Report on the Impact of Climate Change on the Forestry Sector, With a Proposal of Adaptation Measures

Authors:

Dejan Stojanovic, PhD.
Prof. Sasa Orlovic, PhD.
Institute of Lowland Forestry and Environment
University of Novi Sad

List of Abbreviations

E -OBS	European daily high-resolution gridded dataset
FAI	Forest Aridity Index
IPCC	Intergovernmental Panel on Climate Change
RCP	Relative Concentration Pathway

CONTENTS

Introduction

The effects of climate change on the habitat suitability of different tree species largely depend on global emissionscenarios. Based on the observed climate change and projections of anticipated climate based on RCP scenarios of expected gases levels with the greenhouse effect created by the Intergovernmental Panel on Climate Change (IPCC) analysis has been made on the suitability of habitat for different trees species in the Republic of Serbia.

Tree species included in the analysis are the most common ones based on the National Forest Inventory, that is, those that are sufficiently present in the areaso that statistically relevant spatial analysis could be carried out. A potential impact on the national levelas well ason the administrative district level has been calculated.

Methodology

Calculations have been made based on the RCP 4.5 and 8.5 scenarios, for the period between 2041-2070 and 2071-2100. The E-OBS database for the period between 1990-2019 was used for climate data.

Data regarding temperature and precipitation have been integrated into the FAI index (*Forest Aridity Index*, Fuhrer et al., 2011) and the Ellenberg index (Ellenberg, 1988), which have proven to be useful tools for understanding the present forest distribution.

The FAI index takes into account July and August temperatures and rains from May to August, whereas the Ellenberg index takes into account the sum of annual precipitation and the warmest month temperature (July).

The models based on the FAI and Ellenberg index, successfully used in the region (Central Europe, Hungary) have been able toanticipate well for Serbia when it comes to fir, spruce, white and black pine and beech. For other species, these models do not show great precision, but they can be moderately used for other forest species as well. It can be clearly noted that the conditions for the main types of oak (common oak, turkey oak and sessile oak), will not be favorable in the 21st century, compared to the 20th century (Miletic, Stojanovic et al., in press), as shown in the results of this report.

This is the first time that suchanalyses have been carried out for administrative districts in the Republic of Serbia.

Adaptation measures with indicators have been proposed.

Results

Condition estimatesin the Republic of Serbia

It is expected that the last thirty years of the 21st century will see a serious shortageof land suitable for the growth and vitality of forests in the Republic of Serbia, all due to an increase of drought period and general reduction of groundwaters in the lowland areas. An expected increase in aridity is observed, with a generally negative impact on forest ecosystems and forestry industry on the whole territory of the Republic of Serbia.

Calculations for the administrative districts have been made for the first time in this area so far (Tables 1 and 2). There are clear differences between the expected impacts of climate change in different regions of Serbia. Variations of climate change have been observed on the regional level. That means thatBor, Zaječar, Braničevo, Podunavlje, Šumadija, Pomoravlje, Central Banat, Rasina and Nišava regions would be less affected by climate change in the context of beneficial habitats for forest ecosystems, while Mačva, Kolubara, South Bačka, Pirot, Toplica, West Bačka, Jablanica and Pčinja districts will be most affected on the basis of the FAI index (Table 1). In the districts with a lower level of afforestation, planting trees is recommended.

Table 1. Observed mean values of the FAI index at the level of administrative districts together with projections and percentage increase in index or arid habitat

Districts	EOBS 1990-2019	RCP4.5 2041-2070	RCP4.5 2071-2100	RCP8.5 2041-2070	RCP8.5 2071-2100	Δ(EOBS - RCP4.5 2041-2070) (%)	Δ(EOBS - RCP4.5 2071-2100) (%)	Δ(EOBS - RCP8.5 2041-2070) (%)	Δ(EOBS - RCP8.5 2071-2100) (%)	Mean change 2041-2070 (%)	Mean change 2071-2100 (%)	Total mean change (%)
Bor	7,90	7,23	7,69	8,13	10,39	-8,51	-2,65	2,86	31,55	-2,83	14,45	5,81
Zajecar	7,61	7,41	7,91	8,37	10,75	-2,60	3,99	9,98	41,35	3,69	22,67	13,18
Branicevo	7,05	6,92	7,37	7,77	9,94	-1,77	4,58	10,24	41,01	4,23	22,79	13,51
Podunavlje	7,32	7,48	7,95	8,37	10,68	2,22	8,60	14,27	45,84	8,25	27,22	17,73
Sumadija	6,44	6,56	6,99	7,37	9,44	1,88	8,48	14,36	46,57	8,12	27,52	17,82
Pomoravlje	6,82	6,95	7,41	7,81	10,03	2,03	8,77	14,64	47,14	8,33	27,95	18,14
Central Banat	8,03	8,61	9,07	9,59	12,14	7,27	12,97	19,47	51,25	13,37	32,11	22,74
Rasina	6,52	6,91	7,41	7,80	10,00	5,96	13,59	19,65	53,32	12,81	33,46	23,13
Nisava	7,81	8,33	8,93	9,43	12,06	6,67	14,35	20,79	54,46	13,73	34,41	24,07
Belgrade	7,13	7,76	8,22	8,66	11,02	8,81	15,15	21,36	54,47	15,08	34,81	24,95
North Banat	8,16	8,94	9,36	9,96	12,59	9,52	14,61	22,01	54,20	15,77	34,40	25,08
Moravica	5,24	5,63	6,03	6,37	8,20	7,59	15,15	21,59	56,59	14,59	35,87	25,23
South Banat	7,24	8,01	8,47	8,93	11,33	10,55	16,93	23,31	56,45	16,93	36,69	26,81
Raska	5,19	5,67	6,10	6,43	8,28	9,18	17,43	23,80	59,42	16,49	38,43	27,46
Srem	7,08	7,87	8,28	8,76	11,18	11,21	16,98	23,85	58,03	17,53	37,51	27,52
Zlatibor	4,63	5,10	5,48	5,79	7,50	10,25	18,39	25,09	62,07	17,67	40,23	28,95
Kosovo & Metohija	7,03	7,74	8,40	8,80	11,31	10,14	19,51	25,25	60,95	17,69	40,23	28,96
Noth Backa	7,80	8,85	9,21	9,82	12,48	13,35	18,04	25,76	59,93	19,56	38,99	29,27
Macva	6,00	6,80	7,19	7,60	9,75	13,37	19,85	26,77	62,56	20,07	41,21	30,64
Kolubara	5,65	6,41	6,81	7,19	9,23	13,42	20,44	27,24	63,29	20,33	41,87	31,10
South Backa	7,38	8,48	8,87	9,42	11,97	14,84	20,13	27,63	62,24	21,24	41,19	31,21
Pirot	6,69	7,56	8,13	8,67	11,16	13,01	21,59	29,67	66,92	21,34	44,26	32,80
Toplica	6,67	7,63	8,21	8,66	11,08	14,30	23,06	29,72	65,97	22,01	44,51	33,26
West Backa	7,31	8,57	8,93	9,52	12,13	17,32	22,29	30,27	66,02	23,80	44,15	33,97
Jablanica	7,76	9,06	9,77	10,33	13,22	16,66	25,81	33,04	70,27	24,85	48,04	36,44
Pcinja	7,27	9,29	10,10	10,63	13,80	27,77	38,91	46,32	89,83	37,04	64,37	50,71

Šumadija, Podunavlje,Belgrade, North Bačka, West Bačka, Central Banat, Braničevo, North Banat and Zlatibordistricts are potentially less affected, while Mačva, Zaječar, Nišava, Toplica, Pirot, Jablanica and Pčinja districts, as well as AP Kosovo and Metohija, belong to those that will be more affected based on the Ellenberg index (Table 2).

Table 2. Observed mean values of the Ellenberg index to the level of administrative districts together with projections and the percentage increase in the index and aridity habitats

Districts	EOBS 1990 2019	RCP4.5 2041 2070	RCP4.5 2071 2100	RCP8.5 2041 2070	RCP8.5 2071 2100	Δ(EOBS RCP4.5 2041 2070) (%)	Δ(EOBS RCP4.5 2071 2100) (%)	Δ (EOBS RCP8.5 2041 2070) (%)	Δ(EOBS RCP8.5 2071 2100) (%)	Mean change 2041 2070 (%)	Mean change 2071 2100 (%)	Total mean change (%)
Šumadija	32,29	31,66	32,66	34,54	41,00	1,94	1,15	6,98	27,00	2,52	14,08	8,30
Podunavlje	36,19	36,04	37,04	39,16	46,00	0,40	2,37	8,21	27,10	3,91	14,74	9,32
Belgrade	35,77	35,94	36,91	38,93	45,34	0,49	3,19	8,84	26,78	4,66	14,98	9,82
North Bačka	41,36	42,10	42,81	45,15	51,91	1,79	3,50	9,17	25,51	5,48	14,51	9,99
West Bačka	38,47	39,15	39,88	42,02	48,38	1,79	3,67	9,23	25,76	5,51	14,72	10,11
Central Banat	41,24	41,85	42,78	45,09	52,11	1,47	3,74	9,33	26,37	5,40	15,06	10,23
Branicevo	33,93	34,11	35,11	37,22	43,98	0,54	3,48	9,69	29,62	5,12	16,55	10,83
North Banat	43,13	44,35	45,20	47,56	54,76	2,84	4,82	10,28	26,98	6,56	15,90	11,23
Zlatibor	21,42	21,43	22,24	23,54	28,22	0,01	3,81	9,87	31,73	4,94	17,77	11,36
Moravica	25,48	25,57	26,49	28,04	33,45	0,35	3,96	10,05	31,27	5,20	17,61	11,41
Srem	35,56	36,38	37,27	39,32	45,65	2,30	4,80	10,56	28,37	6,43	16,58	11,51
Raska	24,19	24,25	25,16	26,62	32,02	0,24	4,02	10,06	32,39	5,15	18,20	11,68
South Banat	37,71	38,78	39,72	41,97	48,79	2,83	5,32	11,29	29,38	7,06	17,35	12,20
Bor	34,89	35,49	36,50	38,80	45,93	1,72	4,62	11,22	31,66	6,47	18,14	12,30
South Backa	37,85	39,45	40,24	42,44	49,03	4,21	6,31	12,13	29,54	8,17	17,93	13,05
Kolubara	28,50	29,41	30,32	32,04	37,71	3,21	6,41	12,42	32,32	7,81	19,36	13,59
Pomoravlje	32,34	33,26	34,33	36,35	43,33	2,85	6,15	12,42	34,01	7,63	20,08	13,86
Rasina	30,33	31,24	32,34	34,21	40,96	3,00	6,63	12,78	35,06	7,89	20,84	14,37
Macva	29,41	30,98	31,85	33,62	39,39	5,34	8,30	14,32	33,91	9,83	21,10	15,47
Zajecar	33,06	34,57	35,65	37,95	45,34	4,60	7,85	14,82	37,16	9,71	22,50	16,10
Kosovo & Metohija	26,57	27,72	28,78	30,40	36,70	4,31	8,32	14,39	38,12	9,35	23,22	16,29
Nisava	33,98	36,83	38,07	40,41	48,28	8,41	12,04	18,93	42,10	13,67	27,07	20,37
Toplica	29,29	32,61	33,83	35,81	43,01	11,34	15,48	22,27	46,83	16,80	31,15	23,98
Pirot	30,23	34,37	35,59	38,04	45,97	13,69	17,73	25,85	52,05	19,77	34,89	27,33
Jablanica	32,71	37,98	39,40	41,82	50,33	16,11	20,46	27,86	53,86	21,99	37,16	29,57
Pčinja	31,11	37,61	39,19	41,58	50,75	20,91	25,97	33,68	63,14	27,30	44,55	35,93

A universal reduction of favorable habitats for woody species in the Republic of Serbia is expected by the end of the 21st century (Figure 1 - 5). Maps of suitable habitats for fir, beech, spruce and pine trees based on the observed data of E-OBS 1990-2019 and climate scenarios RCP4.5 and RCP 8.5 for the periods between 2041-2070 and 2071-2100 indicate a long-term trend of decreasing suitable habitats for forest species. The Ellenberg index shows a slightly more favorable picture than the FAI in terms of habitat suitability. However, due to a stronger focus of the FAI index on the vegetation period, it can be approximated that the FAI provides robust forecasts, although both can be considered relevant. Although the Ellenberg index is somewhat simpler, it cannot be said it is less accurate. What both indices have in common is that the models based on them predict worsening conditions for forests in most parts of Serbia. The areas where a higher amount or lower decrease in precipitation is expected (Western Serbia) will be in a more favorable position in the long run in the context of forestry and ecosystem services provided by forests (Tables 1 and 2).

