Karadeniz Technical University

2nd Year Specialization Area:

"Ecosystem based multi-use forest management planning"

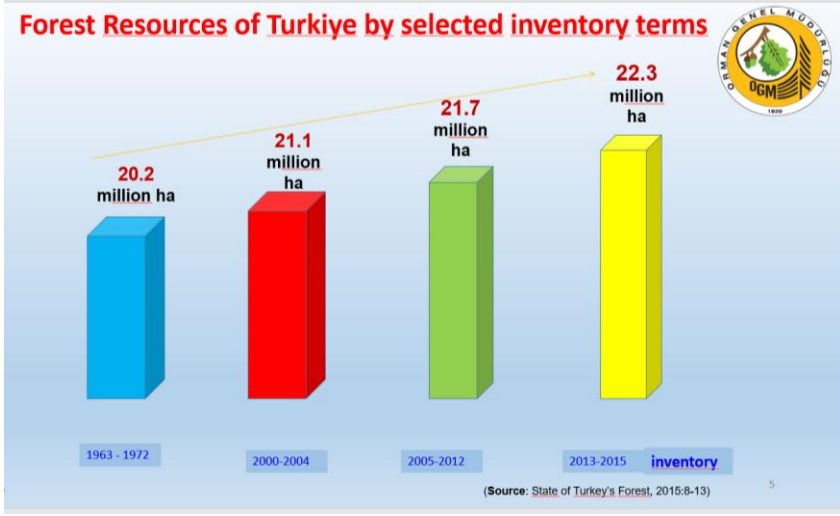
Asst. Prof. Uzay KARAHALİL
KTU: Karadeniz Technical University
Trabzon, TURKEY

State ownership allows us researching in all forest lands!

General Directorate of Forestry

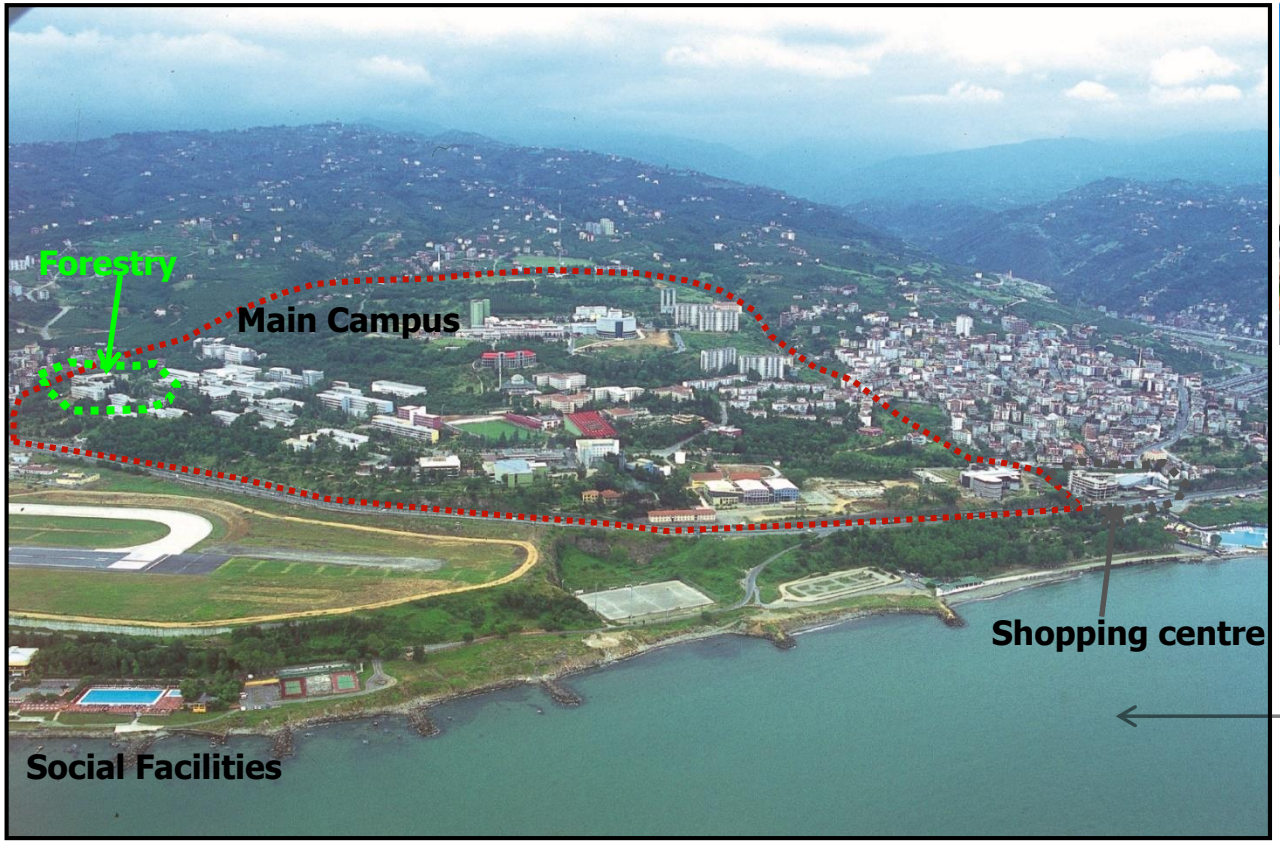
State owned 99.9%

- Area: 77.8 million hectares
- Population: 82 million (2018)
- Forest Cover: 22.6 million hectares (covering 29.0 % as of 2019)
- Largest 19th Economy as of 2020 (with its $766.43 billion economy)



Karadeniz Technical University

The first university in Turkey established outside metropol 1955, 4th across the country. (207 Univ.)



12 faculties

40,000 students

1,242 foreign students

Black Sea

Karadeniz Technical University

Single room
=50 €/month

Karadeniz Technical University

Overall satisfaction ranking (188 universities were evaluated)

Sıra	Üniversite	N	Genel Memnuniyet Puanı	Düzey	2018 Puanı	2018 Sıra
1	Özyeğin Üniversitesi	168	546	A+	561	1
2	Sabancı Üniversitesi	141	545	A+	548	4
3	İhsan Doğramacı Bilkent Üniversitesi	195	542	A+	530	6
4	Koç Üniversitesi	163	538	A+	561	2
5	Abdullah Gül Üniversitesi	90	532	A+	528	7
6	Boğaziçi Üniversitesi	199	532	A+	522	11
7	İzmir Yüksek Teknoloji Enstitüsü	160	531	A+	554	3
8	İstanbul Teknik Üniversitesi	285	525	A+	526	8
9	Gebze Teknik Üniversitesi	137	523	A+	523	10
10	MEF Üniversitesi	131	521	A+	508	18
11	Acıbadem Mehmet Ali Aydınlar Üniversitesi	112	521	A+	530	5
12	Akdeniz Üniversitesi	346	516	A+	519	12
13	Piri Reis Üniversitesi	114	516	A+	511	16
14	İstanbul Şehir Üniversitesi	143	511	A+	513	14
15	Kadir Has Üniversitesi	145	505	A	526	9
16	İstanbul Bilgi Üniversitesi	223	502	A	514	13
17	Galatasaray Üniversitesi	111	500	A	510	17
18	Orta Doğu Teknik Üniversitesi	259	500	A	495	26
19	Karadeniz Teknik Üniversitesi	303	498	A	495	25
20	Yıldız Teknik Üniversitesi	279	497	A	505	20
21	Maltepe Üniversitesi	175	495	A	496	23
22	İzmir Ekonomi Üniversitesi	167	495	A	503	21
23	İstanbul Kültür Üniversitesi	195	493	A	482	34
24	Bezm-İ Âlem Vakıf Üniversitesi	109	492	A	484	30
25	Hacettepe Üniversitesi	344	491	A	470	51
26	İstanbul Üniversitesi	457	490	A	508	19
27	Gazi Üniversitesi	287	489	A	467	53
28	Hasan Kalyoncu Üniversitesi	150	488	A	512	15
29	Işık Üniversitesi	144	484	A	484	29
30	Ege Üniversitesi	341	482	A	471	50
31	Çukurova Üniversitesi	323	480	A	484	32
32	Sağlık Bilimleri Üniversitesi	148	479	B	480	39
33	Yaşar Üniversitesi	173	479	B	478	41
34	Süleyman Demirel Üniversitesi	320	478	B	502	22
35	Marmara Üniversitesi	401	476	B	482	36
36	İstanbul 29 Mayıs Üniversitesi	92	475	B	479	40
37	KTO Karatay Üniversitesi	162	475	B	484	33
38	Erciyes Üniversitesi	364	474	B	463	57
39	TED Üniversitesi	132	474	B	458	61
40	Burdur Mehmet Akif Ersoy Üniversitesi	226	474	B	472	48

Ranked as **15th** on the «Satisfaction of the Richness of Learning Opportunities and Resources» area

Ranked as **16th** on the «Satisfaction of the campus and life» area

Sıra	Üniversite	N	Genel Memnuniyet Puanı	Düzey	2018 Puanı	2018 Sıra
1	Abdullah Gül Üniversitesi	90	532	A+	528	2
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9	Karadeniz Teknik Üniversitesi	303	498	A	495	11
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11	Hacettepe Üniversitesi	344	491	A	470	26
12	İstanbul Üniversitesi	457	490	A	508	8
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19	Erciyes Üniversitesi	364	474	B	463	30
20	Burdur Mehmet Akif Ersoy Üniversitesi	226	474	B	472	24

Faculty of Forestry

- One of the leading faculties (12) in Turkey, has 4 departments:
- Forest Engineering - Forest Resources
- Forest Industrial Engineering
- Landscape Management
- Wild Life Management

Department of Forest Resources

- 8 sub department (Forest management, forest protection, silviculture, forest botany…)
- 17 Prof., 6 Assoc. Prof., 6 Asst. Prof., 17 Res. Asst. (46 academic staff)
- Nearly 80 student-turn out, 80 graduate students
- Management practicum in different ecosystems
- Research forest (6,000 ha), hard to access it though
- 8 Labs: soil, silviculture, genetic, herbarium, entomology, dendrometry, computer, forest management,
- High research interest and capacities in forest management
- Pioneers the use of GIS in forestry and forest management
- High profile in applied fire management and biodiversity in Medditerrenean region

