

## **SUSTAINABLE RURAL DEVELOPMENT IN SERBIA – RELATIONSHIP BETWEEN POPULATION DYNAMICS AND ENVIRONMENT**

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**Abstract.** In this paper the relationship between population and the environment, and their influence on rural sustainability in Serbia, using quantitative typology of rural areas will be examined. The typology is based on the net relative change of population in rural areas in Serbia, according to the difference between the number of inhabitants at the end of the studied period (2011) and a hypothetical population that each rural settlement would have if the population in base year (1961) was changed proportionally to the change of total rural population. Research results indicate types of population dynamics of rural areas with different scale and intensity of environmental degradation: progressive type with favorable human and economic potentials, strong urban influence and huge environmental transformation; stagnant type with advanced agricultural and demographic dimension which imposed pressures to the natural environment; regressive type with heterogeneous demographic, social and economic features, and different impacts on natural and social environment, and dominant regressive type of rural areas highly characterised by the deficient in human and economic potential and preserved natural resources. Based on analysed rural particularities it can be concluded that the different human, environmental and economic potentials and obstacles of determined types of rural areas should be the starting point in defining appropriate sustainable strategies and development directions.

**Keywords:** population, environment, typology, rural areas, Serbia.

### **AIMS AND BACKGROUND**

Sustainable rural development is defined as a development oriented policy concept of permanent mitigation of poverty and insufficient development of rural areas, as well as a concept designed to develop rural areas through activation of self-reliance and careful allocation of state resources, and enforcement of economic growth<sup>1–4</sup>. The core of the problem is in finding balance between environmentally acceptable demographic and economic development, socially fair and spatially and regionally balanced development. Problems and rural development priorities in Serbia do not

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match with the priorities defined by the European Union. Step forward was adoption of the National Strategy for Sustainable Development in 2008. However, the imperative should be developing appropriate national strategies to enable better integration into the European Union and regional schemes<sup>5–7</sup>.

In order to study population-environment issue three approaches have been proposed: pessimistic, optimistic and neutral. Pessimistic theories started with Thomas Malthus at the beginning of the XIX century who formed subsequent discourse on population-environment relations impending doomsday scenario<sup>8–11</sup>. Opposite view on population growth as beneficial describes an importance of technology and individual human responsibility<sup>12,13</sup>. In the past decades there have been an increasing number of researches that stressed the different population characteristics in relation to environmental change<sup>14–20</sup>.

Since 1960 the relationship between population and environment is among the main topics of the UN reports, seminars and conferences<sup>21–26</sup>. Significant document ‘The Laxenburg Declaration on Population and Sustainable Development’ emphasised the importance of demographic challenges in order to achieve sustainable development, primarily through the number, spatial distribution and basic characteristics of the population<sup>27</sup>.

In this paper will be analysed the relationship between population and sustainable rural development in Serbia using an adequate typology which can be a starting point for defining appropriate planning strategies and directions for achieving sustainability.

## EXPERIMENTAL

Different demographic characteristics of the rural areas in Serbia emphasise the need for adoption of adequate typology, as an instrument for achieving sustainable development goals. Typology of rural areas according to population dynamics has to take into account the similarities and differences in regional and local levels to respond to the objectives of this research. The starting point is to analyse the rural changes over in order to explain heterogeneity of population distribution as one of the most critical determinants of environmental resilience.

The first step in the methodology is the identification of the rural areas in Serbia based on the administrative criteria. Rural areas covers approximately 80% of Serbian territory, with 131 municipalities, 4542 settlements and 2 924 990 inhabitants. The second and most important step is directly related to the determination of different types of population dynamics: progressive type, stagnant type, regressive type and dominant regressive type. The typology is based on the net relative change that represents the difference between the number of inhabitants in each rural settlement at the end of the studied period (2011) and a hypothetical population that settlement would have if the population in the base year (1961)

was changed proportionally to the change of total rural population in Serbia. Determining the different types of population dynamics can be made on the basis of the following relations:

$$\begin{aligned} AC_j &= E_j^1 - E_j^0 \\ N_j &= E_j^0(T^1/T^0) - E_j^0 \\ R_j &= E_j^1 - E_j^0(T^1/T^0) \end{aligned}$$

