XIII Young Researchers Meeting on Conservation and Sustainable Use of Forest Systems

Valsaín (Segovia, Spain)

31st January - 1st February 2019

Universidad de Valladolid

INIA Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria

MEDFOR

CENEAM

Instituto Universitario de Investigación iuFOR GESTIÓN FORESTAL SOSTENIBLE

Editors: Elena Hidalgo Rodríguez (coordinator);
Rodrigo Ramos Fernandez; Jorge López Fernández; Daniel Fernando Guerrero Machado; Sami Mohammed Agami; Leonardo Antunes Salgado Santos; Mª Pilar Valbuena Pérez

Sustainable Forest Management Research Institute (University of Valladolid-INIA)
Avda. de Valladolid 44, 34071 Palencia (Spain)
Telephone: +34 979108300
Fax: +34 979108301
Websites:
http://sostenible.palencia.uva.es
www.resarch4forestry.eu

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SESSION V

SHORT SCIENTIFIC COMMUNICATIONS PRESENTED TO CONTEST ON 25 JANUARY, CASA JUNCO (PALENCIA)

PREFACE

Science needs space and time to share and discuss scientific ideas. Our annual Young Researchers is designed to concentrate our energies in this goal so as during the last years, one more time we meet jointly students from different masters (DATAFOREST, MONTES and MEDfOR) and doctorate studies on Conservation and Sustainable Use of Forest Systems at University of Valladolid (Campus of Palencia). During our meeting, students will present and discuss their ideas and findings with colleagues and professors from our program and beyond. This year Professor Fouad Mounir, from École Nationale Forestière d'Ingénieurs-ENFI (Morocco) and Dr. Kevin Beiler from HNE Eberswalde (Germany) will accompany us to discuss with our students their research advances and goals. Also it is important to stress the presence of representatives from spin-off companies and the innovation department of the University of Valladolid.

After thirteen editions our meeting is now a reference for the dissemination of scientific work of our research students and allows establishing new synergies that will help their personal and scientific development. In this edition more than 70 students from 20 countries and four continents (from Vietnam to Ecuador and from Nigeria to Russia including China, Italy, Nepal, Ucrania or Spain among others) will participate. The wide geographic distribution of the participants along with the diverse ecosystems studied, allow us to cover main forestry topics.

As in previous years we have had the cooperation of the Director and staff of the National Environmental Education Center (CENEAM) in Valsaín which, again, hosted us in their facilities. The University of Valladolid and the Erasmus Mundus Action 1 (through the MEDFOR consortium) have collaborated to make this event a success. The Castilla and León Science Office will be represented in the meeting providing to the participant insights on the Research and Innovation Strategies for Smart Specialisation (RIS3) at the regional level. Also I would like to acknowledge professors and students who coordinated and managed the meeting for their hard work which is reflected in the quality of the organization.

Finally, as in other opportunities, I hope that this conference will serve to guide and enlighten our students (current and future) on what we pursue through our technical and scientific training programs. I wish you a fruitful read and a nice time in our meeting at Valsaín.

Dr. Felipe Bravo
Director iuFOR (http://sostenible.palencia.uva.es)

XIII[th] YOUNG RESEARCHERS MEETING ON CONSERVATION AND SUSTAINABLE USE OF FOREST SYSTEMS_2019

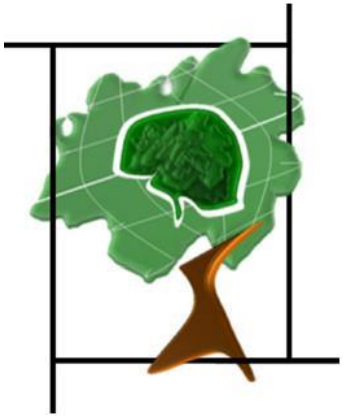
Welcome to the XIII[th] Edition of this Meeting on Conservation and Sustainable Use of Forest System. Again, this academic activity is addressed to young researchers from different Masters and PhD programs of the University of Valladolid and of the Erasmus Mundus Master in Mediterranean Forestry and Natural Resources Management-MEDfOR. It has been entirely organized and managed by the Master degree students of the iuFOR (University Research Institute on Sustainable Forest Management)

A digital edition of the complete Abstract Book will be available at the web page of the Institute.

http://sostenible.palencia.uva.es/

Valsaín – Spain

31st January and 1st February



PROGRAM
THURSDAY 31st JANUARY

08:00 **DEPARTURE FROM PALENCIA (Campus)**
08:30 **DEPARTURE FROM VALLADOLID (Feria de Muestras)**
10:00–11:00 **REGISTRATION & WELCOME COFFEE**

11:00-12:00 **MEETING OPENING & WELCOME CONFERENCE**

Chairperson: **Felipe Bravo**, *IuFOR*
Meeting Opening
Álvaro de Torres Suárez, *Centro Nacional de Educación Ambiental (CENEAM)*
Carmen Camarero Izquierdo, *Escuela de Doctorado de la UVa*
Ricardo Alía, *INIA*
Welcome conference:
José Miguel Viñas (*DIVULGAMETEO*) *A walk through the Climate Change Forest. Shortcuts and cliffs*

12:00-13:30 **SESSION I**

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Cudjoe, Eric: *Modelling for the Adaptation of Forest Ecosystems and Forestry to Climate Change*
Aman, Amna: *Measurement of total suspended Particulate Matter in an urban area*
Aulló, Isabel: *Integration of Forestereo-Lidar Data Using Universal Kriging Models: A Geostatistical Approach for Forest Inventories*
Zurita Véliz, Cynthia: *Vulnerability Analysis and Adaptation actions for the Climate Change and Variability at the Puerto El Morro coastal community, Guayas, Ecuador*
Bezares, Fernando: *Automatic Stand Delineation Tool Based on Remote Sensing: Lidar And Sentinel 2*

13:30-15:30 **LUNCH AND ACCOMODATION**

15:30-16:30 **SESSION II**

Chairpersons: **Fernando Bezares & Jorge López**

Albert, Julia: *Evaluation of Habitat Restoration Projects Effects in the Recovery Process of Pyrrhula murina*
Logan Bigham: *Seedling germination and survival in Q. suber woodlands: Effects of species interactions and microhabitat abiotic conditions*
Zeleke, Gizachew: *Mushroom Local Knowledge, Consumption and Trade in Rural and Urban Areas of Ethiopia*
Thapa, Shankar: *Assessment of Nutrient Extraction from Forest for Farmlands in High Mountains of Nepal (A Study from Lete And Kunjo of Mustang District)*
Rivera Ramos, Alexandra Andrea: *Effect of Irrigation on the Cultivation of Vanilla Planifolia Under an Agroforestry System in Tropical Dry Forest Conditions*
Pardo Moy, Alicia: *Habitat Selection of Rana Pyrenaica: Implications to its Consevation*

16:30-17:00 **COFFEE BREAK**
17:00- 18:30 **SESSION III**

Chairpersons: **Luisa Fernanda & Thi Nhat Minh**
Akram, Sohail: *Livestock grazing; management strategy of wildfire risk prevention in Mediterranean region: Review Article*
Santos, Leonardo: *Evaluation of the properties of wood and charcoal from Hovenia dulcis Thunb.*
Baldassarre, Giuseppe: *Meteorological Satellites for Forest Fire Management: a case study over Antalya in 2008*
Kachakova, Julia: *An introduction of larches in North-Western Russia*
Abate, Dagm: *Population structure, frankincense yield and sexual reproduction of Boswellia papyrifera tree species under different forest management regimes in Quara district, Northern Ethiopia*
Valbuena, Pilar: *Analysis of the construction of a landscape approach process using text mining technique, the definition of mission and vision*
Vazquez Cerro, Sergio: *Silvicultural Management of Boreal Forest and Climate Change*

19:00 **BUS TO SEGOVIA FROM BUS PARKING**
19:00-23:00 **DINNER & VISIT TO SEGOVIA**
23:00 **BUS BACK TO VALSAÍN**

FRIDAY 1ST FEBRUARY

08:00-09:00 **BREAKFAST & WRAPPING UP**
09:00-10:00 **SESSION IV**

Chairpersons: **Rodrigo Ramos Fernandez & Samy Mohammed**
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Velasquez, Luisa: *Preliminary Study on Soil Phosphorus Availability in Mixed Versus Pure Forests of Pinus sylvestris And Quercus petraea. Effect of Percentage of Species Composition*
Xuanhui, Zhou: *A Case Study in Africa: Broad Scale Analysis of Landscape Composition and Configuration with GIS & RS tools*
Mercer, Catherine: *Patterns of Reproduction and Growth in Relict Populations: Trade-offs and Potential for Persistence Under Climate Change*
Rodriguez de Prado, Diego: *Potential Climate Effects on Maximum Stand Density Index for 15 Coniferous and Broadleaved Tree Species Assessed from National Forest Inventory Data*
Franco Manchón, Iván: How Wildfires Affect Fungal Diversity
Doan, Thi Nhat Minh: *Marteloscopes as Tool for Forest Research, Education and Dissemination. Examples from Vietnam*

10:00-11:00 ROUND TABLE & DISCUSSION ON RERSEARCH & SOCIETY:

Chairperson: Irene Ruano Celia

Herrero de Aza (*ECM_WOODNAT*)
Rocío Blanco (*Innovación y Transferencia, FUNGE-UVa*)
Javier Alvarez (*Comisionado para la Ciencia de la Junta de Castilla y León*)

11:00-11:30 COFFEE BREAK
11:30-14:00 VISIT TO CLONAL BANK
(Felipe Pérez & José Climent)
14:00-15:30 LUNCH

15:30-16:30: SESSION V

Chairpersons: Logan Bingham & Julia Albert

Vondo, Noloyis: The Survival of Debarking and Bark-regrowth of Medicinal Tree Species
Romeiro, Joyce: *Potentials and Limitations of Remote Rire Monitoring in Protected Areas*
Zamora, Cristina: *Gene Expression Profile of Fusarium circinatum in Response to the Infection of the Putative Mycovirus FcMV1*
Muleta, Takele Birhanu: *Site Index Curves for Site Quality Assessment Using Guide Curve Method*
Daiyoub, Anghan: *The Biodiversity of Wild Ornamental Geophytes in the Syrian Coastal Area*

16:30-17:00 COFFEE BREAK
17:00-18:00 CLOSING ACT & AWARDS

Chairperson: Elena Hidalgo
Paloma Castro Prieto, *Vicerrectora de Internacionalización UVa*
Oscar Martinez, *Vicerrector de Investigación UVa*

18:00 BUS BACK TO SEGOVIA (Train Station to Madrid), VALLADOLID & PALENCIA

31st January & 1st February 2019

Valsaín - Spain

XIII[th] YOUNG RESEARCHERS MEETING ON CONSERVATION AND SUSTAINABLE USE OF FOREST SYSTEMS

WELCOME CONFERENCE

A walk through the 'climate change forest'. Shortcuts and cliffs

José Miguel Viñas
WMO Consultant (Spain). Meteorology Communicator and Atmospheric Sciences Popularizer

info@divulgameteo.es
Twitter: @Divulgameteo

Climate change is the greatest challenge humanity has ever faced. The scientific evidences about our responsibility in it, invalidates the denialist speech. Although the geological history of the Earth is a succession of climatic changes, the current climate change –whose clearest manifestation is the observed global warming– presents some characteristics that make it unique. On the one hand, it's very fast, without known precedents, which complicates the human and other living beings adaptation to it, and, and occurs at a moment in history when we are almost 8,000 million people, which increases our vulnerability. Climate projections point to a warmer world by the end of the century, although the final magnitude of global warming will depend, in part, on the urgency with which we reduce emissions of greenhouse gases into the atmosphere. If we don't act on time, the climate system inertia will make useless any attempt on our part to reverse the evolution of the climate.