EUR-ACE system

Accredited with ANEA-ACE Label

KARADENİZ TECHNICAL UNIVERSITY 1955

ORMAN FAKÜLTESİ

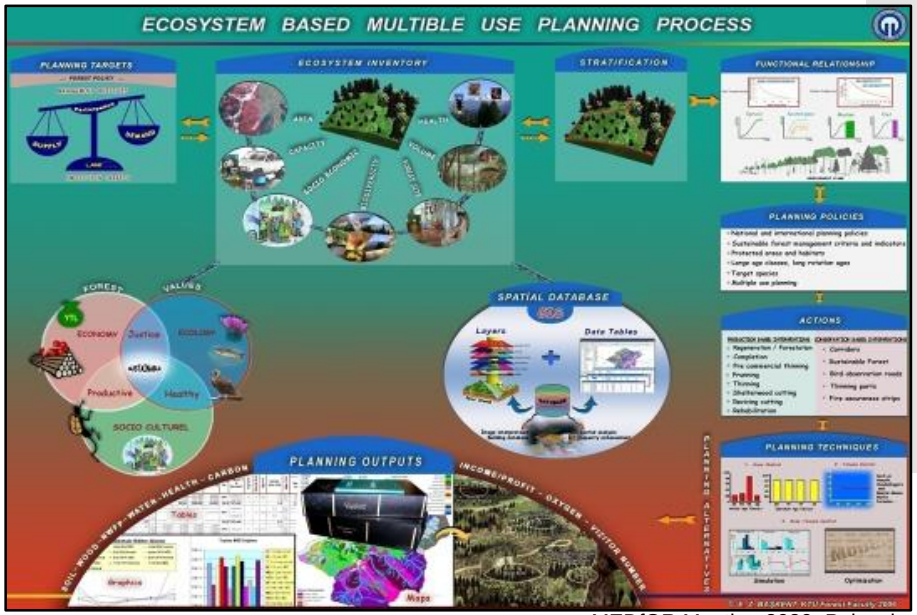
The Focus…

Specialization area

“Ecosystem based multi-use forest management planning”

Contents

- Integration of economic, ecologic and socio-cultural values into multiuse forest management planning
- Using and developing tools to understand forest dynamics
- Geo-Information science, remote sensing applications in forest management planning
- Biodiversity integration
- Fire management



ECOSYSTEM BASED MULTIBLE USE PLANNING PROCESS

PLANNING TARGETS

..: FOREST POLICY :..

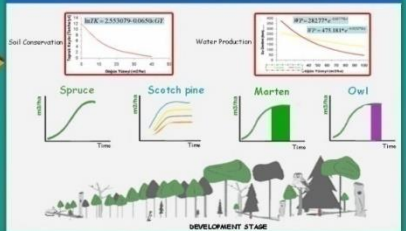
MANAGEMENT OBJECTIVES

PROTECTION TARGETS

ECOSYSTEM INVENTORY

STRATIFICATION

FUNCTIONAL RELATIONSHIP



PLANNING POLICIES

- National and international planning policies
- Sustainable forest management criteria and indicators
- Protected areas and habitats
- Large age classes, long rotation ages
- Target species
- Multiple use planning

ACTIONS

PRODUCTION BASED INTERVENTIONS	CONSERVATION BASED INTERVENTIONS
Regeneration / Forestation	Corridors
Completion	Sustainable Forest
Pre commercial thinning	Bird observation roads
Prunning	Thinning parts
Thinning	Fire secureness strips
Shelterwood cutting	
Reviving cutting	
Rehabilitation	

PLANNING TECHNIQUES

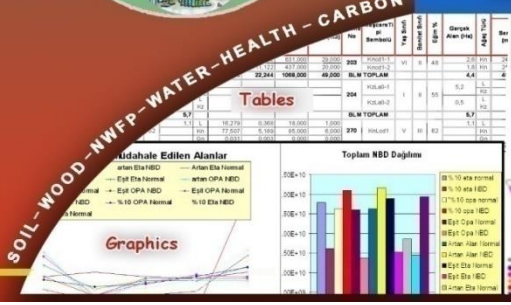
PLANNING ALTERNATIVES

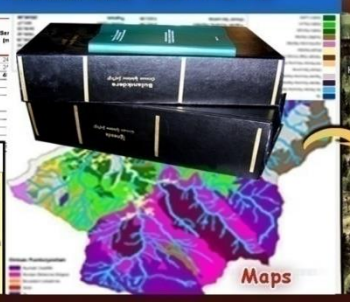
SPATİAL DATABASE

FOREST VALUES

PLANNING OUTPUTS

SOIL-WOOD-NWFP-WATER-HEALTH-CARBON





INCOME/PROFIT - OXYGEN - VIZITOR NUMBER

Asist. Prof. Uzay KARAHALİL

Forest Management Planning

Protected Area Management

Remote Sensing

GIS

Operations Research

Carbon Measurement

Lecturer: Asst. Prof. Uzay Karahalil
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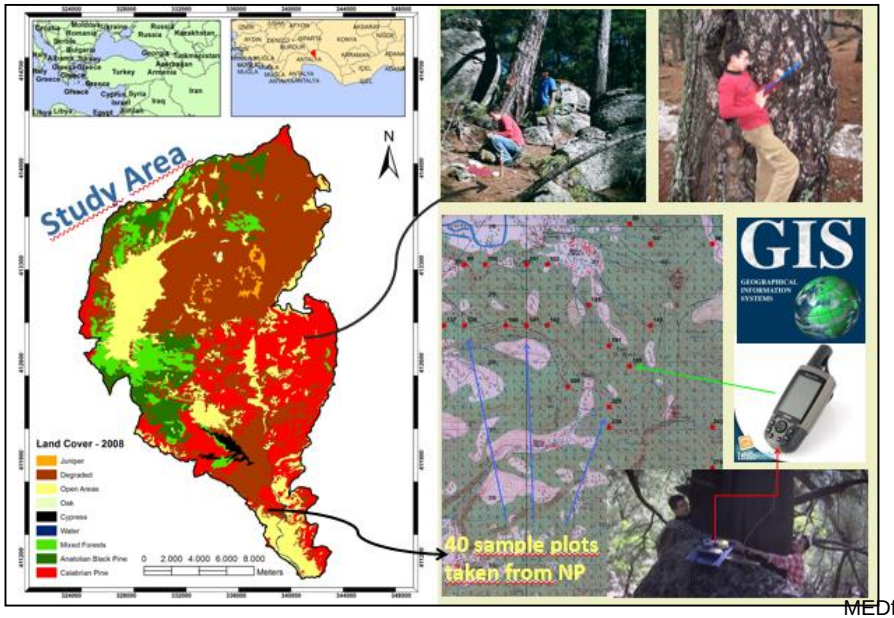
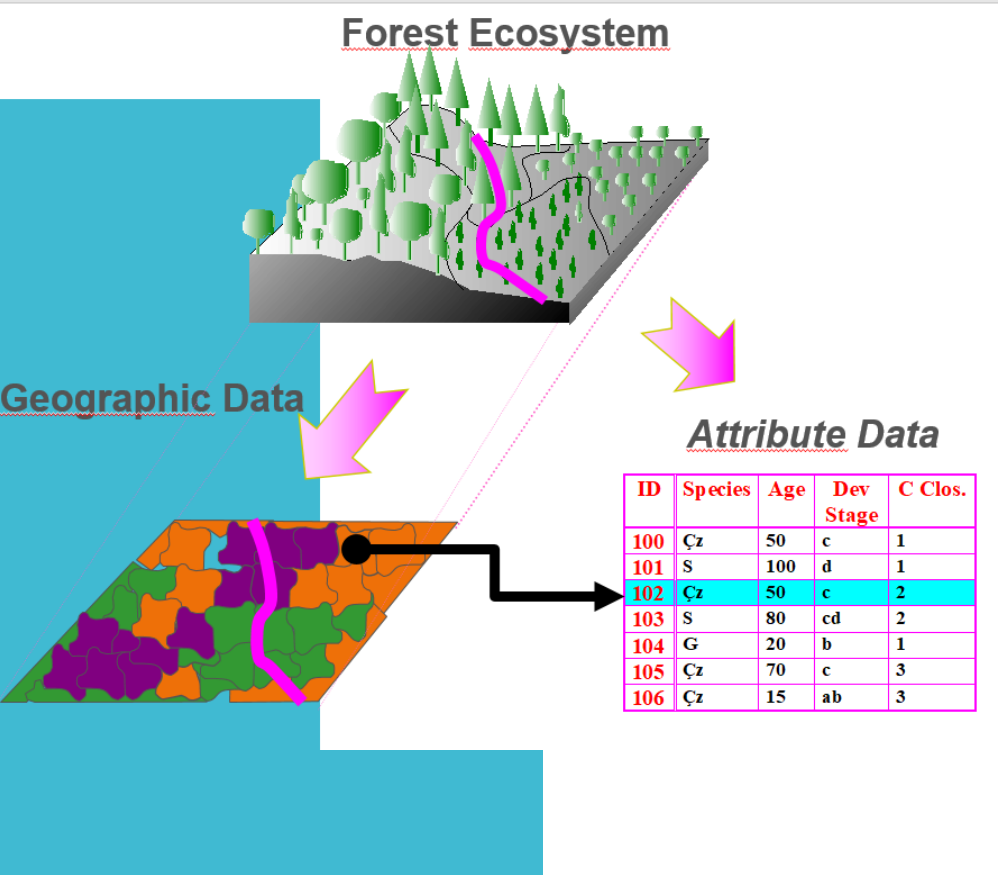
Concepts and Principles of GIS in Forestry

Contents

- GIS, components and applications in forest management
- Data-information, database management systems, spatial data, topology, vector and raster data models, and data quality.
- GIS functions of data input, reclassification, overlay, neighbourhood analysis and data display as applied to Mediterranean forests.
- A practicum: five assignments in spatial database creation (cover type map) and spatial analysis of forest resources. ArcGIS





