Impact of Climate Change on rural development and rural built environment: case study settlements within the Region of the Southern and Eastern Serbia

M Igić*, P Mitković, M Đinđić Branković, J Đekić, M Mitković
Chair for Urban and Spatial planning, Faculty of Civil Engineering and Architecture, University of Niš, 14 Aleksandra Medvedeva Street, 18000 Niš, Republic of Serbia

*Corresponding author email: milica.igic989@gmail.com

Abstract. Great threat to the modern society and built environment is Climate Change (CC), whose impact cannot be observed independently from other factors. This paper discusses the influence of CC on the rural development in Serbia, where about 3/4 territory is rural. Six selected rural settlements: Bojnik, Trgovište, Žitorađa, Golubac, Gadžin Han and Merošina, from the Region of Southern and Eastern Serbia, which is the least developed Region with high percentage of rural areas, were analysed. CC is one of the triggers for migration from rural to urban areas resulting in unfavourable social structure that, along with depopulation, represents a threat to rural development and the CC adaptation, making it a kind of a “wicked” problem. In order to create successful adaptation plans, increase resilience and provide efficient implementation and monitoring processes: (1) Decision making must be on local level and as a long term process with multifunctional - comprehensive approach; (2) Risk assessment and management must be part of every local strategic document - defined contextually depending on the specificity of each municipality; (3) Every municipality has different types and degrees of vulnerabilities, exposure and sensibility, and so measures for adaptations must be “customized” for every settlement depending on the specific spatial, development and natural context.

1. Introduction
Climate change (CC) represents a great threat to the all spheres of human’s life and environment, and its impact is rising rapidly in last century, with the tendency of constant growth in the future. CC is causing many different events, such are extreme weather conditions which have the most hazardous impact on human lives and environment, both built and natural. Nowadays there are many strategies and planning documents regarding adaptation and mitigation to CC which are creating more resilient settlements to the CC impacts. In the case of developing countries, mechanisms for CC are still in development, and in case of Serbia these documents are mainly focused on reduction of GHG emissions. Most of the European Union (EU) countries have adopted National Adaptation Strategies (NAS) and National Adaptation Plans (NAP) which are in accordance with Climate strategies. This paper discusses the influence of CC on rural development in Republic of Serbia, which is characterized by very diverse and rich biodiversity, great forestry and agriculture land, huge water resources and where approximately 3/4 of total territory is defined as rural. There is a national Strategy together with Action plan and a Law on climate change in preparation, but most of the actions are regarding urban areas and they are on national level, which is too general and it is not specified for each Region separately. There are five
statistical and administrative Regions in Serbia which differ in terms of economic development. Within this paper, selected rural settlements from the Region of Southern and Eastern Serbia (RSES) will be analysed and discussed. This Region occupies approximately 33% of total country territory and it is the least developed in terms of economy (it has the lowest GDP per capita), with high depopulation degree, and it consists of high percentage of rural areas that are shrinking with much expressed depopulation - annual population growth is – 12.371 [1]. RSES has very diverse topography and it is distinguished by untouched natural environment, biodiversity, huge water resources, very rich and diverse heritage fund, which are exposed to natural hazards caused by CC. According to their vulnerability and development degree, six rural settlements within different districts of RSES were selected: Bojnik, Trgovište, Žitorađa, Golubac, Gadžin Han and Merošina. These settlements are also seats of their Municipalities and within this paper their current state regarding CC vulnerability and adaptation is analysed, in order to determine interrelation between CC and rural development.

