBONE EUROPEAN PROJECT.

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Within the EBONE European project ("European Biodiversity Observation NEtwork"), spatial pattern, edge interfaces and connectivity of forest phanerophytes habitats were assessed automatically and in a harmonized way from fine-grained "General Habitat" maps available for a hundred of 1km^2 squares located in Austria, Sweden and France. One method consisted in merging mathematical morphology spatial pattern mapping with a fixed edge size (GUIDOS freeware) and a Landscape Mosaic Index characterizing forest surroundings in a circle with a fixed radius. Forest core areas were delineated with edge sizes depending on the permeability of the forest-non forest interface. Forest edges were characterized by their physical structure (perimeter of core, connecting features between core areas or small isolated elements) and interfaces (natural with herbaceous and shrubs, agricultural with crops and/or artificial with urban types of habitats). Forest connectivity was assessed per defined functional dispersal distances on the basis of habitat availability, matrix permeability and inter-patch least-cost distances through an amended version of the CONEFOR freeware. Forest habitats in the 100 squares were thus categorized; results were organized per European Environmental zones and strata. The correspondence to forest cover pattern and connectivity data available at broader scale (1ha mapping unit and aggregated over 10x10km2) is discussed.

Symposium 6: Road ecology: improving connectivity

ROAD EFFECTS AND MITIGATION: RESPONSES OF OWLS AND CARNIVORES

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The negative effects of roads on wildlife are recognized as major contributors to the global biodiversity decline for many taxa. The development and expansion of road networks intensify road mortality, habitat loss and degradation, decreasing the food, shelter, and space availability, all fundamental for species survival. Those impacts and associated mitigations are becoming a major research theme in conservation biology. The main goal of this study was to examine the road effects on owls and carnivores and the mitigation measures' effectiveness to reduce mortality and improve landscape connectivity. Road mortality surveys, radio-tracking and video surveillance were the approaches to achieve the proposed goal. Stone martens and barn owls were

particularly vulnerable to road mortality. Roads do not act as barriers to movement but some road-repulsive behaviors from the roads were documented. Mitigation measures were not fully effective: stone marten and genet responded positively to dry ledges but the small mesh-sized and buried fences did not reduce road mortality.

Symposium 11: Interfaces and interactions between forest and agriculture in rural landscapes

A FRAMEWORK FOR CHARACTERIZING CONVERGENCE AND DISCREPANCY IN RURAL FOREST MANAGEMENT IN TROPICAL AND TEMPERATE ENVIRONMENTS

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Rural forests are forests that are more or less formally appropriated, managed, shaped or rebuilt by rural communities. They are an integrated element of farming systems and contribute to the structure of landscapes and the definition of rural territories. These forests play important functions for the livelihood of rural communities who have developed refined local knowledge and practices related to their use and perpetuation. However, characteristics of these forests are not well defined and encompass highly diversified situations. Based on detailed monographs related to ecological conditions, characterization of actors, uses, customary rules, public policies, forest resources and functions, local knowledge, and political environmental stakes, we compared eleven situations both from developing and developed countries, in which rural communities are highly concerned with the uses of forest resources as a central element of their production system. These case studies were chosen within a large array of conditions, from an ecological perspective (humid tropics, dry forests, temperate forests) as well as regarding human population pressure, socio-economic conditions and public policies related to these forests. Data were harmonised and pooled within a common analysis chart and processed by mean of multivariate analyses. Results show that some variables are characteristic of all rural forests, such as multiple-use of trees and forests including fuel production, self-consumption as well as commercial uses, tree species diversity, ecosystem stability, or patrimonial functions. Other results point out some specificities of particular rural forests, depending on the main use of single out of several tree species, importance of Non Timber Forest Products, land ownership and management, roles in rural livelihood, and the magnitude of public action. This framework aims at better characterizing these particular forests in order to think about alternative forest management policies and revisit forester-farmer relationships.

Symposium 8: Ecosystem services from forests at the watershed scale

IMPACT OF LANDSCAPE INDICATORS ON FORESTS DISTRIBUTION IN THREE DIFFERENT LANDSCAPES OF NE SLOVENIA

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This study took place in the area along the Mura River in Prekmurje region, NE Slovenia. This region can be divided into three areas characterized by different landscape indicators: a) area along the Mura River where forests are dominated by *Salix alba*, *Fraxinus angustifolia* and *Quercus robur*, as well by *Alnus glutinosa* in case of stagnant water; b) alluvial plain with fragments of forest dominated by *Quercus petrea* and *Carpinus betulus* mostly converted to fields; c) hilly region where forests are dominated by *Fagus sylvatica*. Our research aims to analyze the spatial distribution of these forests in the region and find out which landscape indicators are the

most influential. Comparison of those three areas situated in the research region is the basis for development of general concept how landscapes operate over space in distribution of forest types. Forest communities map in a scale 1: 50.000 and landscape indicators (land surface properties, land use, soil type, distance from water bodies and from roads) were used to perform spatial analysis. The results show that the most influence indicators for distribution of different forest types in the landscape are distance to water bodies and land surface properties.

Symposium 9: Management and conservation of Mediterranean forest landscapes

ASSESSING USERS PREFERENCES IN THE CORK OAK MONTADO

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The Montado is the agrosilvo-pastoral system dominant in the southern region of Portugal, Alentejo. This traditional system is nowadays appreciated in various ways that entail several non-production functions. In order to satisfy social expectations, new research approaches concerning the capacity of the landscape to supply demanded functions and their possible integration with currently managed functions, is needed. This study assesses preferences of different user groups of non-production functions for the variety of landscape patterns, in the cork oak Montado. A combination of approaches from quantitative and qualitative research methods was applied. A part of the quantitative approach was used for identification of respondents' preferences for different landscape patterns. The other part, the qualitative approach, using open-ended questions, was applied for understanding and capturing respondents' points of view, their experiences and expectations in landscape use. The results of the survey show that the important landscape characteristics are not the same for all studied user groups, and are directly influenced by the activity or use they represent. The concepts and their relation, revealed from responses to open-ended question about preferences for Montado landscape patterns, help to illustrate the perception of preferred landscape patterns by users of non-production functions. A consideration of revealed results can be helpful in searching appropriate management options for non-production functions and to avoid potential conflicts within the activities.

Symposium 11: Interfaces and interactions between forest and agriculture in rural landscapes

WHEN FORESTS ARE MANAGED BY FARMERS

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Farm forests, i.e. forests managed by farmers, are important components of french landscapes (17 % of french surface area). Farmers, who do not have knowledge in sylviculture in general, harvest them for firewood and timberwood, but also use them for hunting, mushroom harvesting or grazing. The social and ecological fonctions of these woods call for a better understanding of their management. These private woods are mainly small (< 25 ha) and thus are not submitted to french management regulations. We present the conclusions of three multidisciplinary long term studies, in south west of France, based on historical, social and technical analyses of the particularities of these woodlots. Results showed that the traditional social system (« house-centered system») is still influencing forest management, despite its loosing of importance. Woodlots are parts of the agricultural systems but some cultural features limit the implementation modern forestry practices. The roles of farm forests have to be considered on a larger landscape scale perspective.

Symposium 5: Landscape genetics

QUANTIFYING THE LAG TIME TO DETECT BARRIERS IN LANDSCAPE GENETICS

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Linking landscape effects on gene flow to biological processes such as individual dispersal and mating systems is essential to provide a conceptual foundation for landscape genetics. Understanding the rate at which spatial genetic patterns respond to changes in landscape features is crucial for properly interpreting genetic barrier data that initially cause the substructure. The goal of this study was to quantify the time until barriers are detectable (i.e., cause a genetic discontinuity), and the time after their removal until the substructure signature is no longer detectable. We used spatially-explicit, individual-based simulations to compare rates of response of individual-based (e.g., partial Mantel tests) and population-based statistics (e.g., FST) to changes in landscape structure. We simulated a wide range of movement strategies including neighbor dispersal, long distance dispersal, and panmixia. The lag time for a new barrier to become detectable is short (1-14 generations) and nearly independent of movement strategy, suggesting that individual-based approaches can rapidly detect population fragmentation. Furthermore, FST has much less sensitivity to detect a barrier than individual-based landscape genetic approaches. Subsequently, we demonstrate that given neighbor mating and very short distance dispersal strategies, historical discontinuities from > 100 generations ago might still be detectable. This suggests that historical events and landscapes could have long-term effects that confound inferences about effects of current landscape features on gene flow.

Symposium 2: Measures of landscape structure as ecological indicators and tools for cons. planning and forest management

MULTISCALE ANALYSIS OF LAND USE HETEROGENEITY AND DISSIMILARITY AS A SUPORT FOR PLANNING STRATEGIES

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The analysis of landscape structure is commonly oriented to the comprehension of pattern:process relationships and the evolution of such across spatial and temporal scales. Nevertheless, an important – and often neglected – aspect of landscape analysis is its potential to use the derived information as a support for planning, design and decision making in landscape management processes. The results of quantitative analysis of the spatial variation of landscape's composition and configuration across scales can help to identify areas distinctive regarding their heterogeneity, thus indicating different needs for spatial planning. In this work, a methodology is explored for the analysis of forest landscape pattern oriented to planning applications. In it, a series of sequential steps are taken in order to guide analysis into a diagnosis useful for decision making. It starts by defining heterogeneity areas at different scales by means of multiscale approach. Then, composition analysis is used for the integration of qualitative variables. Finally, configuration analysis is made for detecting interaction among landscape elements. It is expected that such an approach, based in a "multi-level" structural analysis, would be useful for the spatial design of planning strategies.

Symposium 3: Landscape assessment tools for adaptive management of tropical forested landscapes

SOCIO-ECONOMIC DIAGNOSIS OF A SMALL REGION USING AN ECONOMIC MODELING TOOL (OLYMPE): AN APPROACH FROM HOUSEHOLD TO LANDSCAPE SCALES TO ASSIST DECISION MAKING PROCESSES FOR DEVELOPMENT PROJECTS SUPPORTING CONSERVATION AGRICULTURE IN MADAGASCAR.

ERIC PENOT

CIRAD UMR Innovation/URSCA-SCRID, Madagascar

This paper presents the methodology, the tools, and some results from the BV-lac project in the lake Alaotra region, in Madagascar. A farming systems reference monitoring network (FSRMN) has been set up since 2007 to help the project in decision making processes for choosing appropriate technologies, and to monitor the project's economical impact in the short and medium term. A farming system modelling approach using a software developed by INRA-CIRAD-IAMM ("Olympe", JM Attonaty, INRA), has been conducted with project operators. Based on a typology of farming systems, the software allows a deep economic analysis of the local context and a good apprehension of smallholders' diversity and can simulate changes in the agricultural technologies, in order to test and adapt them to farmers' conditions. The model provides economic results displaying the actual income improvement and impact on farming practices, labour and organizational changes. The approach is based on partnership (smallholder, farmers' organizations, project operators and local administration), farming system analysis, and modelling for a Decision Support Systems (DSS) project orientation.

Symposium 2: Measures of landscape structure as ecological indicators and tools for cons. planning and forest management

SPATIAL GRADIENTS OF LANDSCAPE METRICS AS INDICATORS OF HUMAN INFLUENCE ON LANDSCAPE

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Landscape metrics have been widely used for mapping of land cover/use change and analysing relationships between landscape pattern and processes. Natural factors and human activity diversify and homogenize landscape simultaneously. The aim of our study was to analyze the extent and magnitude of human influence on landscape along landscape gradients. We calculated several landscape metrics for five transects on soil map (1:10 000) and Estonian Basic Map (1:10 000) from different years (1997-1998 and 2004-2005). We compared the gradients of landscape metrics to determine how the anthropogenic areas have expanded in 10 years and whether the housing and infrastructure tend to expand more quickly on fertile soils. The results showed that the housing has mostly expanded on fields eliminating the possibility to use fertile soils for agriculture or foresting. The pressure on forest areas was not as intense as on agricultural areas. However the new residential areas and roads have increased the fragmentation of large forested areas. The gradients enable to compare the changes in landscape structure in time and space at the same time.

Symposium 4: Network theory to conserve and reconnect forested landscapes

QUANTIFYING KEY ELEMENTS OF LANDSCAPE GRAPHS: MATCHING AVAILABLE TOOLS TO DIVERSE PROBLEMS

FERENC JORDAN

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Landscape graphs provide information about the overall structure of habitat patches and corridors. Network analysis provides a number of tools how to analyze these networks, for example, how to identify key landscape elements and quantify their relative importance. The key challenge for conservation practice is how to find the best network analytical tool for a particular biological problem. I present a case study on a fragmented forest mosaic landscape where the graph can be weighted and directed, and management may focus on preservation, improvement and enrichment. I will discuss how the different network indices can flexibly serve the analysis of the particular questions addressed. This landscape graph represents the habitat structure of only eight forest-specialist carabid species but, finally, I will present some novel results in the hierarchical analysis of landscape graphs and community food webs. Here, community ecological and landscape ecological processes are modeled in the same context and their relative importance is to be investigated.

Symposium 9: Management and conservation of Mediterranean forest landscapes

THE ROLE OF PUBLIC GOODS IN THE MANAGEMENT OF THE MONTADO: EXTERNALITIES OR DRIVERS?

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European peripheric rural areas have been in the last decades under significant economical and social changes, affecting land use and landscape pattern. Mediterranean landscapes, in particular extensively used agro-silvo pastoral systems as the Montado, have though been maintained until today through a traditional management mainly focusing on production. Conditions for maintaining this production are getting more difficult, due to a complex combination of global and local factors, and the preservation of the system is thus threatened. But at the same time, due to the extensive use, the respect of natural bio-physical conditions, and the particular character, the Montado has preserved conditions for supporting other landscape functions, e.g. public goods and services, such as nature conservation, environmental quality, recreation, residential attractiveness, support of local identity, motivating the increase of new types of society demand. From a space of production, the Montado is progressively changing into a space also of consumption and protection. The growing interest of urban people for the countryside has encouraged the emergence of new ways of managing the land, with different concerns and diversified income sources, also associated with new types of land owners and managers. Diversification in the possible motivation for the management of the Montado has already occurred. In the light of the coming changing in the Common Agricultural Policy after 2013, the main issue now is whether production is still vital in the system, or it's role as the driver of the system may be replaced by the provision of new kinds of goods and services, supported through public policies or new markets to be created. This presentation presents the results of a project (Mural –Multifunctionality of rural landscape: assessing users preferences for different landscape types and land cover compositions) applied to a municipally in southern Portugal, where the management of Montado holdings, and the role of landscape functions in this management, has been analyzed through a survey to different types of holdings, within different landscape areas. The survey data reveals differences concerning management, leading to the identification of management types and to innovation trends. The knowledge generated can lead to the identification of new possible paths for land management, besides production.

Symposium 9: Management and conservation of Mediterranean forest landscapes

MANAGING MEDITERRANEAN LANDSCAPES FOR REDUCING FIRE HAZARD: PATTERNS OF FIRE PREFERENCE AND AVOIDANCE BY DIFFERENT LAND COVERS

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Certain land cover types in a landscape are more susceptible to fire then others because of differences in vegetation structure, moisture content, and fuel load composition. The final configuration of burned patches provides useful information on the differential use of the land cover types previously available. If the different land cover categories of a given landscape were equally fire-prone, then we would expect fires to occur randomly in the landscape with an equal proportion of burned and available (before the fire) categories. Alternatively, if fire preferentially burns some categories and avoids others, this knowledge could have practical application for landscape management to decrease fire hazard, by promoting land covers less fire-prone. In the present study we address the following specific questions: (a) can we identify similar fire selection patterns in different regions of Portugal?; (b) in the context of intensive silviculture, what are the regional variations in susceptibility to fire of the more common species used (eucalyptus and conifers)?; (c) to what extent the use of native broadleaved species, in pure or mixed stands, contributes to decrease forest susceptibility to fire? (d) which are the best options, both for landscape management and forest management, for reducing wildfire hazard?

Symposium 12: From abandoned farmland to self-sustaining forests: challenges and solutions

REWILDING ABANDONED LANDSCAPES IN EUROPE

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Several landscapes are being abandoned in Europe as a consequence of current trends in socioeconomic development. Most of those landscapes were formerly the support of subsistence agricultural systems, often mixed agropastoral systems. Many studies have shown the importance of those systems for biodiversity, and several subsidy schemes have been developed to halt the abandonment of those areas. Here we argue that change in these landscapes is unavoidable in most scenarios. The costs of maintaining these cultural landscapes in a world where the agricultural practices and lifestyles have changed are unattainable. The question is then what these landscapes should be managed for. We propose that in many instances these landscapes should be managed to evolve to self-sustaining forests, requiring in the long-term minimum human intervention. These self-sustaining forest could provide a wide range of ecosystem services, including habitat for wilderness dependent species, soil protection, water cycle regulation and carbon sequestration. We conclude by discussing the challenges and approaches in on-going initiatives and projects targeted at rewilding landscapes.

Symposium 2: Measures of landscape structure as ecological indicators and tools for cons. planning and forest management

A META-ANALYSIS ON THE RELATION BETWEEN LANDSCAPE STRUCTURE AND BIODIVERSITY ALONG ENVIRONMENTAL GRADIENTS

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Understanding the factors affecting biodiversity distribution remains a major goal for ecology. In the last decades, many variables have been related with global patterns of species richness. Among others, precipitation, anthropogenic disturbances, temperature and topography have been identified as potential surrogates of species richness. However, most of these associations are region specific due to the unique geographic, evolutionary and land-use histories of each ecosystem. A novel approach has been to investigate the landscape as an integrative unit of multiple variables. This approach allows analyzing the landscape's structure and its relation with species richness using methods that can be undertaken in many regions. Within this context, many studies have been published dealing with this relation between landscape structure and species richness. These publications cover a wide array of landscape indices, scales, taxa and ecosystems. Not surprisingly, the results and conclusions derived from these studies are far from being homogeneous. The lack of a theoretical framework that incorporates the whole range of landscape structure-biodiversity responses, urged us to undertake a meta-analysis to analyze and synthesize the published information around this topic, and to detect possible patterns and regularities hidden in the vast amount of available information. For this, we performed a broad search in the two biggest online databases (Scopus and Web of Science). After a first database cleaning, were all those papers that did not assess directly the relation between landscape structure and biodiversity were eliminated, 218 papers remained for the inclusion in the meta-analysis; these papers were published between 1969 and 2008. We then carefully reviewed these studies for the extraction of statistical parameters such as correlation coefficients to perform the analysis aiming at detecting pattern of the relations between landscape structure and biodiversity along different environmental gradients and taxonomic groups. In our presentation, we will discuss the results of this meta-analysis and a general discussion on this topic will be stimulated.

Symposium 1: Quantifying the effects of forest fragmentation: implications for landscape planners and resource managers

LANDSCAPE DYNAMICS IN CENTRAL AND WEST AFRICA: CAUSES, CONSEQUENCES AND QUANTIFICATION

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Deforestation leading to forest fragmentation is a major problem in Central and West Africa. By means of case studies based on field observations of fauna and flora combined with cartographic and demographic data, a series of case studies is discussed underlining the importance of forest conservation in African landscapes.In Central Africa, the potential impact of mining activities on forest landscapes in the Katanga Province of the Democratic Republic of the Congo is investigated. Deforestation and habitat loss are consequently linked to the degradation of caterpillar populations which constitute a source of income for the rural communities. The potential impact of deforestation on indicator species is also analyzed. In the Oriental Province of the Democratic Republic of the Congo, forest fragmentation is shown to cause a shift in faunal diversity, as illustrated for rodent populations. Deforestation is also shown to be linked to changes in soil fertility and organic matter content.In West Africa, for Ivory Coast, forest dynamics are modeled for a forest-savannah

transition zone situated in the eastern part of the country. By means of a Markov chain approach, the future evolution of landscape composition and forest presence are simulated based upon land cover dynamics between 1986 and 2002. The examples illustrate the omnipresence of deforestation trends in Central and West Africa, and emphasize the need for policy development for forest conservation and enlargement.

Symposium 2: Measures of landscape structure as ecological indicators and tools for cons. planning and forest management

EFFECTS OF LANDSCAPE STRUCTURE AND STAND AGE ON WOODY SPECIES RICHNESS AND BIOMASS IN A TROPICAL DRY FOREST

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Tropical dry forests are the terrestrial ecosystem with the greatest cover in the Yucatán Peninsula, but also one of the most threatened and poorly represented ecosystems under protected areas. This study aims to characterize relationships between tropical dry forest structure, and landscape structure as well as habitat type (stand age) at two different scales: site and landscape level. The number of woody species, stand basal area, height and biomass were calculated from 276 sampling sites as well as for 23 sampling landscapes spanning the range of forest fragmentation, while land cover classes were obtained from multi-spectral satellite image classification. At the landscape level, species richness, basal area and biomass were related to patch age and landscape patterns of patch types (area, edge, shape, similarity and contrast) using regression analysis, while at the site level vegetation structure was related to stand age and image texture indices, which are landscape metrics that represent habitat composition over a specific group of pixels. We discuss the best landscape configuration for biodiversity conservation and for carbon sequestration. This information is crucial for effective conservation and management planning at the landscape level.

Symposium 3: Landscape assessment tools for adaptive management of tropical forested landscapes

INFORMING LANDSCAPE MANAGEMENT: KEEP SIMPLE AND LOOK FOR FRIENDS

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Effective integration of conservation and development objectives in landscape approaches remains elusive. Yet, by examining the experiences of projects, successful or otherwise, we get a better understanding of how to improve, what the priorities are and how to avoid repeating past mistakes. The Landscape Mosaics project aims to test some of the key principles of participatory research approaches at the landscape level, across five sites in tropical countries: Indonesia, Laos, Cameroon, Madagascar and Tanzania. Each of these sites has experienced the project in vastly different ways. This paper explores these experiences from the perspective of the researchers to identify learnings for future landscape research projects and interventions. Project and supporting staff completed questionnaire surveys, contributing their own perspectives in using the Landscape Mosaics approach, including the effectiveness and efficiency of activities, and the key principles and data needs for comparing the project sites. The key themes focused on are trans-disciplinarity, integrating research, conservation and development objectives, flexibility of the approach, and comparability between sites. Responses varied widely reflecting the complex nature of landscape approaches. Beyond the importance of a

good combination of landscape-scale assessment tools, trust, capacity building and time remain crucial for developing real outcomes for adaptive management.

Symposium 12: From abandoned farmland to self-sustaining forests: challenges and solutions

VEGETATION DYNAMICS, ECOSYSTEM PROPERTIES AND NATURAL VALUE IN CHANGING MOUNTAIN LANDSCAPES

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Mountain farmlands are expected to be among the most dynamic landscapes across the 21st century, since rapid changes in social systems are driving shifts in the disturbance regimes, which have shaped those landscapes for hundreds of years. The abandonment of agriculture and extensive grazing in marginal land, and the concentration of rural activities around villages, opens new windows of opportunity for vegetation recovery but also for alternative uses (e.g. energy production), and therefore creates new challenges for managing and monitoring mountain landscapes. Modifications in landscape composition, structure and functioning are expected to promote dramatic changes in the spatial patterns of biological diversity, natural value, ecosystem properties, natural hazards, and ecosystem services. A hierarchic view of the impacts of farmland abandonment on the multiple components of mountain landscapes is envisaged as the most suitable to address trade-offs among trends for individual components. Due to its integrative nature, the conceptual body of Ecosystem Services is proposed as a suitable source of state variables for modeling approaches to trade-off analyses in the landscape context. Besides supporting explicit tests to the effects of farmland abandonment on biodiversity, such models could also provide support to political and technical decision based on reliable forecasts of trends.

Symposium 8: Ecosystem services from forests at the watershed scale

IMPACTS OF WILDFIRES ON CATCHMENT HYDROLOGY: RESULTS FROM MONITORING AND MODELING STUDIES IN NORTHWESTERN IBERIA

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Wildfires have significant impacts on vegetation cover and soil properties, which in turn can lead to significant increases in runoff, erosion and nutrient export from forested hillslopes. However, the impacts of these changes at the catchment scale are still poorly understood, due among other reasons to the difficulty of instrumenting burnt catchments with enough speed to capture hydrological processes at the early stages of forest recovery. Hydrological modelling remains therefore an important tool to assess wildfire impacts in ungauged catchments, but most existing models cannot reproduce hydrological processes in burnt soils. This work will present results from ongoing research projects in the northwestern Iberian peninsula, namely in central Portugal and Galicia. The results include: (i) long-term (i.e. multi-year) runoff, erosion and soil properties monitoring in burnt and unburnt hillslopes and micro-catchments (0.1 to 10 Km^2), providing insights into the local-scale impacts of wildfires on hydrological processes; (ii) modelling approaches to simulate

hydrological processes in burnt areas, informed by collected data. Ultimately, knowledge gained from field monitoring campaigns will be coupled with numerical modelling to evaluate the impacts of wildfires on catchment processes at the meso-catchment scale.

Symposium 7: A landscape approach to sustainable forest management: the challenge to adaptive management and the maintenance of biodiversity value

MODELLING BIODIVERSITY INDEXES TO APPLY IN FOREST LINEAR PROGRAMMING MODELS. A CASE STUDY IN A SECOND-GROWTH NOTHOPHAGUS FOREST.

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To include vegetation diversity index in multi-criteria forest management planning is needed a thorough knowledge of the vegetal dynamic in the targeted forest. Generally, current diversity information is obtained by sampling in the forest, however it is seldom that vegetation data had been gathered in the same stands at preterit times. Otherwise, in many lineal programming models, biodiversity indexes have to be entered in each space-time unit of the forest planning. However, when having ancillary and extend information as national forest inventories, the lack of past botanic samples might be overcome by estimating the most likely vegetal succession along the forest rotation period.Our study was carried out in a second–growth *Nothofagus* forest in Lanco(Chile). Mainly, two different information resources were used, the Chilean National Vegetation Catalogue and 219 sampling forest stands. Basing on these two resources, the vegetal succession were estimated as well as the time when coming up a new species. Our approach was based on canonical correspondence analysis among species and between species and dasometric factors. Further, we obtained the association among biodiversity indexes and dasonomic indicators. As a result we obtained the expected biodiversity index for each spatial-time unit of the forest planning.

Symposium 12: From abandoned farmland to self-sustaining forests: challenges and solutions

RESTORATION OF BIODIVERSITY AND ECOSYSTEM SERVICES IN CROPLAND. FURTHER RESEARCH IS NEEDED BUT ACTION IS DESPERATELY NEEDED

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Cultivation and cropping are major causes of degradation and destruction of natural ecosystems, and farmland currently extends on more than 40% of the land's surface. 'Passive restoration', whereby abandoned agricultural land undergoes secondary succession, is often slow owing to biotic and abiotic limitations. 'Active restoration' by planting trees can be very expensive if large areas are to be restored. We suggest "woodland islets" as an alternative approach to designing ecological restoration in extensive agricultural landscapes. This approach allows conciliate farmland production, conservation of values linked to cultural landscapes, enhancement of biodiversity and provision of a range of ecosystem services. If "further research is needed", "action is desperately needed". The International Foundation for Ecosystem Restoration is developing the "Islets and coasts in agricultural seas" Initiative to implement demonstration projects of conciliation of farmland production and enhancement of biodiversity and ecosystem services. Restoration actions include introduction of blocks of native woody vegetation and revegetation of field boundaries and way sides, rehabilitation and construction of water spots, installation of nest boxes, rehabilitation and construction of stone mounds and walls, and propagation and plantation of singular fruit trees. These restoration actions are accompanied by a variety of social and educational values including citizen science.

Symposium 6: Road ecology: improving connectivity

ROADS AND RAILWAYS SPLIT UNGULATE POPULATIONS TRIGGERING THEIR GENETIC DIFFERENTIATION

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The fragmentation of terrestrial vertebrate populations by roads and railways may threaten their survival. Hence the adoption of mitigation measures when new transport infrastructures are constructed has become widespread during the past decade. Such modifications may be costly but they are vital to ensure that new roads are crossed by some common game species, such as ungulates. However, it remains unknown whether long-established infrastructures are a real barrier to such animals or whether, over time, ungulates learn to cross them via structures (such as bridges) that have not been specifically designed for that purpose. Here we report on the extremely low frequency at which wild ungulates cross transport infrastructures of a diversity of ages that traverse forested areas, and on the emergence of genetic differences in wild boar (*Sus scrofa*) killed on either side of one of them, a motorway just 19 years old. Our results were obtained in continuous forest-scrub patches bisected by transport infrastructures and they reveal that these suffice to fragment ungulate populations. They justify the desirability of developing defragmentation programmes on existing transport networks and of investing in mitigation measures in new infrastructures in order to avoid long-term negative effects on fauna.

Symposium 7: A landscape approach to sustainable forest management: the challenge to adaptive management and the maintenance of biodiversity value

LANDSCAPE PLANT DIVERSITY DISTRIBUTION RELATED TO ENVIRONMENTAL GRADIENTS AND HUMAN IMPACT ACTIVITIES IN SOUTH PATAGONIA

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Composition and distribution of plant communities at landscape level are related to environmental gradients, and their conservation status or impacts. The objective was to evaluate changes in plant diversity at landscape level in a mountain basin located in Tierra del Fuego (Argentina), and to determine the influence of human impacts and conservation value of different vegetation types along environmental gradients. The study was located in Andorra Valley (129 km²) where 139 landscape units were identified according their vegetation types (*Nothofagus betuloides* forests-NB, N. pumilio forests-NP, upper-valley grasslands-UVG, bottom-valley grasslands-BVG and peatlands-P). Floristic surveys (ferns, dicotiledons and monocots) and forest structure were sampled, while environmental variables quantification was performed into a GIS. We found differences in diversity related to aspect, altitude, vegetation types and forest site quality when ANOVAS, classifications and ordination analyses were performed. The most diverse vegetation types were NP and UVG compared to P, BVG and NB, where exotic species were related to the degree of human impact in the studied units. The knowledge of distribution and composition of plant diversity in the different vegetation types and environmental gradients allow us to propose conservation strategies according to the status of the units and their distribution at landscape level.

Symposium 10: Global change and transitions in forest landscapes

POPULATION AND FOREST COVER CHANGE IN SÃO PAULO COAST, SOUTHEASTERN BRAZIL

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Coastal systems are the most densely populated ecosystem zones (as defined by the "Millennium Ecosystems Assessment"). The Low Elevation Coastal Zones are considered the most prone to be affected by global climate change, especially by sea level increase and tropical storms. With the trends of population growth on these areas, concerns about ecosystem services maintenance became more relevant. One of the most important factors associated to global environmental change is tropical deforestation, which is due to different pressures at different scales. On the other hand, some places experience a net reforestation after a long period of predominant deforestation, a process called forest transition. Atlantic Forest inventories in São Paulo State reported a drastic decrease on deforestation rates and a slight increase on natural forest cover in the coastal region between 1991 and 2005. We analyze forest cover, demographic and socio-economic data provided by state and federal agencies for São Paulo State's coastal municipalities. Our goal was to investigate the relationship between social parameters and forest cover changes in recent years at the municipality and regional levels. We discuss the results in face of the Forest Transition Theory, as well as their implications for population vulnerability to environmental change.

Symposium 1: Quantifying the effects of forest fragmentation: implications for landscape planners and resource managers

CHANGES IN THE FUNCTIONAL CONNECTIVITY OF WOODLAND HABITATS ACROSS THE GREAT BRITAIN BETWEEN 1990 AND 2007

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In order to monitor progress towards international biodiversity conservation targets the UK has developed a suite of 18 biodiversity indicators. One indicator, which is aligned to CBD and EU indicators, is intended to assess the change in the impacts of habitat fragmentation on habitat connectivity and biodiversity. In common with much of Europe, the habitats and landscapes of the UK have undergone considerable loss and fragmentation through a long history of human activity. Habitat loss and fragmentation is regarded as a serious threat to biodiversity conservation. The UK connectivity indicator adopts a species-based perspective to examine functional connectivity. Firstly, the indicator accounts for edge impacts (i.e. negative effects of adjoining land cover that differs from the habitat of interest) by applying an internal edge buffer, weighted by the intensity of surrounding land cover. The indicator then calculates the probability of movement within and between the remaining habitat patches. These potential movements are weighted by the area of the patch; a negative exponential dispersal curve; and a least-cost distance measure (which indicates greater potential movement through permeable, ecologically similar, landscape features, as opposed to intensive, urban features). This paper reports on changes in functional connectivity of woodland habitats in 591 1km sample squares across Britain between 1990, 1998 and 2007.

Symposium 8: Ecosystem services from forests at the watershed scale

EVALUATION OF BIODIVERSITY RELATED ECOSYSTEM SERVICES OVER FORESTED LANDSCAPES-A CASE STUDY IN JAPAN

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We developed some indicators to evaluate various kinds of ecosystem services that biodiversity provides and analyzed the effects of forest management. We conducted questionnaire survey, measurement on the collection of special forest products and field counts of forest users. To evaluate pollination services we sampled insects visiting the flowers and made inventories of arthropods. As a result, combination of various methods would result in more effective estimates of ecosystem services than a single method, when we expect not only to cover a large area but also to make more precise estimates with a seasonal variation. Local people visited forests frequently and collected such a large amount of special forest products that could yield great commercial value. Native honeybee and non-Apis insect pollinators visiting flowers appeared to make a great contribution, when a farmland was located next to a large area of forests. Forest cutovers or disturbed by avalanches had a great number of bee species and provided wild vegetables collected by local people, while old secondary broad-leafed forests had greater variety of edible mushroom than tree plantations. Thus, appropriate forest management would contribute to providing greater ecosystem services, while plantation will give negative effects.

Symposium 2: Measures of landscape structure as ecological indicators and tools for cons. planning and forest management

EFFECTS OF BIG FOREST FIRES ON LANDSCAPE FRAGMENTATION: THE CASE OF PELOPONNESUS (GREECE), 2007.

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Environmental heterogeneity, particularly in the Mediterranean region, is widely recognized as one of the main drivers of biodiversity. In the Mediterranean forest landscapes, human disturbance regimes and relative low fire intensities have created a spatial mosaic of land cover, which has a high capacity of harbouring many organisms. Fuel accumulation due to abandonment of traditional land use in conjunction with drier and warmer climatic conditions, have led to an increase in the severity of wildfire hazards and, therefore, to a decrease in biological diversity. In this study, we analyzed the effect of mega-fires on the landscape pattern of ecosystems in Peloponnesus, southern Greece, an area heavily impacted on August 2007 by a ten-day fire, responsible for the loss of 46 individuals. This fire affected the heterogeneity of ecosystems, reshaping the complexity of their landscape structure and disrupting their functionality. Forest patch size and the connectivity between remnant mature forest patches were decreased strongly, leading to increased fragmentation of these important landscapes. A notable difference was observed between areas of natural character and mosaics of pine forest with olive-trees plantations where the latter suffered fewer changes and reduced the severity of the damage on the natural vegetation.

Symposium 3: Landscape assessment tools for adaptive management of tropical forested landscapes

A KNOWLEDGE BASE TO COMPARE MULTI-DISCIPLINARY AND MULTI-SCALE DATA FOR IMPROVED LANDSCAPE MANAGEMENT

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This paper presents a tool which aims at compiling data of local to regional origin and comparing case studies in order to develop a knowledge base for landscape-scale research, planning and monitoring. It is a product of Integrating livelihoods and multiple biodiversity values in landscape mosaics project, a 3-years research project (CIFOR-ICRAF) conducted in five countries. This project included numerous field assessments on four major themes: livelihoods, governance, biodiversity and landscape patterns, as well as a participatory action research component (PAR). Surveys and PAR activities were conducted at different scales, from household to village and higher administrative levels. This trans-disciplinary and multi-scale approach led to a great amount of data and proportional difficulty for cross-site and cross-thematic analyses. The need for a tool to compile the data from all the sites and thematic teams motivated us to work on a data base. The data base was adapted so as to fit with other research or development projects dealing with landscape assessments. It allows comparisons of studies with a landscape focus and, when appropriated by partners, it can become a knowledge base for programs and institutions addressing land use planning issues, notably through landscape assessment and monitoring for adaptive management.

Symposium 10: Global change and transitions in forest landscapes

EFFECTS OF FOREST REGENERATION DYNAMICS ON THE STRUCTURE OF THREE BRAZILIAN ATLANTIC FOREST FRAGMENTED LANDSCAPES

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Recent studies suggested that forest regeneration can compensate deforestation, especially after a forest transition period, but there is few information on how this forest dynamics can affect the landscape structure, and thus the conservation potential of those landscapes. We tested those effects in three landscapes of the Brazilian Atlantic Forest where a forest transition should be occurring. All landscapes had approximately 10,000ha, and were studied from 1962 to 1980's and from 1980's to 2000's. The first landscape presented a forest cover increase during the first period and subsequent forest loss (44% to 46% and 31%), while the other two landscapes showed forest loss in the first period and subsequent forest increase (43%, 28%, 48%; and 11%, 7%, 11%). Both deforestation and regeneration rates were high in all landscapes and dates, showing a fast forest dynamics. Forest regeneration was responsible for a significant increase in fragment area, and allowed also to promote structural connections among fragments, increasing landscape connectivity in all dates and landscapes analyzed. These results showed that forest regeneration can promote significant changes in the landscape structure which should improve considerably the capacity of landscapes in maintaining forest-dwelling species, especially in fragmented landscapes predominantly composed of younger secondary forest.

Symposium 2: Measures of landscape structure as ecological indicators and tools for cons. planning and forest management

POTENTIAL DISTRIBUTION OF NESTING SITES FOR GOLDEN EAGLE (Aquila chrysaetos) USING NESTING LOCATIONS IN A TRANSITIONAL ECOLOGICAL AREA IN NORTHWESTERN SPAIN

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We modelled potential nesting sites for Golden Eagle (*Aquila chrysaetos*) in the province of Ourense (Galicia, NW Spain), using 49 locations of current nests and with the help of 27 environmental variables as raster maps. Fully-automated techniques were used to estimate the potential distribution of locations suitable for nesting within the study area, using the DOMAIN algorithm and implemented in the statistical environment R. The auxiliary raster maps, at 250 meter resolution, included topographic variables (i.e. altitude, slope, insolation, etc), remote sensing information (MODIS-EVI), land use maps, temperatures, biodiversity indexes, habitat fragmentation estimates and human influence. The study revealed that suitable areas for nesting are characterised by altitude ranges between 255 - 1443 m.a.s.l., steep slopes and low human pressure (far from human settlements and roads). This study also shows the great advantages of using remote sensing information instead of traditional land use maps in this kind of study. The results are consistent with the ecological requirements of the species and reveal that the regions with highest habitat suitability are Valdeorras, Quiroga, Viana and Verín. This analysis constitutes a basic tool for the implementation of conservation policies for this endangered species in this transitional ecological area.

Symposium 3: Landscape assessment tools for adaptive management of tropical forested landscapes

ENGAGING LOCAL PEOPLE IN BIODIVERSITY MONITORING FROM THE START – OUR EXPERIENCE IN LAOS

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Conservation agencies, projects and institutions working in the tropics have recently expressed the need to better engage local communities in monitoring activities. Unfortunately, their methods rarely interest local people. Biodiversity monitoring is often top-down: local people are solicited to implement -but rarely design- the monitoring tools. We show how involving local people is key to developing sustainable and relevant monitoring tools. In Laos, district authorities use Land Use Planning (LUP) to balance poverty reduction with forest conservation. LUP is often used in natural resources management outside protected areas, where human activities create forest fragments that still have high biodiversity. Our work in Luang Prabang Province shows that biodiversity monitoring tools based on local knowledge and interests can address land use issues and concerns of decision makers. We developed a set of monitoring tools and methods with input from all stakeholders and tested them in 6 villages. Stakeholders will be interested in biodiversity monitoring if it: i) focuses on resources important for local people and external stakeholders, ii) is relevant for national priorities and integrated in governmental policies, iii) provides incentives for those implementing the activities, iv) has a clear and commonly agreed purpose, and v) is cost effective.

Symposium 5: Landscape genetics

A LANDSCAPE GENETICS APPROACH TO UNRAVEL THE COMPLEX EVOLUTIONARY HISTORY OF THE IBERIAN HONEY BEE HYBRID ZONE

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While landscape genetics is in its infancy, it is a rapidly growing research field in part owing to the increasing availability of powerful molecular and analytical tools. By integrating landscape ecology, spatial statistics and population genetics, landscape genetics is allowing an unprecedented understanding of the microevolutionary processes shaping genetic variation, which has important implications for the advance of ecological and evolutionary knowledge. The Iberian honey bee provides a great model system to address evolutionary questions using a landscape genetics framework. First, previous studies suggest that the Iberian honey bee has a hybrid origin and hybrid zones have been favored by evolutionary biologists as powerful natural laboratories to study evolutionary processes. Second, with the publication of the honey bee genome and development of high-density SNP markers, powerful tools are now available to dissect the relative importance of neutral and adaptive forces in shaping the Iberian honey bee hybrid zone, a goal of central importance as it leads to more robust inferences of demographic history and to identification of adaptive divergence. Herein, we will present an ongoing research project on the Iberian honey bee hybrid zone where the tools of landscape genetics and population genomics will be combined to unravel the challenging evolutionary history of the Iberian honey bee.

Symposium 4: Network theory to conserve and reconnect forested landscapes

SPATIAL GRAPH THEORY TO ASSESS ANIMAL MOVEMENT AND LIMIT DISEASE SPREAD IN FRAGMENTED LANDSCAPES

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There are several ways to characterize landscape spatial heterogeneity. For conservation purposes, the quantification of the amount of fragmentation (e.g., delineating spatial homogeneous patches) or its dual, that is, the degree of landscape connectivity (e.g., identifying potential paths, corridors, between resource patches) is a paramount. These two different properties of landscape spatial heterogeneity can be quantified using spatial graph theory. Here I present how graph theoretic and computational geometric methods can help assess landscape spatial heterogeneity effect on animal movement. Specifically, I describe how spatial graph theory encompasses previous graph-based methods such as those developed to detect boundary (e.g., triangulation-wombling algorithm and categorical-wombling algorithm) and to characterize boundary properties using boundary statistics (e.g., boundary width, boundary length, boundary width) as well as spatial graph-based methods allowing to quantify habitat connectivity (minimum planar graph network, least-cost paths) and algorithm to rank patch according to their importance to maintain landscape connectivity. For illustration, I apply these methods to study woodland caribou habitat in Canada to show how they can help to define reserve networks and prevent disease spread.

Symposium 7: A landscape approach to sustainable forest management: the challenge to adaptive management and the maintenance of biodiversity value

IS IT POSSIBLE TO COMBINE ADAPTATION TO CLIMATE CHANGE AND MAINTAINING OF FOREST BIODIVERSITY?

MARJA KOLSTRÖM, TERHI VILÉN & MARCUS LINDNER

European Forest Institute, Finland

An EU-level review of the climate change adaptation measures in forestry shows that there are adaptation measures that support maintaining biodiversity, but other adaptation measures have the potential to decrease the level of biodiversity. A choice of the adaptation measure might thus involve trade-offs between efficient adaptation and maintaining biodiversity at the stand level. Consequently, planning and management of the adaptation measures should be carried out at the landscape level. The landscape approach allows building a combination of highly adaptive stands with simultaneous high level of biodiversity and stands where adaptation measures do not support biodiversity. This is however a complex task and gets even more complicated since also economic and social standpoints have to be taken into account. Identifying suitable landscape level management strategies can be facilitated with decision support systems which include necessary simulation models. A successful realisation is possible only if all policy makers at different levels, affected stakeholder groups, forest owners and forest workers are aware what measures are suitable and why they are used. The presentation gives an overview of suitable adaptation measures for boreal, temperate and Mediterranean forests as identified from past and ongoing reviews covering many European countries.

