



UNIVERSITÀ
DEGLI STUDI DELLA
Tuscia



**30 ECTS specialization sub-programme at
University of Tuscia (Italy)**

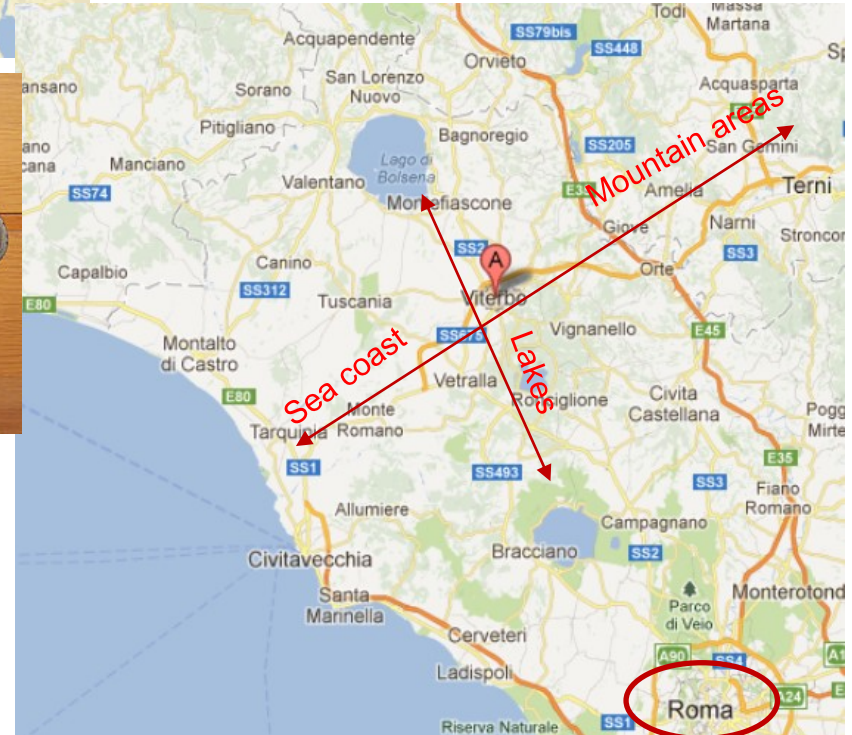
**Advanced tools for sustainable
management of Mediterranean forests**



Viterbo – Lazio – Italy

www.dibaf.unitus.it

DIBAF – Department for Innovation in Biological, Agro-food and Forest systems



City of Viterbo: from Middle Age with Etruscan-Roman roots



© ph mauriziovecchi



© ph mauriziovecchi



Tuscia: a region of mountains, water, ...





....and forests



The University: old and new



www.dibaf.unitus.it

DIBAF – Department for Innovation in Biological, Agro-food and Forest systems



UNIVERSITÀ
DEGLI STUDI DELLA
Tuscia

DIBAF

Department for Innovation in
Biological, Agro-food and Forest
systems



Via San Camillo de Lellis, snc - 01100 Viterbo (Italy)

www.dibaf.unitus.it

DIBAF

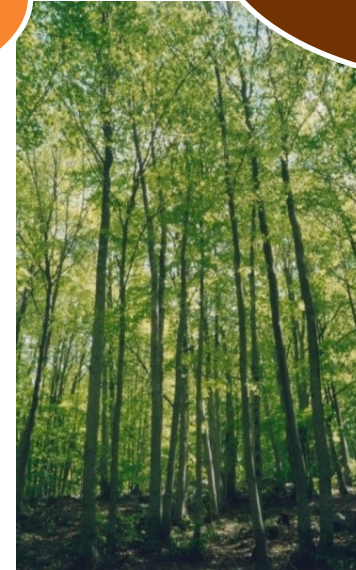
SCIENTIFIC & TECHNOLOGICAL INNOVATION

BIOTECHNOLOGY

FORESTRY
&
ENVIRONMENTAL
SCIENCES

LANDSCAPE
PLANNING
AND
CULTURAL
HERITAGE

AGRO-FOOD
SCIENCES & Tech



All levels of HE courses: BSc – MSc - PhD

www.dibaf.unitus.it

DIBAF – Department for Innovation in Biological, Agro-food and Forest systems

Research laboratories



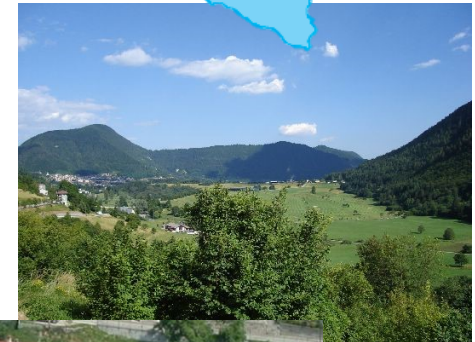
Research laboratories are characterized by advanced equipment, in which students have the opportunity to perform training work and to carry out their master and PhD thesis