The objective of this study is to point out interdependence of rural development and CC impact on both residents and built environment in rural areas, and to discuss adaptation possibilities. CC is one of the triggers for migrations, in case of Serbia migrations from rural to urban areas are resulting in unfavourable social structure both in urban and rural areas. Unfavourable existing age and gender structure of “remaining” population, together with negative demographic growth represents a threat to rural development and makes difficult CC adaptation. Adaptation to CC in rural areas can be observed as a kind of a “wicked” problem [2] because of their complexity and interdependence of different social groups and institutions, and also because of interdependence of CC and rural development in case of Serbia. In order to create successful adaptation plans, increase resilience and provide efficient implementation and monitoring processes, comprehensive, multisector and multifunctional approach must be used with long term projections. Adaptation strategies must be product of cooperation of both professionals and local residents with avoiding of political interfering. All the analyses must be done on local level, based on local context and using specific contextual criterions which are specificity of each municipality. Risk assessment and management must be part of every local strategic document and must be defined contextually depending on the specificity of every municipality. Each municipality, for its settlements should have vulnerability, exposure and sensibility assessment in order to create more efficient strategies that could increase CC adaptation and create more resilient and sustainable settlements.

2. Climate Change: global

CC negative impact is increasing, it is affecting all spheres of life and it is endangering quality of life in both urban and rural settlements. Impact of CC is noticeable on all segments of everyday life of the population, and it is great threat to urbanization process. These negative impacts are directly and indirectly affecting population’s health, resulting in increasing number of death [3]. Lately, this influence is considered by many professionals, but still health issues are not “involved” in mitigation strategies. In 2010 many countries from the European region (Serbia is one of them) signed Parma Declaration on Environment and Health which is dealing with issues and interrelation between health issues and CC [4]. Another great impact of the CC is on the economy, and according European Environment Agency (EEA) report from 2017, economic losses caused by CC hazards in the EEA member countries amounted to EUR 433 billion which is approximately 83% of all economic losses caused by all natural hazards (volcanos, earthquakes, etc.) [5]. Extreme weather conditions are caused by CC and due to their hazardous consequences, they have extremely negative – often fatal impact on human lives and built environment. Their magnitude and incidence of repeating are one of the most important and the most destructive consequence of CC [5, 6, 7]. Because of the “damage” that these impacts are causing to the environment, in last few decades there is often a term “Environmental migrant” [8], which appearance is increasing especially in developing countries of Asia and Africa. Negative effects of CC are causing mass population migrations from vulnerable areas because of unfavourable living and working conditions and according to data from the Internal Displacement Monitoring Centre (IDMC), in period 2008-2016 approximately 227.6 million people were displaced.
internally as a response to disasters [9]. According data from IDMC for 2018, there were 17.2 million people displaced as a response to disasters. Built environment, with built and natural heritage sites, which are located in both urban and rural areas is in great threat. World Heritage Centre (WHC) by UNESCO in 2007 published Report and Strategy regarding CC and world heritage, where detailed information about great threats and possible measures are discussed [10]. Furthermore, International union for nature conservation created application World Heritage Outlook which provides first global assessment of the conservation prospects and deals with CC in natural protected sites around the world.

In order to create mechanism that could promptly and efficiently respond to the CC challenges it is important to develop regulations and to provide their implementation through planning instrument – both urban and spatial and on all levels – national, regional and local. Urban and rural systems become more vulnerable and so the necessity for adequately planning system is increasing. Reduction of vulnerability, mitigation and increasing resilience to the CC are one of the main aspects of each Strategy for adaptation and they should be obligatory part of every planning document, on all levels of deciding. Because adaptation should be at different spatial levels, it is dealing with different society scales and strategies must be determined according different criterions at all scales, in order to ensure their sustainability. Success of the implementation process depends on contextual possibilities and capacities and it is important that it is critically based on all relevant criterions and that all possible setbacks caused by variations are taken into account [11]. According EEA report from 2018, all the countries of EU have developed NAS and NAP [12]. This is not the case for countries in development (especially for former Yugoslavian Republics: Serbia, Bosnia and Herzegovina and Macedonia) which are not members of EU but are part of Europe and Balkans Region.

