

PREDICTION OF SOME ASPECTS OF CLIMATE CHANGE IMPACT IN THE REPUBLIC OF SERBIA


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Abstract. *Climate change, as one of the predominant issues of contemporary society, will result in a series of adverse consequences for society and its future development. The rise in temperature represents a direct negative outcome of climate change that impacts human health, life, and the environment. Moreover, extreme rainfall leading to floods and landslides directly jeopardizes lives, property, as well as the supply and availability of food, water, and energy. Given the obvious impact of climate change on society, there is a need to adapt society to these changes and reduce greenhouse gas emissions. Incorporating these aspects into developmental planning ensures the sustainable development of a society. Given the overall material damages caused by extreme climate and weather conditions in Serbia exceeded 5 billion euros only in the period from 2000 to 2015, examining all aspects of climate change on our society is essential for sustainable development.*

Key words: *Climate change, Society, Sustainable development, Serbia.*

1. INTRODUCTION

The impact of climate change on global society is clearly visible today. Expected climate changes will result in a series of new negative consequences for society and its development in the future. Among the most harmful and direct consequences of climate change is the most obvious increase in air temperature, which affects people's health and life, as well as agricultural and energy production, causes forest fires, etc. Also, extreme precipitation that results in floods, landslides and rockfalls directly threatens lives and property, as well as the supply and availability of food, water and energy [1]. Starting from these direct effects of climate change on life and health, it is clear that they can cause a slowdown in economic development, a decrease in access to health and social protection, and an increase in poverty.

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According to World Bank estimates, by 2030, climate change could push more than 100 million people below the poverty line, primarily as a result of housing loss, more health problems and declining agricultural yields. The poorest part of the population will surely be the most affected, so this part of the population is also the most vulnerable to climate change. Regarding the impact of climate change on Serbian society and economy, the impact of climate change on sectors and systems is significant, as well as the need to adapt to climate change and reduce greenhouse gas (GHG) emissions. It is clear that climate change should be included in planning, both in sectoral development and in infrastructure, because the total material damages caused by extreme climatic and weather conditions in Serbia exceeded 5 billion euros, only in the period 2000-2015, and more than 70% of the losses are caused by drought and high temperatures. Flooding is another major cause of loss. Only in 2014, floods caused enormous damage, and about 1.35 billion euros were needed for recovery [2, 3].

Today, the fight against climate change is one of the priorities in international politics. As climate change is already negatively affecting ecosystems, and the degree of their negative impact will increase over time, this means that food and water will be less available, natural disasters will occur more often, people's health will be threatened, species will disappear, and ecosystems will be destroyed or degraded [1]. In addition to activities to mitigate climate change, it is necessary to establish an effective system of adaptation to climate change.

The European Union has developed a set of strategic and legal documents related to climate change. The document that directly relates to this issue is the EU White Paper on Adaptation to Climate Change. With this document, the EU set a framework for solving the problem of adaptation at the community level and at the same time obliged its members to take a serious and strategic approach to solving this issue. Serbia, as a candidate for joining the EU, is expected to undergo a process of harmonization of politics and law with this document [4].

When it comes to Serbia, previous activities in the processes of adaptation to climate change have been limited in scope. The problems that may arise from climate change and its impact on the economy and the whole society have not yet been thoroughly discussed. Also, Serbia still does not have a national strategy for adaptation to climate change. Moreover, most of the existing sectoral strategies and plans do not consider this issue. Taking that into account, we can say that the adaptive capacity of Serbia is currently at a low level. Certain institutions and organizations have recently made significant strides in developing their capacities to combat climate change, but at the national level, there is still no synchronized and clearly defined climate change adaptation policy. In this context, the adoption of the first law in Serbia dealing with the legal regulation of climate change in 2021 - the Law on Climate Change [5] should be highlighted as a positive step forward.

The analysis in this paper is based on a study "Study on the Socio-economic Aspects of Climate Change in the Republic of Serbia" by Božanić and Mitrović, which was conducted in cooperation with the UNDP, because Serbia has not yet adopted a national climate change adaptation strategy [2].