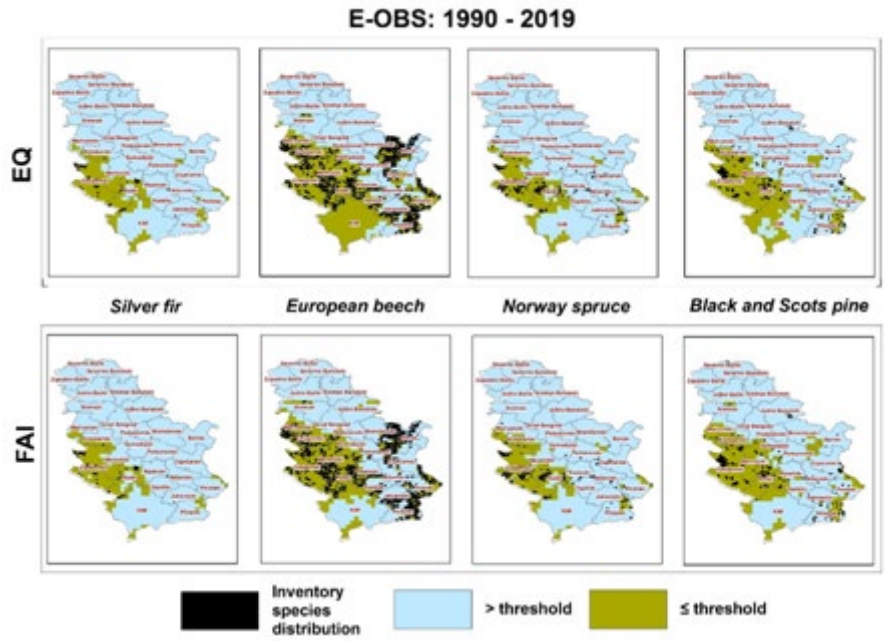

Figure 1. Suitable habitat (green) for fir, beech, spruce and pine trees based on the Ellenberg index (EI) and the FAI index indicating the administrative districts of the Republic of Serbia between 1990-2019 (E-OBS observed data, Miletić, Stojanović et al., in press).

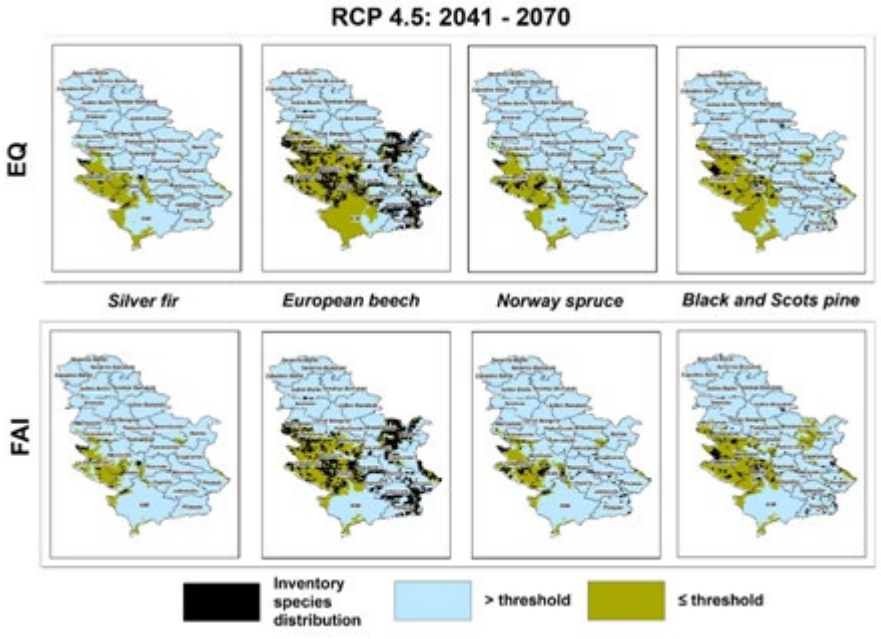

Figure 2. Areas favorable for the growth of fir, beech, spruce and pine treesbetween 2041-2070 according to RCP 4.5 scenario with indicated administrative districts; black indicates the current distribution of the species, blue unfavorable habitats, and green favorable habitats for a specific species (Miletić, Stojanović et al., in press)

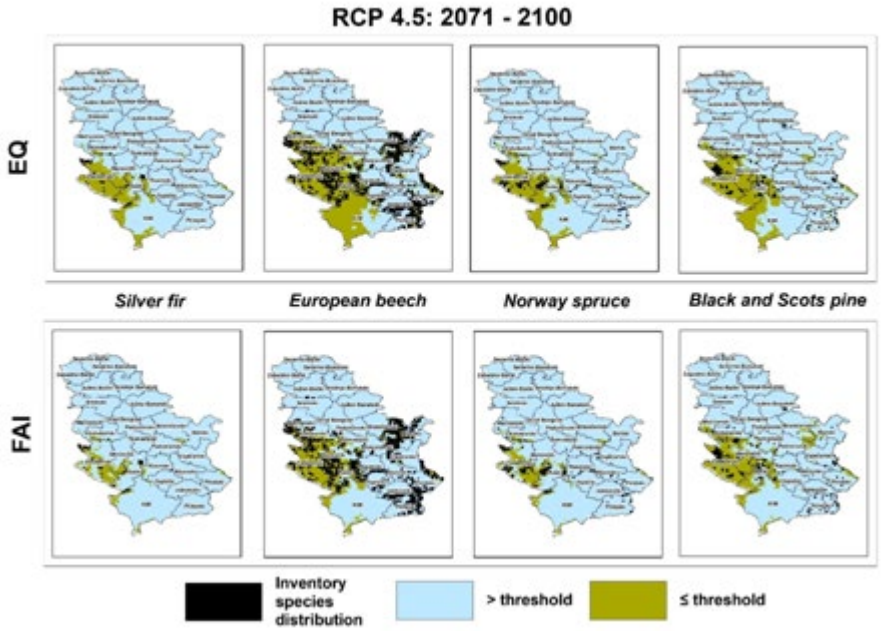

Figure 3. Areas favorable for the growth of fir, beech, spruce and pine trees between 2071-2100 according to RCP 4.5 scenario with indicated administrative districts; black indicates the current distribution of the species, blue unfavorable habitats, and green favorable habitats for a specific species (Miletić, Stojanović et al., in press)

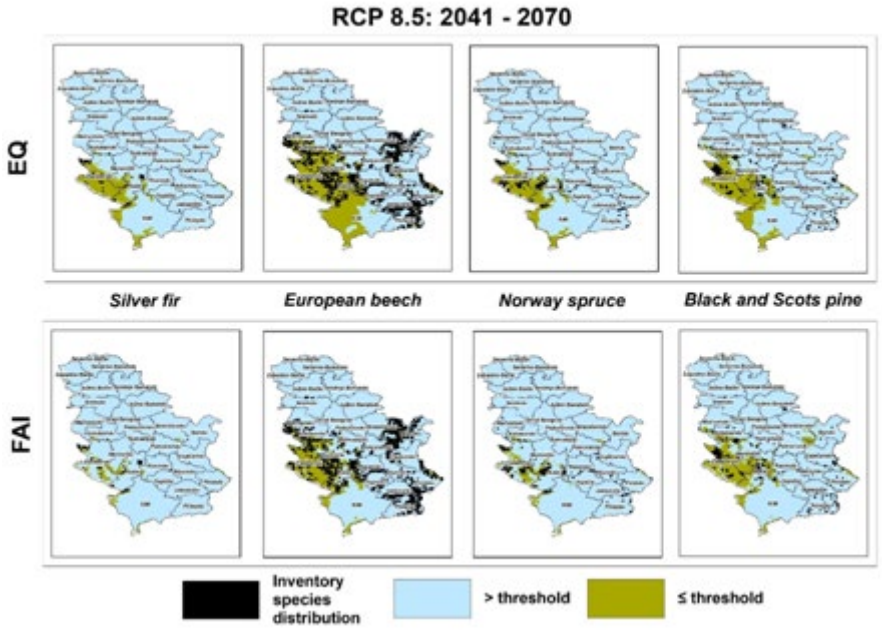

Figure 4. Areas favorable for the growth of fir, beech, spruce and pine trees between 2041-2070 according to RCP 8.5 scenario with indicated administrative districts; black indicates the current distribution of the species, blue unfavorable habitats, and green favorable habitats for a specific species (Miletić, Stojanović et al., in press)

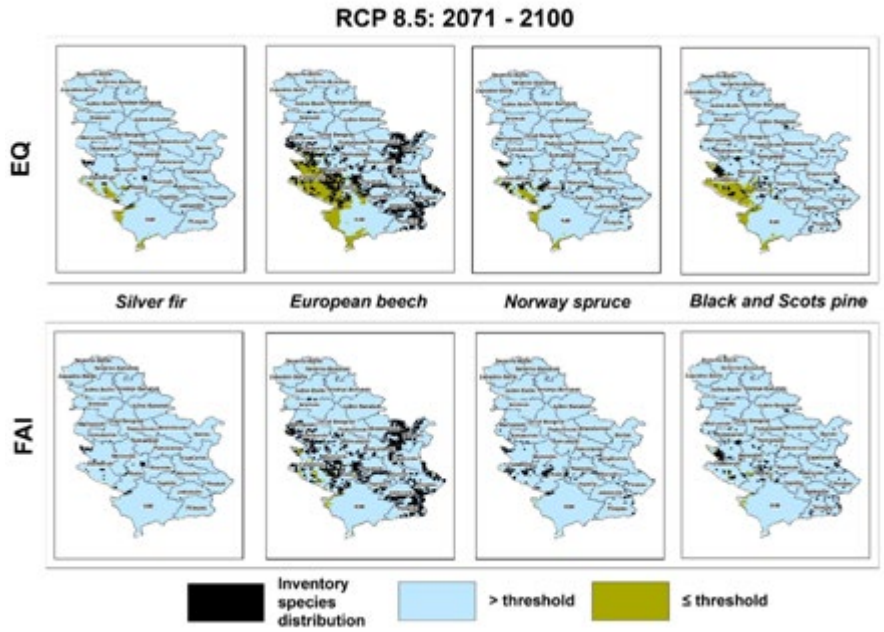

Figure 5. Areas favorable for the growth of fir, beech, spruce and pine trees between 2071-2100 according to RCP 8.5 scenario with indicated administrative districts; black indicates the current distribution of the species, blue unfavorable habitats, and green favorable habitats for a specific species (Miletić, Stojanović et al., in press)

There are five statistical regions in the Republic of Serbia: Vojvodina, Belgrade, Šumadija and Western Serbia, Southern and Eastern Serbia and Kosovo and Metohija. This division by statistical regions are suitable when making Development Plans of forest areas. There are 29 administrative districts in the Republic of Serbia. Areas managed by forest holdings as a whole within large public enterprises often coincide with administrative districts, and in that sense the data from this report can be important for their work and management planning at the level of management units.

Estimate forstatistical regions

The least suitable conditions for forest ecosystems are expected to be found inboth Vojvodina and Belgrade. The biggest changes in the suitability of current habitat conditions for forest species are most likely to be found in Southern and Eastern Serbia, where large areas are covered in forests, while Šumadija and Western Serbia will be the least affected by climate change in the context of its impact on forestry. Kosovo and Metohija will be more affected by the impact of climate change on forestry compared with the average statistical region in various districts of the Republic of Serbia(Tables 1 and 2).

Estimate for administrative districts

West Bačka, **North Bačka**, **Central Banat** and **North Banat** districts are characterized bytheexisting low percentage of forested area, absence of noise, as well as by the arid climate both in the present and the future, so they can be considered as very unfavorable for growth or viability of

forests in the future (from near future to the end of the century), which willhamper efforts to raise new forests[1] (Tables 1 and 2; Figures 1-9, Annex 1).

Jablanica, **South Banat**, **South Bačka**, **Srem**, **Belgrade**, **Podunavlje** and **Pčinja districts** can expect a decrease in forest vitality and reduction of forest cover in the near future (next 50 years) and even more in the second half of the 21st century (Figures 1-9, Annex 1).

Bor, **Braničevo**, **Zaječar**, **Mačva**, **Nišava**, **Pirot**, **Pomoravlje**, **Rasina**, **Kolubara**, **Toplica** and **Šumadija districts** can expect a significant decrease in forest vitality and reduction of forest cover in the long run,i.e. in the second half of the21stcentury (Figures 1-9 , Annex 1).

Zlatibor, **Moravica** and **Raška districts** can expect relatively favorable conditions for forest growth and vitality by the end of the century (Figures 1-9, Annex 1).

Existing forests will face reduced growth, reduced vitality and pronounced mortality in the long run, which is an extremely great challenge for forestry and society as a whole (Table 3).

In the next 50 years, there may be a decrease in habitat suitability as we observe different woody species and indices in the approximate range of 13 to 78 % (Table 3).

The presence of suitable habitats for fir, pine trees, beech, sessile oak, spruce and turkey oak for the expected climate of RCP 8.5 is lower by 30 to 50% compared to the RCP 4.5 scenario, which favors the fact that the intensity of climate change can be crucial for forestry in Serbia.

The reduction of suitable habitats by the end of the century can amount to approximately 25 to approximately 100%, observing the most extreme climatic conditions and the FAI index, which is more sensitive to changes in monthly temperatures and precipitation during the vegetation period. All this suggests that due to climate change an extreme reduction in the prevalence of certain wider spread forest species is likely to happen (Table 3).