Field research infrastructures in natural ecosystems, agroforestry and experimental farms suitable for thesis work but also for traineeships



ALPINE RESEARCH CENTRE of the University of Tuscia

Mountain research and teaching infrastructure of the University of Tuscia, located in the Tesino plateau (Trento province, Italian Alps-Dolomites)



Hosting the MEDfOR Summer Event

MASTER DEGREES

FORESTRY AND ENVIRONMENTAL SCIENCES (LM-73)



MEDfOR LOCAL CONTACT

Prof. Paolo DE ANGELIS

E-mail: pda@unitus.it

Tel. 0761 357292

Curriculum MEDfOR

MEDfOR

ERASMUS MUNDUS MASTER COURSE
MEDfOR
MEDITERRANEAN FORESTRY AND NATURAL RESOURCES MANAGEMENT

www.medfor.eu

The course consists of two curricula, completely taught in English, designed in close cooperation with other Italian and European universities. The different curricula are designed according to a common training framework, but oriented towards different professional careers.

Curriculum: Forests and Environment



It is the main learning path to complete the formation of the forestry professional profile according to a consolidated group of competences, recognised at national and international level. All the courses will be taught in Viterbo. Field practicals and other training activities will be performed in the laboratories and facilities of DIBAF- University of Tuscia. Furthermore, the students could apply for a mobility period in Europe for study or for traineeship, thanks to a wide network of selected Universities and Research centers and the financial support of the ERASMUS+ programme.



Common class activities

Curriculum: Mediterranean Forestry and Natural Resources Management - MEDFOR

Co-funded by the
Erasmus+ Programme
of the European Union



It welcomes students from all over the world interested in expanding their knowledge and competencies in the sustainable management of Mediterranean forests.

Students will get multiple degrees in at least two countries, by attending all the courses of the **first year** at one of the three universities where these are held: **University of Lisbon** (Portugal), **University of Lleida** (Spain), **University of Padova** (Italy), and the **second year** in a different partner University and country. Students which have been enrolled for the first year in Lisbon or Lleida could choose the MEDFOR curriculum offered at the University of Tuscia, Viterbo, where they will be asked to complete 30 credits (ECTS) and where they can work on their final dissertation (30 ECTS). For the admission and other info see: <http://www.medfor.eu/>



***RESEARCH ACTIVITIES IN THE FIELD AS WELL IN THE
LAB WITH THE FULL INVOLVEMENT OF STUDENTS***





Second Year at University of Tuscia (Viterbo - Italy)



UNIVERSITÀ
DEGLI STUDI DELLA
Tuscia

- **30 ECTS** specialization sub-programme: *Advanced tools for sustainable management of Mediterranean forests*. The University of Tuscia will provide advanced scientific tools that are relevant for a modern sustainable management of Mediterranean forests that is the focus of the EMMC objectives.
- **30 ECTS** for Thesis (including internship in our or external laboratories)

Starting date of the class activities – 25 September 2023 (but for logistic reason you should arrive in the period **16-22 September**)

Standard class and lab/field activities: October – December

I examination session: January – February

Additional examination sessions: every month from March to June

II examination session: July and September

Thesis sessions: June, July, September, November, December, February



Second Year at University of Tuscia (Viterbo - Italy)



UNIVERSITÀ
DEGLI STUDI DELLA
Tuscia

- **30 ECTS** specialization sub-programme: *Advanced tools for sustainable management of Mediterranean forests* 30 ECTS specialization sub-programme

You will select 5 courses among the 6 available according to your background and interest (you can decide after the first month of class activities)

Courses

- Forest biotechnology (6 ECTS)
- Forest ecophysiology (6 ECTS)
- Management of forests and agroforest soils (6 ECTS)
- Monitoring Terrestrial Ecosystems Carbon Cycle (ICOS) (6 ECTS)
- Remote sensing in forest resource management (6 ECTS)
- Forest tree cropping (6 ECTS)



Student services and support by International Students Office and Departmental tutors