ID	Species	Age	Dev Stage	C Clos.
100	Çz	50	c	1
101	S	100	d	1
102	Çz	50	c	2
103	S	80	cd	2
104	G	20	b	1
105	Çz	70	c	3
106	Çz	15	ab	3

Species Mix Type Classes	Description
Non Forest	Open lands, agriculture residential area, mine, warehouse, roads, graveyard and etc.
Mixed Forest	It includes mixed productive (crown closure>10%) high forest stands
Degraded Forest	Forest which has been degraded or failed
Kn	*Fagus orientalis*
Kz	*Castanea sativa*
L	*Picea orientalis*
Çs	*Scots pine*
G	*Abies nordmanniana*

- 1970 • Paper based stand type map
- 2015 • Digitized stand type map

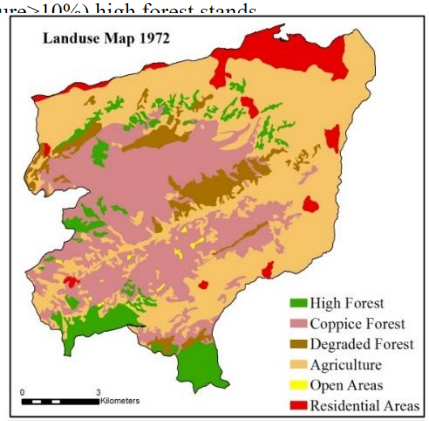
Investigating the Transition Ratio of Changes in Selected Land Use/Land Cover Classes for Modelling

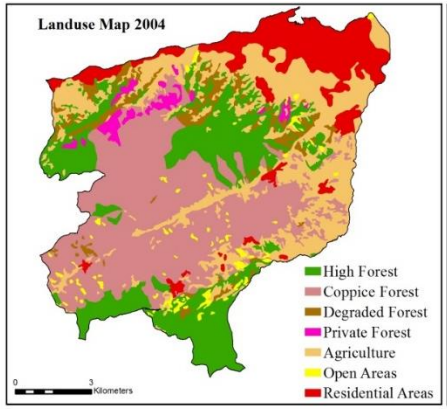
Results and Discussion

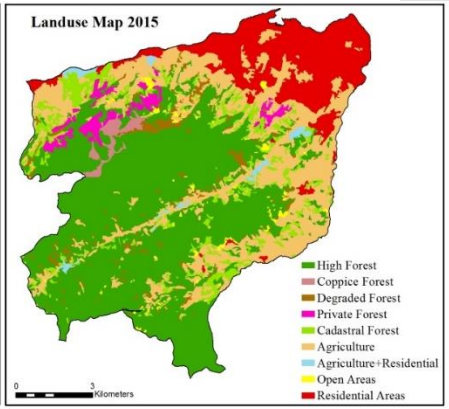
Another PU (Çaykara) Close to Case Study Area Transition Ratios (%)

1971 Land Cover Type	2010 Land Cover Type: Open A,	Spruce	F + SP	Beech	C+A+O	Mixed	Degrad,
Open Areas	86,2	1,9	0,0	0,4	1,0	5,9	4,7
Spruce	11,9	55,1	0,0	0,3	0,1	21,6	11,0
Fir + Scots Pine	11,9	15,4	0,2	0,0	0,0	62,9	9,6
Beech	4,5	6,1	0,0	6,5	2,9	71,5	8,4
Chestnut + Alder + Oak	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Mixed	9,0	15,4	0,1	4,3	2,1	59,4	9,6
Degraded	22,0	9,1	0,2	1,7	6,6	43,9	16,5

Remained the same as in the previous period







Lecturer: Asst. Prof. Dr. Uzay Karahalil
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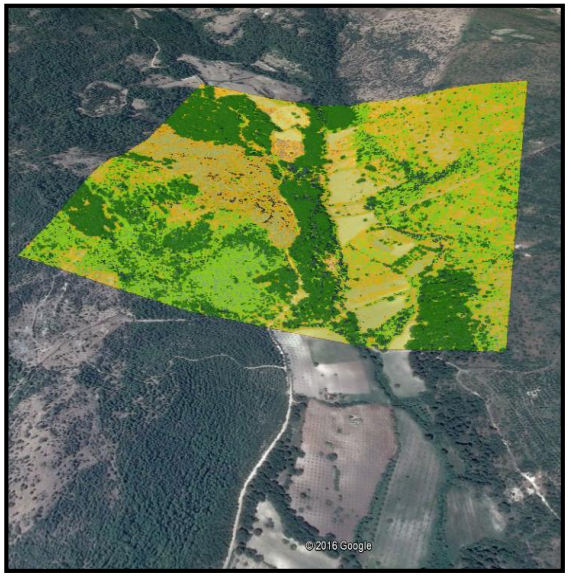
i10-index 5

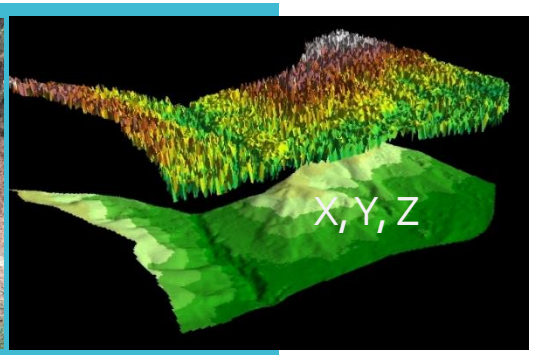
Using Satellites Images in Forest Ecosystems

Contents

- General information about natural resource satellites, LANDSAT/IKONOS
- Resolution, definition of bands, combining bands and opening images.
- Mosaicing, rectifying and cutting images
- Image enhancement techniques, unsupervised/supervised classification
- Case study: Supervised classification of Köprülü Canyon National Park



Estimating Stand Parameters Using Images and LIDAR Data



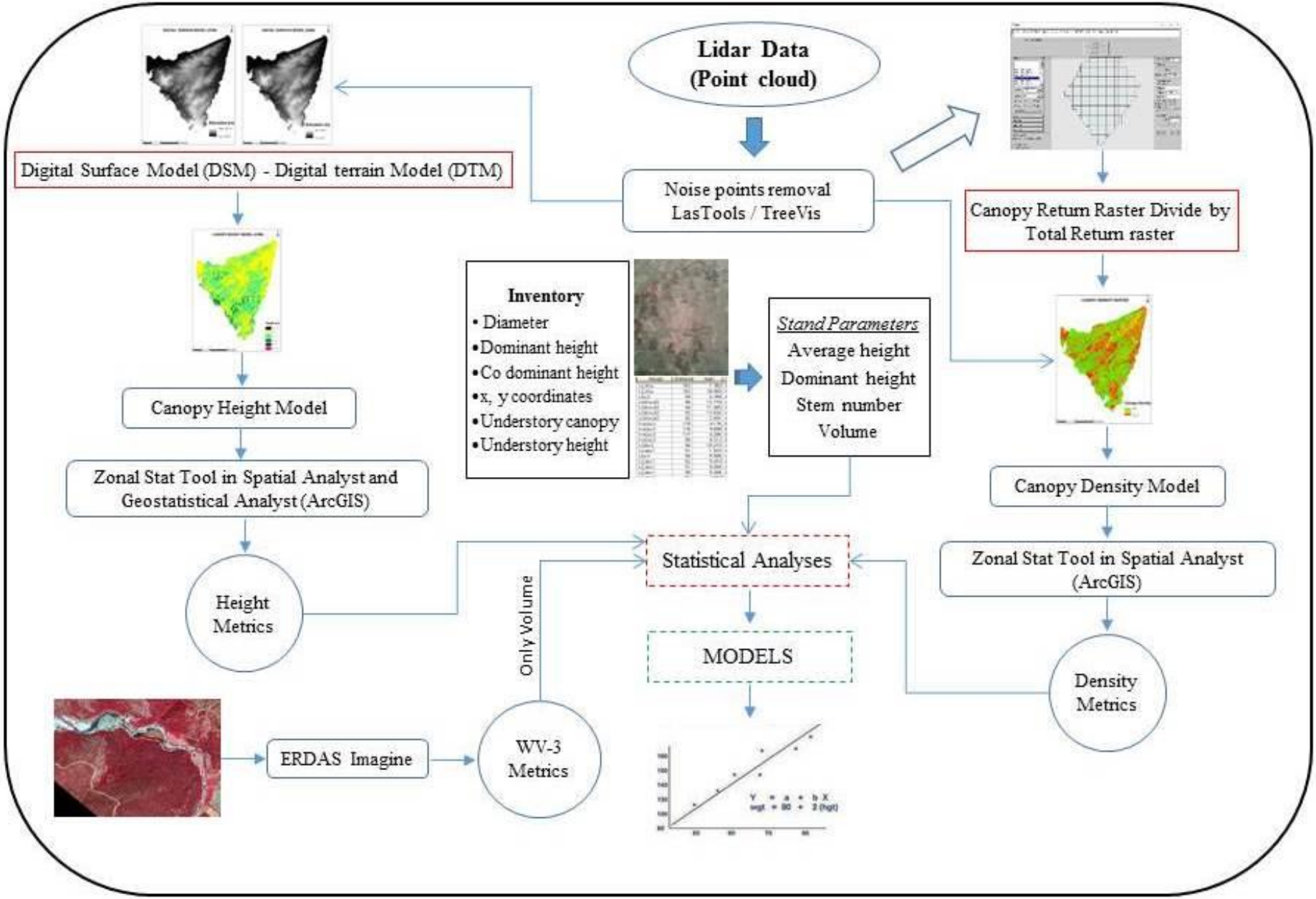
Kennedy KANJA
(Zambia)