1 Note: Regarding forestry and life expectancy of treesshort-term, medium-term and long-term periods can be explained as following:

- short-term – present day, near future
- medium-term – next 50 years
- long-term – period up to the end of the21stcentury

Table 3. Percentage of suitable habitats in the Republic of Serbia for fir, spruce, beech, black and white pine for the observed data and different scenarios (RCP 4.5: 2041-2070 and 2071-2100, RCP 8.5: 204 1 -20 70 and 2071-2100) based on both FAI and Ellenberg index

Forest Stand	E-OBS		RCP 4.5				RCP 8.5			
	1990-2019		2041-2070		2071-2100		2041-2070		2071-2100	
	FAI (%)	E I (%)	Δ FAI	Δ EI	Δ FAI	Δ EI	Δ FAI	Δ EI	Δ FAI	Δ EI
Fir	15.38	16.39	-37.49	-13.96	-60.23	-26.02	-77.57	-41.97	-99.84	-85.93
Spruce	38.52	49.93	-23.84	-17.39	-42.47	-27.14	-55.06	-41.40	-94.16	-71.45
Beech	17.65	17.94	-34.12	-13.41	-56.55	-24.93	-72.19	-41.09	-99.68	-82.84
Black and White Pine	29.16	27.48	-23.10	-16.13	-43.54	-27.29	-57.02	-42.96	-97.38	-75.21

Δ - relative difference between suitable habitats based on observed data and climate change scenarios

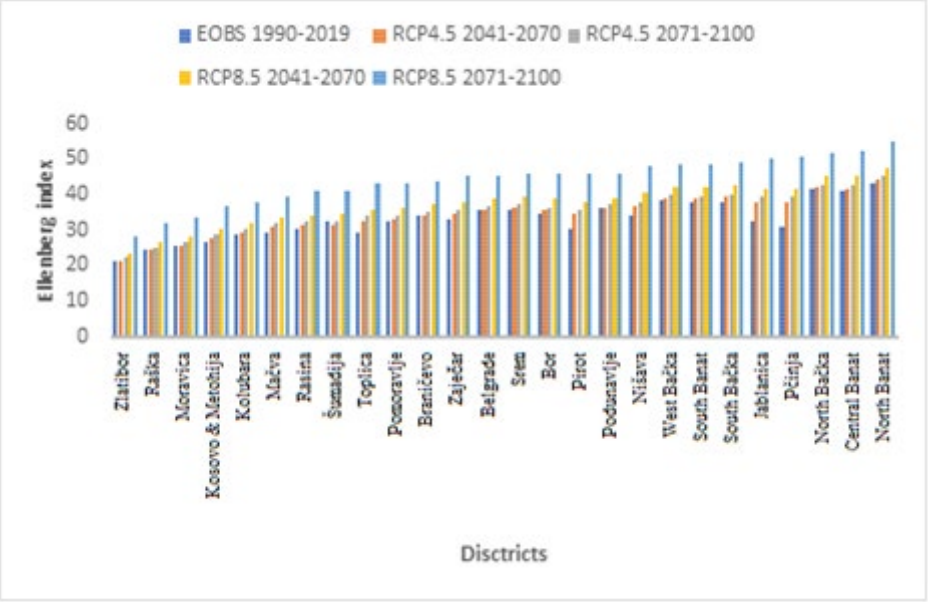

Figure 6. Ellenberg index on the territory of administrative districts in the Republic of Serbia and Kosovo and Metohija sorted out from the most favorable to the most unfavorable conditions for forest growth and vitality by the end of the 21st century

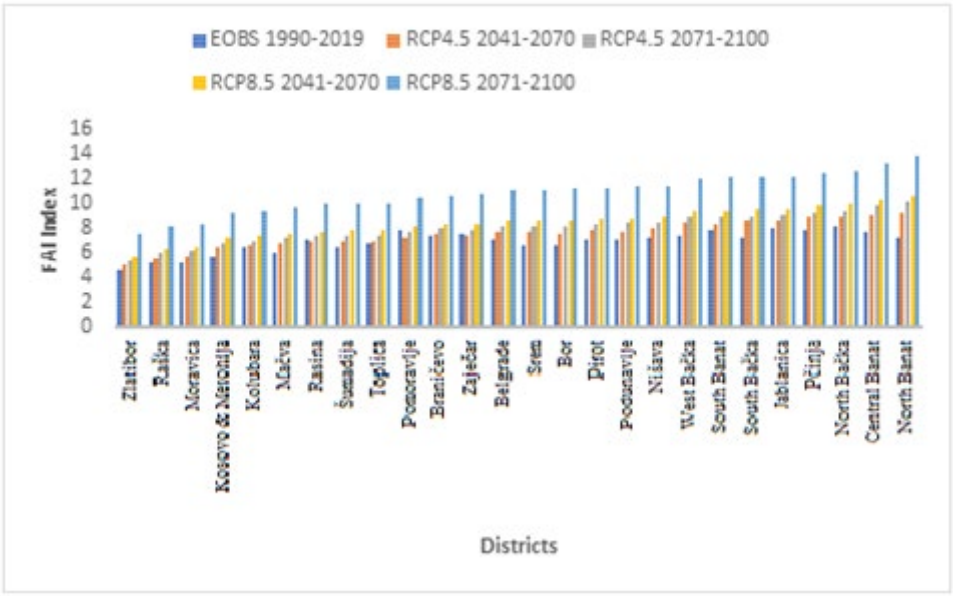

Figure 7. FAI index on the territory of administrative districts in the Republic of Serbia and Kosovo and Metohija sorted out from the most favorable to the most unfavorable conditions for forest growth and vitality by the end of the 21st century

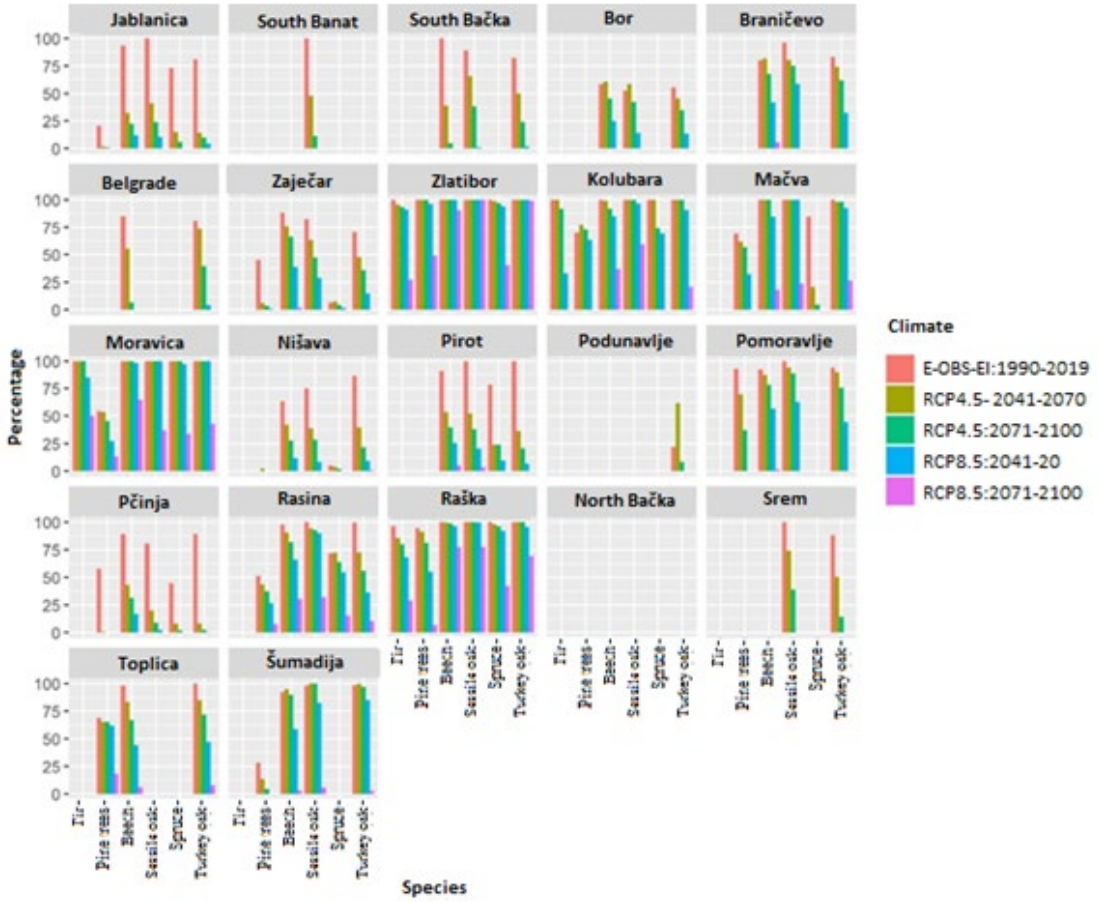

Figure 8. The percentage of suitable habitats (vertical axis) for fir, pine trees, beech, sessile oak, spruce and turkey oak (horizontal axis) by administrative districts in measured and expected climatic conditions presented by the Ellenberg index (E-OBS-EI:1990-2019, RCP4.5- 2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species in a particular district, while the color indicates one of the five climatic periods and scenarios.

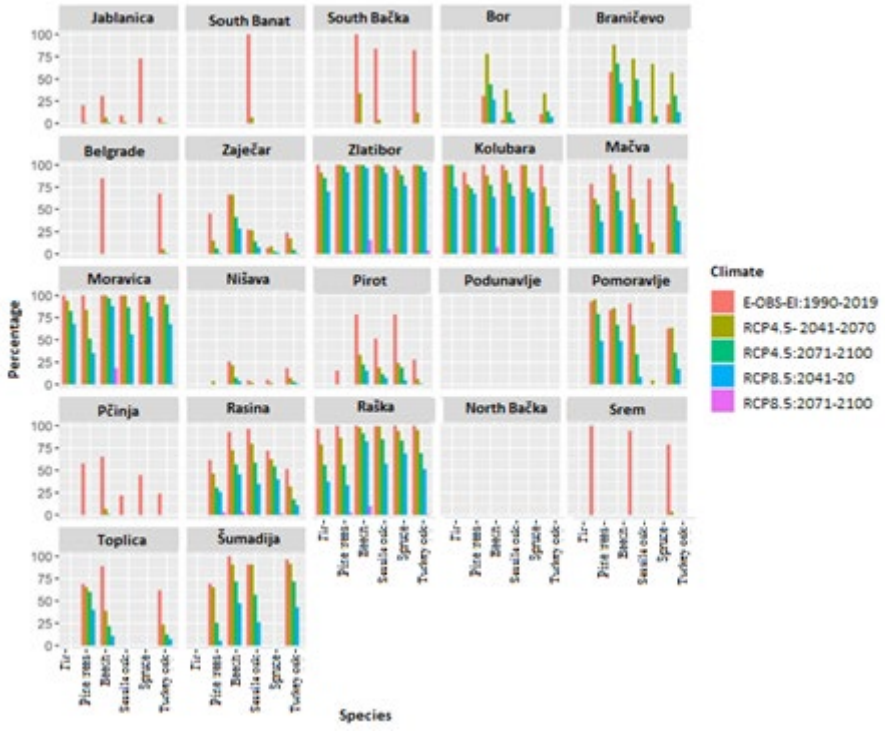

Figure 9. The percentage of suitable habitats (vertical axis) for fir, pine trees, beech, sessile oak, spruce and turkey oak (horizontal axis) by administrative districts in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5- 2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species in a particular district, while the color indicates one of the five climatic periods and scenarios.

Adaptation measures

Measure	Indicators
1. Planting new forests in the districts most endangered by climate change and by absence of forest cover by using species more resistant to drought (turkey oak, downy oak, hedge maple, hornbeam, nettle oak, false acacia, etc.) (D)	**1.1** Inclusion of a new budget line "Afforestation with Forest Reproductive Material Adapted to Climate Change" of the Budget Fund for Forests of the Republic of Serbia and the Budget Fund for Forests of the Autonomous Province for raising 4000000 m² of forests per year to cover the full cost of planting and care between 2022-2031.
2. Possible change of species and genetic structure of forest treesby using different provenances and less sensitive genotypes to the expected change of climatic conditions (especially in the lowland parts of Vojvodina, Belgrade, Southern and Eastern Serbia (S).	**1.2** 4000000 m² of forest planted each year in the districts of the lowest rate of forestation and the expected significant impact of climate change (North Banat, North Bačka, Central Banat, South Banat, South Bačka, West Bačka, Podunavlje) between 2022-2031.
3. Research and monitoring of the impact of climate change on forests. (D)	**2.1** Amended Law on Reproductive Material of Forest Trees in such a way as to allow the use of forest reproductive material of known origin for planting of new forests in order to adapt to climate change with an approval of the Ministry.
4. Creating new parks based on species adapted to climate changes in majorcities of all districts with less than 20% of forestation (North Banat, North Bačka, Central Banat, South Banat, South Bačka, West Bačka, Srem, Podunavlje and Belgrade regions), which are significantly influenced by climate change (K)	**3.1** The inclusion of a new budget line "A study on the impact of climate change on forests within the Budget Fund for Forests of the Republic of Serbia and the Budget Fund for Forests of the autonomous region in the amount of 15 million RSD per year used for research and development projects of monitoring growth and microclimate conditions on 15 typical forest habitats between 2022-2030.
	4.1 A newly built park larger than 50000 m² based on species adapted to drought (turkey oak, downy oak, hornbeam, hedge maple, nettle oak, false acacia, etc.) in the following cities: Kikinda, Subotica, Zrenjanin, Vršac, Novi Sad, Sombor, Sremska Mitrovica, Smederevo and Belgrade, by 2025.

K – short-term, S – medium-term, D – long-term

Annex 1 - Distribution of suitable habitats for fir, pine trees, beech, sessile oak, spruce and turkey oak by administrative districts based on both theFAI and Ellenberg index for observed data and future climate scenarios.