- Support to obtain the permit of stay and for VISA renewal
- Support for the application to the Regional Agency for free student residence and supporting scholarship (only for self-funded students) – *inform the local contact before the end of June*
- Support for the reservation in the student residence or to rent an apartment – you will be contacted from our ERASMUS Office (*we need the final list before the end of June*)
- A department tutor will facilitate the relationships with the academic secretaries, and the management of the web services

WEB - <http://www.unitus.it/en/unitus/international2/articolo/international-incoming-students>



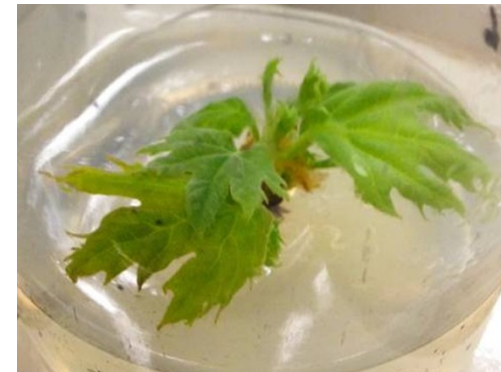
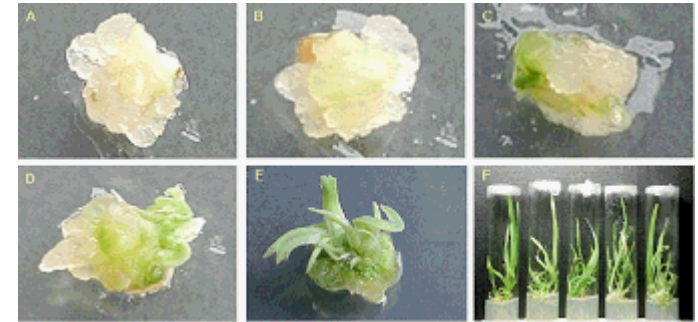
Forest Biotechnology (6 ECTS)

Lecturer: Prof. Elena Kuzminsky

<https://orcid.org/0000-0001-8945-5375>

To know basic elements and methods of forest biotechnology and to gain familiarity with the potential of biotechnology for Mediterranean forest tree improvement by means of the techniques and technologies currently used.

- In vitro culture of Mediterranean forest trees
- Methods of genetic transformation of forest trees
- Applications of recombinant DNA technology for the improvement of Mediterranean forest trees
- Molecular markers and Marker Assisted Selection



Multidisciplinary Approach

“Symbol tree” in the Renaissance Villas

Genetic and phenotypic characterization of the “symbol tree”

Dendrometrical trait and phytosanitary survey

Genetic identification by *LEAFY* gene analysis

Genetic variability: ISSR analysis

Susceptibility to *Ceratocystis platani*

Vegetative propagation

Propagation by woody cutting

Micropropagation



On-going research topics (1)

Micropropagation of historical garden trees

Platanus orientalis coming from Villa Lante -Viterbo



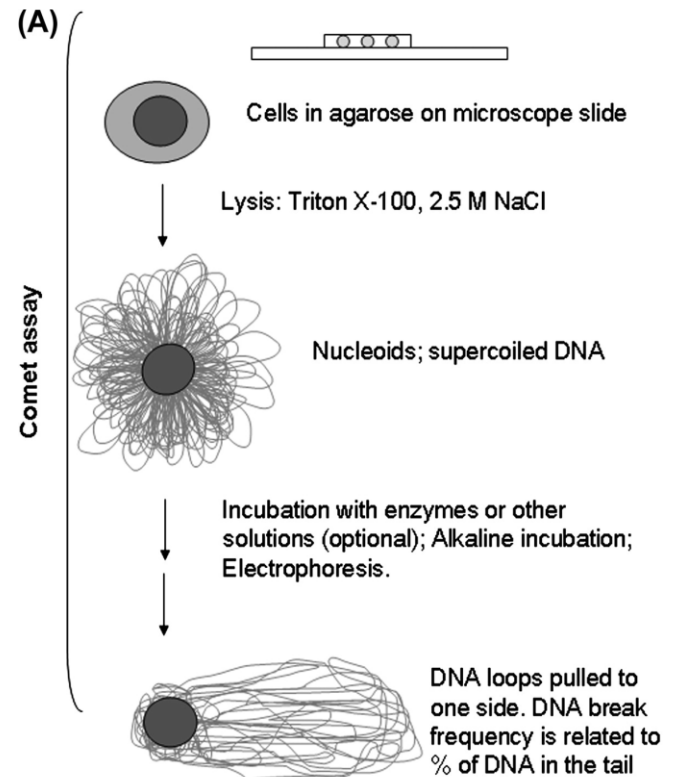
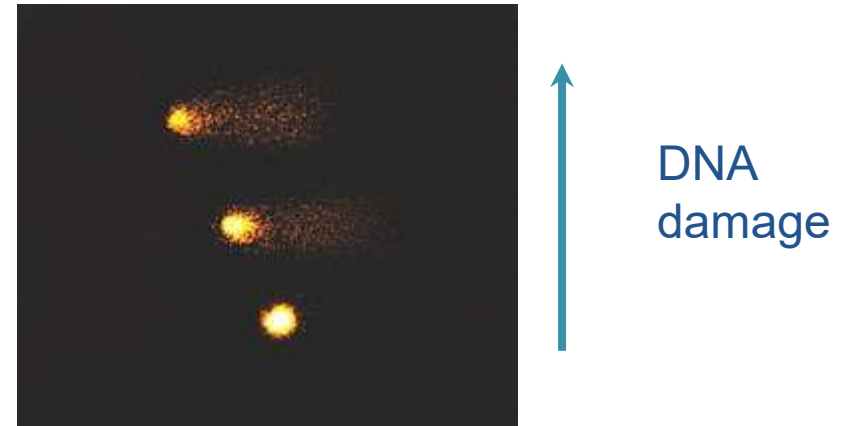
DNA damage by Single Cell Gel Electrophoresis (SCGE) called also Comet Assay