After the introductory considerations, the first three parts of the paper will discuss the impact of climate change on social development, the effects of climate change on health and the effects of climate change on work productivity. The last three parts of the paper will consider water losses due to climate change, the impact of climate change on the decline of agricultural production, and the impact of climate change on especially vulnerable social groups.

2. CLIMATE AND CLIMATE CHANGES

Climate changes, which today can be clearly detected in long-term series of climatological and meteorological data, are characterized in the first place by rising temperatures, but also by changes in the precipitation regime, their annual distribution and distribution by intensity, as well as the increased frequency of extreme weather events and periods with extreme climatic conditions. Such changes clearly affect the environment, economy, health, and safety of people [6]. The analysis of detected climate changes in the territory of the Republic of Serbia showed that the trend of temperature increase is becoming greater over time. In January 2019, the Republic Hydrometeorological Institute announced that 2018 was the warmest year since measurements have been made in the Republic of Serbia [7].

Analysis of future climate changes shows the range of possible future climate conditions depending on future emissions of greenhouse gases and the response of the climate system to these changes. In the territory of the Republic of Serbia, it is expected that the temperature will continue to rise until the end of this century to values that are on average higher by about 3 to 5°C compared to the temperatures of the middle of the last century [11]. In future periods, we can very likely expect further breaking of temperature and precipitation records, both in regions around the world and in Serbia.

Serbia's climate can be described as moderately continental with more or less pronounced local characteristics. According to official data covering the period 1950-2017, nine of the 10 warmest years were recorded after 2000. On average, the warmest year was 2018, followed by 2015. The number of dry days in a year and dry years is constantly increasing. In the period 1998-2017, the average annual temperature in all of Serbia was 0.5 to 1.5°C higher than the value in the period 1961-1990. In the period 2008-2017, the average annual temperature was 1.5°C higher than the value in the period 1961-1990 in most of the territory of Serbia. The trend of increasing average temperatures in Serbia is three times higher than the trend of the average global temperature increase and the average global land temperature [3, 7].

There are several possible scenarios when it comes to climate change. According to the first scenario, the temperature will continue to rise in the future compared to the reference period (1986-2005). According to the second scenario, the average annual temperature for the territory of Serbia will increase by 0.5 °C in the period (2016-2035), reaching a level of 1.5 °C in the period (2046-2065) and by the end of the century (2081-2100) it will be at 2 °C compared to the reference period. According to the third, the average annual temperature will rise by 1 °C in the period (2016-2035), it will reach 2 °C in the period (2046-2065), and according to the fourth scenario by the end of the century (2081-2100), the average annual temperature should be higher by as much as 4.3 °C compared to the reference period. Changes in mean seasonal temperatures indicate that the increase in temperatures in the first half of the century will be faster during the summer, and also faster during the winters in the second half of the century, and higher than the anomalies in the first half of the century [3]. Also, extreme heat waves, which by definition are rare events (once every 10 years in the period 1986-2005), will occur several times a year, and by the end of the century, on average, seven times a year. Heavy rainfall will increase over time. By the end of the century, heavy precipitation on days with extremely heavy precipitation (over 40 mm) will be on average 40% to 60% higher [7].

3. IMPACT OF CLIMATE CHANGES ON SOCIAL DEVELOPMENT

Analyses at the international and European Union level show that climate change has already had a multiple negative impact on the development of society and the economy as a whole. The damage and losses in Serbia caused by natural disasters in the previous period confirm that climate change and global warming are significant risk factors for further development. The future level of risk depends to a large extent on the increase in the average global temperature. Serbia alone cannot have a significant impact on that. Those losses will undoubtedly be much higher in the absence of adaptation measures.