Symposium 11: Interfaces and interactions between forest and agriculture in rural landscapes

LESSONS FROM THE PAST TO THE FUTURE. FUTURE NEEDS FOR FOREST PLANTS

MARTIN HERMY

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Former land use seriously affects the structure and composition of (deciduous) forest ecosystems. Management resulted in a simplified structure. Both plant species composition and seed bank composition differ greatly between recent and ancient forests. Even effects of former Gallo-Roman occupation are still visible in the present plant species composition. Given these pronounced effects, it is no surprise that colonization rates of typical forest plant species are extremely low, ranging between ca. 20-100 m per century. Recent work suggests that also an extinction debt is still to be payed off. If we want species to cope with climate change, we urgently need measures even involving assisted migration or managed relocation; so measures which until now commonly are not considered acceptable in nature conservation & restoration.

Symposium 10: Global change and transitions in forest landscapes

DYNAMICS OF REFORESTATION IN COUPLED SOCIAL-ECOLOGICAL SYSTEMS: THE STATE OF SÃO PAULO, BRAZIL

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Considerable progress has been made in understanding the dynamics of tropical deforestation, which is a major factor associated to global environmental change. It is recognized that reforestation can take place simultaneously with deforestation but the conditions under which a region transitions from a phase of net deforestation to one of net reforestation is largely an untapped research frontier. In the State of São Paulo, inventories have indicated a slight increase on Atlantic Forest area over the two last decades. Our study aims to investigate if reforestation has taken place on rural properties of selected municipalities, and to analyze the factors driving to this outcome. Structured interviews were performed in 600 rural establishments at six municipalities: Campinas, Jundiaí, Monteiro Lobato, São José dos Campos, São Luís do Paraitinga and Ubatuba. Most of respondents declared that forest cover increased in their land over the past five years. Aesthetical values and environmental conservation were frequently reported as important drivers of reforestation, while economic and government incentives were reported as of little or no importance. The households' and landowners' attributes influence over the odds of reforesting are discussed, as well as the relative importance of planted and native forests within the studied landscapes.

Symposium 9: Management and conservation of Mediterranean forest landscapes

PAYMENT FOR ECOSYSTEM SERVICES: A NOVEL TOOL FOR THE CONSERVATION OF MEDITERRANEAN EVERGREEN OAK WOODLANDS?

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The western Mediterranean evergreen oak woodlands have been shaped since historical times into open woodlands, or silvo-pastoral systems, in different regions. When well-managed, these systems harbour high biodiversity, provide direct commodities and generate important ecosystem services. Abandonment and lack of management will cause shrub encroachment, loss of habitat heterogeneity and increased risk of wildfire, imperilling the conservation and cultural values of the system. For example, in cork oak woodlands, cork, a non-timber forest product periodically harvested without killing the trees, has been the main economic incentive maintaining the management of the system. World devaluation of cork market prices however is leading to abandonment of cork oak woodlands in different regions. Payment for ecosystem services is a relatively novel conservation tool potentially applicable to the conservation of cork oak woodlands. We identify, at the regional level, main ecosystem services provided by cork oak woodlands in Southern Portugal and suggest how this tool may be used for the conservation of these systems.

Symposium 4: Network theory to conserve and reconnect forested landscapes

RANKING INDIVIDUAL HABITAT PATCHES AS CONNECTIVITY PROVIDERS: INTEGRATING NETWORK ANALYSIS AND PATCH REMOVAL EXPERIMENTS

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We propose a habitat patch ranking procedure that can help conservation planners to identify patches that, more than others, contribute to uphold species dispersals in a landscape context. We do not introduce any conceptually new connectivity metrics, but we elaborate, extend and partly integrate recent network-based approaches for modeling and supporting the management of fragmented landscapes. In doing so, experimental patch removal techniques and network analytical approaches are merged into one integrated modeling framework for assessing the role of individual patches as connectivity providers in the landscape. In particular, we focus the analyses on the habitat availability metrics PC and IIC, and the network centrality metric betweenness centrality. The combination and extension of these metrics jointly assess both the immediate connectivity impacts of the loss of a particular patch and the resulting increased vulnerability of the network to subsequent disruptions. We evaluate our proposed ranking procedure in two real landscapes in Madagascar and Catalonia (NE Spain) and show that the combined metrics reveal relevant and non-redundant information valuable to assert and quantify distinctive connectivity aspects of any given patch in the landscape. Hence, we argue that the proposed procedure could facilitate more ecologically informed decision-making in managing fragmented landscapes.

Symposium 11: Interfaces and interactions between forest and agriculture in rural landscapes

EFFECTS OF MANAGEMENT ACTIONS IN MAMMAL DIVERSITY AND ABUNDANCE IN A MEDITERRANEAN AGROFORESTRY SYSTEM

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Non-flying mammal species occurring in a highly managed agroforestry system were studied using signs of presence surveys, scent stations, track-plates and trapping, in the cork oak (‘montado’) matrix and other land uses. Results were analyzed using standard statistical methods and GLMs, considering land use, landscape metrics and grazing intensity. Higher diversity and abundances were found in areas of higher shrub density, namely mixed forest stands fenced for cattle exclusion. Many species have shown to be negatively affected by grazing intensity, particularly small mammals. Lower grazing intensity or areas fenced earlier resulted in higher abundances. Except for generalist predators, most species have shown a positive response to landscape heterogeneity and riparian corridors. The increasing use of the ‘montado’ for cattle breeding has leaded to the landscape homogenization by means of grazing and shrub clearance for pastures cultivation and this, together with incremented headage, constrains species diversity and abundance. In this landscape context, water courses assume a relevant role as patches of suitable habitat providing shelter, food, movement corridors and dispersion routes. Recent options of fencing forest patches with good forest natural regeneration or with high diversity/density of Mediterranean macquis, and recovering degraded water courses, to restore landscape heterogeneity, are expected to positively affect the mammal community being the current challenge in terms of monitoring and research.

Symposium 9: Management and conservation of Mediterranean forest landscapes

TESTING THE FIRE PARADOX: IS FIRE INCIDENCE IN PORTUGAL AFFECTED BY FUEL AGE?

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A well-known fire paradox states that fire exclusion leads to larger and more severe fires. If fire occurrence is time-dependent, then exogenous factors such as weather will play a relatively minor role on fire incidence, which to a great extent will be controlled by the existing fuel age mosaic. However, the opposing view is now prevailing in the literature and defends that fuel age is unrelated to wildfire frequency and size in Mediterranean ecosystems. We determined the fire return interval (FRI) associated to each burned patch larger than 10 ha (1998-2008, n=10197), and analyzed fire frequency by fitting a two-parameter Weibull function to the FRI distribution. The control of burn probability by fuel age was found to be weak to moderate but independent of meteorological conditions. Consequently, young fuels will resist burning or will delay landscape fire spread even under extreme meteorological conditions. A mean fuel age of 4 years was successful in avoiding wildfires of 500 ha and more, while some mitigating effect on landscape fire spread persisted up to an average fuel age of 8 years. Hence, fuels exert a short-term but effective control on fire growth. Management implications will be discussed.

Symposium 4: Network theory to conserve and reconnect forested landscapes

LINKING FOREST SPATIAL PATTERN ANALYSIS WITH NETWORK THEORY

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The analysis of forest spatial pattern and habitat corridors is an important component in conservation and restoration policies. Morphological Spatial Pattern Analysis (MSPA) provides an intuitive description of image pattern structures as well as a reliable detection of connecting pathways. This pattern analysis can then be transferred for further studies using network theory approaches, which are particularly suited to quantify the importance of the MSPA-detected nodes and links. The free software toolbox GUIDOS is designed to provide appropriate tools for the application of recent research studies to scientists and especially newcomers in the field of landscape ecology. GUIDOS supports generic image processing tasks, MSPA analysis, and network theory examinations based on Conefor Sensinode. The combination of spatial pattern and network analysis is mutual beneficial and adds value in risk assessment studies, landscape planning, and socio-economic sustainability. The key features of MSPA and network analysis in GUIDOS will be illustrated and explained on a sample data set.

Symposium 1: Quantifying the effects of forest fragmentation: implications for landscape planners and resource managers

BioFrag: A NEW INDEX ASSESSING LANDSCAPE FRAGMENTATION AND ITS ECOLOGICAL EFFECTS

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Landscape fragmentation and its ecological effects are significant drivers of biodiversity loss, yet changes in fragmentation through time are poorly understood because we do not have biologically meaningful ways to quantify those changes. In order to translate complex spatial patterns of land-cover and land-use into measures of biological or ecological impacts, a new generation of landscape metrics is needed that can integrate patterns of biodiversity across the full range of habitats and land cover types that occur within a given landscape. In this study, we introduce a biodiversity-relevant index to describe forest fragmentation in order to (1) investigate how fragmentation has changed through space and time; and (2) assess progress towards globally agreed policy targets on biodiversity and communicate it to decision makers. Using field data for a variety of taxa in well-studied landscapes distributed around the world, we use an index of similarity (Bray Curtis) to assess differences in community composition between control plots and forest plots that are potentially affected by fragmentation. We use a multiple non-linear regression technique that takes account of spatial autocorrelation effects to examine how spatial patterns of community differences vary in relation to a range of fragmentation measures at multiple spatial scales. We predict community composition for every forest pixel on land-cover maps of the study areas and then summarise these maps to calculate a landscape-level estimate of compositional change, which we term 'BioFrag'. We have applied BioFrag on a range of taxa (trees, herbs, amphibians, beetles, birds and bats) from study landscapes around the world (Brazil, Canada, Comoros Islands, Great Britain, Malaysia, Montserrat, New Zealand, and Australia).

Symposium 1: Quantifying the effects of forest fragmentation: implications for landscape planners and resource managers

FRAGMENTATION PATTERNS OF HIGH-QUALITY FORESTS IN ONTARIO

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Forest fragmentation effects are well-documented for many regions, and agriculture is largely responsible for the loss of forest cover. Cultural settlement patterns effect remnant forest patch size, shape, and connectedness as roads, survey lines, and ownership patterns cleave forest boundaries. Forest patch sizes reflect changes in terrain, with largest patches on more diverse terrain where change to other land cover types is more challenging. In this paper we extend this exploration of fragmentation to forest quality, especially utilitarian value in terms of tree species and cultural uses in southern Ontario, Canada. Fragmentation patterns are compared to soil and forest type classifications to examine if high-quality forests have been more fragmented by loss, shrinkage, or isolation than lower-quality forests. Because of cultural settlement patterns and forest use, however, many high-quality forest patches may remain on farms: we compare high-quality forest patterns to agricultural census data to help explain drivers of changes in different forest types. The planning and design implications emphasize forest type and quality in considering conservation and stewardship of remnant forests in agricultural landscapes.

Symposium 4: Network theory to conserve and reconnect forested landscapes

CONNECTIVITY LOSS IN HUMAN DOMINATED LANDSCAPE: OPERATIONAL TOOLS FOR THE IDENTIFICATION OF SUITABLE HABITAT PATCHES AND CORRIDORS ON AMPHIBIAN'S POPULATION

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Landscape connectivity is a key issue for biodiversity conservation. Many species have to refrain to move between scattered resources patches. This is particularly the case for the common frog, a widespread amphibian migrating between forest and aquatic habitats for breeding. Face to the growing need for maintaining connectivity between amphibians' habitat patches, the aim of this study is to provide a method based on habitat suitability modelling and graph theory to explore and analyze ecological networks. We first used the maximum entropy modelling with environmental variables based on forest patches distribution to predict habitat patches distribution. Then, with considerations about landscape permeability, we applied graph theory in order to highlight the main habitat patches influencing habitat availability and connectivity by the use of the software's Conefor Sensinode 2.2 and Guidos. The use of the JRC Forest/Non Forest European map for the characterisation of common frog terrestrial habitat distribution combined with the maximum entropy modelling gives promising results for the identification of habitat discontinuities within a regional perspective. This approach should provide an operational tool for the identification of the effects of "landscape barriers and corridors" on populations structure. Then, the method appears as a promising tool for landscape planning.

Symposium 7: A landscape approach to sustainable forest management: the challenge to adaptive management and the maintenance of biodiversity value

THE CHALLENGE TO ADAPTIVE MANAGEMENT AND THE MAINTENANCE OF BIODIVERSITY VALUE

SANDRA LUQUE

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Considering the resulting impacts on land use and biota, the option of adapting land use and landscapes to mitigate undesired implications by climate change is now appearing on the political and research agendas. One of the most important challenges for future research will be to integrate research across different scales, including spatio-temporal scales within an interdisciplinary and multidisciplinary framework. If we manage to follow this route, science will be able to move from analytical to actionable climate knowledge. This work provides views and examples on how the holistic approach of landscape ecology can be considered towards the interplay between biodiversity value and the needs of forestry activities. Focusing on biodiversity conservation as a proxy for ecological dimensions of sustainable forest management the work proposes a series of requirements for the conservation of habitat networks and ecological processes to be met by forest landscape managers. Landscape ecology, proposes a comprehensive and integrative approach from the plot level to the landscape level, considering adaptive management and an analysis of ecological thresholds. Spatial conservation prioritization methods are applied to a national-scale conservation planning task. Results from Boreal and temperate forests in Europe demonstrate the importance of forest habitat quality models and the development of a spatial framework to integrate information of protected and private forest land.

Symposium 4: Network theory to conserve and reconnect forested landscapes

NETWORK THEORY GOES BEYOND TOPOLOGY: PLACING CONNECTIVITY IN A BROADER CONTEXT OF CONSERVATION MANAGEMENT ALTERNATIVES

SANTIAGO SAURA

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Recent metrics and analytical approaches based on a network-based (graph-theoretical) representation of the landscape have facilitated important progress towards reliable and operational ways to deal with connectivity and ecological flows in forest landscape management. Most of these network methods have however focused on describing topological properties of the landscape networks and of the patches and links therein, but with weak or no link to other ecological characteristics or conservation alternatives different from those strictly related to interpatch connectivity. This provides useful but still partial answers to the actual conservation problems faced by forest managers. We describe how network metrics based on the concept of measuring habitat availability (reachability) at the landscape scale can be used to address some of these limitations. These metrics can be partitioned in three fractions that quantify the different ways in which a patch or link can contribute to habitat connectivity and availability in the forest landscape. We discuss how the evaluation of these separated fractions helps to place connectivity in a broader context of conservation alternatives, by (1) providing a unifying analytical framework that avoids the subjective and arbitrary weighting of connectivity considerations in the final planning and (2) identifying when (and to which degree) connectivity is really a major management issue. We describe how such approach has been implemented in the Conefor Sensinode software (http://www.conefor.org) and illustrate it with some applications to the conservation of selected forest bird species in Spain.

Symposium 6: Road ecology: improving connectivity

THE INFLUENCE OF ROADS ON NATIVE VEGETATION AND RESERVES DISTRIBUTION IN SÃO PAULO STATE, BRAZIL

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Roads affect the environment in different distances and intensities. This work aims to: 1) estimate the area ecologically affected by roads in the whole State of São Paulo, in each type of vegetation and in all reserves; and, 2) verify the influence of road distance on native vegetation cover and on reserves. The study area was the State of São Paulo, southeastern Brazil, where two biodiversity hotspots biomes occur – Brazilian Atlantic Forest and Brazilian Savanna (Cerrado). About 4% of São Paulo is ecologically affected by roads, being dense ombrophylous forest and many reserves highly affected. The area of native vegetation and the area of reserves have increased nearly exponentially with the increase of road distance, indicating that road distance may be a relevant factor to explain the distribution of native vegetation and of reserves in São Paulo. In conclusion, in order to improve conservation and restoration strategies, we suggest that roads should be considered, prioritizing those sites far from them.

Symposium 8: Ecosystem services from forests at the watershed scale

FORESTS IN LANDSCAPES: MODELLING FOREST LAND COVER PATTERNS SUITABILITY FOR MEETING FUTURE DEMANDS FOR LANDSCAPE GOODS AND SERVICES

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At the landscape scale, forests combine with other land covers creating multifunctional landscape mosaics. Different landscape mosaics/patterns have varying abilities to provide landscape functions. The display of a function at the landscape level means that the landscape pattern is able to support a function. However, the explicit effects of forest spatial patterns on landscape functions provided have not been well studied (Turner, 1989, 2005). The overarching goal of this research project is to link landscape pattern with landscape function, considering particularly the role of forests for the provision of amenity functions at the landscape scale. Our goals are: i) modelling forest land cover patterns which enable the highest provision of landscape functions such as water flow regulation, flood prevention, carbon sequestration, recreation and territorial identity in the Portuguese Cávado and Sado catchments; ii) developing a new framework for prioritizing a set of landscape functions at river basin scale considering both land use and climate change scenarios; iii) investigating how the spatial characterisation of landscape functions, made for the case studies, can be applied to a broader set of watersheds. This work combines ecological modelling/statistical analysis and expert judgement/public preferences for better understand the role of forests in sustainable landscapes.

Symposium 5: Landscape genetics

GEOME : TOWARDS AN INTEGRATED WEB-BASED LANDSCAPE GENOMICS PLATFORM

STEPHANE JOOST

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In the present context of rapid global climate change, wildlife ecologists and evolutionists show a renewed interest to study adaptation. Local adaptation in particular has to be better understood in order to provide objective criteria to characterize conservation areas which are the most worthwhile preserving. At the same time, livestock scientists assert that husbandry based on adapted breeds is of priority to most countries in the world, and of key importance to emerging countries. The genetic basis and the level of adaptation of livestock breeds to their environment has to be better understood. To address the issues mentioned here above, landscape genomics is emerging as a research field at the interface of genome sciences, environmental resources analysis, bioinformatics and spatial statistics. Their combination permits to assess the level of association between specific genomic regions of living organisms and environmental factors. To favor the use of landscape genomics, the development of a robust and efficient computer infrastructure is required. GEOME will constitute an easy-to-use and powerful internet platform based on High Performance Computing, able to handle and process very large genome and environmental data sets, offering facilities for the statistical and (geo)visual analysis of results.

Symposium 5: Landscape genetics

USE OF RESISTANCE SURFACES FOR LANDSCAPE GENETIC STUDIES: CONSIDERATIONS FOR PARAMETERIZATION AND ANALYSIS

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Measures of genetic structure among individuals or populations collected at different spatial locations across a landscape are commonly used as surrogate measures of functional (i.e., demographic or genetic) connectivity. In order to understand how landscape characteristics influence functional connectivity, resistance surfaces are typically created in a raster GIS environment. These resistance surfaces represent hypothesized relationships between landscape features and gene flow, and are based on underlying biological functions such as relative abundance or movement probabilities in different land cover types. The biggest challenge for calculating resistance surfaces is assignment of resistance values to different landscape features. Here, we first identify study objectives that are consistent with the use of resistance surfaces and critically review the various approaches that have been used to parameterize resistance surfaces and select optimal models in landscape genetics. We then discuss the biological assumptions and considerations that influence analyses using resistance surfaces, such as the relationship between gene flow and dispersal, how habitat suitability may influence animal movement, and how resistance surfaces can be translated into estimates of functional landscape connectivity. Finally, we outline novel approaches for creating optimal resistance surfaces using either simulation or computational methods, as well as alternatives to resistance surfaces (e.g., network and buffered paths). These approaches have the potential to improve landscape genetic analyses, but they also create new challenges. We conclude that no single approach for using resistance surfaces is appropriate for every situation. We suggest that researchers carefully consider objectives, important biological assumptions and available parameterization and validation techniques when planning landscape genetic studies.

Symposium 1: Quantifying the effects of forest fragmentation: implications for landscape planners and resource managers

SKI PISTES AND BIODIVERSITY: THE EFFECTS OF FOREST FRAGMENTATION AND LANDSCAPE MATRIX ON SIX MODEL GROUPS OF ORGANISMS IN BULGARIA

STOYAN C. NIKOLOV[1], VERA ANTONOVA[1], VLADA PENEVA[1], KIRIL VASSILEV[2], DRAGAN CHOBANOV[3], YORDAN KOSHEV[3], YORDANKA MINCHEVA[1] & STAMEN STANCHEV[4]

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Habitat fragmentation has been recognized as a major factor for biodiversity reduction in the context of global landscape changes resulting from anthropogenic activities. Winter resorts represent an important factor for socio-economic progress of an area, especially in developing countries, and a strong economical interest in this domain exists. However, the effects of forest fragmentation caused by the construction of ski facilities on biodiversity have been poorly studied. In 2009, the impact of ski pistes, forest fragments and landscape matrix on five model groups of organisms (i.e. plants, nematodes, insects, birds and mammals) was investigated in Bansko winter resort, Bulgaria. Overall 150 study plots (in forest fragments and ski pistes) and controls (in undisturbed forests and natural open habitats) were located in the study area. The response to habitat

fragmentation was group and species-specific. Some model groups were negatively affected by forest fragmentation, reduced vegetation cover and unstable soil conditions on the ski pistes, while others were positively associated with the newly created forest edges. Integrated landscape management strategy was addressed: beneficial both for biodiversity conservation and local economy.

Symposium 8: Ecosystem services from forests at the watershed scale

BUILDING INDICATORS ON THE SOCIAL VALUES OF FORESTS – THE LANDSCAPE APPROACH

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Many Mediterranean rural landscapes are acknowledged today for their diversity and outstanding character, related to specific land use systems, in particular extensive agro-silvo pastoral systems, as the Montado in Southern Portugal. The survival of these highly valued landscapes may be related to the non-commodity functions they support and as such the public goods and services they produce. These are functions such as leisure and recreation, hunting, second housing, neo-rural settlement, and identity preservation. They may be supported both through public policies or the creation of new markets. Nevertheless, in order to create or calibrate these support mechanisms, there is a need to assess what is exactly the public is demanding in these landscapes, and what kind of land use systems can be most adapted to this emerging and growing demand. Knowledge on users preferences concerning Mediterranean landscapes is not abundant in literature. Taking in consideration the diversity in the Mediterranean open forest landscapes, and specially their high level of fussiness, both vertical (several layers of land cover, related to mix land use systems) and horizontal (unclear borders in between patches), there is a need to develop specific methodological approaches. In this paper, we present the results of a research that aims at relating preferences, as expressed by different users, to the land cover distribution, in the Montado landscape, and from there to produce an indicator of social value of different landscape types. Preference data has been collected through a survey in the region of Alentejo, to different groups of users, related to the most relevant and already acknowledged amenity functions. In order to reduce the confusing effects of landscape fuzziness, the survey considered each of the land cover classes that are part of the Alentejo landscape, and besides selecting the preferred land cover class, the enquired were also asked to create their preferred landscape composition. This data allows for assessing the distribution of preferences, and to classify land cover classes and proximity in between patches. This can in turn be related to the real or simulated land cover pattern, which can be classified according to the preference distribution, by user group. An area related indicator of value as expressed by users, for each function, can thus be defined. The effects in landscape amenity provision, of different scenarios affecting land use and land cover distribution, can also be measured and this way, and thus scenarios can be compared.

Symposium 10: Global change and transitions in forest landscapes

COMPARISON OF LOCAL-LEVEL DRIVERS OF REFORESTATION IN INDIANA (USA) AND SÃO PAULO (BRAZIL)

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1-Indiana University, USA; 2-Princeton University, USA; 3-EMPBRAPA, Brazil; 4-University of Campinas, Brazil

Much of the Midwest United States has experienced net reforestation since the start of the 20th century after decades of net deforestation during the 19th century. Indiana has experienced a regrowth of over 40% forest cover in some parts of the state. Recent analysis of Atlantic Forest areas in the state of São Paulo, Brazil

identified areas where this same transition deforestation-reforestation transition is occurring. Yet the social and biophysical dynamics functioning in these two places are diverse. Landcover patterns in these two regions are a complex mosaic of agriculture and forest that is a result of land use decisions made by numerous actors on the landscape. This research addresses this reforestation process in these two distinct study areas. A key challenge is how to balance the complexity needed to represent household level land use decisions with the ecological dynamics needed to represent the reforestation process. We present findings documenting the varying interactions between social and biophysical forces to describe the contemporary trajectories of forest cover change in the context of historical legacies and address implications for continued reforestation in these two areas.

Symposium 3: Landscape assessment tools for adaptive management of tropical forested landscapes

SHIFTING CULTIVATION LANDSCAPES IN TRANSITION: UNDERSTANDING THE SPATIAL TRENDS OF AGRICULTURAL MOSAICS TO MAINTAIN ENVIRONMENTAL SERVICES AT TROPICAL FOREST MARGINS

VALENTINA ROBIGLIO

IITA, international Insititue of Tropical Agriculture and ASB Alternative to Slash and Burn, parnership for the tropical forest margins, Cameroon

In the humid forest zone of Southern Cameroon, at the western margin of the Central African forest, there are 2.05 million hectares of agricultural mosaics that consist of fields, fallows, agroforests, secondary forests and remnants of the original vegetation. Under the increasing pressure of urban and regional demand for food commodities, and favored by improved transport infrastructures, the complex mosaics are bound to further expand into the forest and to be converted into more intensively and homogeneous cultivated patterns. In three villages located along a South-North deforestation gradient we analyzed land cover changes and landscape structure over a period of 50 years, combining remote sensing with participatory mapping and GIS analysis. We assessed 1) the critical processes that affect secondary forest regeneration in the fallow units and 2) how drivers of land use change operate at a local scale and affect those processes. Results showed that 1) landscape level processes, in particular the extension of forest destruction coupled with the decline of the heterogeneity of the agricultural matrices, negatively impact forest and regeneration capacity in the fallows; 2) these processes are shaped by tenure and accessibility patterns within the village territory. A paradigm shift is needed to maintain the potential of complex agricultural mosaics for reconciling environmental and development concerns. There is the need for spatially explicit land use assessment and planning according to hierarchical systems (plot, household, community) to enhance the provision of environmental services at the tropical forest margin.

Symposium 9: Management and conservation of Mediterranean forest landscapes

LANDSCAPE DYNAMICS IN THE CORK OAK MONTADO: ROLE OF BIOPHYSICAL AND SOCIAL VARIABLES

VANDA ACÁCIO

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The cork oak (*Quercus suber* L.) land use system of today is the result of long-term combined ecological and land use dynamics. Areas of degraded soil are commonly dominated by rockrose (*Cistus* spp.) shrubs, which are very persistent. It is shown that *Cistus* shrublands have been the most persistent patch-type for 45 years (1958-

2002) and have been expanding, and cork oak forests have been decreasing since 1985. Wildfires triggered transitions from forests to shrublands and contributed to maintain shrubland patches, particularly on south-facing slopes. Persistence of *Cistus* shrublands is also explained by multiple mechanisms that severely constrain cork oak recruitment in shrubland patches. On the other hand, cork oak persistence was more likely in areas without understorey management before 1975, without cork oak plantations, absence of wildfires and steeper slopes. It was also found that fire resistance in cork oak is determined by management decisions. It is concluded that the future of the cork oak land use system in the study area is severely threatened by loss of resilience and that shrubland is an alternative stable state of lower vegetation biomass on the most degraded soils and dry areas, where conditions for forest recovery are extremely hostile.

Symposium 12: From abandoned farmland to self-sustaining forests: challenges and solutions

NATURALLY REGENERATED FORESTS AND SPECIES DIVERSITY PATTERNS IN MULTI-HABITAT LANDSCAPES

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Centro de Biologia Ambiental, Faculdade de Ciências da Universidade de Lisboa, Portugal

European broadleaved forests are severely fragmented due to a long history of human activity. Nowadays, forest patches occur in a matrix of human modified habitats and forest is expanding due to natural regeneration in former agricultural land. While deforestation is no longer a threat, the effects of forest regeneration for biodiversity conservation in countryside landscapes are still debated. We approached this issue through the analysis of species-area relationships in a mountain landscape (NW Portugal) under ongoing farmland abandonment. We analyzed data of plants and birds and tested the performance of the countryside species-area relationship model, which accounts for a differential use of habitats by different species groups. The countryside model had a better fit than the classic species-area relationship model both when explaining the diversity of particular species groups (e.g. forest species) in the multi-habitat landscape, as well as when explaining total species richness. This stresses the relevance of accounting for species habitat affinity when studying diversity patterns at landscape level. Moreover, results also show that regenerated forests patches maintain distinct communities with a high affinity to this type of habitat, thus providing an important contribute for species diversity in the landscape.

Symposium 1: Quantifying the effects of forest fragmentation: implications for landscape planners and resource managers

TAKING IN ACCOUNT LOCAL PEOPLE'S LIVELIHOOD SYSTEMS FOR A BETTER MANAGEMENT OF FOREST FRAGMENTS

ZORA URECH

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During the last few decades, in the East of Madagascar, a large extent of tropical rain forest has been cleared through agricultural activities. Larger cohesive forest massifs are increasingly fragmented and forest fragments of various sizes remain in a landscape mosaic dominated by agricultural patches. Until now only little is known how these fragments are perceived by the local population and what role they play in the local livelihood systems. We therefore tried to get a holistic understanding about the man-forest interface in this fragmented landscape and based our methodology on the sustainable livelihood approach. The research has been conducted in four villages which differ in their distance to the cohesive forest massif and therefore in their access to forest resources. We recognized that the perception of forest fragments and their importance for the local population changed with increasing distance to forest resources. Not only they became more important

to satisfy people's daily needs, but also they had an increasing potential to cause conflicts between villagers. For a possible improvement of forest management designs, we should therefore take in account what role forest fragments play in local livelihood systems and how they can vary with changing access to forest resources submitted for the symposium: "Quantifying the effects of forest fragmentation: implications for landscape planners and resource managers"

Oral sessions

(by alphabetic order of the first author)

Oral Session **Monitoring 1**

IMPACTS OF CHANGES IN LAND USE AND FRAGMENTATION PATTERNS ON ATLANTIC COASTAL FORESTS IN NORTHERN SPAIN

ALBERTO L. TEIXIDO, LUIS G. QUINTANILLA, FRANCISCO CARREÑO & DAVID GUTIÉRREZ

Universidad Rey Juan Carlos, Madrid, Spain

Changes in forested landscapes may cause negative impacts on biodiversity. In northern Spain, major changes in land use occurred during the second half of the 20th century. By using of orthoimages and a set of standard landscape metrics we evaluated the transitions between land cover classes and forest distribution patterns between 1957 and 2003 in Fragas do Eume (NW Spain), one of the largest remaining tracts of Atlantic coastal forests in Europe, containing a high number of threatened species. Eucalypt plantations showed the greatest increase in area (197%) over time. Forest showed a net decline of 20% in total area and represented 30% of landscape area in 2003. Forest losses were mainly due to eucalypt plantations and the building a water reservoir. Forest patch size and core area decreased, and edge length increased over time. In turn, increases were obtained in mean distance between forest patches, and in adjacency to eucalypt plantations and to a water reservoir. These results suggest an increase in forest fragmentation from 1957 to 2003, as well as a change in the nature of the habitat surrounding forest patches. This study shows that land use changes, mostly from eucalypt plantation intensification, negatively affected forested habitats.

Oral Session **Tools of landscape assessment and management 2**

ECONOMICAL VALUATION OF ENVIRONMENTAL GOODS AND SERVICES

ALDA MATOS, PAULA CABO, ANTÓNIO FERNANDES & ISABEL RIBEIRO

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The Economical valuation of Environmental Goods and Services results from the growing concern with the quality of goods and services provided by the industry and, simultaneously, with the reduction of the social welfare. The Economical valuation of Environmental Goods and Services delivers direct and indirect costs and benefits of quantitative and qualitative environmental change in goods and services and corresponding impacts. This is particularly important in evaluation of projects, measures and governmental policies. This work consists in a critical analysis supported by a bibliographic review of the criteria used in economic valuation of environmental goods with emphasis to methods that use hypothetical and complementary markets. Results from critical analysis reveal that environmental quality valuation is very complex. In fact, for each criterion there are several assumptions that become inapplicable to all situations. Effectively, if environment quality of conventional goods has evident complementarity, although in a different measure, the attributed values to the resources could be underestimated. In this situation, complementary and substitute markets are inefficient parameters.

Oral Session **Biodiversity conservation and planning 4**

CHANGES IN STRUCTURE AND COMPOSITION OF FOREST STANDS AT REGIONAL AND NATIONAL LEVEL IN THE LAST FOUR DECADES - A CONSEQUENCE OF ENVIRONMENTAL, NATURAL OR SOCIAL FACTORS?

ALES POLJANEC & ANDREJ BONCINA

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Based on data acquired from the spatial information system Silva-SI, the majority of the entire forest area in Slovenia (22,220 forest compartments with a total area of 7,446 km2) was analysed for changes in structure (growing stock, dbh structure) and tree species composition of forest stands in the period 1970–2008. Different statistical methods (data mining, GLM) and GIS-supported analyses were used to test influence of 20 variables on changes of forest stands: 2 management, 7 social-economics and 11 environmental variables. In the observed period total growing stock has significantly increased - from 190 to 285 m3/ha, as well the shares of medium-diameter (30 < dbh ≥ 50 cm) and large-diameter (dbh > 50 cm) trees in the total growing stock, from 43 % to 46 % and from 9 % to 18 %, respectively. Tree species composition changed significantly in the analysed period, resulting in a higher share of broadleaves, whereas the share of silver fir decreased from 17.5 % to 7.5 % of total growing stock. Changes in forest stand structure were of different magnitudes and directions; their variability was explained by different initial states of forest stands and some of the environmental and socio-economic factors included in the study.

Oral Session **Biodiversity conservation and planning 1**

IMPACT OF Prosopis juliflora (Sw. DC.) INVASION ON PLANT BIODIVERSITY AND SOIL PROPERTIES IN MIDDLE AWASH NORTHEASTERN, ETHIOPIA

AMEHA TADESSE[1], ZEWDU ESHETU[2] ,TESFAYE BEKELE[2] & DEMEL TEKETAY[3]

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The study was conducted at Amibara district of Afar Regional State with the objectives to assess its impact on the native plant diversity and soil properties of the area. Vegetation data were collected from: (i) under and outside the canopies *P. juliflora* and two indigenous tree species, namely *Acacia nilotica* and *Acacia tortilis*, (ii) along the age of invasion of P. juliflora and; (iii) inside and outside fenced area and all samples were collected from 800 quadrats and analyzed properly. Soil samples were also collected from under and outside the canopies of 100 trees of *P. juliflora*, two indigenous species and open lands. A total of 168 soil samples were collected from three depth intervals, i.e. 0-5, 20-30, 40-60 cm. The result showed that a total of 88 plant species representing 30 families were recorded. Of these, 76, 14 and 10% were herbs, grasses and woody species, respectively. *P. juliflora* had lower species diversity [Shannon Diversity Index (H`) = 3.1] and richness under their canopies compared with A. nilotica (H`= 3.6) and A. tortilis (H`= 3.2). Species diversity of the site with high *Prosopis* invasion was lower (H`= 2.99) than the site with lower *Prosopis* invasion (H`= 3.63). Among the woody species, *P. juliflora* dominated outside the fenced area. The result also revealed that the invasion of *P. juliflora* leads to reduced herbaceous diversity and frequency. The soil analysis also showed that higher silt content (49.28% ± 2.49) was found under the canopies of trees of *P. juliflora* than those of the two *Acacia* species. Clay content was higher under trees of P. juliflora (33.25 ± 1.24%) than the open land (27.3 ± 1.45%). The concentration of Ca, Na and K were lower under the canopy of *P. juliflora* than the two *Acacia* species, open land and the site highly invaded by *P. juliflora*, indicating that *P. juliflora* had a potential to ameliorate sodic soils. In general, this study showed that prosopis had less diversity of undergrowth herbs and grass

species than the native *Acacia* species and has a potential to reclaim salt affected soil of the area. Hence, fencing important areas to reduce introduction of *P. juliflora* and planting of *P. juliflora* in degraded and salt affected site is recommended.

Oral Session **Biodiversity conservation and planning 1**

THE IMPACT OF THE MATRIX ON SPECIES MOVEMENT: SYSTEMATIC REVIEW AND META-ANALYSIS

AMY E. EYCOTT[1], GAVIN B. STEWART[2], LISETTE M. BUYUNG-ALI[2], DIANA E. BOWLER[2], KEVIN WATTS[1] & A.S. PULLIN[2]

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Many studies have demonstrated an impact of matrix features on species movement between forest patches but the strength of effects are variable, with no clear pattern emerging. We aim to establish reasons for this variability, in order to guide actions to increase species movement, which benefits species conservation and is a key adaptation to environmental change. We used systematic review and meta-analysis to explore general patterns in matrix impacts on species movement. In particular we tested quantitatively whether matrix that is more similar in vertical structure to the 'home' habitat increases individual movement. We considered both movement of forest species and movement of open-habitat species. We also tested potential reasons for the variability in outcomes from different studies. Matrix types that have a more similar vertical structure to the 'home' habitat increased species movement rates. In experiments with a high contrast in vertical structure, the difference in emigration rates were greater. Quantitative analysis was complemented by narrative synthesis of a wider range of studies which broadly supported these conclusions. This work will provide a broad and robust evidence base to landscape scale policies that include explicit consideration of matrix impacts.

Oral Session **Biodiversity conservation and planning 2**

INCORPORATING LONG-TERM NATURAL VARIABILITY INTO CONSERVATION PLANNING: A CASE STUDY OF ECOLOGICAL RESTORATION OF THE CALEDONIAN FOREST, SCOTLAND

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The necessity of including natural variability as an indicator of ecosystem persistence is recognised in both the science and practice of conservation planning. So far, however, incorporation of long-term natural variability into the conservation planning process has been limited by the difficulties of developing spatially and temporally explicit measurements reflecting ecosystem rather than human scales. This paper offers a conceptual, step-wise framework for prioritizing sites available for conservation based on the potential for long-term persistence of the conservation targets set. This potential was quantified through five persistence factors: ecological memory loss (EML), targetrelevant resistance (TRL), target-relevant resilience (TRR), between-disturbance condition (BDC) and maximum-disturbance impact (MDI). A case study is presented for woodland restoration planning in Glen Affric, Scotland using pollen records from four sites spanning the last 4000 years. Rankings of the sites based on woodland persistence potential differed from those derived solely from the application of ecological models predicting the current potential for woodland cover. This paper demonstrates the importance of including long-term natural variability into conservation planning and offers a

comprehensive approach to the identification of sites with not only the greatest chances of achieving conservation targets over the short-term, but also of maintaining them into the future.

Oral Session **Patterns and processes 2**

PATERNS OF AFFORESTATION PROCESS IN ABANDONED AGRICULTURE LAND IN LATVIA

ANDA RUSKULE, OLĢERTS NIKODEMUS, ZANE KASPARINSKA & RAIMONDS KASPARINSKIS

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Afforestation of the former agriculture land is one of the most typical trends of the contemporary Latvian rural landscape. Socio-economic aspects of land abandonment and its impacts on landscape structure are well studied, but little is known about the environmental factors influencing this process. The study examines development of landscape ecological succession, its spatial character and influencing environmental factors within abandoned agriculture land in Vidzeme, central part of Latvia. The study area comprises a great variety in the spatial dynamics of the ecological succession. The most typical patterns in this area are linear landscape ecological succession related to drainage systems, continuous development of landscape ecological succession, ecological succession from edge of a forest and mosaic development of ecological succession. Character of the ecological succession is influenced by various factors like soil fertility, moisture and light conditions, species composition of surrounding forest, former land use etc. The study aims to assess impacts of these factors on dynamics of natural afforestation process in order to predict its future development.

Oral Session **Disturbances 3**

HOW EFFECTIVE ARE FOREST STANDS AS BIODIVERSITY REFUGES IN INTENSIVE FARMLAND? A TEST OF PATCH, NEIGHBORHOOD AND MATRIX EFFECTS ON FOREST PLANT DIVERSITY IN NORTHERN PORTUGAL

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Due to their small size and to their patchiness within agricultural matrices, forest stands can be considered habitat islands and refuges for native farmland biodiversity. However, the levels and characteristics of such biodiversity are influenced by several drivers, including environmental stress, disturbance by management practice (types and intensity), and spatial heterogeneity of landscape mosaics. Patch-level diversity is known to have a close relationship with the composition and structure of the surrounding landscape, and thus to be influenced by agricultural practices, not only directly through fallowing, mowing and fertilizing, but also indirectly through spatiotemporal patterns of land use.Here we test whether the spatial structure of landscape mosaics surrounding individual patches is more important than patch attributes in determining patterns of plant diversity in forest islands within an intensive dairy farmland of Northern Portugal. We evaluated the relative contribution of patch-level abiotic predictors, patch-level structural predictors, ecotone diversity, and matrix composition (expressing isolation) to explain the floristic composition of patches and the values for several diversity measures (species richness, evenness, SAR slopes, relative edge diversity, and number of alien invasive species). We provide evidence of differential effects of predictor types over composition and diversity measures, and discuss implications for land management.

Oral Session **Tools of landscape assessment and management 3**

LAND-USE MANAGEMENT AND CHANGES IN CAMPANIA REGION (SOUTHERN ITALY): EXAMPLES FROM TEN REGIONAL STATE FORESTS

ANTONELLO MIGLIOZZI, FRANCESCO CONA, ANTONIO DI GENNARO, ANTONIO MINGO, A. SARACINO & STEFANO MAZZOLENI

University of Napoli "Federico II", Italy

In the last 50 years the Italian territory has undergone a remarkable transformation as a consequence of anthropogenic activity. In the Campania Region, the main causes of change are urban expansion, abandonment of mountainous and marginal agricultural areas and expansion of industrial settlements. We document land use variation during the last 50 years and the changes occurred in ten Regional Forests which contain mainly natural land use patches. Their geographic distribution makes these areas representative of the major physiographic and ecological features present in the Campania Region. Two different approaches were followed: At a landscape level, carriers responsible for the transformation of Campania's landscape agroforestry were identified, covering the last fifty years. A land-systems map was used as background to focus on ten different forests, highlighting their status and management perspectives. The main problems of land and forest management are discussed focusing the actions promoted by two new important legislative instruments: the "Piano Territoriale Regionale (PTR)" and the "Piano Forestale Generale (PFG)", related to socio-economic revitalization of rural areas and to the sustainable management of agro-forestry systems. Sustainably managed State Forests could be used as pilot areas for monitoring natural forest processes, testing different management options and results.

Oral Session **Urban Forestry 1**

GREEN SPACE INFLUENCE ON THERMAL COMFORT – STRUCTURED STUDIES IN THE CITY OF BRAGANCA (PORTUGAL)

ARTUR GONÇALVES, ANTÓNIO CASTRO RIBEIRO, LUÍS NUNES & MANUEL FELICIANO

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Green Spaces are regarded as elements that can provide thermal comfort in cities. A research on green spaces contribution to thermal comfort was carried out, with the purpose of identifying essential principles that can help urban designers to enhance the social use of open spaces. These studies were developed in summer and early fall conditions, by means of structured experiments. These experiments took place in three occasions between June 2008 and September 2009, in a total of 432 thermal sensations questionnaires. The methodology consisted in placing different individuals, organized in uniform age groups and equal numbered in gender, under different thermal environments (shadow versus sun exposure, wind versus wind shield, grass versus artificial pavement) and asking them to express their thermal sensations (using a seven levels scale), while collecting meteorological data. A multinomial logistic regression was used to study the influence of both meteorological variables and personal attributes in thermal sensations. Significant results were found relating differences in thermal comfort with the radiation, air temperature and wind speed. Gender was also found to have a significant influence in human thermal sensations. Results show that differences in green spaces layout can significantly change the thermal environment, thus influencing thermal perceptions.