Plants in hydroponic solution under heavy metals stress (Zn)

The **Comet Assay** is a sensitive and rapid technique for **quantifying and analyzing DNA damage** in individual cells.

While most of its applications have been to study animal eukaryotes, there have been **few reports of successful application in the study of plant cells.**

On-going research topics (2)





Forest Ecophysiology (6 ECTS)

Lecturer: Prof. Paolo De Angelis

<https://orcid.org/0000-0001-8310-8831>

To know the environmental constraints of the main physiological processes, at tree and stand levels; to understand the acclimation responses to climate changes and to water scarcity; to gain familiarity with techniques and methodological approaches used in tree ecophysiology

- Morphologic and functional features of the main organs of forest trees: adaptation and acclimation
- Growth and development of forest trees and responses to environmental factors and stresses
- Tree architecture and microclimate within forest ecosystems
- Transpiration and water stress
- Photosynthesis and carbon cycle of forest ecosystems
- Quantitative methods for forest ecophysiological analyses
- Introduction to mathematical models for Mediterranean ecosystem analyses



Ongoing activities of the Forest Ecophysiology Lab.

Studies adaptive traits of trees

Tamarix spp.: ecological and physiological characterisation of Italian populations and provenances





Ongoing activities of the Forest Ecophysiology Lab.

Impacts of environmental constraints on plant ecophysiology

Impact of salt water and aridity on *Tamarix* spp. natural populations



Improving seed recruitment and plant soil water relations in semi-arid environment using woody biochar



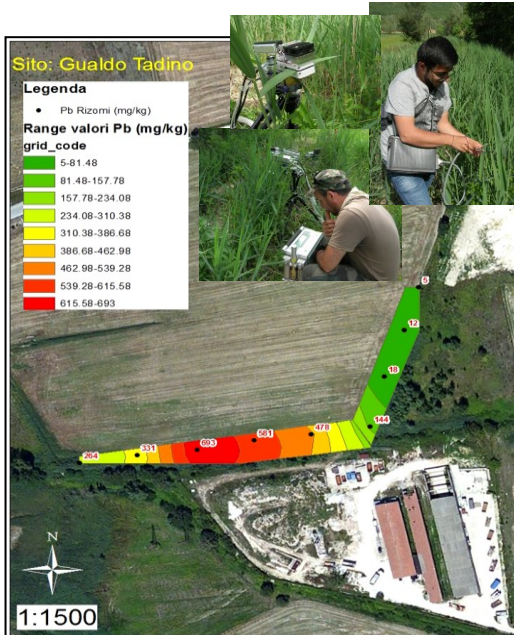
Impact of naturally occurring aridity on plant community gas-exchanges





Ongoing activities of the Forest Ecophysiology Lab.

