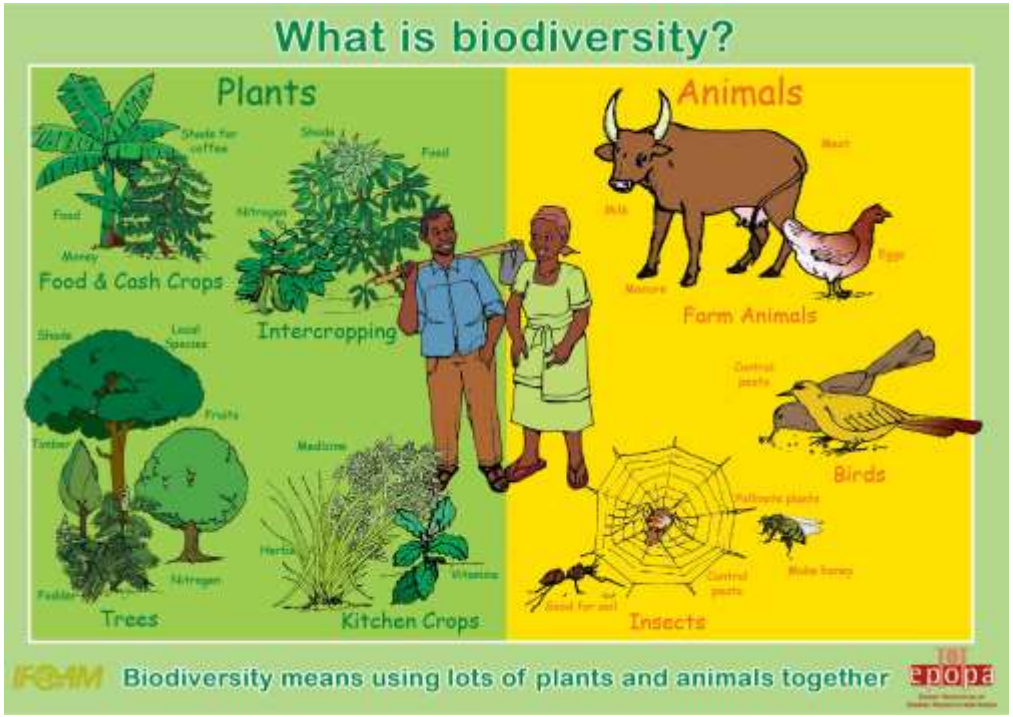
GENERAL BIODIVERSITY CONCEPT
&
BIODIVERSITY ON CAMPUS

What Is Biological Diversity?

Biological diversity is the variety and variability among living organisms and the ecological complexes in which they occur.

What Is Biological Diversity?

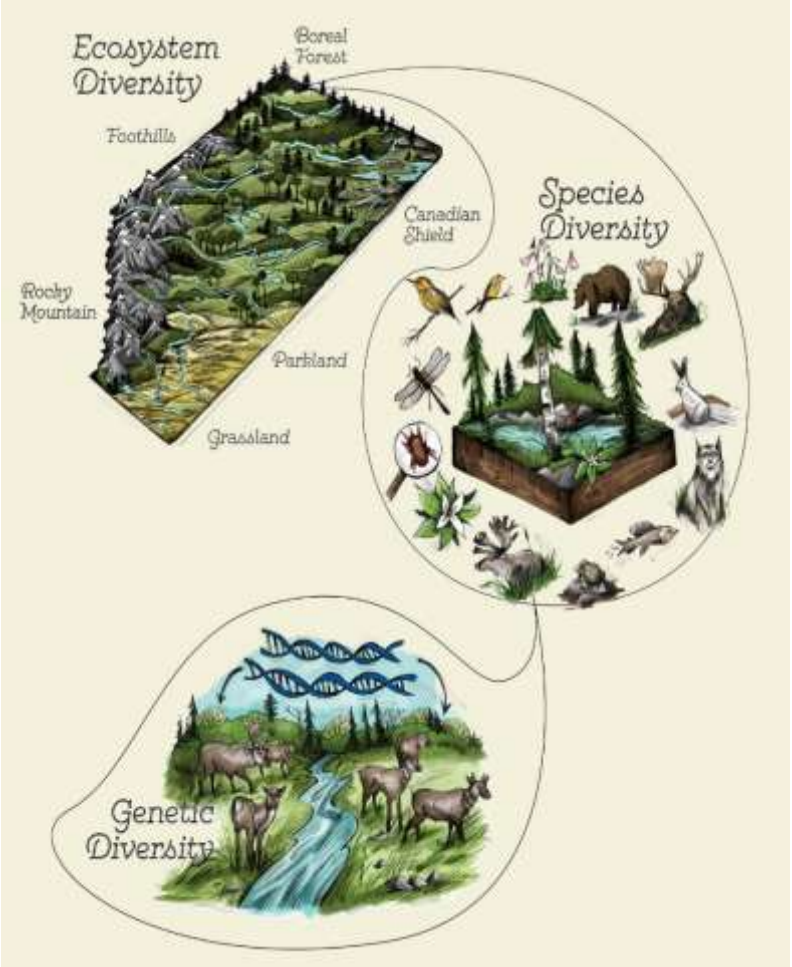
Biodiversity is the variety of life on Earth, it includes all organisms, species, and populations; the genetic variation among these; and their complex assemblages of communities and ecosystems.