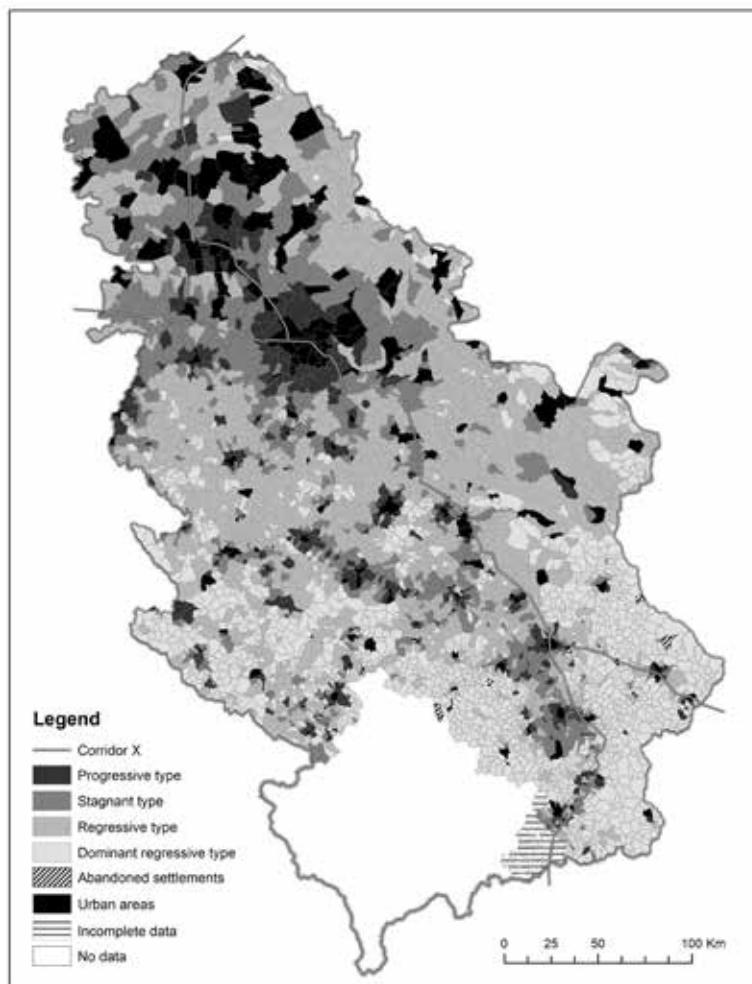
where  $AC_j$  represents spatial changes;  $E_j^1$  – the population in rural settlements in 2011;  $E_j^0$  – the population in rural settlements in 1961;  $N_j$  – the regional development component;  $T^1$  – the total rural population in 2011;  $T^0$  – the total rural population in 1961;  $R_j$  – the net of relative component.

Basic territorial level in this research are settlements. Period of observation is last 50 years, and the used data are from the official Censuses (1961–2011). Additional data used in this research are from various demographic and environmental sources and references regarding to the rural areas of Serbia.

## RESULTS AND DISCUSSION

Rural areas in Serbia before WWII were home for more than three-quarters of the total population of the country. The processes of rapid industrialisation and urbanisation, which started in 1950s caused the migration of millions inhabitants from villages to towns and cities, which led to intensive depopulation, spatial redistribution and changes in vital characteristics and structures of the rural population. As a result, in rural settlements (96% of all settlements) lives only 40% of the total population in Serbia in 2011, and that number is still decreasing which is one of the largest structural development problems of the Serbian society. The modernisation of country after WWII resulted in marginalisation of rural areas which were omitted from development trajectories. These areas were generally treated as a problem not a resource in politics and development programs<sup>28,29</sup>.

According to the values of net relative change of population in rural areas in Serbia, it is possible to distinguish four basic types of population dynamics: progressive type, stagnant type, regressive type and dominant regressive type and their relationships with environmental changes.



**Fig. 1.** Typology of rural areas according to population dynamics in Serbia, 1961–2011

*Progressive type* of rural areas is located around the main urban agglomerations – Belgrade and Novi Sad, and most developed regional centers – Nis, Cacak, Kraljevo, Kragujevac and Sabac (Fig. 1). This type is represented with only 456 or 10% of all rural settlements. Development of these settlements is closely related to the centralised planned industrialisation and urbanisation in socialist period which caused intensive and continuous immigration since 1960s affected doubling of total rural population. Rural settlements situated in this area have been under a strong urban influence which caused huge change of spatial and structural characteristic of rural population. The main demographic characteristics are high population density, favourable natural increase rate and age structure, high share of skilled

population, etc. Under these circumstances rural landscape has changed dramatically, transforming their physical, social and functional structure and acquired urban attributes. However, it is expected that these areas will be transformed into urban regions in the future.