Inventory

S.P No	Area m²	No. of Trees	Trees per ha	Dominant Height (m)	Av. Height m	Total Volume (m³)	Volume per Ha	Shrub C.C %	Shrub Height (m)
2	600	19	317	10.8	8.7	2.215	36.9	10	1.7
6	400	17	425	15.7	13.3	4.158	103.9	30	1
7	400	32	800	15.2	13.4	8.377	209.4	35	1.5
9	800	20	250	21.6	13.8	7.194	89.9	80	2
10	400	13	325	20.2	17.3	10.207	255.1	25	1.6-1.7
11	400	18	450	24.6	20.	10.077	251.9	40	1.3-1.4
13	800	6	75	14.4	9.92	1.531	19.1	10	3.5-4
16	600	12	200	15.4	12.7	5.509	91.8	100	3.5-4
21	800	8	100	31.1	25	12.888	161.1	5	0.7-0.8
23	600	13	217	20.1	16.1	13.15	219.1	0	0
24	600	10	167	20.2	15.4	16.872	281.2	65	1.6-1.7
25	800	26	325	28.5	21.5	10.193	127.4	40	1.7
26	800	14	175	18.4	15.3	8.803	110.0	10	1.3-1.4
27	400	14	350	16.1	12.2	6.621	165.5	30	1.5
28	400	31	775	15.2	11.9	5.965	149.1	35	1.5-1.6
29	400	40	1000	11.1	8.9	3.301	82.5	10	3
30	400	27	675	15.2	12.3	7.878	196.9	80	2.5-3
31	400	17	425	16.4	14.6	6.047	151.2	15	1
32	400	18	450	14.9	12	3.952	98.8	90	4-4.5
33	600	35	583	14.6	8.5	5.405	90.1	10	1.3
35	600	12	200	27.9	23.6	11.626	193.7	5	1.8-1.9
36	800	13	163	24	21.5	15.675	195.9	30	2.5-3
37	600	18	300	19.5	14.3	10.147	169.1	40	1.7
39	400	19	475	15.8	14.5	3.858	96.4	10	4-4.5
40	600	9	150	14	11.3	2.347	39.1	100	3.5-4

	Mean	Minimum	Maximum
Tree height (m)	13.7	6.4	25.0
Dominant height (m)	17.0	8.7	31.1
Tree density (N/ha)	372	75	1750
Volume (m^3/ha)	130.8	10.1	260.1
Crown closure of shrubs(%)	39.2	0	100
Height of shrubs (m)	2.0	0	4.5

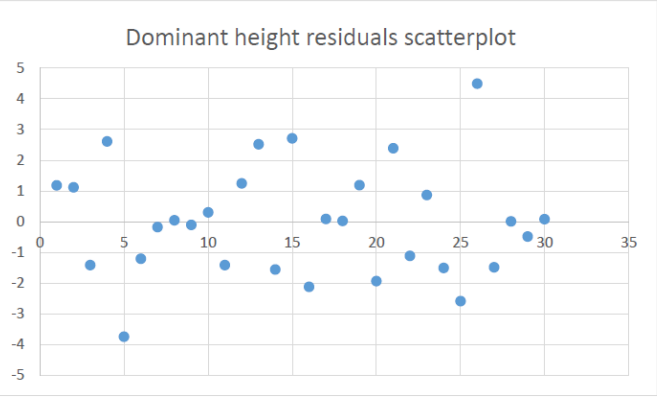
Methods

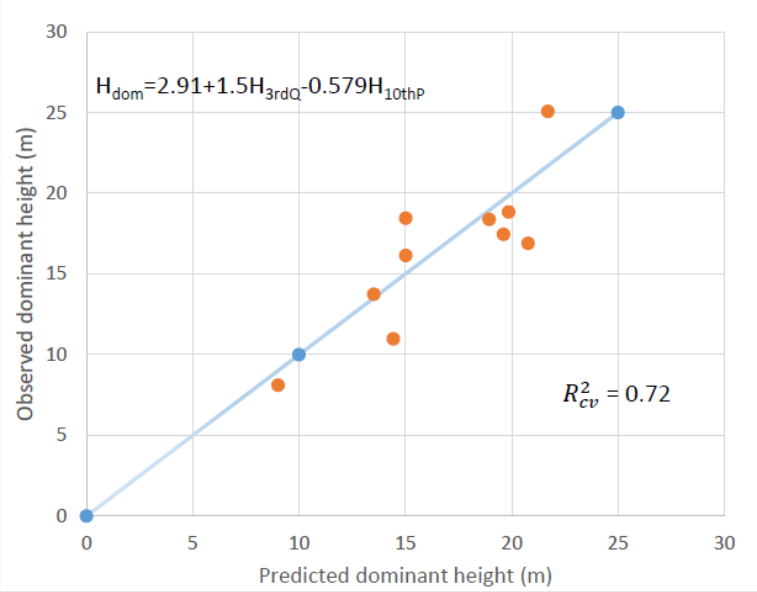

Lidar Data
(Point cloud)
Noise points removal
LasTools / TreeVis
Digital Surface Model (DSM) - Digital terrain Model (DTM)
Canopy Return Raster Divide by
Total Return raster
Canopy Height Model
Inventory
• Diameter
•Dominant height
•Co dominant height
•x, y coordinates
•Understory canopy
•Understory height
Stand Parameters
Average height
Dominant height
Stem number
Volume
Zonal Stat Tool in Spatial Analyst and
Geostatistical Analyst (ArcGIS)
Canopy Density Model
Zonal Stat Tool in Spatial Analyst
(ArcGIS)
Statistical Analyses
Height
Metrics
Only Volume
MODELS
Density
Metrics
ERDAS Imagine
WV-3
Metrics

Results

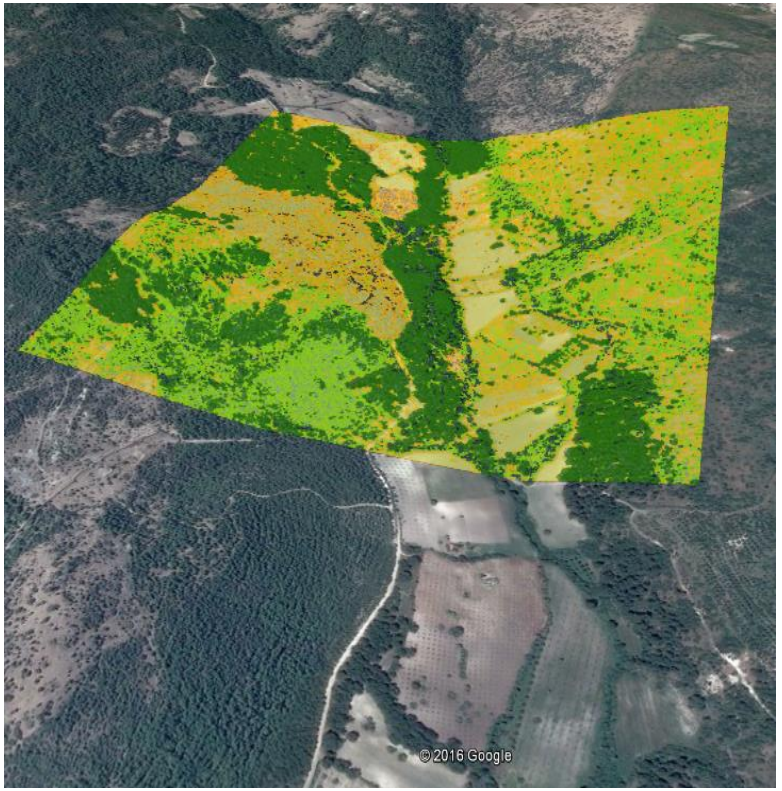
Table 7. Dominant height regression model output

Regression Statistics					
Multiple R	0.918				
R Square	0.843				
Adjusted R Square	0.831				
Standard Error	1.881				
Observations	30				
ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	512.591	256.295	72.420	0.000
Residual	27	95.554	3.539		
Total	29	608.145			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	
Intercept	2.909	1.114	2.612	0.015	
3rd Q	1.500	0.178	8.448	0.000	
10th P	-0.579	0.262	-2.207	0.036	





Results



Only LiDAR

	V(m3/ha)	N(adet/ha)	hq(m)	$h_{üst}$(m)
Düzeltilmiş R^2	0,66	0,73	0,83	0,83
Hata	40,4	119	1,80	1,88

LiDAR+WV3

	V(m3/ha)
Düzeltilmiş R^2	0,70
Hata	32,3

Prof. Dr. Ertugrul Bilgili

Lecturer: Prof. Dr. Ertugrul Bilgili
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- Ph.D., University of New Brunswick, Faculty of Forestry and Environmental Management, Canada.
- MScF, University of New Brunswick, Faculty of Forestry, Faculty of Forestry and Environmental Management, Canada

Research fields

- Forest protection
- Forest fires
- Fire behavior
- Fire risk&danger assessment
- Fire ecology
- Statistics / single tree Growth&Yield modeling
- Fire management

Lecturer: Prof. Dr. Ertugrul Bilgili
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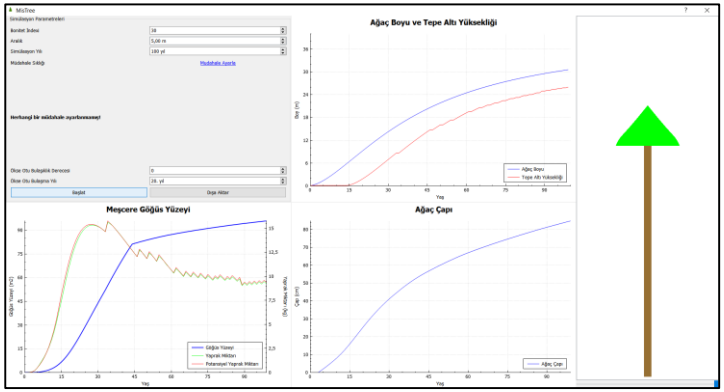
Ecological Modelling

Objectives of the Course

- To acquaint students with the ecological modelling concept, modeling approaches and implications.

Contents of the Course

- Concept of ecological modelling, modelling approaches, model applications in forestry, model development, model development principles, bounding, parsimony, flow chart, sensitivity analysis, and verification in modelling.



Lecturer: Prof. Dr. Ertugrul Bilgili
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Ecological Modelling

Learning Outcomes

- Report on the concept of ecological modeling in forest ecosystems.
- Discuss modeling approaches and identify the key differences between them.
- List the model development principles, define modeling terminology.
- Develop a flow chart of a dynamic process and develop a simple dynamic model to simulate it.
- Conduct sensitivity analyses and validate the models using independent data.
- Report and present model results.