SESSION I

Modeling for the adaptation of forest ecosystems and forestry to climate change

Cudjoe, Eric
NATURE CONSERVATION CENTER
cudjoe09@uw.edu

The climate change effects on forest ecosystems and forestry in the temperate climate zone can be modeled as shifts of the forest vegetation and zones. However, we need to understand the effects of climate on the forests to adapt our forest management to climate change. This study incorporates a bio-geographical model of climate conditions in the forest vegetation, in order to estimate and predict the impact of present and future climate change on the two-tree species in turkey forests—the Black pine (*Pinus nigra*) and Taurus Fir (*Abies cilicica* subsp. Cilicica). The bio-geographical model is done by a suite of software applications in the GIS environment. The model outputs are defined as a set of conditions - climate scenario and the ecological conditions which is suitable for the two species. These predicted changes can be graphically visualized. The results of the model scenarios for the regional climate change show that by 2070, optimal growing conditions for Black pine and Taurus Fir will decline, also effect of inter-specific competition, increase in mortality due to fire effects and increase in susceptibility to diseases and pests which will impede the rate of recruitment. Based on these results, it is strongly recommended that the strategy for sustainable forest management in the region highly re-evaluated. Thus, the current model of climate conditions in forest vegetation zones could be applied as a support tool for the development of a sustainable forest management strategy and facilitate improved decision making in the face of climate change.

Keywords: *forest ecosystem, bio-geographical model, climate scenarios, sustainable forest management, inter-specific competition*

Measurement of total suspended particulate matter in an urban area

Amna
Government College University, Lahore
amna.aman1234@yahoo.com

Particulate matter is a serious problem and get even more worst when there are smog days. Many people got affected by physically, economically and mentally as well. It also affects the visibility on roads during winter season and causes road accidents. Particulate matter has many health effects due to this reason; it has been studied well in abroad as well as in Pakistan during the last few years. Total suspended particulate matter is investigated over the period of three months of winters in Lahore at Government College University. Total suspended particulate matter samples were collected by the help of glass microfiber filter paper by using a sampler known as High Volume Sampler. 144,000 Litre air was passes through the sampler for six hours. Pre and post-weighted filter paper gave the idea about the difference of Total Suspended particles. After taking the measurements by running HVS for about 6 hours we post weighted the filter paper. Among all the samples, the highest reading was 0.49 × 106µg/m3 and minimum reading was 0.011×106µg/m3 of particulate matter. However, According to Pakistan Environmental Quality Standards for ambient air the suspended particulate matter by using HVS (with average flow rate of not less than 1.1m3/min) for 24 hours should be 500µg/m3. But the shocking results revealed that for 6 hours the highest amount that was observed of particulate matter was 49,000µg/m3 whereas for 24 hours it was approximately 196,000µg/m3. This deviation from standard values showed that the amount of particulate matter is thousands of time higher than the ambient air quality standards. Therefore, the risk vulnerability ratio of being affected is also seems to be high. Furthermore, these samples were also analysed by using PIXE technique and various proportions of different elements like Si, Mg, Ca, Fe and Zn were found. However, among those Si (Silicon) was the one having the highest peaks in all samples, and the reason was the presence of constructional sites. Additionally, through survey analysis we also came to know that most of the people were affected during smog days when levels of particulate matter were raised up and most of the people were not much aware of the severity of the harmful impacts. But they were inclined towards the willingness of adapting mitigatory measures. Therefore, interventions in forest management strategies are recommended because trees are the natural air filters. However, water sprinklers should be installed on constructional sites.

Keywords: *suspended particulate matter, smog, urban area , silicon, ambient air quality*

Integration of Forestereo-Lidar data using universal kriging models: a geostatistical approach for forest inventories

Aulló-Maestro, Isabel
INIA-CIFOR
isabel.aullo@inia.es

Forest characterization is essential for effective management and conservation policies. Forest inventories play an essential role as a cost-efficient way to assess forest structure and monitoring forest dynamics. ForeStereo, an optical sensor developed in 2005 by INIA-CIFOR, provides field-based estimates of individual tree level and stand level variables based on the analysis of stereoscopic hemispherical images collected at sampling locations. Yet modelling is needed to evaluate measured values of the variables over the entire area of interest. Remote sensing provides spatially explicit and comprehensive variables to support modelling of forest variables, as airborne LiDAR-derived statistics which are widely used in forest inventory. In this work we propose the application of geostatistics for the estimation of forest resources over Valsaín Scots pine pinewood, in the Central Mountain Range of Spain, applying ForeStereo survey supported by airborne LiDAR data. A 400 m grid was set for the ForeStereo survey with 111 sampling points throughout the study area. We developed a region-growing segmentation and automated matching of the ForeStereo stereoscopic hemispherical images from which the individual tree position, diameter and volume are determined. A method to correct the instrument bias and the occlusions was developed to derive the following stand level variables: number of trees per hectare (N), Quadratic Mean Diameter (QMD), Basal Area (BA) and volume (V). Universal Kriging was used to predict the ForeStereo variables at a 23 x 23 m grid covering the study area. As auxiliary variables we included the Percentile 01, 05, 25 and 95 of elevations and the Percentage first returns above 2 m LiDAR metrics. Here we present the results and conclusions of the study presented at the biannual conference ForestSAT2018: the combination ForeStereo-LiDAR for obtaining precise maps and estimations of diameter distributions, basal area and volume.

Keywords: *forest inventories, forestereo, stereoscopic hemispherical images, lidar, universal kriging.*

Vulnerability analysis and adaptation actions for the climate change and variability at the Puerto El Morro coastal community, Guayas, Ecuador

Zurita Véliz, Cynthia
Escuela Superior Politécnica del Litoral
czuritav@gmail.com

The authors present the results and conclusions of the study "Vulnerability Analysis and Adaptation actions for the Climate Change and Variability at the Puerto El Morro coastal community, Guayas, Ecuador", located in the El Morro parish, Guayas province, Ecuador (DATUM WGS 84S 577401.61E 9711416.93N). Its objective was to "acknowledge the environmental and socioeconomic vulnerability of the Puerto El Morro community, for the proposal of adaptation actions to the climate change and variability, up to the year 2025".

The study took place between October and November of 2014, and its methodology included: a) an analysis of the climate variability and tendencies regarding temperature and precipitation during a 30-years cycle (1980-2010), in order to estimate a future scenario of climatic conditions, based on the processed data obtained from the CIIFEN (Centro Internacional para la Investigación del Fenómeno de El Niño); and b) an analysis of stakeholders interactions, and of vulnerability based on livelihoods, using the software CRISTAL (version 5.0), for the identification of adaptation actions, this last, considering also interviews made with the key local stakeholders.

From the analysis of the available data regarding temperature and precipitation measurements of the study period, the results do not reveal a noticeable change in the seasonal patterns of these two variables in the future. In the case of rainfall, the trend is slightly decreasing, observing for 1983 and 1997 as periods of considerable increase in rainfall, due to the El Niño Phenomenon; in the case of maximum and minimum temperatures, the trend is very slightly increasing, and its linear tendencies would allow notorious changes to be observed only in very broad extrapolation periods. It is concluded that the processing of the available data until 2025 does not reflect a marked trend in time with respect to an increase or decrease in air temperature, as well as precipitation, which is consistent with other studies developed by CIIFEN (2011). Also that the infrastructure and main livelihoods (fishing and tourism) of the community are vulnerable to climate change and variability, given the potential threat of extreme rainfall, with direct impacts such as flooding (degraded environmental sanitation), landslides (roadblocks), sedimentation (affectation to estuary and boats), and estuarine water quality (affectation to fisheries resources), being the main adaptation measures: The stabilization of slopes of the hills of the community to minimize erosion, rehabilitate Environmental Sanitation (Sewerage), and improvement of the community access road. These proposed activities should be managed by the social actors for inclusion in the update of the Development and Territorial Organization Plan (PDyOT) of the local municipality, to achieve the reduction of vulnerability to climate variability and change for the Puerto El Morro coastal community.

Keywords: vulnerability, climate change, adaptation, coast, tendencies.

Automatic stand delineation tool based on remote sensing: Lidar and Sentinel-2

Bezares, Fernando
Unicversidad de Valladolid. Agresta Sociedad Cooperativa
fernandobezares95@hotmail.es

The use of technology to answer daily problems faster and more accurately is more real today than any time before. Time is precious. To obtain more outputs and results, either companies or universities seek to reduce time consuming manual processes. In light of what is previously exposed, this study aims to develop a tool to automatize stand delineation process required in the management of the woods. To achieve that goal, the tool will be developed in Python 3 using as data sources Airborne LiDAR information and Sentinel-2 spatial images. Furthermore, QGIS segmentation algorithm (meanshift) will be used to process the input information and obtain the result. The output, a map of the homogeneous forest regions, should not be considered as a final output but as a guideline that the forester could use to finally determine forest stands. This tool based on free available data will save time of field work preparation and execution, allowing to invest more time in other task of forest planning. Nowadays this tool is still in development. More exploration in methodology has still to be done, as well as results are not to be expected until June 2019.

Keywords: *lidar, qgis, gis, python 3, sentinel 2, stand delineation*

SESSION II

Evaluation of the effects of habitat restoration projects in the recovery process of *Pyrrhula murina*

Albert, Júlia
MEDFOR
julia.albert.4@gmail.com

This project is a bibliographic review of the effects of different habitat restoration projects in the population of the Azores bullfinch (*Pyrrhula murina*), an endemic bird species from São Miguel Island (Azores, Portugal). This study covers the species biology and ecology and also the population history and its main threats, which comprise mainly habitat loss and alien plant species invasion. Also, it is done a valuation of the current situation of the species population and the effects of the five consecutive restoration projects that have been carried on in the island. The results show an increase of the population after the third restoration project and, furthermore, the species category in the IUCN Red list has changed from Critically endangered in 2005 to Vulnerable in 2016. Therefore, the Azores bullfinch is considered a success recovery case, despite long-term conservation is necessary in order to avoid the return of alien species in the restored areas.

Keywords: *pyrrhula murina, habitat restoration, conservation, species recovery, bibliographic review.*

Seedling germination and survival in *Q. suber* woodlands: species interactions, microhabitat abiotic conditions, and the search for a nurse shrub

Bingham, Logan
University of Lisbon, Higher Institute of Agronomy
logan.robert.bingham@gmail.com

The sustainability of Iberian *Q. suber* woodlands and agroforestry systems is threatened by multiple biotic and abiotic pressures, including drought, acorn predation, and seedling herbivory. Previous research suggests that the use of nurse shrubs may represent an attractive strategy for improving recruitment. To identify possible relationships between shrub species dominance, abiotic variables, and *Q. suber* seedling performance. 20 sampling plots were divided into 4 groups of 5 replicates by apparent understory species dominance: (1) *Cistus ladanifer*; (2) *Cistus salvifolius*; (3) *Ulex spp*.; and (4) Diverse. Each plot contained 2 subplots: 4 transects of unmanaged understory, and 4 cleared in 2015. Six *Q. suber* seedlings were planted along each transect. Floristic composition and shrub cover were assessed once to validate plot shrub species dominance. Abiotic variables, seedling germination, and survival were assessed periodically from 2016-18.