Impacts of environmental pollutants on plant physiology



Ecophysiological analysis of riparian vegetation in a lead contaminated zone



Phytoremediation of polluted sludges



Phytotoxicity of polluted leachates





Management of forests and agroforest soils (6 ECTS)

Lecturer: Prof. Tommaso Chiti

<http://orcid.org/0000-0002-3794-4692>

To learn the properties and processes of forest and agricultural soils and their relationships with tree growth/site productivity; to know the effects of management practices on forest and agricultural soil properties to improve productivity and sustainability

Course structure

- ❑ History and management of forest and agroforest soils (4 hours)
- ❑ Composition of soils: Soil Formation and minerals, Soil organic matter, Soil structure, water and pores (12 hours)
- ❑ Life in soils: the microorganism d biogeochemical cycles (8 hours)
- ❑ Sampling forest and agroforest soils across space and time (4 hours)
- ❑ Influence of tree species, fire, nutrients and site preparation on forest and agroforest soils (6 hours)
- ❑ Managing forests and agroforest soils for carbon sequestration (6 hours)
- ❑ Field practice in a forest in the Viterbo area: soil description and site evaluation (8 hours)

Suggested prerequisites

Basic ecological concepts are welcomed.

Impact on soil carbon of different types of agroforestry systems

Wood and crop production



Wood production



Wood and livestock production



Impact of carbon farming practices on soil carbon sequestration

- How to maximise soil carbon sequestration
- How to calculate the soil mitigation potential of a practice
- Focus on sustainable soil practices
- Soil carbon accounting



Active collaborations

Agroforest certification



ISPRA

National Inventory report of GHG



Wood production





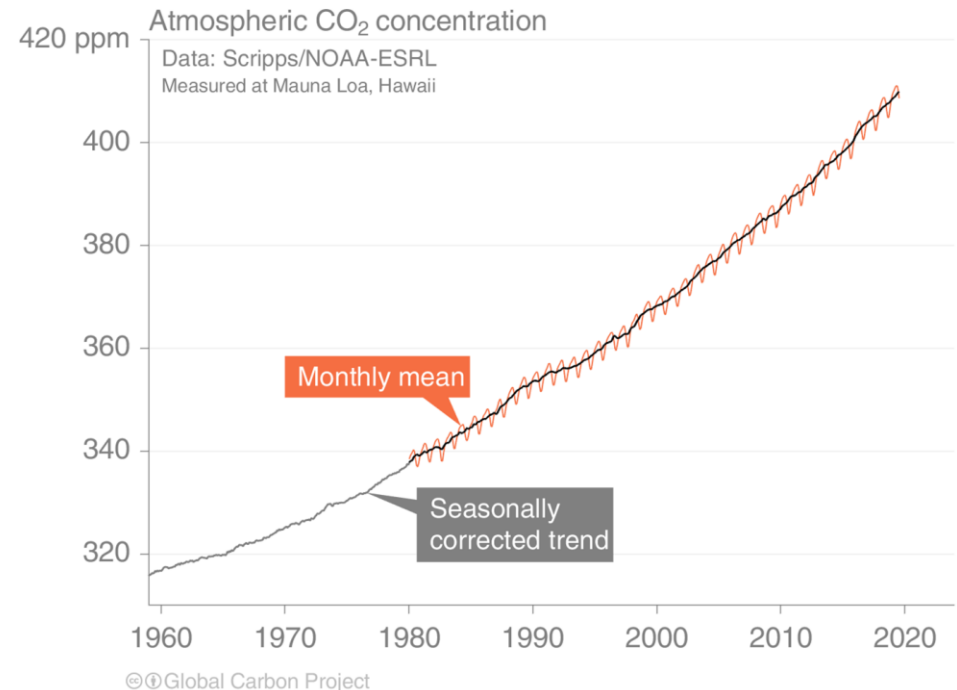
Monitoring terrestrial ecosystems carbon cycle (ICOS) (6 ECTS)

Lecturer: Prof. Dario Papale

<https://orcid.org/0000-0001-5170-8648>

The course will give an introduction to the global carbon cycle, the interaction between climate change and ecosystem functioning and the methods to monitor biosphere-atmosphere interactions

Our atmosphere composition is changing due to the anthropogenic emissions. Terrestrial ecosystems are impacted by the induced climate change



