



Funded by the
Erasmus+ Programme
of the European Union

Master Programme Erasmus Mundus
MEDITERRANEAN FORESTRY AND NATURAL
RESOURCES MANAGEMENT

Book of Abstracts

Master Thesis

2014/2016 – 3rd Edition.



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CHARACTERIZATION AND CONSERVATION OF WETLANDS WITH GLOBAL CHANGE DYNAMICS: A CASE STUDY ON RATARGUL SWAMP FOREST, BANGLADESH

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Abstract

Bangladesh is known as the largest delta of the world where 50% of the total national land of the country is wetland. This wetland includes rivers, estuaries, mangrove swamps, fresh water swamp, marsh (haor), oxbow lake (baor) and bowl-shape depression (beel), water storage reservoirs, ponds, and others seasonal inundation areas. Wetlands in Bangladesh have great contribution to the country's ecologic, industrial, socio-economic and cultural aspects. About 50% people of this country are directly depended on wetland resources for livelihood and 70% of animal protein of the country comes from fresh water fishes. In addition to this, 6-8% revenue comes from only haor areas of Bangladesh. However, most of these wetlands of Bangladesh are being destroyed due to high population pressure and extreme level of resources extraction. A case study was completed on Ratargul Swamp Forest in order to find out characteristics, functions, values and services of this forest. This study has also explored criteria of dependency of local people, disturbances and optimal management option of this forest. To complete this study, qualitative and quantitative research approach were followed. Participatory Rural Appraisal (PRA) tools were used to collect socio-economic information. Remote sensing and GIS tools were used to detect land use change over time. The results found that the forest is located 35 m above from mean sea level and comprise part of two rivers, several canals, natural depressions and with artificial ponds. During rainy season, the average height of water level from the forest floor is 4 m. Sometimes it raises also 7.5 m due to flash flood. This forest provides multiple goods and ecosystem services which play a vital role on the livelihood security of the local people. But, the degradation and disturbances of this forest is significant. The study found that high density forest was reduced by 18.40 ha and degraded area has increased by 25.53 ha from 2005 to 2015. However, the participatory forest management approach could be an effective tool for sustainable management of this swamp forest.

Key words: Wetland, Ecosystem services, Livelihood security.

EFFECT OF CLIMATIC AND MICRO-CLIMATIC CONDITIONS ON THE PROVISIONING OF FUNGAL-BASED ECOSYSTEM SERVICES IN MEDITERRANEAN PINE STANDS

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Abstract

Mushrooms are one of the most important non-wood forest products in the Mediterranean Basin. They provide a wide variety of ecosystem services, including a contribution to the sustainability of forest ecosystems and global carbon cycle. Moreover, wild edible species possess a strong socio-economic significance.

Climate appears to be the most important factor determining mushroom productivity. Climate change models predict drier and hotter conditions for the Mediterranean, raising the concern about the long-term provision of mushroom ecosystem services, because of the expected reduction of water availability in the soil as a result of decreased precipitation and increased evapotranspiration.

Soil moisture is assumed to be an important micro-climatic variable affecting mushroom productivity since it integrates climate, site variables and forest stand characteristics. With the aim to increase our understanding of the interaction between climate and micro-climate, and their relative role in determining mushroom occurrence and productivity, we used a long-term yield data-base from 28 permanent mushroom inventory plots established in 2008 in *Pinus pinaster* stands under coastal Mediterranean climate. Mushrooms were collected on a weekly basis during the autumn fruiting season and classified as total, edible and marketed mushrooms. A process-based soil water balance model was used to reconstruct soil moisture values to complement field observations. Mixed-effect two-stage models employing monthly climate and micro-climate (soil moisture) variables were fitted to mushroom occurrence and productivity data.

We found that mushroom production in the Mediterranean was primarily dependent on weather conditions during the same month, with the exception of precipitation, whose effects were found to exhibit a delay of one-month. Temperature had both positive and negative effects, with high temperatures limiting production at the beginning of the fruiting season and low temperatures limiting it towards the end. Although climate-based models had better predictive power than micro-climate-based models, the latter allowed more profound insight into the processes of mushroom fruiting.