Plot classifications were validated by multivariate analysis of floristic composition and ordinal cover-abundance data (NMDS, ANOSIM). Relationships between plot type and abiotic variables were evaluated using PCA; those between shrub dominance, subplot class, and seedling performance were assessed univariately. Seedling survival declined dramatically following a pronounced drought in 2017. Four soil parameters (pH, organic matter, P, K, and N) contributed >80% of the variance between plot types. With the exception of C. salvifolius plots, median germination was higher in managed subplots relative to unmanaged ones. Survival of germinated seedlings was higher in unmanaged subplots, especially those containing *Ulex spp*.

Low survival rates reduced statistical confidence, and soil effects could not be rigorously separated from effects derived primarily from inter-species interactions. These preliminary results add to the evidence that drought stress is a critical limiting factor for *Q. suber* recruitment. Possible species-dependent interactions warrant additional study. Efforts to densify sparse montados/dehesas should continue to emphasize measures to reduce water stress and ameliorate degraded soils. Further research into the use of nurse shrubs in *Q. suber* regeneration is indicated.

Keywords: *quercus suber, cork oak, dehesa, montado, nurse shrub, rehabilitation*

Mushroom Local Knowledge, Consumption and Trade in Rural and Urban Areas of Ethiopia

Zeleke, Gizachew

iuFOR (University of Valladolid/INIA)

gizachewzleke@gmail.com

Ethiopian's natural forests provide diverse wild edible products which play an important role in closing food gaps during drought or scarcity periods. However, the loss in natural forest cover is estimated between 150,000 and 200,000 ha of land per year. There is still a need of knowledge to assist in the nationwide effort to combat food insecurity, ensure dietetic diversity and resources conservation, considering rural people as the main actors of their own development. The conservation and maintenance of wild mushrooms is commonly a major goal for contemporary forest management. Such management approach, however, is poorly represented into the forest systems of Ethiopia.

The objective of this study is to acquire the basic knowledge on country's current mushrooms consumption and trade, as a first step to undertake the research on "Mushrooms valuation for food security and environment conservation in Ethiopia". Therefore, aiming to represent the country's forest resource in general as a prototype, five different agroecological areas had been selected. Totally fifteen focus group (FG) discussions were performed, one site per agroecological area. FG participants were forest users of interested groups, including 10 woman, 10man, and 10elders. The FG discussions were conducted following the guidelines questions categorized under four different themes on the (1)forest resource and NTFPs (2) mushroom resource, (3) hypothetical market scenario for mushroom conservation and (4)current local knowledge on the mushroom resources. In addition 18individual supermarkets were addressed in Addis Ababa (8), Hawassa (6) and Bahir Dar (4). Supermarkets managers or sellers have been asked about the mushroom products they usually sell the: type, form, price, brand, their source, problem of supply, their willingness to buy and to sell locally collected fresh mushroom.

All the study forest sites are sources of timber and non-timber forest products (NTFPs) for their livelihood. Mushrooms are used for food and medicine only in two study sites. However, in the other three sites mushrooms are considered as useless and disease causing organisms. On the other hand, the interest for fresh mushroom is high in urban supermarket. Despite the interest, all supermarkets supply the imported mushrooms in can, and just four supermarkets sell the cultivated fresh ones.

The information collected will permit the design of the methodology to i) assess the socio economic and ethnomycology importance of mushrooms, ii) investigate rural mushroom valuation for the conservation and sustainable management of the forest resources (iii) assess the urban consumers preferences to participate on wild mushroom production and forest conservation. Finally, this study will recommend the mechanism by which how the wild mushroom demand will be satisfied by local producers and the participation of rural producers and urban consumers in conserving the mushroom and forests resources.

Keywords: *non-timber forest products (ntfps), sustainable conservation, food security, wild edible products, market.*

Assessment of nutrient extraction from forest for farmlands in high mountains of Nepal (a study from Lete and Kunjo of Mustang District)

Thapa, Shankar
Institute of Forestry, Tribhuvan University
shankarbikram@gmail.com

The high mountain farming system depends heavily on forests for organic residues/ manure, mulch, animal feed and bedding materials. While literature exist on role of forest in maintaining productivity and fertility of farms in mid-hills, their assessment and quantification in high mountains is scanty. In an attempt to fill this knowledge gap, the study was carried out in 5 villages (2 in Lete and 3 in Kunjo) to quantify the amount of nutrients (N, P, K) being extracted in the form of litter from forest for farmlands. In addition, the forest product extraction system and farmers' dependency on forest for maintaining farm fertility were also assessed. Samples of litter (6) were collected and were analyzed to determine the nutrients (NPK) by standard methods. Random sampling of households was done with 25% sampling intensity (n=138) for questionnaire survey to collect socio-economic and resource use data.

The average amount of N, P and K being extracted by each HH per year was found to be 3.84, 2.99 and 0.54 kg in Lete VDC (Lete and Kalopani) while it was found to be 19.66, 1.84 and 10.39 kg in Kunjo VDC (Chhyo, Kunjo and Taglung). The farmers of Kunjo depended more on agriculture and extracted more amount of N, P and K. The extraction of the forest products was found to be regulated by a non-political VDC level committee (CAMC) consisting of 3 sub-committees. These committees consist of members including ward representative and Mukhiyas. All HHs depended on forest for maintaining soil fertility. Among them, 85.29% HHs totally depended on forest for compost manure while 14.71% used small amount of chemical fertilizers in addition to the compost. In depth study regarding the effects of removal of litter and other forest products on the forest site is recommended.

Keywords: *high mountains, Pinus wallichiana, leaf litter, plant tissue analysis, soil fertility.*

Effect of irrigation on the cultivation of *Vanilla planifolia* under an agroforestry system in tropical dry forest conditions

Rivera-Ramos, Alexandra Andrea
National University of Colombia, Department of Agronomy Science
alexandra.9229@gmail.com

Vanilla planifolia is an orchid of economic importance, whose fruits are commercialized in the international market. This plant is usually cultivated in agroforestry arrangements and its production is an ecologically and socially desirable alternative. Colombia, due to its climatic and geographical conditions, is an ideal place for the production and commercialization of vanilla. However, the study in dry areas, where the incidence of pathogens is lower, has not yet been studied in depth.

This work seeks to evaluate the changes in the growth and physiology of the vanilla in a tropical-dry-forest zone, under the cover of *Azadirachta indica* (Neem) in drought and rainy season, with the application of an irrigation system. Morphological –RCR, new internodes, and length of the last internode- and physiological -chlorophyll fluorescence, CO2 assimilation rate and titratable acidity- parameters were evaluated. All variables recorded showed significant differences ($P \geq 0.05$) between the treatments, except RGR, and between the measurement dates, except the CO2 assimilation rate. The used irrigation system increased the vanilla growth and evidenced modifications in its photosynthetic and growth responses.

Keywords: *vanilla planifolia, tropical-dry-forest, physiological-responses, water-stress, co2 assimilation*

Habitat selection of *Rana pyrenaica*: implications to its consevation

Pardo, Alicia
MEDFOR
alicia_pardo_moy@hotmail.com

Amphibian's species have the greatest grade of decline among vertebrates. Although there are many studies to avoid the extinction of these species, there is an enormous information gap. The fact of study new species as the Rana pyrenaica, of which information is not abundant, can help us in decoding patterns of behavior for its conservation. The environment of the amphibians not only is affected by human activities, but its populations and habitats are constantly influenced by climate change. For the future, the climate models which are planned are different from the ones that actually exist; so it is interesting to study this specie to find aspects that can affect the amphibians in general, being able to increase our knowledge about its behavior and try to avoid the passing of many species which are in the limit of the extinction.

Keywords: *amphibian, conservation, knowledge, environmental factors, presence*.

SESSION III

Livestock grazing; management strategy of wildfire risk prevention in Mediterranean Region: review article

Sohail, Akram
University of Lleida
sohailakram205@gmail.com

Understory fuel loads are consequence of abandonment of livestock extensive grazing activities in Mediterranean forest. Changes in land use and reducing the flow of ecosystem services have direct effects on biodiversity and landscape dynamic. Wildfires are one of the most prominent risks due to increase in fuel loads. Different fuel treatments with aimed to reduce understory biomass and promoting low density and vertically discontinuous stands are applied to reduce wildfire risk. Potential management strategies included low and intermediate intensity thinning, pruning, controlled burning to open complex forest structure and grazing with mixed livestock herds. Grazing is surely the most ecologically sound technique for creating discontinuities in fuels, primarily at the shrubby layer, and disrupting fuel ladders. It can play a positive role in fire prevention while on other hand, preserving species diversity through the replication of the ecological effects of the wild relatives of livestock. Grazing followed by carrying capacity and at moderate intensity has been shown to change wildfire behavior, by slowing its spread, shortening flame length, and reducing fire intensity, although it does not significantly reduce the risk of fire ignition. In the vicinity of urbanized areas, grazing can prevent or minimize expansion of shrublands which have much greater fuel loading and pose greater fire hazard than grasslands. Grazing can directly amplifying the heterogeneity of fuel continuity, and indirectly by causing a shift in plant community composition to less-productive and more-ephemeral species. The suitable choice of grazing season, type of plant communities, type and amount of biomass to be grazed, livestock density, social structure of the herd, carrying capacity, type of fencing, and stocking rate are defined key factors in prescribed grazing system.

Keywords: *livestock, wildfire, grazing intensity, fuels loads, abandonment*

Evaluation of the properties of wood and charcoal from *Hovenia dulcis* Thunb.

Antunes Salgado Santos, Leonardo
Federal University of Viçosa
leonardo.santos@ufv.br

Hovenia dulcis is an East Asian native species belonging to the Rhamnaceae family. In Brazil the species is popularly known as uva-do-japão (Japanese grape) and is planted mainly in the southern region, alone or in small stands. Its wood is used for many different purposes such as construction, carpentry and firewood. The species is a fast-growing tree and produces an edible pseudo fruit that is used in human and animal feeding and it is also studied due to its extractives with medicinal properties. Due to these characteristics, the objective of this work was to determine the properties of Hovenia dulcis wood and charcoal. The basic density, the anatomical characteristics of the fibres, the chemical composition and the Higher Heating Value (HHV) for the heartwood, sapwood and heartwood/sapwood transition zone were determined for the wood. The mechanical properties were also determined for the wood. The carbonisations were carried out in a muffle furnace with an initial temperature of 150 °C, final temperature of 450 °C and a duration cycle of 4.5 hours. For the charcoal, the gravimetric yield and the condensable and non-condensable gases, the apparent relative density, the immediate chemical composition and the HHV for the heartwood and sapwood were determined. The mean basic density of heartwood, sapwood and transition zone were 0.580; 0.599 and 0.604 g/cm3 respectively. The HHV values found were 4,676.0; 4,627.5 and 4,697.0 Kcal/Kg respectively. The lignin contents were 45.95%; 39.82% and 40.89% respectively. For the mechanical properties the average values were 41.02 MPa for compression parallel, 105.94 MPa for static bending and 11.83 MPa for shear parallel, being the wood classified as C40. The gravimetric yield in charcoal was 31.26% and 31.27% for heartwood and sapwood respectively. The apparent density of the charcoal was 0.44 g/cm3 for the sapwood and, for the core, 0.40 g/cm3. The content of volatile materials for the heartwood and sapwood were 23.35% and 22.82%, respectively, and the fixed carbon contents were 73.78% and 74.12%. Heartwood has good characteristics for direct burning. The species is recommended for building construction and production of furniture. The pyrolysis of the wood resulted in a good quality charcoal, but a more detailed study is recommended for the determination of the best carbonization rate for the production of a charcoal with more desirable characteristics.