Lecturer: Prof. Dr. Ertugrul Bilgili
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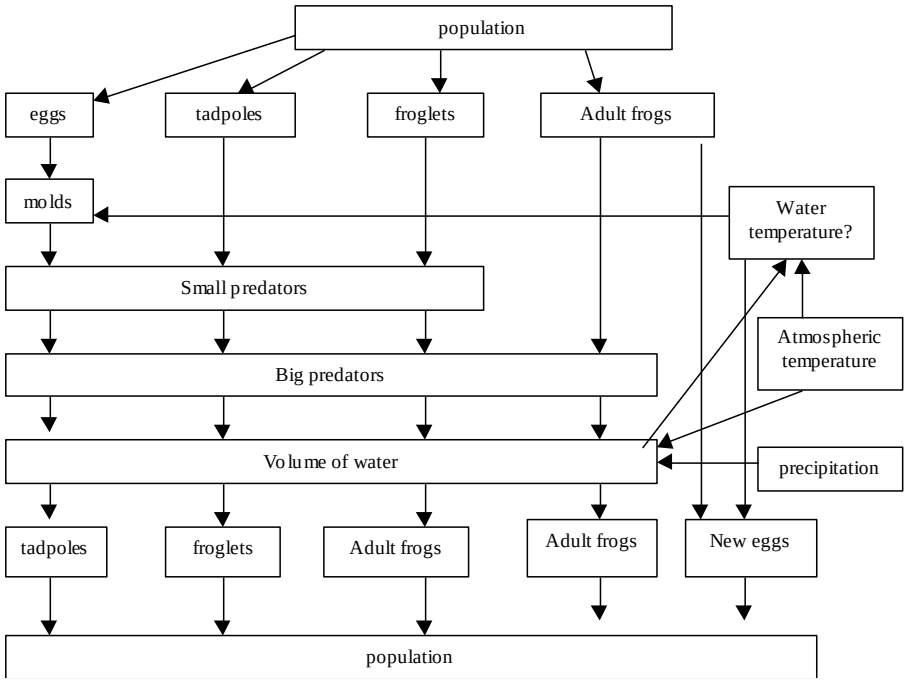
Ecological Modelling

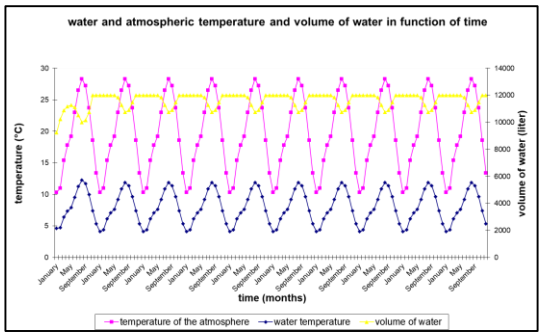
Student Project Sample

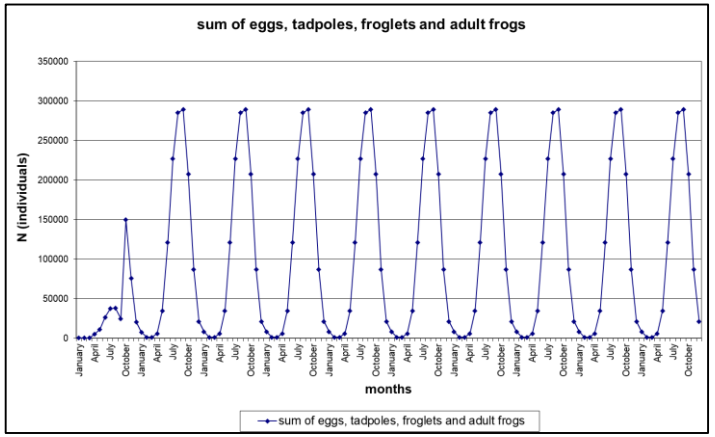
Design of a dynamic model for a frog population in a pond.



Variables

- volume of water
- water temperature
- concentration of molds
- number of eggs
- number of froglets
- number of tadpoles
- number of adult frogs





Lecturer: Prof. Dr. Ertugrul Bilgili
h-index 14
i10-index 20

Protecting Biodiversity in Forest Ecosystems

Objectives of the Course

- To enable students to understand the importance and role of biodiversity in the protection of forest resources.

Contents of the Course

- Concepts of ecosystem and biodiversity, the structure and functions of different forest ecosystems, principle components of biodiversity, indicator, keystone, and flag species, habitats and biodiversity, patch Dynamics.

Lecturer: Prof. Dr. Ertugrul Bilgili
h-index 14
i10-index 20

Protecting Biodiversity in Forest Ecosystems

Learning Outcomes

- Define biodiversity and explain its importance.
- Explain the structure and functions of different forest ecosystems.
- Relate biodiversity to the well being of ecosystems.
- Define indicator, keystone and flagship species and relate them to the protection, maintenance and survival of ecosystem components.
- Explain the role of patch dynamics in the protection of biodiversity.
- Evaluate and discuss the threats to biodiversity.
- Calculate indexes of biodiversity (richness, evenness).
- Report and present the findings before an audience.

Lecturer: Prof. Dr. Ertugrul Bilgili
h-index 14
i10-index 20

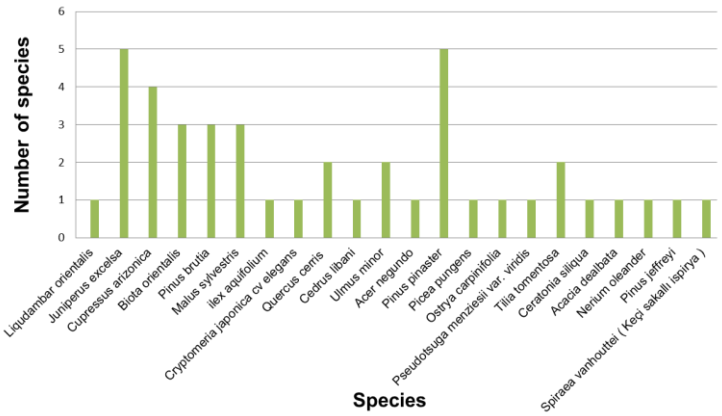
Protecting Biodiversity in Forest Ecosystems

Student Project Sample

- Measurements of Biodiversity in Forest Ecosystems – Tree Species diversity

Field work

Plot # 1



Plot # 2

Sampling Area	Shannon Index	Simpson Index
First	2,89	0,93
Second	2,12	0,86
Normal Range	1,5 - 3,5	0-1,0

Lecturer: Prof. Dr. Ertugrul Bilgili
h-index 14
i10-index 20

Fire Ecology

Objectives of the Course

- To acquaint students with the ecological role of fires in forest ecosystems.

Contents of the Course

- The use of fire, the concept of fire ecology, forest fires as an ecological entity, the role of fires in the formation and maintenance of forest ecosystems, the relationship between forest and fire, the effects of fires on plants, soil, weather and wildlife.
- Fires as a management tool, controlled and prescribed burnings.
- The effect of climate change on wildland fires, and future fire scenarios under expected climate change conditions. Impacts, adaptation and mitigation of climate change.

Lecturer: Prof. Dr. Ertugrul Bilgili
h-index 14
i10-index 20

Fire Ecology

Learning Outcomes

- Define the concept of fire ecology and explain its importance in understanding the functioning of fire dependent ecosystems.
- Examine and explain the effect of fire on vegetation and soil properties.
- Discuss fire as a disturbance agent in many ecosystems.
- Explain and discuss species adaptations to fire (plant succession) and illustrate it using a schematic model.
- Formulate prescription for the use of fire as a management tool (controlled and prescribed burning)
- Understand and discuss the effect of global climate change on forest fires

Prof. Dr. Salih TERZİOĞLU

Lecturer: Prof. Dr. Salih Terzioglu
h-index 12
i10-index 18

Research fields

- Forest Botany
- Plant species
- Plant biodiversity
- Non Wood Plant Products
- Biodiversity conservation

Lecturer: Prof. Dr. Salih Terzioglu
h-index 12
i10-index 18

Principles of Identifying Vascular Plants

Objectives of the Course

- This course aims to provide graduate student how they identify the vascular plant taxa and the prepareing the identification keys.

Contents of the Course

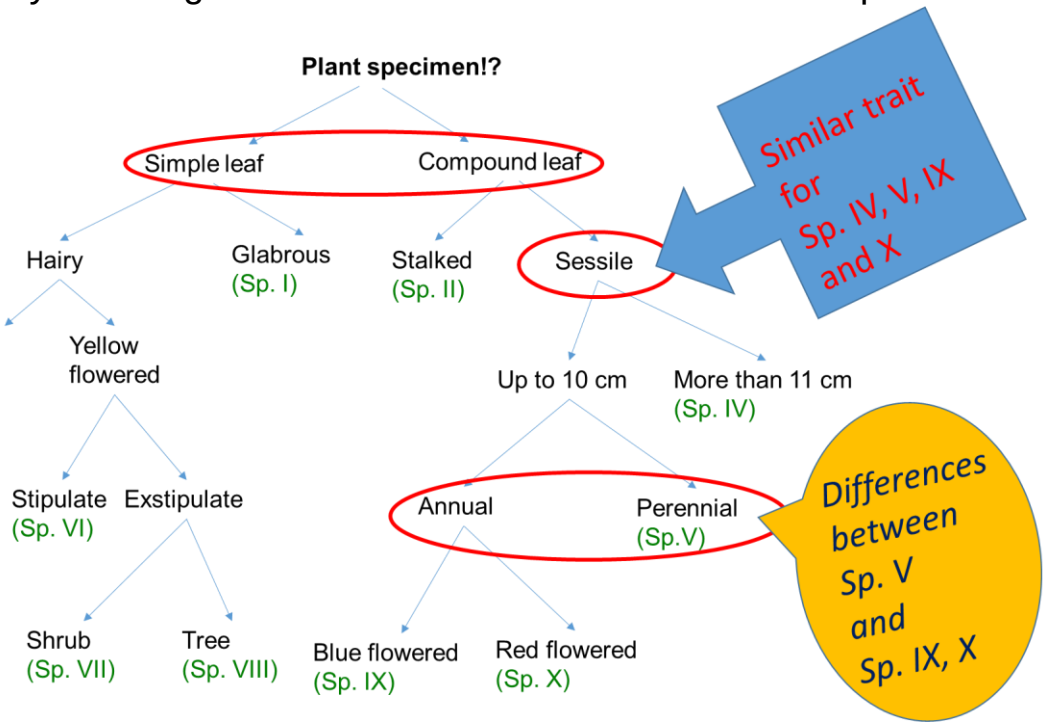
- Vegetative and generative organs of Vascular plants (Spermotophyta (Gymnospermae, Angiospermae) and Pteridophyta)
- Preparing identification keys and their usage in identifying plant taxa.
- Plant association and plant sociology
- Biodiversity and its components
- Vegetation classification by: Braun-Blanquet, IUCN, EUNİS, Natura2000
- Floristic list, characteristic species, habitats, minimal areas
- Integration of biodiversity (flora) into forest management plans
- Case study: Field work

Lecturer: Prof. Dr. Salih Terzioglu
h-index 12
i10-index 18

Principles of Identifying Vascular Plants

Learning Outcomes

- Understand different vegetative and generative organs of vascular plant taxa.
- Use different plant identification keys (Multi-access, dichotomous etc.)
- Identify the families of vascular plants.
- Identify the living and/or herbarium materials of vascular plants.