The decline in GDP due to global warming caused by climate change is shown in Fig. 1. The negative impact of climate change on GDP obviously increases with the increase in average global temperatures over time. Given the fact that the projections of a temperature increase of 10 °C have been exceeded and that it is difficult to implement the increase in average global temperatures to return to that level by the end of the century, we can expect a drop in Serbia's GDP due to climate change from 0.150% to 0.318% per annum. This is equivalent to a loss of about US\$7 billion to about US\$15 billion per year by the middle of the 21st century. This additionally confirms the justification of investing in climate change adaptation measures (Fig. 1).

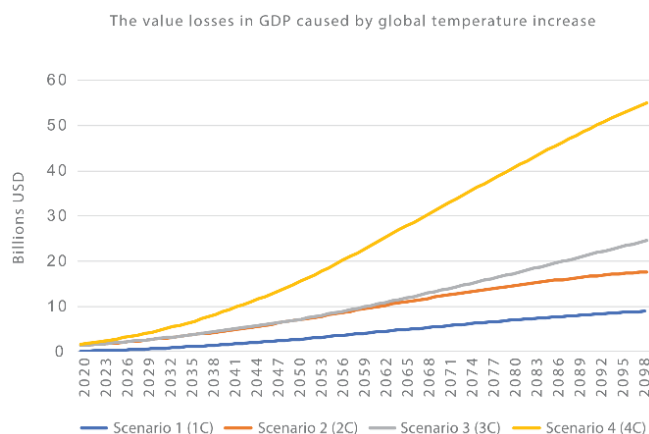


Fig. 1 Projections of GDP losses due to the mean global temperature increase (in billion USD) [2]

Climate change is expected to have a greater impact on the poor than on the rich, according to changes in GDP. A decline in GDP can mean a decline in employment and, consequently, an increase in the number of people living below the poverty line, in the absence of a timely response or adaptation to it. The decrease in GDP increases the vulnerability of the population, reducing its ability to adapt to climate change. This will further increase the pressure on economic development and the well-being of the whole society if, in addition to the personal, there is no timely recognition of the problem and an adequate government response to it. In support of the need for an answer, there is also a global assessment that, if there is no answer, the expected loss of GDP by the year 2100 may be 2-10%, while the implementation of adaptation and mitigation policies may reduce GDP by 1-10%. 3% [2].

4. THE EFFECTS OF CLIMATE CHANGES ON HEALTH

Heat stress is one of the most negative effects of climate change and leads to an increase in mortality and disease, especially among the elderly and part of the population suffering from chronic diseases. The population living in areas without or with few green areas, especially in urban areas, is particularly at risk. At the same time, effective adaptation measures, which include green infrastructure, have had additional positive effects on air quality and health in general.

Exposure to high ambient temperatures causes needless suffering and death. Temperatures above long-term averages during summer months and discrete heat extremes are associated with excess mortality. In high-income countries, heat is one of the largest weather-related causes of death. In addition to mortality, hot weather and heat extremes are associated with increased emergency room visits and hospital admissions, increased deaths from cardiorespiratory and other diseases, mental health issues, adverse pregnancy and birth outcomes, and increased health-care costs. Most heat-related morbidity and mortality should be preventable with improved preparedness and avoidance of exposure. Studies consistently show that adults older than 65 years, people with cardiopulmonary and other chronic diseases, and very young children are particularly vulnerable to the effects of heat, irrespective of income level or geographical region. There is greater knowledge about the burden of heat-related mortality in high-income countries, although excess mortality also occurs in low-income and middle-income countries [8].

In Europe, including Serbia, there was an increase in the number of heat waves and the number of hot days. For example, in 2007, during the heat wave in Serbia, 90% of the total number of deaths were people over 75 years old, and the largest number of deaths were cardiovascular patients [7, 9]. Considering this and the increase in the mortality rate in Serbia, mainly among those suffering from cardiovascular diseases, we can assume, but not claim with certainty, that part of this increase is caused by climate change. Expectations in this context, as well as projections about the need for investment in the health system, are even more pronounced if one takes into account the expected spread of vectors (e.g. mosquitoes) and diseases from tropical regions to Serbia, based on analyzes made for Europe as a whole. The introduction of these diseases has already been observed in the previous period. Because of this, climate change can have a significant negative impact on the stability of the Serbian health system, primarily due to an increase in cardiovascular and respiratory diseases and associated costs [9].