Keywords: *heartwood, sapwood, charcoal, properties, hovenia dulcis*.

Meteorological satellites for forest fire management: a case study over Antalya in 2008

Baldassarre, Giuseppe
Istanbul Technical University
gi.baldassarre@gmail.com

Forest fire is the most important factors that threaten forests in Turkey where the coastline, which starts from Hatay and extends over the Mediterranean and Aegean coast up to İstanbul, has the highest fire risk. Approximately 60% (12 million ha) of Turkey's forest area is located in fire sensitive areas. Every year in Turkey burn an average of 100 km2 of Forest Land (JRC (2009)). Satellite remote sensing technology provides the only automated fire detection method capable of detecting fire locations over large areas. For over 30 years meteorological and environmental satellites have been utilized to detect, monitor, and characterize fires. In this study we produced a performance analysis comparing the fire detections reported by the most stable polar (FIRMS-MODIS) and geostationary (LSA SAF-SEVIRI) satellite fire products against the available ground truth over the province of Antalya (South-West of Turkey), during summer 2008. 13 out of 23 fires (with total area burned larger than 2 ha) have been observed by the tested techniques. Out of the 10 fires undetected by satellite, 9 were located in pixels classified as cloud. Only one, the smallest of them, went undetected in condition of clear sky at its start time. 3 out of the 13 matching events were detected from satellite in less than 30 min from the first ground report. A good result if we consider that in the mobile phone era, in densely populated area like Antalya, fires are normally reported shortly after they start. Furthermore Satellite observations made it possible to quickly locate and monitor large burning areas providing a synoptic picture of the burnings.These results show that satellite detection and characterization of active fires can provide crucial information to Civil Protection Service and Forest Service in order to better manage wildfire control in terms of minimize the response time to the event and during fire crisis management. Near real time monitoring and tracking of active fronts is very important during crisis management concerning the optimal distribution of ground and aerial forces.

Keywords: *remote sensing, forest fires, seviri, modis, monitoring*.

An introduction of larches in North-Western Russia

Kachanova, Julia
University of Padova
kachanovajulija@gmail.com

Larches are quite sustainable, easy-to-manage, non-demanding, and multipurpose species native to northern regions. Significant research has been done analyzing adaptation of naturalized larch populations in Bulgary (e.g., Petrova & Gerasimova, 2017). Moreover, other scientists addressed larch reproduction features in the Republic of Khakassia (e.g., Poznakhirko, 2013). One of the ways to reproduce larch species in conditions that differ from their natural ones is to grow seeds in those new conditions, and, subsequently, seeds from trees that grew in new conditions and shown best results (e.g., Tupik, 2009). The main objective of present research study was to detect best species for reproduction and breeding of larches in North-Western Russia where the climate is different from the larches' natural habitat. An introduction of larches in North-Western Russia is one of the ways to mitigate aftermaths of some global problems that we face nowadays such as climate change, deforestation, and decreasing biodiversity. Seven larch species were represented in the study (i.e., *Larix Sibirica*, *Sukaczewii*, *Decidua*, *Polonica*, *Dahurica*, *Maritima*, *Japonica*). Research data were collected at the Botanical Garden of St. Petersburg State Forest Technical University and Okhta Experimental Base. Data were analyzed utilizing the comparative analysis of seeds' and cones' characteristics (i.e., quality, quantity, crop, age, size, and sowing qualities) of trees from different sites (single tree/stand) and with various parameters (height, diameter, crown cover). The results showed that *Larix Sukaczewii*, *Sibirica*, and *Decidua* of mature age with developed structure demonstrated the best characteristics and can be adapted as the reliable seed source for sustainable reproduction of larches in North-Western region of Russia. The results can be used to inform further adaptation research by scientists. Additionally, the results can be implemented by foresters and breeders in North American Forests to start growing larches in similar climate conditions.

Keywords: *larch, breeding, restoration, urban forest.*

Population structure, frankincense yield and sexual reproduction of *Boswellia papyrifera* tree species under different forest management regimes in Quara District, Northern Ethiopia

Dagm, Abate
dagtfsm@gmail.com

Boswellia papyrifera (Del.) Hochst is a deciduous dry-land tree species. It forms relatively pure stands in the arid lowland areas of Ethiopia. It is multipurpose species, but the major use is the production of frankincense. There has been a spatial shrinkage of the species due to deforestation, and declining regeneration and absence of sapling individuals in most of the natural stands. Some of previous studies forecasted a complete collapse of the population in the near future. The current study investigated population structure, frankincense yield and sexual reproduction of Boswellia papyrifera tree species under different management regimes in Quara districts of Amhara region, Northern Ethiopia. Specific objectives were: assess population structure of B. papyrifera in different management regimes, examine the effect of taping intensity on frankincense yield and examine the effect of taping intensity on fruit production of trees of different DBH. Four management regimes were considered: State, Private, Cooperative and Rested or Un-tapped forests; and five representative forest sites were selected (two from private and one from each of the other). Tree count and DBH measurement were done on 50 plots of 20x20m. The tapping experiment had treatments of No, six and 12 tapping intensity. Each tapping treatment was applied on three trees of different DBH in each plot, i.e. 10-20, 20-30, > 40class. One way and two way ANOVA and LSD mean comparison test were used to analyze the data. Forest under cooperative and private concessions are highly disturbed / degraded (in terms of density of all species and B. papyrifera). The structure of the whole tree community has a bi-modal distribution. Population structure of the species was type III, there are no seedling and sapling individuals. The observed structure indicated that the population is unstable and under threat due to lack of regeneration and juvenile. The tapping experiment revealed that tapping 12 times had resulted in a greater yield than six times. But, this is only true if medium sized individuals are tapped. So, future tapping practice should take into account of this finding. Regarding sexual production, fruit production was significantly influenced by tapping intensity, where higher tapping intensity resulted in reduced number of fruits, and hence lower sexual reproduction capacity of trees. Therefore, this should be considered in future management and tapping practices.

Keywords: *boswellia, frankincense, population, reproduction, tapping*.

Analysis of the construction of a landscape approach process using text mining technique, the definition of mission and vision

Valbuena, Pilar
ETSIIAA (Universidad de Valladolid)
pilar.valbuena@icloud.com

There is not a simple definition of Landscape approach, but it is agreed that it relates to conservation, forestry, agriculture, and other land uses, to address the challenges of all kind that can not be approached on the traditional management boundaries or systems. It includes a participatory (that includes governance), multi- and inter-disciplinary approach. One of this examples of process of Landscape approach is the Model Forest, that are defined as "both a geographic area and an approach to the sustainable management of landscapes and natural resources", and with more than 60 sites all over the world, some of them working for more than 25 years, they represent one of the networks of landscape approaches more mature. But we need to understand better the processes of construction of these landscape approach initiatives and the elements required to its construction.

The Palencia Model Forest initiate is used as study case, and it was launched by several entities from the It was declared Model Forest Candidate and became part of the International Model Forest Network in March 2017, after a long process of nearly two years of meetings and workshops. The Palencia Candidate Model Forest covers over 4000Km2 and comprised of 92 municipalities, and it has been defined as a neo-forestry landscape.

Text mining is similar to content analysis, which also aims to extract common themes and threads by counting words. This proposes that data mining techniques can be used to provide an initial insight of the information gathered qualitatively, and this will help to make a first evaluation of the construction of a landscape approach initiative.

The objective of this study is to develop a method of evaluation of the construction of the vision and mission in the Palencia Model Forest using text mining technique. And in order to accomplish this objective, to develop patterns of the construction of the common message of the landscape approach process through time, not only with interviews but with the data from different meetings, working groups, etc.

Keywords: *model forest, text mining, landscape approach, qualitative research*

Silvicultural Management of Boreal Forest and Climate Change

Vázquez-Cerro, Sergio
svcerro@hotmail.com

At first, higher temperatures and more precipitation are expected mainly in winter. These weather conditions are having an impact in boreal forests because insects' pests and fungal diseases will become bigger. Also, more frequent windfall events benefit them and forest fire potential may increase while risk of snow may decrease. In another hand, higher temperatures make growing season will be longer for that reason the growing stock and deciduous trees will increase. Therefore, the spatial distribution of tree species will change.

Climate change will affect many soil properties, such a carbon and nitrogen circle, pH or soil organic and bacteria content. The main change will be in carbon circle due to higher concentrations of CO_2 but it is unclear the knowledge of this topic. Forest management will be change also. It is mean that higher temperatures will make short length period of permafrost.

Some management strategies are necessary so that the forests can adapt progressively to the change of environment that is taking place at present. In this way with the following strategies (according to the three groups of before) it is possible to achieve that the forests adapt to the climatic change:

Silvicultural management and its planning; Preference for natural regeneration whenever possible. And in case that natural regeneration cannot use, it will use plant material (seeds and seedlings) improved in regeneration; Correct choice of soil preparation method and application of fertilization according to the characteristics of the species to be cultivated.; Promote the planting of multi-species forests and avoid over-cultivation of the Norway spruce; Manage thinnings in time and intensity to adapt to the growth times of the species, avoid thinnings adjacent to new clear-cut areas and vice versa. Even use short rotations to avoid silvicultural risks and avoid large differences in height between neighbouring stands to minimize wind damage; Genotypes/forest management guidelines: review seed transfer zones and management rules to improve the forests' resistance to different abiotic and biotic; Technology and infrastructure: improve the infrastructure for the use and transportation of wood.

Furthermore, forests of boreal zone and its biomass can contribute to mitigating climate change through strategies through forest management. The strategies are: Conservation or maintenance of carbon accumulated in forests through fire prevention and extinction, proper silviculture planning, use of long rotations, maintenance of dead wood and taking advantage of the carbon present in the soil; Carbon increase with the use of thinnings and reforestations; Replacement of construction materials with a lot of carbon footprint by wood for structural (buildings) and fossil fuels by biomass.

Keywords: *boreal silviculture, adaptation, mitigation, strategies, climate change*.

SESSION IV

Does the mixture of trees species have any influence on soil pH?