Types of Biodiversty

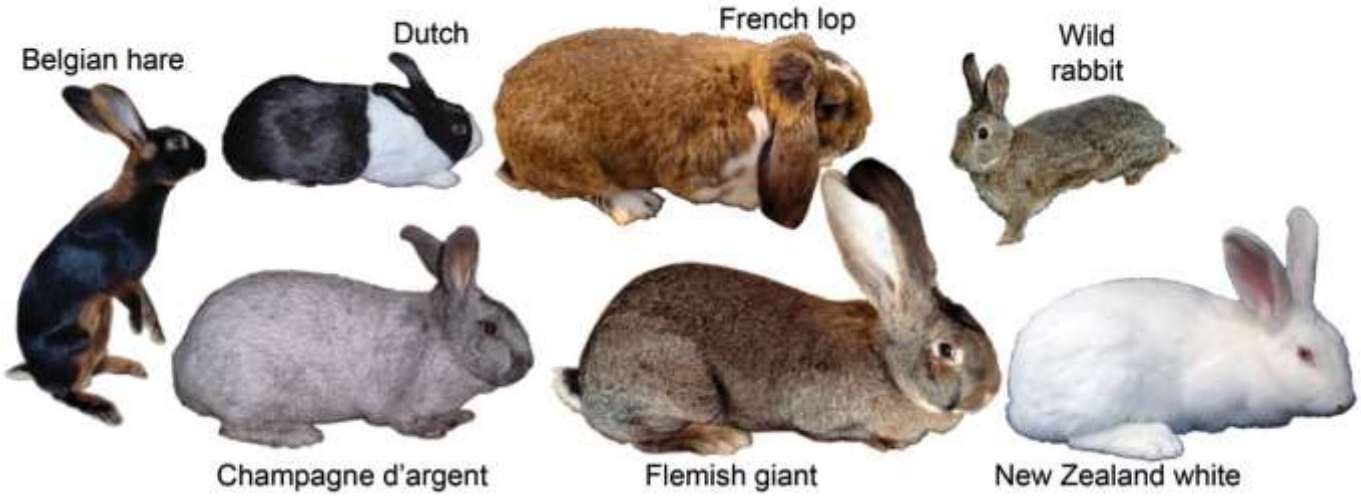
There are 4 components of biodiversity

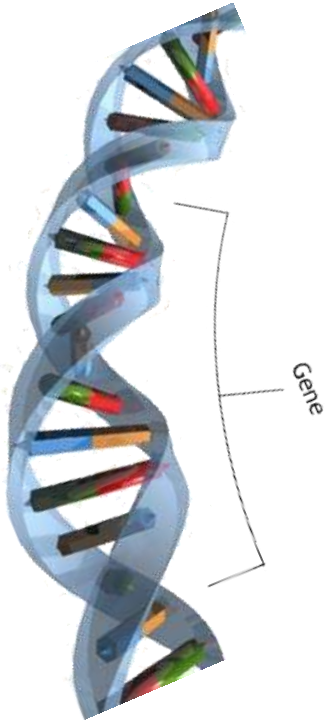
- Genetic Diversity
- Species Diversity
- Ecosystem Diversity
- Process Diversity



Types of Biodiversty

Genetic diversity is the combination of different genes found within a population of a single species, and the pattern of variation found within different populations of the same species.





Types of Biodiversty

Species diversity is the variety and abundance of different types of organisms which inhabit an area.*Species diversity* refers to the variety of species within a region.

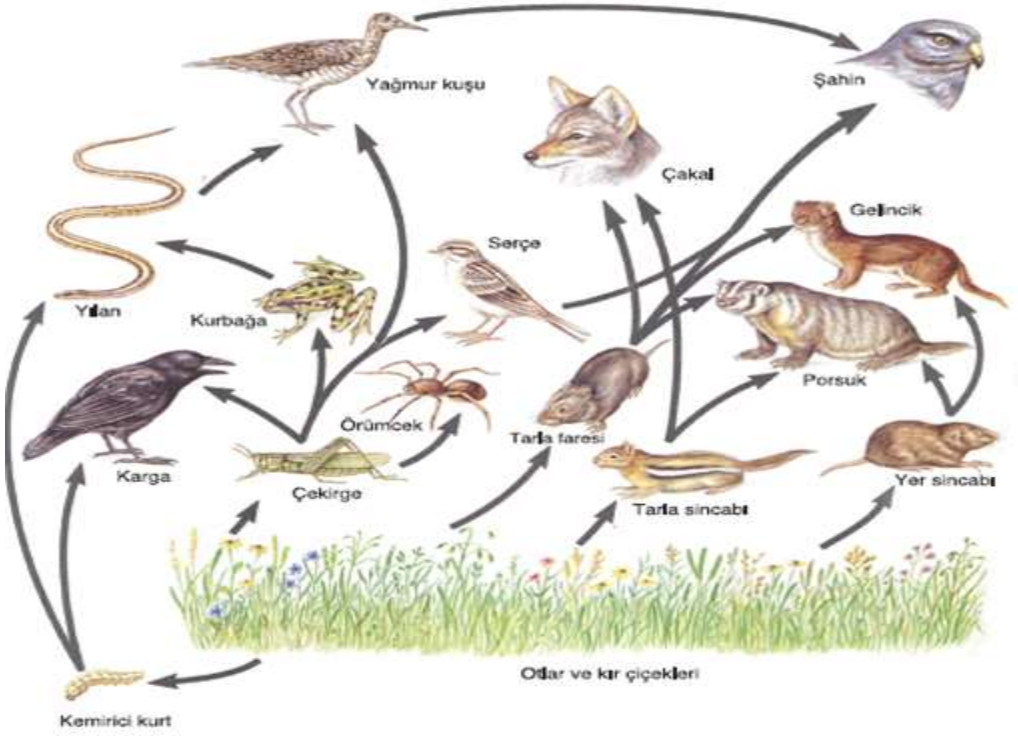
Types of Biodiversty

Ecosystem diversity encompasses the variety of habitats that occur within a region, or the mosaic of patches found within a landscape.Ecosystem diversity refers to the diversity of a place at the level of ecosystems.

Types of Biodiversty

Process diversity is on evolutionary outcome of everlasting interaction among living and non-living things in an ecosystem. Process is very important to continue of biodiversity.

Ithomia - Eupatorium



Methods to Measure Biodiversity

Quantitative indexes of biodiversity have been developed primarily to denote species diversity at three different geographical scales;

- **Alpha diversity ;** The number of species in a certain community is described as alpha diversity.

- **Beta diversity ;** Beta diversity links alpha and gamma diversity. It represents rate of change of species composition along an environmental or geographical gradient.

- **Gamma diversity;** Gamma diversity applies to larger geographical scales. It refers to the number of species in a large region or on a continent.

Methods to Measure Biodiversity

Species	Sampel Area 1	Sampel Area 2	Sampel Area 3
Castanea saliva	▲		
Fagus orientalis	▲		
Pinus brutia	▲		
Criptomeria japonica	▲		
Pyrus	▲		
Mespilus germanica	▲		
Quercus petrea	▲		
Pinus pinea	▲		
Picea orientalis	▲		▲
Robinia pseudoaccaia		▲	▲
Liquidambar orientalis		▲	
Speria van houtte		▲	
Fraxcinus angustiflora		▲	
Laurus nobilis		▲	
Weigela florida		▲	
Ulmus leavis		▲	▲
Elma		▲	
Forsythia intermedia		▲	
Acer negundo		▲	
Ostrya carpinifolia			▲
Pinus brutia			▲
Thuja pilicata			▲
Eucalyptus camaldulensis			▲
Juniperus virginiana			▲
Cedrus libani			▲
Cupressus arizonica			▲
Alfa	**9**	**10**	**10**
Beta	S.A1 and S.A2: **19**	S.A2 nad S.A3: **18**	S.A1 and S.A3: **17**
Gama	**26**		

Methods to Measure Biodiversity

There are 5 methods to measure biodiversity

- Species Richness
- Species Evenness
- Disparity
- Species Rarity
- Genetic Variability

Methods to Measure Biodiversity

- **Species Richness;** the total number of given species in a quantified area.
- **Species Evenness;** the degree to which the number of individual organisms are evenly divided between different species of the community.
- **Disparity;** measures the phenotypic differences among species resulting from the differences genes within a population.
- **Species Rarity;** the rarity of individual organisms within a quantified area.
- **Genetic Variability;** each population of a species contributes to additional biodiversity due to variations between gens.