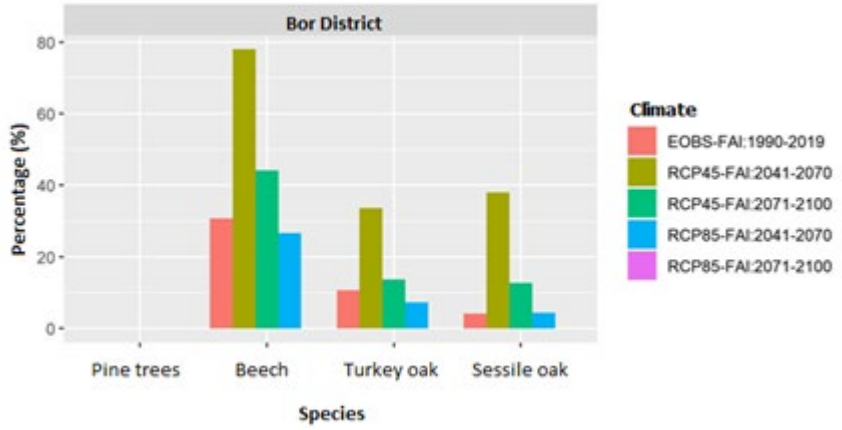

Figure 10. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak and sessile oak (horizontal axis) for Bor administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

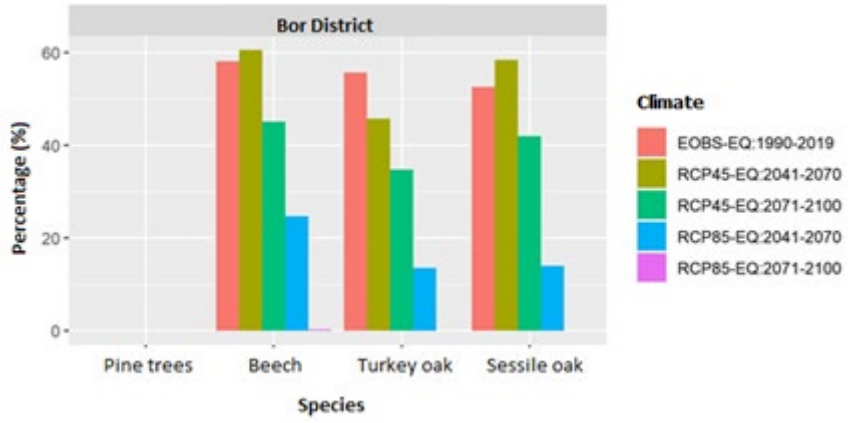

Figure 11. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak and sessile oak (horizontal axis) for Bor administrative district in measured and expected climatic conditions presented by the Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5: 2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

BRANIČEVO DISTRICT

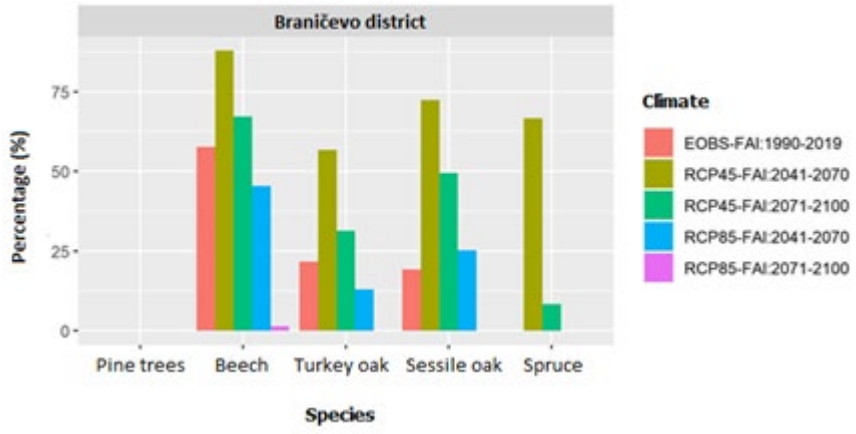

Figure 12. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce (horizontal axis) for Braničevo administrative district in measured and expected climatic conditions presentedby the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

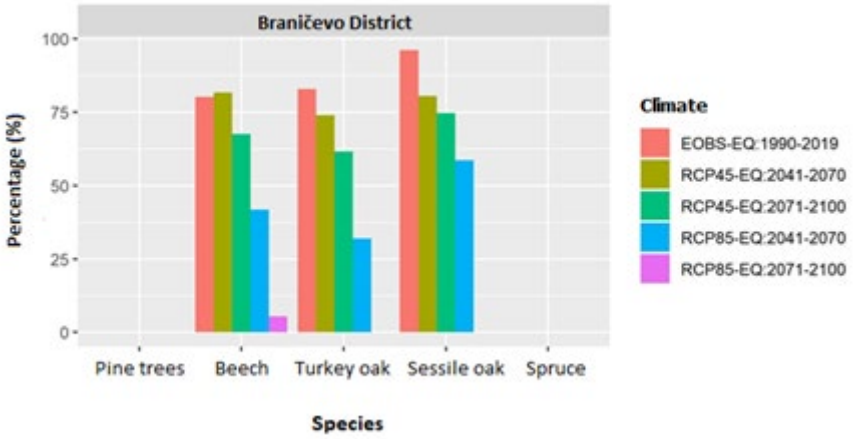

Figure 13. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce (horizontal axis) for Braničevo administrative district in measured and expected climatic conditions presented by the Ellenberg index (E-OBS-EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

BELGRADE DISTRICT

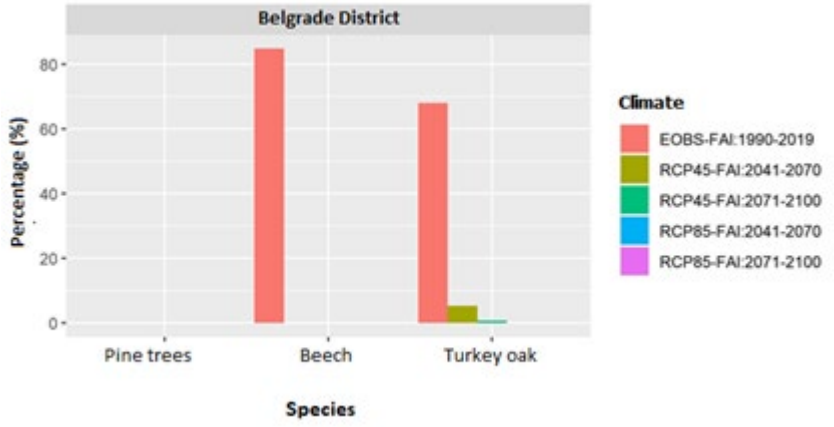

Figure 14. Percentage of suitable habitats (vertical axis) for pine trees, beech and turkey oak, sessile oak and spruce (horizontal axis) for Belgrade district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4. 5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5: 2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

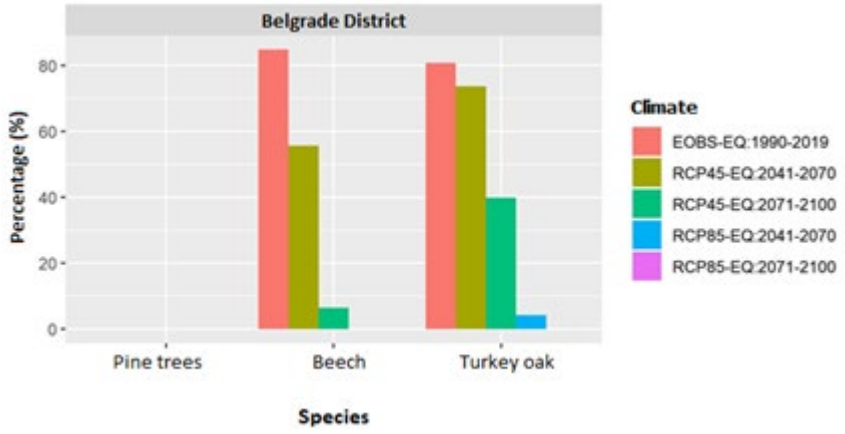

Figure 15. Percentage of suitable habitats (vertical axis) for pine trees, beech and turkey oak (horizontal axis) for Belgrade in measured and expected climatic conditions present ed by the Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5: 2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

ZAJEČAR DISTRICT

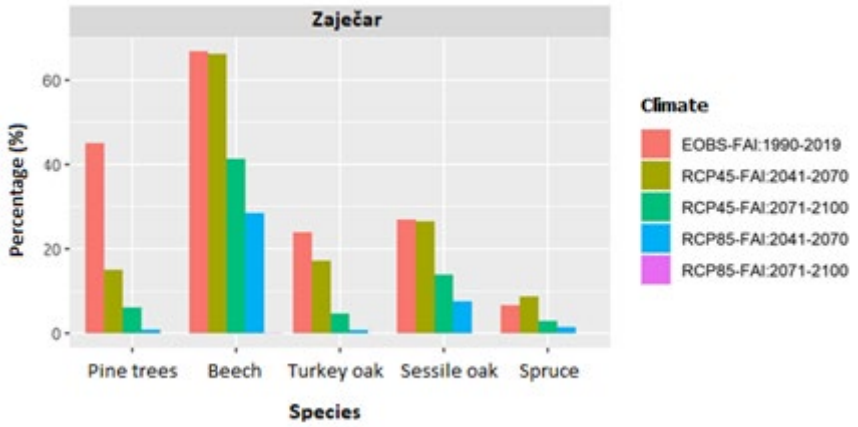

Figure 16. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce (horizontal axis) for Zaječar administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

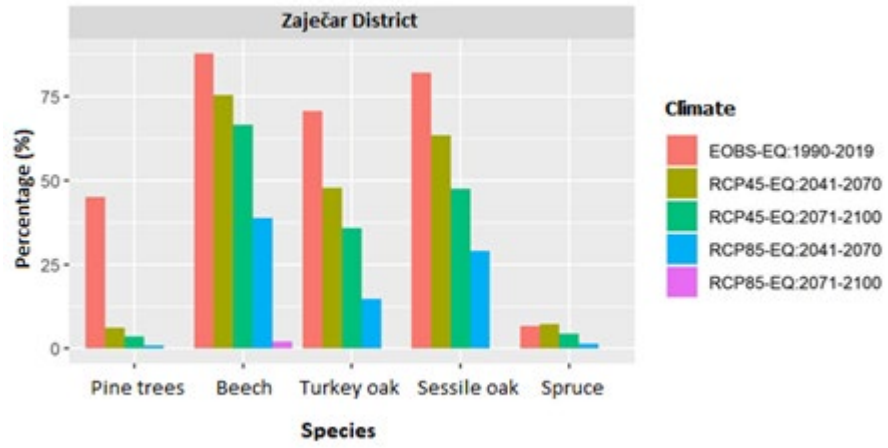

Figure 17. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce (horizontal axis) for Zaječar administrative district in measured and expected climatic conditions presentedby the Ellenberg index (E-OBS- EQ:1990-2019, RCP 4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

ZLATIBOR DISTRICT

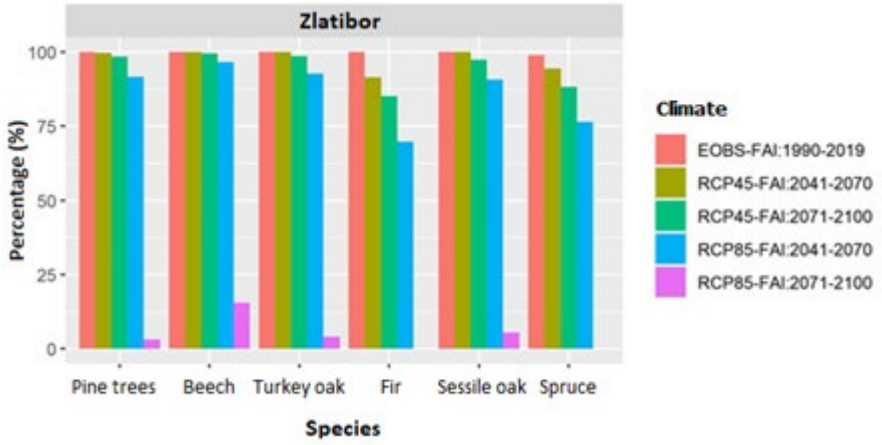

Figure 18. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce (horizontal axis) for Zlatibor administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5: 2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

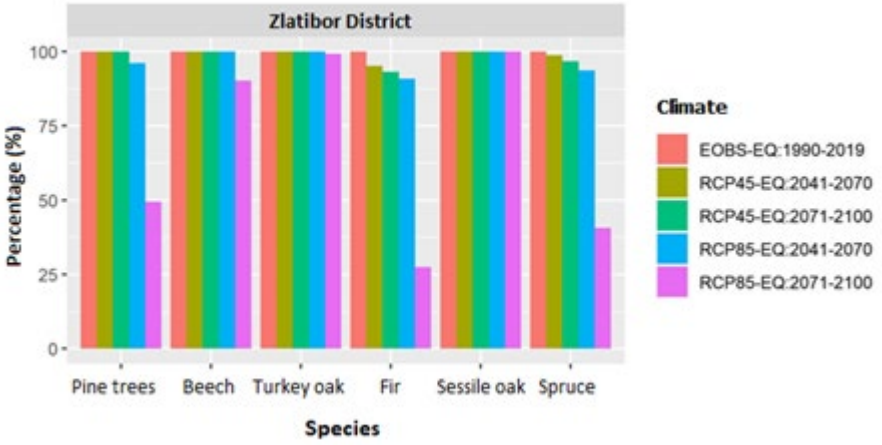

Figure 19. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce (horizontal axis) for Zlatibor administrative district in measured and expected climatic conditions presentedby the Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5: 2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