In addition to these direct costs in prevention or treatment, it is expected that the intensification of climatic extremes (especially heat waves) will increase the number of calls to emergency services and their interventions [10]. This results in the need for additional staff as well as auxiliary tools and equipment for an appropriate response. This further leads to an increase in the costs of the health care system, i.e., an increase in the mortality rate in the event of their absence.

In the case of Serbia, additional expenditures for the health system caused by climate change in the periods 2020-2040, 2040-2100 and 2020-2100 were calculated based on four different IPCC scenarios (RCP2.6, RCP4.5, RCP6 and RCP8.5). In general, additional expenditures are caused by increased investments in disease prevention and protection, increase in the number of employees, etc. (Table 1) [2]. In the case of an average increase in global temperature of 4 °C, the expenses for the healthcare system of Serbia, at the end of the century, will be 5.7 times higher than in the case of the optimistic scenario of a global reduction of GHG emissions.

Table 1 Additional expenditures for the health care system of Serbia due to climate change (billion USD) [2]

Increase of T by:	2020-2040	2040-2100	2020-2100
1°C	0.343	1.851	2.194
2°C	0.685	3.703	4.388
3°C	0.951	5.163	6.115
4°C	1.513	11.010	12.523

5. THE EFFECTS OF CLIMATE CHANGES ON WORK PRODUCTIVITY

Heat waves are more and more often the cause of work injuries and illnesses, as well as a decrease in work ability and productivity. Heat waves and rising average temperatures do not affect all occupations and types of work equally. Jobs that require a lot of physical activity and/or a long time spent outdoors are particularly affected. Farmers and construction workers are expected to be particularly affected by climate change. They are considered particularly vulnerable groups in terms of the impact of climate change. If temperatures rise further, less physically demanding jobs and occupations, such as office and domestic jobs, will also become vulnerable to climate change. In this case, the pressure is mostly psychological, especially when working in non-air-conditioned rooms [11].

It is difficult to determine the vulnerability of certain occupations to climate change, because it largely depends on personal thresholds for temperature tolerance. What is certain is that older workers have less physiological resistance to heat, and therefore less resistance to climate change. At the same time, given that the elderly population is beginning to make up an increasing part of the workforce in Serbia, the vulnerability of Serbian society to climate change is also obvious. The impact of heat waves on the population, in addition to serious health problems, also affects the productivity of the working population.

Table 2 shows the percentages of lost working hours due to heat stress in different sectors and the economy as a whole. For Serbia, these analyses show that a loss of 0.03% of working hours or 1,000 jobs due to heat waves can be expected in 2030. The hours lost due to heat waves by sector in Serbia in 1995 and 2030 are presented below (Table 2) [2].

Table 2 Comparison of lost working hours per sector in Serbia, in 1995 and 2030 [2]

Sector	1995	2030
Agriculture (in shade) (%)	0.04	0.09
Industry (%)	0.0	0.03
Construction (in shade) (%)	0.04	0.09
Services (%)	0	0
Total (%)	0.01	0.03
Total (in thousands of jobs)	0.4	1.0

A reduction in working hours causes a fall in Serbia's GDP. Research shows that, as a result of an increase in average global temperatures of 1.5 °C, Serbia's GDP may fall by 0.02% (mostly due to a decrease in labor productivity in agriculture, construction and tourism). At the same time, GDP declines depending on the increase in mean global temperatures for the periods: 2020-2040, 2040-2100 and 2020-2100 are shown in Table 3. [2].

Table 3 GDP losses due to reduced labour productivity (billion USD) [2]

Increase of T by:	2020-2040	2040-2100	2020-2100
1°C	0.171	0.926	1.097
2°C	0.343	1.851	2.194
3°C	0.476	2.582	3.057
4°C	0.757	5.505	6.261

Due to the decrease in labor productivity, Serbia's GDP will be lower by 171 million dollars than in the case of no climate change, i.e., already in the near future (2020-2040) and with a minimal change in the average global temperature (1 °C).