Prof. Selahattin KÖSE

Modelling techniqes as OR

Forest management planning

Integrating forest values into forest management plans

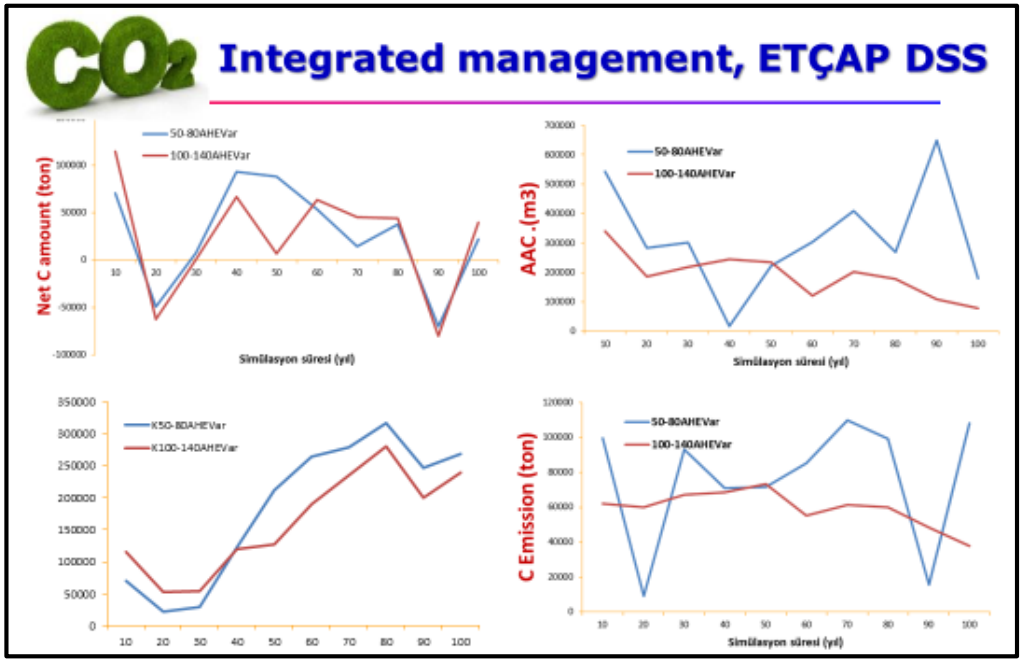
Ecosystem based multiobjective forest management planning

Lecturer: Prof. Selahattin KÖSE

Multi-objective Planning (Forest Dynamics & Modelling)

Contents

- Forest values and multiobjective programming problems
- Multiobjective formulations (Focusing on Goal Programming)
- Model buildings for few case study areas
- Project work: development and presentations of sample For Mgtm models
- Understanding the cause-effect relationships



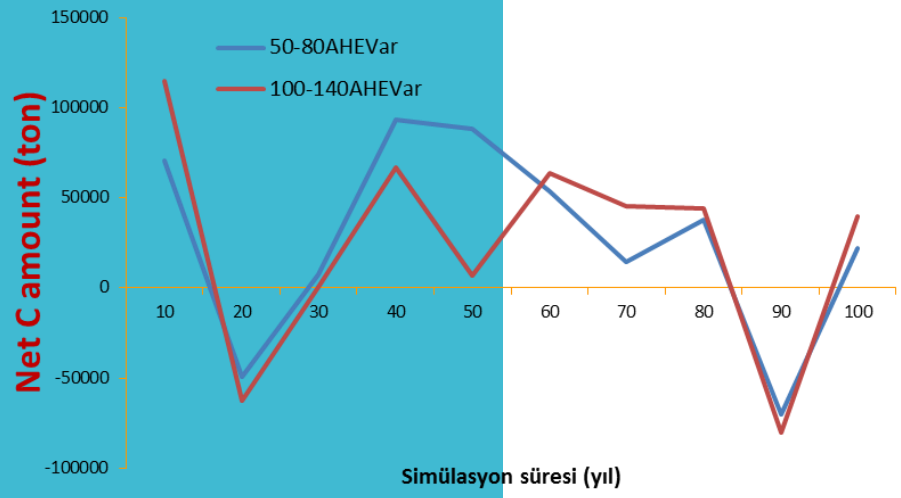
Lecturer: Prof. Selahattin KÖSE

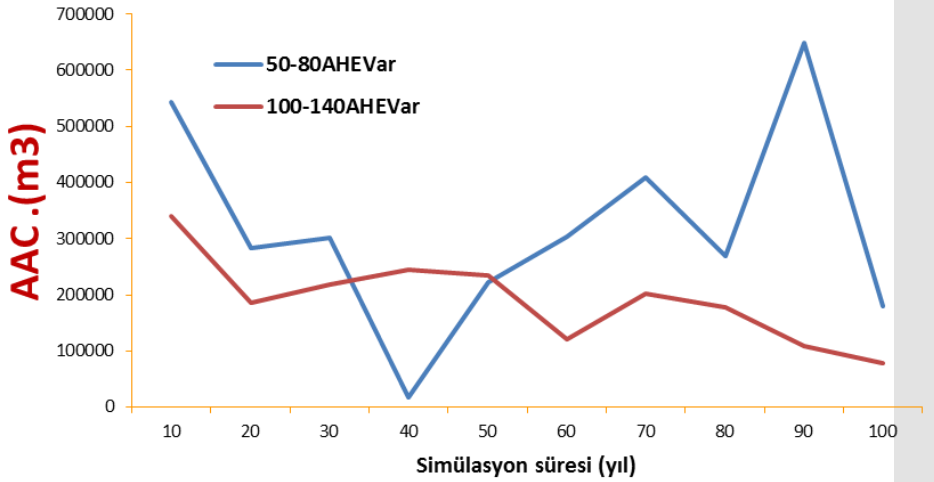
Multi-objective Planning (Forest Dynamics and Modelling)

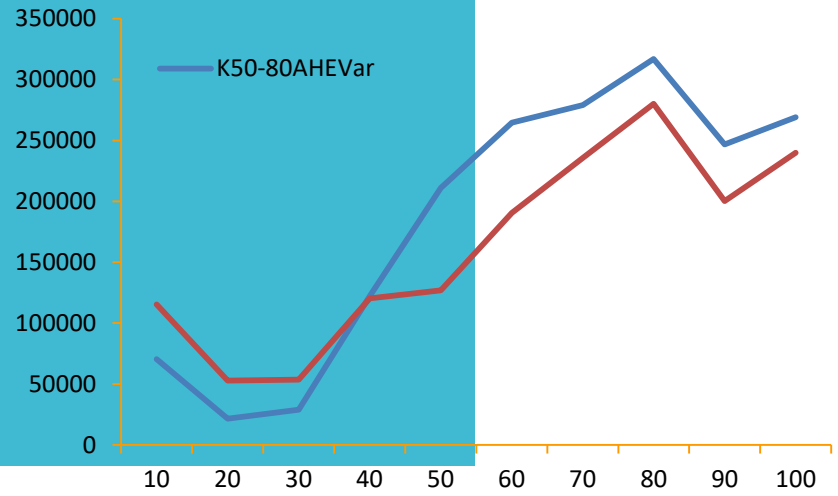
Contents

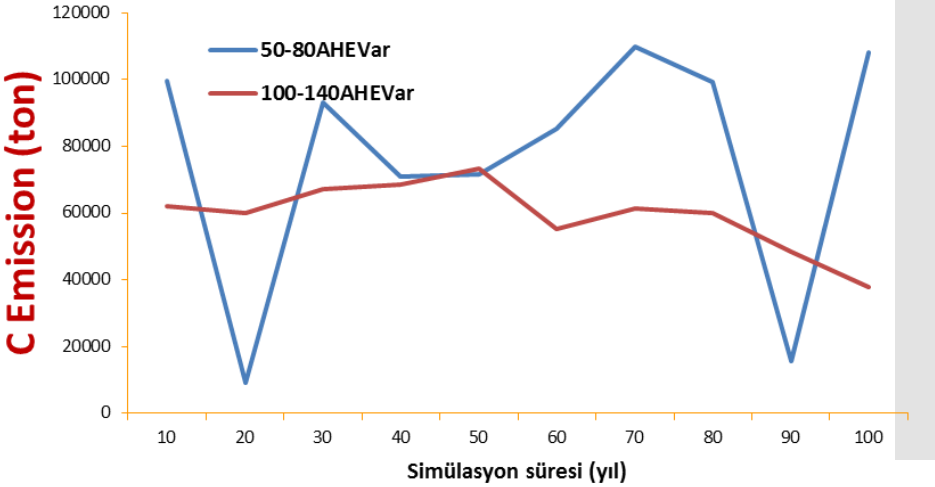
- General principles of forest dynamics; the relationships of tree, stand, habitat, ecosystem and forests
- Natural disturbances and management actions/treatments to be applied to forests
- Description of compositional and configuration of forest ecosystems
- Monitoring the spatio-temporal changes of forest ecosystems
- The effects of changes in spatial structure of forests and their relationships to forest management objectives
- Modelling forest management problems with linear programming
- Development of plan alternatives, model outputs, assessment of forest dynamics with performance indicators and comparison of various planning alternatives