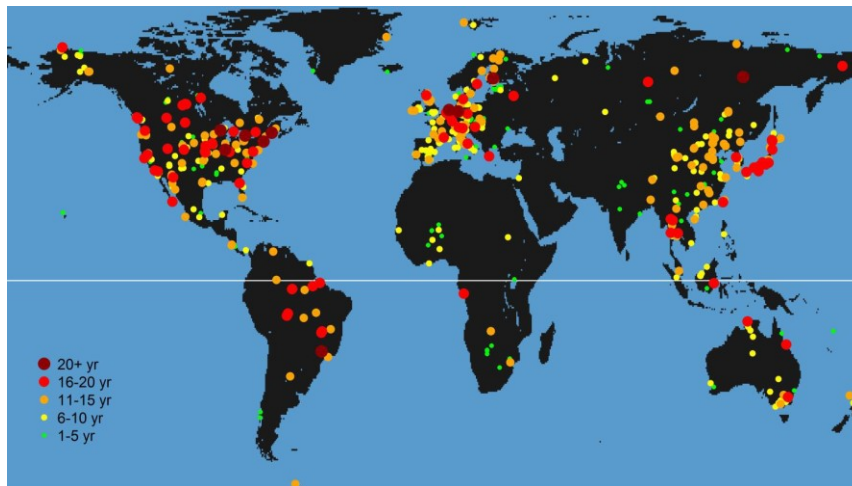
Monitoring the ecosystem components

Theory and practical activities on different monitoring techniques and methods



Direct measurement of greenhouse gases

From theory to sensors,
setup and data collection
and analysis: a full cycle
in the direct GHGs fluxes
measurement

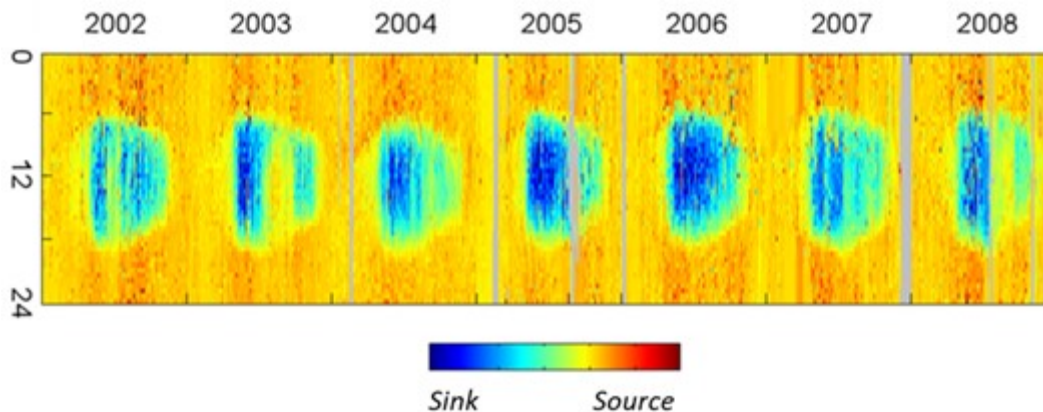


Integrated Carbon Observation System

The department hosts
the Ecosystem Thematic
Centre of the ICOS
European Research
Infrastructure



An international network

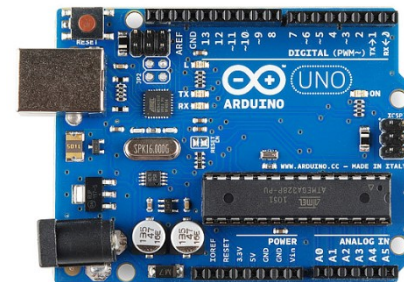


Course organization

About 50% theory and
50% practical activities

Main lecturer always
present but additional
experts involved in the
classes

Strong link with research
activities and technical
developments





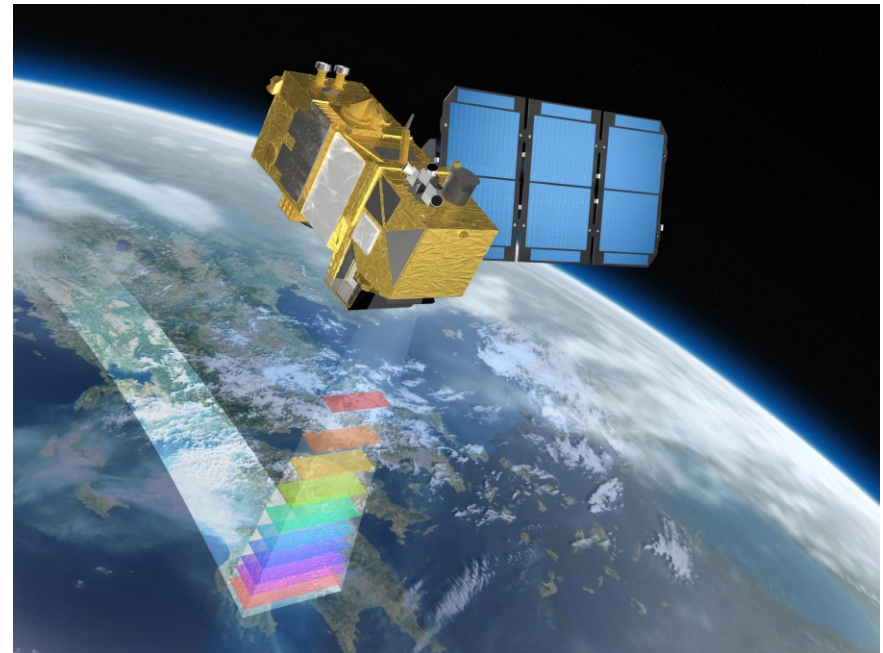
Remote sensing in forest resource management (6 ECTS)