Keywords: Mushrooms, Ecosystem services, Climate, Micro-climate

DEVELOPING A BUSINESS MODEL FOR SMALL AND MEDIUM FOREST HOLDERS UNDER FSC CERTIFICATION SCHEME

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Abstract

The Forest Stewardship Council (FSC) certification scheme is a market-based voluntary approach, was emerged during the 19th century in order to halt the rate of massive deforestation in tropical countries, to create a globalized market for the forests and forest products harvested from a sustainably managed forest and to make people aware about the environmental conservation. Since then, this certification process has generated enormous amount of benefits including premium prices, raising environmental awareness among people, abiding the national legislations, health and safety for the workers, better marketing opportunities and so on for different level of forest owners and manufacturers. However, in spite of all these benefits, it could not ensure equal business opportunities, access to the international markets for the small and medium forest holders.

This study aims to develop a business model for those small and medium forest holders who are facing obstacles against receiving those expected benefits of FSC certification scheme.

The study will be conducted based on the literature review of different successful business models already existing in and out of forestry sector and by an online questionnaire developed for experts.

It can be assumed that the findings of the study will bring out new ideas to facilitate the access to certification process for small holders, identify available marketing opportunities, obstacles against better financial income from the sale of their product, role of supporting organizations to improve their business, gaining more benefits from the FSC certification scheme and motivating them to remain connected in the certification process and encouraging more people to take part in the certification process.

Keywords: Small forest owners, FSC certification, marketing.

MODELLING HEIGHT DISTRIBUTION ON YOUNG CORK OAK PLANTATIONS IN PORTUGAL

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Abstract

Cork oak (*Quercus suber* L.) represents a crucial role on “montado” ecosystem and socio-economic life in Portugal. The importance of decision support tools such as growth and yield models is recognized worldwide, and this work will contribute for the improvement of the SUBER model, a growth and yield model developed for cork oak stands in Portugal. The tree total height distribution is relevant when studying young stands, as it is the unique variable used to characterize the stand.

The purpose of this thesis lies in modelling the heights distributions of young cork oaks plantations, using existing and to be performed measurements of 42 plots distributed throughout Portugal. The plots are located in recent plantations carried out since 22 years ago. For this the following partial objectives had to be fulfilled: 1) selecting the best probability density function (pdf) to simulate height distribution of young cork oak trees by the kurtosis and skewness values; 2) modelling the parameters recovery of the pdf selected, using edaphoclimatic variables as input; 3) validation of the proposed framework, to estimate height distribution using the Kolmogorov-Smirnov statistic.

The results are: 1) the Johnson’s distribution was the best probability density function due to its flexibility; 2) the mean height, the standard deviation of the tree heights, the skewness and kurtosis were the moments and function of moments used in the parameter recovery; 3) it predicted the “moments” from edaphoclimatic variables with a model efficiency of 0.91, 0.61, 0.35 and 0.21, for the mean height, the standard deviation, the skewness and kurtosis models, respectively; 4) 66% of the simulated height distributions followed the real distribution according to the Kolmogorov – Smirnov test (p-value = 0.01).

The general behavior of the simulated Johnson’s distribution using the four models developed for the moments is quite acceptable to predict the height distributions.

Keywords: Johnson’s function, total height distribution, probability density function.

TIMBER TRACEABILITY IMPACT ON FOREST GOVERNANCE IN TROPICAL COUNTRIES. THE STUDY CASE OF HONDURAS

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Abstract

Illegal logging has devastating effect on some of the most valuable remaining forests. Traceability, control and verification are different concepts and the main tools used by Governmental institutions, civil society and Private sector organization in order to brake this issue, by giving evidence of the legal origin of the wood before placing it in the international or domestic markets. However, if the system is corrupt, it is likely that forest governance will be corrupt as well. In such situations, changing forestry laws and regulations alone will solve few problems.

Therefore traceability, control and verification systems have an impact on the good forest governance that is defined by the Governance of Forests Initiatives (GFI) by 5 principles: Accountability, Capacity, coordination, Participation and Transparency. In order to determine in which sense forest governance is influenced by tracking systems we will conduct several interviews with experts from different contexts in Honduras, with the purpose of knowing their perception of the traceability impact on the forest governance. We are highly expecting an important impact on the transparency, participation and cooperation of all actors in the local and national level.