Oral Session **Patterns and processes 2**

RECENT RELATIONS BETWEEN FORESTRY AND AGRICULTURE IN POLAND- THE RURAL LANDSCAPE ON THE AXIS OF OPENNESS AND ENCLOSURE

BARBARA BOŻĘTKA

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The Polish rural landscape has encountered considerable changes after new landscape drivers appeared at the end of the last century. Interestingly, they are well pronounced in interrelations between forestry and agriculture. A steady increase in a forest cover is noted in Poland(up to 28.9% in 2007) . The rise is linked mainly with land abandonment (exceeding local scale) and operation of the State's Program for Afforestation. However, it is accompanied be several processes initiated in farming areas, but having evident impact on forests, e.g. settlement sprawl and intensification of agriculture connected with the loss of small habitats and ecological corridors (mainly road alleys). The work presented here focuses on the influence of above mentioned factors on landscape structure, it employs a broad-scale analysis and concentrates on the changes specific to the last two decades. The issue of landscape heterogeneity is widely investigated, an axis of openness-enclosure and its spatial redistribution received spatial attention. Results of the research reveal that a fine-grained mosaic, characteristic for Poland, has experienced crucial changes; some of them arise new hazards for forest landscapes and their biodiversity values. Additionally, important features of landscape transformation were recognized: 1. differences in afforestation patterns between the north-western and central parts of the country, 2. increase in landscape homogeneity, 3. spreading out of semi-wild patterns. In consequence a fundamental question may be posed: Is new landscape evolving?

Oral Session **Tools of landscape assessment and management 2**

SPATIAL CHARACTERIZATION OF LANDSCAPE FUNCTIONS AND SERVICES TO SUPPORT LOCAL LANDSCAPE PLANNING

BEATRIZ FIDALGO[1,2], RAUL SALAS[1], JOSÉ GASPAR[1], LUÍS PINTO[1], HUGO OLIVEIRA[3], ANDREIA COSTA[1] & JORGE FREIRE[1]

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Decision-making on landscape changes is the domain of various stakeholders. These actors make different demands on the landscape and hold different perceptions of the benefits that landscapes must deliver to society. At the same time, decisions governing landscape changes occur almost exclusively at the local level. Therefore, local land managers need simple tools for assessing the capacity of landscapes to provide ecosystem services. In this study we decided to adopt the concept of landscape functions to express this capacity. We present a methodological framework to quantify landscape functions and to make their spatial variability explicit. Depending on the availability of spatial information, landscape functions were assessed linking functions to land cover data, using spatial indicators or using decision rules based on literature review. The methodology was tested in a council of central Portugal. Results showed that a range of different landscape functions could be successfully mapped. The quantitative landscape function maps resulting from our methodology could serve as an input for different integration and aggregation methodologies, which could support policy makers and spatial planners decisions. This approach provides a reliable methodology for identifying the landscape capacity to provide goods and services but also to support the negotiation process among stakeholders that value differently landscape functions. Although the proposed methodology has been specified for our case study area, the general approach should be applicable in other areas as well.

Oral Session **Biodiversity conservation and planning 2**

PEATLAND DISTRIBUTION ANALYSIS ON AZOREAN TERRESTRIAL PROTECTED AREAS

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In most of Azorean islands, due to high precipitation levels and a placic horizon formation, peatlands prevail in high altitude places. The recognition of peatlands importance is proved on their European protected status (Habitat Directive). This study intended to evaluate the real extension of peatlands inside terrestrial protected ZEC (Special Conservation areas areas) areas (studied 16 ZE occupying 24212 ha). These were mapped and separated in two categories, natural, including bogs, fens and forested peatlands and semi-natural formations, including pastured formations and exotic species plantations areas. The results show that a wide area is occupied by peat formations, about 70 Km2, representing 29% of ZEC surface. Semi-natural type represents more than 40% of total peatland area. The most widespread natural type is forest peatlands and the most extensive areas are located in Terceira and Flores. These two islands present also the largest areas of the sphagnum type (bogs). Fens are most common in S. Jorge and Faial. The semi-natural formations are located mainly in Pico and Terceira islands. Azores has still large natural areas but is increasing the human impact on peatlands, so is imperative that these formations be subject to efficient management and conservation measures, including restoration techniques.

Oral Session **Biodiversity conservation and planning 2**

USING BUSINESS AND BIODIVERSITY TO PUT CONSERVATION INTO PRACTICE: THE HERDADE DO ESPORÃO CASE STUDY

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Although Esporão estate has a great potential to be considered a High Conservation Value Area, this will only happen if an adequate management of Biodiversity and an ecological restoration are put into practice. According to Costa et. al. (1998), the Herdade do Esporão estate is situated between the biogeographic superdistricts Baixo Alentejano and Alto Alentejano. The results will be presented in the form of indicators relating land use (agricultural, forestry…) and the type of landscape. The landscape of the estate is dominated by vineyards (450 hectares), olive groves (95 hectares), Oakland mixed forests, streamside woodlands and grasslands. The Vegetation units of Esporão are presented and characterized, using phytosociological (Braun-Blanquet, 1979) and cartographic methods, which are the main sources for the habitat approach method. The forested landscape is quite diverse, consisting mainly in 750 ha of Holm Oak Montado (*Quercus rotundifolia*) although most areas are extremely degraded as a result of an inadequate policy of stone pine (*Pinus pinea*) afforestation within the Montado areas. Also highly relevant is the streamside gallery and mixed woodland patchwork covering the area of the Caridade stream and subsidiaries, including the area of the dam on the northern sector, which include several high conservation value areas spread across the whole estate. Some of the highlights of plant communities that correspond to Biodiversity Hotspots are: *Fraxinus angustifolia* oaklands with a rich understory including endemisms such as *Narcissus jonquilla* (*Ficario ranunculoidis – Fraxinetum angustifoliae*) and Holm oaklands with orchid meadows of *Ophrys tenthredinifera*, *Orchis morio* and *Orchis papilionacea* (*Pyro bourgaeanae-Quercetum rotundifoliae*).Despite of the presence of some degradated areas in Esporão, there are habitats with special relevance of ecological, sintaxonomical and corological aspects.

Oral Session **Biodiversity conservation and planning 2**

ASSESSING TRADE-OFFS IN ADAPTIVE FOREST MANAGEMENT FOR MULTIPLE ECOSYSTEM GOODS AND SERVICES UNDER CLIMATE CHANGE USING LANDSCAPE SCALE MODELING

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The development of adaptive management strategies to maintain and enhance the provision of ecosystem goods and services (EGS) of forest ecosystems under climate change is a key challenge in Europe and worldwide. However, managing forests for multiple EGS will often necessitate trade-offs in management decisions. Here we assess where on a landscape trade-offs between competing EGS are likely to occur. Second, we evaluate how management decisions taken on the local scale affect EGS provisioning at the landscape scale. We used a process based forest model (LandClim) to simulate forest dynamics, and the associated EGS, across a range of climate change and management scenarios in the Black Forest, Germany. In our case study region timber production and biodiversity are two of the key EGS and we focused on the interactions between them. Our results indicate that management for timber production and biodiversity can be achieved best where the target tree species occurs in its natural distribution range. Second, our results suggest that adaptive management strategies that manage stands for either maximum timber production or maximum biodiversity may be optimal depending on how much weight is put on maintaining connectivity between high biodiversity stands. We conclude by discussing how adaptive management decisions can influence the temporal and spatial distributions of EGS, and how they will be influenced by climate change.

Oral Session **Biodiversity conservation and planning 1**

THE EFFECT OF FIRE REGIMES AND LOGGING ON TREE HOLLOW DYNAMICS AND ARBOREAL MARSUPIALS IN AUSTRALIAN EUCALYPT FORESTS

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About 15% of Australia's vertebrate fauna depend on tree hollows, with many species being rare or absent in areas with few hollows. Hollow development in Australian eucalypt forests can take > 100 years. Disturbance regimes therefore have the potential to affect their density. Interaction between the principal disturbances (selective logging and fires) on the development and destruction of hollows are poorly understood. This study explored effects of fire frequency and logging regimes on forest stand structure, basal area, hollow abundance and density of hollow dependent fauna. Within unlogged forests fire frequency was negatively related to stand basal area but positively correlated to increased rates of basal damage and hollow abundance. Logging decreased the stand basal area and hollow abundance and increased fire frequency decreased the number of hollows in interaction with logging. These correlations occurred within two distinct eucalypt forest types. The presence of Greater Glider an arboreal marsupial known to be sensitive to disturbance was related to abundant tree hollows and high stand basal area. Densities of Greater Glider were highest within unlogged and unburnt forests and decreased with logging and areas that had experienced fires 7-9 years previously. Fire frequency is predicted to increase as a consequence of increased dryness under climate change. An adverse future is therefore likely for hollow dependent fauna in eucalypt forests.

Oral Session **Urban Forestry 1**

MULTI-FUNCTIONALITY IN URBAN FORESTS IN EUROPE

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Multifunctionality, the concept that more than one function can be delivered by any given environment is now well established, in most cases these multiple benefits extend beyond trade benefits to include non-market benefits such as public health gains, biodiversity and recreational opportunities. Not all of the benefits are complementary and conflicts arise typically between different users. Management solutions and social skills are being used successfully to overcome difficulties. Forests 'in and close' to urban areas have unique qualities not easily provided by other landscape types and as a consequence the uses of woodlands in urban settings are especially diverse and the management challenges higher. In this paper the author will draw from his comparative experience across 15 European Countries ranging from Iceland to Italy to consider the multi-functions of urban forests and draw out learning points around community involvement, promotion and management of forest assets at different scales. The paper will also cover the role of urban forests within the widening debate on green infrastructure which is becoming a major public policy discussion in several European countries driven in part by considerations around climate change and urban form.

Oral Session **Management and sustainability 1**

SUSTAINABLE LANDSCAPES IN CHILE?

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In the last decades, Chile's impressive record of sustained economic development has incurred significant environmental costs that raise doubts about the ecological sustainability of the Chilean model. This rapid economic growth has been associated with severe changes in landscape composition across the country. We analysed rates and temporal changes in land use changes (LUC) in four contrasting landscapes and identified the main driving factors of LUC. From north to south, landscapes exhibited an annual deforestation rate of 1,4%, 3,1%, 1,6% and 1,8% respectively over the last four decades. These forest losses were associated with a replacement of native forest and shrublands by i) urban grounds and agriculture in central Chile, ii) forest industrial plantation in south-central Chile and iii) pasture lands in southern Chile. Native vegetation was the land use category most impacted by LUC. These changes occur at higher magnitudes in areas affected by more intense productive processes. Although different areas in Chile are exhibiting a modification of landscape patterns due to LUC, distinct driving factors are shaping the landscapes across the country. An integrate assessment of the spatial patterns of LUC and their associated causes represent an adequate approach to provide recommendations for a sustainable landscape.

Oral Session **Patterns and processes 1**

DINAMICS IN THE SPATIAL PATTERNS OF DRYLAND FOREST IN LATIN AMERICAN LANDSCAPES

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Due to the close link between spatial pattern and process, diverse efforts seek to measure landscape patterns to monitor changes. In this research we assessed the trends in the spatial patterns of dryland forest cover in six study areas in Mexico, Argentina and Chile by analysing the evolution on selected landscape metrics over the last four decades. Patch density, patch size and aggregation index were used to measure changes in the configuration of forest cover. Results demonstrated that the spatial patterns of dryland forests were highly variable over the last four decades in the study countries. It was observed a unidirectional trend in the metric values associated with forest fragmentation in some landscapes. Others exhibited a bidirectional alteration with metrics changing direction during the study periods. On the other hand, some landscapes presented a reverse in forest reduction or a stability in forest cover. Understanding the trend in spatial patterns of dryland forest is important for the conservation of its biodiversity and the provision of diverse ecosystem services. Despite of this importance, many forest assessments and international initiatives still focus on the extent of forest loss without concern for its spatial pattern.

Oral Session **Monitoring 1**

LICHEN DIVERSITY AS AN ECOLOGICAL INDICATOR OF LAND-USE CHANGE

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Among the potential biodiversity tools, lichen communities are one of the most commonly used in biomonitoring programmes because they have the appropriate characteristics that makes them a model organism to understand the relations between biodiversity and multiple environmental factors. The responsiveness of lichens to changes in the environment can be monitored by using variations in lichens diversity and/or abundance. In this work we tested if changes in lichen diversity could be used as long-term ecological indicators of land-use change in a regional area. For that we selected the Alentejo Litoral because the land-use changed significantly from the late 1970's. This is an industrialized region of Sines on the SW coast of continental Portugal. As a consequence, urban development has recently increased. Lichen diversity was sampled in 1980, 1997, 2002 and 2009 in a 30x50 km area comprising 70-100 sampling sites in space for each studied period of time. For each period of time a geostatistical spatial model was build using lichen diversity information, namely the standardized indicator LDV (Lichen Diversity Value). These models were compared with information from Corinne land-use information from 1990, 2000 and 2006. The results show that lichen diversity indicators are correlated to land-use namely in artificial and agriculture areas. Moreover, land-use change over time can also be related to changes in lichen diversity indicators together with information from population density and indicators of agriculture land-use intensity.

Oral Session **Patterns and processes 3**

MODELLING THE IMPACT OF LANDSCAPE FRAGMENTATION ON FOREST ECOLOGICAL FUNCTIONALITY

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The biological diversity of forests and of other natural or semi-natural environments is threatened by human induced habitat loss and fragmentation. These changes to forest spatial patterns may impact on their ecological functions and alter their ability to resist and respond to external disturbing factors. A number of indicators have been proposed to assess changes to the spatial patterns of forests but relatively few evaluate the ecological impact of such changes. This paper present results from a project to link and harmonise the analyses of forests spatial patterns at European, National and Regional scales, and improve the ecological evaluation of forests vulnerability and resilience. The work is based on the use of GIS fuzzy Multi Criteria Evaluation (MCE) modelling to relate changes to forest spatial patterns with the ecological functions. The results are presented for seven study areas from five different biogeographical regions across Europe, evaluating the impact of changes to forest patterns on five species specific models (one butterfly: Apatura ilia; one small mammal: *Martes martes*; one bird: *Picoides minor*; and two large mammals: *Canis lupus* and *Capreolus capreolus*), on one species-unspecific model and for two spatial scales. The results demonstrate that the proposed method may be operationally applied. In general, the aggregation of the species-specific models tend to have the same temporal trend as the unspecific model and for this reason it may be considered as a simple model for an operative application at pan-European level. However, the results are scale-dependent and demonstrates the necessaity for high resolution multi-temporal forest maps. Moreover, further species-specific information is need to support ecological modeling to effectively evaluate the impact of changes to the spatial pattern of forests on target species.

Oral Session **Tools of landscape assessment and management 3**

UNDERSTANDING THE PATTERNS OF PROCESSES OF LAND COVER CHANGE IN CALACA, BATANGAS, PHILIPPINES USING PARTICIPATORY RURAL APPROACHES AND GIS MAPPING

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The rolling landscape of Calaca, Batangas underwent extensive land cover change since the 1930's. Half of the lush forest cover and most of the grassland areas were converted to agricultural lands planted to coconut and sugarcane. Participatory Rural Appraisal (PRA) approaches were conducted to gather information from local farmers, elderlies and the local government unit regarding land cover change in Calaca. Baseline information including boundary map, land use map, soil map, and elevation map as well as climate data and socio-economic data were collected from the map archives and literature. Planting of sugarcane in Calaca started as early as the 1930's. The establishment of two sugarcane processing plants in nearby municipalities (Batangas Sugar Central in 1956 and Balayan Sugar Central in 1965) paved the way to large scale conversion of open grassland areas into sugarcane plantation areas in Calaca in the 1950s. Rampant harvesting of hardwood timber species in the forest areas occurred in the 1950s. This was followed by the establishment of coconut

plantations in the upland areas. By the 1960s, marketing of copra was established in the area. Market is a major driving factor in the land conversion in Calaca.

Oral Session **Tools of landscape assessment and management 1**

COMBINING MAP-BASED AND GROUND-BASED DATA: MAPPING FOREST LANDSCAPE ATTRIBUTES AS STRATA WITHIN DOUBLE SAMPLING FOR STRATIFICATION DESIGN

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Ground-based forest inventories often tabulate population statistics for geographic areas, land ownerships, or ecological classifications. Frequently, users also desire maps of inventory information. However, map-based technologies generally start with remote-sensing information independent of land-based inventories or use model-based methods to map selected variables from them. It would be useful to map land-based inventory statistics for all attribute variables (e.g., forest area, basal area, volume) in a common sample design, without developing separate models for each variable. The Forest Inventory and Analysis (FIA) grid network of plots covers all forest land in the United States. Double sampling for stratification is used: phase 1 information is from multispectral data and phase 2 information is from field plots. We combined ground-based FIA data with remote-sensing information to produce cover maps of commonly calculated inventory statistics for a sparsely populated western state with high-elevation dryland and conifer forests between valleys of rangeland and desert. Much land in this state is publicly owned, with a history of tree cutting and grazing that has affected forest recovery. Combining map-based and ground-based data into the same sample design holds promise for improved forest landscape planning and management and for monitoring forest ecology in response to human activities.

Oral Session **Disturbances 3**

DETECTING THE SPATIAL SCALE AT WHICH CLIMATE AND FOREST COMPOSITION INFLUENCE SYNCHRONY OF INSECT OUTBREAKS

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Spatial synchrony of insect outbreaks is important because of the role that synchrony plays in creating large outbreaks, and the role that outbreaks play in shaping forest landscapes. Although it has been shown that environmental factors influence the duration and severity of spruce budworm (*Choristoneura fumiferana* (Clem.)) outbreaks, the role of climate and forest composition in promoting outbreak synchrony had never been determined, and the scale at which the factors exert their influence was not known. Principal coordinates of neighbor matrices was used to determine the spatial pattern of outbreak initiation in eastern Canada; about 87% of the variability in outbreak initiation was described. Four subsets of principal coordinates described the pattern at spatial scales from ~100–1200 km. Twenty environmental variables (11 climate and nine forest composition) were included in the "best" model of outbreak initiation synchrony, as determined by Aikake's Information Criterion, at one or more spatial scales. At the very coarse spatial scale (~1000–1200 km) forest variables explained more than twice as much as climate variables of the variation in outbreak initiation synchrony. Conversely, at the fine spatial scale (<~100 km), climate variables explained more than four times as much as forest variables.

Oral Session **Biodiversity conservation and planning 3**

EIGHT YEARS OF DEVELOPMENT OF A SILVOPASTORAL SYSTEM: EFFECTS ON FLORISTIC DIVERSITY

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Biodiversity is an important issue to promote agricultural sustainability, and usually depends on vegetation management. One of the main reasons to maintain biodiversity is to enhance productivity in extensive systems, due to the best complementarity between different species to use soil resources. The objective of this study was to evaluate the effect of two different tree species, and three types of fertilization on alpha biodiversity (Shannon–Wiener index H´) nine years later. The treatments evaluated were an exotic (*Pinus radiata* D. Don) and a native (*Betula alba* L.) tree species, established at two densities (833 and 2500 tree ha-1) and three types of fertilization: no fertilization, dairy sewage sludge fertilization and mineral fertilization. All species involved were native. The results showed an important reduction in species richness in the systems established at high density under Pinus radiata tree compared with *Betula* treatment fertilised with Mineral or without fertilisation. Shannon index was reduced when fertilization was applied under birch at high density, mostly with dairy sludge, compared with control (no fertilisation index). No effects of tree species, density or fertilization on plant diversity was detected when tree density was 833 trees ha-1.

Oral Session **Management and sustainability 3**

THE IMPORTANCE OF ENVIRONMENTAL EDUCATION TO RESTORE AND PRESERVE NATURAL AND CULTURAL HERITAGE: THE CASE OF PIRAI DA SERRA – SOUTH OF BRAZIL

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Pirai da Serra is located in the south of Brazil and it represents an impressive natural and cultural heritage. The area of Pirai da Serra is characterized by canyons, escarpments, grassland vegetation, araucaria forests, fauna and flora diversity, archaeological material (rock art) and cultural traditions. In the last decades, despite some efforts to avoid degradation, it is possible to observe a permanent transformation in the landscape in terms of environmental collapse. Some examples of local natural dilapidation is a wide use of land to increase agriculture, development of exotic species of forest (e.g. pinus plantation), forest burning, scarcity of water among other environmental impacts. Considering these circumstances, it is urgent the development of Environmental Education practices which promote the involvement of the local community in order to prevent a complete devastation. The local community participation (teachers, students, parents, people from religious and cultural groups, social movements, politics among others) are essential to promote an environmental practice. This kind of practice must be able to deconstruct non-environmental actions and increase the consciousness of people in relation to restoration and preservation of natural and cultural heritage of the area.

Oral Session **Patterns and processes 1**

ESTIMATING SHIFTS IN SPECIES DISTRIBUTIONS: INFLUENCE OF MACRO-CLIMATE AND LOCAL PROCESSES

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During Holocene climate change, species ranges adapted rapidly to changing climate conditions. For recent climate change, however, it is unclear if species are able to keep pace. Here, we estimate the influence of changing macro-climate and local processes (i.e., biotic interactions, seed dispersal, anthropogenic land-use) on large-scale species distributions and migration. First, we evaluated the variation of species co-occurrence patterns in climate space and estimated the influence of these patterns on species distributions for current and future climate over Europe with niche based-models. Second, we combined current tree species distributions from the niche-based models with migration rates from a process-model and a GIS cost analysis, to estimate key processes influencing tree migration and to predict more realistic shifts in large-scale tree distribution. Results show, that according to the 'stress gradient-hypothesis', biotic interactions mainly limit species distributions and migration towards favorable growing conditions, while climate seems to be directly limiting only where biotic interactions are low. Landscape fragmentation is limiting migration of secondary successional species, because they show rather short seed dispersal distances. Overall, this may lead to considerable time lags in range shifts during climate change. Compared to species distribution models assuming no or unlimited migration, implementing more realistic migration rates may reduce the uncertainty in projections of species distributions under climate change scenarios.

Oral Session **Management and sustainability 2**

BIOMASS YIELD AND CARBON SEQUESTRATION: A POTENTIAL FROM SPAIN'S FORESTS (ON CENTRAL AND IBERIAN MOUNTAIN RANGE SYSTEMS)

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The interest on the estimation of forest biomass, regulation of carbon sequestration and nutrient cycling has increased over the past decade. Forests in Spain are important resources of timber and other forest products. Therefore, it is necessary to estimate and to understand the potential role of forests in the mitigation of global warming effects. Up to now, few studies have been conducted to estimate the biomass carbon accumulation of Spanish forest ecosystems. With current data, we developed a forest growth model which considered the structure variables of forest growth. The main focus of this study is to provide an estimation framework based on growth of Maritime pine (*Pinus pinaster* Aiton) and Scots pine (*Pinus sylvestris* L.) stands. We developed a model to estimate woody biomass and carbon sequestration under different ecoregions. Data were analyzed throughout the last decade. As expected, factors related to density and site productivity interacted on woody biomass production of forest stands. Due to these interactions, managers need more tools for forest management, knowledge of different forest structure and practical silvicultural methods.

Oral Session **Management and sustainability 1**

ROLE OF PLANTED FORESTS AND TREES OUTSIDE FORESTS IN SUSTAINABLE FOREST MANAGEMENT IN IRAN

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From a forestry point of view, Iran is divided into five vegetation regions and during the period 1960-1999, afforestation amounted to 2,221,000 ha total area planted. The annual rate forest plantations establishment is 63,000 ha, the majority being implemented under government investment. Tree species planted are generally limited to indigenous or acclimatized exotic species. To ensure maximum success, most plantations are irrigated during 2-3 seasons. Water shortages are a major constraint to planting, particularly in arid zones. Site preparation costs are high, and establishment of irrigation facilities very expensive. The state grants substantial support to promote private investment in fast growing tree species plantations, which amount to 150,000 ha of which, 35% are young stands. The present evaluation of Trees outside forests in Iran is incomplete for lack of comprehensive data and information. In 2000 it was estimated that orchards accounted for 1,704,000 ha, about 14 % of the total forest area of Iran. Collaborative efforts between government, municipalities, NGOs and citizens' groups have led to the establishment of a quite dense network of urban and peri-urban forests in Iran, estimated in 1996 to be 530,288 ha (mean annual area treated 3,760 ha). Urban and peri-urban forestry is gaining momentum in the country and many provinces have developed their own urban forestry establishment programmes. Result show that the current situation of Iran's natural resources is a reflection of its past and present social, ecological, technological, economic, political and administrative measures. Technical or engineering solutions are not enough; they need to take into account the needs, priorities and aspirations of the rural poor.

Oral Session **Tools of landscape assessment and management 3**

CLIMATE AND LAND USE INTENSITY SHAPE FOREST-MEADOW ECOTONES IN SUBTROPICAL MONTANE SYSTEMS

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I used SELES (Spatially Explicit Landscape Event Simulator) to build a spatially explicit dynamic model of forest-meadow dynamics in north-western argentinean montane systems. I combined dendrochronological, historical, experimental and satellite imagery based data to parameterize the model. The model permitted to handle the complexity of a system that involves non-linear interactions between grazing intensity, climate conditions, human fire ignition, fire events, seed dispersal and tree colonization. I ran the model for 50 years under different land use, climatic and fire policy conditions. For each variables I determined three states, generating 27 scenarios: present, a 50% reduced and a 25% increased land use intensity; present, 25% increased and 25% decreased rainfall; and no fire policy, a 50% reduction of fire ignitions policy and a total suppression of fire sources with active fire-fighting policy. I quantified the forested area for 10 runs under each scenario. Under most of the scenarios forests encroached over meadows. Forest area diminished whenever rainfall decrease was associated with grazing increase but mainly when fires were totally suppressed from the system. These results suggest that under the most plausible scenario (further land abandonment and rainfall increase) forest will continue to encroach if we do not suppress fires totally.

Oral Session **Disturbances 1**

HIGHWAY VERGES: SAFE REFUGES OR EFFECTIVE BARRIERS FOR SMALL MAMMALS?

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Small mammals (SM) play a vital role in ecosystem equilibrium, namely as prey to many endangered top-predator species. In the last decades, Portugal experienced a production increment of livestock, which resulted in vast over-grazed areas, contributing to a SM general decrease. Because highway verges (HV) are fenced no cattle can access them, and since HV generally sustain a well developed vegetation cover and humidity conditions for SM presence, we aimed to test if HV may function as source areas to surrounding areas. We compared SM densities between HV, montado and open areas, and quantified which environmental features most influence SM presence in HV. At the same time, we studied individuals' movements in HV to quantify the road and traffic barrier effect for SM movements. We captured 496 individuals (9896 trap.night-1). We found significantly higher densities of SM community in HV. GLMMs suggest that vegetation height and cover density play an important role in their presence. Very few crossings were recorded, although the low probability of being road-killed. We argue that HV should be managed in order to maintain viable SM populations, while preventing predator access to minimize its road-killing risk. Also, grazing exclusion areas should be implemented in vast continuous grazed areas to allow connectivity among SM metapopulations.

Oral Session **Patterns and processes 1**

DYNAMIC SPACE-TIME AND FUTURE TRENDS OF CHANGE IN LANDSCAPE UNITS OF COASTAL WATERSHEDS IN LA ARAUCANÍA REGION OF CHILE.

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In the coastal rim of La Araucania land use has changed significantly during the last one hundred years mostly due to anthropogenic effects, though also because of significant natural effects such as the earthquake and tsunami of 1960. The aim of this study is to identify the direction and magnitude of the patterns of change that landscape units have had from 1980 to 2007. The analysis was made in base of the data obtained by remote sensing and cadastral mapping of vegetation, evaluating the change of spatial patterns to propose a prospective model by 2017. The analysis of spatial dynamics considered calculating the rate of change, diversity and Shannon evenness, proportion of landscape unit and associated statistics to shreds. The prospecting method was based on Markov Chains and Cellular Automata. The results show notorious changes in land use during the last 27 years, especially denoting forest expansion and fragmentation of natural habitat, thus altering the structure and function of the landscape. Regarding the future scenario, the survey indicates a trend of maintaining the forest and a slightly increasing of native forest. The largest losses of surface would be given by the agricultural matrix in conjunction with wetland areas and wet lands.

Oral Session **Patterns and processes 1**

MULTI-TEMPORAL ANALYSIS OF FOREST LANDSCAPE FRAGMENTATION IN THE NORTH EAST OF MADAGASCAR

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Habitat fragmentation has become a main concern for tropical forest managers. Transition of large blocks of forest into mosaics of forest and notably slash and burn cultivation affects biodiversity, here measured through tree abundance and floristic species richness. The present study gives a time series analysis and quantitative information on fragmentation processes related to the spatial distribution of settlements and geographic parameters. Image classifications were carried out with SPOT 5 multispectral dataset of 2004 and 2009 to establish land use maps. Then, forest patches has been reclassified depending on their spatial fragmentation index into 'low fragmented forest' and 'fragmented forest' using the variation of classes (forest or non forest) in a 3x3 kernel (pixel group). The diachronic analysis of each class has shown that (1) the deforestation, which is caused by insufficient arable land and rural poverty, is increasing for upland rice production ; thus the landscape is progressively more fragmented (2) the fragmentation dynamic is significantly different according to the distance to road, to village and to topographic parameters. These aspects are used for spatiotemporal modeling of the landscape dynamics in order to develop active involvement of local communities in decision making for a sustainable management of natural resources.

Oral Session **Biodiversity conservation and planning 4**

GENETIC STRUCTURE OF Cedrela fissilis Vel. (Meliaceae) POPULATIONS, AN ENDANGERED TROPICAL TREE SPECIES, IN BRAZIL

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Cedrela fissilis, as other rare tropical tree species in Atlantic Forest, has suffered a severe decrease in the number of individual and populations during the conversion into agricultural and urban areas and exploitation of timber products. These facts have been caused serious consequences in the long-term maintenance of genetic diversity. Moreover, this species has a great potential to produce high quality timber, especially in mixed stands, which are becoming economically feasible for the scarcity of wood, as well as, it is also being widely used in restoration projects of tropical forests.In this context, it becomes important to study the genetic diversity of remnant populations of this species and the structuring of this diversity. This study analyzed ten populations of *C. fissilis* in five states in southern-central Brazil, occurring in three forest typologies (semi-deciduous forest, rain forest, sub-tropical forest), to evaluate the genetic structure, infer strategies for their conservation, and establish criteria for the use of genetic resources. We developed nine microsatellite loci for this species, revealing 130 alleles in all populations. The inbreeding within populations was relatively low and they presented genetic differentiation according to the stepping-stones model, but the populations of semi-deciduous forest and the rain forest showed greater similarity between themselves.

Oral Session **Monitoring 1**

LAND USE CHANGES AND MIXED FOREST DYNAMICS. THE CASE OF MONTIFERRU MOUNTAINS (SARDINIA, ITA) (1956-2006)

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Classically land cover dynamics had been exclusive considered under biologist criteria. Nowadays this order is altered by human-induced processes and in terms of global change it is necessary to take into account its role into landscape dynamics. In the case of forest areas, land use changes related to primary sector activities are key factors to analyze land cover dynamics. This analysis requires the ecological and social criteria integration, linking socioeconomic and biophysical driving forces; hybrid methodologies based on holistic approaches are basic tools to interpret them and to propose biodiversity conservation management guidelines. This study was conducted at oak and holm oak mixed forests areas of Montiferru Mountains (Sardinia, Italy). The aim was to analyze land use & land cover changes during the last five decades, especially reforestation due to forestland use decrease and abandonment circumstances linked to traditional rural economies' crisis. Changes observed have become apparent at different biodiversity levels. Firstly, mixed forestland surface has grown by mean 13% and reforestation reached upper levels (ca. 25-30%) in areas characterized by low use recurrence. Secondly, despite the increase of deciduous oaks population in contrast to previous decades, holm oaks tend to dominate mixed forest composition and regeneration dynamics.

Oral Session **Tools of landscape assessment and management 1**

MODELING FOREST VEGETATION CHANGE UNDER CLIMATE CHANGE BETWEEN THE TEMPERATE AND THE BOREAL FOREST IN SOUTHERN QUEBEC USING LATITUDE-SHIFTED TRANSITION MATRICES

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Biogeographical transition zones are likely to become very dynamic under climate change because of the diversity of vegetation communities and ecological processes involved. In southern Quebec, we observe a sharp forest vegetation change in a 100 km latitudinal gradient, shifting from the temperate to the boreal forest. In this study, we used environment-and-disturbance conditional forest vegetation transition matrices (TM) to assess how forest vegetation change under climate change might happen along this latitudinal gradient. TMs were obtained from ten 100 km2 sample-landscapes, distributed along a latitudinal gradient. TMs were derived from overlaid vegetation and disturbances photo-interpreted maps from the beginning, the middle and the end of the 20th century, allowing us to detail forest type transitions after different disturbance types and to assess the effect of latitude on them. Transition matrices were then incorporated into a non-spatial landscape model (VDDT) in order to test the effect on the rate of change in forest composition of shifting northward the TMs, according to modeled future climates. Our results show that southern and northern landscapes are more resistant to change but in-between mixedwood dominated landscapes are rapidly transiting to deciduous landscapes. Such phenomenon results from a strong interaction between forest composition, disturbance type and latitude shifted-transitions.

Oral Session **Patterns and processes 3**

EVALUATION OF THE ECOSYSTEM SERVICE IN THE FOREST FORMATIONS OF BIOSPHERE RESERVE "SREBARNA", NORTHEASTERN BULGARIA

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The investigation observes the basic parameters in ecosystem services of the forest formation on the territory of Biosphere Reserve „Lake Sreburna". Wetland system is a part of Danube catchments. Importance of the lake depends of rich biological and landscape diversity. The most important are bird colonies of Dalmatian pelican and waterfowl birds. Forest formations in the lake and around the wetland systems are natural place for nesting and spreading of the bird populations. They are dominated of willows and popular species. The forest formations in Danubian islands have high level of importance as quality and diversity of the ecosystem services. They are flooded for the different period of time during the high Danube waters. This process reflects and determines the complex of ecosystem services in the reserve. The results of the research can use for optimization of nature protection and conservation activities in the Biosphere Reserve Srebarna and the territories around the wetland system.

Oral Session **Urban Forestry 1**

URBAN FOREST AREAS, BIODIVERSITY AND WELL-BEING: A CASE STUDY IN ITALY

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In this study, we selected five typologies of urban green spaces in Italy, ranging from a minimum of biodiversity and a maximum of man-made elements to a maximum of biodiversity and a minimum of man-made elements. A convenience sample (N = 125) was contacted in the city of Padua, Florence, Rome, Bari. A questionnaire focusing on people's experience in the environment (length and frequency of visits, activities performed, perceived restorativeness, affective qualities of the place, perceived well being during and after the visits) was administered. Results showed that the perceived restorative properties are higher in the peri-urban green areas, and significantly increasing as a function of biodiversity levels in the environment. Moreover, the activities performed in the environment impacted both perceived restorativeness and respondents' well being. Finally, frequency and duration of visits positively predicted self-reported well being. As expected, a significant mediating role of both perceived restorativeness and affective qualities upon the relationship between duration and frequency of visits and individual well being was detected. The theoretical implications in the analysis of the process leading to restoration are discussed, and potential guidelines in view of a more healthy management of everyday urban and peri-urban natural environments are envisaged.

Oral Session **Disturbances 3**

INDIRECT ESTIMATION OF LANDSCAPE USES BY Lama guanicoe AND DOMESTIC HERBIVOROUS THROUGH THE STUDY OF DIET COMPOSITION IN SOUTH PATAGONIA.

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Herbivory is central in ecosystem function studies, and herbivores through browsing influence over regeneration and vegetation composition. Understanding diet selection behaviour along the year is important to predict herbivore impacts on regeneration and vegetation dynamics under different scenarios of forest and grazing management. The objective was to evaluate diet composition of herbivorous, and correlate them to the use of different vegetation types along the year. The study was conducted in 100 km² of Tierra del Fuego Island (Argentina) where 205 floristic surveys were obtained. Feces of native (*Lama guanicoe*) and domestic (*Bos taurus* and *Ovis aries*) herbivorous were collected. Four laboratory samples per species and season were analyzed, each one composed by five fecal collection. Samples were mixed, dried and ground in a mill (1 mm) for microhistological analysis. Browsing occurred all around year, where native and domestic herbivorous alternate the uses of different environments. Native species preferred *Nothofagus pumilio* forests, except in winter, where domestic species had major predominance. Beside this, all the herbivorous species included grasses founded in open environments (grasslands and peatlands) in their diet. The knowledge of diet and plant distribution at landscape level allows us to propose management strategies for native and domestic herbivorous.

Oral Session **Monitoring 1**

MULTI-SCALE ANALYSIS OF CARBON STOCKS AND DEFORESTATION MONITORING – CASE OF THE EASTERN TROPICAL HUMID FOREST OF MADAGASCAR

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Carbon accounting and deforestation monitoring constitute the most important instruments in implementing the Reducing Emission from Deforestation and Degradation (REDD) mechanism in developing countries like Madagascar. Furthermore, most of the researches and calculations have been established at different scales and they are not sufficiently useful and operational for forest monitoring over large areas. The present research develops a methodology to assess the aboveground biomass at a large scale through vegetation indices. Thus, biomass inventory provides data for calibration and classification of the Normalized Difference Vegetation Index (NDVI) on high resolution sensor images (Landsat ETM+ 2005, SPOT 5 2009 multispectral datasets), and NDVI combined with the Enhanced Vegetation Index (EVI) on moderate resolution sensor images (Moderate Resolution Imaging Spectroradiometer Image). The results demonstrate that the EVI provides an accurate classification (till 2000 on MODIS) at a large scale. Also, NDVI is applicable for forest monitoring but may be saturated on perhumid regions. Moreover, the use of vegetation indices enables the replication of the classification over time, useful for the detection of changes and the establishment of a deforestation baseline. In this way, these indices constitute one of the parameters for carbon monitoring in the future.

Oral Session **Patterns and processes 3**

APPLICATION OF REMOTE SENSING TO ASSESS THE IMPACT OF WILDFIRES IN THE NATURAL VEGETATION RECOVERY AND LANDSCAPE STRUCTURE IN THE MEDITERRANEAN FOREST OF ALICANTE PROVINCE

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Forest fires in the Mediterranean zone cause major disturbances in landscape structure especially in the wooded stratum, since the recovery of the initial state of the natural vegetation is a complex and very slow process. This process, depending on many factors, passes through several stages leading to changes in the landscape structure through time. In this research, several Landsat TM and ETM+ images were used to assess the impact of wild fire relative to climatic patterns in the Mediterranean forests of the Province of Alicante over the past 25 years. The use of the Normalized Difference Vegetation Index (NDVI) for mapping the burnt zones and indicators of landscape heterogeneity allowed us to analyze the degree of landscape change in these forests caused by the fires. In the majority of the observed zones the natural vegetation did not completely recover over this time period. The alteration in landscape structure and its floristic composition depends on the type of vegetation and its maturity before the fire, topography, microclimates, the climate general, and finally, land use and management.

Oral Session **Urban Forestry 1**

PUBLIC PARTICIPATION, BIODIVERSITY AND RECREATIONAL VALUES IN URBAN FOREST PLANNING IN FINLAND

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In Finland most of the urban green areas are forests with indigenous understorey vegetation. Urban forests are located near residential areas, and they are actively used for outdoor recreation. Municipalities own most of these forests in Finland. The aim of this study was to investigate the present way of planning and managing of municipality owned urban forest, and the possibilities to take into account multiple values, e.g. recreation and biodiversity. Majority of the municipalities were interested in improving forest biodiversity in their recreational forests. They have actively inventoried their forests for the biodiversity purposes, and have used lighter management methods than for commercial forests in order to increase both recreational values and biodiversity. Participatory planning has been commonly used for taking forest users' opinions into account and for integrating multiple values. Multi-functional forest planning, multi-criteria decision analysis and advanced decision-support tools are rather new approaches in the field of urban forestry. However, this study showed that these modern methods could be useful tools for integrating multiple values – such as recreational, ecologic, cultural, aesthetic values- into planning process and thus to improve the quality of urban forest planning.

Oral Session **Patterns and processes 2**

EVALUATING THE FIELD-SCALE WATER USE OF CELLULOSIC BIOFUEL CROPS

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A comprehensive set of research studies has been developed to describe the environmental effects of biofuel growth in loblolly pine (*Pinus taeda*) plantations in the southeastern U.S, evaluating site productivity and sustainability, wildlife, and water. The hydrology field studies consist of three sets of watersheds across the southern US. At each geography there is an older, reference stand, a switchgrass (*Panicum virgatum*) interplanted site, a silvicultural site, and a biofuel planting only site. Surface and ground water quality and quantity is being collected by event and periodic sampling. The watershed studies will ultimately provide the detailed water budget needed to determine field evapotranspiration rates and timing. However, there is an urgent need to estimate the water use of intensive biofuel growth. Two additional studies with comparable treatments will help by giving an estimate of the relative magnitude of biofuel water use in comparison with that of an existing pine plantation. One study tracks soil moisture and groundwater in newly established experimental blocks in low lying, poorly drained soils, and another soil moisture in well-established uplands operational tracts. The results of these smaller-scale studies are presented for one growing season, and the large scale study is reviewed.

Oral Session **Biodiversity conservation and planning 2**

MODELING LAND USE/COVER CHANGE AND BIODIVERSITY CONSERVATION IN MEXICO

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A nationwide multidate GIS database was generated in order to carry out the quantification and spatial characterization of land use/cover changes (LUCC) in Mexico during the last decades. Digital maps from three different dates (1993, 2002 and 2007) from the National Institute of Geography, Statistics and Informatics (INEGI) were revised and integrated into a GIS database along with ancillary data (distance from roads and settlements, slope, type of soils, land tenure, and socio-economical parameters at municipal level). Land cover maps were overlaid in order to generate LUCC maps, transition matrices and to calculate rates of conversion. An analysis of causes and drivers of LUCC was done through GIS analysis to develop a spatially explicit model of LUCC which takes into account biophysical and socio-economic factors and to establish different scenarios of change. Maps of probability of changes were created and compared with map of biodiversity. Results show that although rates of deforestation have decreased during the most recent period, LUCC represent still a serious threat to biodiversity conservation in Mexico.

Oral Session **Biodiversity conservation and planning 2**

CHARACTERIZING SPATIOTEMPORAL ENVIRONMENTAL VARIATION THROUGHOUT ONTARIO USING REMOTE SENSING DERIVED INDICATORS

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Ecosystems are naturally variable. This variability can be due to the inherent land cover, topography, seasonality, and natural variations in climate. Ecosystem variability can also extend beyond this natural range due to disturbances such as fire, harvesting, land conversion, insect infestation, and increasingly may be due to extremes in climate (e.g. snow, ice storms, flooding, rainfall, temperature fluctuation). Differentiating disturbances from natural variability and understanding vegetation productivity changes resulting from disturbances are of high importance for ecosystem management. To capture ecosystem variation over the province of Ontario, Canada, we utilised a series of ten-day composites of Medium Resolution Imaging Spectroradiometer (MERIS) fraction of Photosynthetically Active Radiation (fPAR) over a 6 year period. We investigated changes in the variations in fPAR derived vegetation indices (annual productivity, degree of vegetation seasonality and vegetative perennial cover) using a non-parametric statistical test. Results indicated that considerable changes in vegetation productivity are occurring in Eastern Ontario as well as in other more localized regions in northern Ontario. Using a range of auxiliary information on fire disturbance, land cover, distance to nearest road and city, topography and protected areas, we provide explanations as to the possible drivers behind this variability.