Lastly, it is important to remember that both natural disasters and climate-related natural disasters have the potential to destroy infrastructure, which might have an impact on productivity and the provision of social and health services. The number of individuals without proper social protection on the earth might expand due to an increase in the frequency and intensity of natural disasters, since there are already millions of them. Using the COVID-19 pandemic as an example, Serbia has experienced it. Although climate change may increase unemployment in one sector, it also opens up employment opportunities in another "climate-oriented" sector.

6. WATER LOSSES DUE TO CLIMATE CHANGE

There is a negative trend for river flows in Serbia. The long-term trend in domestic rivers was about -30%/100 years, while the spatial distribution varies. The long-term trend for the Danube and Sava rivers on the territory of Serbia is negative and amounts to about -10%/100 years [2].

In the future, flow changes will be in the range of a few percent, rarely exceeding 10%. Regarding the impact of climate change on water, it can be expected that the areas of central and southern Serbia, as well as sectors and individuals whose earnings depend on the water sector, will be most affected. There is a trend of decreasing groundwater availability, but lower than in surface water. It should be kept in mind that the water supply in bigger parts of Serbia is connected to underground water. Declining water quality may be an additional cause of climate change pressures on population health and health system costs, as well as on economic development in general [12, 13].

The effects of climate change on water resources are reflected in the reduction of water quality and availability: for households, agricultural production and industry. These consequences can cause a decline in GDP, both through water procurement and through increases in water, food and energy prices. Additional pressure on GDP can be caused by unsustainable and unprofitable investments in irrigation systems as an adjustment measure. In planning irrigation and building systems, climate change projections must be included along with the sector's vulnerability to climate change. The water collection, purification and distribution sector accounts for 0.5% of Serbia's total GDP. Given the expected decrease in water flow and the availability of drinking water in Serbia due to climate change, GDP losses are also expected (Table 4) [2].

Table 4 GDP losses due to decreased availability of drinking water (billion USD) [2]

Increase of T by:	2020-2040	2040-2100	2020-2100
1°C	0.425 (0.03%)	8.424 (0.12%)	8.849 (0.11%)
2°C	0.850 (0.07%)	16.849 (0.24%)	17.698 (0.22%)
3°C	1.156 (0.10%)	23.721 (0.37%)	24.877 (0.33%)
4°C	1.922 (0.14%)	50.869 (0.49%)	52.792 (0.45%)

The most important adaptation measures for the water sector include measures already defined as necessary to reduce the risk of natural disasters and to improve water management.

7. IMPACT OF CLIMATE CHANGES ON THE DECLINE OF AGRICULTURAL PRODUCTION

Rising temperatures and increasingly frequent extreme events can lead to a significant decrease in yield and an increase in yield fluctuation from year to year in Serbia. Climate change will have the greatest impact on corn yields. If adaptation measures are not implemented by 2030, corn yields are expected to decrease by up to 58% under non-irrigated conditions. The yield of wheat will decrease by up to 16% in the period until 2030. A decrease in sugar production per hectare of sugar beet is also expected, and by 2100, a decrease in soybean and grapevine production [2, 14].

A decrease in yield also means a decrease in income, especially for small agricultural producers and seasonal workers. We cannot rule out an impact on the entire population through a reduction in food availability, and especially on the poorer part of the population, due to a possible increase in food prices. Cereal production accounts for about 50% of the total agricultural production in Serbia and contributes 6.3% of the country's GDP. Therefore, any decrease in yields, especially of cereals, has a noticeable impact on the GDP of the Republic of Serbia, i.e., its projections for the future (Table 5) [2].