Getino, Marina
Agroforestry science department, ETSIIAA Palencia, University of Valladolid (Spain)
marina.getino@uva.es

An increasing number of forest managers have focused their studies on mixed rather than pure stands due to the strong evidences that mixed forests provide several ecosystem services more efficiently. It is known that soil and vegetation are closely related. Vegetation establishment depends on soil characteristics, but at the same time, soil characteristics might be modified by plant debris and root activity. Depending on tree species composition the leaf litter production will be different and so quality and quantity of soil organic matter (SOM) inputs. Decomposition and mineralization of SOM could fundamentally influence soil pH and consequently nutrient mobility an availability, among other soil properties. In this study we assess whether oak-pine (*Quercus petraea* and *Pinus sylvestris*) mixed forests affect soil pH differently than pure ones. To this end, 20 circular plots of 5m radius were selected within two experimental triplets. The selected plots cover a wide range of percentage of species mixture, as well as different stand densities. Three soil samples of at least 30 cm were taken at each plot and then mixed to have a single representative sample per plot. Soil horizons were identified and separated for further analysis. Also, six soil pits were dug to describe triplet profiles. A total of 26 soil samples with three horizons per sample were analysed for pH. Also, total roots were estimated in each soil horizon. Litterfall was collected at each point of soil sampling, by using a 25*25cm quadrant. As in soils, litterfall samples were taken in three points at each plots and mixed in order to have a single representative sample per plot. Afterwards, litterfall samples were separated into 8 fractions: fresh and fragmented fractions for pine and oak, non-separable fragmented fractions, humified fraction, branches and others. All fractions were dried and weighed to calculate total biomass. So far, data shows a higher acidification of the first soil horizon in pine plots. However, statistical analysis are being performed in order to detect possible differences.

Keywords: *som, ph, mixed forest, pinus sylvestris, quercus petraea*

Preliminary study about on soil phosphorus availability in mixed versus pure forests of *Pinus sylvestris* and *Quercus petraea*. Effect of percentage of species composition

Velásquez-Camacho, Luisa Fernanda
Sustainable Forest Mangement Research Institute, UVa-INIA. Palencia (Spain).
luisafernandavelasquezcamacho@gmail.com

In mixed-species forests, tree species composition can affect nutrient return through litter fall. This in turn is expected to have an effect on soil available nutrients, which could influence the nutrient status. Phosphorus (P) is an important nutrient, whose plant-available form is often low in natural forest ecosystems. In this study we assessed whether oak-pine (*Quercus petraea* and *Pinus sylvestris*) mixed forests increase soil phosphorus availability in comparison to pure ones. For this purpose, 20 circular plots of 5m radius were selected in Aguilar de Campoo (Northwestern Spain). Six of these plots were dominated by *Pinus sylvestris*,other six plots by *Quercus petraea* and eight plots were located in a mixture of both species. So, the selected plots covered a wide range of percentage of species mixture, as well as different stand densities. Three superficial soil samples (0-10 cm) were taken at each plot and then mixed to have a single representative sample per plot. Also, six soil pits were dug to describe triplet profiles. A total of 26 superficial soil samples were analysed and soil concentrations of Olsen´s P, available P extracted by anion exchange membranes, total organic and total inorganic P were determined. Our preliminary results show that mixed forests do not show a direct effect in soil availability in this area. Next, this analysis methodologies will be tried in other plots in the Pyrenees. As a result, significant differences among forest masses and the sites are expected to be obtained.

Keywords: *soil phosphorus, mixed forest, pure forest, soil science, forest management.*

A case study in Africa: broad scale analysis of landscape composition and configuration with GIS & RS tools

Xuanhui, Zhou
Landscape ecology lab, UBC
zhouxuanhui9988@gmail.com

In this report, I give summary of my work on landscape metrics calculation based on five African countries, Uganda, Ethiopia, Malawi, Nigeria and Tanzania. First, I collect result of selected seven landscape metrics and saved in separate folders by country. Then, I use regression analysis to test the correlation between metrics. I find that before the PLAND (Forest coverage) thresholds, around 0.5, PLAND and ED (Edge density) have positive correlation, after the thresholds, PLAND and ED have negative correlation. At the end, I compare my result to previous work, from Libin, by linear regression analysis, that shows the accuracy is higher than 99.7% in all countries. The calculation is processed in Fragstats. All the data that are mandatory for calculation is processed in ArcMap and ArcCatalog. The charts that present all results and linear regression analysis are processed under the environment of R studio.

Keywords: *remote sensing, gis, landscape ecology, deforestation, africa*

Patterns of reproduction and growth in relict populations: trade-offs and potential for persistence under climate change

Mercer, Catherine
University of Valladolid, University of Padova, University of Stirling
mercer.catherine12@gmail.com

Climate change is altering the conditions that determine species distributions. Poleward expansion is expected to coincide with southern range retraction, as populations become limited by drought conditions. However, it has been suggested that the trailing-edge of the species distribution is partly structured by relict populations, that have the potential to persist under climate change. Relict populations are found outside the continuous range, among complex topographic conditions that create a locally favourable climate. To greater understand the reasons for relict population persistence, this study investigated demographic patterns across populations at the southern distribution edge of Common Beech (*Fagus sylvatica*), in Catalonia (NE Spain). Populations where classified according to geographical (continuous range or isolated) and ecological (aridity) marginality. Measures of demography and health status where taken in a total of 40 populations (10 per classification). Using generalized linear models, marginal climatic conditions were found to negatively affect health, in both isolated and continuous range populations. In the continuous range, decline was 13% higher in populations with marginal climates, compared to those that were non-marginal. In contrast, isolated populations showed an increase in decline of just 1% in marginal conditions. This study highlights that isolated populations have greater resistance to poor climatic conditions than continuous range populations. In future, populations in the continuous range will continue to decline towards extinction within the region, whereas isolated relicts will act as a key driver in the stabilisation of the species southern range.

Keywords: *climate change, species distribution, range retraction, relict, common beech*.

Potential climate effects on maximum stand density index for 15 coniferous and broadleaved tree species assessed from national forest inventory data

Rodríguez de Prado, Diego
iuFOR (UVa-INIA), ECM Ingenieria Ambiental S.L.
diego.rodriguezdeprado@gmail.com

Maximum Stand Density Index (SDImax) is an important variable used in the research and management of complex forests under different silvicultural, ecological and economical scenarios. SDImax is the maximum number of trees per hectare at a given reference size, before self-thinning occurs as effect of intraspecific and interspecific competition. This index is a key variable used in the estimation of the area potentially available by species in a mixed stand. Recent research has focused on the estimation of size-density relationships for coniferous species. However, there is a lack of info for broadleaved species. In addition, SDImax has been proven to be species and region-specific but less is understood how it is affected by climatic conditions.

The principal objective of this study was to analyze the influence of climate on SDImax developing climate-dependent models for the main coniferous and broadleaved species in Spain. In total, 15 species (8 coniferous and 7 broadleaved) were studied using the Spanish Nacional Forest Inventory and climatic data. Firstly, linear quantile regression and stochastic frontier analysis were used to estimate species-specific coefficients of the self-thinning lines. Secondly, basic models were generalized as a function of different climatic variables in order to take into account climatic conditions in the estimation of SDImax. Estimations of SDImax from non-dependent climate models were taking as a reference in order to determine trends in the variation of this value as a function of the selected climatic variables for the studied species.

Results indicated significative interactions between climate and the Maximum Stand Density Index values for all studied species. In general, reductions in SDImax were related to warmer and drier conditions. Increasing temperature and evapotranspiration with reducing precipitations lead to smaller SDImax values. This trend is similar among all studied species. However, there are differences in how and which specific climatic variables affect them.

This study highlights the influence of climate in the SDImax variation for different coniferous and broadleaved species, suggesting the use of species-specific climate-dependent models in the conservation and sustainable management of forest ecosystems.

Keywords: *maximum stand density index ,climate,carrying capacity,reineke,national forest inventory.*

How wildfires affect fungal diversity. A case of study from boreal to mediterranean pinus forests

Franco-Manchón, Ivan
ivan.franco@alumnos.uva.es

Pinus forests are ecologically and economically important worldwide. They play an important role in Mediterranean and boreal forests. Although Pinus species seem to show an ecological adaptation to recurrent wildfires, climate changes associated with global warming and a new era of mega fires is predicted. In this context, fungal communities could be strongly affected by these wildfires. The aim of this case of study was to analyse fungal community dynamics in *Pinus pinaster*, *P. nigra* and *P. sylvestris* forests growing under wet Mediterranean, dry Mediterranean and boreal climatic conditions, respectively, by comparing the mushrooms produced in severely burned Pinus forests in each area. Sporocarps were collected during the main sampling campaigns in unburned plots one year after fire, and in burned plots one year and five years after fire. We collected 182 taxa, belonging to 81 genera. It reveals a high level of fungal diversity in these pine forests, independent of the climatic conditions, however the composition of the fungal communities was strongly affected by wildfire. Mycorrhizal taxa were impacted more severely by wildfire than the saprotrophic taxa, particularly in boreal forests: no mycorrhizal taxa were observed the year following fire in boreal forests. From our results, it seems that fungal communities of boreal *P. sylvestris* forests are not as adapted to high-intensity fires as the Mediterranean fungal communities of *P. nigra* and *P. pinaster* forests. This fact will have a strong impact reducing ecological biodiversity and incomes global warming non adapted areas.

Keywords: *wildfires, fungal diversity, ecological adaptation, pine, mediterranean, boreal*.

Marteloscopes as tool for forest research, education and dissemination. Examples from Vietnam

Doan, Thi Nhat Minh
University of Valladolid; VNU University of Science
minhd@alumnos.uva.es

The BioEoN (European-Vietnamese Higher Education Network for Sustainable Forest- and Bio-Economy) project establishes a Higher Education Institution (HEI) network of excellence for peer2peer learning and joint academic capacity building. In the BioEcoN project, six universities from Europe and Vietnam collaborate to develop innovative learning materials that offer students a multidisciplinary perspective in sustainable forest and bio-economy. Within the framework of the project, the VNU University of Sciences had set up a standard plot Marteloscope on the area of 1 ha (10 times larger than the current standard plots in Vietnam) at the 43m core area of Vietnam National University, following the standards from Uniersity of Valladolid, to serve practice and internship for students to study forests and biodiversity. Marteloscope is a fixed research area in the forest that uses the measurements and related software to provide detailed view of biodiversity, forest resources, ecology, and silviculture. The Marteloscope can give students opportunities to improve their practical knowledge; policy makers can use research or make appropriate decisions. The construction of the Marteloscope uses the simplest technologies such as measuring tape, ruler and compass, to modern tools such as digital cameras, laser ruler, unmanned aircraft, multi-frequency positioning, total station, geographic information system, 3-dimensional map construction, stand visualization - Virtual Tours, GIS programs and software, online environmental information system to manage and update facilities. Data obtained from the study area been digitized and built into a complete database for research, teaching and learning.

Keywords: *forest inventory, geodetic referencing, tree positioning, tree measuring, biomass.*

SESSION V

Optimization of Walnut plantations value chain through mushrooms

Herrero, Celia
ECM Ingenieria Ambiental, S.L.
chdeaza@ecmingenieriaambiental.com

European society and regulations demand sustainable and profitable forest management which enhance the utilization of the entire forest resources. Innovative solutions are needed to deal with efficient and sustainable wood production from economic and ecological point of view.

WOODnat Project (Second generation of planted hardwood forests in the EU [GA 728086]; www.woodnat.eu) is an H2020 innovation action which aims for increasing the use of quality walnut hardwood produced under sustainable management practices.

WOODNAT consortium is composed of 9 partners (8 of them are companies), located in 5 European countries, which collaborate on the optimization of the wood products value chain in walnut plantations. In WOODNAT Project, ECM is developing forestry technological tools which range from the beginning of the plantation to the final harvest at the end of the rotation. Among them, Stumps Biological Degradation, through saprophytic mushrooms, is highlighted as a natural, sustainable and environment-friendly alternative solution in the latest management step of the walnut wood forests.