Oral Session **Patterns and processes 1**

IS DISSIMILARITY IN ALIEN PLANT SPECIES COMPOSITION BETTER EXPLAINED BY ENVIRONMENTAL, DISPERSAL OR GEOGRAPHICAL DISTANCE? OR DOES DISTANCE REALLY MATTER?

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Patterns of alien species richness and composition reflect the joint effects of invasibility and invasiveness. Understanding and anticipating biological invasions requires assessing both dispersal ability and other attributes of alien species promoting their invasiveness, or those features of the receiving communities, habitats or landscapes promoting their invasibility. In a landscape context, environmental dissimilarity may be more useful than geographic distance to predict species composition. When comparing native species composition among a set of landscape mosaics, environmental (dis)similarity is usually of higher importance than geographical distance between pairs of mosaics. However, when the same exercise is carried out for alien invaders (mainly neophytes and thus still not occupying their full potential range in the invaded range), geographic or dispersal (i.e. functional) distance may play a more important role. Here we test this hypothesis by applying dissimilarity-based methods with simple and partial Mantel tests to assess the importance of environmental, dispersal and geographic distances in explaining alien composition dissimilarities between the sampled sites. We will address the following two questions: 1) Is distance between pairs of landscape mosaics more important that environmental (dis)similarity in explaining patterns of alien species composition? and 2) Is dispersal distance more important than plain geographic distance?

Oral Session **Disturbances 1**

FIRE AND LANDSCAPE: A MULTI-SCALE ASSESSMENT OF A COMPLEX RELATION

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In Ecological Modelling there are well known effects of scale on model predictions and in the explanatory power of variables. Here we address the complex relation between fire regime and landscape pattern through a multi-scalar analysis of the relative importance of landscape features in explaining fire history in continental Portugal. We test the hypothesis that the relative importance of landscape features will increase as we move from regional to local scales. We modelled attributes of the fire regime using three different spatial extents (the whole country, the North of Portugal, and nature reserves). Total burnt area and fire recurrence were modelled at the civil parish level against three types of explanatory variables (physical environment, landscape and socio-economy). For each scale and fire variable, we measured the competing explanatory power of each predictor block, using normalized median absolute deviation. We confirmed that scale influences the explanatory power of predictor blocks and individual predictors, but we also show how different response patterns may be obtained at a given scale depending on geographic location. We propose a hierarchical view of the effects of multiple drivers on fire regime as a suitable way to improve risk models and land management strategies aimed at mitigating wildfires.

Oral Session **Biodiversity conservation and planning 1**

FORTRESSES AND FRAGMENTS: IMPACTS OF FRAGMENTATION IN A FOREST PARK LANDSCAPE

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Our research addresses patterns of land cover and forest fragmentation in and around Kibale National Park in equatorial East Africa, and how park presence affects local livelihoods. Combining discrete and continuous data analyses of satellite imagery with a geographically random sample of two agricultural areas neighboring Kibale, we examine multi-scalar landscape change and diminishing resources in the context of population increase, potential climate change, and fortress conservation. While park boundaries have remained relatively intact since 1984, the domesticated landscape has become increasingly fragmented, with forests and wetlands shrinking, becoming more isolated, and suffering decreased productivity. Remnant wetland and forests are of particular interest because they supply ecological goods and services, but also provide habitat for primates and elephants from which to raid crops, not only posing a risk to food security, but may also lead to zoonotic disease emergence through spillover and spillback events. As the population outside Kibale swells and land becomes scarcer, remnant forests and wetlands are used more intensively for material resources and converted to other land uses. Quantifying landscape responses to local scale anthropogenic change (agricultural conversion) in a region facing climate impacts is essential to developing frameworks of complex islandized park landscape interactions.

Oral Session **Tools of landscape assessment and management 1**

INTERPRETATION OF FOREST VERTICAL STRUCTURE AND ASSOCIATED BIRD HABITAT PREFERENCES FROM AIRBORNE LIDAR

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The vertical structure of woodlands is an important functional component of forest landscapes and its associated biodiversity, e.g. with regard to birds. Airborne Light Detection and Ranging (LiDAR) and Terrestrial Laser Scanner (TLS) data were compared to establish the retrieval accuracy of ground elevation, forest canopy height and vertical profiles. Vertical canopy profiles derived from LiDAR were further related to observations of 36 bird species. Comparison of canopy profiles indicated that the airborne LiDAR pulse was unable to penetrate elements of the sub-canopy recorded by the TLS, whilst the TLS signal was similarly not reaching the upper canopy elements. However, the vertical LiDAR profiles correlated well with the distribution of specialized woodland birds, e.g., wood warbler, pied flycatcher and tree pipit. The correlation was reduced where the density of plant components led to an attenuation of the LiDAR pulses, such that information on the sub-canopy or understory was reduced. The study highlights the opportunities for capturing structural forest information from airborne LiDAR. It recommends the use of higher LiDAR point densities for improved retrieval of the lower canopy structure. TLS data is a useful tool for the validation of LiDAR pulse penetration through the vertical forest profile.

Oral Session **Tools of landscape assessment and management 1**

DEVELOPING MODELS AND PROCESSES TO AID DECISION SUPPORT FOR UNDERSTANDING LAND MANAGEMENT CHANGES IN THE CANADIAN BOREAL FOREST

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Human population, in terms of number of people and expectations, exerts demands upon the environment for resource production and general use. Forested lands, which encompass more than half of the 10 million km2 surface area of Canada, are not immune to this pressure. Industrial forested lands in Canada support multiple uses (e.g., forestry, oil and gas, mining, agriculture, recreational use, urban development) within the same space and time. It is evident that the current planning processes need to evolve to consider these cumulative, long-term impacts. A novel forest management planning initiative is presented that considers wildfire response and vegetation change within the context of climate change and human population growth. In addition, water quantity and quality are modeled as part of the Forest Watershed and Riparian Disturbance project, using deterministic (a new variant of the Soil and Water Assessment Tool) and stochastic (artificial neural networks) approaches. Finally, coarse and fine filter biodiversity and habitat supply models were developed as part of the Biodiversity Assessment Project. All of these measures are analyzed under various models to produce an optimum long-term forest strategy that satisfies current economic drivers and the new paradigm of intrinsic values that are naturally contained within the forest.

Oral Session **Patterns and processes 3**

RELATIONSHIPS BETWEEN NITROGEN CONCENTRATIONS AND THE SPATIAL PATTERNS OF WATERSHEDS LOCATED IN A NORTH PATAGONIAN LAKE BASIN IN SOUTHERN CHILE.

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The concentration of nitrogen in lakes is closely related to the anthropogenic activity in the drainage basins. We assessed the relationship between the spatial pattern of four watersheds and the physical-chemical characteristics of rivers that flow into a lake in southern Chile which is used for salmon farming. We selected four sub-areas to study: watersheds dominated by native forest that empty into areas of the lake without (A1) and with (A2) salmon farming; and watersheds with mixed ground use (A3) and completely agricultural watersheds (A4) that influence salmon farming areas. We found a significant relationship between the spatial patterns of the drainage watersheds and the nitrogen concentrations of the tributary rivers. The concentrations of dissolved inorganic nitrogen (DIN) were significantly lower (1:10) in rivers flowing through watersheds covered by native forest than in those dominated by agriculture. This spatial pattern was repeated in the lake sediments: total nitrogen concentrations varied significantly from the pristine watershed to the most disturbed watershed. Our results show evidence of how the spatial patterns may influence the nitrogen concentrations in rivers. In the lake, nitrogen concentrations were higher in salmon farming zones located at the exit of human-influenced watersheds.

Oral Session **Tools of landscape assessment and management 1**

VISIBILITY ANALYSIS AND VISUAL DIVERSITY ASSESSMENT IN RURAL LANDSCAPES

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This paper presents a methodological approach to analysing visual diversity and content, using GIS tools. The analysis of features visibility is usually based on methods which calculate the number of locations from which feature is visible. However, visibility analysis using GIS suffers from several limitations that can significantly influence the results. In this study the authors have tested the differences in visibility through time using a DEM with cover heights. The results provided information about the visibility of each land cover type, which were used to evaluate the visual diversity at three different dates, and to provide an input to the derivation of information on landscape visual quality. The visibility maps were also used as inputs about the visual content of the landscape. The results show significant differences in both visual content and diversity through time, and illustrate a difference between the potential perceptions of change, and the real extent of change in an area. The landscape content maps were evaluated in terms of parameters for use in planning tourist routes. The final analysis and evaluation of the results is ongoing, based on expert experience and opinion. This will include an assessment of their value in informing landscape management and planning.

Oral Session **Biodiversity conservation and planning 1**

UNDERSTANDING VASCULAR PLANT SPECIES DIVERSITY AT LANDSCAPE LEVEL. SPATIAL RELATIONSHIPS BETWEEN ALPHA AND BETA DIVERSITY IN FORESTED LANDSCAPES.

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Biodiversity conservation is a universal goal that has been considered a key action in relation with sustainable use of resources. Nowadays, there are many research projects trying to establish diversity baselines for different groups of plants and animals across main ecosystems and habitats of the world. Recent approaches focused on diversity at landscape level have reported valuable data for several biological taxa but there are not unified methodologies for sampling and testing diversity data at this level. Many Mediterranean landscapes, at least in Mediterranean Basin, are characterised by a mosaic of land uses in reduced territories and this heterogeneity must be detected and evaluated at this level. Present paper proposes the use of a landscape diversity index for vascular plant data as indicator of local diversity (LDIVP). Methodology has been applied to several municipalities in Spain. Basic data for calculation of the new index are: 1) Number and spatial distribution of habitats. 2) Species-inventories accumulation curves. 3) Use of diversity estimators based on sampled data. 4) Application of additive methods for calculating relationship between alpha, beta and gamma diversity at local scale. Testing of LDFIVP significance has been carried out using vegetation samples in multiescalar plots from several Spanish rural landscapes. Advantages and objections are discussed and a stratified method for sampling and monitoring vascular plant diversity at landscape level is proposed.

Oral Session **Management and sustainability 2**

ARE PLANT FUNCTIONAL TRAITS DETERMINING SPECIES RESPONSE TO HARVEST TREATMENTS?

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The employ of plant traits for predicting the performance of species to land use is a common topic in landscape ecology. However, little attention has been paid to their contribution to forest ecology. Since plant traits can determine species responses to human induced disturbances, e.g. harvesting, they can become a useful tool for forest management planning. In this study we evaluated the extent to weighted mean plant traits were related with the response of understory species to three different harvest intensities in a natural Maritime pine forest in Spain. Our results showed a strong relationship between plant traits and harvest treatments. Particularly, early successional species and wind dispersed species were associated with more intense harvest treatments. Moreover, there were differences in the response of the different grouping of traits considered (vegetative and regenerative traits) to harvesting. We discuss the implication of these findings for future forest management approaches in similar areas.

Oral Session **Biodiversity conservation and planning 3**

LANDSCAPE PLANT DIVERSITY DISTRIBUTION RELATED TO ENVIRONMENTAL GRADIENTS AND HUMAN IMPACT ACTIVITIES IN SOUTH PATAGONIA

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Composition and distribution of plant communities at landscape level are related to environmental gradients, and their conservation status or impacts. The objective was to evaluate changes in plant diversity at landscape level in a mountain basin located in Tierra del Fuego (Argentina), and to determine the influence of human impacts and conservation value of different vegetation types along environmental gradients. The study was located in Andorra Valley (129 km²) where 139 landscape units were identified according their vegetation types (Nothofagus betuloides forests-NB, N. pumilio forests-NP, upper-valley grasslands-UVG, bottom-valley grasslands-BVG and peatlands-P). Floristic surveys (ferns, dicotiledons and monocots) and forest structure were sampled, while environmental variables quantification was performed into a GIS. We found differences in diversity related to aspect, altitude, vegetation types and forest site quality when ANOVAS, classifications and ordination analyses were performed. The most diverse vegetation types were NP and UVG compared to P, BVG and NB, where exotic species were related to the degree of human impact in the studied units. The knowledge of distribution and composition of plant diversity in the different vegetation types and environmental gradients allow us to propose conservation strategies according to the status of the units and their distribution at landscape level.

Oral Session **Disturbances 3**

SEPTEMBER – 2009 FLOODS IN ISTANBUL (MISUSE OF LAND AND URBANIZATION)

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The province of Istanbul received a substantial amount of rainfall between 7-9th of September 2009. This storms caused many flood events and 31 causalities and a large amount of property loss in Ayamama Creak watershed. In this paper we identified and discussed the reasons of flooding in Istanbul and its relations to urbanization. To do this we benefited from a case study called Ayamama Creek watershed. To find out the extent of urbanization and increasing of impervious surfaces we benefited from satellite images taken in 1982 and 2008.After evaluating the images and survey study we calculated the increase in impervious surface inside the watershed with 25 years intervals. The results showed that impervious areas have been almost doubled in the watershed for the last quarter century. Florya weather station, the closest weather station, data were used to analyze the seasonal distribution and daily maximum precipitation for last 30 years. We also calculated time of concentration and peak runoff rates for the basin for 1982 and 2008. The time of concentration and peak flow rate increased in 2008 compared to 1982. According to Florya weather station, Ayamama Creek Watershed has an average precipitation of 661mm and maximum daily rainfall is 116.4mm. The most hazardous months for floods in the region are from October and December. The days when the floods occurred on September 9th, annual rainfall was 150mm in the basin. This amount was greater than 113.82mm of hundred years frequency.

Oral Session **Disturbances 3**

IMPACT OF HEMLOCK DECLINE ON SUCCESSIONAL PATHWAYS AND ECOSYSTEM FUNCTION AT MULTIPLE SCALES IN FORESTS OF THE CENTRAL APPALACHIANS, USA

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Hemlock woolly adelgid (HWA) is an invasive, exotic insect causing widespread mortality in eastern hemlock (*Tsuga canadensis* (L.) Carr) forests of the eastern United States. Eastern hemlock is considered a foundation species, regulating local ecosystem structure and function (e.g., microclimate, nutrient cycling). Across the central and southern Appalachian Mountains, hemlock dominates ravine and riparian forests. Thus, the loss of this foundation species may have dramatic effects across riparian and stream ecosystems. Currently, we are working to clarify how the loss of hemlock will affect the vegetation composition and ecosystem function in hemlock forests of the central Appalachians at both local and landscape scales. Using a chronosequence approach, we are examining hemlock forests within regions classified as long-term invaded (> 10 years), recently invaded (5-10 years), and intact. Within each region, we have also identified stream reaches that remain intact to serve as controls. Initial analyses indicate hemlock is particularly dominant immediately adjacent to streams, with few other species in any of the vegetation layers. As this evergreen with poor quality leaf litter declines, light availability and decomposition rates are increasing, changing the successional pathways of these forests and providing resources for additional species including invasive, non-native plant species.

Oral Session **Management and sustainability 3**

HUMAN IMPACTS ON LANDS RESOURCES IN WEST-AFRICA AND BEYOND

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In order to get a clearer picture of the biophysical base and the human impacts on it, including brief comments on associated economic activities, it is helpful to "go down" in scale from a global to a continental or even to a sub-continental or regional scale. For a first overview one could adopt the zonal classification of "landscape belts", which can be used as an expression of the existing combined attributes of climate, vegetation, soil, and land use. In West Africa, this sequence of "landscape zones" extends from the rain forest to the desert in a fairly regular fashion. An analysis linking this major biophysical pattern with corresponding patterns of land use and economic development poses some interesting questions. Political boundaries have cut right across this ecological zonation, usually encompassing several landscape belts within each state. Development of land use, including industry, has been strongly influenced by history, i.e. mainly by events in the pre-colonial, colonial, and post-colonial periods. Within this biophysical donation, agricultural activities and mining industries play a more dominant role than manufacturing. Similarly, rapid urbanization has influenced the patterns of development.

Oral Session **Biodiversity conservation and planning 3**

RANKING FOREST TREE GENETIC RISK ACROSS THE SOUTHERN APPALACHIANS: A TOOL FOR CONSERVATION DECISION-MAKING IN CHANGING TIMES

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Changing climate conditions and increasing pest and pathogen infestations will increase the likelihood that forest trees could experience population-level extirpation or species-level extinction. Funds, however, will be limited for management and gene conservation efforts to preserve forest tree genetic diversity, presenting a particular challenge in species-rich regions such as the Southern Appalachian Mountains of the southeastern United States. To facilitate the effective use of limited resources, we developed a system that ranks the risk of genetic degradation for more than 130 Southern Appalachian tree species. These include high-elevation species endemic to the 22 million hectare region, species with genetically diverse southern populations isolated from large distributions in the northern United States and Canada, and species widespread across the United States but with high-elevation ecotypes in the Southern Appalachians. This system gives each species a rating for risk factors relating to (1) its biological attributes, such as fecundity and seed dispersal mechanism; (2) its population structure; (3) its overall rarity and its commonness within the region; and (4) extrinsic factors associated with such influences as changing climate, pest susceptibility and over-exploitation. The factor scores are weighted and summed to give a risk rating for each species, which are ranked according to their overall susceptibility to genetic degradation. The flexibility of this approach allows for its application at multiple scales and across any area for which data exist on the population dynamics and distribution of the species of interest. We present examples of Southern Appalachian tree species with high, moderate and low risk of genetic degradation.

Oral Session **Tools of landscape assessment and management 2**

USING A MULTI-CRITERIA APPROACH TO FIT THE EVALUATION BASIS OF THE MODIFIED 2-D CELLULAR AUTOMATON: PIMP YOUR LANDSCAPE

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The contribution presents an indicator based evaluation approach, which is used in the frame of the land-use management support tool “Pimp your landscape”. “Pimp your landscape” is a modified 2-D cellular automaton, which enables a multi-criteria impact assessment of land-use management planning decisions. To evaluate land-cover changes, values are assigned to each land-use type which describe its specific contribution to regionally specific sets of ecosystem services (e.g. ecological functioning, economic wealth, human health and well-being, aesthetical value) and / or environmental risks (e.g. sensitivity against extreme events or CC driven risks such as wind and water erosion, drought). A major problem is that universally valid indicators which allow to estimate such values are rare. Indicators taken from sectoral evaluation approaches, such as they are available from forest or agricultural research address often different target scales and thus may not be used for a holistic evaluation on landscape level. We focus on the question how to make measurable the impact of planning measures. When using an indicator set for estimating the value of a landscape for regional economy, an extreme imbalance between the economic value of urban and semi natural (rural) areas is resulting. In consequence, e.g. the contribution of forest and agricultural areas to regional economy is mostly underestimated. A combination of business and national economic indicators is developed to come to a more realistic evaluation.

Oral Session **Management and sustainability 2**

SPATIAL MODELLING OF FOREST LANDSCAPE STRUCTURAL CONNECTIVITY

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The decrease in biodiversity in recent years and the projected loss of species in future decades has drawn the attention of policy makers to the need to develop conservation policies over large areas. Climate change and habitat fragmentation are considered key pressures on biodiversity. Landscape adaptation to climate change involves maintaining connectivity to facilitate species movements to track favourable environmental conditions. Methods based on mathematical morphology provide a generic, flexible, and automated approach for the identification of structural connectivity over large areas. The structural connectivity of forest landscapes was derived at the national scale for present and future climate and land use scenarios. The scenarios are defined with the support of various factors, such as soil variables and morphological features. The results are discussed with regard to their relevance to landscape vulnerability and adaptation to climate change.

Oral Session **Management and sustainability 1**

THE CERTIFICATION OF FOREST MANAGEMENT AND ITS CONTRIBUTION TO THE RIGHTS OF WORKERS

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The certification of forest management must assure that the wood used in products is extracted from acceptable environmental standards of forest organization. In addition, forest certification must have compliance with related national and international law. The FSC (Forest Stewardship Council) institutes some criteria to guideline conscientious and responsible forest management. These criteria are grounded by environmental, social, cultural and economical aspects which are essentials to promote a sustainable society. In this sense, this study is framed on some reflections concerning the certification of forest management in Brazil. Particularly it addresses the need of assuring the rights of workers, and compliance with occupational health and safety measures. The main idea is to present some discussions concerning the respect in relation to rights of workers in connection with community participation in the management process to control and prevent labor injuries.

Oral Session **Disturbances 2**

IMPACTS OF INDUSTRIAL DEVELOPMENT ON HABITAT SELECTION AND MOVEMENT ECOLOGY OF WOLVES (Canis lupus) AND WOODLAND CARIBOU (Rangifer tarandus caribou) IN THE SOUTH PEACE REGION OF BRITISH COLUMBIA

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Since the early 1990's, regions surrounding the Peace River in Northeastern British Columbia have experienced rapid land-use change from resource extraction activities, in addition to large-scale agriculture and forestry.

Landscape change has altered a once stable relationship between woodland caribou (*Rangifer tarandus caribou*) and wolves (*Canis lupus*); caribou are now threatened by increased predation through apparent competition. My research goal is to understand factors influencing wolf distribution relative to high-quality habitat for caribou. I will first use resource selection functions (RSFs) to quantify the spatial relationships between 39 collared caribou to nine variables that are hypothesized to influence seasonal distribution: elevation, solar incidence, snow cover, forest cover, seral forest stage, linear feature density, cumulative disturbance density, distance to linear features and closest feature of concern. For wolves, I will use a statistical model based on counts to relate the number of locations within a habitat selection unit (HSU) to a number of covariates representing environmental or industrial features that might explain seasonal distribution. I will use the average area of wolf kill-site locations to define the extent of HSUs. These units will then identify the dimensions of a systematic grid placed across the territory. In addition to the abovementioned variables, wolf models will contain % quality caribou habitat and distance to water as potential predictors of seasonal distribution. My study will provide insights on wolf-caribou interactions that may be applicable to other wildlife negatively influenced by increasing human disturbances.

Oral Session **Disturbances 2**

MERGER OF THREE MODELING APPROACHES TO ASSESS POTENTIAL EFFECTS OF CLIMATE CHANGE ON TREES IN THE EASTERN UNITED STATES

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Climate change will likely cause impacts that are species specific and significant; modeling is critical to better understand potential changes in suitable habitat. We use empirical abundance-based habitat models utilizing tree-based ensemble methods (in a tri-model approach) to explore potential changes of 134 tree species habitats in the eastern United States according to various emission/GCM scenarios (http://www.nrs.fs.fed.us/atlas). The models suggest substantial potential changes in suitable habitat, including a retreat of the spruce-fir zone and an advance of the southern oaks and pines. To help interpret and potentially add additional realism to these outputs, we assigned and calculated Modification Factors for 12 disturbance and 9 biological factors that cannot be specifically assessed with the empirical RandomForest approach. We also use a spatially explicit cellular model, SHIFT, to calculate colonization potentials for some species, based on the abundance of the species, the distances between occupied and unoccupied cells and the fragmented nature of the landscape. By combining results from the three efforts, we are estimating potential climate change impacts for forest managers that can be used to aid in management decisions under climate change. These tools are being applied in northern Wisconsin.

Oral Session **Biodiversity conservation and planning 3**

CONSERVATION VALUE OF AGRICULTURAL LANDSCAPES OF SÃO PAULO, BRAZIL

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In São Paulo, Brazil, the Environmental Law demands that at least 20% of the total area of a property has to be kept under native vegetation. The main local agricultural activities are sugarcane, eucalyptus and pastures. These activities are predominantly connected to the agroindustry and their respect for the local Environmental Law is more related to the market than to law enforcement. However, a significant part of the original wildlife can still be found in these agricultural landscapes. Although predominantly generalists, some of these species show a notable adaptive capacity to find food resources and shelter at least partially in the agroecosystems

themselves not only in the remnant fragments of native vegetation. Moreover, most of the local 130 thousand remaining fragments of the Atlantic Forest are located in agricultural landscapes not in conservation units. This adds some conservation value to agricultural landscapes in addition to their socioeconomic and cultural values. However, agriculture still has a plethora of environmental impacts such as pollution, habitat destruction and the introduction of exotic species, which should be further investigated. Studies on β-diversity among distinct agricultural landscapes should be prioritized for improving conservation value and mitigating environmental impacts associated with agriculture.

Oral Session **Disturbances 1**

LANDSCAPE CHANGES AND WILDFIRE BEHAVIOUR: NEW FIRE SCENARIOS IN SPAIN

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Recent trends in landscape change, according with new models of economic development and new lifestyles, have determined new territorial scenarios for wildfire ignition and propagation. The main drivers of the landscape change with implications in wildfire behaviour have been the following: (i) agricultural and forest land management abandonment and the underlying socio-economic processes; (ii) shifts in forest-related policies with consequences in structural causes of wildfires; (iii) proliferation of linear infrastructures, urban sprawls and expansion of the wildland-urban interfaces. These changes in the landscape have influenced the occurrence and propagation of wildfires. In the last decades, an increase in the frequency of wildfire episodes of great intensity and speed, that are related to the new territorial scenarios, and which overwhelmed the capacities of the extinction systems all across the country, has been recorded. Thus, it is possible to recognise several generations of wildfires, associated with the different stages of landscape evolution. This paper analyses the landscape changes related to the wildfire behaviour that have happened in Spain through the last twenty years and predicts future change trends. To do that, the main variables considered are: land use/land cover, fuel load attributes and recent fire history. The final objective is to identify and characterise the new fire scenarios, pursuing the aim of making easier the adaptation and improving the efficiency of the wildfire defence units, as well as reducing territorial vulnerability to forest wildfires.

Oral Session **Biodiversity conservation and planning 1**

WOOD MICE CONSERVATION IN A CHANGING MEDITERRANEAN AGRO-FOREST LANDSCAPE: THE IMPORTANCE OF REFUGES

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One of the most important structures for individual's survival are refuges, especially for species subject to significant predatory pressure or living in environments affected by severe climatic conditions. We studied how wood mice (*Apodemus sylvaticus*), inhabiting a changing Mediterranean agro-forest landscape, use nests and the factors that could be determining this use. Radio-tracking of 16 mice (8 males and 8 females), allowed us to detect 24 diurnal nests, which were used with a high fidelity rate (1.75 nest/animal), on average 6.75 nights/days. Nests and randomly selected 24 non-nests sites (located within an area defined by the sum of all individual home ranges), where characterised according with macro and micro-habitat parameters. Using a Generalized Linear Model (GLM), we tested three hypotheses: 1) nests use is influenced by its proximity to food patches; 2) the degree of sheltering provided by each site influences its use; and 3) nest use is constrained by a combination of food and shelter related features. Females had higher nest fidelity and the degree of sheltering provided by each site had a positive significant influence on its use. Nests with difficult access (e.g.,

under tree roots), good drainage (e.g., sleep slopes) and lower human disturbance (far from water and orchards) were used more often. The proximity to food patches seems to influence negatively nest use. Results indicate the need to preserve patches of natural dense vegetation besides riparian habitats, usually the focus of mammalian protection plans in Mediterranean agricultural landscapes. These patches are important areas for *Apodemus sylvaticus*, an acorn disperser species, preyed by raptors or mammalian carnivores. When negatively affected it may have a deleterious and cascading effect on ecosystems structuring.

Oral Session **Biodiversity conservation and planning 3**

EXTENSIVE PATTERNS OF CLONALITY IN P. ALBA AND P. X CANESCENS IN SPAIN: IMPLICATIONS FOR RIPARIAN LANDSCAPES AND ECOSYSTEMS MANAGEMENT

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Riparian vegetation in temperate zones holds great environmental importance as it is the only forest vegetation to be found in many agricultural landscapes, thus its conservation should be a priority. Among riverine tree species, genus Populus stands out, including species and hybrids whit a remarkable ability to spread clonally in absence of adequate conditions for sexual reproduction. Consequently, our research was focused on evaluating Populus species genetic diversity on the light of their special reproductive features (hybridization and vegetative reproduction). In this work, we present our results on P. alba and P. x canescens in the river Douro basin (North Spain). Nuclear microsatellite markers and Bayesian statistical analysis have been used for the detection of hybrids and purebred stands. Our results highlight the existence of a rather small number of genotypes accounting for most of the individual trees and stands in the whole study area. This extremely low genetic diversity could be explained by a post-glacial invasion by vegetative means and is regarded as a threat for those forests on the verge of a probable global change. Management recommendations are issued for these and other clonally-spreading species, like promoting a higher genetic diversity and sexual reproduction.

Oral Session **Tools of landscape assessment and management 3**

IDENTIFICATION AND CHARACTERIZATION OF FOREST EDGE SEGMENTS FOR MAPPING EDGE DIVERSITY IN RURAL LANDSCAPES

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UMR1201, Dynafor, INRA, INPT, Castanet Tolosan, France

Forest edges are key components of rural landscapes and they influence major ecological processes important for biodiversity conservation. There is a variability of forest edges, according to their physiognomy, orientation, history and topography, but few methods are available to identify automatically these different types of edges and to map them at a large scale. We propose to identify edge segments based on morphological subdivision of forest boundaries. These segments can then be mapped and characterized by other spatial data to provide forest and land managers with a new image of the variability of edges in landscapes. We present the details of a procedure based on Arcgis tools, applied on the output from GUIDOS tools, to identify edge segments. We provide examples of edge segments descriptors obtained from a digital elevation model (slope of the edge, topographic position) and from a landcover map (type and diversity of land covers adjacent to forest boundaries). Our results showed the feasibility of the automatic mapping of edge variability over a large scale. It opens new perspectives for the analysis of landscape dynamics and their effects on biodiversity.

Oral Session **Management and sustainability 3**

MAPPING TREES PREFERRED BY FARMERS: PARTICIPATORY ASSESSMENT AND LAND SUITABILITY EVALUATION FOR IMPROVED AGROFORESTATION OF DEGRADED FORESTLANDS IN CLAVERIA, SOUTHERN PHILIPPINES

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In recent decades, the Philippine government has promoted the planting of fast-growing tree species in its agroforestation programs for degraded forestlands. These programs have not proven to be succesful because the introduced trees were not environmentally suitable and locally acceptable in the areas. Focusing on three deforested watersheds of Claveria, Mindanao, this paper assesses the suitability of government-recommended and locally-preferred tree species. Participatory surveys were conducted to identify locally-preferred tree species per elevation class (low, middle, high). Analysis of government-recommended species were limited to three fast-growing species (Gmelina arborea, Acacia mangium, Eucalyptus deglupta). A GIS-based land suitability analysis was conducted for all trees by matching growth requirements (elevation, rainfall, temperature, soil) to local conditions. Results show that government-recommended trees were suitable in less than 40% of the study area, while most of the locally-preferred species were suitable in more than 70%. The locally-preferred tree species also matched a wider elevation range. We found out that the choice of trees by farmers are based on their desire to improve their household food security and farm income. Overall, we conclude that incorporating trees that match the livelihood objectives of farmers at the local level can help improve the agroforestation of degraded forestlands.

Oral Session **Patterns and processes 2**

RELATING SPATIAL PATTERNS OF AGROFORESTRY SYSTEMS TO SOIL EROSION IN THREE DEFORESTED WATERSHEDS OF CLAVERIA, SOUTHERN PHILIPPINES

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The rapid encroachment of unsustainable cropping systems in tropical forests of Philippine upland areas has resulted to immense environmental degradation of watersheds. In recent years, agroforestry has become the preferred land-use management option to control soil erosion in watersheds while optimizing farm productivity. Adopting agroforestry contributes to variations in landscape pattern and soil erosion rates in the watershed. This paper investigates the relationship of soil erosion with various types of agroforestry land uses (ALUs) and landscape patterns in three deforested watersheds of Claveria, the Philippines. Land uses were identified from cadastral surveys and linked to a GIS database to compute for spatial pattern metrics. Soil erosion from the land uses was simulated using SCUAF version 5.0. A statistical model was used to relate soil erosion to the land uses and landscape patterns. Results indicate that soil erosion is closely associated with spatial configurations of ALUs. Soil erosion is higher when there is high interspersion of ALUs and when a large number of the parkland-ALU patches exists within a watershed. Soil erosion is likely low if ALU patches are unfragmented and located in steeper slopes. The results emphasize that succesful management of tropical watersheds must include the promotion of agroforestry systems.

Oral Session **Tools of landscape assessment and management 2**

NATURALNESS AND DIVERSITY OF BIOTOPS: THEIR IMPACT ON LANDSCAPE QUALITY - A MATHEMATICAL MODEL

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Comparative valuation of the quality of landscapes is a basic task in land use management and planning. To this end a novel mathematical model is proposed for straight forward calculation of the index of environmental value of landscapes. The model is founded on five building blocks: (i) A landscape is considered to be mosaic of biotic patches; (ii) each patch displays the characteristics of a single representative biotope out of a finite set of generic biotopes; (iii) the environmental value of a generic biotope depends on its degree of naturalness (flora, fauna) and diversity which are determined in field surveys; (iv) a landscape´s environmental value is a simple function of the environmental values of its constituent biotopes; (v) the influence of shape and corrugated surface of a patch on the environmental value of the associated landscape is reflected by an amplification factor. The mathematical tool introduced here grades landscapes from the point of view of their environmental value. It is easily applicable and accounts for the biotic properties (naturalness and biodiversity) as well as for the structure of the landscape; thus it lends itself e.g. to comparative and trade off analyses in land use management and planning in changing landscapes.

Oral Session **Biodiversity conservation and planning 3**

CRITERIA FOR LANDSCAPE INTEGRATION OF REFORESTATIONS IN THE MEDITERRANEAN REGION: IDENTIFICATION OF BEST PRACTICES IN THE COMMUNITY OF MADRID

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The European Landscape Convention was approved in 2000 by The European Council with the aim of protecting, managing and planning landscapes in Europe. In 2008, this Convention entered into force in Spain, so nowadays it is mandatory to develop specific or sectorial strategies. We propose a methodology to define criteria and identify best practices for landscape integration of reforestations in the Mediterranean region, based on landscape ecology. The methodology encompasses the following phases: i) Identification of the main relationships of landscape with biodiversity, connectivity and public preferences; ii) synthesis of principles and criteria for landscape integration of reforestations in the Mediterranean region; iii) Detailed landscape criteria definition, both qualitative and quantitative, for species selection, terrain preparation, planting, protection of the reforestation area and initial pruning and thinning treatments. We applied this methodology to reforestations in the Community of Madrid area. As a result we typified 30 best practices that may be of use for reforestation in the Mediterranean region.

Oral Session **Management and sustainability 1**

DOES FOREST CERTIFICATION CONTRIBUTE TO BOREAL BIODIVERSITY CONSERVATION IN SWEDEN AND NW RUSSIA?

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FSC is one of leading forest certification schemes which encourages sustainable forest management at different levels. Many studies have been done concerning the political and social outcomes of FSC. However, little is known about the contribution of certification for biodiversity conservation on-the-ground. Russia and Sweden have the largest areas FSC certified forest in Europe. However, countries have different forest histories, governance systems of forest resources which are likely to influence the potential of FSC for biodiversity conservation. The aim of this paper is to analyse FSC standard content and outcomes of FSC for boreal biodiversity conservation on-the-ground using concrete forests management units in Russia and Sweden. Key research questions are: how is biodiversity addressed in the FSC standards in Sweden and Russia? Does certification have a potential to ensure biodiversity conservation within the forest? We analyse and compare the biodiversity requirements at different spatial scales in national FSC standards in Sweden and Russia. Focusing on two state forest management units we evaluate the functionality of set-aside stands by applying morphological spatial pattern analyses and habitat suitability modelling. We discuss the potential of FSC for biodiversity conservation with different levels of ambition in managed boreal forests in Russia and Sweden.

Oral Session **Disturbances 1**

WOODY PLANT DIVERSITY IN MEDITERRANEAN LANDSCAPES: THE ROLE OF AGROSILVICULTURAL DISTURBANCES AND NON-STATIONARITY

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In a context of secularly imposed silvicultural treatments, Mediterranean forest flora may be adapted to certain levels of these disturbances. Biodiversity responses to forestry need therefore to be understood for management purposes, particularly at the landscape scale given the processes of rural abandonment occurring at this scale in the Mediterranean Europe. This study analyses the role of silvicultural and agrosilvopastoral (dehesas) practices in shaping woody plant diversity patterns at the landscape scale (5 x 5 km) in Central Spain. The approximate 21,000 plots from the third Spanish national forest inventory allowed us to cover a vast study area and to evaluate relationships without assuming spatial stationarity. In that purpose, we compared traditional regression models with those derived from geographically weighted regression techniques, modelling tree and shrub species richness and diversity against a set of environmental, biotic (according to literature) and management explanatory variables. Results indicate that disturbances induced by management, although traditionally not considered in most landscape models, play a significant role determining patterns of gamma diversity at intermediate scales in the Mediterranean. Furthermore, intermediate-disturbance selection cuttings benefited woody plant diversity (gamma) in most parts of the study area. Finally, the assessment of the spatial variation of the studied relationships alerts about the use of indirect factors, such as elevation, as a proxy for other causal variables.

Oral Session **Tools of landscape assessment and management 3**

APPLICATION OF MODERN, NON TRADITIONAL RESTORATION METHODS ON BROWN COAL LOCALITIES OF CZECH REPUBLIC

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Nowadays the importance of brown coal as a raw material is caused by growing needs of power in the Czech Republic. It namely concerns the only major domestic fossil raw material without which our country would become fully depended on the import of energy resources. Over 70% brown coal reserves have been exploited in the North-Bohemian Basin today. Opencast mining of brown coal naturally led to vast landscape damages. Therefore reclamation work has acquired great significance. Brown coal is mined in four general mining localities which in principle differ in geological terms and partially in the parameters of acquired coal. That requires a little different methodology of exploitation and reclamation. Mining and reclamation works proceed in two considerably different geological areas. In case of the first area the main issue is the occurrence of extremely acid phyto-toxical areas (high contents of coal – ca 5%), in the case of the second area the main issue is the occurrence of sterile areas (high content of physical clay). The research methodology of the areas of interests and the reclamation works themselves described in this article arises from North Bohemian Mines locality reclamation philosophy. It is based on the knowledge of overburden minerals properties and detailed survey of each reclaimed sites. Apart from the earlier published methodology of fertilizable soils application used today in operation experiments with filling areas left for natural succession and pilot application of power plant stabilizer and ash in phyto-toxic areas and air seeding of white mustard (*Sinapis alba* L.) have been launched lately. The results are stated in the paper.

Oral Session **Disturbances 2**

MODELLING FEEDBACKS BETWEEN AVALANCHES AND FORESTS UNDER A CHANGING ENVIRONMENT IN THE SWISS ALPS

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Feedbacks between avalanches, the main disturbance in the Swiss Alps, and forest regrowth, are important forces shaping alpine treelines. Under rapid and drastic environmental change, in this region mainly temperature change and land abandonment, these feedbacks can develop unexpected dynamics. Because of the different temporal and spatial scales of avalanche destruction and forest regrowth, simulation and management of avalanche protection forests have proven difficult. Merging forest and avalanche models provides a tool to analyze such feedbacks, and to envision management scenarios for protection forests under climate and land-use change. Within the Swiss mountain land use project MOUNTLAND, the forest landscape model TreeMig is combined with different forest–avalanche interaction subroutines. We developed a spatially explicit model for avalanche release zones inside forests, based on e.g. tree density, slope steepness, or forest type. Preliminary results reveal that (1) TreeMig is sensitive to the proposed changes in disturbance simulation, (2) a succession-based simplified vegetation model shows feedback effects with an avalanche subroutine, and (3) the intermediate disturbance hypothesis partly applies to avalanche influence on forests as simulated in the succession model. The newly merged model TreeMig-Av is presented and scenarios of forest–avalanche interaction under climate and land-use change are interpreted.

Oral Session **Disturbances 3**

A SPATIO-TEMPORAL METHODOLOGY FOR QUANTIFYING DISTURBANCE IN EAST AFRICAN RAINFORESTS

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The relationship between forest disturbance and biodiversity is central to understanding and managing biological processes in the context of forest-human interactions. However, the relationship remains poorly defined due partly to the complexity of disturbance that is often inadequately researched. Forest disturbance methods have typically lacked the spatially-explicit treatment essential to forest management and conservation which require a realistic spatial assessment and quantification of disturbance to effectively marshal resources. The methodology presented here employs GIS to integrate and analyse multiple spatial data sources including satellite imagery, aerial photography, maps, forestry records and data from interviews. A time series of forest cover forms the back-bone of the research, while their overlay and analysis in GIS enables the creation of spatially-explicit indices of forest cover change and disturbance. The methodology captures past disturbances such as the logging episodes of earlier decades that have left their indelible mark on forest species composition and structure. The analysis distinguishes between commercially and locally driven disturbances and compares them against the forest cover change index to assist policy makers in focusing their efforts to the respective causal factors. The result reflects the highly localised reality that constitutes the challenge facing forest managers.

Oral Session **Disturbances 2**

HOW IMPORTANT ARE RIPARIAN FORESTS TO AQUATIC FOODWEBS IN AGRICULTURAL WATERSHEDS OF NORTH-CENTRAL OHIO, USA?

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In agricultural landscapes the restoration of riparian forest patches along streams is a priority for watershed management plans. While riparian forests serve many important functions, one of the most important is providing energy subsidies to aquatic ecosystems. There are questions, however, as to the degree to which aquatic food webs are supported by inputs from small and often isolated forested riparian patches in agricultural landscapes. To examine these contributions, and their importance to aquatic food webs, we compared the plant communities and stream food webs of forested riparian patches with those of non-forested riparian patches in an agricultural landscape. Next, we used stable isotope analyses to determine whether the primary source of energy for different levels of aquatic food webs were derived from terrestrial or aquatic sources. Although we observed differences in riparian plant communities, and macroinvertebrate and fish assemblages, between the forested and non-forested patches, we found that energy subsides were primarily from aquatic sources for both patch types. This suggests that in agricultural watersheds, aquatic food webs may be decoupled from forested riparian patches and that other restoration activities (e.g., drainage control structures) will need to be modified to improve ecosystem function in these watersheds.

Oral Session **Patterns and processes 2**

THE INFLUENCE OF SPATIAL STRUCTURE ON NATURAL REGENERATION AND BIODIVERSITY IN MEDITERRANEAN PINE PLANTATIONS: A NESTED LANDSCAPE APPROACH

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Promoting plant diversity in plantations is a worldwide concern. This research aimed to evaluate the effect of the spatial configuration of pine plantations on regeneration and plant diversity in order to facilitate management decisions. Spatial characteristics of pine plantation patches at landscape scale (distances to other vegetation types) and at patch scale (patch geometry and internal structure) were related to abundance of *Quercus ilex* seedlings and the Shannon diversity index of plant species. Results showed that *Q. ilex* regeneration and plant diversity are affected by the spatial configuration. (1) Proximity to oak patches favoured abundance of *Q. ilex* seedlings and plant diversity. (2) Patch geometry affected plant diversity, with larger patches having less diversity. However there was not a clear relation between patch geometry and abundance of regeneration of Q. ilex. (3) Internal structure influenced both regeneration of *Q. ilex* and diversity. More heterogeneous areas were characterized by higher diversity and less abundant oak regeneration suggesting that some species show different response to microhabitat heterogeneity. From a management perspective, the process of conversion of pine plantations might be promoted by 1) considering the benefit of having the seed source uphill from the plantation, 2) increasing fragmentation of plantations and 3) managing internal structure to promote heterogeneity for plant diversity taking into account the different microhabitat requirements of species.

Oral Session **Patterns and processes 2**

LANDSCAPE CHANGES IN CASTRO LABOREIRO PARISH (NW PORTUGAL): FARMLAND ABANDONEMNT AND FOREST REGENERATION.