Table 5 GDP losses due to declining cereal yields (billion USD) [2]

Increase of T by:	2020-2040	2040-2100	2020-2100
1°C		115,355 (1.66%)	121,380 (1.48%)
2°C	12,050 (0.94%)	230,710 (3.32%)	242,760 (2.95%)
3°C	16,368 (1.38%)	324,683 (5.03%)	341,051 (4.46%)
4°C	27,305 (1.92%)	696,126 (6.74%)	723,430 (6.16%)

In the case of an increase in the average global temperature by 2 °C, Serbia's GDP will be 242,760 billion dollars lower by the end of the century than projected without climate change, and a double increase in temperature (4 °C) will lead to a three-fold increase in GDP losses. The differences in GDP losses depending on the reduced agricultural production of cereals due to the increase in the average global temperature are shown in Fig. 2.

To understand the impact of climate change on Serbian society, it is important to note that the increase in average global temperatures is no more than 1 °C and in 1994 and later, for 43% of the total area of agricultural land, direct damage caused by lower yields amounted to 4.6 billion dollars [2].

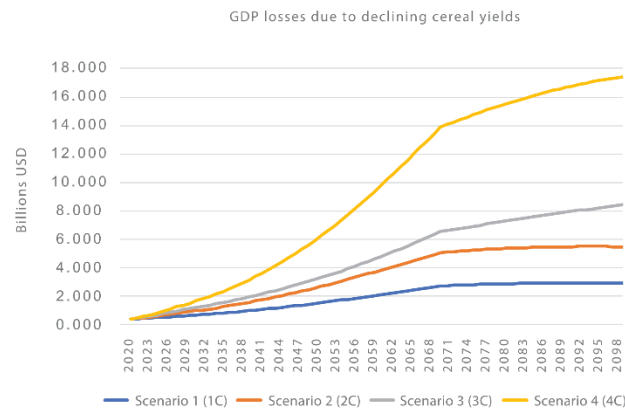


Fig. 2 Projections of GDP losses due to declining production of cereals (billion USD) [2]

It is obvious that climate change can significantly affect the production and availability of food. Global estimates show that yield reductions by 2050 could cause a 10% to 20% increase in hunger, compared to no climate change. By 2060, the prices of some of the key cereals, such as corn, wheat and rice, could increase by up to 150% [2]. It is clear from this that the impact of climate change on the agricultural sector has both a direct impact on the rural population and an indirect impact on the urban population. Certainly, in this case too, the greatest burden of climate change lies on the poor population, and the growth of the population below the poverty line can also be expected. In terms of adaptation, just as in the case of water, the key measures are actually already foreseen measures to reduce the risk of natural disasters and improve agricultural production. Consequently, the application of adjustment measures should not significantly change investments in the agricultural sector or at least the profits that the population would ultimately benefit from those investments.

8. IMPACT OF CLIMATE CHANGES ON ESPECIALLY VULNERABLE SOCIAL GROUPS

The place of residence (cities or rural areas) has its own forms and manifestations, but it is certainly affected by climate change. According to this preliminary analysis, the impact of climate change on the population in rural areas is primarily reflected in lower incomes due to the decline in agricultural production, but also increased health risks due to reduced availability of water resources and difficult access to health care. Among them, farmers with minimal capital are certainly the most vulnerable because, most often, they are completely dependent on agricultural production and natural resources.

Seasonal workers in the agricultural sector are also among the most vulnerable [15]. In urban areas, the impact of climate change is also linked to air quality, as well as the price and availability of food and water, which are increasingly affected by climate change. As a result, the cost of living in cities is rising. Also, the direct cumulative impact of heat waves is significantly greater in urban areas than in rural areas. Heat and heat waves primarily cause negative effects on the younger (children) and older population, as well as in jobs where employees are exposed to the direct influence of heat and sun.

Farmers and construction workers are expected to be particularly affected by climate change, which places them in particularly vulnerable groups. We should not forget the firefighters, police officers, health services and emergency services in case of natural disasters. In the case of a further increase in temperatures, less physically demanding jobs and occupations, such as office and domestic jobs, will become vulnerable to climate change. In this case, the pressure is mostly physiological, especially in the case of working in non-air-conditioned spaces.

The vulnerability of certain occupations to climate change is difficult to determine because it also largely depends on temperature tolerance thresholds. What is certain is that older workers have less physiological resistance to heat, and therefore less resistance to climate change. The vulnerability of this group is greater among workers with chronic diseases or disabilities.