JABLANICA DISTRICT

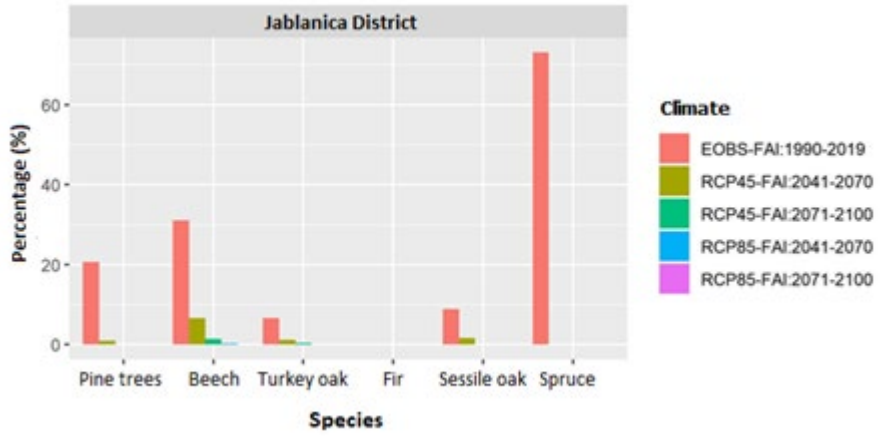

Figure 20. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce (horizontal axis) for Jablanica administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

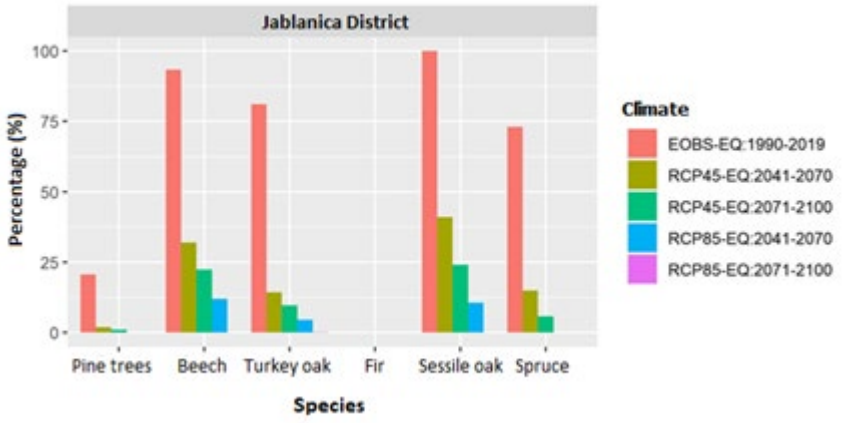

Figure 21. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce (horizontal axis) for Jablanica administrative district in measured and expected climatic conditions presented by the Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

SOUTH BANAT DISTRICT

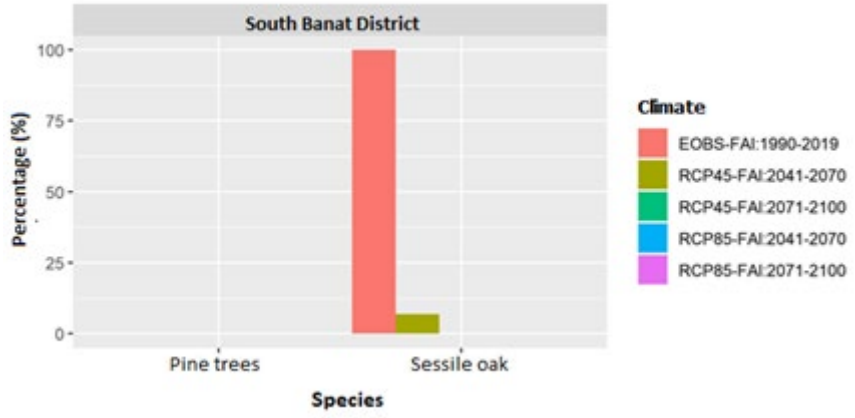

Figure 22. The percentage of suitable habitats (vertical axis) for pine trees and sessile oak (horizontal axis) for South Banat administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

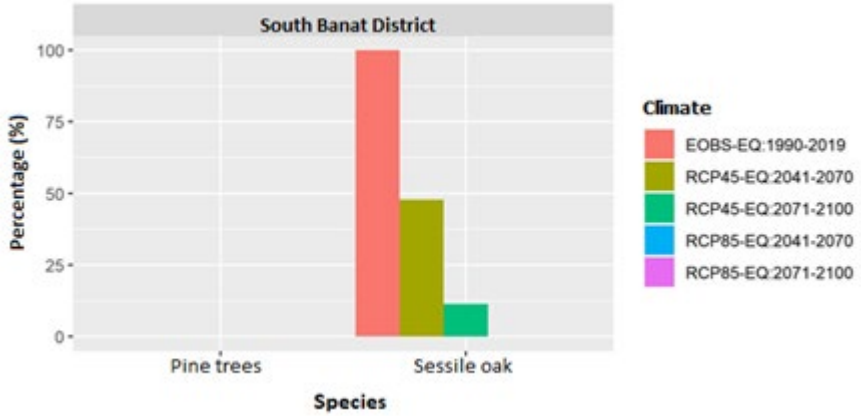

Figure 23. Percentage of suitable habitats (vertical axis) for pine trees and sessile oak (horizontal axis) for South Banat administrative district in measured and expected climatic conditions presented bythe Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

SOUTH BAČKA DISTRICT

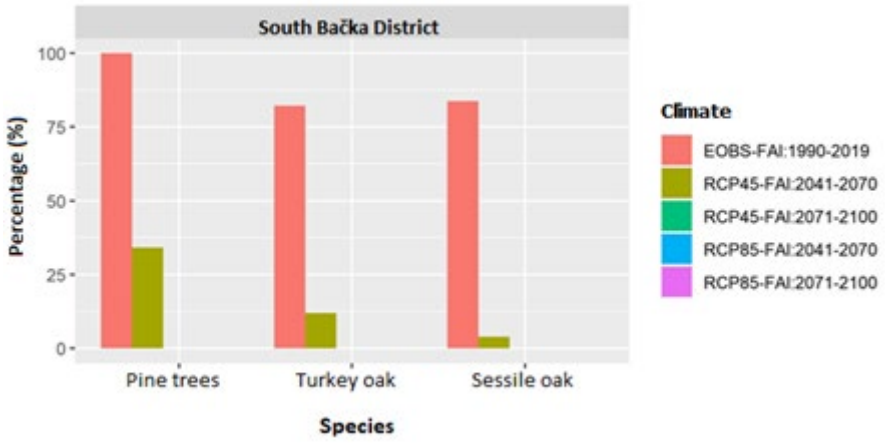

Figure 24. Percentage of suitable habitats (vertical axis) for beech, turkey oak and sessile oak (horizontal axis) for South Bačka administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

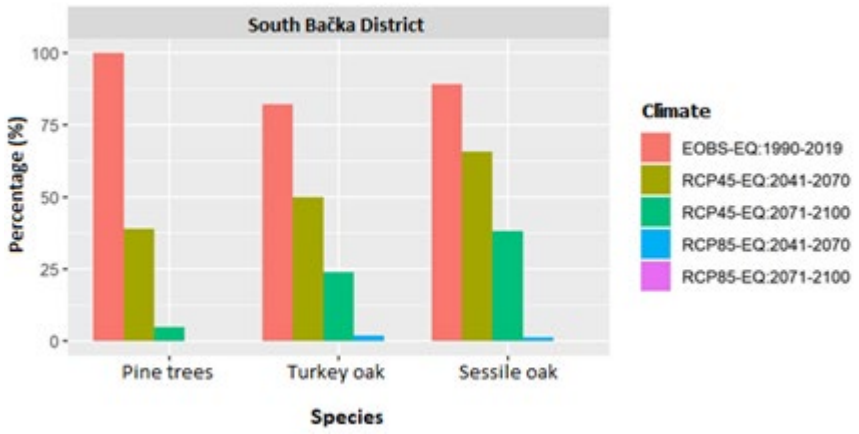

Figure 25. The percentage of suitable habitats (vertical axis) for beech, turkey oak and sessile oak (horizontal axis) for South Bačka administrative district in measured and expected climatic conditions presented by the Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041 -2070, RCP4.5: 2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

KOLUBARA DISTRICT

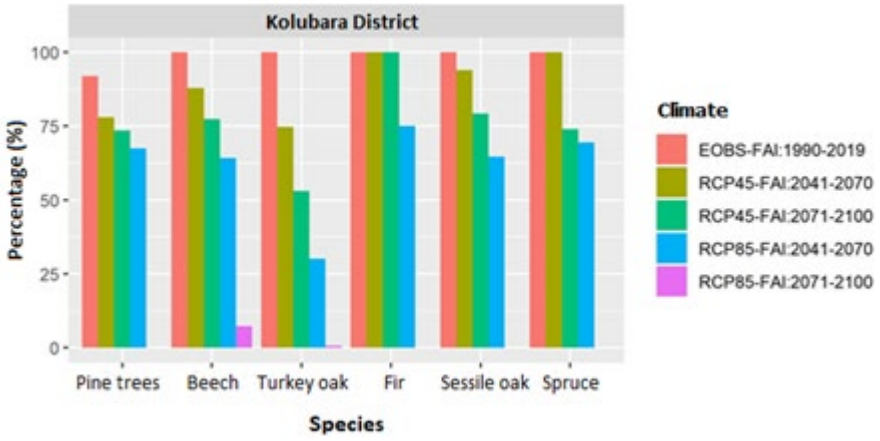

Figure 26. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce (horizontal axis) for Kolubara administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

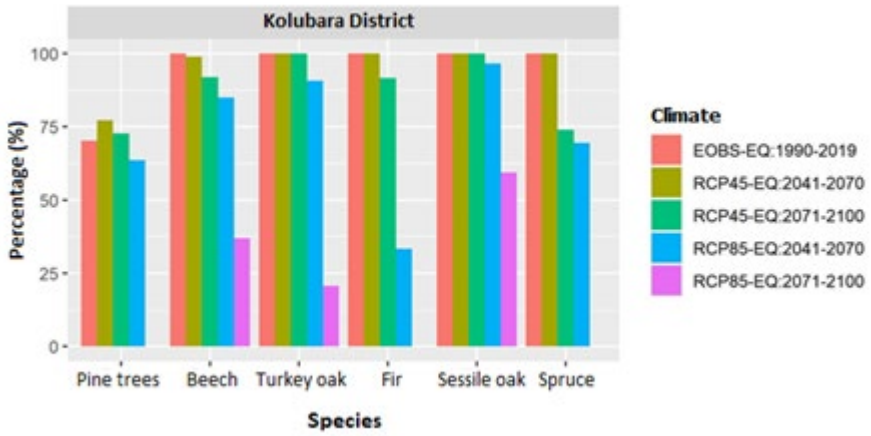

Figure 27. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce (horizontal axis) for Kolubara administrative district in measured and expected climatic conditions presented bythe Ellenberg index (E-OBS-EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

MAČVA DISTRICT

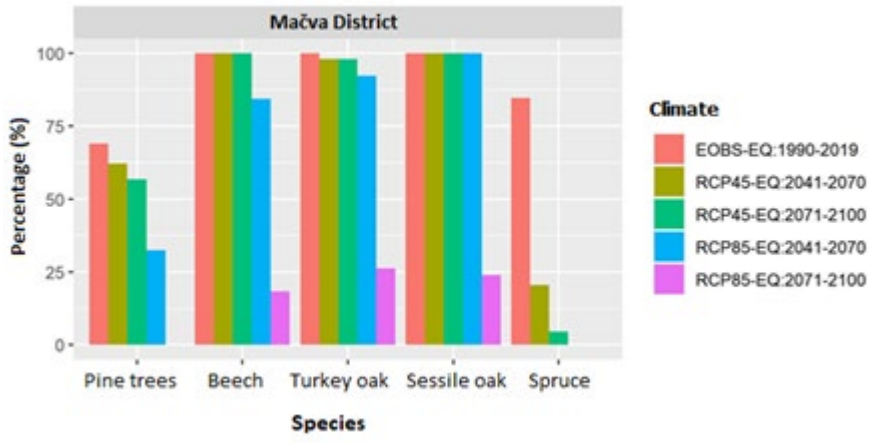

Figure 28. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce (horizontal axis) for Mačvaadministrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