Why Is Important Measurement of Biodiversity?

Many factors negatively affect ecosystems and ecological process, so biodiversity loss occurs result in factors. Measurement of biodiversity is important to following ecosystem's change and controlling species diversity.

Why Is Important Measurement of Biodiversity?

Various indexes have been developed for the measurement of Biodiversity. Some of them are Shannon Diversity Index, Simpson's Index, Berger-Parker Index and Pielou's Index.

The most commonly used indexes for measurement of biodiversity are Shannon Diversity Index and Simpson's Index.

In this study Shannon Diversity Index and Simpson's Index were used for measure of Biodiversity.

Biodivesity Indexes

Shannon Diversity Index	Simpson Diversity Index
$SH = \sum_{i=1}^{s} -(\ln\ pi)\, pi$	$C = 1 - \sum_{i=1}^{i=s} p_i^2$
SH = Shannon diversity index **P_i = Relative frequency of "i" in the research area.** **S = numbers of species encountered** **∑ = sum from species 1 to species S**	**C = Simpson diversity index** **P_i =Relative frequency of "i" in the research area.**

Measurement of Biodiversity

The sampling was done in three sampling areas determined randomly.

They are located around Karadeniz Technical University Campus.

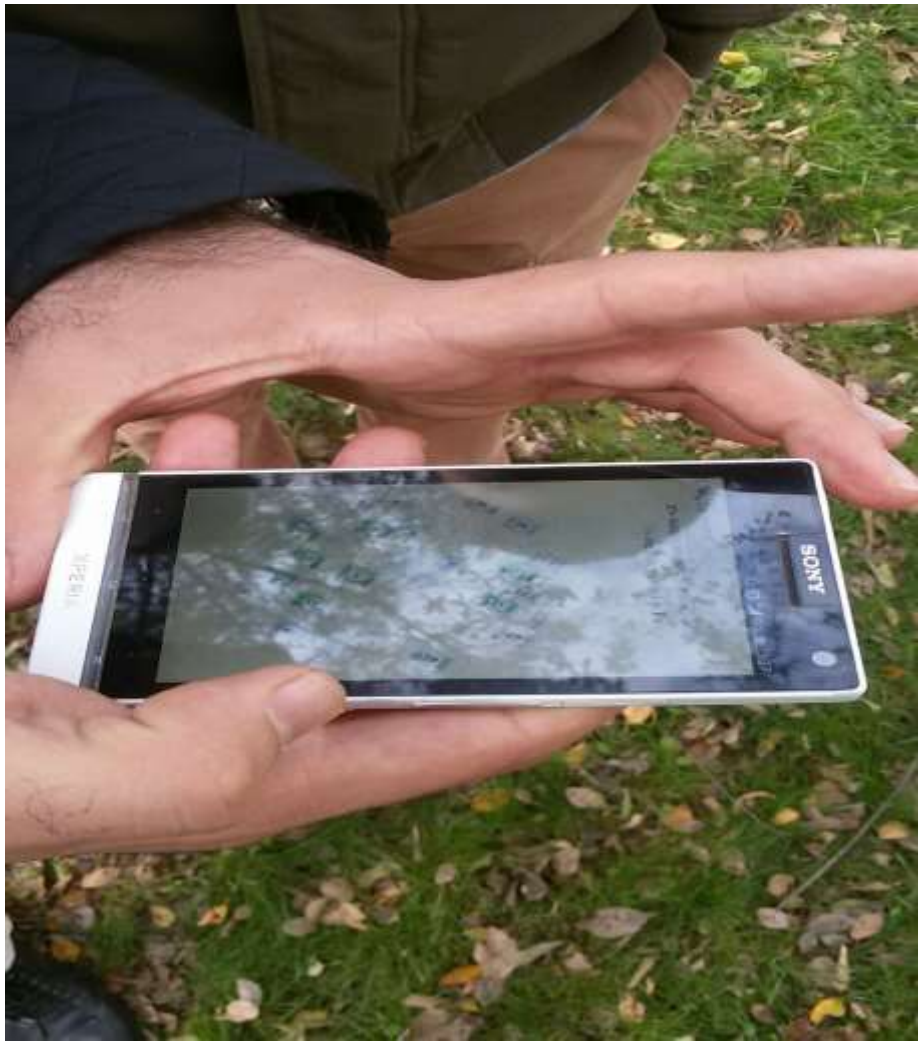
First sampling area

Second sampling area

Third sampling area

Measurement of Biodiversity

Sampling Area1:	K 56° 49' 92"
	D 45° 38' 69"
Sampling Area2:	K 56° 53' 12"
	D 45° 38' 72"
Sampling Area3:	K 56° 53' 89"
	D 45° 38' 54"