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In the last decades, European mountain regions have witnessed a demographic depression and the abandonment of traditional agricultural activities. In this paper we analyze the landscape changes in Castro Laboreiro parish (NW of Portugal) with special focus on changes undergone by agricultural areas and oak forests. We search for differences in the patterns of change in brandas and inverneiras, and we seek to identify the distance to the nearest seed dispersal source that constrains the conversion of abandoned areas into oak forests, as well as the rate of forest regeneration. Aerial photographs and orthophotos from 1960, 1990 and 2007 were analyzed in a GIS environment. Quantification of landscape structural changes was based on transition matrices together with landscape metrics, using FRAGSTATS. Our results show a decrease in landscape heterogeneity and an increase in shrubs and oak forest. We also found an opposite relation between the distance to the nearest seed dispersal source and oak forest colonization, as well as an early colonization of oak forest in inverneiras. In Castro Laboreiro, land abandonment is leading to the homogenization of the landscape mosaic but also promoting the expansion of the galaico-portuguese oak forest, a unique habitat of great value for nature conservation.

Oral Session **Patterns and processes 3**

CONNECTION OF ECOLOGICAL PROCESSES ACROSS SPATIAL SCALES: LINKING NITROGEN CONCENTRATION IN LICHENS WITH AMMONIA EMISSIONS AND DEPOSITION AT A REGIONAL SCALE

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Pollution by Nitrogen (N), mostly ammonia from agriculture activities, is increasingly recognized worldwide as a key driver for ecosystem change. However, there is a missing link between the predictions made by N emission and deposition estimates- calculated from models at broad spatial scales, and the actual N impact, that occurs at a much lower spatial scale. The use of biomonitors could provide that link, more specifically the N concentration in lichens [N]. The aim of this work is to develop a link between the [N] and the estimations of N-emissions and N-deposition from models. We have done so in a region of SW Portugal with different land-uses where we measured [N] and interpolated it for the entire region using geostatistics. This information was related to N-emissions estimated with two spatial resolutions: i.) parish-level information on cattle; and ii.) using land-cover information from satellite data, considering the area occupied by intensive and extensive agriculture; Additionally the [N] was related to nitrogen deposition measured using samplers. For both methods of estimating N-emission there was a significant correlation between [N] and emission estimates. Additionally, it was observed that there was no correlation with artificial areas, excluding NOx as N source for lichens. These results confirmed that [N] were reflecting the N-emissions mostly from agriculture activities. Secondly we aimed at relating [N] to deposition measures. This will allow us to use [N] as a tool to assess the areas under the impact of N greatly enhancing the performance of N-emission and deposition models by increasing their spatial resolution.

Oral Session **Management and sustainability 3**

MULTI-LEVEL GOVERNANCE AND SPATIAL PLANNING FOR SUSTAINABLE FOREST LANDSCAPES IN NORTHWEST RUSSIA: KOVDOZERSKY MODEL FOREST

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Regional clear-felling of naturally dynamic forests during the Soviet period has left many remote forest landscapes in the Russian Federation with very limited wood resources for decades to come. Ideas about rural development based on forest non-wood goods, ecosystem services and ecological and cultural landscape values are thus emerging. To understand stakeholders' needs for development based on use and non-use values in forest landscapes we interviewed all 31 stakeholders from private, public and civil sectors in the Kovdozersky Model Forest in southernmost Murmansk oblast. While about half of the stakeholders were confined to the Kovdozersky forest management unit (~500,000 ha), the spatial levels of stakeholder activities ranged from local villages to the entire catchment of Kovda River in the Russian Federation and Finland. However, the number of actors is increasing. To avoid future negative externalities and risks for conflicts by adaptation and mitigation there is a need to (1) communicate the state and trends about sustainability dimensions of forest landscapes, (2) encourage collaborative learning processes about natural resource management based on principles of adaptive governance and active adaptive management, and (3) plan at multiple spatial scales to satisfy and reconcile the needs and interests of different landscape stakeholders.

Oral Session **Management and sustainability 1**

IMPLEMENTING ECOLOGICAL FORESTRY CONCEPTS AT US FISH AND WILDLIFE NATIONAL WILDLIFE REFUGES IN THE NORTHERN LAKE STATES, USA

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The U.S. Fish and Wildlife Service's (FWS) National Wildlife Refuge System (NWRS) presently consists of 547 refuges and 95 million acres. Although traditionally focused on single-species management, recent FWS policy has encouraged managers to focus on broader landscape management and ecosystem restoration goals. One approach, termed "ecological forestry", stresses an understanding of the effects of natural disturbances on biological legacies, structural and compositional heterogeneity and complexity at multiple scales, and the recovery periods between disturbance events. We have been examining how these guiding principles can be integrated into NWRS forest ecosystem management. Specifically, we are partnering to develop management strategies to help: 1) restore the once extensive mixed-pine forest ecosystems and associated wildlife species of eastern Upper Michigan; 2) mitigate the effects of the beech-bark disease complex on American beech (*Fagus grandifolia* Ehrh); and 3) promote habitat for wildlife species of jack pine (*Pinus banksiana* Lamb.) forest ecosystems, including the federally endangered Kirtland's warbler (*Dendroica kirtlandii* Baird). These efforts are on-going and will continue to be monitored over time. However, our initial work suggests that the NWRS provides an excellent crucible to study the application of ecological forestry principles and develop novel ways to manage forest ecosystems and landscapes.

Oral Session **Management and sustainability 2**

POTENTIAL FUTURE EFFECTS OF FIRE AND VEGETATION DYNAMICS, CLIMATE CHANGE, AND MANAGEMENT ON ECOSYSTEM SERVICES – WILDLIFE HABITAT AND CARBON SEQUESTRATION IN FORESTS OF THE PACIFIC NORTHWEST, USA

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The interplay of fire, vegetation dynamics, and climate change has important implications for landscape patterns and dynamics of numerous resources and processes, such as maintenance of biodiversity and carbon sequestration. One example relates to efforts to conserve habitat and populations of the Northern Spotted Owl (NSO; Strix occidentalis caurina) in forests of the Pacific Northwestern US. With a group of research scientists, I am developing and evaluating several management scenarios intended to conserve NSO habitat and reduce fire risk at stand and landscape scales in dry forests of Oregon and Washington. This work provides innovative modeling procedures and results, maps showing areas most prone to large wildfires, examples of landscape vegetation and fuels management prescriptions to minimize likelihood of the largest fires, and maps and modeling predictions of habitat dynamics and probability of NSO persistence under different scenarios. In related research, I am using the spatial, mechanistic vegetation gap, fire, climate change model FireBGCv2 to assess potential shifts in fire regimes and vegetation communities. In this research I am evaluating tradeoffs to ecosystem services such as carbon sequestration and habitat dynamics for wildlife, including the NSO, and assessing potential ecosystem feedbacks and thresholds, under climate change and fire management.

Oral Session **Disturbances 2**

HOW CLIMATE AND FOREST MANAGEMENT CAN OPERATE THROUGH LANDSCAPE STRUCTURE TO AFFECT THE ERUPTIVE POTENTIAL OF A FOREST INSECT POPULATION

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The mountain pine beetle (MPB) is endemic to western North American pine forests and is currently responsible for an outbreak that covers an unprecedented 10 million hectares in western Canada. The potential for further expansion north and east has historically been limited by winter cold and mountainous terrain, but warmer winters have recently allowed MPB into formerly unsuitable habitats. MPB now threatens the jack pine, *Pinus banksiana*, forests of northern Alberta and Saskatchewan. Because jack pine is susceptible and extends through the rest of the boreal all the way to the east coast, MPB seems poised to invade the whole extent of Canada's boreal forest. This concern has motivated our study of how landscape structure affects outbreak development and spread. As part of this study, we describe a model of MPB-stand dynamics. Based on recent field work, the model includes a threshold at low density which the local beetle population must overcome to become eruptive. We show how, from the MPB perspective, landscape structure responds to climate and forest management and has strong, indirect affects on the likelihood of eruption. We discuss the recent under-estimation of MPB spread in Alberta by much more complex models.

Oral Session **Disturbances 1**

ASSESSING FOREST FIRE RISK IN PORTUGAL - A GEOSTATISTICAL APPROACH

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Forest fire is a relevant disturbance that affects Portuguese landscape, many times threatening ecosystems with special conservation interest. The long term average of area burned across landscape is determined by a complex set of variables including the weather, the extent of forests, the topography, fragmentation of the landscape, fuel characteristics, season, latitude, fire suppression policies and priorities, fire control, fire site accessibility, ignitions and simultaneous fires. In this study we propose to build a model for accessing Portuguese fire risk based on four risk factors: weather, topography and land use. The model is based on historical fire data in a stochastic framework in order to predict forest fires risk maps. The Daily Severity Rating (DSR) is used as a meteorological risk of forest fire, from the Canadian Forest Fire Weather Index System (CFFWIS), is calculated from daily meteorological data. Here, fire risk is defined as the conditional probability, P(fire| DSR, slope, land cover class) at a certain location. This conditional probability can be derived from P(fire| DSR), P(fire| slope) and P(fire|land cover class) using the Tau model for combining the different sources of information. The impacts on forest fire risk of the land cover changes over the Portuguese territory will be evaluated based on the analyse of fire risk maps calculated for 2000 and 2005.

Oral Session **Biodiversity conservation and planning 4**

A METHODOLOGICAL PROPOSAL FOR RESTORATION OF FORESTS IN SOUHTERN BRAZIL

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In order to comply with the Brazilian Forest Code, landowners except in the Amazon must set aside at least 20% of their land area as Legal Reserves. The Paraná Biodiversity Project, with support from the State Government and the World Bank, developed a Legal Reserve restoration model that is both ecologically and economically viable. By mixing native and exotic (Eucalyptus) species, timber production is possible in 20 years. Adding to wood production, other benefits such as carbon offset, soil and water protection, increased biodiversity, and species conservation are ensured through a land use strategy that simultaneously leads to increased size of forest fragments and landscape connectivity. To enhance chances for adoption of such strategy on the highlands in Southern Brazil, we propose to use the native conifer (Araucaria) instead of Eucalyptus in the system. A 30-year evaluation of regeneration under cultivated Araucaria canopy showed 61 species from 30 families (H'= 3.15) and 48 species from 23 families (H'= 2.54) under 550 and 1,680 tree/ha stands, respectively. Commercial timber volume was also higher under the former density. The presence of endangered species in both situations suggests the ecological importance of the low density stand as a suitable alternative for this purpose.

Oral Session **Monitoring 1**

THE PROCESS OF URBANIZATION AND THE ENVIRONMENT - the case of irregular land occupation in the city of Ponta Grossa - PR - Brazil

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This study, based on bibliographical research, examines the urbanization process as a social phenomenon which is historical build. Also, it analyses the habitation problem from irregular housing in Ponta Grossa – Paraná – South of Brazil. In addition, the study takes into account the dynamic of this process and it finds out that environmental degradation comes from the way the space is used by people. The article argues that this situation is a central issue to the public politics. From this, the text presents a discussion concerning the importance of interdisciplinary actions from different areas to find qualitative and social planned alternatives to the families who use to live in these spaces. Finally, it points out the importance of environmental projects which take into consideration the sustainability process and social inclusion.

Oral Session **Management and sustainability 2**

ANTHROPOGENIC AND CLIMATE CHANGE IMPACTS ON THE WESTERN GHATS MOUNTAIN FORESTS OF INDIA

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Depletion of natural forests has large impact on biodiversity, water resources and economy of India. Rapid rise in human and livestock population, poverty in forest-dependent communities and promotion of tourism lead to encroachment into the Western Ghats Mountain forests on which thousands of the poor and landless depend for livelihood. The forests including tropical rainforest are rich in biodiversity with rare species of wildlife, medicinal herbs and precious trees. Introduction of plantation agriculture, water and power development programmes and poaching destroyed extensive forest areas. Changes in rainfall intensity and changing size of raindrops cause erosion of the degraded land, resulting in sedimentation in reservoirs and rivers. Floods and landslides become common. High temperature and long dry season cause forest fires. Though India has invested heavily on afforestation and forest protection and has developed a strong forest policy, they could not fulfil the objectives because of various social, political, and administrative reasons. Present study assesses the anthropogenic and climate change impacts in the Western Ghats Mountain forest and analyses the current national policies, strategies and programmes related to forests. Suggestions for an appropriate forest policy, environment policy and climate change adaptation strategy and for their effective implementation have been provided.

Oral Session **Disturbances 2**

IMMEDIATE EFFECTS OF TYPHOON DISTURBANCE AND ARTIFICAL THINNING ON UNDERSTORY LIGHT ENVIRONMENTS IN TWO SUBTROPICAL FORESTS IN TAIWAN

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We compared changes in understory light environments immediately following three typhoons, which are the most important natural disturbance to low-elevation ecosystems in Taiwan, and artificial thinning (25% and 50% of stems removed) in two subtropical forests. Our goal was to determine whether typhoon disturbance and artificial thinning result in similar understory light environments. Both typhoon disturbance and artificial thinning enhanced understory light availability, but the enhancement following thinning, 45%, was considerably greater than that following typhoon disturbance, < 25%. Overall understory light availability increased 45% and 120% after 25% and 50% thinning, respectively. The diffuse nature of canopy disruption following typhoon disturbance relative to the patchy and binary canopy removal associated with artificial thinning was likely the reason for their very different impacts on understory light environments. It appears that artificial thinning with more than 25% of stems removed increases understory light availability to levels that do not naturally occur in low-elevation forests. Because light plays an important role in seedling growth and therefore forest regeneration, forest development following artificial thinning is likely to be different from that following typhoon disturbance. Such differences should be taken into consideration in the management of low-elevation forests in subtropical regions like Taiwan.

Oral Session **Tools of landscape assessment and management 2**

THE THIRD DIMENSION IN LANDSCAPE METRICS ANALYSIS APPLIED TO CENTRAL ALENTEJO - PORTUGAL

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Landscape metrics have been widely developed over the last two decades, although the question remains: How does landscape metrics relates with ecological processes? One of the major recent developments in landscape metrics analysis was the third dimension integration. Topography has an extremely important role on ecosystems function and structure, even though the common analysis in landscape ecology only conceives planimetric surface wich leads to some erroneous results, particularly in mountain areas. In this study we tested some landscape metrics behavior according to topography variation applied to concrete areas in Central Alentejo. It is presented the significance analysis of the results achieved in planimetric and 3D environment.

Oral Session **Management and sustainability 3**

IMPLICATIONS OF BIOMASS ENERGY HARVESTING FOR FORESTED LANDSCAPES IN THE NORTHEASTERN UNITED STATES

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Intensifying interest in woody biomass energy production in industrialized nations will impact forested landscapes in those countries. These effects will range from site-level impacts on soil nutrients, water quality, and species composition to landscape-level impacts manifested in changes in forest type and seral stage distributions as well as in land use changes. In the densely populated, yet densely forested northeastern United States, existing and planned expansions of woody biomass energy production has potential to alter the forested landscape in positive and negative ways. This research presents a conceptual model that links the region's biomass market with a land area model to simulate shifts in land use from forest to non-forest and alterations in forest species composition and successional stage that will be useful for projecting future landscape conditions. Evolving forest conditions will influence biodiversity, vulnerability to invasive species and climate change, and economic productivity. The potential for biomass-based economic activity to maintain forest land use in an urbanizing environment will be an important consideration. The model will have the capacity to evaluate policy remedies that reinforce positive changes or mitigate negative impacts. The results of a preliminary case study are presented.

Oral Session **Disturbances 1**

COULD CHANGES IN FIRE REGIME ALTER THE LANDSCAPE PERSISTENCE OF CORK OAK-SHRUBLAND MOSAICS? A SIMULATION APPROACH IN SOUTHERN FRANCE

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The recurrence of wildfires, their size and their patterning are hypothesized to affect the composition and the persistence of vegetation communities in landscapes. In southeastern France, the Maures massif is a mosaic of cork oak woodlands protected by the European Union (Habitat directive 92/43/EEC), shrublands, and mature oak woodlands. Cork oak (*Quercus suber*) is renowned as especially fire-resistant and fire-resilient. However, the cork oak ecosystems experience increasing tree mortality and regeneration failure, likely due to recurrent wildfires and severe summer droughts. An issue for the sustainable management of the massif is to determine to which extent this mosaic could remain stable in a context of changes of disturbances. We tested the impact of changes in disturbance regime by fires on the persistence of the cork oak populations. For this purpose we simulated different fire regimes (i.e. fire recurrence and size) using the LASS-Fateland model (Pausas 2006). We compared the abundance and the patterns of cork oak in two types of mosaics, i.e. large cork oak patches versus small patches. The results highlight the importance of the landscape structure in determining species dynamics and their long-term persistence in a context of changes of disturbance regime. They have implications for landscape management of cork oak populations to limit the potential impact of increasing wildfires.

Oral Session **Biodiversity conservation and planning 4**

TOWARDS A WESTERN BAROQUE: BIODIVERSITY IN A HETEROGENEOUS LANDSCAPE

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Increasingly landscape ecologists are crossing perceived disciplinary divides in initiating discourses on Sense of Place. Landscape design is implicit in this discussion. Particularly within urban landscapes, sense of place is left in the hands of the artist, planner, or marketing officer, rarely the landscape ecologist. Consequently designed landscapes become thin veneers of existing systems-rich, floristically-diverse landscapes. This paper, written by a landscape architect, uses the example of Perth, Western Australia, a rapidly expanding city located in an internationally recognized biodiversity hotspot, to argue for a greater link between ecologist and designer in the creation of truly diverse and rich landscapes. The city's fringes are smoothed over and bull dozed with little regard. As are all landscapes, the landscape of Perth is the sum of its parts; the inimitable details of Perth's parts are widely misunderstood. While the scientists may know the specific and the inhabitants crave the picturesque, very few understand the place at a landscape scale. This paper argues for a quality of placefulness by presenting a series of speculative design propositions that marry landscape ecology principles with design vision.

Oral Session **Management and sustainability 3**

WHERE AND WHY THE CZECH OLD-GROWTH FORESTS SURVIVED IN THE CULTURAL LANDSCAPE

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For the use in the national environmental policy and nature conservation the naturalness assessment of all the Czech forests was performed using 29 parameters (historical influence of man, tree species composition, amount of deadwood etc.). From the total forested area of 2,568 000 ha about 30 000 ha of old-growth forests were identified on 490 localities in the range of 10-1200 ha per locality. The old-growth forests were classified into three degrees of naturalness – original, natural and near-natural. All localities were assessed by GIS cluster analysis (parameters: more than 3 localities and more than 300 ha in the circle with diameter of 20 km). In this manner 8 clusters were identified and compared with the map of historical landscape settlement and the map of landscape terrain. It appears that 67% of old-growth forests area have survived only in 4 (out of 19 total) landscape types. The most 'protective' landscape types are as follows: i) long-chiselled mountain slopes and high mountain plateau (50%), which were settled last, but protected first and ii) karsts and steep river valleys in lower locations (17%), which were not technologically available during the older settlement (neolithic and middle-age settlement) and weakly productive sites for later exploitation.

Oral Session **Tools of landscape assessment and management 2**

FOREST QUALITY IN THE VICINITY OF MEXICO CITY: ASSESSMENT TOWARDS SUSTAINABLE FOREST MANAGEMENT

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Numerous attempts have been made to define criteria and indicators (C&I) for the assessment of sustainable forest management (SFM) at various scales (e.g. global, regional, national, forest management unit). In 1998, the WWF and the IUCN developed the forest quality C&I initiative for assessing SFM at the level of landscapes. The initiative relies on the forest quality principle and encompasses criteria from three categories: (1) forest authenticity, (2) environmental benefits, and (3) other social and economic benefits. The aim of this study was to assess forest quality of high elevation, temperate protected forests in the vicinity of Mexico City. We integrated field and laboratory verifiers of forest composition, pattern, function, process, tree health, area and fragmentation, and management, as well as ecosystem services indicators. C&I, together with their verifiers, were weighted by a group of experts through a pairwise multicriteria analysis. Overall, experts agreed in that forest composition and process verifiers are the most important indicators for the assessment of forest quality. This information was synthesized and analyzed through Canonical Correspondence Analysis and a spatial multicriteria evaluation. Fir (*Abies religiosa*) forest has the highest values for the forest quality indicators, whereas the *Pinus hartwegii* forest, typical of very high elevations, had lower values in general. A forest quality map was produced by means of spatial interpolation and by integrating information for all indicators; this tool is expected to provide a solid yet flexible framework for decision making and monitoring of the sustainable forest management in the area and other places around the world.

Oral Session **Patterns and processes 1**

LANDSCAPE CHANGE INTO THE FUTURE: PROJECTIONS OF FOREST STRUCTURE AND COMPOSITION IN THE NORTHERN UNITED STATES OVER THE NEXT 60 YEARS

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The Northern Forest Futures Project (NFFP) is a window on tomorrow's forests, revealing how today's trends and choices can change the future landscape of the Northeast and Midwest regions of the United States. This effort starts with existing assessments and inventories and a scoping of trends and public issues, builds alternative futures based on those trends and the latest ecological and social science, analyzes what those futures mean for people and forests, and delivers an educational outreach that allows individuals, organizations, and resource managers to directly assess what difference possible lifestyle, policy and management choices make to the well-being of their communities and forests. Ultimately, the NFFP informs decision making regarding the protection and sustainable management of public and private forests in the northern United States. Why a Northern Forest Futures Project? Forests and forest ecosystems provide a critical array of public benefits from clean air and water to commercial products to open space. The forests and their ability to provide benefits are continually changing and will continue to change as they respond to natural forces and human decisions. The complexity and rate of change in the region demands a rigorous evaluation of existing and emerging natural forces and the impacts of those forces and our response to them on future forest sustainability. Who is Involved? The Northern Forest Futures Project is a cooperative effort of the US Forest Service, the Northeastern Area Association of State Foresters, and the academic community. This broad array of partners strengthens the prospects for success of this ambitious project.

Oral Session **Monitoring 1**

USING NATIONAL FOREST INVENTORIES TO EVALUATE THREAT PROBABILITIES: RISK-MAPPING NON-NATIVE INVASIVE PLANT PRESENCE IN NORTHERN US FORESTS

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Non-native invasive plants (NNIP) are rapidly spreading into natural ecosystems (e.g., forests, grasslands) with the perpetual change of land use patterns in modern age. Potential threats of invasion of NNIPs into natural ecosystems include biodiversity loss, structural and environmental change, habitat degradation, and economic losses. The U.S. Forest Service - Northern Research Station Forest Inventory and Analysis Program collects data on forest structure and composition and selected measures of ecosystem health from the Plains States to the North Atlantic coast of the United States. Health indicators collected include the presence and cover of selected non-native invasive plants (NNIP). The program initially (2005-2006) collected data on 25 difference species on 100% of the plots in 11 Midwestern states. Later (2007 and afterwards), the inventory was expanded to 43 species and 24 states, but reduced to approximately 20% of the plots inventoried in a given year. These data, combined with the forest inventory data, provide a unique opportunity to examine the presence and extent of NNIP and relate them to forest characteristics that may encourage or inhibit their presence. Using the 2005-2006 Forest inventory and analysis (FIA) database (over 8000 plots randomly distributed across forested lands) and other data like forest cover and transportation coverage/layers, the authors analyzed the invasibility patterns of NNIPs of interest by using a combination of nonparametric techniques, including classification and regression tree, kernel density smoothing, and bootstrap. Invasion of NNIPs across a landscape (region) is a non-stationary process involving both natural and anthropogenic factors

and disturbances which interact at various spatial and temporal scales At the regional level, the NNIP probability and cover/abundance map showed NNIPs are spreading from the middle (less forested areas) to the north and south (highly forested areas) in the region. The probability of NNIPs in highly forested areas (forest cover > 53 %) averages 0.12 in contrast to the higher presence probability of 0.54 in less forested areas. At the landscape scale, forest cover percent and road density (distance to roads), as surrogates of natural and anthropogenic disturbances, are the most significant drivers of NNIP occurrence/abundance. In highly forested areas (northern and southern parts of this region), site-scale factors forest type, site condition, stand density and biodiversity are significantly correlated with NNIP occurrence. Disturbance-mediated forest types, e.g., oak-hickory (*Quercus-Carya*) and mixed-hardwood forests, are more widely invaded by NNIP than later-successional forest types.

Oral Session **Management and sustainability 2**

ADAPTATION OF FOREST ECOSYSTEMS TO AIR POLLUTION AND CLIMATE CHANGE: A GLOBAL UPDATE

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Mitigation effects of forest ecosystems to anthropogenic stressors are becoming more significant as human pressure around the world increases. Adaptation of ecosystems to changing environmental conditions is a significant part of the issue. Monitoring, modelling, assessment of multiple stressors, ecophysiology, and nutrient cycles are thoroughly studied fields. Recently, social and economic issues together with water relations are gaining attention. We summarise the main research needs emerging at the recent 24th IUFRO Conference for Specialists in Air Pollution and Climate Change Impacts on Forest Ecosystems. They include a need for information on nutritional status of forest stands for sustainable forest management. It is suggested to maintain long-term monitoring programs and to account for the effects of extreme years, and past and present management practices. Long-term monitoring can also help to understand the effects of forestry treatments on the nutrient and water budgets of the ecosystems which may enable to improve management practices like water saving silviculture. It is important to reveal the difference of forest management on water quality, quantity, and regime and also the effects of air pollution and climate change on it. Variation in water availability due to changing climatic conditions is a major point of concern.

Oral Session **Patterns and processes 3**

ECOSYSTEM PRODUCTIVITY OF THE CONTINENTAL US FORESTS: DATA-BASED ESTIMATION

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In this study, we developed spatially-explicit estimates of net ecosystem productivity (NEP) at 250m resolution for the continental US forests based on the forest inventory analysis data (FIA), empirical equations, forest type classifications, and forest age map. The study produced an important ground-based NEP data layer that can be used for validating estimation by large-scale carbon models, and for interpolating NEP estimates from flux-tower measurements at sites that are sparsely located across the US. Our initial results indicate that the forests of the continental US are far from reaching productivity equilibrium and that most of them are robust carbon sinks with remarkable carbon accumulation rates. Regionally, forests and NEP are affected by different dominant factors. For instance, forests in the southeast US are young with high NEP, reflecting fast plantation rotations and intensive industrial forestry management. Forests in the northeast US are still recovering from agricultural abandonments and forest harvests in the early 20th century and have relatively lower NEP because most forests are entering more mature growth stages. Still, the northeastern forests can accumulate annually about 30-38 Tg C in the landscape, with average productivity (NEP) of 92 gC/yr, which is almost equal to the average of global temperate forests. However, because our estimates are based on periodic remeasurement of sample plots, our results represent the average NEP over the landscape of different regions, which is related to forest type and stand age. Therefore, the estimated values cannot fully reflect the effects of interannual variations of climate, disturbances and other changes in environmental conditions. However, we may still conclude that if there were no catastrophic disturbances and other severe environmental impacts in the near future, the continental US forests would likely serve as an effective carbon sink for next three to four decades.

Oral Session **Tools of landscape assessment and management 1**

DEVELOPMENT OF A STREAM CORRIDOR SURVEY METHODOLOGY TO LINK WITH WATERSHED VULNERABILITY IN ISTANBUL

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More than 15 reservoirs are producing water to large Istanbul city with a population of more than 12 million. Watersheds of most reservoirs are under pressure of urbanization and sprawl. In 3 watersheds of the city (Alibeyköy, Sazlıdere, and Kağıthane) we initiated a large scale study towards 3 main objectives; (1)Build up a methodology to link watershed characteristics and land use with stream corridors, (2)Evaluate the integration, health, functionality, and sustainability of riparian ecosystems, a component of stream corridors, (3)Develop a methodology that will reflect watershed characteristics together with human impacts. To reach these objectives we combined a thorough field survey study with a GIS assessment. According to results we found strong correlations between many variables. For example; positive correlation between forests covers percentages and stream corridor integrity scores, and strong negative correlations between, herbaceous vegetation diversity and settlement intensity, human impact scores of the watersheds and riparian functionality score, consumptive water quality score and road intensity, ecologic water quality score and settlement intensity, macroinvertebrate number and road intensity. Based on these linear relationships we established models to predict many watershed properties including human impacts based on stream survey parameters we used.

Poster sessions

(by alphabetic order of the first author)

Poster Session **Management and sustainability PM 1**

RESTORATION OF LANDSCAPE WITH NATIVE TREE SEEDLINGS AND THEIR RESPONSE TO VARIABLE LIGHT CLIMATE: A CASE STUDY OF ENRICHMENT PLANTING IN ETHIOPIAN HIGHLANDS

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Deforestation rates in the tropics and subtropics continued at alarming rates, leading to an increase of secondary forests. Human activities, timber extraction, slash and burn agriculture and fuel wood extraction are the well known important deforestation factors. Similarly, Ethiopia is losing a significant cover of its natural forest every day, yet surprisingly little field-based information exists on the ecological requirements and silvicultural strategies for the majority of species, which could be translated into plans for conservation, enhancement, restoration of biological diversity and increase productivity. Systems of canopy manipulation to suit seedling establishment of species, particularly those depleting locally, keeping in view the shade tolerance/intolerance syndrome for seedling growth, on the basis of specifically designed field experiments is vital. A project was undertaken to design sustainable forest management strategy for the utilization of Munessa forest. Under the project, growth and photosynthetic performance of four native tree species seedlings under variable light environment in a gap and forest understory of dry afromontane forest was evaluated. The study indicated that survivorship was significantly different among species. Survivorship was also different between seasons. Lower survival was recorded in the dry season. *J. procera* had the highest overall survival which was significantly higher than all the other species. Seedling height and diameter growth decreased with decreasing irradiance, with the best growth performance observed in forest gap center. Water Use Efficiency (WUE) differs among species, highest being *P. falcatus* and followed by *P. africana*, *J. procera* and *C. africana*. *C. africana* had the highest photosynthetic rate of 2.97 µmol m-2 s-1. Whereas, *P. falcatus* exhibited a lower photosynthesis (1.04 µmol m-2 s-1) also lower transpiration rate (0.20 m-2 s-1) resulting higher water use efficiency (5.76).

Poster Session **Biodiversity conservation and planning PB 1**

WHICH ARRANGEMENT OF LANDSCAPE FOR WILD RABBIT?

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The rural landscape is in continuing transformation and processes such as agriculture and shepherding abandonment, together with the fire, give arise to fitoestructural changes. In the National Park of Peneda-Gerês the changes resulted in an ensemble of patch of vegetation with differentials succession states until the recovery forest oak (*Quercus pyrenaica*). Despite the capacity of wild rabbit (*Oryctolagus cuniculus*) to colonize a great diversity of habitats, preferences for types of vegetation cover are showed by this species. In this sense, the shrubby communities play an important role in the satisfaction of biological demands. At present, the most appropriate floristic structure combination for wild rabbit in this agroecosystem is being explored. The rabbit distribution was assessed by faecal pellets signs, into a grid of 25-ha cells defined as squares of 500x500 m. Vegetation cover was categorised into six different types and the structural analysis of the vegetation was carrying out by a transept methodology. The number of vegetation patches, and their respective areas and perimeters per vegetation types were estimated. Fire events, water reservoir and urban nucleus were also considered. The habitat suitability for several biological needs (food, tranquillity, shelter) was evaluated in each cell using the HSI, habitat model described by Carmo (1986) with some modifications. All model components are considered as independent variables. The wild rabbit presence was confirmed in 74% of study area. The variables that discriminated cells with wild rabbit presence/absence were the shrubs (cover type that provide

better shelter) and leguminous shrub as food. The structural organization of vegetation is pointing out as the most relevant limitations to allow the presence of wild rabbit. The results are exposed based on the evolution of the structure intra and inter-community, to explore the capacity of the vegetation for maintaining this species.

Poster Session **Disturbances PD 1**

HUMAN-CAUSED FOREST FIRE IN MEDITERRANEAN ECOSYSTEMS OF CHILE: MODELLING LANDSCAPE SPATIAL PATTERNS ON FOREST FIRE OCCURRENCE

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Fire disturbance is recognized as an important problem because it can devastate natural resources, human property and threaten human lives. Moreover, forest fires result in enormous economic losses because they consume timber, degrade real estate, generate high cost of suppression, affect environmental, recreational and amenity values. In Chile, forest fire occurrence has increased strongly in the last years; the mean frequency is now about five thousand forest fires declared per year. These fires have affected a mean area of about fifty thousand hectares per year.In this study we developed empirical models to investigate the relationship between landscape heterogeneity and forest fire occurrence in Mediterranean ecosystems of Chile. The study area extends over 892 km2 and is located in Eastern Central Chile. Based on the availability of geo-referenced forest fires and remote sensing data, a 5-year period of fire occurrence from 2004 to 2008 was selected for this study. Our data of spatial heterogeneity were obtained at multiple spatial scales, including climatic, topographic and human-related variables, land-cover and spectrally derived variables from satellite imagery. The main explanatory variables included in the best regression logistic model were temperature, precipitation and distance towns. The model is statistically significant and relies on few explanatory variables, reducing the likelihood of artifact. This model correctly classified about 73% of the validation data set. The results showed that the probability of forest fires occurrence is related to higher temperature and precipitation and lower distance to towns. Our predictions suggest that 46% of the study area has high probability of forest fires occurrence, which are concentrated mainly in the eastern locations of the study area.

Poster Session **Monitoring landscape change PMo 1**

USING HEMEROBY CLASSIFICATION FOR ASSESSING THE DYNAMICS OF HUMAN IMPACT IN FOREST LANDSCAPES OF NORTH ROMANIAN CARPATHIANS

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The landscape is experiencing a continuous change and its evolution related to human activities. It is very important to monitor these changes in order to prevent landscape degradation and to find solutions to perform ecological rehabilitation. One measure of human impact on the landscape is the hemeroby index, defined as the percent of neophytes from total amount of plant species (Steinhardt, 1999). In landscape structure assessment a more general approach to this index was developed, based on land use types, landscape geometry, land cover types. The typology of landscapes according to the degree of naturalness, namely: ahemerobe, oligohemerobe, mesohemerobe, α – euhemerobe, β – euhemerobe, polyhemerobe, metahemerobe. The study area used for the test was represented by the mountainous part of Suceava County. The land cover/land use types were derived from aerial photographs taken in 1956, 1971, 1979, and we tried to determine a dynamic of the hemeroby degree in these areas on a period of 50 years. The results were

represented by dynamics charts of land area distribution on hemeroby classes and show an increased human activity in the area, with high impact especially on forest vegetation areas.

Poster Session **Monitoring landscape change PMo 2**

SOIL PROPIERTES AND FOREST QUALITY IN LENGA FOREST OF TIERRA DEL FUEGO, ARGENTINA: DOES A RELATION EXIST?

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Nothofagus pumilio (lenga) forest is the most important timber species in the southern part of Patagonia. The volume and timber production change according the site quality, which is mainly determined by the height of the dominants trees. The objective of this work is to evaluate soil chemical properties in sites of forest with different timber quality. We selected three stands of lenga forest according to the site index (1=high to 5=low) in Tierra del Fuego, Argentina. We measured soil chemical properties in the first 10cm of the organic soil of a high (1.5), intermediate (2.5), and low timber quality site (3.5) (21, 18, and 15m mean timber height, respectively) with similar topography characteristics. We found a higher total Nitrogen, organic matter, and %C in soils of forest with high timber quality in comparison to sites of intermediate and low quality. However Phosphorus was higher in the site with low quality respect the stands of intermediate and high quality, maybe associated to the high mobilization of phosphorus at low pH, as we found in the low quality site. According to this pattern high quality timber stands grow in soils with high fertility, and low quality stands in poor-nutrient soil conditions.

Poster Session **Monitoring landscape change PMo 3**

FOREST FRAGMENTATION IN THE SOUTHERN BRAZILIAN AMAZON. CASE STUDY: MUNICIPALITY OF QUERENCIA, MATO GROSSO - BRAZIL

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Southern Brazilian Amazon, especially of the State of Mato Grosso, is the region where most of deforestation occurs after several large, government sponsored agricultural resettlement programs subsidized by generous fiscal incentives. Once of the municipalities that stands out in this region is Querencia, wihich in the last 20 years deforested more than 400.000 hectares, because the implementation of agricultural systems, mostly soya bean. In this study we investigated landscape fragmentation in the Municipality of Querência, during 1989 and 2006. The municipality of Querencia is located at coordinates 12º 35' 53" South and 52º 12' 51" West, with average elevation of 300 meters. We used Landsat TM imagery from july 1986, August 1994, july 1997, September 2000, and july 2003 and CBERS-II imagery from August 2006 to map the evolution of desforestation. Landscape changes were examined by calculating landscape and class metrics using the software Fragstats 3.3 related to size, density, and connectivity. The major land cover changes are observed at the landscape level. The fragmentation increased in the landscape leading to the reduction of connectivity. The conversion of natural vegetation into agricultural and pasture lands are responsible for the landscape fragmentation.

Poster Session **Urban Forestry PU 1**

URBAN TREE INVENTORY AND SOCIO-ECONOMIC ASPECTS OF THREE VILLAGES OF PONTA GROSSA, PARANÁ/BRAZIL

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The objective of this study is to analyze the urban tree in the villages Esmeralda, Jardim Carvalho and Vilela, Bairro Jardim Carvalho in Ponta Grossa, identifying the percentage of native and exotic species and also relate to afforestation with the socio-economic aspects of the local area. It also seeks to provide subsidies to the municipal government for the development and implementation of an afforestation plan. Measurements were taken of the sidewalks, as well as analysis of possible conflicts with the space that is, which should provide favorable conditions for their development. Were covered 59 routes enabling the identification of 479 individual trees, of which 28% are native species and 72% exotic, and the species Lagerstroemia indica L. (extremosa) the species that stood out with 18%. This result demonstrates the trend in urban areas the prevalence of exotic species and the weak participation of the green element in the urban landscape, since the average by 8.11 was individual trees. Were identified conflicts with urban facilities highlighting the need for a correct and efficient management, and also potential routes for future crops without risk of urban conflicts.

Poster Session **Tools of landscape assessment and management PT 1**

LANDSCAPE RUNOFF, PRECIPITATION VARIATION AND RESERVOIR LIMNOLOGY

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Landscape runoff potential impact on reservoir limnology was indirectly assessed by the analyses of the effect of precipitation variation on several water quality parameters, on *Anabaena* (Cyanophyta) and crustacean zooplankton abundances. The obtained results showed that total phosphorus increased with strong precipitation events whereas water transparency presented an opposite trend. Wet periods followed by long dry periods favored Anabaena dominance, which induced an accentuated decreasing of all crustacean zooplankton species abundance. Therefore, in a climate changing scenario these data are crucial to monitor and predict the effect of landscape changes on aquatic ecosystem integrity and ultimately in water quality.

Poster Session **Tools of landscape assessment and management PT 2**

RESERVOIRS: MIRRORS OF THE SURROUNDING LANDSCAPE?

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In order to assess in what extent the environmental quality of aquatic systems reflect the landscape features several water quality parameters were determined in two reservoirs located at the R. Douro catchment during three successive years. Concomitantly, the surrounding landscape was characterized and the existing potential sources of phosphorous and nitrogen runoff were identified and when possible estimated. Located in a mountainous area with negligible direct human influence, it was expected to find lower amounts of suspended

organic matter and nutrients in Serra Serrada Reservoir. Water level fluctuations caused by intensive human water use, grazing and frequent land fires in the surrounding landscape can explain the unexpected high values of the mentioned parameters. In Azibo Reservoir the factors with greatest influence on water parameters seem to be allochthonous sources of nutrients originated from agriculture and grazing in the catchment area and recreational activities. However, in this particular case the potential sources of nutrients could have been minimized by the patchy structure of the surrounding landscape, which is composed by numerous buffer areas such as woodlands, meadows and riparian vegetation. Further long term research is being conducted in Azibo in order to modeling how this reservoir mirrors the surrounding landscape changes.

Poster Session **Tools of landscape assessment and management PT 3**

CONNECTING LANDSCAPE CONSERVATION AND MANAGEMENT WITH TRADITIONAL ECOLOGICAL KNOWLEDGE: DOES IT MATTER HOW PEOPLE PERCEIVE LANDSCAPE AND NATURE?

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Ethnobotanical surveys conducted in Trás-os-Montes highlighted a renewed interest in cultural and heritage values of landscapes. Landscape diversity is mostly based on traditional ecological knowledge (TEK) and practices that, since a long time ago, interacted with natural processes. Rural contexts face social and economical constraints and landscapes are change accordingly. This poster aims to describe recent landscape changes at a local scale and people' perceptions. Moreover, to discuss local conceptions as important tools for landscape conservation and management. Landscape changes have emerged from consented semi structured interviews, as well as participant observation, carried out during all seasons of the year. Examples are the use of perennial rather than seasonal crops, imposed strict production conditions disabling some traditional activities, and the introduction of many herbaceous and woody ornamental plants. The analysis of the data shows that different farming practices, abandonment of farming activities, mobility and residential housing are the driving forces in landscape changing. Young and some middle aged people value some of these changes, which they consider less hard-working and a symbol of modernity. Others regret actual landscape transformations because they are regarded as a waste of resources, abandonment, and landscape is perceived as unproductive, which is considered reprehensible. Nevertheless, most of the informants are aware of a dynamic process that is taking place and conscious that landscape, like themselves, must adapt to changing times.

Poster Session **Biodiversity conservation and planning PB 2**

THE LOMBADA NATIONAL GAME ZONE: FOREST MANAGEMENT PLANS FOR THE BALDIOS (COMMONS) AREAS

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Landscape conservation is directly linked to forest management. Fourteen forest management plans were produced for the independent baldios units (commons) at the Lombada National Game Zone (ZCNL), located in the east of Montesinho Natural Park (Bragança, Portugal). It involved the characterization of several parameters as well as the preparation of forest management proposals. Planning considered the forest areas characteristics, their multifunctionality, and the environmental, biodiversity and local populations constrains and requirements. Eight of the commons comprise 96.2% of the study area, and the remaining six represent

3.8%. Approximately 80% of the forested area is composed by pine stands and 20% by hardwood stands. *Pinus pinaster* is the most representative specie but *Quercus ilex*, *Castanea sativa* and *Quercus pyrenaica* are also relevant. Shrub communities appear in 149 plots (3455 hectares), mainly *Erica australis* associated with *Pterospartum tridentatum* and *Halimium alyssoides*. Other land cover/land uses were observed in 547 plots (1159 hectares), and classes of lower dimensions have high spatial dispersion. We recommend the afforestation of 3708 hectares with *Quercus pyrenaica*, *Quercus suber*, *Prunus avium*, and *Castanea sativa*. We also propose the management of 2658 hectares (309 plots) of natural regeneration, favoring native tree species regeneration, contributing to cheaper and easier management, with better adapted plants/populations and favoring shrub species which may serve as habitat for wildlife. These "baldios" forest management plans aim at a sustainable management of the existing resources, planning the conservational and economical aspects in articulation with the resident populations.

Poster Session **Biodiversity conservation and planning PB 3**

THE IMPORTANCE OF BOTANICAL GARDENS IN URBAN LANDSCAPES: RELATIONS BETWEEN ECOSYSTEM FUNCTIONS AND PLANT FUNCTIONAL DIVERSITY

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Botanical gardens in urban areas function mainly to support native and non native biodiversity. However, they also function in order to provide green areas for passive recreation, education, and esthetic appreciation for the human population. The functional diversity of botanical gardens in comparison with that of common urban parks is much higher, since the items of botanical gardens collections come from all over the world. Several questions about how the richness of species or functional groups affects ecosystem function remain unanswered. A botanical garden full of trees provides the same services as most forest ecosystems do, such as CO2 sequestration, climate regulation, soil retention and refuge of biodiversity. With such high functional diversity, we can expect that a botanical garden provides some services (such as food production) more fully than most ecosystems, thus serving as an attraction for wildlife. In this work, we analyze the functional diversity of the collection of the Oporto Botanical Garden, with the aim of understanding the relationship between plant functional types and the services they provide.