The younger generation, i.e., children, is certainly a particularly vulnerable group. This vulnerability is clear when considering the impact of heat waves and other natural disasters, but also due to physiological underdevelopment that can be significant with prolonged exposure to climate change. In addition to the direct impact of climate change, the vulnerability of groups can also be a consequence of mitigation and adaptation measures. The reduction of GHG emissions, i.e. their mitigation, and the accompanying transformation of the sector into sectors with a low carbon content, can lead to job losses and an increase in electricity costs. Job losses are expected primarily in the fossil fuel and agricultural sectors, as well as in large companies.

The increase in energy prices is directly related to the income of an individual household, and those whose income is at or below the poverty line are among the population groups that must be considered. Floods and heat waves can have a particularly negative impact on the so-called socially isolated population groups, which by definition include the elderly, patients with chronic diseases and the disabled, those dependent on social assistance, living alone, members of ethnic minorities, the homeless, but also residents of remote and infrastructurally poorly connected areas.

Vulnerability to climate change is greatest among already vulnerable groups, including the poorest population, which is certainly one of the categories most vulnerable to climate change. The analyzes for this study confirm the vulnerability of the Serbian economy and population to climate change. The level of vulnerability depends on the population group and activities, their incomes and expenditures, as well as on a number of individual parameters for each individual [15, 16].

However, in the case of Serbia, it is necessary to continuously monitor the impact of climate change on vulnerable social groups such as children, women and the elderly, persons with special needs, refugees and other vulnerable persons.

9. CONCLUSION

Climate change, as a current problem of modern society, has various potential negative effects on society as a whole, including in our country [17]. It is evident that changes in climate parameters already affect the value of GDP, which is significant for the growth and development of the Serbian economy. It is also obvious that the negative impact of climate change on GDP increases with the increase in average global temperatures. Due to the decrease in labor productivity, the GDP of the Republic of Serbia can be expected to

decrease by 171 million dollars by 2040, with a minimal increase in the average global temperature (1 °C).

The impact of the increase in average global temperatures on the total value of GDP is different depending on the growth scenario. However, even a minimal increase in mean global temperatures will result in a fall in GDP relative to the possible value without global warming.

Limiting the growth of average global temperatures until the end of the century within the framework of the Paris Agreement (2 °C) would lead to a loss of Serbia's GDP of 4.53% by the middle of the century, which could significantly reduce investment in climate change adaptation measures. Investing in reducing greenhouse gas emissions could lead to a drop in GDP by as much as 3.4% by 2030 and 3.9% by 2050. In 2030, a loss of 0.03% of working hours or 1,000 jobs can be expected due to heat waves alone, mostly in the agriculture and construction sectors [16].

Mitigation measures lead to the creation of net new jobs. Job losses are expected in the fossil fuel and agriculture sectors. Also, a decrease in the number of employees in large businesses and an increase in the number of employees in small and medium enterprises is expected. An increase in the number of employees can be expected in activities related to the forestry sector. The analyses carried out in this study confirm that the process of transformation into a carbon-neutral and climate-adapted society, as well as all other processes, can additionally endanger already vulnerable population groups that must be given special attention. They also confirm the need for timely retraining or an adapted education system for new practices, technologies and sectors in which more employment is expected in the coming period.

Economic development and investments in climate change adaptation and mitigation are not in conflict, and they are not mutually exclusive. Moreover, they complement each other and offer a wider range of possibilities for the transformation of Serbian society in the ongoing transition process.

Finally, contemporary sources of literature increasingly embrace the concept of a holistic approach to solving climate change problems. A holistic approach to analysis of the economic, technological, institutional, legal and other consequences of climate changes is necessary [18]. Furthermore, decisions about climate change continue making their way into managerial decision-making and strategizing; however, state and businesses can negotiate with people but not with nature [19]. As a result, decisions surrounding climate change adaptation are quickly rising in importance all over the world.

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