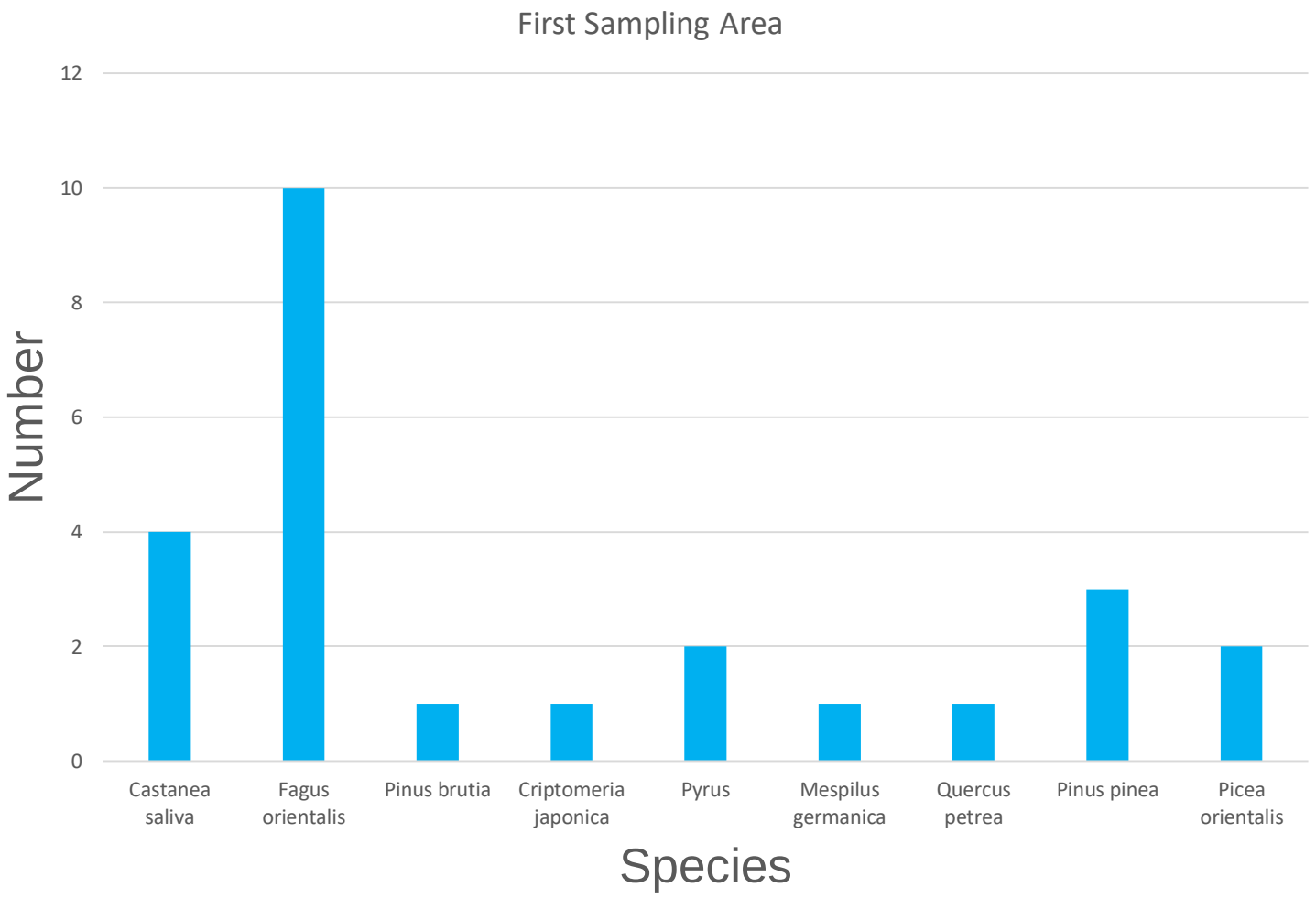
Measurement of Biodiversity

Measurement of Biodiversity

First sampling area 800m^2

	Species	Number
1	Castanea saliva	4
2	Fagus orientalis	10
3	Pinus brutia	1
4	Criptomeria japonica	1
5	Pyrus	2
6	Mespilus germanica	1
7	Quercus petrea	1
8	Pinus pinea	3
9	Picea orientalis	2
	Total	**25**

Measurement of Biodiversity

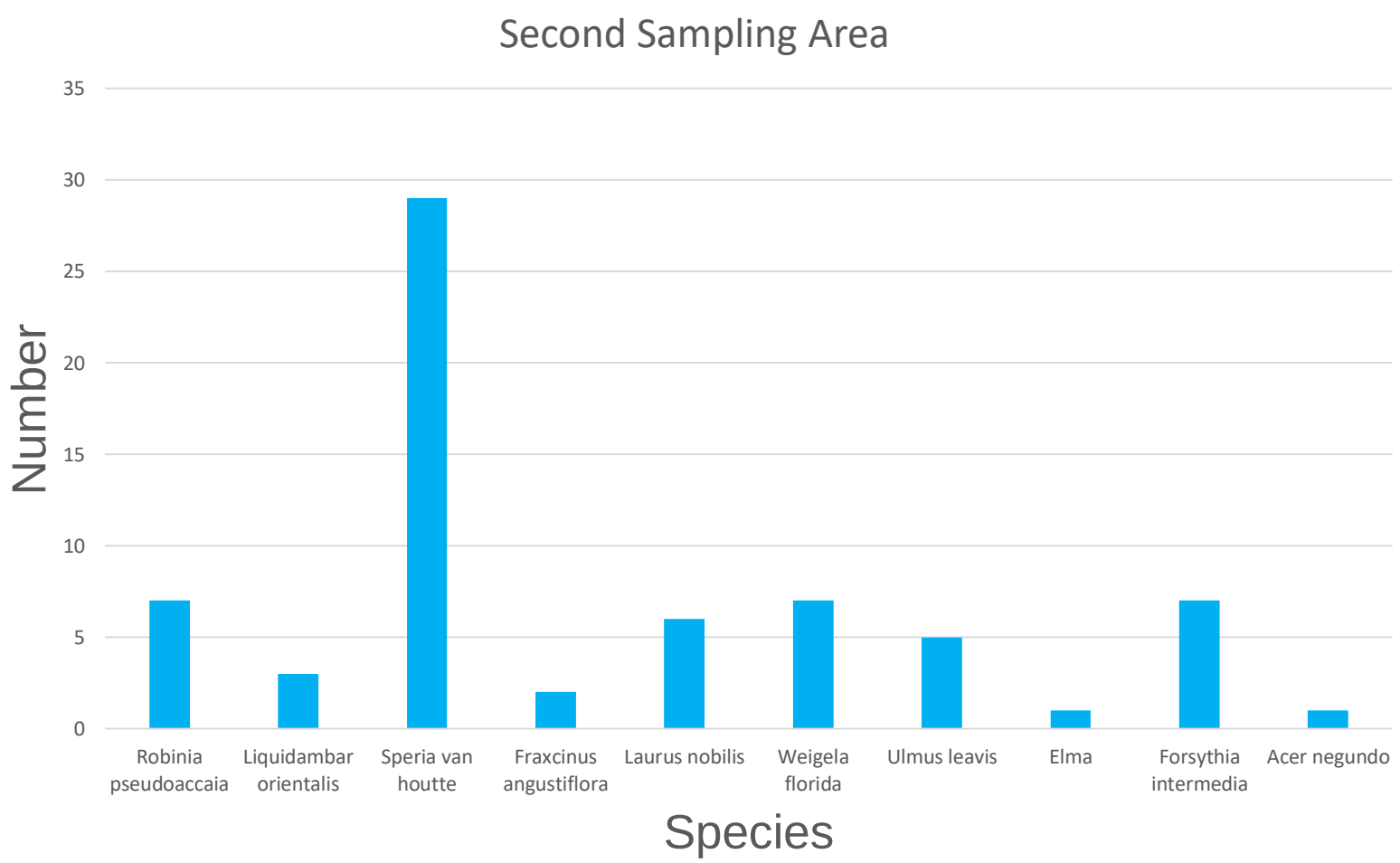


Measurement of Biodiversity

Second sampling area 800m^2

	Species	Number
1	Robinia pseudoaccaia	7
2	Liquidambar orientalis	3
3	Speria van houtte	29
4	Fraxcinus angustiflora	2
5	Laurus nobilis	6
6	Weigela florida	7
7	Ulmus leavis	5
8	Elma	1
9	Forsythia intermedia	7
10	Acer negundo	1
	Total	**68**