ECM Ingeniería Ambiental's role in WOODNAT project is focused on three objectives which target the different phases of walnut stand development: 1) improving plant growth and survival during acclimation stage by enhancing nutrient uptake through this natural way, mycorrhization, at the beginning of the plantation, 2) improving the profitability of the plantations growing different strains of edible or medicinal fungi species and 3) establishing Stumps Biological Degradation methodology with Pleurotus ostreatus, Lentinula edodes and Trametes versicolor to eliminate the stump in the latest stages of the plantation.

Results of WOODnat project will allow ECM to show sustainable solutions related to mushrooms in walnut management practices and to optimize the walnut plantations value chain through fungal innovative outputs.

Keywords: *walnut, mushrooms, stumps biological degradation, mycorrhization, sme.*

Potentials and limitations of remote fire monitoring in protected areas

Machado Nunes Romeiro, Joyce
Federal University of Viçosa
joy.romeiro@gmail.com

Protected areas (PAs) play an important role in maintaining the biodiversity and ecological processes of the region. One of the greatest challenges for the PA management in several biomes in the world is wildfires. The objective of this work was to evaluate the potentialities and limitations of the use of data obtained by orbital remote sensing to monitor fire occurrence in PAs. Fire Occurrence Records (FORs) were analyzed in Serra do Brigadeiro State Park, Minas Gerais, Brazil, from 2007 to 2015, using photo interpreted data from TM, ETM+ and OLI sensors of the Landsat series and the Hot Spot Database (HSD) from the Brazilian Institute of Space Research - INPE. It was also observed the time of permanence of the scar left by fire on the landscape, through the multitemporal analysis of the behavior of NDVI (Normalized Difference Vegetation Index) and NBR (Normalized Burn Ratio) indexes, before and after the occurrence. The greatest limitation found for the orbital remote monitoring was the presence of clouds in the passage of the sensor in dates close to the occurrence of the fires. The burned area identified by photo interpretation was 54.9% smaller than the area contained in the FOR. Although the HSD reported fire occurrences in the buffer zone (up to 10 km from the Park), no FOR were found at a distance greater than 1100 m from the boundaries of the Park. As the main potential of remote sensing, the possibility of identifying burned areas throughout the park and surroundings is highlighted, with low costs and greater accuracy.

Keywords: *protected areas, fire occurrence, remote sensing, normalized difference vegetation index, normalized burn ratio.*

Gene expression profile of *Fusarium circinatum* in response to the infection of the putative mycovirus FcMV1

Zamora, Cristina

Sustainable Forest Management Research Institute, University of Valladolid – INIA, Palencia, Spain

cristina.zamora@uva.es

Virus infections generally are ubiquitous in major fungal families including plant-pathogenic fungi. The effects of these mycoviruses range from asymptomatic to detrimental conferring hypovirulence to their host. Three different mycoviruses of the genus *Mitovirus* has been identified infecting Spanish isolates of the conifer pathogen Fusarium circinatum (FcMV1, FcMV2-1 and FcMV2-2). Mitoviruses has been associated with the hypovirulence phenomenon in many phytopathogenic fungi, motivating the study of F. circinatum mycoviruses in an attempt to limit the effects of the devastating Pine Pitch Canker disease. Although the presence of mitoviruses does not seem to affect the size of the lesions caused by F. circinatum, it does so reducing the percentage of spore germination and mycelial growth. Thus, metabolic activity reduction could be related to the presence of mitoviruses but it is necessary the use of more accurate methods to determine their effect beyond the visible symptoms. The development of new tools based on host genome studies helps to address the intellectual challenge of understanding the fungal–virus interactions. For the purpose to identify genes linked to the presence of the mitovirus FcMV1, standard differential expression analysis was carried out using RNA-Seq. Total RNA from virus-infected and cured isogenic F. circinatum strains was isolated and sequenced. CLC Genomics Workbench V7.5 was used to perform the bioinformatic analysis. As a result, 14 genes were differentially expressed in response to mitovirus FcMV1 infection. Our analysis provides further detailed insights into mitovirus-F. circinatum interaction.

Keywords: *mycovirus, rna-seq, Fusarium circinatum, pine pitch canker, gene expression*

Site index curves for site quality assessment using guide curve method

Muleta, Takele Birhanu
takeana55@gmail.com

Site index modelling is one of the most common methods of determining the site quality based on the dominant or co-dominant height-age relationships. This study aimed at comparing different site index equations developed previously to select the best candidate model and to develop site index curves for the study area.

Data on the dominant height and age were acquired from 133 temporary plots. Seven different equations were used for the study which were previously developed. Those equations were the modified Hossfeld I, Hossfeld I, II, III, IV, Smalian and Mitscherlich Richards-chapman equations. All the models were fitted using R software and analysed for the goodness of fit statistics. Both quantitative and qualitative model evaluation techniques were used to identify the best candidate model for the study area. The guide curve method used to develop the site index curves using the best candidate model.

It was found that modified Hossfeld (I) was the best candidate model based on both the quantitative and qualitative model evaluation (Residual standard error= 4.734, AIC= -24.329, BIC= -22.205) criteria compared to all the other models developed. Thus, it is the most suitable for the construction of the anamorphic site index curves for the study area. The site index curves developed by the model was logical and showed the natural pattern of the dominant height and age relationship.

The results obtained in this study are crucial and can be used for various purposes including for effective forest management planning, forest policy making, in decision making and to classify the site into different classes based on different site indices.

Keywords: *site index, anamorphic, site index curves, dominant height.*

The biodiversity of wild ornamental geophytes in the Syrian Coastal area

Daiyoub, Angham
Tishreen University
anghamdaiyoub@gmail.com

Syria is a country, which located in the east of the Mediterranean, and as all Mediterranean countries it is distinguished as a hotspot of biodiversity with more than 3100 plant species including a high number of endemism with 330 endemic plant species. Most of the Syrian forests are located in the coastal Mediterranean mountains, which represent the most important habitat for wild plants especially the high economic value plants as medical and aromatic plants, edible plants and wild ornamental plants. This research was conducted in 20 sites along the Syrian coast in order to cover the largest possible site characteristics for geophytes inventory using a checklist of multiple criteria (type of habitat,soil,aspect,elevation,storage organ, slope and scientific classification) in addition to other criteria related to the studied site in different seasons with different climatic conditions. The collected data was analysed using Microsoft excel and the results showed a high number of registered geophytes of 60 species belonging to 15 plant families. The most representative family was Liliacaeae which represented by 16 species followed by Orchidaeae with 16 species in the time that seven families were represented by only 1 species. Among the studied habitats broad leaved habitats were the richest with geophytes like Tulipa agenensis, Fritillaria elwesii, Paeonia mascula, Orchis anatolica.

Keywords: *geophytes,mediterranean,ornamental,biodiversity,inventory.*

SHORT SCIENTIFIC COMMUNICATIONS CONTEST

PRESENTED IN CASA JUNCO (PALENCIA)

JANUARY 25TH

Strategic options to reducing deforestation drivers in the Raimondi District, Ucayali Region

Cotrina, Denisse
denisse.cotrina@gmail.com

The district of Raimondi faces a high level of deforestation due to conflicting interests between actors, and the lack of a long term strategic vision for development due to forestry activities are currently unprofitable compared to other agricultural activities generating the forest ecosystem values other than wood are not recognized. The primary objective suggests forestry and agricultural activities that consider low emissions approach in the District of Raimondi, Province of Atalaya, Ucayali Region.

The methodological approach took into account quantitative and qualitative research which included fieldwork to achieve the full integration of the stakeholders and their relation with drivers and barriers that cause deforestation adapting all the results to the social, economic and environmental context.

The first phase corresponds to the mapping of actors built from the field activities in the Ucayali region and the identification of critical issues. This information allows a better understanding of the deforestation agents and their relations that affect the potential low emission activities that reflect the proposal.

The second phase considers the driver analysis which reveals the lack of land planning regulation and a high level of extreme poverty in the border territories making Raimondi attractive and vulnerable to immigration.

Finally, strategic options selected shows the potential of reducing deforestation generating a positive impact on carbon stocks and their effects on the socio-economic development in the region.

This study promotes sustainability in different landscape area giving priority to actions to stabilize agriculture in harmony with the value of Peruvian forest.

Keywords: *planning, landscape, land use, stakeholders, low emissions.*

Multitemporal study of land use and forest cover in the municipality of Puerto Rico (Meta) and its projection for the year 2020

Guerrero Machado, Daniel
Universidad Distrital Francisco José de Caldas, Bogotá, Colombia.
dfgm2006@gmail.com

The Municipality of Puerto Rico is a region that represents the most disturbing environmental and social problems of the country, is located to the south of the Department of Meta. It is a target for forest degradation and praderization, armed conflict, illicit crops, displacement, poverty and informality in land tenure. Its area is divided into three major planning zones: the La Macarena National Park, the Ariari-Guayabero Production Area and the Recovery Area for North Production, which are the subject of analysis throughout the document.

The objective of the multitemporal analysis is to analyze the changes that were presented in the coverage during a period of 23 years, using 4 LANDSAT satellite images of different dates (1991, 1997, 2003 and 2014), the analyzes allow to determine the dynamics of losses of forests due to deforestation processes and the increase of other coverages due to human intervention and thus to show the change figures of the coverages mapped in the Municipality in each of the three great areas of management.

According to the above, a methodological process was used to obtain data of spatio-temporal changes that consisted in the digital processing of the images with the help of tools and specialized software for this task.

The first part of the document shows the scope of the work, a detailed description of the area of study, as well as a deeper methodological description; in the second part, the step-by-step methodological development, the results of changes in coverage, the projection for the year 2020 of the transformations of some coverages for each of management areas. A discussion is generated on the basis of the results obtained, its conclusions and recommendations for related work to be carried out in the future and finally, there is a series of annexes that allow to discriminate in greater detail the figures and procedures, cartography developed for each of the analysis dates mentioned.

Keywords: *land cover use, multitemporal study, forest coverage, forecast, markov chains.*

Indigenous strategies for climate change adaptation

Kebede, Hilina Yoahnnes
Hawassa University, Wondogenet College of Forestry and Natural Resources
hilulop@yahoo.com

Pastoralism is one of the livelihood systems that have sustained the arid and semi-arid environments. The untapped knowledge about their environment makes pastoralists unique. This uniqueness shall be maintained, embraced and their techniquality and skills must be the central part of any developmental policy.

This work presents a study in Kebribeyah district predominantly of an agro pastoral area. The objective was to assess pastoralist's perception and their response mechanisms including emerging strategies. Accordingly, the data was collected by using key informants, interviews, intensive desk studies and focus group discussions. The results from this study showed that agro pastoralist's perception was in line with the recorded temperature data of 30 years. However, perception of change in rainfall didn't coincide with the trend of annual rainfall which shows a 30.45mm increase over the period of 30 years. Indigenously developed climate change adaptation strategies like traditional weather forecasts, mating calendar, traditional social insurance ('Gargar'), traditional rotational grazing system ('Seri'), soil and water conservation ('BERKAD') and emerging adaptation strategies such as milk and meat sell ('HILBELE'). Social interventions should focus on these cultural strategies and regional policies should work towards mainstreaming these age-tested practices for successful climate change adaptation in the drylands.