Keywords: (Traceability, Forest governance, Impacts)

SOCIAL INNOVATION IN FORESTRY: A PRELIMINARY ANALYTICAL FRAMEWORK

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Abstract

Over the years social innovation has been receiving increasingly consideration to address the complexity of global problems that require sophisticated solutions to tackle social problems and add collective value. As a natural resource-based sector, with its potential role for employment and for community development, forestry is a promising field within which to investigate the role of social innovation in the support of adding collective social value. However the main innovations in forestry in recent decades have been of a technological and organizational nature, and social dimensions of innovation have been poorly explored by discourse and research. Therefore, in order to be able to provide relevant advice that includes the social dimensions on forest policy the purpose of this work is to provide an overview about the different uses and meanings of social innovation found in the literature, to identify drivers, limiting factors, pre-condition and mechanisms that can support or hinder social innovation in forestry and to propose a preliminary analytical framework relevant for the field of social innovation in forestry. Once the analytical framework is developed, an exploratory case-study approach was used in order to preliminarily test the completeness and feasibility of the framework, consisting of a consultation with a few social forest experts to actually use and fill the analytical framework based on the case study that they are involved with. Thus, results from such exploratory analyses should not be taken as conclusive. The intention was that this study would explore the usefulness of a social innovation perspective and would suggest starting points for more detailed case studies, rather than provide conclusive empirical findings.

Keywords: social innovation; forestry; analytical framework

ANALYSIS OF SUITABLE FOREST SPECIES FOR FORESTRY AND AGROFORESTRY USE IN CAPE VERDE

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Abstract

The archipelago of Cape Verde is a small country consisting of 10 main islands located in the Atlantic Ocean, about 445 kilometers from the West African coast and is situated in an arid and semi-arid zone that goes across the African continent.

The climate is tropical with two distinct seasons: the dry season (from November to June) and the rainy season (from July to October). The dry season is characterized by hot and dry winds, sometimes heavily loaded with dust which reduces atmospheric visibility in a significant manner.

Water scarcity is a major constraint for the agricultural and agroforestry development. With drought periods natural resources are partly degraded due to excessive rural activity and agricultural practices. Therefore in such harsh conditions and with the increasing demand for fighting the global warming worldwide is important to improve forestry, to protect agriculture by establishing new plantations.

In a planting project, the selection of the species is essential and based on a number of parameters that include, at least, environment, growth, suitability to animal browsing and economic value. The objective of the present research is to create a database of potential tree species to support plantation forestry and agroforestry in Cape Verde for environmental and agriculture protection and also to establish new markets for wood and non wood forest products.

Keywords: (Cape Verde – Agroforestry – Wood products)

USING YIELD-SAFE MODEL TO ASSESS CLIMATE CHANGE IMPACT ON YIELD OF COFFEE (*COFFEA ARABICA*) UNDER AGROFORESTRY AND MONOCULTURE SYSTEMS

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ABSTRACT

Ethiopia economy strongly depends on coffee (*Coffea arabica L.*) production. Coffee, like many other agricultural crops, is sensitive to climate change. Future changes in climate will have an impact on coffee yield and quality, while changing population dynamics of coffee pests' and diseases. Studies have called for an urgent development of coffee's adaptation strategies against climate change and agroforestry systems have received attention as an adaptation and mitigation strategy for coffee production under future climate. This study contributes to the assessment of coffee production in 1) monoculture and in 2) agroforestry systems, under different climate scenarios, in four different regions, providing insights for preliminary recommendations for coffee growers and policy makers. The Yield-SAFE process-based model was used to predict yield of coffee in monoculture and under agroforestry systems for forty years of current and future climate (Representative Concentration Pathways (RCP) 4.5 and 8.5 - HadCM2 model). In monoculture system, coffee yield was estimated to decrease between 4-38 % and 16-58 % in RCP 4.5 and 8.5, respectively from its current yield of 1000-1600 kg ha⁻¹ yr⁻¹. However, in agroforestry system the decrease was between 4-13 % and 13-25 % in RCP 4.5 and 8.5, respectively from its current yield of 1200-2200 kg ha⁻¹ yr⁻¹, showing that agroforestry systems have a higher resilience when facing future climate change.

Keywords: CORDEX, climate change adaptation, Ethiopia, process based model