Measurement of Biodiversity

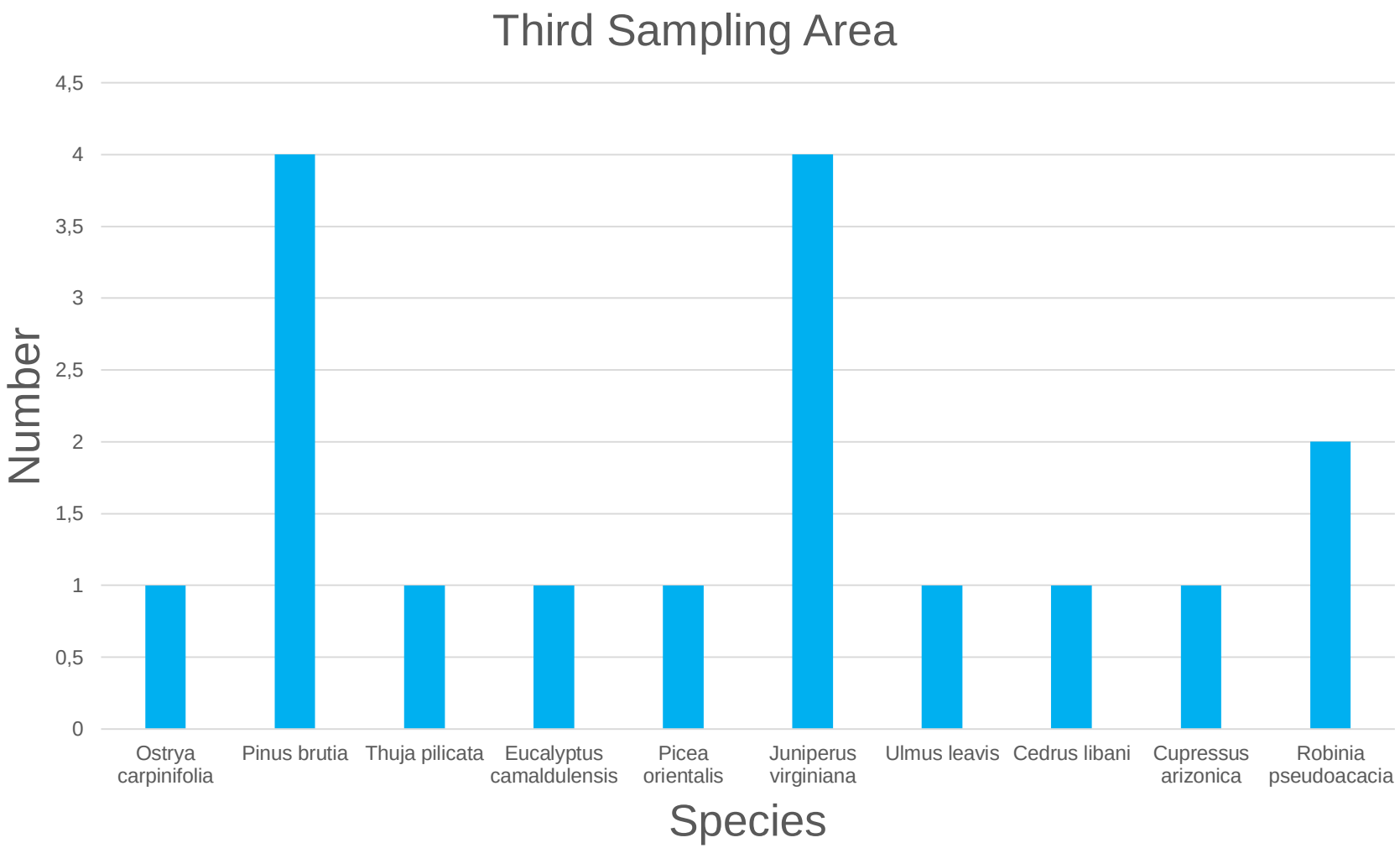


Measurement of Biodiversity

Third sampling area 800m^2

	Species	Number
1	Ostrya carpinifolia	1
2	Pinus brutia	4
3	Thuja pilicata	1
4	Eucalyptus camaldulensis	1
5	Picea orientalis	1
6	Juniperus virginiana	4
7	Ulmus leavis	1
8	Cedrus libani	1
9	Cupressus arizonica	1
10	Robinia pseudoacacia	2
	Total	**17**

Measurement of Biodiversity



Measurement of Biodiversity

Species0	Number	Pi	pi(lnpi)	pi2	Shmin	SHmax
Castanea saliva	4	0,16	-0,293213	0,0256		
Fagus orientalis	10	0,4	-0,366516	0,16		
Pinus brutia	1	0,04	-0,128755	0,0016		
Criptomeria japonica	1	0,04	-0,128755	0,0016		
Pyrus	2	0,08	-0,202058	0,0064		
Mespilus germanica	1	0,04	-0,128755	0,0016		
Quercus petrea	1	0,04	-0,128755	0,0016		
Pinus pinea	3	0,12	-0,254432	0,0144		
Picea orientalis	2	0,08	-0,202058	0,0064		
Total	**25**		**1,8332977**	**0,7808**	**0**	**3,218875825**
	S		**SH**	**C**		

Measurement of Biodiversity

Species	Number	Pi	pi(lnpi)	pi2	Shmin	SHmax
Robinia pseudoaccaia	7	0,102941	-0,234047	0,010597		
Liquidambar orientalis	3	0,044118	-0,137687	0,001946		
Speria van houtte	29	0,426471	-0,363443	0,181877		
Fraxcinus angustiflora	2	0,029412	-0,103716	0,000865		
Laurus nobilis	6	0,088235	-0,214213	0,007785		
Weigela florida	7	0,102941	-0,234047	0,010597		
Ulmus leavis	5	0,073529	-0,191917	0,005407		
Elma	1	0,014706	-0,062052	0,000216		
Forsythia intermedia	7	0,102941	-0,234047	0,010597		
Acer negundo	1	0,014706	-0,062052	0,000216		
Total	**68**		**1,8372199**	**0,769896**	**0**	**4,219507705**
	S		**SH**	**C**		

Measurement of Biodiversity

Species	Number	Pi	pi(lnpi)	pi2	Shmin	SHmax
Ostrya carpinifolia	1	0,058824	-0,16666	0,00346		
Pinus brutia	4	0,235294	-0,340452	0,055363		
Thuja pilicata	1	0,058824	-0,16666	0,00346		
Eucalyptus camaldulensis	1	0,058824	-0,16666	0,00346		
Picea orientalis	1	0,058824	-0,16666	0,00346		
Juniperus virginiana	4	0,235294	-0,340452	0,055363		
Ulmus leavis	1	0,058824	-0,16666	0,00346		
Cedrus libani	1	0,058824	-0,16666	0,00346		
Cupressus arizonica	1	0,058824	-0,16666	0,00346		
Robinia pseudoacacia	2	0,117647	-0,251772	0,013841		
Total	**17**		**2,0992928**	**0,851211**	**0**	**2,833213344**
	S		**SH**	**C**		

Measurement of Biodiversity

Sampling Area	Shannon Index	Simpson Index
First	1,833	0,781
Second	1,837	0,770
Third	2,099	0,851
Normal Range	1,5 - 3,5	0-1,0