Keywords: *adaptation strategies, climate change, indigenous strategies, pastoralism.*

Invanding potencial from sea almond (*Terminalia catappa* l.) In resting forest

Sanches, Joyce
Universidade de São Paulo
joyce.sanches@gmail.com

Current and the next decade they will be identified in the time as group of the most excellent concerns with the ambient quality of the planet. Subjects as global heating and the eminent loss of the amount and quality of the water are argued constantly. A more specific ambient problem has worried specialists in the world all, including Brazil. One is about the large-scale dissemination of exotic species. The subject has been treated in the half academic as biological invasions and it is not only restricted to the plants. The study presented here it at the time deals with a trees species with great dissemination in the country and used in urban areas and beach bands due to proportionate shade of the summer. The occurrence of the sea almond in protect areas of integral protection can represent a threat to the species for the occupation of the space. The identification with scientific methodology of the germination characteristics and reproductive success had been the form to evaluate the threat degree that the species represents for the environment of restinga. Thus, this study it had the objective to determine the potencial of biological contamination of the singapure almond (Terminalia catappa L.) through the analysis of the index of germination speed (IVG), average time of germination, average speed of germination, frequency of germination, germinability (G%) and analysis of the tax of survival and transistion of seedly, young and adults. The results indicate that the seeds of the species can germinate in ample band of temperature, mainly, will be the full sun. Pulped fruits had presented greater speed and tax of germination. Seedly had presented high tax of comparative mortality to adult and youngs. The necessary species was concluded that to be removed of the area of restinga, therefore, although to be considered established, in favourable conditions it will develop itsef occupying the niche of other local species.

Keywords: *alien species, terminalia catappa, biological contamination, protect area*.

Deforestation in Western Ukraine

Nahorna, Olha
Olhanahorna1@gmail.com

In Ukraine forests occupy about 16% of the entire territory of the country, which means almost 10,4 million hectares of forests. 40% of them belong to Western Ukraine and are represented by Carpathian forests. In this area forest logging has already reached the scale of ecological disaster. Forest overcut has already leaded to floods and mountains erosion. Ecosystem of forests is being actively destroyed; animals, birds, and plant species are dying out. There is no plantation and regeneration in harvested forest areas. Mountains are getting bald. What is more, a very big amount of trees are being harvested illegally. There are many corrupt gray schemes for logging and export of timber abroad. The goal of this research was to determine the main reasons for the current forest situation in the region and find out possible solutions.

Mostly illegal logging is caused by the poor state of the country's economy - the local population is forced to do this just for physical survival, because Western Ukraine is a depressed region, there is no legal opportunity to earn money due to the extremely high level of unemployment.

In the same time, there are a lot of plans and public initiatives for forest saving, but their realization turns out to be impossible. The main reason is lack of finance investments, as almost all money raised for timber goes into the shadow economy sector.

It is possible to say that Ukraine is facing a big challenge. Local characteristics: the legacy of the communist regime - command method of leadership, corruption, lack of technical control tools, gray schemes for forest harvesting, lack of interactive connections at all levels (private households producing logging, local communities, industrial suppliers, poachers, local governments and reserves) with second-order governance structures.

Numerous laws have been passed by governmental institutions. These laws in many respects copy positive foreign experience, but they have been thoughtlessly transferred to a system that is not adapted for their execution. Governance system should be interactive, but in Ukraine there is no interconnection between organizations and communities in different levels.

In the future, if a modern governance system of governance is not built, Ukraine may face the irreparable and complete destruction of the entire Carpathian forest ecosystem. Moreover, the forest ecosystem of the Ukrainian Carpathians is part of a larger mountain forest ecosystem, which also includes the relevant regions of Romania, Slovakia, the Czech Republic and Hungary, countries that are members of the European Union. Ecological disaster of one of the parts can affect the other parts. It would be wise to create a common system for protecting the forests of these territories, taking into account the vector of development of Ukraine in the direction of European integration.

Keywords: *deforestation, ukraine, carpathians, illegal logging, mountain forest.*

The challenges of silviculture in Nigeria forest management

Adeeko, Adedotun Olanrewaju
University of Padova, Italy and University of Valladolid, Spain
adeekoadedotun@yahoo.com

Nigeria is a forest rich country having majorly tropical forest and dry savannah. The forest played a great role in enhancing the economy of the country before the exploitation of crude oil started. After the discovery of crude oil, the forest which is usually managed by the government is totally neglected. This gives the local inhabitants opportunity to carry out different illegal activities in the forest. Many endangered species, ecological hotspots and biological diversities have been lost and vegetation cover has gradually reduced because of this negligence. The need to increase and improve the vegetation cover is now a global and national concern and Nigeria government are getting more aware the role forest plays in both economic diversity and environmental stability. To achieve this, application of proper silviculture is required.

This paper focused on the problems of the current silviculture in Nigeria which includes; adapting silvicultural practice to the local ecosystem, formulating policy that will encourage local participation in forest conservation, adapting silvicultural practices that favour agriculture and adopting improved and technological based silviculture. This paper also highlighted some possible solutions to these problems; forest planning should be done on a local ecosystem scale, silvicultural practices that allow people to use the forest, agrosilvopastoral system and interdisplinary approach.

However, silvicultural practices should recognize the role of local participation to achieve a desired result.

Keywords: *silviculture, participation, interdisplinary, agrosilvopastoral, ecosytstem*.

Estimating the distribution of rare and valuable woody plant in Ba Na Nature Reserve

Thanh Phuong, Nguyen
VNU University of Science, Vietnam National University
nguyenthanhphuong_t58@hus.edu.vn

Nowadays, conservation and management for the woody plants which are in danger in the nature reserve are essential. Because of over-exploitation and the loopholes in the management, the number of species, especially the rare and valuable species, have been declined dramatically in recently. Thus, it is necessary to create and update their locations to create a thematic map to represent their distribution. It will make the management boards work more effectively. This thesis was conducted in Ba Na nature reserve and focused mainly on the vegetation and the woody plants in here. After analyzing the natural features in Ba Na such as geographic characteristics, climates, vegetation and hydrological and soil texture, 10 rare and high valuable woody plants were chosen to represent on the map. Basing on collecting data about the locations of 10 species, the distribution map is created by applying the Geographical Informative System (GIS) on MapInfo 15.0. Moreover, by analyzing the biological, ecological characteristics as well as the status of these species and combining with the distribution map, it will become the tools for sustainable use and effective management. This thesis also proposed some solutions for the nature reserves in general and some specific suggestions for Ba Na nature reserve

Keywords: *gis, woody plant, plant distribution, conservation, management.*

The effect of different development stages on the quantity and quality of the essential oil of *Citrus aurantifolia* (christm.) Swingle in Iran

Razieh Ebadati, Esfahani
rz.ebadati@gmail.com

The Mexican lime tree with the scientific name of *Citrus aurantifolia* (Christm.) Swingle has great economic value because of its essential oil with a unique flavor. The essential oils from the peel of *C. aurantifolia* were collected during three development periods. The essential oil was analyzed by capillary GC and GC-MS. The essential oil yields (v/w%) were 1.54%, 0.88% and 1.23%, respectively. The highest oil yield was obtained at stage I (1.54% v/w). The analysis of the essential oil indicated that limonene, β-pinene, geranial, neral, and γ-terpinene were the main compounds of all samples. At the first stage, the highest percentages belonged to limonene (39.38%), geranial (14.32%) and neral (11.01%). On the other hand, the highest percentages of β-pinene and γ-terpinene (24.25% and 8.92%, respectively) were found at the final stage. Therefore, it is concluded that the harvest time has a considerable effect on the content and amount of lime fruit essential oil.

Keywords: *citrus aurantifolia, development stages, essential oil, gc-ms, limonene.*

Human-Canids conflict in Dhorpatan hunting reserve, Nepal

Thapa, Prakash
Institute of Forestry, Pokhara Campus, Pokhara, Nepal
prakash.thapa@studenti.unipd.it

Canids are group of least studied carnivores. They have wide distribution, flexible diet, adaptable behavior and multifaceted social organization. They play an important role in food chain contributing in ecological balance. However, human-canids conflict is a serious issue for their effective conservation. The study on human-canids conflict was conducted in Dhorpatan Hunting Reserve, Nepal. Data were collected through direct field observation, household survey, group discussions, key informant interview and preliminary survey. This study showed the increasing level of human-canids conflicts. Livestock depredation was the major problem for local people. The main reason behind the conflict was shared habitat between canids and livestock. People living in villages had negative attitude towards the conservation of canids. There was significant difference in the perception of people on canids conservation with respect to education ($P<0.05$) and sources of livelihood ($P<0.001$). The major anthropogenic problems associated with canids were land encroachment, retaliatory killings, illegal hunting, deforestation and grazing inside the reserve. Also, local people had a belief on the use of canids' body parts in traditional medicines. Livestock insurance, forming grazing restricted sites, community based anti-poaching units, conservation awareness and conservation action plan were recommended for reducing conflicts and long-term conservation of Canids.

Keywords: *anthropogenic problems, canids, conflicts, perception, belief.*

Tree community classification and diversity pattern within the communities in Juri Natural Forest, Bangladesh

Nabi, Md Nur Un
DFES, SUST
nursustbd@gmail.com

Juri Natural Forest is a biodiversity-rich primary forest in Bangladesh, which remains ecologically unexplored. Distinguishing plant communities has been central to vegetation science for decades. There is growing interest in describing plant community structure and diversity patterns in fragmented and degraded tropical forests because this has implications for conservation of species and habitats. The forests of Bangladesh are now subject to unprecedented threat not only from deforestation and fragmentation, but also from climate change. Thus, the issue of conserving the remaining remnant forests has become a priority. In this research I aim to identify the tree communities and compare the tree species diversity in those communities. The Juri Natural Forest (JNF), Bangladesh, (240 55' 238" – 240 32' 580" N latitude and 910 50' 028" – 920 11' 762" E longitude).I sampled a total of 60 plots by using arbitrary sampling technique without preconceived bias for collecting tree data. TWINSPAN (Two-Way INdicator SPecies ANalysis) was performed to classify tree communities and diversity indices was applied for the measurement of diversity in each community. WinTWINS software was used for the community classification and indicator species analysis. Diversity analysis was accomplished by using R software.Result: Six different communities were identified. Tree alpha diversity was highest on the midhill to uphill sites (dominated by Polyalthia simiarum-Duabanga grandiflora community) while diversity was lowest on the eroded foothill sites (dominated by Tricalysia singularis community). A distinguishing feature of Polyalthia simiarum-Duabanga grandiflora community is the strong preference for acidic soil in comparison to other communities. This community represents highest number of individual trees (ha-1) and indicates the highest number of indicator species. In Shannon diversity and Gini-Simpson index, the significant mean difference exists in between Polyalthia simiarum-Duabanga grandiflora and Ficus roxburghii ($p=0.05$) although in Pielou's evenness index no significant difference was observed. Main conclusion: The JNF consists of six tree communities which provides a crucial habitat for different tree species. Alpha diversity patterns were associated with topographical variation. Findings of the study illustrated that, in terms of composition, communities of the shady moist sites were highly similar and foothill communities were dissimilar.

Nomenclature: Uddin and Hassan 2011, Ahmed and Hasan 2011, Dey 2006, IUCN 2004.