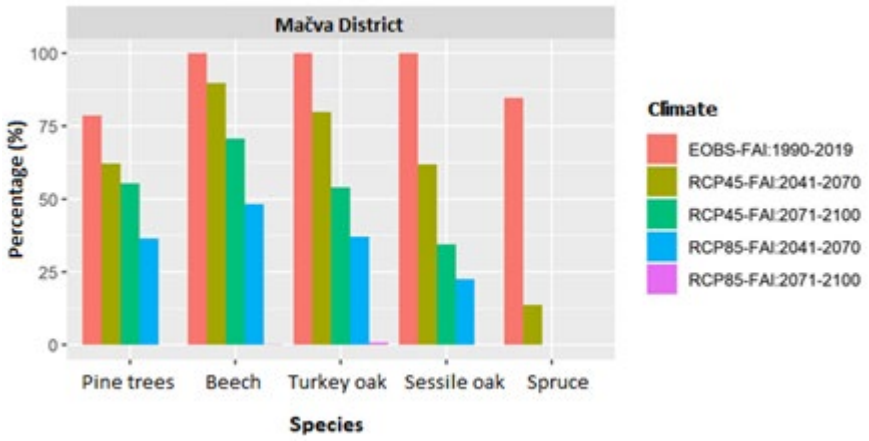

Figure 29. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce (horizontal axis) for Mačva administrative district in measured and expected climatic conditions presented by the Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

MORAVICA DISTRICT

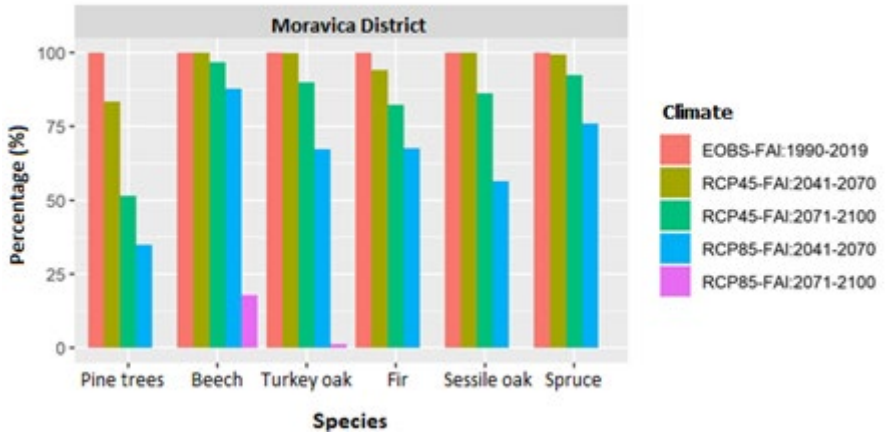

Figure 30. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce (horizontal axis) for Moravica administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5: 2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

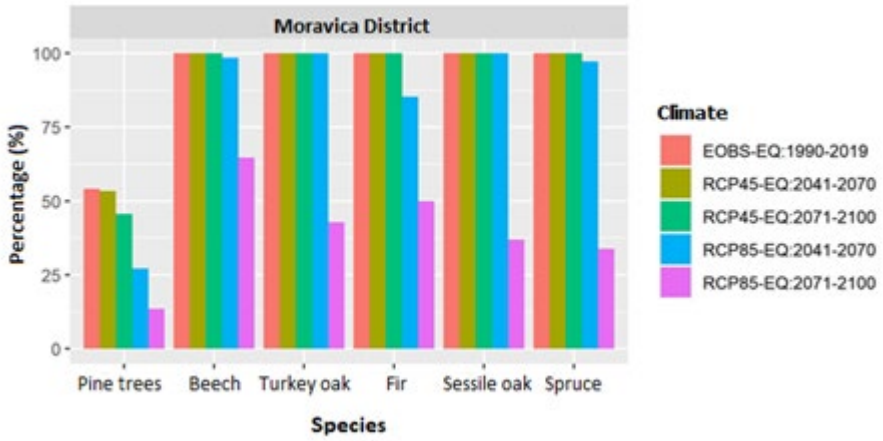

Figure 31. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce (horizontal axis) for Moravica administrative district in measured and expected climatic conditions presented bythe Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

NIŠAVA DISTRICT

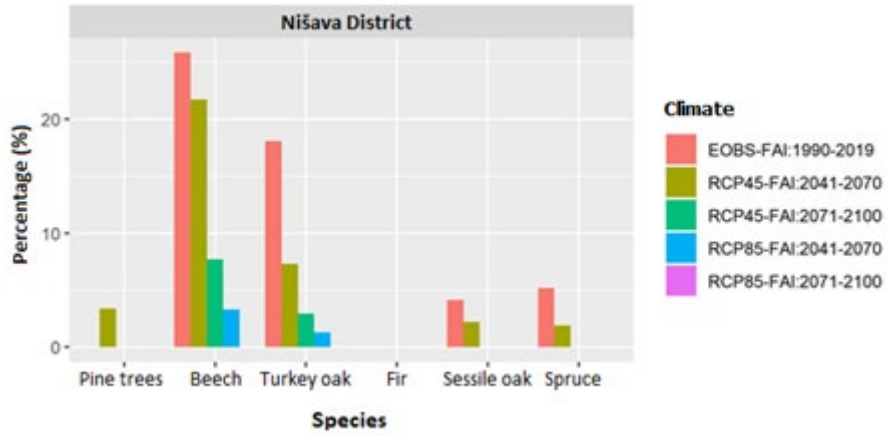

Figure 32. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce (horizontal axis) for Nišava administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

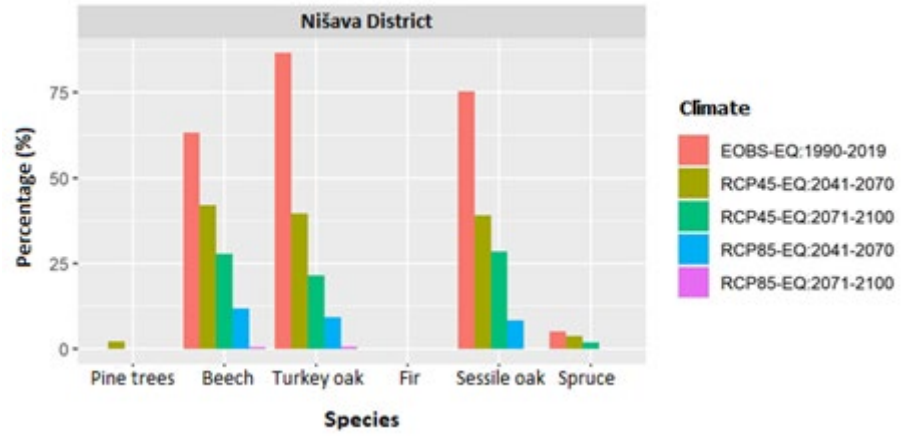

Figure 33. Percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce (horizontal axis) for Nišava administrative district in measured and expected climatic conditions presented by the Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

PIROT DISTRICT

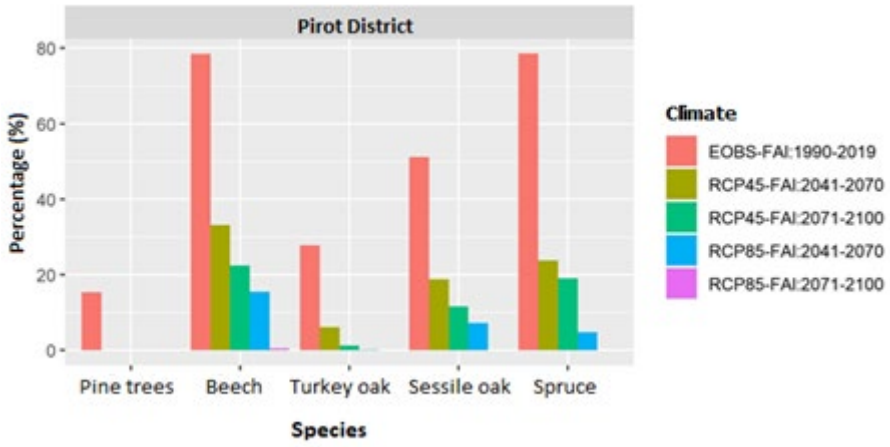

Figure 34. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce (horizontal axis) for Pirot administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

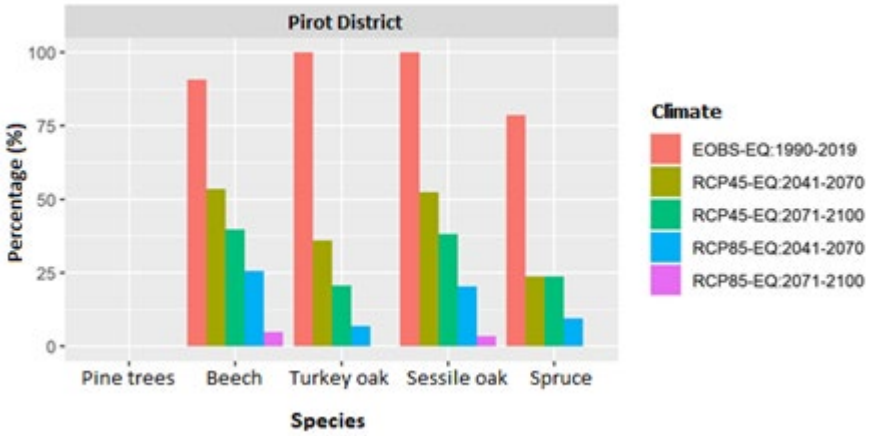

Figure 35. Thepercentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce (horizontal axis) for Pirot administrative district in measured and expected climatic conditions presented by the Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

PODUNAVLJE DISTRICT

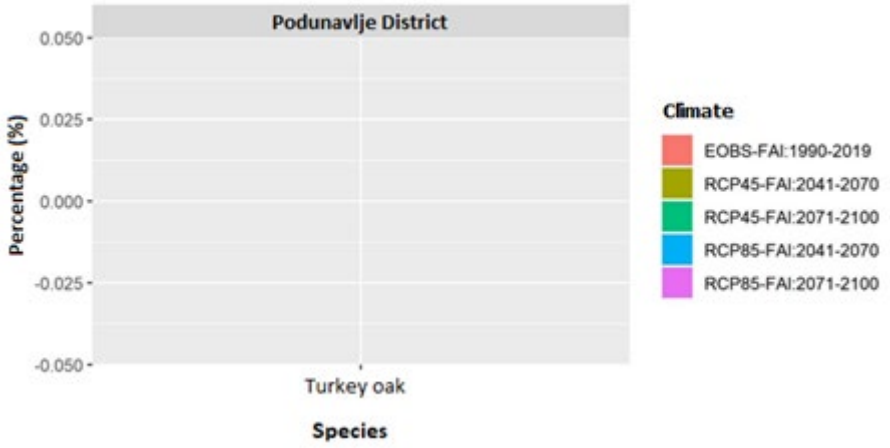

Figure 36. The percentage of suitable habitats (vertical axis) for turkey oak for Podunavlje administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

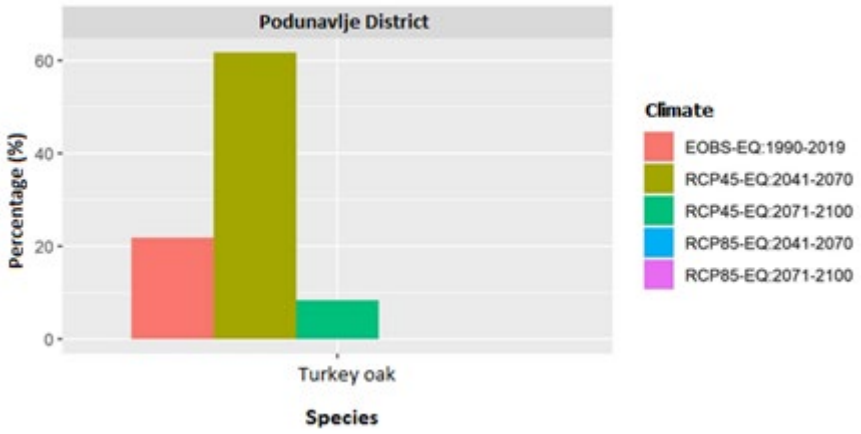

Figure 37. The percentage of suitable habitats (vertical axis) for turkey oak for Podunavlje administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071 -2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

POMORAVLJE DISTRICT

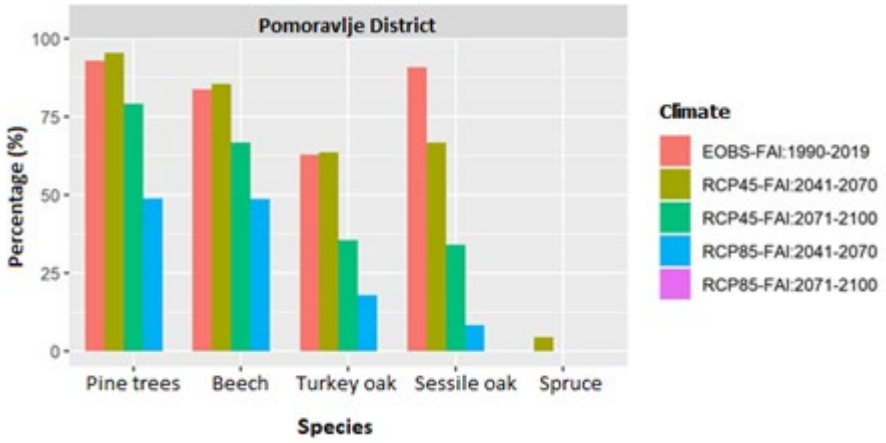

Figure 38. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce for Pomoravlje administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