Poster Session **Patterns and processes PP 1**

MODELING THE IMPACT OF RURAL POPULATION DYNAMICS ON LAND USE CHANGE IN THE ATLANTIC FOREST OF ARGENTINA (1970-2030)

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Globally, there is a trend toward population urbanization and reduction in rural population. This trend could provide opportunities to reduce tropical deforestation, particularly in regions where deforestation is driven by subsistence agriculture conducted by rural inhabitants. In this study, we analyzed the importance of rural population as a driver of deforestation from 1970 to the present in the Atlantic Forest of, Argentina, a global conservation priority. Based on the trends and associations between rural population and land cover change between 1970 and 2006, we built a model of future scenarios of land cover, which run up to 2030. Between 1970 and 2001, rural population change was highly correlated with the deforestation rate ($r^2=0.82$; $p<0.005$). In all scenarios, based on both rural population change and government land use restrictions, native forest

cover is expected to decrease substantially by 2030; from 50% of the total province area in 2006, to 37% in the most favorable scenario to 17% in the most pessimistic scenario. The work exemplifies how rural human demography plays a key role in forest conservation in some ecosystems of very high conservation value, where the subsistence agriculture, conducted by rural inhabitants is a driver of deforestation.

Poster Session **Disturbances PD 2**

CLIMATE CHANGE EFFECTS ON REGIONAL POPULATION DYNAMICS OF THE SOUTHERN PINE BEETLE.

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Climate and/or regional weather patterns have long been considered drivers of southern pine beetle (SPB), *Dendroctonus frontalis* Zimmermann, population dynamics. In both the laboratory and field, temperature has been shown to affect the development, reproduction, survival and movement of SPB. It follows that changes in climate (whether long-term anthropomorphic or short-term natural changes) may affect the distribution, abundance and pestilence of the SPB. However, to predict the potential impacts of climate change it is first necessary to understand the role of climate (in particular temperature) on SPB dynamics. In this poster we utilize the historical record of SPB outbreaks, historical weather data, models of SPB life-history components, and a simple population model of SPB to explore the importance of weather as a driver of SPB outbreaks in southern forest landscapes.

Poster Session **Monitoring landscape change PMo 4**

THE IMPACT OF LEGISLATION ON THE DYNAMICS OF LAND USE THE RIVER BASIN CARÁ-CARÁ, PONTA GROSSA-PR/BRAZIL, IN PERIOD FROM 1980 TO 2007

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The human ownership of area causes transformations that can be accompanied and identified by means of land use, of delineation of areas of environmental conflicts and categories of hemeroby. The objective of this work is examine the dynamics of occupation of the land use in Cará-Cará hydrographic basin located in municipal district of Ponta Grossa, in Parana State – Brazil, between the years 1980 and 2007, and the relation of laws in force with the land use. It was necessary to search and draw up maps of relevant legislation, of slope and land use that were overlay until they reach to maps synthesis of conflicts land use. As for land use, the urban class increased (121.83%) due to the increase in population and reforestation decreased 30.69% according to changes in the economic context of the study period. Areas that are in conflict regarding the use represent 21.05%. Classes of hemeroby showed that the landscapes more artificial than natural occupy 41.94% of the basin area. It was concluded that the changes in Cará-Cará hydrographic basin were motivated by guidelines of the Municipal Master Plans. This search presents data for use in future planning projects to be undertaken by the public agency responsible.

Poster Session **Tools of landscape assessment and management PT 4**

EVALUATION OF PEDOTRANSFER FUNCTIONS FOR PREDICTING SOIL WATER RETENTION IN PORTUGUESE SOILS

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Estimates of soil water retention characteristics using pedotransfer functions (PTFs) are useful in many studies, such as hydrological modelling and soil mapping. The determination of the parameters for these functions can be obtained from direct laboratory and field measurements. However, these measurements are time consuming which makes it costly to characterise an extensive area of a land. As an alternative, the existing databases of measured soil hydraulic data may be used to obtained hydraulic parameters by fitting the water retention functions or to develop PTFs from easily measured properties, such as texture, bulk density and soil organic matter content. The objective of this study was to evaluate four published PTFs (Rawls – Brakensiek, Vereecken, Mayr – Jarvis e Campbell) to estimate the parameters of soil water retention functions for Portuguese soils. Two different soil data sets from North of Portugal (231 horizons), consisting of a full description of soil properties and soil water retention characteristics, were used in this study. Soil water retention function parameters were estimated for Campbell, Brooks – Corey, van Genuchten and Hutson – Cass functions by fitting to soil water content-pressure data, using an algorithm based on the simplex method and by application of a PTF for each function. The PTFs were evaluated by comparison of predicted and measured water contents at field capacity and permanent wilting point. The results showed a good performance of Brooks – Corey function with parameters predicted by Rawls – Brakensiek PTF.

Poster Session **Management and sustainability PM 2**

DISENTANGLING RECENT CHANGES IN FOREST BIRD RANGES IN MEDITERRANEAN FORESTS (NE SPAIN): ASSESSING GLOBAL CHANGE IMPACTS AND GUIDING LANDSCAPE MANAGEMENT

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In Mediterranean Europe, after the widespread afforestation and forest maturation following a large-scale decline in traditional uses, such some types of silvicultural treatments, many forest bird species have expanded their ranges in the last decades of the 20th century. Nevertheless, forest management could help to buffer the expected negative impacts of global change in the years to come. Providing guidelines for a proactive management is of fundamental in ecological research. In order to disentangle the processes mediating recent range changes of forest birds in the Mediterranean region of Catalonia (NE Spain) and to provide management guidelines, we studied the relationships between the variations in forest bird species richness at 10x10 km and forest landscape dynamics associated with land abandonment (afforestation and maturation), fires and management. Data from bird atlases, forest inventories, fire perimeters' and land-use maps was used. The widespread afforestation and forest maturation appeared to counteract the potentially negative effects of fires on species richness, being the impact of forest management on birds much smaller than the impact of the former. Nevertheless, forest practices of moderate intensity and an adequate management of landscape connectivity pattern may be beneficial, allowing species to better face range changes associated with global change.

Poster Session **Monitoring landscape change PMo 5**

FOREST PATCHES IN AGRICULTURAL LANDSCAPES (LOESS AREAS OF SE POLAND)

BOGUSLAWA BARAN-ZGLOBICKA & WOJCIECH ZGLOBICKI

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A mosaic of naturally and anthropogenically conditioned patches of terrain cover, which are diversified as regards the kind, size and shape, appears in the agricultural landscapes. Human activity is the main factor influencing the spatial and in time changeability of land use. However, in many cases the impact of abiotic environment components can also be significant. The research was carried out in two test areas (28 km2 and 35 km2) located in SE Poland. Studied areas were cultivated already in the Neolith, the next strong expansion of settlements and farming began in the Medieval period. Nowadays area is characterized by the dominance of arable lands in the land use structure. The analysis of woodiness changes were carried out on the basis of four maps comparison, representing the years 1840, 1890, 1935 and 1997. The digital data base of natural environment components was also used. Spatial analysis consisted of the assessment of changes of forest patches as well as some chosen statistical parameters prepared for the four time periods: 1840-1890, 1890-1935, 1935-1997 and 1890-1997. The character of the abiotic components on the areas covered with forests in various time periods as well as on the areas, on which the forestation or deforestation took place have also been examined.

Poster Session **Disturbances PD 3**

TESTING CONCEPTS OF COMPLEXITY IN NATURAL AND MANAGED FORESTS: LESSONS FROM SOUTHEASTERN BOTTOMLAND HARDWOODS

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In the southeastern Coastal Plain of the United States, Atlantic hurricanes are influential disturbance processes that drive forest development. Across the region, unlogged old-growth floodplain or bottomland forests are rare, and thus provide unique reference systems to compare natural and anthropogenic disturbances. Such studies are critical to inform forest management and restoration efforts that are increasingly designed to emulate natural disturbances and provide multiple ecosystem services. Using data collected from Congaree National Park, a 9,953-ha floodplain forest in South Carolina, we compared forest composition, structure, and complexity in old-growth forests that had been clear-cut, partial-harvested, and affected by Hurricane Hugo in 1989. After approximately twenty years of development, hurricane impacted stands were more compositionally and structurally complex than either partial-harvested or clear cut stands. Certain species, particularly Liquidambar styraciflua and Ilex opaca were particularly sensitive to disturbance types. Our analyses indicate that even partial harvests may result in simplified forest complexity and landscape heterogeneity. Therefore, minimal extraction from remaining old-growth forests should be a priority conservation goal. Further, silvicultural practices that enhance compositional and structural complexity should be considered to restore disturbed bottomland hardwood forest ecosystems.

Poster Session **Biodiversity conservation and planning PB 4**

FOREST FRAGMENTATION AND WILDLIFE POPULATION CONNECTIVITY IN SOUTHERN PORTUGAL: A COMPARATIVE LANDSCAPE GENETICS APPROACH

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In the context of habitat fragmentation, it is increasingly recognized the importance of landscape genetics surveys of multiple species to assess how general versus taxon-specific are the influences of landscape features in the genetic structuring of populations, and infer the location and strength of corridors and barriers. A relevant application of research on genetic connectivity is the identification of corridors linking protected areas, since these are the most likely suitable habitat patches to persist into the future under environmental management policies. Here we present an ongoing comparative landscape genetics project studying four highly distinct forest-dwelling animal species in a area in southern Portugal containing three Natura 2000 sites of protected montado habitat, but undergoing significant habitat fragmentation elsewhere. Our goals are to investigate: 1) how habitat fragmentation and species' ecology combine to influence the population structure and connectivity of different species; 2) how can we use such data to preserve, restore or design ecological corridors of general importance for biodiversity conservation; 3) how well connected are the Natura 2000 study sites for the different species surveyed; and 4) the potential of comparative landscape genetics as an integrative approach in landscape ecology research and as a scientific tool in the management and conservation of communities and habitats.

Poster Session **Tools of landscape assessment and management PT 5**

LANDSCAPE CONNECTIVITY ASSESSMENT FOR MEDITERRANEAN FOREST DISTRICT PLANNING

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Connectivity conservation is a major goal in wildlife resource planning. A necessary first step for its implementation is to perform an adequate diagnosis of the existing functional connectivity between habitats. In this work we propose a methodology that focuses on the assessment of landscape connectivity within two Mediterranean forest districts of Spain called Pinares and Alto Tajo. Each district is formed by several landscape types that were previously defined and characterized. We used the Spanish Forest Map (1:50,000) as the digital source map in order to determine forest habitat patches. We calculated the Integral Index of Connectivity (IIC) for every landscape using the software Conefor Sensinode 2.2. This is a powerful tool for quantifying habitat availability that is based on graph theory concepts. Forest connectivity was measured from a multi-species point of view, i.e., setting different dispersal distances assumed to be representative of differing animal groups. As a result, we detected the landscape types where forest planning should have connectivity as a major concern. We confirmed that the hierarchical order of the landscapes is different depending on the considered dispersal distance and, thus, we inferred ecological implications for animal species from the reported results. Hence the proposed methodology may be useful for suitable and efficient forest planning and landscape designing.

Poster Session **Patterns and processes PP 2**

THE USE OF VORONOI TESSELLATION TO CHARACTERIZE SAPLING POPULATIONS

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Forest regeneration is a spatial complex process with numerous unknown variables. The area potentially available (APA) to an individual plant represents a concept extensively used in population ecology but it has fewer implementations in forest research. In this paper I use a Voronoi tessellation (Dirichlet or Thiessen tessellation) in order to determine area potentially available to a sapling. The Voronoi polygons were used to characterize spatial pattern of sapling distribution as well as the competition relations between the individuals. It is obvious that, mathematically, the Voronoi tessellation represents one of the best solutions to determine neighbouring competitors of a tree. The area of Voronoi cells is frequently connected to biometrical attributes and the growth of the saplings. Furthermore, analyzing the Voronoi tessellation of a sapling, population can indicate the spatial pattern of the saplings. It is considered that weighted Voronoi polygons may be more fitted for assessing sapling relationships but it is more difficult to implement such specific algorithms to great amount of data. Modern investigation techniques were used and several practical software solutions were produced (Voronoi and Aria Voronoi programs).

Poster Session **Biodiversity conservation and planning PB 5**

FINE-SCALE MAPPING OF HIGH NATURE VALUE FARMLANDS: NOVEL APPROACHES TO IMPROVE THE MANAGEMENT OF RURAL BIODIVERSITY AND ECOSYSTEM SERVICES

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High Nature Value farmlands (HNVf) are defined as rural lands characterized by high levels of biodiversity and extensive farming practices. These farmlands are also known to provide important ecosystems services, such as food production, pollination, water purification and landscape recreation. Recently, this concept has been introduced in Rural Development Programmes related to biodiversity preservation in traditional agricultural landscapes. However, there are no specific rules concerning the practical use of the concept, particularly on the identification of potential HNVf areas at a local scale. This becomes important regarding the application both in the context of multi-scale agricultural development and farmland biodiversity protection. We present a novel approach for HNVf mapping which provides an improved local discrimination of farmlands according to their contribution for the conservation of rural biodiversity and ecosystem services. Our approach is based on a multi-criteria valuation of habitat types based on land cover map and agrarian censuses. It is considered applicable in other EU countries since comparable datasets are usually available. This methodology is also expected to provide the backbone of a standard, cost-effective methodology for HNVf monitoring, with an emphasis on the impacts of land use change on species, habitats and landscape function.

Poster Session **Tools of landscape assessment and management PT 6**

THE USE OF A PORTABLE LiDAR SYSTEM IN EVALUATING CANOPY STRUCTURE IN OLD-GROWTH AND SECONDARY-GROWTH MANAGED SOUTHEASTERN PINE FOREST

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Portable LiDAR height profiles and derived metrics and indices- canopy cover, canopy height, and Shannon Height Diversity Index (SHDI) - are compared among 0.34 ha plots with different fire frequency and fire season treatments within secondary forest and old growth plots. The secondary forest plots located on Tall Timbers Research Station (Florida) for this study were the Stoddard Fire Plots, a study ongoing for over 5 decades. The treatments considered consisted of three replicates each of four different fire treatments: 1-year, 2-year, 3-year fire return interval, and fire suppressed plots. The remaining secondary plots were randomly located at Pebble Hill Plantation (Georgia) and treated using a 2-year late dormant season fire cycle. The old growth plots at the Wade Tract Preserve (Georgia) were treated using a 2-year growing season fire cycle. Statistically significant higher canopy cover and structural diversity were found in 3-year fire return and fire suppressed plots. Additionally, the 3-dimensional structures of the secondary plots were compared to old-growth stand structure using height distribution histograms and SHDI. The goal of this study was determine the efficacy of a new technique to quantify structural differences for refining recommendations for the most appropriate fire-return interval for southeastern pine management.

Poster Session **Biodiversity conservation and planning PB 6**

SPATIAL HABITAT SUITABILITY PARAMETERS OF A STRATEGIC-SPECIES FOR CONSERVATION DECISION

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Predictive spatial models of species distribution resulting only from statistical operations between geographical and environmental factors may not be reflecting the resilience of a habitat. This study aims to select parameters of species habitat suitability to support conservation decision-making in a landscape ecology perspective. The methodological strategy consists in two points: (1) Parameters selection of spatial distribution and forest quality requirements of a strategic-species; (2) Parameters evaluation by standardized and weighted indices in a multi-criteria decision-making process based on expertise knowledge. The Euterpe edulis species was selected as a strategic-species because is related to important functional aspects of natural systems. At the same time is an important socioeconomic resource for the local population. The parameters related to the species distribution (topographic factors, drain system and altitude) were combined with factors of quality of landscape functionally related to the species. From the evaluation of these parameters through standardized and weighted indices was possible to spatially indicate the matrices of the habitat suitability for the species. The main advantage of this evaluation is not only to provide the spatial arrangement of suitable habitat for the species, but to be used as conservation decision tool for defining its functionalities at the landscape.

Poster Session **Scaling in landscape analysis PS 1**

HABITAT SUITABILITY MODELS FOR TWO SPECIES OF FOREST RAPTORS IN CATALUÑA. METHODOLOGICAL CONSEQUENCES RELATED WITH DIFFERENT SCALES AND DATA SOURCES

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Knowing species distribution and their spatial relationships in habitat, ecosystem and landscapes is fundamental for studies of population genetics, evolutionary and conservation biology, biodiversity maintenance, territorial planning and more. How a species could distribute along a territory is a function of different environmental variables that changes in space and time. Recent georeferenced information about not only species distribution but also related to climate, lithology, changes in lands uses or historical disturbances (wild fires, floods, wind storms) at different scales are valuable data sources for elaborate habitat suitability models that are in the basis of connectivity or habitat fragmentation analysis. In this communication we use GIS based information from different sources and at different scales (1x1 km2, 4x4 km2 and 10x10 km2) for elaborate habitat suitability models of two forest raptors species (*Buteo buteo* and *Accipiter gentilis*) along a north-south gradient in Cataluña. The area of study includes 7000 km2. Forest raptors species presence/absence data on 679 1x1 km2 grid cells of the Atlas of Nesting Birds of Cataluña and Spanish Forest Map 1:50000 are the main information sources. Logistic regression methods have been essayed for comparison along different scales. Preliminary results shows unexpected no relation between variables like land use type or diversity of habitats and raptors presence at 1x 1 km2 , since this relationship is slightly consistent (almost for Buteo buteo) at 10 x 10 km2 scale.

Poster Session **Patterns and processes PP 3**

NUTRIENT RETRANSLOCATION IN PURE AND MIXED PLANTATIONS OF Populus deltoides AND Alnus subcordata

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Nutrients allocated to green leaves are recycled through 4 parallel pathways: herbivory (feces and dead bodies), throughfall, foliar resorption and litter decomposition. Research often focuses exclusively on decomposition, but the fraction of nutrients recycled trough each pathway may be of similar magnitude. Populus deltoides and Alnus subcordata were planted in five proportions (100P, 67P:33A, 50P:50A, 33P:67A, 100A) in Noor, Iran. After 7 years (in September 2003), the effects of species interactions on tree internal cycling of nutrient (retranslocation) were assessed. Leaves were collected from the bottom one-third of the tree by clipping two small twigs located on opposite sides of the crown. Six representative trees (two near the center of sub-plot and one in each corner of it) of each species were sampled for fully expanded leaves. Senescent leaves were also collected from each species in each sub-plot. The Nitrogen retranslocations of both species were not significantly differed between the different proportions (100P(33.51%), 100A(21.41%), 67P:33A(35.76%:11.80% respectively), 50P:50A(33.67%:11.50%), 33P:67A (31.98%:10.66%)) also it was not different between the two species. Finally, it should be implied that nutrient retranslocation was not differed as a result of mixing these species at this age.

Poster Session **Management and sustainability PM 3**

THE REGIONAL ANALYSIS OF FOREST MANAGEMENT RISKS (BY THE EXAMPLE OF RUSSIAN NORTHERN AREAS)

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The northern taiga areas of Russia are rich of coniferous and softwood forests, but a number of adverse natural-climatic and economic factors makes proper forest management difficult. Additional efforts and measures are required to mitigate the impact of the harsh climatic conditions on the forestry activities. The analysis of natural hazards and risks in forest management, which would also take into account related social and economic consequences, is a prerequisite condition for sustainable usage and preservation of forest potential in the northern territories of Russia. In order to assess and estimate the risks in forest management, there was conducted an integrated analysis based on weighted summation of such quantitative indices as the amount of forest resources, ecological potential of woods, the degree of natural-climatic hazards and other factors. Based on the calculation of the forest resource balance, the quantitative estimation of valuable woods loss was made.

Poster Session **Biodiversity conservation and planning PB 7**

RELATIONSHIP BETWEEN LANDSCAPE STRUCTURE, CLIMATE AND RARE WOODY SPECIES RICHNESS IN TROPICAL FORESTS OF THE YUCATAN PENINSULA, MEXICO

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Two key concerns about the tropical forests of the Yucatan Peninsula are: the effects of land-use and climate change on biodiversity, and the scant knowledge about rare plants species, which are most vulnerable to these changes. The aim of this study was to characterize the relationship between landscape structure, climate and rare woody species richness. We identified three levels of rarity – high, medium and low– using herbarium records, according to species abundance, habitat specificity and potential range distribution (modeled with DOMAIN). We estimated the spatial distribution of climate variables using universal kriging, and calculated landscape metrics as well as the number of species for each level of rarity using a square grid of 25 km x 25 km in the whole Peninsula. We also evaluated the association between landscape structure, climate and rare woody species richness using regression analysis. We discuss the best landscape configuration and climate conditions to promote the conservation of the different levels of rarity of woody species. Our approach and results can help develop conservation and land-use planning strategies for the Yucatan Peninsula.

Poster Session **Management and sustainability PM 4**

VALUES OF MANGROVES AND ITS INTERACTION WITH MARINE ECOSYSTEM IN A NATURAL LANDSCAPE

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The mangrove lands that, used to be considered as waste land in the past, have recently been treated as a valuable ecosystem, especially for their unique features. Mangrove forests have been traditionally utilized by the local people for a variety of purposes. Values of mangroves are recognized as various benefits. Study developed in the south west of Iran in Boushehr province and recognized that the forest of the mangrove ecosystem is capable to yield the following direct benefits: Lumber or similar construction wood; Poles, fuel wood, fishing gear; Raw materials for the wood-based industry of various nature and including board mills, rayon mills, match factories and charcoal products; Non-timber products including tannin (mostly from bark) to supply raw materials for leather tanning industries, fishing net processing units, thatching material for roofing and raw materials for indigenous medicine; Edible products including honey and wax, game animals, meat and fish, fruits, drinks and sugar. The mangrove ecosystem can yield the following indirect benefits: Natural spawning ground for fish and crustaceans, especially for shrimps and prawns; Contribution to mud flat formation and control of erosion; Capability to check inland salinity intrusion; Enhanced capability to combat the impact of cyclone and tidal surge; Enhanced capability to function as a shelter belt during storms and cyclones. So in view point of these various use and benefits for human and marine ecosystem, conservation of mangrove forests would be a main strategy in the area.

Poster Session **Tools of landscape assessment and management PT 7**

STUDY OF RIPARIAN LANDSCAPE CHANGES USING AERIAL PHOTOGRAPHS AND GIS. THE CASE OF GUADARRAMA RIVER (CENTRAL SPAIN)

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Riparian ecosystems changes and their effects on river landscape evolution, are constant and continuous, as well as the relationship of the mentioned ecosystems with the neighboring ones. However, it has been during the last century that this evolution has accelerated and made uneven towards the loss of these ecosystems wealth, largely due to human impacts. This study analyzes the riparian landscape evolution in three stretches of Guadarrama River, based on the imperatives of the WFD. These stretches were chosen based on a previous hierarchical classification of the basin. We analyzed the evolution of the river morphology and the riparian vegetation using GIS and remote sensing techniques, throughout a period of 50 years with four temporal windows: 1956, 1972, 1991 and 2006. The obtained data have been validated against field surveys. There has been a reduction of mobile bars, channel width and fluvial space, with a surface increased of the riparian band. From these results, it is possible to conclude that Guadarrama River is more and more constricted and that it is losing capacity of movement due to hydro-geomorphologic changes. As a consequence, the quality of the riparian vegetation is decreasing, as well as the riparian ecosystem health and the whole landscape.

Poster Session **Disturbances PD 4**

EFFECTS OF ENDOZOOCHOROUS SEED DISPERSAL ON THE SOIL SEED BANK AND VEGETATION IN THE WOODLAND AREA

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In the framework of nature conservation and restoration, some experts found the potential of endozoochorous seed dispersal in a semi-natural landscape. Predicting seed input by large herbivores through germination test of seeds in dung is needed to figure out the role of large herbivores. The contribution of large herbivores to ecological restoration sites can be determined by gathering quantitative information of the dung seed content and compared it with soil seed bank content and aboveground vegetation in grazed and ungrazed woodland area. The seed density and species richness of two areas as well as dung content were evaluated by germination test in the green house to find out effect of grazing regime. The result show that cattle grazing had a positive effect on distribution of vegetation from lawn area to woodland area. Species richness in graze area is higher than ungrazed one. Grazing reduced the cover of grazing sensitive and transport exclusive species to grazed woodland area. Grazing affected the number of seeds in the soil seed bank sample in the woodland area by creating gaps, stimulating losses by germination. In conclusions, seed density and species richness in the soil seed bank are less directly affected by large herbivore but direct effect on above ground vegetation.

Poster Session **Biodiversity conservation and planning PB 8**

A LANDSCAPE MANAGEMENT PLAN FOR NATURA 2000 "MONTEMURO SITE"

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The "Montemuro Site" is one of the Portuguese Natura 2000 sixty sites. This territory has been emblematic, mainly in the summer, due to the traditional transhumance of shepherds whose came from the Center of Portugal to benefit from highland pastures. However, agriculture and grazing nowadays tend to be abandoned, increasing the landscape homogeneity and continuity hence increasing fire risk and reducing biodiversity. A landscape management project has been prepared for the "Montemuro Site" to suit both goals of socio-economical development and nature conservation. The main focus was the conservation of priority habitats which could not be attained without considering fire prevention. Consequently, prescribed fire and grazing were the techniques highlighted to promote landscape diversity, by cleaning abandoned agricultural lands, restoring pastures and reducing biomass in the forest understory. The social value of shepherds and the restoration of ancient transhumance tracks were also planned. Natural regeneration of oaks and old hardwoods management and conservation were also be addressed by the project, as well as the restoration of riparian vegetation, fauna and wolf habitat conservation. Fishing and hunting activities were suggested for both ecological management and economical purposes. Nature and rural tourism can get an interesting benefit with the landscape biodiversity, providing an economical return.

Poster Session **Management and sustainability PM 5**

IMPACT OF TREE SPECIES REPLACEMENT ON CARBON STOCKS IN FOREST FLOOR AND MINERAL SOIL

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The increase in atmospheric carbon content, as expected considering actual trends, draws attention to the highly valuable role of forest ecosystems in the global carbon cycle. Accordingly, the carbon storage capacity by different species should be a decision support tool when introducing new forest species. This study aims at evaluating the influence of replacing areas of Quercus pyrennaica, which represents native vegetation of Serra da Nogueira, in the northeast of Portugal, by *Pseudotsuga menziesii* on carbon stocks in forest floor and mineral soil. Three sampling areas were selected in adjacent locations with similar soil and climate conditions. The first area, covered by *Quercus pyrennaica* (QP), represents the original soil. The second area is in a 40 years old stand of *Pseudotsuga menziesii* (PM40), and the third one, also under *Pseudotsuga menziesii*, is 15 years old (PM15). In each sampling area, at 10 randomly selected points, samples were collected in the forest floor (0.25 m2 quadrat) and in the soil (at 0-5, 5-10 and 10-20 cm depth). Results show that carbon concentration is significantly higher in forest floor under native species (QP), but the amount of organic residues accumulated on the soil surface is higher under the introduced specie (PM40 and PM15). The forest floor stores 15, 12 and 6% of total carbon for PM40, PM15 and QP, respectively. Four decades after species replacement, a soil organic carbon loss is observed, although no significant differences were found when comparing soil under introduced (PM) with original species (QP). A carbon loss of around 30%, in PM15, and gains of about 10%, in PM40, are computed when considering mineral soil and forest floor together. As shown by results, in PM, forest floor was a carbon sink whilst mineral soil was a carbon source.

Poster Session **Tools of landscape assessment and management PT 8**

IMPORTANCE OF HABITAT PATCHES FOR THE MAINTENANCE OF LANDSCAPE CONNECTIVITY IN BAIRD´S TAPIR HABITAT IN GUATEMALA

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Landscape connectivity is important for the survival of different species. Bairds tapir is one of them that has seen its habitat being reduced and fragmented in Guatemala. Landscape management needs to identify the importance of different patches in order to set conservation priorities. An assessment of the importance of patches in the potential habitat for this species in Guatemala was done using software Conefor Sensinode 2.2. Patches which are important for the conservation of the species based on its connectivity characteristics were identified with the Integral Index of Connectivity –IIC- which is a binary connectivity index. The results showed that Mayan Biosphere Reserve, and its major patches located in the northern part of the country, have the highest IIC and thus the major importance in providing connected habitat suitable for the survival of Baird's tapir. Since this area has been suffering important losses of habitat because lack of state responses, more strong political measures are needed to keep and enhance landscape connectivity.

Poster Session **Monitoring landscape change PMo 6**

LANDSCAPE TRANSFORMATIONS SEEN THROUGH THE HISTORICAL CARTOGRAPHY: SARDINIA AS CASE STUDY.

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Land Use and Land Cover Changes are directly linked to landscape transformations due to human activities. In the last century land changes dynamics have increased just like the attention towards the need of landscape conservation. Landscape, as a collector of "environmental objects and relations existing between them", can be considered a privileged point of view in order to understand the territorial dynamics. In particular, forestry systems, as biodiversity collectors, seem to have suffered the biggest changes in terms of loss/increase of surface. The work presented here, regarding the whole Sardinian island, can be considered the first one, at this scale, about on changes analysis focused on forestry landscape. Recovering historical cartography, not yet analyzed, on the Sardinian forestry extension at the beginning of XX century, and integrating the obtained data with different data-sources (e.g. CORINE, historical, statistical ones), a new frame is designed to underline the increase of forestry surface, with a new and innovative methodology. The obtained results could be a reliable and useful tool to direct new studies on forestry landscape, especially for Mediterranean and Apennine regions and to manage and compare new scenarios on biodiversity conservation.

Poster Session **Monitoring landscape change PMo 7**

COMPARISON OF REFLECTED SOLAR RADIATION, AIR TEMPERATURE AND RELATIVE AIR HUMIDITY IN DIFFERENT ECOSYSTEMS

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Solar energy is the prime source of energy for functioning of plants and the whole ecosystem. Transmission of solar radiation through cloud-free atmosphere is influenced mostly by amount of water vapor and dust. In summer up to 8kWh.m-2 of solar radiation comes on Earth surface during one sunny day. It is evident that different type of distribution of solar energy will be on dry surface in comparison with plant stand saturated with water. We investigated the analysis of meteorological data for the period 1 April – 30 September 2008, from six weather stations on Třeboň Biosphere Reserve, Czech Republic, aimed at studying compare rate of solar energy in two types of wetlands (Wet Meadows and fish pond) with a field, sealed surface (concrete), pasture and village. Solar radiation, air temperature, air humidity had been compared. Results demonstrate interaction between change of average temperature and plant cover. Changes of land cover results in changes of average temperature. Daily averages of temperature at clear days are markedly influenced by early morning minima. Short wave radiation albedo of water during vegetation season was two times lower than the albedo of field and three times lower than the albedo of concrete surface.

Poster Session **Monitoring landscape change PMo 8**

MAPPING INVASIVE SPECIES (Acacia dealbata Link) USING ASTER/TERRA AND LANDSAT 7 ETM+ IMAGERY

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The rapid spread of invasive alien species (IAS) is now recognised as one of the greatest threats to the ecological and economic well-being of the planet. This study shows a comparison between ASTER/TERRA and ETM+/LANDSAT 7 sensors data suitability for mapping the Acacia dealbata Link spots. The work was carried out in central Portugal (Viseu region) where the presence of invader species in pure stands is quite significant. The images were ortho-rectified and submitted to supervised classifications techniques. The achieved results showed an overall accuracy of 89.42% over the ETM+ image and 86.69% over the ASTER image. For the class Acacia dealbata Link, the producer's precision was 100% for both images but the user's accuracy was only 23% in ETM+ and 12% in ASTER image. This means that the spectral signature were representative of the *Acacia dealbata* Link class, and had been well created, however given the nature of this land cover class (permanent leaf and closed canopy) it can be misconfused to Meadow and Grass due to their similar spectral response. The obtained results suggest good perspectives for the use of this type of satellite sensor data in order to detect and map this invasive species.

Poster Session **Monitoring landscape change PMo 9**

ASSESSING MULTI-TEMPORAL LAND COVER CHANGES IN THE MATA NACIONAL DA PENEDA GERES NATIONAL PARK (1995 AND 2009), PORTUGAL - A LAND CHANGE MODELER APPROACH FOR LANDSCAPE SPATIAL PATTERNS MODELLING AND STRUCTURAL EVALUATION

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The present study sought to evaluate land cover/land use evolution, for the period between 1995 and 2009, within the Mata Nacional of Peneda Geres located in the Peneda Geres National Park (Portugal). This study was based on Landsat TM images classification and GIS procedures, such as Land Change Modeller (LCM) approach. Landscape diversity and structural changes, from 1995 to 2009, were analysed by means of Mean Shape Index, Shannon's Diversity Index, Patch analysis and Markov analysis, in order compare landscape metrics and to calculate land cover dynamics. The achieved results enable to state that land cover classes presented significant structural changes. The most significant changes occur in the land cover classes of *Pinus pinaster*; *Quercus robur*; *Acacia dealbata*; and shrub land. The most worrying result was achieved for the *Acacia dealbata* species, which presented a strong invasive behaviour. Landscape metrics analysis showed a significant stratification increasing and a dramatic reduction of patch surfaces. In spite of spatial changes observed, the achieved biodiversity indexes are very alike for both dates.

Poster Session **Monitoring landscape change PMo 10**

LANDSCAPE CHANGE AND CARBON SEQUESTRATION: THE CASE OF THE DEILÃO PARISH, NORTHEASTERN PORTUGAL

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We estimated carbon stocks at the landscape level over the last 48 years in the Deilão Parish (4200 ha), Bragança District, Northeastern Portugal, with the purpose of analyzing carbon sequestration dynamics in this changing landscape. We created land use GIS coverages from digitized and orthocorrected aerial photographs from 1958, 1968, 1980, 1992 and 2006 based on the COS2005 (IGP) land use/land cover classification system. Bellow- and aboveground carbon stocks for each land unit were estimated based upon published biomass equations and inventory data. Combining patch level data with GIS coverages we estimated biomass and carbon in the landscape for the 5 dates above. The Deilão parish presented symptoms of abandonment such as a decrease in agriculture (53% of the area in 1958 to 37% in 2006) and an increase in forest plantations (0.8% in 1958 to 32% in 2006). Shrublands also decreased from 46% to 30% of the area within the same period. Sequestered carbon in Deilão increased 360% during the 48 period of time under consideration, from 20,572t in 1958 to 75,449t in 2006. This corresponds to a mean annual sequestration rate of 0.27t/ha/year. Changes in carbon stocks are due mainly to land use change and vegetation growth described above, most noticeably the expansion and growth of newly planted forest stands.

Poster Session **Patterns and processes PP 4**

IMPACT OF TIMBER HARVESTING ON SOIL MICROBIAL DIVERSITY, ENZYME ACTIVITY AND NITROGEN FLUXES IN FIELD SITES OF THE BOREAL PLAIN, ALBERTA, CANADA

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Timber harvesting causes changes to the entire forest ecosystem, especially soil processes. The Forest and Watershed Riparian Disturbance (FORWARD) project is investigating the impact of tree harvesting and fire disturbance on boreal forest watersheds. The objective of this component of FORWARD was to monitor changes in community structure and diversity of soil microorganisms, enzyme activity and bioavailable nitrogen (N) fluxes in disturbed soils over 18 years post-harvest. Soil forest litter (LFH) and mineral (Ae) horizons were sampled from harvested cutblocks at various stages of regrowth (1, 2, 3, 4, 5 & 18 yrs). Samples were analyzed for phospholipid fatty acid profiles, enzyme activity and bioavailable N flux. Preliminary results show that soil microbial diversity differed ($p<0.01$) between cutblocks at various stages of regrowth and between LFH and Ae horizons. Enzyme activity and N fluxes appeared to be higher in the more recently cut sites. This study suggests that landscape changes due to forest harvesting alter soil microbial processes enzymatic activity, and N fluxes in the years following the disturbance. Over time, forest soil microbial processes within this study generally re-stabilize as the ecosystem reaches a new state of quasi-equilibrium.

Poster Session **Management and sustainability PM 6**

ESTIMATING NON-MARKET COSTS AND BENEFITS OF FOREST RESTORATION IN THE DRYLAND LANDSCAPE IN CENTRAL CHILE.

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Agricultural and urban expansions have led to a loss and degradation of forest landscape in central Chile. Currently, the valuation and assessment of whether restoration is cost-effective have not been studied in Chile. Our objectives were: i) to determine the traditional patterns of dryland forests use; ii) to explore the attitudes of local people towards restoration actions; iii) to estimate the net benefit of dryland forest restoration. We used the Colliguay valley as a study case. Research methods combined participatory surveys and structured interviews. To determine benefits of forest restoration, the structured survey included contingent valuation questions that allowed for the calculation of willingness to pay measures. We used satellite imagery to prioritise sites for restoration and estimate the restoration costs. Overall results suggest that low income and lack of productive alternatives induce local people to carry on forest-extractive activities that promote landscape degradation. There is a substantial benefit of restoring forest ecosystem services in Colliguay valley (US$ 85,950), although this amount is substantially less than the estimated costs of restoration (US$ 173,700). A pending challenge is the need to explore compensation mechanisms that encourage landowners to engage in forest restoration practices.

Poster Session **Management and sustainability PM 7**

POLICY RECOMMENDATIONS FOR CHILEAN DRYLAND FORESTS LAND-USE PLANNING

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Conservation and sustainable use of dryland landscapes is central to livelihood development and poverty alleviation in diverse parts of the world. Conversion to agriculture and urban ground has led to a loss, fragmentation and degradation of dryland forests in Central Chile. In fact, 38% of dryland forests have disappeared between 1976 and 2008. Such overexploitation has caused a serious decline in ecosystem services. In response to this dramatic situation, since 2007 the REFORLAN project ("Restoration of Dryland Forests in Latin America") has identified and promoted approaches for the sustainable management of dryland forest ecosystems. This goal was accomplished through a multi-disciplinary research approach that analyzed how restoration of degraded lands can be achieved in a way that will mitigate the effects of unsustainable land use practices. From the project's output and through a participatory process, we generated policy recommendations to support the development of national land-use planning strategies incorporating dryland forest restoration. For instance, it is crucial to develop a research agenda to address the role of forests in the quantity and quality of water in dryland ecosystems. This experience and recommendations could be relevant to other Latin American countries, and to other dryland regions around the world that deal with similar challenges and problems.

Poster Session **Biodiversity conservation and planning PB 9**

WOOD MACROLICHEN LOBARIA PULMONARIA ON CHESTNUT TREE CROPS: THE CASE STUDY OF ROCCAMONFINA PARK (CAMPANIA REGION - ITALY)

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Integrating at landscape level the information coming from local environment indicators can provide useful tools for monitoring environmental quality in conservation programs. *Lobaria pulmonaria* is a lichen species widely used to evaluate the spatio-temporal continuity of forest cover and to measure the state of environment in areas of high biogeographical interest, under the pressure of climate change, atmospheric pollution and human land use. In the Lobaria project framework by the Società Italiana Lichenologica, wood macrolichens were sampled on Chestnut woods in the Roccamonfina-Foce Garigliano regional park, Campania Region (Italy). A geographical datasets of lichen distribution, land use, topographical and climatic characteristic was built in GIS environment to perform spatial analysis. Multivariate analysis was conducted in order to highlight the relationships between lichen distribution and environmental quality. The results show that the agronomic management practiced in this area on Chestnuts tree crops enabled the establishment of stable conditions over time and the development of species indicator of undisturbed areas. Integrating the lichen flora data points in GIS environment allowed to build a general framework that allow to analyse at landscape level the changes occurred in topography, climate and disturbance regime over the area.

Poster Session **Monitoring landscape change PMo 11**

LAND USE ALTERATION IN PORTUGAL. WHAT DID CHANGE BETWEEN 1990 AND 2005 AND WHAT ARE THE SCENARIOS?

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In the last decades changes occurred in all Mediterranean territory. Social and economical trends changed and the related land use accompanied the alteration. We used the Soil occupation chart (1990) and the Forest national inventory (2005) to analyze the alterations. We will present the study of the variation in land use in Continental Portugal between 1990 and 2005, the transition matrix and the trend scenarios. Results will show the course of changing and enable the reflection about the future of portuguese landscapes.

Poster Session **Urban Forestry PU 3**

LISBON'S PUBLIC GARDENS, HOST PLACE FOR WORLD'S TREES

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This study aims to contribute to the characterization and evaluation of Lisbon's Gardens. The distinctiveness of each garden, its heritage importance and its use as a public space were all factors in determining its overall

value. Within the framework of the 2009 project "Methods of Characterization and Classification of Lisbon's Public Gardens with heritage interest", 31 of Lisbon's Public Gardens were studied and a new methodology was developed to measure their landscape, historical, social and cultural value. Garden's Landscape value is evaluated according to several parameters, one of which is the botanical quality indicator. It determines trees' richness and uniqueness, assessed by botanical diversity and singularity evaluation methods (e.g., surveys, Shannon index, Equitability), and trees' heritage interest, based on their rarity, age, size and health. 3751 trees in 31gardens were studied. The following results were obtained: 46 families, 83 genus and 139 species. 58% of the trees were evergreen and 42% deciduous. 25% of the species were exotic, 31% introduced and 13% native. Lisbon's Mediterranean climate allows the coexistence of different tree species, from Northern Europe to subtropical climates. In addition to its aesthetical value, this botanical diversity plays a central role in increasing biodiversity and promoting urban ecological sustainability.

Poster Session **Tools of landscape assessment and management PT 9**

A PROTOCOL FOR ASSESSING RIPARIAN VEGETATION PATCHES AS ECOLOGICAL CORRIDORS. THE CASE OF THE GUADARRAMA RIVER IN CENTRAL SPAIN.

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Riparian areas are critical landscape features for managing water quality, riparian connectivity and streambank stabilization. These areas are being targeted for restoration using riparian buffer systems in suitables locations to restoring connectivity of these corredors for the benefit of widlife. This work is applied on the Guadarrama River (central Spain), which is a highly human-altered area. The materials we used in this work involved: (i) ortho-photographs, (ii) topographic maps, (iii) satellite images and (iv) ancillary maps and information. In this paper we propose a GIS-based method for quickly identifying where buffers can be established to restore connectivity of riparian areas -the critical gaps. After a hierarchical classification of the river, we used 0.5m pixel-size ortho-photographs approach, based on which riparian vegetation patches were digitalized. A sensitivity analysis was then performed in order to find an apropiate patch size and discontinuity length, according to the type of river. The critical gap is located when a riparian remnant exceeds the dispersal distance threshold. As a result, we classify the study area in two groups: (i) areas to be preserved and (ii) intervention areas, according to a three-level scale of priority in both cases. This assessment may serve as a valuable benchmark for monitoring trends in riparian connectivity.

Poster Session **Biodiversity conservation and planning PB 10**

ECOLOGICAL FACTORS INFLUENCING BETA DIVERSITY AT TWO SPATIAL SCALES IN A TROPICAL DRY FOREST OF THE YUCATÁN PENINSULA

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Understanding the ecological factors determining beta diversity at different spatial scales is relevant for ecological theory as well as for conservation and management. In this study, we analyze the relationship between beta diversity and habitat and spatial variables at two different spatial scales (site and landscape). Vegetation classes were identified based on a supervised classification. We determined plant species composition and abundance, and obtained soil samples from a total of 276 sites in 23 sampling landscapes. We

performed a partial CCA and RDA in species composition at two spatial scales. Patch-type metrics and spatial dependence were used at the landscape level, whereas soil properties and spatial dependence were used at the site level. Soil variables accounted for 57.41% of the variation in species composition, space accounted for 21.88%, stand age accounted for 18.79%, and the shared contribution of all variables represented 2.10% of the total variance explained. At the landscape-level, contrast (TECI) explained 29.11% of the variation in species composition, followed by the percentage of land (PLAND) 17.72%, patch shape index (SHAPE_AM) 18.14%, and the shared contribution 35%. These results underscore the importance of spatial scale for patterns of beta diversity, and provide relevant information for biodiversity management and conservation.