Keywords: *twinspan,; richness index; shannon index; gini-simpson index; tropical forest; conservation.*

Cork sector overview: from harvesting to final products

Hederic, Ivan
Universidad de Lleida
ivan.hederic@gmail.com

Valuable properties of cork as material have been recognised by many civilisations, including Romans, Greeks, and Egyptians. From building life jackets and floating fishing nets in the past, this important non-wood forest product is today mostly used as a bottle stopper. The short harvesting window of opportunity, necessity of skilful workers for extraction, inability to harvest from the same tree every year, and perhaps the fact that Quercus suber grows endemically only in some countries of the Mediterranean basin can make this famous bark quite profitable alternative to timber production. This research uses secondary sources of information to present a summary of today's cork sector. It discusses where does an annual production of roughly 200000 tonnes of cork come from, where is it exported, and what are the achieved sector's revenues. Finally it offers an insight of the main threats connected to cork productions and offers recommendation for further development of the sector.

Keywords: *cork, quercus suber, portugal, spain*.

Taxonomic, functional and phylogenetic diversity of Raghunandan Hill Reserved Forest, Bangladesh

Chowdhury, Sangita

Department of Forestry and Environmental Science, Shahjalal University of Science and Technology, Sylhet-3114, Bangladesh.

sangitafes@gmail.com

In disentangling ecosystem functioning, functional diversity (FD) and phylogenetic diversity (PD) are considered more appropriate predictor than species richness (SR) and taxonomic diversity (TD). Though there is a close relationship between TD, FD and PD. In this paper we explored the relationship between TD, FD and PD in Raghunandan Reserve Forest (RRF), Bangladesh. We selected 68 plots from the sloping natural forest which cover three beats of RRF and include four functional traits such as leaf area (LA), specific leaf area (SLA), leaf dry matter content (LDMC) and tree height. We used Shannon diversity and richness indices for analyzing TD, Rao's quadratic entropy (Rao 1982) as a functional diversity index and Faith's (1992) index of phylogenetic diversity (PD). We found positive linear relationship between TD, FD and PD in RRF. FD increased with SR as well as TD due to low functional redundancy. PD showed linear relationship with SR and TD suggesting phylogenetic over dispersion. In our study, FD also increased with PD. So, the species of our study site are distantly related from each other. Focusing on functional diversity and phylogenetic diversity can improve understanding of the consequences of biodiversity loss as the functional and phylogenetic relationships help to understand the ecosystem processes of a given assemblage. In addition, this study can keep contribution in conservation decision-making and policy-making.

Keywords: *taxonomic diversity, functional diversity, phylogenetic diversity, ecosystem functioning, redundancy.*

European Union as a model of regional economic integration in Central Asia

Rahmonov, Muhsidin
mukhsidin@list.ru

Integration can be understood as a group of people who comes together of independent part to form a new whole. It is a process where voluntary states come together within a single system to cooperate with each other. It has been a long aged idea implemented for different reason. Especially after the Second World War, integration of European economy was considered to rebuild the states' economy, strengthen industries and make free import and export between each other. Taking this into account, the objective of this paper is to review the concept of economic integration, experiences of European economic integration, options to adopt the integration for central Asian countries and put way forward in relation to forestry sector. Based on the review, the two major theories explaining the integration approach are the theory of Neo-functionalism and the theory of Liberal-intergovernmentalism. With respect to Neo-functionalism, the main bench mark for the integration process was the creation of free trade area in 1957-1968 with the abolition of custom duties, restrictions and other limitations on trade between member countries. This helped to eliminate the free trade area, the free movement of people, goods, and services within the integration, have common policy on the transport and agriculture and the development of economic policy with the harmonization and the principles. The theory of Liberal-intergovernmentalism is typically manifested in the treaty of Lisbon made in 2009 with a main aim of making the European Union more transparent, democratic during the decision making and closer to the citizens of the member states. According to the theory of liberal-intergovernmentalism, interdependence should be very important probably in the Central Asian countries, because Central Asian countries possess rich natural resources as energy, water, gas, silver and other that will involve them to be interdependent. In Central Asia, there has been Commonwealth of Independent States (CIS), which is the regional organization established with the aim of democratization and cross border to prevent crime, and to cooperate with each other in the trade, and for the security of member states from the external powers. The paper concluded that economic integration can be adopted in Central Asia. But, the integration process don't need to go through all the stages and forms that were implemented in the European Integration. Given that forests are important sectors of national economy across central Asia, integration could inevitably influence the sector, specifically in timber trade, pulp and paper industry and other forest products and services.

Keywords: *central-asia, economy, eu, liberla-intergovernmentalism, neo-functionalism*

Silvicultural problem in Nigeria and its ecological solution using water and light as a case study

Cajetan Ugochukwu, Ugwu
ugwucajethan7@gmail.com

Nigeria is a land of tropical rain forest which is influence by hot tropical climate with a long two seasons such as dry and rainy season, its a country sits on the Atlantic coast with a land area of approximately 90 million hectares . Nigeria forest sector is a member of African Timber Organization (ATO) and the International Tropical Timber Organization (ITTO) , with several NGOs involved in forestry, e.g. the Forestry Association of Nigeria (FAN), Nigeria Conservation Foundation (NCF), Savanna Conservation, Nigeria Environmental Study Team (NEST), etc. How Light affect Nigerian rainforest silviculture because Plant life occurs in layers in a tropical rainforest, The uppermost layer consists of very tall trees—some over 150 feet tall—rising out of the dense canopy below, because of the very dense canopy, little sunlight reaches the ground. In a dense forest, the canopy trees can block out over 95% of the sunlight . Water affect the Nigerian silvicultural system because availability of water has a direct impact on the health of forests and their inhabitants, Trees serve as natural sponges, collecting and filtering rainfall and releasing it slowly into streams and rivers, and are the most effective land cover for maintenance of water quality. The effects of tree species, rotation length, and thinning regime are determined by water availability and water quality. The Best way forward are Delineation of boundaries and Capacity building and Institutional Strengthening, Promotion of community participation in forestry program.

Keywords: *silviculture, ecology, water, light.*

Forest fire in South Africa: the roles of sustainable development in controlling fire effects

Ugwu Nnaemeka, Vitus
ugwuvts@gmail.com

Wildfire, an essential element for the South Africa country, Can be a threat to Human life and property if is not well managed. The recent Wildfire that tore through a coastal south Africa town and kill at least four people and force about 10,000 to evacuate their home. This study attempts to analyze the forest fire phenomenon in south Africa in other to investigate the main causes of the problem. Base on relevant studies and past experience in neighboring countries, the study defines the main sources of UN-sustainability of the system. Natural Environmental, Human Social Life Economic Activities. Changing in life styles and the transition from agricultural to service economic, large population densities and high land demand and pressure are condition that are favorable to increased fire hazard. This study also evaluates the present fire suppression polices and stated that current polices are not enough to abate the present situation. Furthermore the study suggests that a more comprehensive policy based on the concept of sustainable development is needed in order to overcome the trend. Introduce effective environmental and rural development action within the south Africa subsidy policies. subsidies should promote the development of functional landscapes, in which both sustainable Agroforestry systems and highly valuable forest (both in terms of biodiversity and social economic value) help reduce the system's vulnerability to fire.Evaluation from governments of the total economic cost of forest fires. Both direct and indirect loss including human lives, houses, infrastructures, natural resources and biodiversity as direct losses and ecological degradation, water shortage, soil loss and many other aspects as indirect losses, should therefore be taken into account. Awareness raising campaigns targeted to different sectors of society (tourist,Land owners, farmers) and educational activities.

Keywords: *causes, prevention, controlling, fire suppression policy*

Ecosystems services assessment of Ampudia (Palencia, Spain)

López Fernández, Jorge
University of Valladolid
jorge.lopez.fernandez@alumnos.uva.es

Extensive research has been conducted globally into conceptual frameworks for ecosystem services. In the last decades, the concept and relationship between ecosystem services (ES) and human well-being has been discussed and investigated. All the ecosystems provide benefits from human well-being, especially forests, recognised as extremely important ecosystems in relation to their capacity to provide goods and services to society. Nevertheless, this capacity greatly depends on the type of forest and on the management applied.In this study, has been used a forest map (Spanish National Forest Map: scale 1:25,000) and information describing composition and structure to assess eight services closely associated with forest ecosystems in Ampudia (Palencia, Spain) in municipal scale. The following Ecosystems services considered were: provision of food, provision of materials (timber and fibres), provision of bioenergy (firewood), provision of water (water storage and infiltration phenomena), climate regulation (carbon storage), erosion regulation (protection against erosion), extreme climate phenomena (floods and windy stage), water good quality (water depuration) and cultural (recreational use and nature tourism). By combining information about the contribution of each ecosystem with, firstly the functional services (FS) and secondly the contribution of FS to ES, we established representative spatial models for the eight ES representing different categories of the potential supply of each one, based in population preferences and technical researches. The pondered information was mapped and representing for visual interpretation. The native mixed forest and pure native forest, in the study, provide more ES than other ecosystems in the village, being crops and urban systems, the worst ES provider.

Keywords: *ecosystem functions, ecosystem services, human wellbeing, regional land-use planning, ecosystem assessment.*

Plantation of *Cistus ladanifer* mycorrhizal plants with *Boletus edulis*

Fernández Ramos, Rodrigo
UVA
rodrigo.ramos.fernandez@alumnos.uva.es

Cistus species are mainly distributed around the Mediterranean basin, in Spain are represented twelve species of this genus. In the case of Zamora, the most representative shrub is *Cistus ladanifer*, which can form extensive areas of shrublands. *Cistus ladanifer* is a pyrophytic species that can colonize highly degraded areas and abandoned agricultural lands in a short time.The shrublands of this species are historically consider like non-interest lands by the people of the region. They manage it with fire, to obtain pasture and sometimes only to clean it. However, this ecosystem has a rich diversity in fungal species, one of this fungal species is *Boletus edulis*, which is edible and reaches high prices in the markets of many countries.*Boletus edulis* form symbiotic ectomycorrhizal association with *Cistus ladanifer*, the production of the fungus starts when *Cistus ladanifer* are 3-4 years old, which is the main advantage versus forest systems, where *Boletus* can grow too. This association is going to be use in a plantation in Zamora to produce *Boletus edulis* with the main objective of generate economic benefits. However, we also achieve to prevent forest fires and to give value to this ecosystems.With the proof of the site is correct, after geologic and meteorological studies and seeing that *Boletus* grow naturally, the plantation has been projected to maximize the production of the fungal species.The plantation has four different plots, two in agricultural lands and two in forestlands, these plots are in two municipal terms Rabanales and Rábano de Aliste, and suppose a total surface of 8.61 hectares.The project has six main chapters of budget. The first, the treatment of pre-existing vegetation, a clearing, realized only on forestland plantation and a plow in agricultural land. The site plantation, a lineal chisel subsoiled of three meter wide. A manual implementation of the mycorrhizal plants. A perimeter firewall to avoid possible forest fires and a two-meter high fence to avoid theft of other people. All this methods are the best options having account the conditions of the site. After the economic study has been seen that the project is economic profitable, but with a low range. Mainly due to the big amount of mycorrhizal plants per hectares and their price.

Keywords: *mycorrhizal plant, boletus edulis, cistus ladanifer, plantation*.