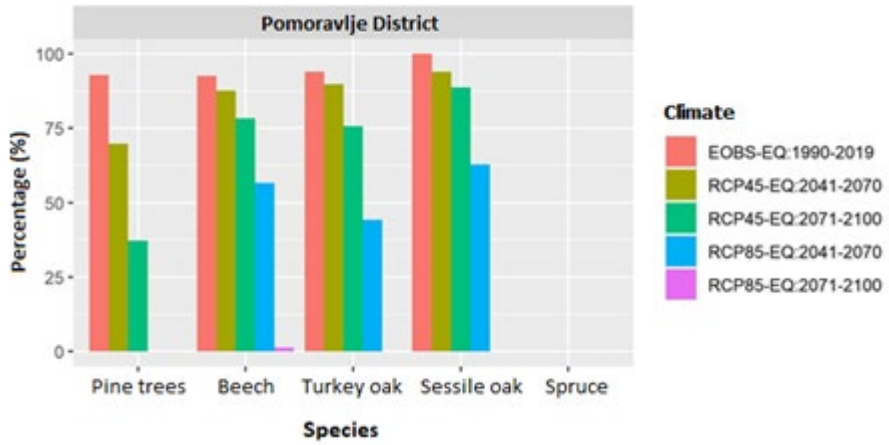

Figure 39. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce for Pomoravlje administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

PČINJA DISTRICT

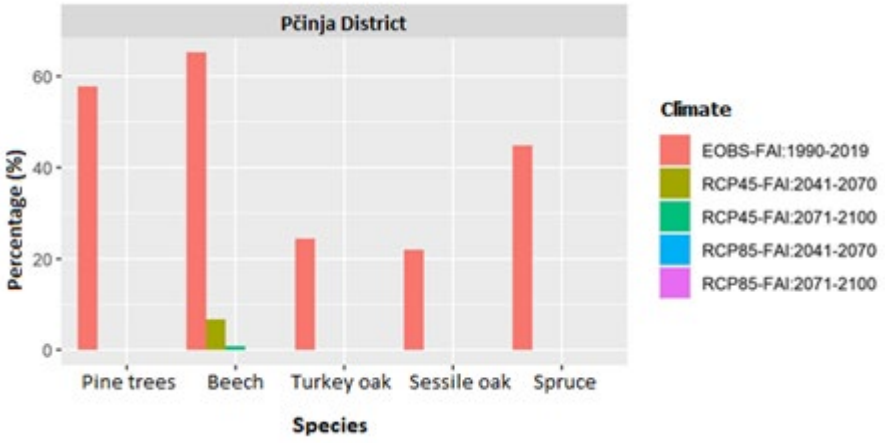

Figure 40. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and sprucefor Pčinja administrative district in measured and expected climatic conditions presentedby the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

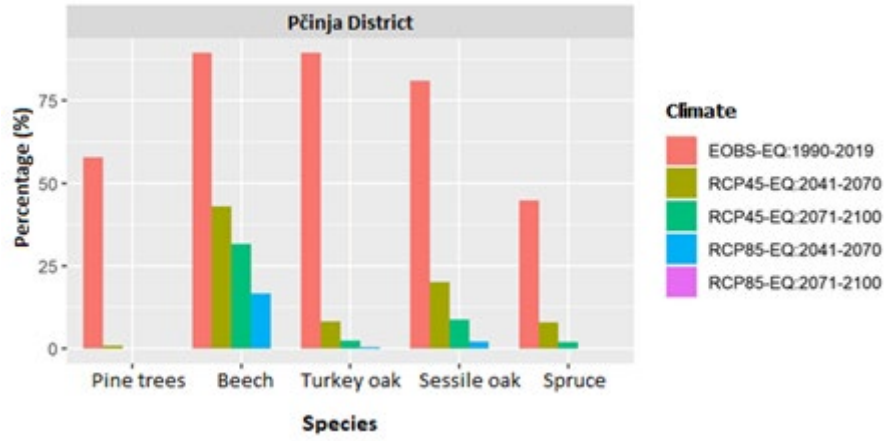

Figure 41. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce for Pčinja administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5: 2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

RASINA DISTRICT

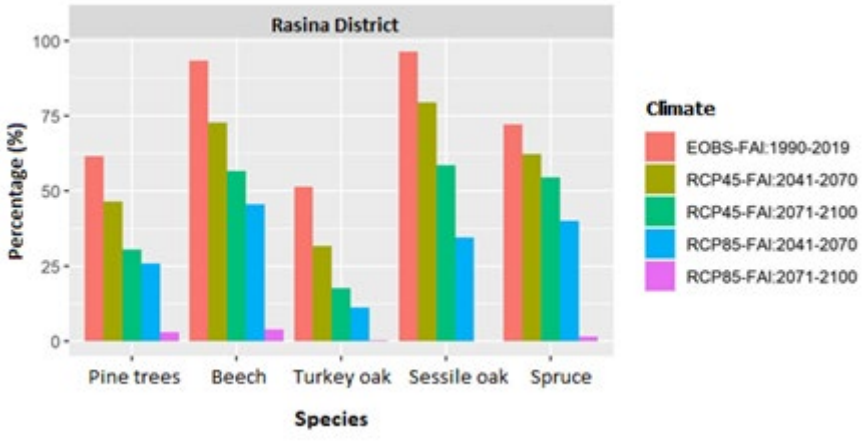

Figure 42. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce for Rasina administrative district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

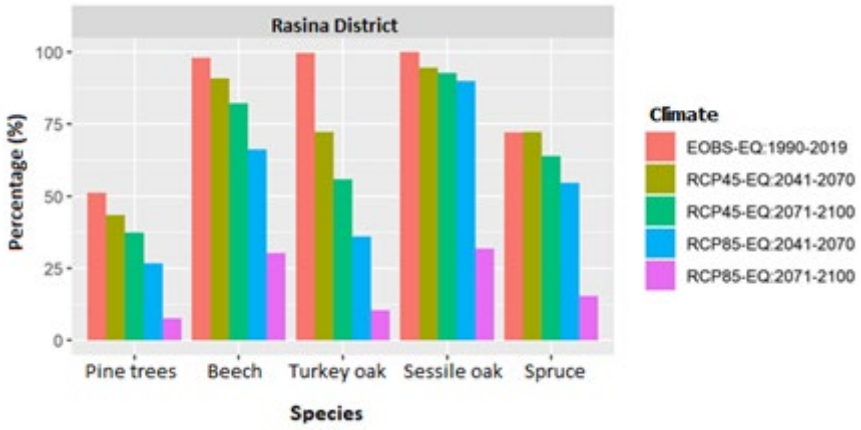

Figure 43. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce for Rasina administrative district in measured and expected climatic conditions presented by the Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041- 2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

RAŠKA DISTRICT

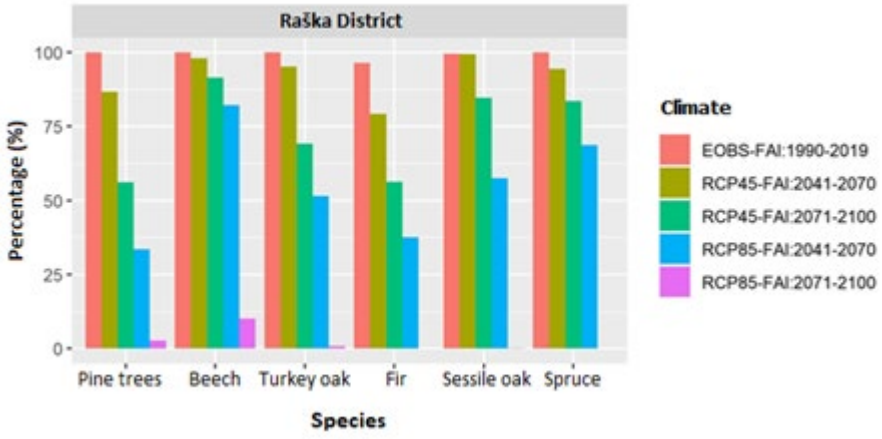

Figure 44. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce for Raška administrativedistrict in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5: 2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

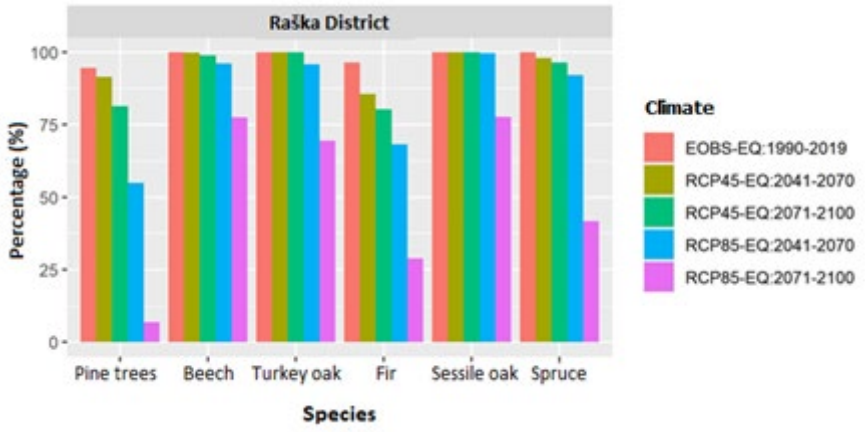

Figure 45. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, fir, sessile oak and spruce for Raška administrativedistrict in measured and expected climatic conditions presented bythe Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

SREM DISTRICT

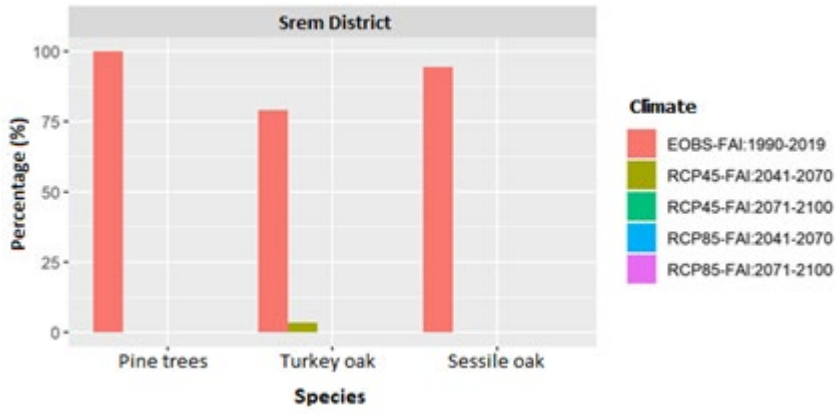

Figure 46. The percentage of suitable habitats (vertical axis) for pine trees, turkey oak and sessile oak for Sremadministrativedistrict in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5: 2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

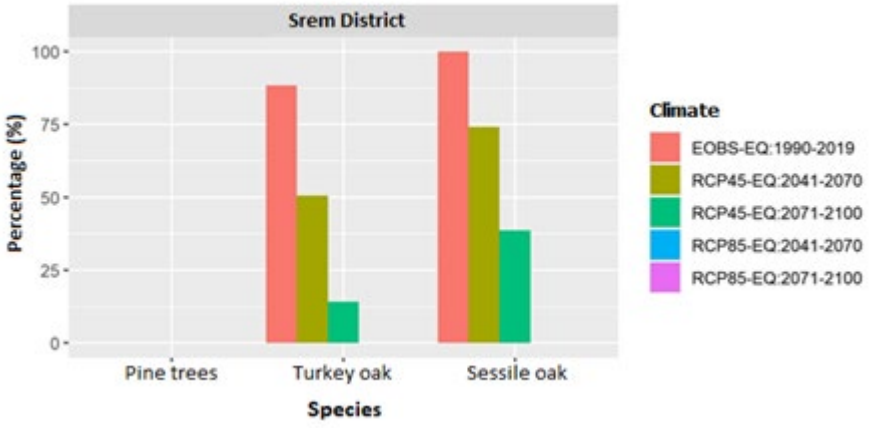

Figure 47. The percentage of suitable habitats (vertical axis) for pine trees, turkey oak and sessile oak for Sremadministrative district in measured and expected climatic conditions presented by the Ellenberg index (E-OBS- EQ:1990-2019, RCP 4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

TOPLICA DISTRICT

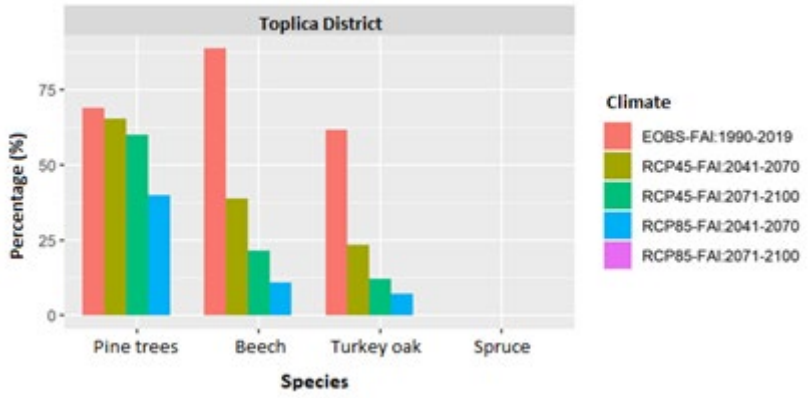

Figure 48. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak and spruce for Toplica district in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