Measurement of Biodiversity

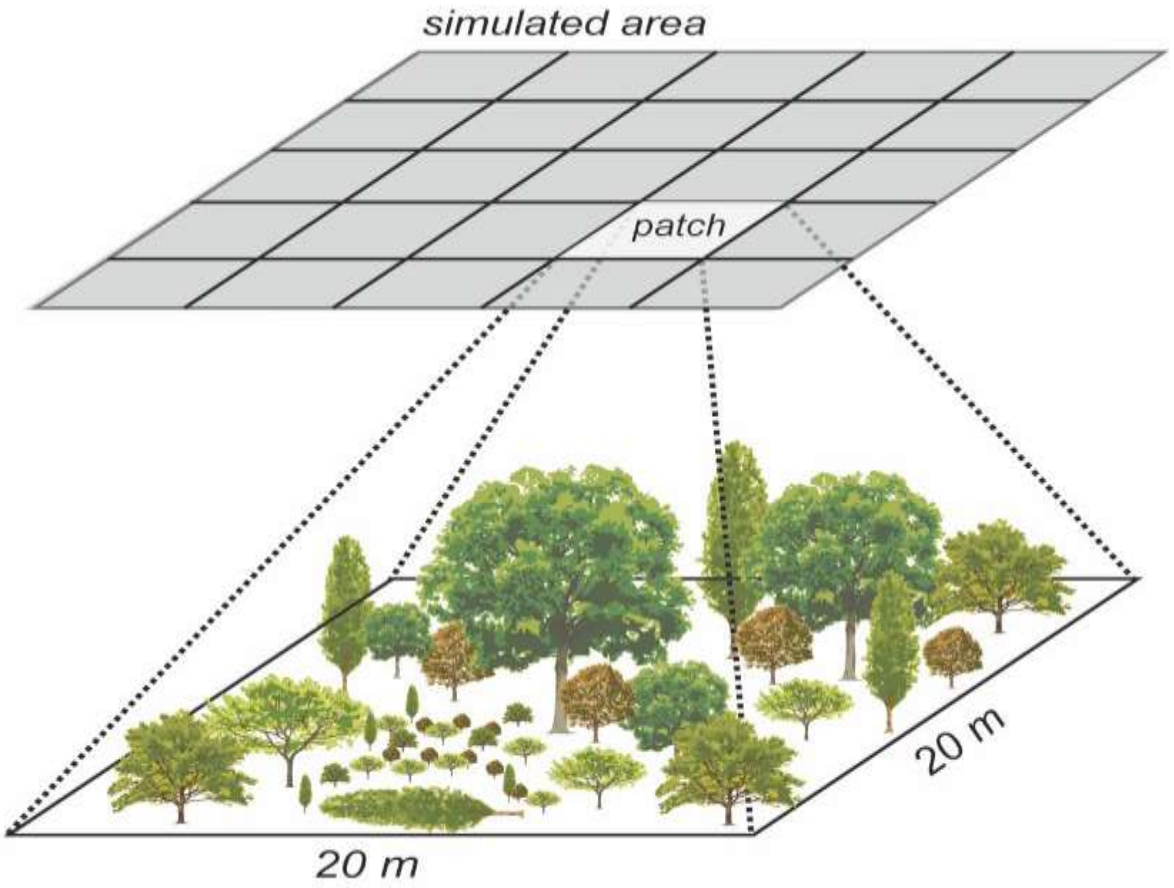
According to I. Sampling area, the value of Shannon Diversity Index is 1,833, the value of Simpson's Diversity Index is 0,781; for II. Sampling area, values of those were calculated respectively as 1,837 and 0,770 and Index is 1,833, the value of Simpson's Diversity Index is 0,781 and or III. Sampling area, values of those were calculated respectively as 2,099 and 0,851.

The lowest limit of Shannon Diversity Index is 1,5 and the highest limit is 3,5. According to these values, when each sampling area is evaluated, first,second and third sampling areas have **high species** diversity, however third sampling area is **higher species** diversity than first and second sampling area.

The lowest limit of Simpson Diversity Index is 0 and the highest limit is 1. The more this value reaches to 1, the more biodiversity increases; the more this value reaches to 0(zero), the more biodiversity decreases. When the sampling areas are considered, third of sampling areas have a **high species** diversity

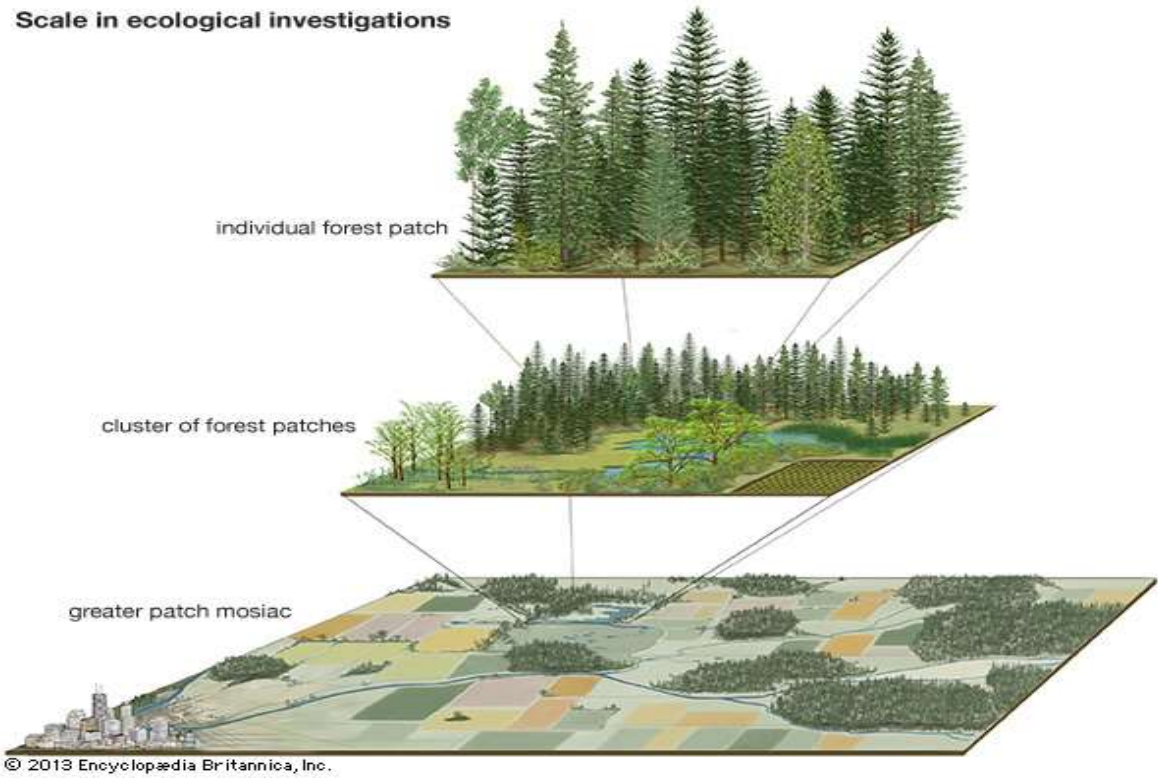
Patch Dynamics

Patches are spatial units different from their neighbors.