3. Climate Change: Serbia

As the most vulnerable areas which need urgent and special attention regarding adaptation to CC, rural areas, agriculture, natural environment and resources (water resources) were determined [13]. Serbia is within the Region of South Eastern Europe (SEE) and many strategies regarding CC are adopted for this Region. Unfortunately, in Serbia, main attention is paid on urban areas and climate strategies were discussed mainly for them. Regarding Serbia, in terms of planning, there is no good connection between planning on different levels – regional and local which is also reflecting on climate change adaptation and it jeopardizes entire mitigation process. Currently, there is no interrelation between predicted measures and financial, spatial and professional local resources. Measures are too general and there are no feasibility assessment for specific areas. Cooperation between different sectors is not foreseen. All actions are mainly short term without any long term predictions. After some strategy is adopted, there are no instruments for evaluation of the implementation process.

Within the Ministry of Environmental Protection, Serbian Environmental Protection Agency (SEPA) was established with main goal to monitor and manage national information system for environmental protection. SEPA provides online data from different measurement stations regarding status of environmental factors through environmental indicators and pollutant register. Besides SEPA, Republic Hydrometeorological Service of Serbia (RHSS) is providing online data regarding climate, based on everyday measures and with some periodical comparative statistical data for temperature and precipitation. Awareness of the residents is on a very low level and there is a constant need in dissemination of knowledge in this area. Lately, many Universities and Faculties started with courses involving students and young professionals in this topic, in order to raise their awareness and to prepare them to challenge growing impact of CC, which is important especially for future architects and urban planners [14].

Most common and frequent natural hazards on the territory of Serbia are floods, torrential floods, drought, seismic activity, forest fires, excessive soil erosion and landslides. In 2011, first risk assessment and first integral map of natural hazards distribution in Serbia for land-use planning were presented [15]. Serbia has very rich and diverse hydrographic network, with many mountain rivers and streams which represent great threat in cases of heavy precipitation and extreme weather events. Floods, especially torrential floods are causing excessive erosion of soil and landslides. Because of the global warming and
change in temperatures, heat waves and decrease of precipitation are causing droughts and forest fires. Many earthquakes with different magnitude occurred on the territory of Serbia. It is considered that approximately 63.2% is the probability of earthquake occurrence with a 100-year period of the observed seismicity [16]. In last decade, one of the greatest events caused by CC were floods of river Danube in 2014 where about 38 municipalities were affected and many more faced problems of landslides (about 3,000 landslides were activated) and torrential floods as a consequences of this event [17]. According data from RHSS, 2018 was the warmest year since there are measurements [18]. Average temperatures in Serbia are rising and it is predicted that until the end of the century, mean annual temperature will increase between 3 and 5 °C compared with temperatures from middle of last the century.