Lecturer: Prof. Anna Barbati

<https://orcid.org/0000-0002-9064-0903>

Course goal: to identify the appropriate role of RS as a tool to handle particular forest management questions

- today, the growing availability of open remote sensed data has the potential to offer remote sensing solutions to address information needs in forest resource management
- not easy to properly appraise the usefulness and the value of remote sensing imagery products for forest mapping and monitoring applications



Course goal: to identify the appropriate role of RS as a tool to handle particular forest management questions

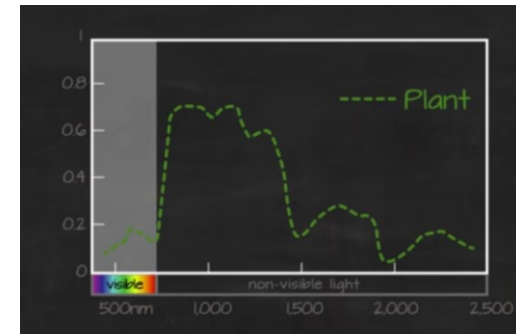
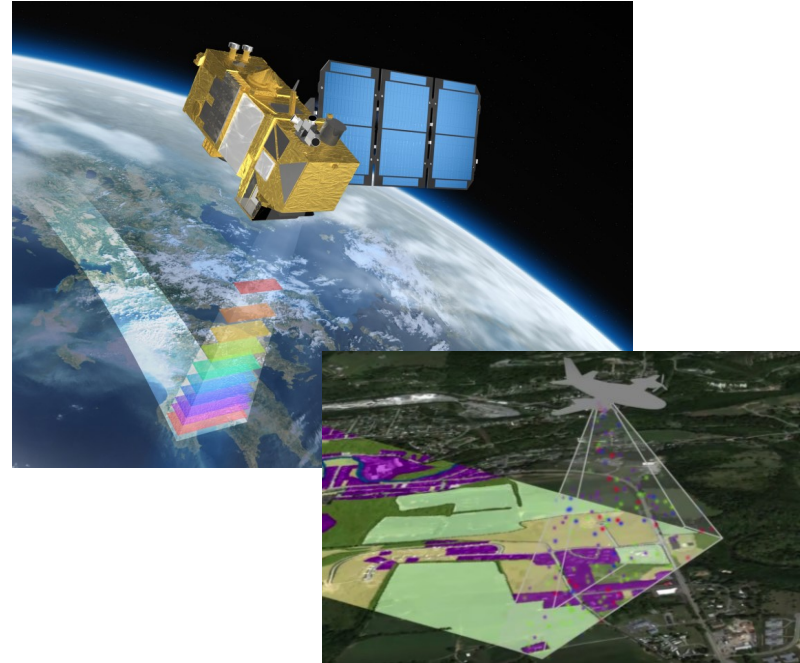
FOREST RESOURCE MANAGEMENT QUESTIONS

What is the spatial distribution of forest cover?

Species composition?

Can habitat fragmentation be measured and quantified?

What is the best way to monitor forest production?