Patch Dynamics

Patch dynamics is a conceptual approach to ecosystem and habitat analysis that emphasizes dynamics of heterogeneity within a system .

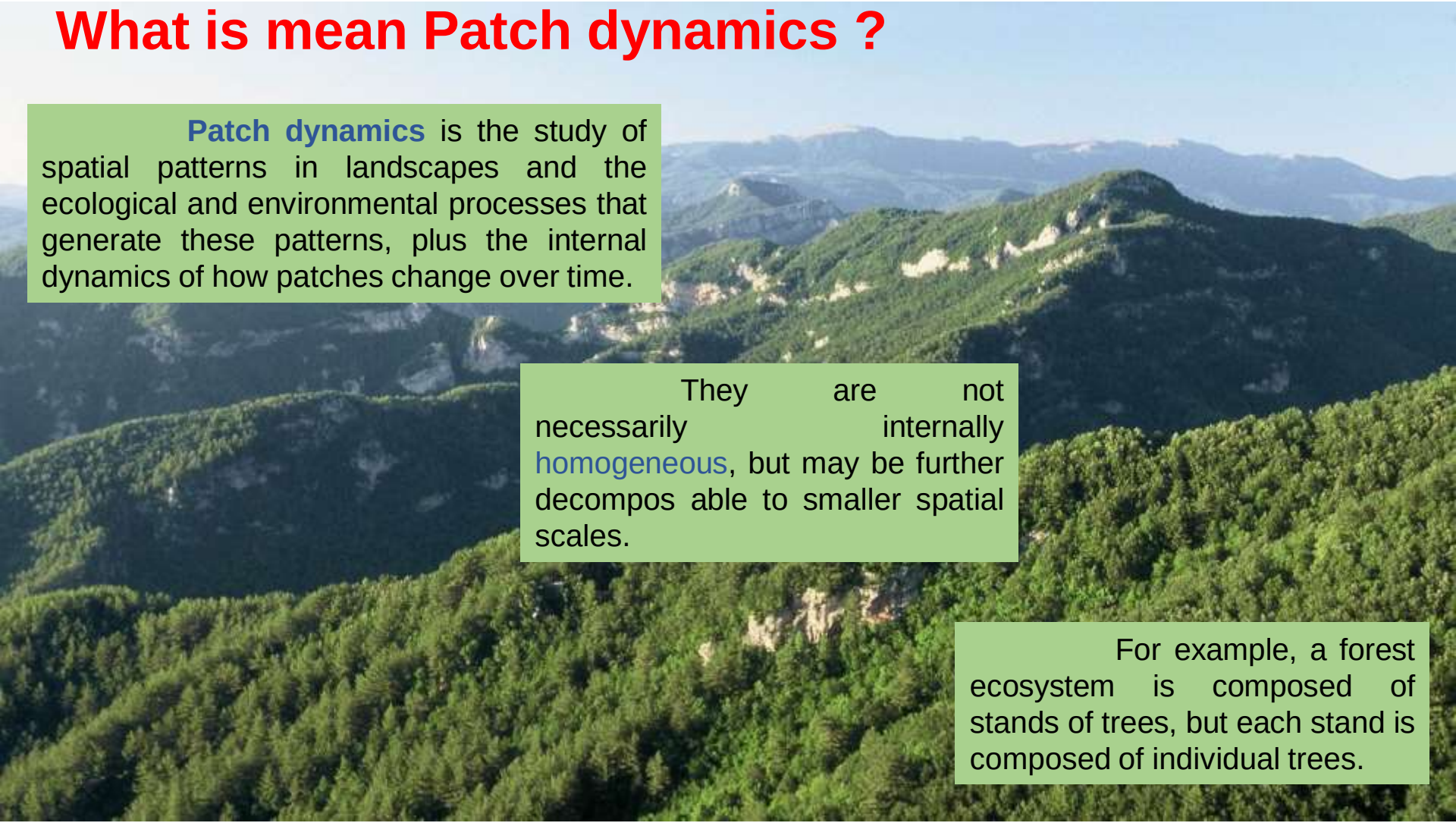


Patch Dynamics

That each area of an ecosystem is made up of a mosaic of small '*sub-ecosystems*'.

Patch Dynamics

What is mean Patch dynamics ?



Patch dynamics is the study of spatial patterns in landscapes and the ecological and environmental processes that generate these patterns, plus the internal dynamics of how patches change over time.

They are not necessarily internally homogeneous, but may be further decompos able to smaller spatial scales.

For example, a forest ecosystem is composed of stands of trees, but each stand is composed of individual trees.

Patch Dynamics

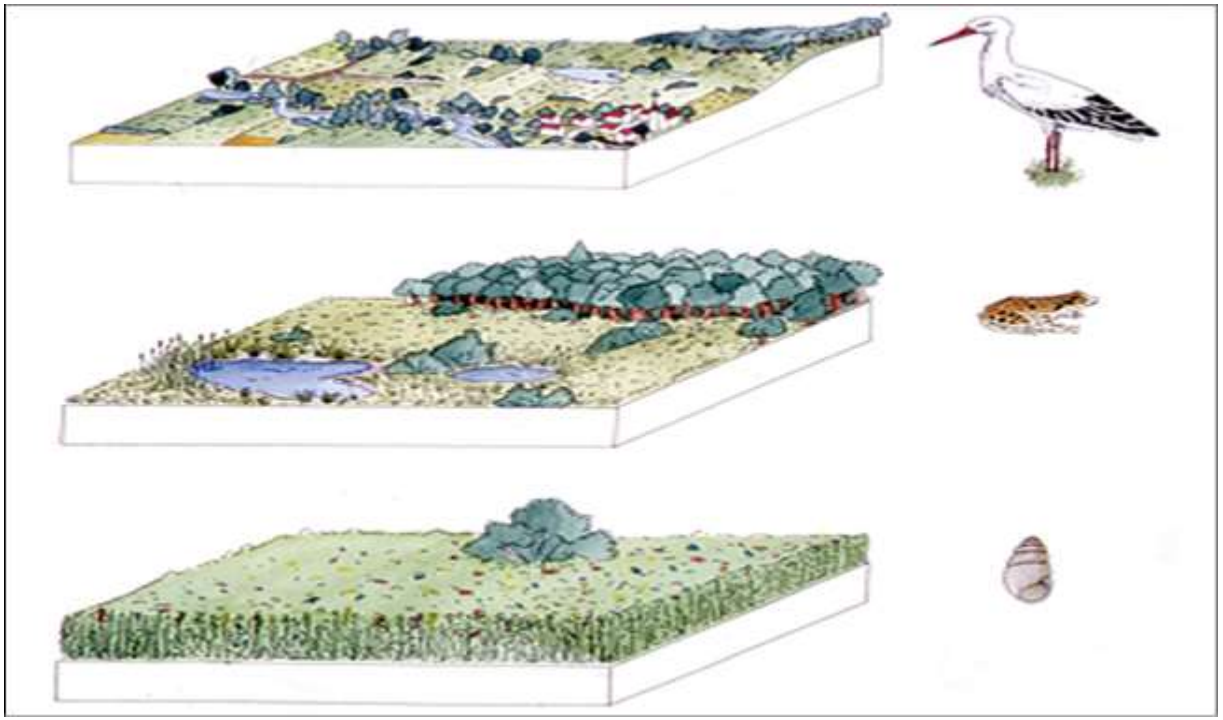
Importance In Conservation Of Biodiversity