3.1. Legislation and planning framework regarding Climate Change in Serbia

As a European country and a member candidate for EU, Serbia has signed few documents regarding CC actions and committed in accomplishing common goals. In 2008, Serbia signed Kyoto Protocol and since 2010 became member of the United Nations Framework Convention on Climate Change (UNFCCC) as a developing country. As the first document adopted regarding this protocol was National strategy for inclusion of the Republic Serbia into the clean development mechanism (CDM) of the Kyoto protocol in the sectors of waste management, agriculture and forestry in 2010 [19]. Main goal of this document was to raise awareness regarding environmental protection and to discuss possible CDM projects applicable in Serbia. Efficient ways for GHG emissions reductions within the post - Kyoto framework in Serbia in 2011, and Nationally Appropriate Mitigation Actions (until now there are 12 developed projects) were also adopted, and main focus is on the reduction GHG emissions in urban areas, as well as the selection of targeted sectors - energy production, industry, transportation, buildings, agriculture, waste and forestry - clearly indicating where the focus for future actions should be placed [19, 20]. First report submitted to the UNFCCC was in 2010 and this document was base for future actions, investigations and policies in the area of climate change and sustainable development of the country, as well as the preparation of the future national reports [21]. Within first report, as a most vulnerable areas agriculture, forestry, population’s health and natural and water resources were determined. Serbia signed Paris Agreement on Climate Change in 2015, and legally committed to accomplish defined goals regarding CC adaptation. Within this Agreement, obligation that countries have to fulfil are defined, and among them there are different “tasks” depending on the level of development [22]. Another report: Second National Communication of the Republic of Serbia under the UNFCCC was published in 2017 [23]. This document was result of a project for period 2012-2015 and within this document there are some projections for short term period until 2030 for every 5 years and long term projections by 2050. Also, vulnerability assessment, CC impacts and adaptation measures were defined for analysed period. In 2010, Agency for energy efficiency was established in Serbia with main goal to improve energy saving and energy exploitation – consumption in general. Until now, Agency has published three Action plans regarding energy consumption and saving: I for period 2010-2012, II for period 2013-2015 and III for period by 2018. Within III Action plan it is expected to achieve saving in energy consumption in 2018 of 0,7524 Mtoe [24]. In 2015, Draft version of the First national plan of adapting to the changed climatic conditions for the Republic of Serbia was presented and its “target” areas were agriculture, forestry, water resources and protection of nature, ecosystems and biodiversity [25]. In 2018 draft version of Law on Climate Change was presented and its adoption is expecting in 2019. Within this Law, Low carbon development strategy, Program for adaptation to changing climatic conditions and Action plans are determined. This strategy and Program are for the period of ten years and their preparation is in the process. As a part of this Law is also establishment of the National Council on Climate Change. Law predicts evaluation and monitoring of implementation process and reports must be published in every 4 years [26]. Currently, Strategy for climate change together with Action plan is being in the preparation process [27]. The Strategy will identify priority measures for GHG (mitigation) emissions, as well as the time framework for implementation and the total financial resources needed.
In the domain of urban and spatial planning, very first documents that is dealing with the issue of CC is Spatial plan of Republic of Serbia for the period 2010-2020 [28]. Spatial plan is suggesting that climate data become obligatory part of urban and spatial planning and design of built environment and infrastructure, defined through different legal instruments in order to adequately response to the CC and extreme weather challenges. Adjusting existing strategies and regulations with EU standards and defining integral strategy for CC adaptation and protection of nature, built environment and population, are also one of the goals for future period determined within this plan. Law on the planning and construction, with its latest amendments from 2019, is not dealing with CC adaptation, but it predicts “rational” use of renewable energy sources in construction and obligatory energy efficiency demands for buildings [29]. It is defined that each building must accomplish defined demands regarding energy efficiency and it must have certificate from professionals in this area. This Law also determines that planning documents, and projects for special objects must have Environmental Impact Assessment in order to preserve natural environment.

Regarding planning and strategic documents, National Sustainable Development strategy for period 2008-2017 is one of the important strategic documents from last decade that have analysed issue of CC [30]. After the Strategy, Action plan for its implementation was adopted and these documents are also important strategic framework for strategy regarding natural resources protection. National Environmental Program was adopted in 2010 along with the Action plan for its implementation until 2019 [31]. This Program also deals with the problem of CC regarding nature protection and air pollution. All of the strategies are dealing with CC regarding environmental protection – management and protection of environmental quality and biodiversity. Another thing is that all these regulations are regarding CC in general and there are no specific documents dealing with the issues of rural areas, which is very important if we take into account that approximately 3/4 of the country territory is rural. In order to efficiently access the problem, cooperation between different parties should be promoted and climate protection governance should not be strictly categorized as local, regional and national. CC adaptation strategies are great challenge for entire society, they cannot be defined and limited only to certain geographical/spatial range, or only urban or rural area, their decision making must be multi scale, between different authority scales and different state levels [32].