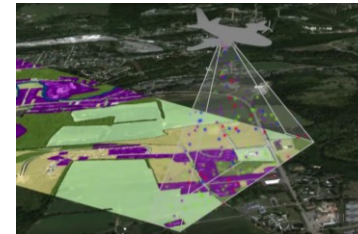
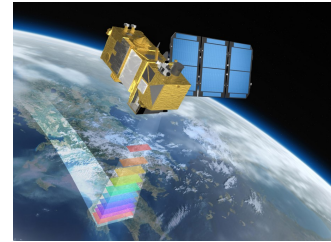


Teaching APPROACH



Lectures, single pieces of knowledge

Lab activities: connecting pieces by training exercises in QGIS



Data source

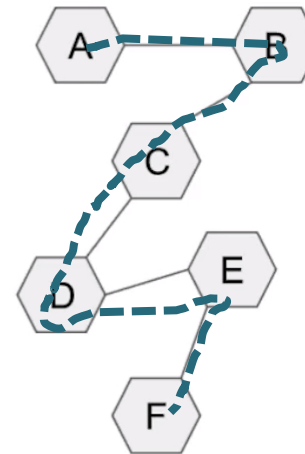
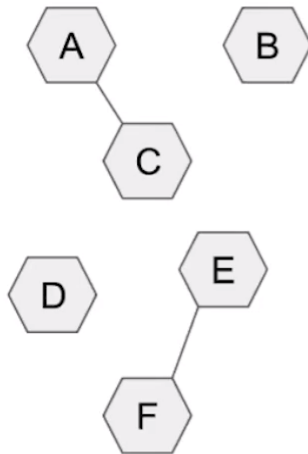
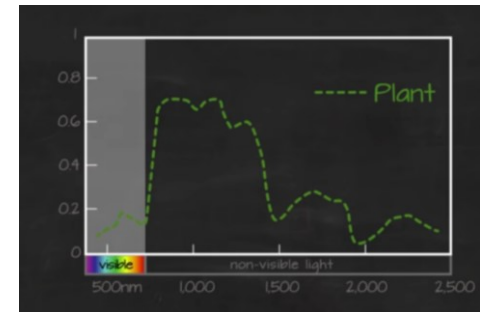


image data pre-processing

image classification techniques

FOREST COVER MAPPING/
CHANGE DETECTION ISSUE





Forest tree cropping (6 ECTS)

Lecturer: Prof. Maurizio Sabatti

<https://orcid.org/0000-0001-7576-2112>

Teaching activities are oriented to provide basic elements and methods of forest tree cropping and to gain familiarity with the techniques and technologies currently being used. The context of forestry and agroforestry plantations under the Mediterranean environment is also emphasized.

- Basic concepts of forest tree plantations
- Short rotation forestry (SRF) for energy production
- Agroforestry
- Phytoremediation using trees
- Forestry plantations, landscape and biodiversity conservation in the Mediterranean environment



Conservation of poplar germplasm at the Experimental Farm (EF) of the University of Tuscia

DIBAF started germplasm collections of native european poplars (*Populus alba* and *P. nigra*) from 1988. Currently:

- ✓ more than 500 poplar genotypes (*P. alba* and *P. nigra*) are in collections in the EF;
- ✓ breeding activities generated more than 2500 poplar genotypes of F₁, F₂, and Backcross generation conserved in the EF;
- ✓ a clonal archive of poplar species from Europe, America, Middle and Far east is hosted at the EF, including many hybrid poplars used in traditional poplar cultivation



Active collaboration with private companies in Italy involved in the agroenergetic market of SRF



Italy has a long tradition of poplar growing and use.



An active poplar breeding programme is managed by a private company to produce new genotypes for SRF





Available thesis topics



Master thesis list page 1/2 - [next](#)

Forest and Environmental Sciences click on picture for details

<p>Forest fires RS</p>	<p>Rainfall and citizens</p>	<p>Erosion limitation</p>	<p>Water level images</p>
<p>Green roof</p>	<p>Forest soil quality</p>	<p>Soil enzymes in forest</p>	<p>Soil recovery</p>

The updated list of thesis topics is available on the web page:
www.unitus.it/en/dipartimento/dibaf/scienze-forestali-e-ambientali/

Different sessions for the thesis defence:
July – September – October – December - February



Additional opportunities



As a regularly enrolled student at the University of Tuscia, you can apply to other ERAMUS+ and International programmes, if the general principle that exclude the double scholarship is respected (self-funded students and after your scholarship period).

- ERASMUS mobility for traineeship: 2-4 months in European Research Centres and Innovative Companies
- ERASMUS KA171: supporting thesis in non-EU countries
- Bilateral International programmes



A multicultural community



Our social account

FB page: [MSc-Forestry-Environmental-Sciences-Unitus](#)

FB group: [Forestry & Environmental Sciences at UNITUS](#)

Instagram: [sfa_lm](#)

YouTube: [MSc SFA-UNITUS](#)



**Thank you for the attention
and see you in Viterbo!**