A habitat patch is any discrete area with a definite shape, spatial and configuration used by a species for breeding or obtaining other resources. Mosaics are the patterns within landscapes that are composed of smaller elements, such as individual forest stands, shrubland patches, highways, farms, or towns.

Patch Dynamics

Importance In Conservation Of Biodiversity

Migration occurs from one patch to another. This migration maintains the population of some patches, and can be the mechanism by which some plant species spread.



Patch Dynamics

Importance In Conservation Of Biodiversity

The concept of patch dynamics suggests that to conserve biodiversity or restore and manage ecosystems successfully, ecological processes and ecosystem resilience should take precedence over targeted end points and the preservation of equilibrium states.

Conclusion

Biodiversity provides direct products and ecosystem services.

Conclusion

What are the Threats to Biodiversity?

- **Over-hunting** has been a significant cause of the extinction of hundreds of species and the endangerment of many more, such as mammoth , bald ibis , panda Panthera tigris virgata …

Anadolu parsı
(Panthera pardus)

Conclusion

What are the Threats to Biodiversity?

Commercial hunting, both legal and illegal (poaching), is the principal threat.

Commercial seal hunt in Canada

Conclusion

What are the Threats to Biodiversity?

Pollution from chemical contaminants certainly poses a further threat to species and ecosystems.

Air pollution

Conclusion

What are the Threats to Biodiversity?

Climate Change and Global Warming, a changing global climate threatens species and ecosystems.

Effect of global warming

Conclusion

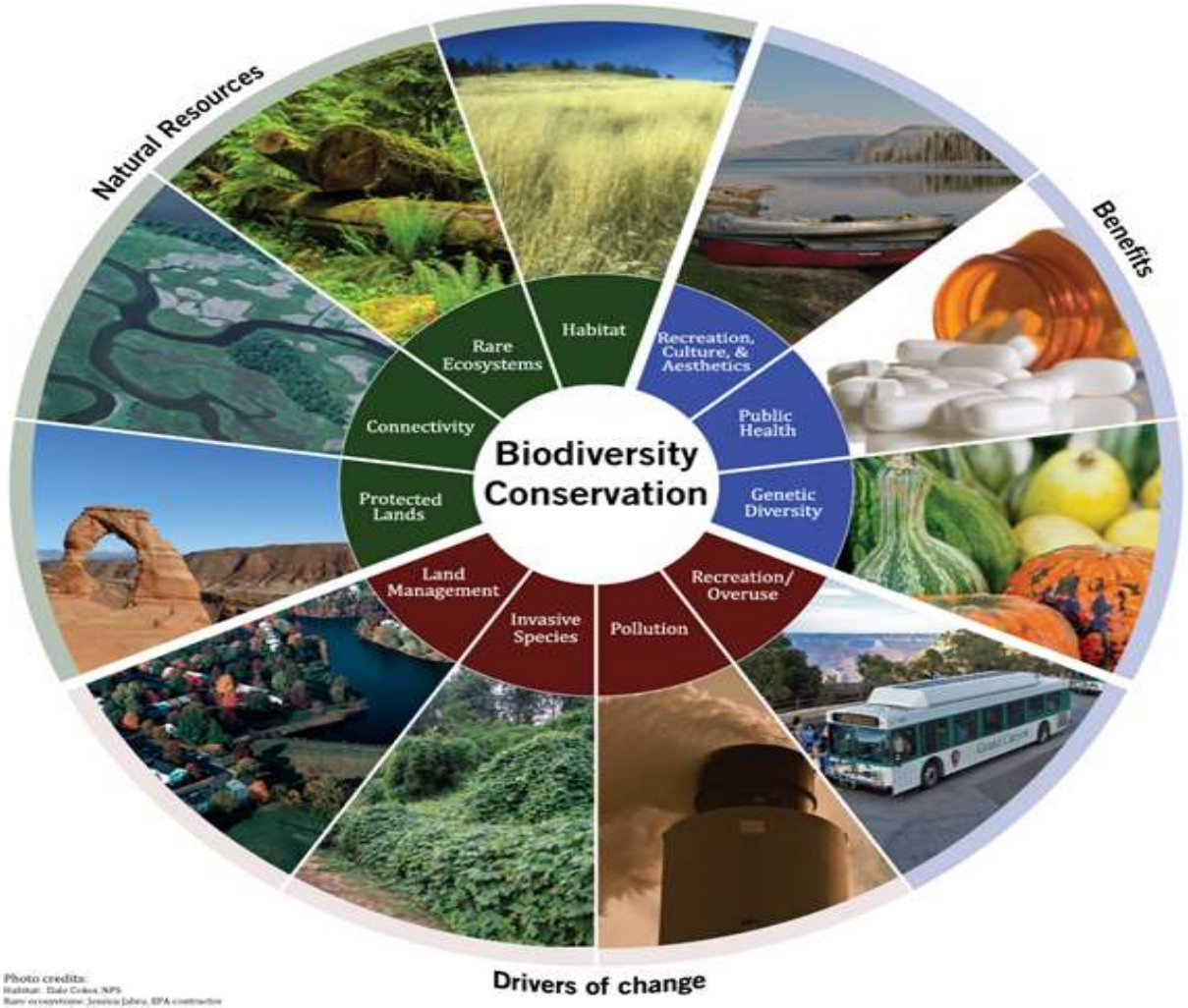


Photo credits:

Conclusion

Constantly all of Earth‘s ecosystem have been transformed by human and continue to be converted for agricultural and other uses, also biodiversity is negatively affected

Conclusion

To assess biodiversity in given area we should analyze the whole structure, not focuse on one object. We should not only focus on the species and species groups, but also on ecological processes

Conclusion

Other factors contribute on the conservation of biodiversity – protected areas protect endangered species and intact natural systems and help slow down loss of biodiversity

Conclusion

Also botanical and zoological gardens, environmental education, scientific and industry collaboration contribute in biodiversity conservation. Ecological restoration which is the process of bringinh degraded ecosystem back to its original state as close as possible is very important for biodiveristy.


THANK
YOU