### 4. Rural development and CC: Region of Southern and Eastern Serbia

For analysing of the interdependence of rural development and CC, as a study area - RSES was chosen. RSES occupies one third of the country territory (approximately 26,248 km²), within lives about 25% of the total country residents, and this is the least developed Region with participation of only 14,1% in national GDP. This Region consists of 9 Districts with total 1,973 settlements and 1,521.081 inhabitants. From this number of settlements, only 46 are classified as „urban” and 1.927 are classified as „other” – rural settlements. This Region consists of 38 Municipalities and 9 cities, and except cities of Bor and Niš, all other municipalities and settlements are underdeveloped. Regarding spatial organization, within RSES population density is 58 inh/km², and according Organization for Economic Co-operation and Development definition, areas with population density less than 150 inh/km² are rural. Territory is mostly high hilly and mountainous, and most of the settlements in the eastern part are declared as “weak – remote” [33]. Except urban areas of the cities Niš and Leskovac, and area around city of Vranje, RSES is mainly classified as Region III -mostly mountainous areas where agriculture and mining are developed, and the focus is on the exploitation of natural resources. The main problems this Region is facing, because of its heterogeneous structure, are depopulation, unemployment and underdeveloped economy.

In order to determine interrelation between CC and rural development, for the purpose of this research six rural settlements were selected from this Region according to the following criteria: development level (economy development), population growth (population - social structure), adopted planning instruments (strategic and planning documents), natural hazards exposure (according past data and future scenarios) and predominant activity (agriculture). Selected settlements are: 1) Bojnik
settlement in the Jablanica District; 2) Trgovište in the Pčinja District; 3) Žitorađa in the Toplica District; 4) Golubac in the Braničevo District; 5) Gadžin Han and 6) Merošina in the Nišava District (figure 1).

Even these settlements are seat of the same named municipalities, in terms of economy development they are underdeveloped and in statistical classification of Serbia all the settlements within these municipalities are defined as “other” - rural. According data from Development Agency of Serbia, development of the regions and unit of local self-government can be classified in V groups, and from selected municipalities five are in the group V – devastated area and only Gadžin Han in group IV (figure 1). Regarding demographic growth, all of them are characterized by negative demographic growth which is very pronounced in last 15 years. Because of the depopulation, negative age and social structure is expressed [1, 31]. All of the Municipalities have spatial plan and local strategy for sustainable development adopted. All of these settlements are exposed to natural hazards and impacts of CC which is presented on figures 2 and – annual temperature and precipitation for period 2008-2017 [34]. In this observed period, in the eastern part of the country deviations of the temperature were above 2 °C (figure 2) and significant are also deviations regarding precipitation with above 10% on the southern part of the country (figure 3), compared to values from the period 1961-1990. Droughts during summer periods with negative 20 - 30 %, especially in central, eastern and southern part of Serbia. For vulnerability – exposure to different nature hazards, online platform Climate ADAPT and Think Hazard! tool are used, as well as data from SEPA and RHSS regarding past, current and future scenarios. Population within these settlements and municipalities is mainly agriculture orientated, and agriculture has high share in their gross income. Agriculture production is one of their main industries for development and its yield is threatened by CC impact. Strategies, plans and programs regarding rural development are also analysed in order to investigate suggested strategic directions, actions and measures for rural and regional development.

Figure 1 - RSES - selected settlements - municipalities http://ras.gov.rs/uploads/2017/09/mapa-uredba-sr-eng.pdf (modified by authors)

Figure 2 – Temperature deviation for period 2008-2017 (°C) compared to period 1961-1990 [34]

Figure 3 – Precipitation deviation for period 2008-2017 (%) compared to period 1961-1990 [34]

Main spatial and demographic characteristics of these settlements, according defined criteria, are shown in Table 1 for each settlement. Even they are seats of their municipalities, they are still rural in character with dominantly agriculture production, pronounced depopulation and very low population density. These settlements are from different Districts within RSES but have similar structure demographic, planning instruments and land use. All analysed Municipalities have developed Spatial plan, except Bojnik and Merošina all of them have “valid” Strategies for local sustainable development and except Žitorađa and Golubac all have Local plan for waste management. However, topic of CC change or “elementary disaster”, as it is defined within spatial plans, is only mentioned and discussed within them. Other strategies and plans are not discussing measures and actions towards CC adaptation. In the table 2, natural hazards that were discussed within current spatial plans are shown for each
municipality. Municipality Merošina was involved in cross border cooperation project with municipality in Bulgaria regarding CC - Prevention and mitigation of the consequences of natural and artificial disasters. Municipality Golubac faced huge floods in 2014 and 2015 and since then, city formed Headquarters for Emergency Situations which is in charge for acting in extreme weather events. This is one of the rare cities/municipalities that have implemented measures for floods protection (the greatest threat is river Danube).