Poster Session **Tools of landscape assessment and management PT 10**

ASSESSING "SPATIALLY EXPLICIT" LAND USE/COVER CHANGE MODELS

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Spatially explicit land use/cover change (LUCC) models aim at predicting the location and pattern of LUCC. The simulation involves a spatial procedure which identifies the potential locations of change and eventually replicates the patterns of the landscape. An evaluation procedure based upon the comparison of the simulated land use/cover map with the true map of the same date is generally carried out. However, most of the evaluation techniques only evaluate the spatial coincidence between simulated and true changes and do not assess the ability of the model to simulate the landscape patterns (e.g. size, shape and distribution of patches). This study aims at evaluating simulated deforestation maps obtained by two models (DINAMICA and Land Change Modeler). Simulated maps were evaluated using a fuzzy similarity index which takes into account the fuzziness of location within a cell neighborhood and fragmentation indices. Results show that more realistic simulated landscape are often obtained at the expense of the rate of location coincidence. When patterns of landscape is an important issue (e.g. Fragmentation effects on biodiversity), indices taking into account spatial patterns, and no only location should be used to assess model performance.

Poster Session **Patterns and processes PP 5**

CLIMATIC CHANGE AND ITS CONSEQUENCES ON GROSS PRIMARY PRODUCTION (GPP), EVAPOTRANSPIRATION (ET), AND WATER USE EFFICIENCY (WUE) ON MONGOLIA PLATEAU

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The Mongolia Plateau is among the most sensitive regions to the changing climate while experiencing rapid increases in land uses. Using MODIS products and other available databases, we examined the changes of gross primary production (GPP), evaportranspiration (ET), and water use efficiency (WUE) by biomes (desert, grassland, forest, and agricultural land) and country, i.e., 1.146 and 1.56 million square km for Inner Mongolia (IM) of China and Mongolia (MG), respectively. From 2000 through 2006, the mean (STD) GPP of the plateau 841.1 (34.0) Tg C.Yr-1, with 449.3 (26.4) and 391.8 (14.0) Tg C.Yr-1 for IM and MG, respectively. IM and MG,

respectively, also lost 326.3 (13.4) and 267.8 (8.7) billion m3 water through ET, resulting an average WUE of1.47 (0.07) and 1.01 (0.06) g.mm-2. At biome level, desert showed the most variable over the 7-year study period, while forest had the least. More interestingly, the temporal variation of all three metrics for the same biome in IM was significantly higher than that of MG. The cooler, wetter 2003 seemed to be responsible for the elevated GPP and WUE for the desert and grassland biomes, but not for the forest. In comparison, the cooler and drier 2005 increased GPP, but not WUE of the grassland and forest biomes.

Poster Session **Monitoring landscape change PMo 12**

MONITORING AND INTEGRATING ESTHETICAL AND ECOLOGICAL VALUES AT THE CENTRAL ASIA LANDSCAPE CHANGE

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Desertification is the gradual transformation of usuable land into desert; is usually caused by climate change or by destructive use of the land. Dust storms are natural events that occur frequently in arid and semi-arid regions of Central Asia and indicator of rapid desertification. Dust storms can be both a symptom of serious anthropogenic land degradation and a problem in its own. Monitoring the phenomenon in remote regions is dificult task and require disperse and different technical backgrounds of researchers. The present research is carried in three Central Asian countries – Kazakhstan, Uzbekistan and Turkmenistan. A web-based geographic information system for monitoringand landscape change and aeolian soil erosion in Central Asia was developed, implemented and used. The objective of the present pepar is to describe how to integrate ecological thinking into landscape planning of the Central Asia Silk Road area. In ecological aesthetics pleasure is derived from knowing on how the part of the landscape relate to the whole. A questionary was used as research tool to measure landscape preference. The questions were constructed following the principles described by PATTON (1980): 1) Experience/Behavior; 2) Opinion/Value questions; 3) Feelings (emotional responses to experiences and thoughts); 4) Knowledge; and 5) Sensory Experience.

Poster Session **Disturbances PD 5**

HERBACEOUS PLANT DIVERSITY ACROSS FIRE CREATED EDGES IN CONTINENTAL HOLM OAK WOODLANDS

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We analyzed herbaceous plants distribution across edges of holm oak (*Quercus rotundifolia*) woodlands created and maintained by fire in order to describe plant community structure across edges and to evaluate the role of fire in the patterning of plant diversity at the patch scale. We recorded abundance in twelve 60-m long sampling lines placed perpendicularly to the woodlands boundary at 1, 5, 10, and 20m outside and 0, 1, 5, 10, 20, and 40m inside the woodlands, using the line intercept method (2 x 10-m line parallel to the boundary). In the same locations, we measured tree and shrub cover, height and density and recorded time since last fire disturbance. Data was analysed graphically and statistically using multivariate ordination analysis techniques,

namely CCA. Results indicated that, on average, herbaceous species richness was higher outside than inside the woodlands and peaked 1m outside the boundary. Time since last fire in adjacent shrublands affected richness patterns across edges. Richness was higher outside than inside in young adjacent shurblands, higher inside than outside in old shrublands and peaked 1m outside in intermediate age shrublands. interior, exterior and edge (1m outside the boundary) species and locations were well correlated with explanatory variables reflecting the interior-exterior woodland gradient sampled and shrub recovery after fire.

Poster Session **Tools of landscape assessment and management PT 11**

SPATIAL DYNAMICS OF CHESTNUT BLIGHT DISEASE AT THE PLOT LEVEL USING THE RIPLEY'S K FUNCTION

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We used the Ripley's K function, a second-order analysis method, to describe the spatial dynamics of tree infection caused by chestnut blight (*Cryphonectria parasitica* (Murrill) Barr) in sweet chestnut orchards. Our research question was whether the location of infected trees affected the spatial pattern of spread of the disease in orchards. We also wanted to know whether existing patterns could be associated with management practices. Surveys of infections and mortality caused by chestnut blight were conducted at the tree level in 4 plots in 2003, 2004, 2005, and 2009 in the Curopos parish, Vinhais, Portugal. We applied the Ripley's K function to locations of diseased (infected and dead) trees to look for spatial pattern. We compared locations from successive dates using the bivariate form of the K function to look for spatial association of diseased trees in consecutive years. We found both random and aggregated patterns of infected trees in the beginning of the study period and significant association of infected trees between successive dates, particularly at short distances. The results indicate that fast, short distance spread of chestnut blight occurs within orchards which can possibly be explained by both natural propagation of the disease and management practices.

Poster Session **Biodiversity conservation and planning PB 11**

UNCOVERING CHIMPANZEE (Pan troglodytes) LANDSCAPE PATTERNS OF OCCUPANCY THROUGH A COUPLED GRAPH THEORETICAL AND HABITAT SUITABILITY MODELING APPROACH

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Pan troglodytes verus is considered one of the most endangered primates in the world due to habitat loss or degradation, and it is considered extinct in several regions of West-Africa. This study aims to uncover the patterns of chimpanzee occupancy at landscape level in southern Guinea-Bissau through a coupled graph theoretical and habitat suitability modeling approach. A spatially explicit model was constructed using a maximum entropy framework based on nest location data. Model performance was assessed using 10-fold cross-validation. Random Delaunay graphs were generated within a Monte Carlo simulation framework supported by remote-sensed land use/cover data, and shortest-path distance between patches of the same class measured. Other landscape compositional, structural and functional attributes were also used as independent variables. The developed model revealed an overall good performance. Highest suitability patches appear to be related with stable continuous forested areas where other forest patches can easily be reached

thus favoring zones with higher contiguity and connectivity of resources possibly translatable into more mobility for the animals' foraging raids. These analyses strongly impact landscape management actions and might help to develop fruitful conservation strategies for chimpanzees in Guinea-Bissau.

Poster Session **Monitoring landscape change PMo 13**

SPATIAL DYNAMICS OF SWEET CHESTNUT ORCHARDS IN A DISEASE-AFFECTED REGION

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Along with agriculture abandonment, sweet chestnut (*Castanea sativa*) diseases are important drivers of landscape dynamics in the northern regions of Portugal. Ink disease (*Phytophthora cinnamomi* Rands) has affected orchards historically but chestnut blight (*Cryphonectria parasitica* (Murrill) Barr) became a major cause of tree mortality after its establishment in 1989. We analysed the spatial structure of sweet chestnut plantations in the Curopos parish (Vinhais, Portugal) over the 1985-2006 period in order to understand the role of diseases in landscape dynamics. We mapped chestnut plantations in 1985, 1995 and 2005 from aerial photography and determined total chestnut orchard area, number of orchards, average orchard area, area of disease-caused mortality, and area and number of new plantations. Mortality was very high in both 1985-1995 and 1995-2005 decades, above 40% in area. New plantations represented more than 100% of the chestnut area in the first decade and near 50% in the second. New plantations were established in diseased-affected orchards (53%) and in marginal agriculture land recently abandoned (47%). The balance between mortality and new plantations resulted in a 75% net increment in area over the period of study. Number of plantations and average area also increased. We concluded that in spite of high incidence and tree mortality in Curopos over the last 20 years, there was relevant investment in new chestnut plantations which was responsible for relevant landscape dynamics.

Poster Session **Biodiversity conservation and planning PB 12**

ECOLOGICAL RESTORATION OF "CHICO MENDES" PARK ECOSYSTEM IN RIO DE JANEIRO

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The "Chico Mendes Municipal Natural Park" located on a sandbank area of "Jacarepagua Baixada" in the Rio de Janeiro City,Brazil, was created in 1989 with the aim of preserving species of flora and fauna from Atlantic Forest. With an area of 43 hectares, the park has the following forest types: Riparian (20 to 25 meters of height) and Gallery forest, Flooded and non-flooding (20 to 30 meters of height). In the arboreal stratum are found the "Pau Brazil" (*Caesalpinia echinata* Lam.), "Aroeira" (*Schinus* sp.), "Figueiras"(*Ficus tomentela*, *Ficus insipid* Willd.), among others trees species. To restore this ecosystem, the exotic species improperly planted allied with invader species were eradicated. Flora and fauna native species were reintroduced, as the Broad-snouted caiman (*Caiman latirostris*). In the ecological restoration methodology, a mosaic was used in a process of Forest Enrichment. Restoration mosaics had different shapes and four groups of diverse species were used. Due to fragility and richness of this ecosystem, the seedlings were distributed in esteemed spaces for each group without alignment. After 90 days, 35% of species were replanted. The results were satisfactory and the original environment was recomposed by the city of Rio de Janeiro.

Poster Session **Monitoring landscape change PMo 14**

LANDSCAPES IN TRANSITION - MONITORING IN AREAS OF LANDSLIDES

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The satellite images use has been very effective for monitoring the dynamics of the landscapes. Landscapes vulnerable to environmental disasters can be monitored by techniques of change detection, into different complexities. We reached to evaluate the technique application for detecting changes in the land use and occupation in areas affected by landslides in November 2008 in Morro do Bau, Santa Catarina State, which led to material and human losses. The study used four images from different dates between 1992 and 2009 (post-disaster). Vegetation index were developed using bands 7 and 4, minimizing the atmospheric and radiometric effects. Conclusions: the techniques used were effective to detect changes caused by the disaster, such as exposure to soil and sediment deposition; during the study period there was no deforestation in the area of landslides; so, the event had magnitude greater than the forests protection could promote, mainly by high rainfall period and intensity, combined with the high potential for mountains and the regolith formed by very fine sediments erosion, of Santa Catarina Complex Granulitic and the geological faults that control the valleys. Landscapes like this are subject to natural relief accommodation events; when associated with human occupation, there will inevitably be a disaster.

Poster Session **Monitoring landscape change PMo 15**

SIMULATION OF CLIMATE SCENARIOS FOR THE REGION OF CAMPOS GERAIS, STATE OF PARANÁ, BRAZIL

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This study aimed to simulate climate scenarios based on possible change to the region of Campos Gerais, state of Parana, Brazil. Originally defined as a phytogeographical region, the Campos Gerais understand the grasslands and savanna parks situated on the edge of the Second Paraná Plateau. In the forests of Campos Gerais, the Araucaria angustifolia is the main tree species, occupying portions of the plateau state of Parana whose floristic composition is strongly influenced by low temperatures and frost occurrence. Thus, using daily weather series as input data, stochastic climate models were parameterized to simulate the climate scenarios, based on projections of the Intergovernmental Panel on Climate Change (IPCC). The results achieved through analysis of air temperature graphs, presenting essential elements for a systematic reflection on the future of the floristic diversity of Campos Gerais, showed that an environment in the near future may be unfavorable to the development of species that today fully supplies the forests in this region.

Poster Session **Monitoring landscape change PMo 16**

THE DEFORESTATION OF LOESS UPLANDS OF SE POLAND AND ITS STAGES AS DOCUMENTED BY VALLEY DEPOSITS (CASE STUDY: BYSTRA RIVER VALLEY, LUBLIN UPLAND)

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A human impact on loess landscapes of SE Poland has been ongoing for 5 thousand years. Agricultural activity resulted in replacing the natural plant cover (mixed forests) by agricultural lands, mainly arable lands. In the

areas of diversified relief it has lead to the increase of intensity of geomorphological processes (soil erosion and gully erosion). Significant correlations between phases of human impact (phases of deforestation) on the environment and dynamics of gully erosion exists. Development of gullies on loess areas started on small scale in Neolithic and Bronze age (deforestation close to settlement). Described process became faster in the 10th and 14th century (first permanent deforestation). The maximum intensity of gully erosion was noted in 17th and 18th centuries (intensification of agriculture). Deforestation and one of its results – gully erosion – created a sedimentological and geochemical record in deposits accumulated in bottoms of valleys. Grain size parameters of the sediment clear indicate the origin of the material – it came from the gullies. An increased content of heavy metals in the sediments was also found, especially in a case of Cd and Pb. Deposition of finer sediments, containing more heavy metals started about one thousand years ago as a result of land use changes (mainly deforestation).

Poster Session **Biodiversity conservation and planning PB 13**

A COMBINED METHOD USING EXPERT KNOWLEDGE AND REMOTE SENSING FOR HABITAT INTERPRETATION AND MAPPING: A NATIONAL LEVEL EFFORT TO MAP TEMPERATE FOREST HABITATS IN FRANCE

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To protect our environment, ensure sustainable use of its natural resources and maintain an acceptable level of biodiversity several national and international legal mechanisms have been set up (EEA 2007). Protection requires monitoring to see how effective these nature conservation programmes and Directives are. Following the same logical thinking, monitoring which we all agree it is essential, requires habitat mapping and a good set of biodiversity indicators. Within this agenda, Member States are at different stages of implementing European Directives and applying national monitoring systems for a diverse range of purposes. Within this framework we present the first approach undertook by France in order to map natural and semi-natural forest habitats. The method is based on the establishment of ecological habitat classifications, using field data from botanical inventories, ancillary information and segmentation based remote sensing classification. These methods simplify the dataset and provide a classification scheme with an objective basis. The characteristics and discriminating features of each habitat can be identified and used to make a clear description of the habitats, following a hierarchical scheme, thus facilitating its use and interpretation according to the Habitats Directive. Combined soil information, climatic and ecological information was proven effective to improve the scheme for the French forest habitats mapping.

Poster Session **Monitoring landscape change PMo 17**

REGIONAL INDICATORS OF FOREST BIODIVERSITY IMPACTS FROM CLIMATE CHANGE IN THE EASTERN UNITED STATES

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Altered environmental conditions associated with climate change may impact the short-term ability of forest tree species to regenerate in many locations. In the longer term, tree species unable to adapt to the new conditions may have to shift to new locations or face local extirpation. Over both time frames, forest tree

biodiversity may change in unexpected ways, particularly across large areas. We have created a set of indicators to track regional changes in forest biodiversity in the eastern United States. We used repeated measurements, five years apart, of Forest Inventory and Analysis (USDA Forest Service) data from nearly 7,000 plots in four Northern and four Southern states to quantify changes in species diversity and evolutionary diversity for trees and seedlings. Results suggest that tree biodiversity in the North and South has increased in recent years, while seedling biodiversity may be decreasing in the North and increasing in the South. Although relating these results to climate change may be tenuous, these indicators may be a useful tool for tracking climate-related biodiversity change as forest inventory coverage expands and remeasurement occurs over the entire United States.

Poster Session **Disturbances PD 6**

COMBINING MULTI-CRITERIA EVALUATION AND GEOSTATISTICS TO PREDICT POST-FIRE REGENERATION OF PINUS HALEPENSIS AT A REGIONAL SCALE

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After the catastrophic fires in southern Greece during 2007, public demand set as priority an effective post-fire rehabilitation strategy. Due to the great variability of P. halepensis's regeneration, a GIS based model was developed and adjusted according to the local ecosystem. The model aims to predict the natural post-fire regeneration of P. halepensis to detect forest patches that possibly require human intervention. The model combines a multi-criteria evaluation (MCE) and a geostatistical model according to Bayesian statistics. Seven environmental parameters were standardized using Fuzzy functions and combining means of a weight average. These parameters were suggested to be significant in controlling natural regeneration process by both statistical analysis and expert opinion estimation. The geostatistical model was based on field data (84 sites) using the Ordinary Kriging algorithm. Applying Pearson correlation, we detected a strong congruence ($r=0.81$, $p<0.001$) between the numbers of P. halepensis seedlings detected in the field and those estimated by the model. According to the final model of natural regeneration probability, a 30% of the area was investigated to need some level of forest restoration. This finding establishes our model as an important tool for any further management plans.

Poster Session **Monitoring landscape change PMo 18**

SPATIOTEMPORAL CHANGES AT THE NORTHERN LIMIT OF TREE DISTRIBUTION IN QUEBEC SINCE 1970

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The effects of climate change are already detectable in many taxa. Trees are an informative indicator of range dynamics because of the close association between climate and plants. Range shifts at the northernmost limit are likely to be the dominant response and may be more reflective of long-term shifts because displacement occurs over generations. One concern, however, is whether plants will be able to track shifting suitable habitats. It is imperative to understand these dynamics to better mitigate impacts. The overall objective of this research is to study spatiotemporal trends at the northern limit of tree distribution in Québec, Canada between

1970 and 2000 as a response to climate change. The difference in latitude (DIL) method aims to quantify shifts in tree and sapling distribution limits through time to determine whether a northward displacement is evident. The ratio method will look at spatial changes in per-site count ratios to assess whether distribution-wide abundance gradients have also shifted northward. The outcomes of this research will further understanding of tree migration patterns with respect to rapid warming. This research is part of the Climate Change and Biodiversity project (CC-Bio) (http://cc-bio.uqar.qc.ca)

Poster Session **Patterns and processes PP 6**

MODELING DISTRIBUTION OF INVASIVE TREE SPECIES IN RELATION TO CLIMATE AND LAND USE CHANGE ALONG NEOTROPICAL LANDSCAPES

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The Yungas montane forests of NW Argentina are a diverse ecosystem that plays a key role in protecting water resources for millions of people living in the fertile foothills. In this region precipitation has increased in association to global climate change, and extensive grazing has decreased as a consequence of socioeconomic changes. Both factors promoted forest recovery. However, an increasing proportion of these secondary forests are dominated by *Ligustrum lucidum*, an exotic tree species, making new forests ecologically different from the original ones. Current trends in climate and land use suggest that *Ligustrum* forests may cover tens of thousands of hectares in the coming decades. This study developed predictive distribution models of *Ligustrum* in response to climate and land use changes along Yungas based on MAXENT and GARP niche models; and compared successional trends and animal communities in *Ligustrum* and native-dominated secondary forests. The results will help to explain to predict "invasive" behaviour of *Ligustrum* and its potential effects on the ecological servies (carbon sequestration, biodiversity protection, watershed conservation) of these mountain ecosystems.

Poster Session **Tools of landscape assessment and management PT 12**

WHEN IS THE ROLE OF HABITAT PATCHES AS CONNECTING ELEMENTS REALLY IMPORTANT? AN ASSESSMENT THROUGH THE ANALYSIS OF SIMULATED AND REAL-WORLD HABITAT PATTERNS

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Managing landscape connectivity is crucial for maintaining biodiversity as it can alleviate the synergistic effects of fragmentation and habitat loss. Indices based on graph theory and on the concept of measuring habitat availability at the landscape level have been shown to be an appropriate way to guide decision making regarding landscape connectivity. We quantify the three different ways in which habitat patches contribute to overall landscape connectivity by partitioning the values of the Probability of Connectivity index (PC). We evaluate the relative importance of each of those roles as a function of (1) forest spatial pattern and abundance and (2) species dispersal capabilities, emphasizing the stepping stone effects. For this purpose, we evaluate a wide array of simulated landscapes patterns covering different scenarios of fragmentation and habitat loss and we analyze real-world data on an endangered forest bird specie habitat in Catalonia (Spain), to identify the critical landscape elements for the maintenance of its habitat connectivity. We discuss how such methodology can be used to determine in which situations management should concentrate most on the preservation of the role of habitat patches as connecting elements that contribute to uphold connectivity in a wider landscape context.

Poster Session **Tools of landscape assessment and management PT 13**

ASSESSMENT OF CONNECTIVITY ELEMENTS IN BAIRD´S TAPIR HABITAT IN GUATEMALA.

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Assessing landscape structural connectivity with morphological spatial pattern analysis is gaining more acceptance. New tools for landscape assessment as software GUIDOS use this approach to detect connectors in digital images of landscapes. The morphological spatial pattern of Baird´s tapir habitat was analyzed with this tool in order to identify structural connectivity elements. A reclassification of the 1:50,000 map of land cover of Guatemala was performed selecting broadleaf forests and wetlands as potential habitat for this species. The elements found were 88 loops corresponding to 1.34% of the total area of the habitat; 1,274 branches corresponding to 11.28%; 243 bridges corresponding to 4.09% and 2,340 islets corresponding to 14.22%. This information can help stake holders to propose management measures that would strengthen landscape connectivity (eg. management of islets as stepping stones) and minimize negative impacts of global changes on the landscapes of Bair´s tapir habitat in Guatemala.

Poster Session **Patterns and processes PP 7**

THE EFFECTS OF LAND COVER CHANGES ON THE HABITAT MORPHOLOGICAL SPATIAL PATTERN AND POPULATION VIABILITY OF BAIRD'S TAPIR IN LAGUNA LACHUÁ NATIONAL PARK, GUATEMALA.

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The current morphological spatial patterns (MSP) of forests, produced by human activities, have disturbed populations of large mammals at a level that most of them are threatened, such as Baird's tapir, the largest terrestrial mammal in the Neotropics. We intended to evaluate how changes in land cover (1960-2003) have affected the population viability (PV) of this species. The area evaluated was the minimum quadrangle that includes Laguna Lachua National Park and the two nearest protected areas. Using land cover images we determined the MSP in different years using GUIDOS. PV was modeled using VORTEX. Changes on the land cover reduced the species habitat from approximately 95% of the area to 46%, and produced a fragmented MSP. From 1960 to 1983 the majority of the area was core with a few perforations, some of them natural. In 1991 more than the 50% of the core was loss, since then, the reduction of corridors, islets and branches, increased the isolation of the park. These changes in the MSP dropped the PV from 0% to 100% probability of extinction. Results show that habitat modification has accelerated the extinction process. Redirect this tendency is a challenge to land use planning and wildlife conservation.

Poster Session **Urban Forestry PU 4**

BENEFITS OF URBAN GREEN SPACES IN NOISE, AIR QUALITY AND THERMAL COMFORT: THE CASE STUDY OF BRAGANÇA

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Urban green areas provide multiple environmental services, contributing to high-quality environments in our cities. With the purpose of evaluating the influence of urban green spaces in air quality, noise and thermal comfort, a research was developed throughout the last 4 years in the city of Bragança, Portugal. All these aspects were approached from physical and social perspectives. The physical approach involved several studies at urban and green space scales. Field experiments covered such areas as measurements of air pollutants concentrations (ozone, nitrogen dioxide, volatile organic compounds and PM10), sound pressure levels, meteorological and other parameters related to thermal comfort. The social approach consisted in assessing perceptions of citizens over green spaces and their influence on the environment, alongside with the assessment of their attitudes towards those spaces, by means of specific questionnaires applied to a representative sample of local inhabitants. Results showed the relevance of the green spaces in contributing to ameliorate air quality, create more pleasant soundscapes and provide better thermal comfort conditions, especially in spring and summer. Relations between benefits of green spaces and their size, their physical and biological diversity, and their location were found. These characteristics were also identified by respondents as key factors in a moment of selecting a green space to pass the time and to enjoy part or all services it can provide. In the opinion of the respondents, those factors are crucial in maximizing many environmental and social functions of urban green spaces.

Poster Session **Tools of landscape assessment and management PT 14**

FIRE - CRIME OR "AGRICULTURAL IMPLEMENT"

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Fire is to rural mountain community's more than one element. Thus, as water and wind are used for mills and land provides the livelihood, Fire has its role in the rural cycle. Fire has always had an imperative role in shaping the traditional agro-ecosystems. The last decades have witnessed a growing bureaucracy and ban its use as an "agricultural implement". Policies shouldn't prohibit this management tool but rather to support those who are still in possession of this empirical knowledge. The legislation would have to get closer to rural needs and not vice versa. The "level" in which it is locate requires "steps" that do not exist or are invisible by the recipients, preventing them from manage their lands legally. The current bureaucratic system unworkable and constantly changing, in addition to the lack of resources and support, carry the local people to wear the role of criminals and resorting their actions to a fire inappropriately and bewildered, reflected in spectacular numbers of ignitions and burned area. The most effective and feasible way to restore and manage an agricultural ecosystem must pass by the stakeholders involved, because they are those that with the use, give it life and sustainability.

Poster Session **Biodiversity conservation and planning PB 14**

ECONOMIC ESTIMATION IN PLANNING OF USING OF PRESERVATION OF NATURAL LANDSCAPES

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The economic-geographical analysis of wildlife management in the Tomsk region has shown that with a view of maintenance of a sustainable development of territory economically preservation of natural properties of wood on manufacture of a foodstuff, medicinal raw materials, minor wood resources will be more effective. This direction of wildlife management is capable to provide multiplicate economic benefit of preservation of a habitat of dwelling of animal and fish resources, and also development of recreational use of wood for amateur hunting and fishery. In the Tomsk region of the population of 25 % of area lives in 12 areas (50 % of territory of area) where biological resources are a basis of existence of the population. It is necessary to pay attention to wild-growing products of wood which do not demand expenses for reproduction, the estimation of their exhaustion in local territories in connection with industrial preparation of wood at the same time is necessary. It is necessary to provide preservation of traditional places of mass growth of mushrooms and berries, nuts for the purpose of prevention of blasting of their stocks in interests of local population for which дикоросы are an additional source of incomes. On the basis of creation of system of their account and an estimation. Monetary estimations of natural resources taking into account a social factor reflect economic-geographical features of territory, are indicators of stability of wildlife management and can be used in management as an ecological monitoring component. The author proves necessity of preservation of natural landscapes for the purpose of maintenance of steady use of biological resources

Poster Session **Monitoring landscape change PMo 19**

CHARACTERIZATION OF A Maculinea alcon POPULATION IN THE ALVÃO NATURAL PARK (PORTUGAL) BY A MARK-RECAPTURE METHOD

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The aim of this research was to estimate the parameters that characterize a *Maculinea alcon* population located at the Alvão Natural Park, by the repeated marking-release-recapture method. This method consists in the capture of as many individuals as possible which are individually marked and then released. After three days, sampling was repeated and the basic parameters of population dynamics were estimated on the basis of the rate marked vs unmarked *M. alcon* captured. Sampling was made during the flight period between 2007 and 2009 and the results showed that maculinea population density has increased. At the peak of the flight period, the estimated number of maculinea adults was 201 in 2007, 392 in 2008 and 1600 in 2009. Results indicated also that the males capture was higher at the beginning of the flight period while females increase gradually over the flight period in the studied years. The ratio male/female was 0.9 in 2007, 1.4 in 2008 and 1.2 in 2009.

Poster Session **Biodiversity conservation and planning PB 16**

CONTRIBUTION TO THE CHARACTERIZATION OF Gentiana pneumonanthe L. AND Maculinea alcon L. DISTRIBUTION IN THE ALVÃO NATURAL PARK

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The aim of this research was to study the distribution of *Gentiana pneumonanthe* in the geographic area of Alvão Natural Park, in order to determine the area of *Maculinea alcon* expansion as well as the region's potential for development and conservation of this butterfly species. Due to the ecology needs of *Maculinea alcon* L (simultaneous presence of *G. pneumonanthe*,the host plant,and *Myrmica* sp., ants that adopt *M. alcon* on its larvae stadium), we made a survey of plants, butterflies and ants' nests, using a DGPS. Data collected during the field work was then used to create a GIS, in order to analyse the relationship between plants, ants and butterflies. The results show that the land with less soil human disturbance was the most favourable habitat to the plants development as well as to the ants and, therefore, to the presence of butterflies.

Poster Session **Urban Forestry PU 5**

NITROGEN-USE EFFICIENCY AND ECONOMIC EFFICIENCY OF SLOW-RELEASE N FERTILISERS APPLIED TO AN IRRIGATED TURF IN NE PORTUGAL

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Urban forestry and urban greening are at the top of the political agenda, since they beautify the landscape and improve the health and well-being of urban dwellers. They also bring several ecological benefits such as air cleansing, carbon sequestration and storm water retention. However, their social and ecological benefits can be reduced by an inappropriate management. An unbalanced N fertilization program, for instance, may lead to water and atmospheric pollution due to nitrate leaching and greenhouse gas emissions. In this work, the effect of three slow-release fertilisers was compared with a conventional fertiliser in a turf of the Instituto Politécnico de Bragança, Portugal. The fertilisers used were: Floranid 16-7-15 (slow-release fertiliser, IBDU/Isodur); Basacote 9M 16-8-12 (controlled-release fertiliser, copolymer ethylene acrylic); Nitroteck 20-8-10 (stabilized fertiliser, dicyandiamide + coating with polyterpene); and Nitrolusal (ammonium nitrate, 20.5% N) split into two fractions. Based on DM yield, N concentration in dry material and fertilisation costs, indices of N-use efficiency and economic efficiency were estimated. The results showed that Basacote released less N than that required for an adequate plant growth in early spring. Moreover, the release period seemed to be negatively longer than that specified by the manufacturer. Nitroteck, Floranid and Nitrolusal showed similar N-use efficiency. The indices of economic efficiency ordered the slow-release fertilisers as Nitroteck > Floranid > Basacote.

Poster Session **Management and sustainability PM 8**

ADAPTABILITY OF NEW PROVENANCES OF QUERCUS SUBER IN TRÁS-OS-MONTES, PORTUGAL: ITS IMPORTANCE FOR THE SUSTAINABILITY OF THE FOREST SYSTEMS.

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Quercus suber (Cork oak), an important species in the areas of Mediterranean influence, presents high potential of expansion regarding expected climatic changes. Nowadays, cork oak area in Trás-os-Montes is 6380 hectares and is an important species to consider in the adaptive silviculture strategies in response to the climatic changes. Cork oak woodlands plays an important role on the rural economy, as a source of cork, high quality fruits for cattle, pastures, aromatic and medicinal plants and game habitat. Despite its ecological and socio-economic importance, cork oak adaptability to environmental conditions is poorly understood. Furthermore, climate change scenarios foreseen enhanced water deficits in the Mediterranean region and therefore, to allocate the most adequate seed sources to each set of climatic conditions in future afforestation activities, is an important task for forest landowners. Considering that an important source of variation in the characteristics related with adaptability may be at the provenance level, we evaluated inter-provenance variability at a trial in Mogadouro (Trás-os-Montes). Such trial is part of a multi-locality provenance test belonging to an Euforgen network, where 35 populations from the natural cork oak distribution area are represented. After ten years, results point out the importance of considering the seed origin: significant differences between populations were observed for survival and height. The highest growth is being observed in the Moroccan provenances and French ones showed lowest survival.

Poster Session **Management and sustainability PM 9**

FOREST MANAGMENT AS A TOOL FOR LANDSCAPE RESTORATION IN THE BRAZILIAN ATLANTIC FOREST

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The Brazilian Atlantic Forest (BAF) is considered a global hotspot of biological diversity. Therefore, countering the effects of past forest loss and fragmentation via habitat protection and restoration should be treated as crucial priorities in this biome. The most used restoration technique is the planting of many native species from different functional groups. Our goal was to find species that can be managed, supply important forest products, and also used in restoration projects. A secondary data was searched and analyzed to list these species. A total of 48 tree species were identified as raw material for forest products management. These supply 22 categories of timber and non-timber products. Moreover, the natural distribution of these species was analyzed aiming at trees of possible use in large scale projects. Two species were restricted to one Brazilian state only, six were distributed in one region, 21 occurred in two regions and 19 species were scattered along the coast. The vast majority of species (80%) had a widespread distribution along the Brazilian coast, so theoretically, these should be more suitable for projects involving restoration and management.

Poster Session **Management and sustainability PM 10**

RELATIONSHIP BETWEEN ANIMAL BEHAVIOUR AND LANDSCAPE ATTRIBUTES IN NORTHEAST OF PORTUGAL

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The small ruminant production system in Northeastern Portugal is an extensive activity based on the exploitation of spontaneous resources. The shepherds direct their flocks on daily grazing itineraries over different land use types. These circuits differ hugely throughout the year in organization and duration. The places visited and time spent in each land use type depend on the environmental conditions and needs of the animals. Four flocks (two of goat and two of sheep) were monitored monthly for a year. Each flock was observed for a complete day by an operator using a hand held GPS. Data collected consists of geographical position and type of land use crossed, plus some variables of territory such as slope, altitude and air temperature. Also, animal behaviour was monitored. Behavioural activities (grazing, browsing, resting and walking) and the grazed species were noted every 15 minutes by direct observation (instantly recorded). The corrected frequencies approach was used for the data analysis. The principal aims were to examine the relationship between animal behaviour and land use types, and to check how it changes throughout the year and the time of day (temperature effect and vegetation moisture). Our results suggested a strong relationship between land use types and behavioural activities.

Poster Session **Management and sustainability PM 11**

ASSESSMENT OF HUMAN AND PHYSICAL FACTORS INFLUENCING SPATIAL DISTRIBUTION OF VEGETATION DEGRADATION - ENVIRONMENTAL PROTECTION AREA CACHOEIRA DAS ANDORINHAS, BRAZIL

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This study examined the influence of human and physical factors in the spatial distribution of vegetation degradation in the Environmental Protection Area Cachoeira das Andorinhas (Brazil). Landsat TM image, topographic map, DEM and secondary data were used for generation of maps of the human and physical factors examined. Those factors comprised: roads network, rural settlements/village/city, tourist sites, mining sites, agricultural areas, drainage, slope and geology. The diagnosis of vegetation degradation was made with utilization of five ecological indicators: cover of invasive species, understory, canopy, bare soil and dead shrub percentage. The sample plots (47) were classified according to vegetation degradation variations. Regression and correlation analyses were used to investigate the relationship between vegetation degradation and human and physical factors. The factor slope presented significantly negatively correlated to vegetation degradation in forest areas. Distance to tourist sites showed significant negative correlation to vegetation degradation in the savannah and rocky shrublands formations. Those factors can enhance accessibility of humans and livestock to natural vegetation areas, which may increase intensity of damaging activities in areas of lower slope and shorter distance to tourist sites. The information can contribute to improvements in conservation management strategies in the protection area.

Poster Session **Biodiversity conservation and planning PB 17**

LANDSCAPE STRUCTURE OF A CONSERVATION AREA AND ITS SURROUNDINGS IN MINAS GERAIS STATE, BRAZIL

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This study examined the suitability of a conservation area establishment through the investigation of the landscape spatial structure inside and outside the area. The land cover mapping was performed using CBERS image, supervised and unsupervised classification. Landscape metrics were calculated utilizing Fragstats 3.3 software. From the total conservation area and surrounds the forest to be preserved represented 8.43% and grasslands 6.63%. The 6 forest and 35 grasslands patches were equivalent to 1.76% and 25.54%. The presence of a large forest patch inside the conservation area (1.529, 20ha) revealed the preservation of a rare patch in the landscape. The shape index varied from 1.68 to 2.02. The core index was higher for the forest patches (92.73%). Mean distance among patches was 224.93m (forest) and 109.82m (grasslands); 50.00% of forest patches and 57.14% of grasslands presented distances lower than 100m. The pastures showed high juxtaposition index (95.41%). The overall pattern denoted low influence of the edge effect and reasonable connectivity among patches. Conservation planning for the area has to take into consideration that free grazing can be a source of impacts. Measures for the surrounding areas maintenance as a buffer zone can enhance the flux among patches inside and outside the area.

Poster Session **Monitoring landscape change PMo 20**

MONITORING VULNERABILITY OF THE SPANISH FOREST LANDSCAPES: THE SISPARES APPROACH.

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SISPARES is a system developed to study the ecological evolution of the Spanish Rural Landscapes including their characterisation, classification, and recent past and future changes. It is based on a sampling network of 215 permanent 4x4 km plots surveyed by using aerial photographs of three dates: 1956, 1984 and 1998. Currently, a new survey is going on. The network design was based on an environmental stratification of Spain well linked to the European Environmental Stratification. Forest Landscape Vulnerability (FLV) is defined as the risk of human disturbance, especially forest fires. We assessed FLV using an index based on Forest Landscape Fragility (FLF) weighted by Road Accessibility. FLF is defined as the risk of landscape disturbance caused by a high degree of interspersion and juxtaposition between patches of forest and non forest land uses: The non forest land uses, such urban, crop and managed grassland, are considered as potential sources of human disturbances, for the forest land use patches, including woodland, “matorral”, “dehesa”, tree plantation and riparian woodland.

Poster Session **Biodiversity conservation and planning PB 18**

TWO OWLS' SPECIES AS A SURROGATE FOR BIODIVERSITY VALUE IN THE FRENCH ALPS FORESTS

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The problem in biodiversity monitoring and conservation is that usually exist vast gaps in available information on the spatial distribution of biodiversity that poses a major challenge for the development of biodiversity indicators and regional conservation planning. Within this context, the concept of habitat quality is fundamental to the study of ecology. For woodland birds, the problem of quantifying quality is compounded by a three-dimensional complexity of the habitat, much of which is out of reach from the ground, and by the mobility of the birds themselves. Measurements of habitat structure, offer the potential to directly predict quality (in terms of physical structure and plant species composition). An example using two bird species, Tengmalm owl (*Aegolius funereus*) and Pygmy owl (*Glaussidium passerinum*) is presented as indicator of forest biodiversity. Maximum entropy (Maxent) modelling is used to model the distribution of these two species within a large study area in the French Alps. Maxent is a presence-only modelling approach with a proved good potential to predict wildlife distribution. Despite biased sampling design, this method performs very well in predicting spatial distribution of the two owl species. Results are then used as criteria in the habitat biodiversity value index.

Poster Session **Monitoring landscape change PMo 21**

IDENTIFICATION OF CLIMATIC TRENDS FOR SOME LOCALITIES IN THE SOUTH REGION OF CAMPOS GERAIS AND SURROUNDINGS, STATE OF PARANÁ, BRAZIL, THROUGH THE ANALYSIS OF HISTORICAL DATA OF RAINFALL AND TEMPERATURE

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This study aimed to assess possible changes in climate municipalities in the southern region of Campos Gerais (Fernandes Pinheiro, Lapa, Ponta Grossa), Parana, Brazil. The forest vegetation occupies about 22% of the area of Campos Gerais, including different types and successional stages. These forests have naturally fragmented, forming isolated groves of various sizes and extensions, located on the slopes, small depressions or tracks that come in rivers, streams and springs. To investigate possible changes in climate, we analyzed daily temperature (maximum, average and minimum) and precipitation, which applied the nonparametric test of Mann-Kendall. Data analysis revealed an increase in average and minimum temperatures in the three locations analyzed. For the maximum temperature only the city of Ponta Grossa showed negative trend, a fact explained by the increase in cloudiness in the region. For rainfall data, the city of Ponta Grossa and Fernandes Pinheiro had a positive trend, while in Lapa precipitation showed a negative trend.

Poster Session **Monitoring landscape change PMo 22**

ANALYSIS OF RAINFALL IN THE VILA VELHA STATE PARK, PARANÁ, SOUTH OF BRAZIL, IN THE PERIOD BETWEEN 1954 AND 2001.

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The objective of this study was to perform a temporal analysis involving frequency, intensity and variability of rainfall occurred in the State Park of Vila Velha, near the city of Ponta Grossa (PR), between January 1954 and December 2001. Data of daily rainfall (mm) were analyzed obtained from the Meteorological Station located inside the State Park of Vila Velha, State of Paraná, South of Brazil, which constitutes a Conservation Unit with an area of 5,032,384.00 m2 and presents vegetation of open grassland and scattered clumps of forest, with the focus on the Paraná Pine (*Araucaria angustifolia* (Bertol)). As partial results it was found that the high average annual rainfall for the series studied was 1546.2 mm, revealing a growing trend over the years and that the five largest total annual rainfall occurred in El Niño years (1998 , 1983, 1957, 1993 and 1990). The month with the highest average rainfall was January and was the lowest average was observed in August. Summer is the most rainy season, including the highest number of days with rain. The range of "very low rainfall" showed the highest frequency in all months.

Poster Session **Biodiversity conservation and planning PB 19**

ECOTOURISM AND CONTROLLING FOREST STAND DAMAGES. CASE STUDY: VARZEGAN DISTRICT NORTH WEST OF IRAN

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This paper aim to show using ecotourism how can protection the lands, forest stands and biodiversity or not? In addition to preserving forest ecosystems and biodiversity, natural protected areas in Arasbaran are homelands for people, largely indigenous, who traditionally base their resource management on a multiple use strategy. We analyzed land use and land cover changes in the Varzegan district in the Arasbaran Northern west of Iran, where Varzegan recently incorporated ecotourism to their set of economic activities. We evaluated changes in land use using vegetation maps from 1997 to 2002 based on Enhanced Thematic Mapper (ETM+), land sat 7 and predicted vegetation cover in 2010 by developing a cellular automata and Markovian chains model. So we selected 2 parts at study area for controlling of damages and monitoring of ecotourism effects on the area. We used two scenarios to predict land cover in 2010: (a) forest ecosystems and biodiversity implemented at the same rate; (b) forest ecosystem and biodiversity decreases due to the growing demand of ecotourism. Both scenarios predict slight change in the area. Results provide guidelines for managing natural resources managements, suggesting that forest stand protection, biodiversity conservation and ecotourism are compatible activities.