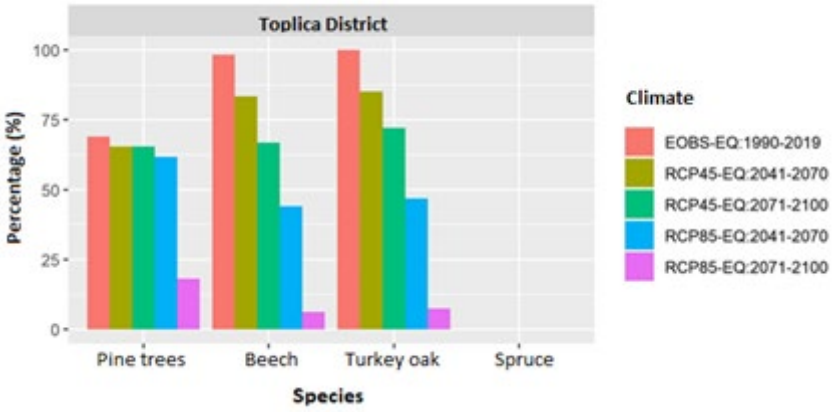

Figure 49. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak and spruce for Toplica administrative district in measured and expected climatic conditions presented by the Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5: 2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

ŠUMADIJA DISTRICT

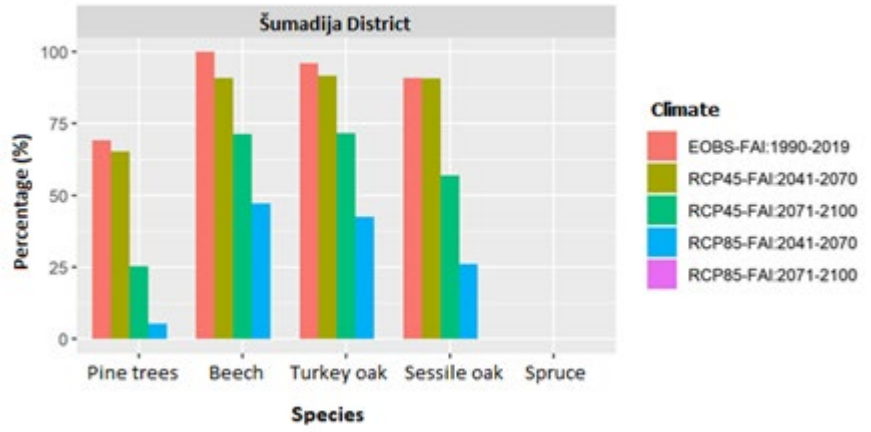

Figure 50. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce for Šumadija administrativedistrict in measured and expected climatic conditions presented by the FAI index (E-OBS-FAI:990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

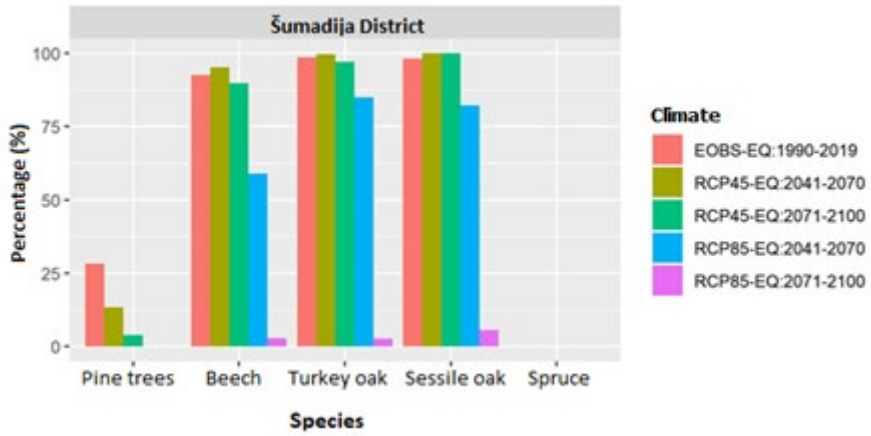

Figure 51. The percentage of suitable habitats (vertical axis) for pine trees, beech, turkey oak, sessile oak and spruce for Šumadija administrative district in measured and expected climatic conditions presented bythe Ellenberg index (E-OBS- EQ:1990-2019, RCP4.5-2041-2070, RCP4.5:2071-2100, RCP8.5:2041-2070, RCP8.5:2071-2100). The height of the pillars indicates the percentage of suitable habitats for a particular species, while the color indicates one of the five climatic periods and scenarios.

Proposed Adaptation Measures

Name of activity / measure: Planting new forests		
Description of activities / measures	Planting new forests in the districts most endangered by climate change and the absence of forest cover using species more resistant to drought (turkey oak, downy oak, horn-beam, field maple, nettle trees, false acacia, etc.) (D)	
Type of measure	Policies	
	Financial	X
	Technological / Infrastructural	
	Capacity Building / Training	
	Preventive measure	
	Elimination of consequences	X
Measure status	**Planned**	
Content and link to other measures	For a measure to be entirely feasible it is necessary to enable change of species and genetic structure of forest trees by using different provenances and less susceptible genotypes	
Basis for activity / measure	Forest Act SPATIAL PLAN OF THE REPUBLIC OF SERBIA from 2021 to 2035 Decree on determining the Annual Program for the Use of Funds from the Budget Fund for Forests of RS and APV	
Period of implementation of activities / measures		
Potential problems and obstacles	State the reasons that could affect the implementation of the planned activities / measures	
Institution(s) responsible for the measure	Preparation	Ministry of Agriculture, Forestry and Water Management
	Implementation	Ministry of Agriculture, Forestry and Water Management
	Monitoring	Ministry of Agriculture, Forestry and Water Management
Expected investments in the preparation and development of measures	/	
Funds required for the implementation of measures	4000000m² x 400 thousand RSD = 160 million RSD per year	

Source of funding in the reporting year (if there are several sources, indicate the percentages)	Local government budget and sector (specify budget line)	/
	National Budget- Forest Fund	160 million RSD / per year
	Private investment	/
	Donation (name the institution)	/
	Credit	/
Duration of the results of activity / measure (indicate the time period in which it will be necessary to repeat the activity / measure)	Up to 5 years	
	5-15 years	X
	Over 15 years	
Additional benefits	For example. areas that are protected from floods, the number of protected citizens, the number of protected households, etc.	
Link to GHG emission reductions	Indirectly, through carbon sequestration.	
Indicators	Initial value (specify unit)	Current situation
	Target value (last year if multi-year) (specify unit)	Raised 4000000 m² forests each year in the districts with the lowest afforestation rate and expected significant impact on climate change (North Banat, North Bačka, Central Banat, South Banat, South Bačka, West Bačka, and Podunavlje regions) in the period 2022-2031 (total of 40000000 m² of forests).
	Achieved value (specify unit)	/
	Describe the methodology used to monitor and check the quality of the data or attach links in the following cell	Annual monitoring of planting effectiveness.
Links to relevant documents, technical documentation and similar		
NOTES		

Name of activity / measure: Research on the impact of climate change on forests		
Description of activities / measures	Despite significant efforts, both research and monitoring of the impact of climate change on forests are not as developed. There is lack of sufficient knowledge regarding forests most endangered by climate change regarding specific management measures (thinning, rotation cycle, the difference between coppice and high forests and their productivity due to climate change). Inclusion of a new budget line "Research and Impact of Climate Change on Forests within the Budget Fund for Forests of the Republic of Serbia and the Budget Fund for Forests of the Autonomous Province" in the amount of 15 million dinars per year for research projects of monitoring growth and microclimatic conditions at 15 typical forest habitats for the period between 2022-2030.	
Type of measure	Policies	
	Financial	
	Technological / Infrastructural	X
	Capacity Building / Training	X
	Preventive measure	X
	Elimination of consequences	X
Measure status	**Planned** Adopted Implementation in progress Implemented Finished	
Content and link to other measures	Planting new forests or knowledge required for decision making regarding the establishment of new forests.	
Basis for activity / measure	Forests Act, Regulations of the annual program of budget use of the Fund for Forests of the Republic of Serbia and AP Vojvodina	
Period of implementation of activities / measures	2022-2030	
Potential problems and obstacles	/	
Institution(s) responsible for the measure	Preparation	Ministry of Agriculture, Forestry and Water Management
	Implementation	Scientific Institutes
	Monitoring	Ministry of Agriculture, Forestry and Water Management
Expected investments in the preparation and development of measures	/	
Funds required for the implementation of measures	RSD 15 million per year	

Source of funding in the reporting year (if there are several sources, indicate the percentages)	Local government budget and sector (specify budget line)	/
	National Budget- Forest Fund	
	Private investment	
	Donation (name the institution)	
	Credit	
Duration of the results of activity / measure (indicate the time period in which it will be necessary to repeat the activity / measure)	Up to 5 years	
	5-15 years	X
	Over 15 years	
Additional benefits	Increasing the capacity of the forestry sector knowledge wise.	
Link to GHG emission reductions	/	
Indicators	Initial value (specify unit)	/
	Target value (last year if multi-year) (specify unit)	A ten- year series of data and results from monitoring the impact of climate on typical forest ecosystems.
	Achieved value (specify unit)	/
	Describe the methodology used to monitor and check the quality of the data or attach links in the following cell	/
Links to relevant documents, technical documentation and similar		
NOTES		

Name of activity / measure: Change of species and genetic structure of forests		
Description of activities / measures	Possibility of changing species and genetic structure of forests by using different provenances and less sensitive genotypes to the expected change of climatic conditions (especially in the lowland parts of Vojvodina, Belgrade, Southern and Eastern Serbia (S).	
Type of measure	Policies	X
	Financial	
	Technological / Infrastructural	
	Capacity Building / Training	
	Preventive measure	X
	Elimination of consequences	
Measure status	**Planned** Adopted Implementation in progress Implemented Finished	
Content and link to other measures	Regarding the establishment of new forests	
Basis for activity / measure	Law on Reproductive Material of Forest Trees	
Period of implementation of activities / measures		
Potential problems and obstacles	/	
Institution(s) responsible for the measure	Preparation	Ministry of Agriculture, Forestry and Water Management
	Implementation	Ministry of Agriculture, Forestry and Water Management
	Monitoring	Ministry of Agriculture, Forestry and Water Management
Expected investments in the preparation and development of measures	/	
Funds required for the implementation of measures	/	

Source of funding in the reporting year (if there are several sources, indicate the percentages)	Local government budget and sector (specify budget line)	/
	National Budget- Forest Fund	/
	Private investment	/
	Donation (name the institution)	/
	Credit	/
Duration of the results of activity / measure (indicate the time period in which it will be necessary to repeat the activity / measure)	Up to 5 years	
	5-15 years	
	Over 15 years	X
Additional benefits	More efficient forest management.	
Link to GHG emission reductions	/	
Indicators	Initial value (specify unit)	Law on Reproductive Material of Forest Trees
	Target value (last year if multi-year) (specify unit)	The Law on Reproductive Material of Forest Trees was amended with the possibility of using forest reproductive material of known origin for raising new forests in order to adapt to climate change with the approval of the Ministry.
	Achieved value (specify unit)	/
	Describe the methodology used to monitor and check the quality of the data or attach links in the following cell	/
Links to relevant documents, technical documentation and similar	https://www.upravazasume.gov.rs/wp-content/uploads/2015/12/Zakon_o_reproduktivnom_materijal_u_sum_drv.pdf	
NOTES		

Name of activity / measure: Construction of new parks		
Description of activities / measures	Construction of new parks based on species adapted to climate change in all district capitals with less than 20% afforestation (North Banat, North Bačka, Central Banat, South Banat, South Bačka, West Bačka, Srem, Podunavlje and Belgrade) which are significantly affected by climate change (K)	
Type of measure	Policies	
	Financial	
	Technological / Infrastructural	/
	Capacity Building / Training	
	Preventive measure	
	Elimination of consequences	
Measure status	**Planned** Adopted Implementation in progress Implemented Finished	
Content and link to other measures	/	
Basis for activity / measure	SPATIAL PLAN OF THE REPUBLIC OF SERBIA from 2021 to 2035	
Period of implementation of activities / measures	2022-2025.	
Potential problems and obstacles	Lack of land	
Institution(s) responsible for the measure	Preparation	Ministry of Environmental Protection
	Implementation	Local governments / cities
	Monitoring	Faculties and Institutes
Expected investments in the preparation and development of measures	/	
Funds required for the implementation of measures	The average size of a park is 100 000 m² x 1 million = 10 million RSD per park. 9 cities in total or 90 million RSD.	

Source of funding in the reporting year (if there are several sources, indicate the percentages)	Local government budget and sector (specify budget line)		The budget of local self-governments is related to environmental protection.
	National Budget- Forest Fund		/
	Private investment		/
	Donation (name the institution)		/
	Credit		/
Duration of the results of activity / measure (indicate the time period in which it will be necessary to repeat the activity / measure)	Up to 5 years	X	
	5-15 years		
	Over 15 years		
Additional benefits	Recreational, aesthetic, spiritual role of parks.		
Link to GHG emission reductions	Carbon adoption.		
Indicators	Initial value (specify unit)	Current situation	
	Target value (last year if multi-year) (specify unit)	A newly built park larger than 50 000 m² based on species adapted to drought (turkey oak, downy oak, hornbeam, field maple, nettle trees, false acacia, etc.) in the following cities: Kikinda, Subotica, Zrenjanin, Vršac, Novi Sad, Sombor, Sremska Mitrovica, Smederevo and Belgrade, until 2025.	
	Achieved value (specify unit)	/	
	Describe the methodology used to monitor and check the quality of the data or attach links in the following cell	/	
Links to relevant documents, technical documentation and similar			
NOTES			