Integrated management, ETFOP DSS



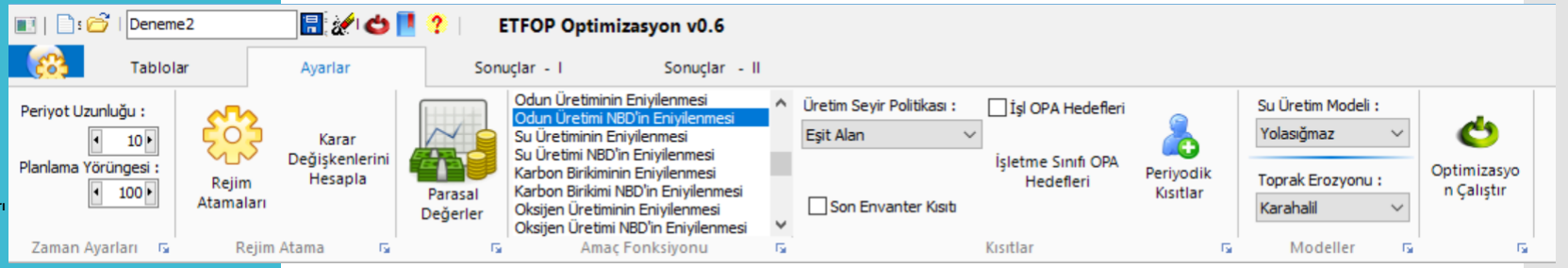






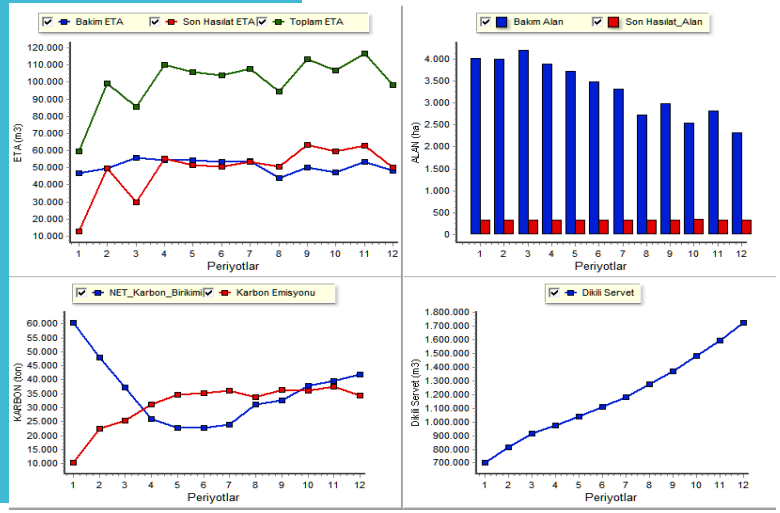
ETFOP *(ECOSYSTEM BASED MULTI FUNCTIONAL PLANNING)* DSS

Assoc. Prof. Ali İhsan Kadıoğulları

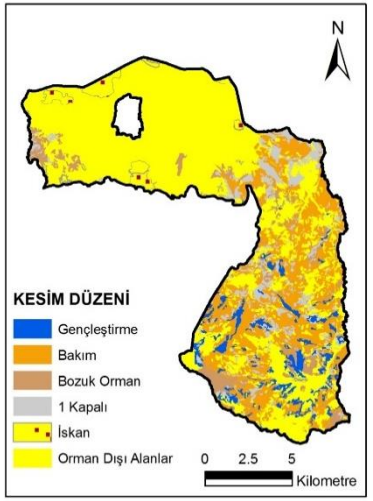


Asst. Prof. Özkan Bingöl

Asst. Prof. Uzay Karahalil



Periyotlar	BakımETA	SON Hasıla	Toplam ETA
Başlangıç	0,0000	0,0000	0,0000
1	46837,7186	12843,4086	59681,1272
2	49829,9801	49576,4009	99406,3810
3	55796,2387	29615,5052	85411,7438
4	54462,3461	55466,4995	109928,845
5	54576,7231	51349,0841	105925,807
6	53294,3789	50829,4087	104123,787
7	54103,0881	53657,6510	107760,739
8	43984,5129	50651,3170	94635,8300
9	49916,2895	63514,4090	113430,698
10	47488,6190	59515,3510	107003,970
11	53600,6540	63079,3961	116680,050
12	48075,6465	50222,8356	98298,4820



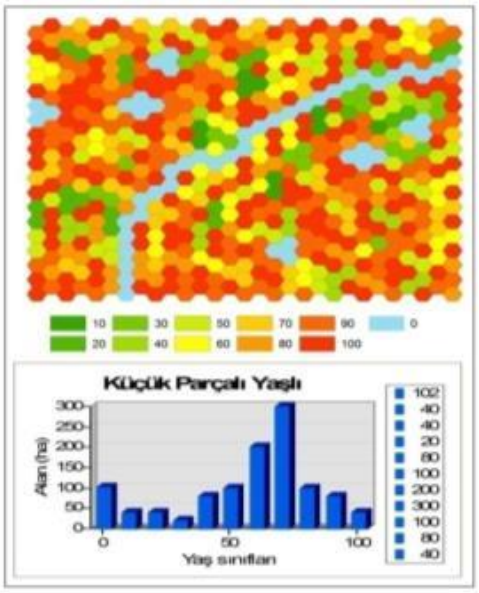
Lecturer: Prof. Selahattin KÖSE

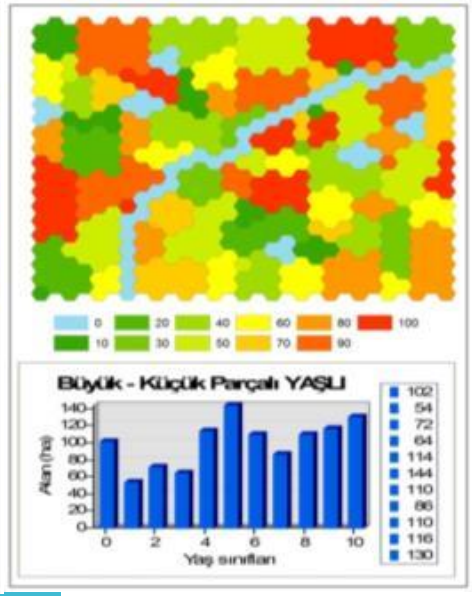
Spatial Planning in Forest Management

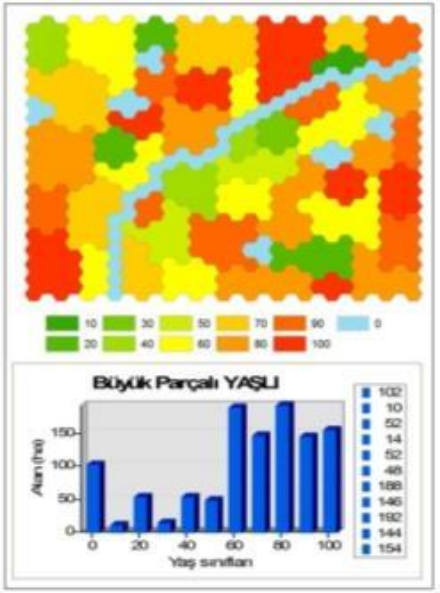
Contents

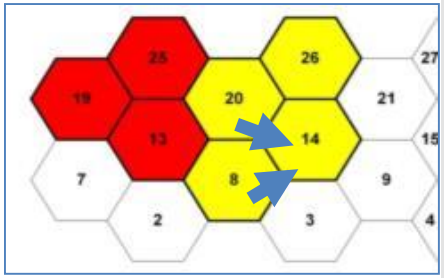
- Spatial planning, spatial parameters such as block size, opening size, adjacency or green-up, proximity distance and their use in forest management
- Spatial forest modeling techniques such as Tabu search and Simulated annealing
- Forest landscape structure and fragmentation indexes (class area, patch size, landscape similarity index, number of patch, patch density, mean patch size)
- The use of spatial parameters and metrics in decision making process
- Application of spatial forest management planning models using ETFOP