Poster Session **Monitoring landscape change PMo 23**

REMOTE SENSING AND CHANGE DETECTION TO LAND-USE CHANGING(CASE STUDY: NORTH WEST OF IRAN)

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Arasbaran is located in east Northern part of East Azerbaijan province that for the reason of the having of Mountainous forests and, special standing condition destruction the Increase duration the time, was changed to fragile ecosystem. In this study, Maximum likelihood supervised classification and post – classification change detection techniques were applied to land sat images acquired in 1987 and 2002. Respectively, to map land cover changes in the North western forests of Iran. A supervised classification was carried out on the six reflective bands for the two images individually study area, It was found that integrating visual interpretation with supervised classification led to increase in the overall accuracy by about 12 percent The study area has undergone a very severe land cover change as a result of Mismanagement and Economical condition A considerable increase in Range land has taken place as well as increase in Agricultural land. The area of forest stands has decreased considerably Integrating GIS and remote sensing provided valuable information on the nature of land cover changes especially the area and spatial distribution of different land cover changes. The main causes of land degradation in the study area are converting of forest stands to Range lands, Range lands to crop lands, and converting of crop lands to bare lands This problem show sere to be continue for disclimax and needs to be Seriously studied, through multi – dimensional fields including socio economic, in order to Environmental evaluation and new planning for ecosystem management.

Poster Session **Patterns and processes PP 8**

LAND USE AND COVER CHANGE IN SOUTHERN MEXICO: EVIDENCE FOR CHANGING TRENDS IN A HIGHLY DYNAMIC LANDSCAPE

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Land use and cover change (LUCC) constitute the most important factor for environmental degradation and biodiversity loss. Recently, a discussion started about a paradigm change from deforestation to forest transition for the Neotropics. In this study patterns and processes of LUCC and deforestation were analyzed for the Grijalva-Usumacinta watershed, one of the hydrologically and biologically most important watersheds in Mexico, in order to test the hypothesis of changing trends on a regional scale. For this purpose change maps, change rates and change probabilities were calculated for two time periods, including newly available data for 2007, and summarized inflow charts of the principal LUCC transitions and dominant LUCC processes were identified. The study showed a stagnation of deforestation and LUCC rates and probabilities, together with a growing natural reforestation process, but there is still no evidence of net reforestation since deforestation and degradation still outweigh the vegetation regrowth. The pattern of deforestation and degradation at large scale changed to a smaller and more diffuse one. Even though a trend towards landscape stabilization was observed, considering the still high absolute change rates, the processes of deforestation and forest degradations still play a primordial role for biodiversity conservation and it's planning.

Poster Session **Biodiversity conservation and planning PB 20**

ELECTRICAL NETWORK HAZARD ASSESSMENT FOR THE AVIFAUNA IN PORTUGAL

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The suspended electrical network represents a danger to the birds' wildlife conservation, both because of the possibility of collision and electrocution. Land use and land cover type are strictly related to birds' presence, eating habits and nesting. This way they are factors that are directly related to collision and electrocution hazards. This work was based on the occurrences geographical position (GPS) and the location of suspended electrical network. The available data were used to create a GIS in order to calculate hazard maps. These maps were created by means of geostatistical processes and multivariate analysis. The final results indicate that approximately 46% of the total (km) electrical network analysed are classified with the two higher hazard classes in the case of electrocution, and about 40% in the case of collision. The classification maps show that the danger of electrocution is greatest in the central and southern Portugal, and the danger of collision is higher especially in the central region.

Poster Session **Scaling in landscape analysis PS 2**

RESTORATION AND EVALUATION OF SATOYAMA/SHRINE FOREST LANDSCAPE ANALYZED WITH HABS(THE HISTORICAL AGRO-ENVIRONMENT BROWSING SYSTEM) AND A COLLECTION OF OLD PICTURES PAINTED IN THE MIDDLE 19TH CENTURY

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The purpose of this study was to clarify the landscape of shrines, temples and Satoyama forests in the 19th century "Shimousa" area, the region extending from northern Chiba to southern Ibaragi. We used two types of historical sources for analysis and used GIS. One was historical pictures named "Shimousa Meishou Zue", a collection of old pictures painted in the middle 19th century, and the other was the rapid survey maps produced by the Historical Agro-Environment Browsing System (HABS). The results indicated that the historical pictures and maps contain sufficiently accurate information to identify the landscape: 94.7% of pictures were found at their current name and position, and 42.1% of pictures had been restored to their location and view at that time. The vegetation of shrines, temples and satoyama forests was the same type of tree: over 90% of shrine forests consisted of pine trees.

Poster Session **Biodiversity conservation and planning PB 21**

PARTICIPATORY ACTION RESEARCH CONCERNING THE LANDSCAPE USE BY A NATIVE CERVID IN A WETLAND OF THE PLATA BASIN, ARGENTINA

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The marsh deer is one of the few deer species restricted to wetland habitats. The Delta of the Paraná River holds one of the three main populations of this species in Argentina and it is considered threatened at both

national and international level. Part of the natural vegetation of this wetland has been converted to industrial forests and cattle ranches after draining the land. Thus, the subsistence of the species at the landscape level may depend on its adaptation to the altered habitats and the attitude of the local people towards the marsh deer. Based on interviews to 23 stakeholders, we evaluated their perception about how this cervid uses the landscape and what threats this species is facing. The cervid were registered in poplar (26.9%), and willow (19.2%) afforestations and, to a lesser extent in dirty roads, freshwater marshes and pastures. Sixty percent of the interviewers agreed that afforestations with low management (with understory foliage) function as refuges. In turn, the interviewers agreed that the current hunting level is the biggest problem for the regional marsh deer population and they are willing to collaborate in controlling it. Livestock also was considered as a potential source of disease for cervids.

Poster Session **Management and sustainability PM 12**

UTILIZATION OF NON-WOOD FOREST PRODUCTS IN A TRANSITION ECONOMY: RURAL UKRAINIAN ROZTOCHYA REGION AS A CASE STUDY

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Sustainable use of non-wood forest products (NWFPs) is a component of sustainable forest management. NWFPs provide important use and non-use values to stakeholders in rural landscapes. However, sustainable use of non-wood goods, ecosystem services and landscape values require planning and regulation. The aim of this study was to investigate utilisation of NWFPs by different local stakeholders in Ukraine's rural Roztochya region. This region is an important forest corridor across EU's Eastern border and plays a vital role for biodiversity conservation at local to EU levels. First, we analysed national and international policy documents, national and regional management regulations concerning the use of NWFPs. Second, using open-ended interviews with local forest users and a questionnaire survey in villages, we studied the reasons for collection, methods of collection, amount harvested NWFPs by different forest users, traditional practices of NWFP utilization, and how these have changed during the past decade of economic transition. The results show that NWFPs provide important livelihood resources for many rural communities. We discuss the need to develop a strategy for sustainable management of NWFPs in countries in transition from socialistic planned to market economy, like Ukraine.

Poster Session **Patterns and processes PP 9**

ECOLOGICAL ASPECTS OF SOILS DEFLATION DEVELOPMENT IN AGROLANDSCAPES OF THE SOUTH-EAST OF THE WESTERN-SIBERIAN PLAIN

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The observations made from 1985 to 2008 have shown than aeol processes in the agrolandscapes of the South-East taiga in the Western-Siberian plain during the cold season of the year (October – April) develop each year. Deflation affects the grey forest soils in the plowing areas which have no snow at all. The soil deflation intensity is determined according to the two factors: blowing out of the soils' depth at the definite period of time and the aeol particles content in the snow. The average soils blowing out depth changes from 0, 01 to 0,4 mm. During the cold season of the year less than 50 g/m2 to 824 g/m2 are accumulated in the snow (2003). Up to 90 % of dust, 21% of fine sand and up to 30,4 % prevail in the aeol deposits composition. The aeol processes

lead to the taking out of the central, nutritional plant elements, migration of the chemical elements and their accumulation in the areas of forest belts and edges, and relief-depressions as well. Humus content in aeol deposits reaches 3,53 %, nitrogen-up to 0,62 %, phosphorus – 0,56 %. Heavy metals are also present, they are the following: Pb plumbum = lead up to 16 g/t; Cu copper up to 95 g/t; Zn zink up to 68 g/t; Ba barium up to 860 g/t; V vanadium up to 146 g/t.

Poster Session **Biodiversity conservation and planning PB 22**

INFRASTRUCTURES FOR HUMAN MOBILITY AND BIODIVERSITY CONSERVATION IN EUROPE'S WEST AND EAST: TOWARD INTEGRATED DECISION-MAKING FOR SUSTAINABLE LANDSCAPES

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While transport infrastructures for mobility of humans and goods tend to increase with economic development, the functionality of habitat networks for biodiversity conservation tend to deteriorate. Planning to resolve this challenge is particularly difficult in inter-regional and trans-national contexts. This paper provides a foundation for systematic analyses of governance and management of interactions between linear complexes of man-made transport infrastructures, and functional networks of natural and cultural landscapes for biodiversity conservation. Because transport infrastructures form a frontier of economic development that moves toward the eastern border of EU, the functionality of habitat networks becomes increasingly vulnerable. Plans and scenarios of economic development along the border of the European Union and Ukraine suggest that this frontier of change will negatively affect forest and woodland landscapes with high ecological and cultural values. We discuss how trans-national landscape approaches for governance and management can contribute to resolving and avoiding conflicts between transport infrastructures development and maintenance of functional habitat networks for biodiversity conservation. The prospects for resolving the problems by integrated landscape approaches are largely determined by the societal context in terms of legacies of top-down and bottom-up governance, and the phase in the socio-economic development.

Poster Session **Disturbances PD 7**

THE INFLUENCE OF LAND DEGRADATION AND ECOLOGICAL RECONSTRUCTION ON LANDSCAPE STRUCTURE IN HILLY REGION OF NORTH EASTERN ROMANIA

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The effect of land degradation (land erosion, land displacement, waste lands) extends on different levels of landscape management: it affects not only land productivity, but also the structure of the landscape and the ecological interactions between the composing ecosystems. The objective of the research is the simulation of three landscape structures situations: non degraded landscapes, land degradation affected landscapes and ecologically rehabilitated landscapes. The study area is the Suceava Plateau, located in North Eastern Romania and the materials used are digital aerial images of the area (2004) and GIS database regarding soil degradation. The methods used in the study include simulation of landscape structures based on land cover types maps, computation of landscape structure indices in the three situations mentioned above, comparative analysis of landscape structure values. The results show that the occurrence of land degradation influenced especially the degree of fragmentation and patch connectivity. Ecological rehabilitation by means of reforestation improves the connectivity of forest patches and increases the diversity measured at landscape level.

Poster Session **Biodiversity conservation and planning PB 23**

GIS ANALYSIS OF THE ANTIDOTE PROGRAMMA IN PORTUGAL

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The aim of this research was to analyse the huge number of animal poisoning occurrences in Portugal and to establish a relationship between poisoning, land use, land cover and human activity. It was used a large database, belonging to the programme Antidote Portugal in order to create a GIS. This database records all occurrences attributes, such as, the location of dead animals, the number of affected individuals, the species that belong and their location. Two approaches were made, one based on poisoning occurrences and one base on number of dead animal per occurrence, in order to calculate hazard maps. Both approaches were based on multivariate analysis and geostatistical processes. According to the results, agro-forested areas are those were the most cases occur. A special reference must be made to the Protected Areas and the Natural Park of Southwest Alentejo and Costa Vicentina, were token place few cases but very deadly.

Poster Session **Patterns and processes PP 10**

CAN LICHEN FUNCTIONAL GROUPS BE A GOOD INDICATOR OF MACROCLIMATIC CONDITIONS OF A LANDSCAPE?

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Desertification and land degradation results from several factors including climate change and human activities, posing a threat to the people and to the environment in the affected areas. The south of Portugal is characterized by different landscapes in terms of macroclimatic conditions, and part of this region was already found to be one of the areas in Portugal more susceptible to DLD. We intend to use lichen functional groups related to water availability in different areas of Alentejo, with the aim of detecting contrasting macroclimatic conditions in space. This region is characterized by a Mediterranean climate, with heterogeneous conditions in terms of humidity. Coastal areas have higher humidity due to the predominant northwest winds that come from the sea, whereas the inner part of this region is much dryer and can be classified as semi-arid. Lichen biodiversity will be evaluated based on hygrophyte/xerophyte functional types and will be calculated with the lichen diversity value (LDV) using a standard methodology. Data on functional groups will be related with macroclimatic series from over 30 years. The previous relation will be further discussed with other environmental factors such as altitude, slope, aspect and orography.

Poster Session **Patterns and processes PP 11**

SPATIAL LOCATION OF FARMERS AND LAND OWNERS OF DIFFERENT STRATEGIES: CASES FROM DENMARK AND PORTUGAL

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Based on transitions theory we compared areas in Denmark and Portugal in order to find evidence of the co-existence of productivist and post(non)-productivist strategies at local level and to test the spatial distribution pattern of areas concerned with these different farming strategies. From a landscape ecology perspective the Danish area is characterised by a matrix of highly intensified agricultural fields with scattered patches of forests and plantations. The town Sønder Omme is the main urban area with smaller villages spread in the landscape. The Portuguese area is mainly characterised by a matrix of silvi-pastoral systems. The town Castelo de Vide is the only real urban area but small patches of hamlets and farm houses are found in the landscape. Within both case areas the two strategies co-exist but in both areas there are significant correlations between landscape area types and farmer types. The spatial distribution pattern of farmers and land owners of different strategies differs between the two case areas. Also the patterns and thus the landscapes change over time. The results raise issues as to segregation vs. integration of landscape functions in the relation to the topics of landscape scale management, diversification strategies, and rural viability.

Poster Session **Biodiversity conservation and planning PB 24**

EXTENT AND CHARACTERISTICS OF MIRE HABITATS IN GALICIA (NW IBERIAN PENINSULA): IMPLICATIONS FOR THEIR CONSERVATION AND MANAGEMENT

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NW Iberian Peninsula hosts a variety of mire habitats linked to wet environments that contrast with surrounding regional vegetation. These wetlands are confined to locations meeting certain azonal conditions, due to local topographies that prevent or delay drainage, to the occurrence of significant rainfall, or to a combination of both. Despite of their international relevance and their designation as habitats of interest for biodiversity conservation by the EU habitats Directive, they are threatened mainly by changes in land use, particularly by agriculture intensification/abandonment and the development of wind farms. In the present work we address the mapping, description and analysis of these habitats in a spatial explicit way in the region of Galicia (NW Iberian Peninsula), in order to support the development of strategies for their planning and management. Results showed differences in the extent, distribution and characteristics of the different types of mire habitats with important implications in their conservation.

Poster Session **Biodiversity conservation and planning PB 25**

ASSESSMENT OF CONSERVATION STATUS IN MANAGED CHESTNUT FOREST BY MEANS OF LANDSCAPE METRICS, PHYSIOGRAPHIC PARAMETERS AND TEXTURAL FEATURES

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Chestnut forest is a cultural landscape which has been recognised as an habitat of interest in the Natura 2000 European network threatened by land abandonment and recent rural landscape change. The loss of coverage of its characteristic species (*Castanea sativa*) and its progressive replacement by other taxa can be used as indicator of its degradation, resulting in some cases from natural succession dynamics or the invasion by alien species in others. In this work we aim at modelling the conservation state of chestnut forests in the NW of Iberian peninsula assuming the relative coverage of chestnut as indicator of forest stands quality. We used as potential predictors features available at wide geographic scales, namely geographic location, land-cover heterogeneity approached by means of satellite images texture, along with landscape metrics. As some of these variables are prone to be influenced by terrain shape, we also introduced topographic parameters derived from Digital Elevation Models in the analyses. Results allowed us to classify chestnut forests in relation to their conservation state and to identify current degradation trends. We expect that the results would serve as a basis for an ongoing, more indeep research on conservation strategies for Iberian chestnut forests.

Poster Session **Monitoring landscape change PMo 24**

QUANTITATIVE ASSESSMENT OF TEMPORAL DYNAMICS IN ALTITUDINAL-DRIVEN ECOTONES IN A SECTION OF VALTELLINA ITALIAN ALPS

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Mountain ecotones are sensitive to climate and global change and their historical dynamics can be used as a record and indicator of such events. Both climate warming and land use abandonment had the general effect of increasing the altitude of mountain ecotones, nevertheless there are relatively few studies aiming at the quantification of these altitudinal shifts in a spatial explicit way at a detailed scale. In this work we quantified the altitudinal shifts of mountain ecotones and also analysed their spatial pattern and relations with the topography along mountain slopes. We applied a novel procedure to delineate the current and former location of three characteristic mountain ecotones, which we formalised as forest, tree and tundra lines in a section of Valtellina (Italian Alps). The application of this approach allowed us to estimate overall decadal altitude increments of 25 m for forest line, 13 m for treeline and 11 m for tundra line and to differentiate locally between episodes of altitudinal advance and retreat. We also conducted an analysis of vegetation patches morphology and their interaction with terrain relief variables at the ecotone locations, which showed significant implications in their dynamics.

Poster Session **Disturbances PD 8**

EFFECTS OF NON-NATIVE PLANT SPECIES ON FOREST COMMUNITIES IN LITHUANIA

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Forests are considered to be relatively stable ecosystems and resistant to plant invasions. However, rapid increase of number of alien species and their populations is observed in the forests of Lithuania recently. Investigations on impact of alien plant species to forest communities were performed in forest habitats in the environs of Vilnius (Capital of Lithuania). It is known that namely urban areas contain the greatest proportion of alien plants. Results of the investigation enabled to evaluate how alien species penetrate different forest communities and estimate relationships between plants of forest communities and alien species. Our studies showed that the effect of alien plants on species composition of invaded communities was marginal and was correlated with the distance from the forest edge, vegetation type and influence of various human activities. The recorded non-native plants were divided into 4 groups: ornamentals, nutritional plants, weeds and accidental immigrants. The most abundant is the group of decorative non-native plants. It includes annuals, biennial and perennial herbaceous and woody ornamental plants, escapers from gardens (e.g. *Lobularia maritima*, *Rudbeckia hirta*, *Gypsophila paniculata*, *Lychnhis coronaria*, *Syringa vulgaris*, *Sambucus racemosa*). The most common alien plants in the studied habitats are aggressive and invasive accidental immigrants, such as: *Impatiens parviflora* (Jaccard coefficient CJ=41.3), *Amelanchier spicata* (CJ=20.7). The number of alien species in the investigated areas varied from 18 to 29. The correlation between distance of the research areas from the edge of the forest and number of alien plant species was decrescent, statistically reliable and negative (r=-0.73).

Poster Session **Biodiversity conservation and planning PB 26**

EVALUATING AN OLD SUSTAINABLE NATIONAL FOREST IN SOUTH BRAZIL TO DECIDE THEIR CONSERVATION STATUS

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Native species reforestation was a federal politics in Brazil in the decades of 1940-60, settling National Forests all over the country. After the project's dismounting and their transformation in units of conservation of sustainable use, old sets presenting vigorous sub-forests becoming important remainders of the endangered Atlantic Forest. Nowadays, the government intention to exploit their timber has caused intense internal discussions once they could be protected by law as mature regenerated forests. Intending to elucidate their appliance, it were evaluated sub-sets under reforestation in the Açunguí National Forest. Phytossociological studies showed 61 species distributed in 30 families, which the most representative were Flacourtiaceae, Lauraceae and Myrtaceae. The most frequent species, excluding Araucaria angustifolia itself were Cordyline dracaenoides and Cyathea corcovadensis, forming the shrub strata, followed by *Casearia sylvestris*, *Allophyllus edulis*, *Clethra scabra*, *Dalbergia brasiliensis* and *Matayba elaeagnoides*, in the medium strata. The IVI varied between 14.3 and 7.5. Diversity of species was high for secondary forested areas - Shannon's index (H'= 3.15); equitability index (J'= 0,77); basal area of 54,8 m²/ha. There were endangered species and bioindicators that enhance the ecological importance of this National Forest. Thus, this one should not be exploited despite their original purpose.

Poster Session **Scaling in landscape analysis PS 3**

ENVIRONMENTAL DRIVERS OF BENTHIC COMMUNITIES: THE IMPORTANCE OF LANDSCAPE METRICS.

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The distribution of aquatic communities is dependent on processes that act at multiplescales. In the absence of water quality impairment it is known that the local-scale physical habitat exerts a major influence over the biotic assemblages at a site. However, these local environmental features dependent upon large scale-controls, such as catchment level land use. This study comprised 270 samples distributed over 2 years and used a nested sampling design to estimate the variance associated with three successive spatial scales: basin, site and microhabitat. Habitat assessment was made using River Habitat Survey. The derived Habitat Quality Indices and the benthic composition were crossed with landscape metrics and types of soil use, obtained from Geographical Information System data, using distance-based linear models and distance-based redundancy analysis. Invertebrate variation was mainly linked with intermediate scale (site) and landscape metrics were the main drivers determining local characteristics compared to proportions of soil use. We found that the aquatic community exhibited a stronger relationship with landscape metrics, especially patch size and shape complexity of the dominant uses, than with habitat quality. We suggest that instream habitat improvement is a short-term solution and that stream rehabilitation must address the influence of components at higher spatial scales.

Poster Session **Monitoring landscape change PMo 25**

STUDENTS' LONG TERM ECOLOGICAL RESEARCH (LTER-EDU) AT RAMAT HANADIV PARK

SALEIT RON

Ramat Hanadiv, Israel

The loss of biodiversity, climate change, changes in the quality of soil and the availability of water resources are all examples of ecological processes that take place over long time spans. Long-term ecological research (LTER) stations have been established around the world to monitor these kinds of changes. LTER-EDU is an educational project that offers school students a chance to be partners in a global monitoring effort. The students collect meteorological data and monitor vegetation, arthropods, butterflies, birds and other data. The monitoring takes place at Ramat Hanadiv, a Mediterranean nature park consisting of over a thousand acres of open landscape abundant with indigenous fauna and flora. Students from all over Israel collect and upload ecological data onto an educational website enabling other students to participate in data analysis and to draw conclusions based on all the data gathered. Long-term climatic-ecological monitoring and cooperation with students who gather data and study their environment in different sites, supports the development of various dimensions of ecological literacy, particularly the temporal and spatial dimensions.

Poster Session **Biodiversity conservation and planning PB 27**

IMPACT OF ROADS ON UNGULATE SPECIES: A PRELIMNARY APPROACH IN PORTUGAL

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The impact of linear infrastructures, particularly the roads on wildlife, has been one of the highlight themes of a new field of knowledge that combine Conservation Biology and modern Engineering Sciences. The impacts of roads in the ecological landscape include habitat loss, fragmentation, and degradation, barrier effect, wildlife vehicle-collisions, among others long-term effects. Gradually there is a growing concern in the roads planning and execution, according to the measures to prevent and mitigate the impacts on wildlife. The design of infrastructures in the landscape has an enormous relevance to wildlife because it causes mainly the fragmentation of the habitat. In Portugal, the wild ungulate populations (e.g. wild boar, red deer, roe deer) tend to increase in a generalized way. Animals have been dispersing into historical areas like coastal and urban areas. It's just at this range, where human presence is more intense, causing impacts on those species. This work is a preliminary evaluation of some ecological effects of roads, with emphasis on impacts to ungulate populations in north and central Portugal, using official information on ungulate vehicle-collisions from the National Forestry Authority of the Portuguese Ministry of Agriculture and National Policy.

Poster Session **Biodiversity conservation and planning PB 28**

VEGETATION COMPOSITION AND DIVERSITY IN RELATION TO ENVIRONMENTAL FACTORS IN THE DESERT WATERSHED, CENTRAL SAUDI ARABIA

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Watersheds are common features in arid regions of the World, and support transition habitats for mesophytic flora including rare and endemic species. Despite their ubiquitous nature in the landscapes of Arabian deserts, watersheds have attracted little attention concerning their floristic composition and ecological processes. This study describes relationships between the environmental characteristics of watersheds and their effects on vegetation composition and diversity in the hyper-arid Al-Aramah Plateau, Central Saudi Arabia. A total of 75 species belonging to 29 families and 69 genera were recorded. The richest families were Asteraceae, Poaceae, Fabaceae and Brassicaeae. Therophytes and hemicryptophytes were the most frequent life forms. Classification of vegetation stands using cluster analysis displayed six clear vegetation groups, each with specific indicator species. The six vegetation groups were confirmed by Detrended Correspondence Analysis (DCA) and the length of the first two axes of DCA indicating a complete turnover in species composition. Cumulative variance recovered in the Bray and Curtis variance-regression ordination was substantial (72.8%). Community structure of plant communities may be influenced primarily by a combination of morphometric and edaphic variables of the watershed, and anthropogenic pressure which in turn may determine the distribution and abundance of moisture and nutrients, and perhaps promote habitat specialization and/or competitive exclusion. Those communities occurring on fine textured soils close to the ephemeral water channels with the Sudano-Zambezian trees (*Acacia gerrardii*, *Lycium shawii* and *Ziziphus nummularia*) were more diverse. The findings of the study have implications for the design of rehabilitation programmes for watersheds disturbed by human activities.

Poster Session **Tools of landscape assessment and management PT 16**

ASSESSING MANAGEMENT SCENARIOS USING WILDFIRE SIMULATIONS AND LANDSCAPE INDICES

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In the Mediterranean context, where wildfires are a grave threat to forests, a major aim for management is to reduce the risk of intense and large wildfires. Moreover, it is necessary to implement cost-effective practices in order to manage great extensions of territory. Through a passive approach, considering that landscape structure plays an important role on wildfire spreading, particularly in large fires, this practices can be accomplished by defining a fireproof landscape, efficient in retarding the growth of intense wildfires. On this basis, we studied the case of the Alto Tajo district (104.000 hectares, Central Spain). We quantified its current landscape pattern and simulated a considerable amount of surface fires throughout it, using FlamMap software. As a result, we located critical areas, with very high burn probability. Afterwards, we proposed several landscape management scenarios, combining different treatments only on these areas. Each of these scenarios was then assessed by two means: performing FlamMap simulations again and applying landscape indices. In this way, we were able to evaluate the effectiveness and ecological effects of fuel treatments combinations, by comparing current landscape and management scenarios data. Finally, taking into account trade-offs between both effects of fuel treatments, we selected the most appropriate management practices for this forest district.

Poster Session **Patterns and processes PP 12**

SPATIAL PATTERN OF SOIL MACROFAUNA BIODIVERSITY IN WILDLFE REFUGEE OF KARKHE IN SOUTHWESTERN IRAN

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Information about the spatial patterns of soil biodiversity is limited though required, e.g. for understanding effects of biodiversity on ecosystem processes. This study was conducted to determine whether soil macrofauna biodiversity parameters display spatial patterns in the riparian forest landscape of Karkhe, southwestern Iran. Soil macrofauna were sampled in 2009 using 200 sampling point along parallel transects (perpendicular to the river). The sampling procedure was hierarchically, maximum distance between samples was 0.5 km, but the samples were taken at 250m, 100m, 50m, 10m and 5m at different location of sampling. Soil macrofauna were extracted from 50 cm×50 cm×25 cm soil monolith by hand-sorting procedure. Number of animals (abundance) and Shannon H' index were analyzed using geostatistics (variogram) in order to describe and quantify the spatial continuity. The variograms of two indices were spherical and revealed the presence of spatial autocorrelation. The range of influence was 1724 m for abundance and 1326 m for diversity. The variograms featured high ratio of nugget variance to sill (abundance (52%), diversity (55%)). This showed that there was the small-scale variability and proportion of unexplained variance. Spatial distribution of soil macrofauna may be influenced by soil organic matter, texture, vegetation cover and intrinsic population processes.

Poster Session **Patterns and processes PP 13**

A PHYSIOTYPE-BASED MODEL OF ECOREGIONS FOR THE NATIONWIDE ECOSYSTEM MANAGEMENT OF JAPAN

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So far, no scheme for hollistic way management has been created for Japan. In this research we suggest a new multi-purpose ecologically-significant planning unit at various hierarchical spatial scales for the whole of Japan based on the concept of ecoregions. We delineated physiotope-based ecoregions at two hierarchical spatial scales using their main controlling factors: a) macroscale – biogeographic boundary and main geotectonic regions, and b) mesoscale – regional climate regime and main tectonic faults. These physiotope-based ecoregions were each characterized by landform and geological classes specific to Japan's geomorphology: tectonic relief, volcanism and paleogeography. Using these resulting topographical units, we calculated various landscape metrics using FRAGSTATS to quantify the differences in landscape structure, configuration, complexity, variability and diversity of physiotope-based ecoregions when seen from two spatial scales. We find that landscape structure, configuration and complexity vary greatly among physiotope-based ecoregions at macroscale, and reflect Japan's geologic timelines and formation history, and also paleobiogeography. At mesoscale, the unique configuration of each climate-geomorphological units are described and discussed.

Poster Session **Biodiversity conservation and planning PB 29**

CONSERVATION OF PRIORITY BIRD SPECIES IN A PROTECTED AREA OF CENTRAL GREECE USING GEOGRAPHICAL LOCATION AND GIS

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The effects of habitat structure and spatial variation on bird community composition were studied in the protected area "Antichasia-Meteora mountains" (GR1440003), 600 km2. The census of bird diversity was conducted from late April until mid June, and in October 2008. In 185 randomly selected sampling plots, each of 0.785ha, the following parameters were recorded: (i) habitat type; (ii) habitat cover variables (% cover of herbaceous plants, low shrubs, tall shrubs, trees, and % cover of bare ground) and (iii) spatial variables. Stepwise regression analysis was used to investigate the relationships of species richness with the vegetation. Geostatistics were used to examine the spatial distribution of priority species by semivariography followed by kriging interpolation. The total of sampling sites were analysed and geostatistics were computed in "anisotropy". The variables analysed were the total abundance and richness of priority bird species in the study area. The results showed that bird richness is correlated significantly with fallow land (β=0.15, $P<0.05$), and also with the presence of tall shrubs (>50cm tall) ($P<0.001$). Bird abundance is correlated significantly only with habitat type, specifically with fallow land (β=0.30, $P<0.05$) and farmland (β=0.24, $P<0.05$). Geographical location is associated with the presence of priority bird species.

Poster Session **Biodiversity conservation and planning PB 30**

LANDSCAPE-LEVEL HABITAT SUITABILITY MODEL FOR THE BALKANIC CAPERCAILLIE (Tetrao urogallus rudolfi): A TOOL FOR EFFECTIVE CONSERVATION AT THE SOUTHERN EDGE OF SPECIES DISTRIBUTION

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The Capercaillie has been known as an umbrella species for woodland biodiversity and an indicator species for good ecological condition of old forests. Therefore, understanding distribution patterns of this species is crucial for the sustainable forest management and biodiversity conservation. In 2008, data on the distribution, landscape parameters and microhabitat features of the lek-sites were collected. A total of 184 trees used by Capercaillies as well as 1840 neighboring trees were described during the displaying period in the Rhodopes Mountains, southern Bulgaria. Landscape and microhabitat preferences of the species were computed and a habitat suitability model for the Capercaillie was build using a GIS-based forestry map of the area. The accuracy of the model was estimated at two levels: by (i) comparison with the available data from forestry services, and by (ii) randomized plots visited in 2009. The habitat model was applied to define and prioritize the core, step-stone and isolated populations for the aim of the effective conservation of the metapopulation at the southern edge of species distribution.

Poster Session **Patterns and processes PP 14**

A REGIONALLY ADAPTABLE APPROACH OF BIODIVERSITY ASSESSMENT USING LANDSCAPE METRICS WITHIN THE 2D CELLULAR AUTOMATON “PIMP YOUR LANDSCAPE”

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There still is no standardized method of measurement and assessment of biodiversity in landscape ecology. We propose an easily applicable and regionally adaptable approach to quantify biodiversity at landscape level using landscape metrics within the modified 2-D cellular automaton “Pimp Your Landscape”. In addition to a basic evaluation of land use types regarding each grid cell, a consideration of landscape patterns is essential in order to evaluate ecological functions and services at landscape level. Starting point of the here presented approach is the aggregation of land use types according to their degree of hemeroby. Thus, a spatially explicit consideration of “natural” and “not natural” areas is possible. With regard to the concept of habitat connectivity, the cost- distance- method allows to identify functionally connected natural areas in a next step. Further indicators to assess biodiversity were taken into account. Effective habitat area, naturalness, heterogeneity and fragmentation of a landscape can be quantified using here presented landscape metrics. We found that the assessment of biodiversity requests a combination of landscape metrics on the one hand and scientific and normative assumptions on the other hand.

Poster Session **Biodiversity conservation and planning PB 31**

LEGAL EFFICIENCY AND CUMULATIVE EFFECTS IN ENVIRONMENTALLY PROTECTED AREA

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The implementation of Conservation Areas (CA) in Brazil occurs on regions already occupied with a history of impacts, traces left by human action. So, it is expected that its impacts are, at least, reduced through management actions, hoping that the reversibility of the process occurs toward conservation. Therefore, legal and management decisions must be taken according to the impacts observed over a temporal sequence of human action. These multiple overlapping of land use and legal decisions are efficient? The objective of this study was interpret the effect chains for two decades to estimate accumulate of these impacts in the present and future and relate the results face of environmental laws in force in that period. The study area was composed by three adjacent regions: the Sustainable Development Reserve of Despraiado, the Ecological Station of Juréia-Itatins and the buffer zone. The cumulative effects were inferred by constructing scenarios compared by Markov chain, multicriteria analysis and cellular automata. The strategy has explained the state changes along the series of land use and has simulated the changes in the coming years.

Poster Session **Patterns and processes PP 15**

IMPACT OF CHANGING CULTIVATION SYSTEMS ON THE LANDSCAPE STRUCTURE OF LA GAMBA, SOUTHERN COSTA RICA

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Human activities often causes changes and homogenization in landscape structure. To investigate the impact of human activities on a tropical agricultural land mosaic we mapped land cover and small-scale linear landscape elements in La Gamba (Costa Rica) and compared eight sections of differing human impact by landscape metrics at class and landscape level. Primary and secondary forests consisted of few, large and compact patches, usually neighboring similar patch types. Conversely, the cultivated landscape comprised many small patches, a high diversity of land cover types, and many linear landscape elements. Contrasting the results of other studies, most rural sections obtained higher fractal dimensions than forests, probably due to the high density of linear landscape elements. Rural sections including few linear landscape elements, mostly big plantations or pastures, showed metric values similar to those of forest sections. We conclude that the globally increasing cultivation of oil palm plantations is significantly altering the countryside of La Gamba and other tropical land mosaics. New plantations substitute remnants of natural landscape elements which are important habitats and corridors for wildlife. To support wildlife movement between forests, the protection of habitat corridors such as live fences and riparian vegetation is of mayor importance.

Poster Session **Monitoring landscape change PMo 26**

LANDSCAPE CHANGES IN A WATERSHED IN THE SOUTHWEST OF PORTUGAL

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The landscape is the spatial and temporal result of interacting natural and socio-cultural environments and is characterized by certain attributes, some of the most important being structure and function. However, the changes driven by human influence cause negative impacts upon the landscape components and consequently upon the entire landscape itself. Over the centuries human intervention has altered the landscape of the south of Portugal, the most dramatic changes having taken place during the last one hundred years: the dominant component of the landscape has changed first from natural/semi-natural shrubby communities, to cereal crops and later to oak tree montados through processes of farmland abandonment, reforestation, change in the type of crops and trees grown, cutting or burning of the shrubs. All of these changes affected landscape composition and configuration and thus the functioning of natural systems. The objective of this paper is to study landscape dynamics of a watershed in the southwest of Portugal during a century, using data from different time periods, the consequences of ecosystem change and possible options of response. Within the context of a GIS land-use changes were quantified, through the analysis of land use maps and aerial photographs/ortophotomaps and several landscape metrics were calculated.

Poster Session **Disturbances PD 9**

IMPACT OF PLASTIC WASTES ON GROWTH OF Lasiurus scindicus HENR

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Pollution with plastic materials in wild areas is common in Saudi Arabia because of uncontrolled human activities .A Study was conducted to evaluate the effect of different types of plastic on seedlings growth of Lasiurus scindicus Henr. Three solid types of plastic; Polyethylene, Polyethylene terephthalate and Polystyrene were separately tested under controlled greenhouse conditions. Lasiurus scindicus grew for 12 week in sandy soil with and without plastic in tubes 60cm in height and 16cm in diameter. Every type of plastic was placed separately on soil surface and at 5cm depth below the soil surface. The results showed that all plastic types induced a reduction in L. scindicus growth when compared with control plants. Polyethylene terephthalate decreased each of root surface area by 3.75%, number of root tips by 14.59% and root dry weight by 26.66%. Also, Polystyrene reduced root surface area by 4.15%, number of root tips by 30.86% and root dry weight by 18.33%. Polyethylene reduced root surface area by 13.37%, number of root tips by 6.93% and root dry weight by 18.33%. In general, pollution with plastic materials may affect plant growth where changing physical or chemical properties of rhizospher with plastic may reduce plant ability to survive.

Poster Session **Management and sustainability PM 13**

FROM METAPHOR TO ACTION : IMPLEMENTING VIABLE FOREST ECOSYSTEM MANAGEMENT IN LANDSCAPES. THE FORGECO PROJECT.

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In France, the conclusions of the Grenelle Environment Round Table (2007) stress the importance to intensify wood production and timber exploitation while improving the actions in favour of safeguarding biodiversity. Vis-a-vis of such a stake, which concepts, methodologies and tools can be validated on strong scientific grounds that can be proposed to the actors charged to implement policies and actions on the ground? Through the example of sustainable forest management, the FORGECO project (2010-2014), founded by the National Research Agency, privileges a participative and adaptive approach of expertise on forest management and its ecological and socio-economic vulnerabilities, thought the construction and evaluation of intensification forest management scenarios, from the plot level to the landscape level. In order to allow a spatio-temporal integration of the information and to support a decision-making processes, the project rests on the development of a set of tools: dynamic resources model, habitat quality models, development of a SIG framework, production probability frontiers models, dynamic model for viability scenarios and participative conceptual models. The methodological framework and tools proposed will be tested on two contrasted study sites in France. The FORGECO project will deliver a comprehensive, detailed technical report and scenario analysis on adaptive forest management.

Poster Session **Disturbances PD 10**

ASSESSING THE FIRE-RESISTANCE AND THE FIRE-RESILIENCE OF LANDSCAPES IN SOUTHERN FRANCE TO MITIGATE THE IMPACT OF CLIMATE CHANGE

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French Mediterranean-type ecosystems are driven for a part by wildfires, which are hypothesized to increase with climate change. To help mitigating the potential impacts of increasing fire regime, we tried to assess which landscapes are fire-resistant or fire-resilient, these two variables being linked but not strictly correlated. Fire-resistant landscapes resist fires (i.e. limit propagation) or reduce the impact of fires on the ecosystems. Fire-resilient landscapes have the ability to return to an equilibrium state after a temporary disturbance and to persist (i.e. species will regenerate and maintain after fire). We have compared the resistance and the resilience of three main French Mediterranean ecosystems to fires using a simulation and modeling approach. Our results emphasized the resistance and resilience of landscapes dominated by resprouting oak species as long as the disturbance regime remains stable. However, recurrent and severe wildfires can cause abrupt changes of vegetation and the expansion of shrublands into the oak mosaic, and then affect the landscape stability. Pine-dominated landscapes can shift very rapidly from fire-resistant and fire-resilient systems to unstable systems depending upon the spatial and temporal changes of fire regime. Landscapes dominated by shrublands are generally resilient but with some limits.

Poster Session **Monitoring landscape change PMo 27**

FOREST LANDSCAPE CHANGES IN SOUTHERN CAMEROON

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Tropical deforestation is of prime interest as it involves the terrestrial ecosystem with the highest levels of biodiversity and carbon stocking. It represents nearly 20% of anthropogenic greenhouse gas emissions, and is receiving increasing attention as a relatively cost-effective way to reduce overall emissions. Reducing the rates of deforestation requires assessment of land cover change trends and understanding the direct and underlying drivers causing them, which can then be used to help design land use strategies aimed at meeting national level emissions targets under REDD+ agreements. We present an analysis of deforestation and land use change for two different areas in the humid forest zone of Cameroon at the western margin of the Congo Basin Forest. The two areas represent different patterns of population density, infrastructural development, market access, forest cover and agricultural land use extension and intensification level. Forest land is managed under various institutional and regulatory settings including protected areas, forest management units, community and council forests. Output of the land use land cover analysis presented are used to feed in integrated social, economic and ecological simulation models to evaluate impact of potential REDD policy levers on agricultural and forestry land uses at the tropical forest margin. Results show the expansion and intensification of small-scale agricultural activities for cash crops and perennial plantation (oil palm) along a gradient of population density and accessibility but also in areas bordering protected areas and forest reserves. Forests are progressively degraded in particular in areas outside the Non Permanent Forest Domain where the impact of diffused small-scale logging activities is high.

Poster Session **Monitoring landscape change PMo 28**

EFFECTS OF FOREST HARVESTING IN FUNGAL COLONIZATION OF LENGA LEAF LITTER DECOMPOSITION IN TIERRA DEL FUEGO, ARGENTINA

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Impacts of shelter-wood cut on fungal biodiversity in *Nothofagus pumilio* (lenga) forests are little studied in Tierra del Fuego. *Nothofagus pumilio* is the most important timber species in the southern part of Patagonia. Our objective is to evaluate fungal colonization of lenga leaf litter in forests managed by shelter-wood cut. Three common situations were studied: 1) stockpiled and 2) shelter-wood harvested areas in forests harvested 1 year ago, and 3) undisturbed surrounding forest (control). Fungal biodiversity was assessed in collected litter-fall before filling litterbags and in litterbags after 253 days of decomposition in field. The richness of species was low: in the initial leaf litter, we identified 9 species; only 2 species were common with the 19 species found at 253 days. Stockpiled and harvested areas had more species and were more diverse than control (richness=10, 11 and 6 species; Shannon index= 2.10, 2.16 and 1.64, respectively). The percentage of rare species was higher in these areas in comparison with control sites (40%, 55% and 17%, respectively). Our results suggest that forest management influences fungal biodiversity and species community colonizing leaf litter. In an outlook interactions of fungal biodiversity and decomposition will be discussed.

Poster Session **Patterns and processes PP 16**

RISK AREAS FOR FLOODING IN HYDROGRAPHICAL BASIN OF ARROIO DOS PEREIRAS IN IRATI – PR – BRAZIL

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This study aimed to identify and map risk areas for flooding in the hydrographical basin of Arroio dos Pereiras in the Irati – PR. It also sought to establish the recurrence intervals of these events and its space / time changes during the study period (1983 to 2006). To map the risk areas were considered the subdivision and land use, the characteristics of the drainage network (watercourse morphology and location of flood plains), structural changes and watercourse contentions, and the history of previous events along the local press, brigade of firemen, residents and researchers of local history. These procedures allowed to identify and map through the tools of GIS the most susceptible areas for flooding and to recognize the period of recurrence of these events through the documentary record. The results may provide support for planning and management in the basin area, orienting preventive measures and streamlining the subdivision and land use.

Poster Session **Tools of landscape assessment and management PT 17**

NEW CLASSIFICATION AND UTILITATION OF FOREST FUNCTIONS IN LANDSCAPE

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The paper presents basic information on scientific and research activities in the field of research, classification and applying the functions of tree species and their communities (mainly forest) in Slovakia. Main aim of the research task is scientific assessment of acquired knowledge on functional effects of forests under real ecological, forest management and socio-economic conditions of the regions of Slovakia. Constructed is new classification system in which we divided strictly tree species functions understanding how influences or effects on particular compounds of environment (- ecological sphere) and their utilization by a human society in economic and social sphere. In this way can be offered integrated functions of tree species and their communities how goods or service. To the forest function (tree species function) and its classification we access individual. Here are important indicators structure and ecological stability of tree species community. To the possibilities of utilization of forest functions we use integration of forest functions and economic access. Current ecological or ecosystem approach to the functions of tree species, their communities, thus also forest and possibilities of their utilization by a human society in economic and social field changed actual access to forest functions.

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