Table 1. Analysed settlements - main spatial, demographic and vulnerability data

| Settlement | Bojnik | Trgovište | Žitorada | Golubac | Gadžin Han | Merošina |
|------------|--------|-----------|----------|----------|------------|----------|
| District   | Jablanica | Pećinja | Toplica | Braničevo | Nišava | Nišava |
| Municipality (M) census 2002 | 13,318 | 6,372 | 18,207 | 9,913 | 10,464 | 14,812 |
| SORS 2017 | 10,310 | 4,620 | 15,197 | 7,541 | 7,098 | 13,130 |
| Population density inh/km² | 39 | 12 | 71 | 21 | 22 | 68 |
| Number of settlements in M | 36 | 35 | 30 | 24 | 34 | 27 |
| Share of population aged over 60y in M | 37.8% | 27.7% | 36.4% | 39.5% | 50.6% | 37.6% |
| Share of working population in agriculture | 43% | 30.5% | 61% | 45% | 64.5% | 63.1% |
| Land use for agriculture in M | 73.1% | 56.2% | 67% | 41% | 57.7% | 77% |

* Planning documents: rsp, SP, grp
** Strategies: lpwm, cbc, lsd, srd, lsp, cbc
*** Natural hazards: f, tf, l, tf, hw, e, sa, ff, l, ff, fi, sa, ff, l, ff

Table 2. Natural hazards discussed within Spatial Plans for analysed settlements/municipalities

| Settlement | floods | torrential floods | landslides | forest fires | fires | seismic activity | soil erosion | drought |
|------------|--------|-------------------|------------|-------------|-------|------------------|--------------|---------|
| Bojnik     | x      | x                 | x          | x           | x     | x                |             |         |
| Trgovište  | x      | x                 | x          | x           | x     | x                |             | x       |
| Žitorada   | x      | x                 | x          | x           | x     | x                |             |         |
| Golubac    | x      | x                 | x          | x           | x     | x                |             |         |
| Gadžin Han | x      | x                 | x          | x           | x     | x                |             |         |
| Merošina   | x      | x                 | x          | x           | x     | x                |             |         |

On the other side, regarding rural development, in 2014 Strategy for agriculture and rural development was adopted and, as one of the priority areas, adapting and mitigating to the impact of CC was recognized [35]. Unfortunately, this Strategy just defines this as a threat, but clear and concrete measures for adaptation are not suggested. In 2018, National program for rural development for period 2018-2020 was adopted in order to help implementation of the Strategy. Again, this program only
touched on topic without concrete proposals [36]. According to classification of OECD and Strategy for agriculture and rural development, 75.1% of the country territory is defined as rural and 49.9% of total population lives within it. Rural areas/rural settlements, represent important part of the country territory and because of their diverse topography, depopulation process and devastated economy, they are underdeveloped. In 2017, agriculture production, forestry and fishing, had share of 7.3% in national GDP and this value decreased for 11.2% - in 2016 share was 8.22% [1].

Based on the conducted analyses, rural settlements in Serbia are endangered from CC and highest negative impact is on the agriculture, built and natural environment. Since agriculture is dominant industry within rural settlements, economic development is also jeopardized. On the other hand, built environment is mainly used for housing so safety of the residents is endangered. Hazards have impact on natural environment – especially on water resources and forests causing fires, and also life quality and population health is threatened. Decrease of agriculture yield is leading to “unstable” economy of the settlements and their rural municipalities. On the other hand, devastated economy is trigger for migration of young people looking for a job. Lack of living conditions caused by landslides, soil erosion and water pollution is also causing rural – urban migrations and creating unfavourable social structure. With depopulation process, elderly population is dominantly in rural settlements which is a threat to development of modern technologies in field of agriculture, and development of other industries that could revive deprived areas and contribute to balanced local and regional development.