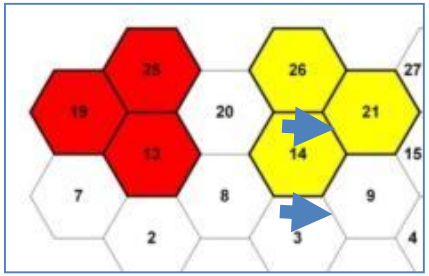
Spatial Modeling

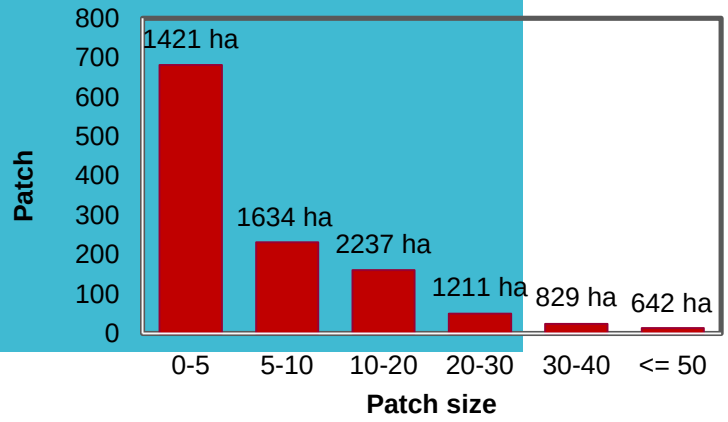


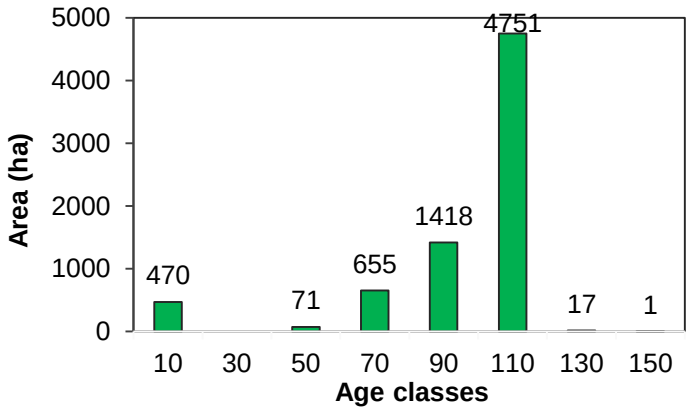












Prof. Mehmet MISIR

Modelling techniqes as OR

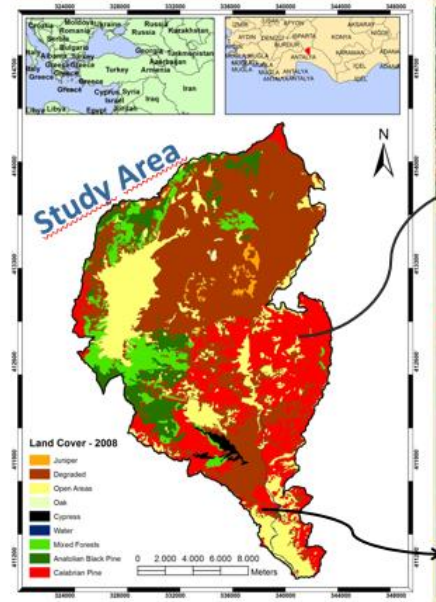
Forest management planning

Remote sensing applications

Integrating carbon sequestration into forest management plans

Carbon studies

Material

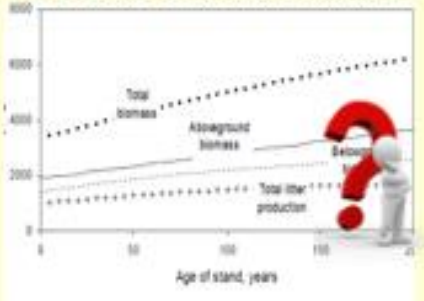


GIS
GEOGRAPHICAL INFORMATION SYSTEMS

Laboratory Works

- Owen dried weight
- Volume calculaton
- Preperation of samples
- Carbon Measurement using Device

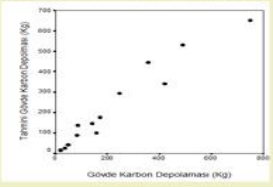
❖Project is ongoing...
❖Will be finished in June..



Field Survey

- Leaf
- Branch
- Barck
- Stem
- Fine, Coarse Root
- Litter
- Dead Wood
- Soil

Diameter Category(cm)	Number of Sample Trees	
	National Park	Production Forest
0-3,9	1	-
4-7,9	3	6
8-11,9	7	2
12-15,9	5	1
16-19,9	5	4
20-23,9	5	2
24-27,9	3	3
28-31,9	7	3
32-35,9	3	7
36,39,9	2	2
40-43,9	1	3
44-47,9	1	2
48-51,9	2	4
>=52	4	-
TOTAL	49	39



❖ Developing carbon models

	Model	Coefficient			R^2	$S_{y.x}$	F_h	Sig. Level
		b_0	b_1	b_2				
Stem	$Y = b_0 + b_1 \times d^2$	-33.726	0.383		0.963	40.96	3666	P<0.001
Branch	$Y = b_0 + b_1 \times d^2$	0.131	0.011		0.647	4.37	270	P<0.001
Leaf	$Y = b_0 + b_1 d + b_2 d^2$	25.152	-2.002	0.049	0.759	4.12	230	P<0.001
Bark	$Y = b_0 + b_1 \times d$	-2.174	0.414		0.648	3.10	270	P<0.001
All Tree	$Y = b_0 + b_1 \times d^2$	-28.360	0.413		0.680	41.10	424	P<0.001

Lecturer: Prof. Mehmet MISIR
h-index 5
i10-index 2

Forest Ecosystem Management

Objectives of the Course

- This course aims to explore various values of forest ecosystems in preparing a participatory based multiple use forest management plans focusing on ecologic, economic and socio-cultural values.

Contents of the Course

- Exploring the role of ecological integrity, biodiversity, forest healthy, habitat management, natural disturbances and spatial planning in ecosystem management.
- Forest certification and sustainable forest management criteria and indicators.
- Social, ecological, economic and technological aspects of ecosystem management.
- Identification and examination of factors affecting forest landscape patterns/structure and process over time. Application of management science techniques to ecosystem management

Other researchers…

Staff	Area of Expertise
Prof. Mahmut EROĞLU	Pest management
Prof. Hakkı YAVUZ	Growth and yield
Prof. Cantürk GÜMÜŞ	Forest Policy
Prof. Z. Cemal ÖZKAN	Dendrology
Prof. M. Fehmi TÜRKER	Forest economics
Prof. Ali Ömer ÜÇLER	Tree Improvement
Prof. İbrahim TURNA	Forest Renewal
Prof. Devlet TOKSOY	Forest economics
Prof. Bedri SERDAR	Wood Anatomy
Prof. Nuray MISIR	Growth and yield
Prof. Murat YILMAZ	Forest Ecology
Prof. Ömer KARA	Watershed Mngmt
Prof. Selçuk GÜMÜŞ	Transportation

Staff	Area of Expertise
Asoc.Prof. Sez.HACISALİHOĞLU	Watershed Mngemt
Asoc.Prof. Erhan ÇALIŞKAN	Transportation
Asoc.Prof. Dr. Zafer YÜCESAN	Silviculture
Ast.Prof. Dr. Arslan OKATAN	Range management
Ast.Prof. Dr. Sefa AKBULUT	Plant science
Ast.Prof. Dr. Saliha ÜNVER OKAN	Transportation
Ast.Prof. Dr. Oğuz KURDOĞLU	Social forestry
Ast.Prof. Dr. Mahmut BAYRAMOĞLU	Forest economics
Ast.Prof. Dr. Ercan OKTAN	Silviculture

Draft Thesis Topics -I

- Land use changes and their implications to forest management planning
- Estimating some forest parameters using remote sensing
- Integration of soil conservation/water production into forest management plans
- Integration of carbon sequestration into forest management planning
- Evaluation of forest dynamics under various management strategies in preparing forest management plans
- The effects of various rotation periods on the performance of forest ecosystems
- Integration of climate change into forest management plans

Draft Thesis Topics -II

- Preparing a spatially feasible forest management plans with GIS
- Management planning of industrial plantation with fast growing trees
- Integration of fire management into forest management plans
- Integrating plant diversity into forest management plans
- ……..

Research activities

Ongoing projects…

- TÜBİTAK project Determining Carbon sequestration for pure and mixed Cremian Pine stands
- Erasmus+ Project: Developing Protocol for Carbon Storage Studies
- H2020: ALTERFOR; Alternative FMM, 21 Partners, 17 countries, 13 cases
- KTU Research Projects (KTU) Determing carbon storage for managed and protected Calabrian Pine stands
- GDF-AFD-ONFI-KTU Exploring the Adaptation Potential of Marmara Forests to Climate Change
- CEM-TUBITAK-KTU National Land Cover / Use Classification and Monitoring System (UASIS)

Our Graduate Students

- Juan MENACOSTA (MSc), Spain (Finished, 2016)-MEDFOR
- Kennedy KANJA (MSc), Zambia (Finished, 2016)
- Sidra Ijaz KHAN (MSc), Pakistan (Finished, 2017)-MEDFOR
- Sauti RAYMOND (MSc), Rwanda (Finished, 2019)
- Elharith HAGR (MSc), Sudan (Finished, 2019)
- Fosso CONSTANTIN (PhD), Cameroon
- Moussa MBHOU (PhD), Cameroon
- Sauti RAYMOND (PhD), Rwanda

113 Exploring Spatiotemporal Dynamics of Gölcük Planning Unit (43 Years) & Implications of International Convention

Sidra Khan, Karadeniz Technical University-Medfor

IV. Türkiye İklim Değişikliği Kongresi – TİKDEK'2017 5-7 Temmuz 2017, İstanbul
IV. Turkey Climate Change Congress - TCLCC'2017 5-7 July 2017, Istanbul, Turkey

INTEGRATION OF CLIMATE CHANGE TO FOREST MANAGEMENT PRACTICES: DRIVEN FACTORS AND CONCEPTUAL FRAMEWORK

Fosso Lionel Constantin[1], Uzay Karahalil[2]

Karadeniz Technical University Faculty of Forestry
Department of Forest Engineering
61080 TRABZON

folionelc@yahoo.fr ; uzay@ktu.edu.tr

Last Semester - (2019 Fall)

- Julia KACHANOVA (Russia)
- Angham DAIYOUB (Syria)
- Takele MULETA (Ethiophia)

Why KTU of Turkey?

- Different landscape, ecosystems and culture to experience
- Qualified academics and good infrastructure
- Cozy campus life with different fields of research
- Easy access and convenient place to live
- University has ECTS label, diploma supplement and accreditation
- Awarded with MÜDEK/ABET/EUR-ACE accreditation certificate
- Cheap and beautiful to travel around

Erasmus team to help you…

KARADENİZ TECHNICAL UNIVERSITY OFFICE OF INTERNATIONAL RELATIONS

ERASMUS+ OFFICE

E-mail: ofinaf@ktu.edu.tr

Working Hours: 08:00 - 12:00 / 13:00 - 17:00

Mrs. Çiğdem HÜSEM *Contact Person for Incoming Students*

Phone: + 90 462 377 3797
Fax: + 90 462 325 32 32
E-mail: cigdemhusem@ktu.edu.tr

Postal Address: Karadeniz Teknik Üniversitesi, Dış İlişkiler/Erasmus Ofisi, Rektörlük, 61080, Trabzon, Turkey


Thanks…