Analysing all these rural settlements and their municipalities on the one side and CC impacts, regulation and current state on the other side, it is obvious that there is interrelation between them and that efficient adaptation to CC could be one of the main tools for improving rural, and at the same time balanced regional development. Efficient adaptation measures are depending on rural development because depopulation process – migration rural to urban and negative social structure are representing threat to CC adaptation. Even each of the municipalities has developed basic planning documents, and municipality Trgovište even has Plan for rural development, still all these documents are just “recognizing” these problems and defining some “possible” directions for adaptation which is too in general and very similar in all plans. Local context and local human, technical, built and natural resources are not considered adequately, which could threaten process of adaptation. None of the rural settlements has Risk assessment plans according to its current state. Another problem is politics interfering, because these municipalities often change government structure and each authority makes short term plans in order to “achieve more for less time”. All the suggested measures does not have implementation, evaluation and monitoring plans, and often they stay within the planning documents.

CC impact and devastation of rural areas must be mutually observed and process for adaptation depends on development process and vice versa. Determent of this interconnectedness is crucial for successful mitigation, adaptation and development process. Even though Serbia is only EU candidate, it is important that its strategies are in accordance with European. In 2014 EU has adopted Rural Development policy priorities in the 2014-2020 programming period [37], within which six priorities were defined. Priority five within this policy is Resource-efficient, Climate-resilient Economy and within this priority are five focus areas regarding CC. EU rural development policy is funded through the European Agricultural Fund for Rural Development (EAFRD) and it is required to spend a minimum of 30% of the total contribution from the EAFRD to each rural development programme on climate change mitigation and adaptation as well as environmental issues. Serbia is not EU member, but still IPA and IPARD funds, and other European funds are available and could be supportive for adaptation and actions. Main problem is that awareness of the residents regarding CC is on a very low level, indifference of local authorities and residents and lack of professionals in rural areas. Mainly strategies are done for urban areas and rural areas are put aside which in case of Serbia must be changed since this areas occupy significant territory.

5. Conclusion
CC as a great threat of today, has very negative increasing impact on human lives, natural and built environment and it cannot be observed independently because there are many factors, that together with
CC, endanger quality of life. This impact is pronounced in both urban and rural areas, and there are many strategic documents regarding urban areas. Rural settlements are not considered within CC strategies, and so far only agriculture, forestry, water resources, natural biodiversity and ecosystems protection are considered within Draft of the First national plan of adapting to the changed climatic conditions for the Republic of Serbia. In order to improve rural and regional development and to have efficient CC adaptation programs, it is essential to determine interrelation between rural development and CC. CC adaptation should be observed as a tool for balanced rural and regional development, and rural development as a measure for adapting and mitigating CC and its impacts. Since 75% of the country territory is rural, this is essential for future plans and strategies regarding rural and agriculture development, because one action pulls another and depends on it.

In order to develop sustainable and efficient mechanism in terms of planning and development of rural areas on one side and efficient adaptation measures on the other side, analyses shows that decisions must be on local level – level of the municipalities. These measures must be long term and involvement of different professionals and local resources is mandatory in order to have comprehensive approach. Risk assessment and management must be contextually defined for each municipality and even maybe for each settlement or group of settlements if they have same specifics. Previous practice where every strategy was too general and measures were same as in the planning documents of higher level didn’t gave concrete results and so far there are no improvements in CC adaptations in these areas. Every municipality and settlements within it have different types and degrees of vulnerability and exposure and so adaptation measures and development strategies must be defined. Plans, programs and strategies for rural development must recognize CC adaptation as essential tool – catalyst for balanced development. These documents must have sections regarding CC and it must be defined as a strategic priority which programs will be contextually developed. Rural development cannot be planned without CC adaptation and also CC adaptation is not possible without even development of all areas - urban and rural.

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