Three components had the major effect on changing rural areas in this type: demographic, economic and land component. Intensive population increase and landscape transformation into areas with urban features caused important changes in natural and social (or ‘cultural’) environment. Environmental transformation due to strong urban influence is determined by pressures such as the conditions of the natural environment, the dynamics of population growth, the intensity of housing, the extent of land use changes, the adequacy of infrastructure and services, the welfare, etc. These changes can cause numerous problems: air and water pollution, loss and degradation of agricultural land, solid waste, spread of informal housing, inadequate housing quality, rural poverty, etc.

*Stagnant type* of rural areas is represented in Vojvodina and rural areas situated alongside the settlements of progressive type and main transport corridors (Fig. 1). This type includes 740 villages or 16.3% of total rural settlements, with almost one third of total rural population (decline of 200 000 people in 50-year period). Development of these settlements is strongly related to rapid industrialisation and economic development of major urban centres, as well as regional and sub regional centres and medium-sized towns. General demographic characteristics are favorable gender and age structure (with population in optimum fertility and working age), educational level, etc.

Rural areas of this type are the most developed, because of its favourable natural and social conditions and highly productive agriculture, especially in Vojvodina, because of the fertile land and climate conditions as well as adequate structure of agriculture production and relatively well integrated economy. However, highly productive and market oriented agriculture and agriculture-related industry leads to certain environmental problems. Intensive use of pesticides and irrigation resulted in soil degradation<sup>30</sup>. Environmentally sensitive areas such as river basins, lakes, ponds and wetlands are impacted by the intensive land use which can negatively affect their ecosystems<sup>31</sup>. Settlements in Central Serbia within this type were most affected by the process of de-agrarisation. Environmental degradation and loss of the agricultural land do not affect only farmland but also natural areas. The changes in the land use caused various environmental problems: loss and degradation of agricultural land, loss of farm land productive potential, usage the land for rural purposes, but under certain changes, conflicts over land use priorities between population demands and environmentally functions, etc.

*Regressive type* is the most common type in rural areas in Serbia with 1784 settlements or 39.3% of total rural settlements predominantly situated in Central Serbia

and region of East Banat (Fig. 1). Due to very intensive rural-urban migration in the period 1961–2011 these rural areas experienced very high population decline of almost 50%. The contemporary characteristics are population decline, ageing, low rates of natural increase, etc., followed by economic decline (decrease of the GDP, lack of investment, high unemployment rate, etc.) Unlike the previous types of rural areas, with rather homogeneous socio-economic, functional and morphological structure, regressive type has relatively heterogenic characteristics reflected in different genesis (planned and spontaneously formed villages), physiognomy (compact and dispersed type), population size (small, medium and large), economic activities (agricultural, mining, etc.) and functional orientation (local rural centres, touristic centres, eco-villages, ethno-villages, etc.). Most of the settlements keep the rural attributes with diversification of agricultural activities, from extensive farming to highly productive and market oriented agriculture.

There are numerous changes in the natural and social environment of villages in this type due to their heterogeneous spatial distribution and structure. Process of de-agrarisation was important in transformation of the environment, although in a less significant extent than in rural areas of progressive and stagnant type. It is very important to emphasise the social mobility of rural commuters because it is necessary to provide them satisfactory quality of living conditions in order to reduce depopulation, rural-urban migration, abandonment of farmland and to preserve agricultural households. The important issues are also the rural areas in few municipalities (Bor, Majdanpek, Kostolac, Lazarevac, Obrenovac) which have based their economies on the extraction of the rich natural resources, with stressed ecological impact. The environmental degradation caused the negative impact on population health which is correlated to the exposure to those hazards<sup>32</sup>.

*Dominant regressive type* of rural areas is mostly represented in Southeast Serbia and parts of East and Southwest Serbia, predominantly in mountainous, peripheral, and border areas characterised by the modest demographic and economic potential. These areas represents traditionally underdeveloped rural areas, formed by the complex influences of natural, socio-economic, cultural and political factors. Industrial growth in Socialism together with urbanisation push population out of these areas. Left marginally, these areas became ‘desert islands’ and ‘problem regions’. This type of settlement is characterised by demographic exodus – in 1455 settlements (32% of total rural settlements) live only 5.8% of total rural population today. Due to the fact that in the smallest Serbian settlements (less than 20 inhabitants) situated in these area medium age of population is over 50 years it is assumed that numerous villages will disappear in following years. Economic polarisation in Serbia left these rural areas with underdeveloped agricultural structure, mostly based on exploitation of natural resources. Because of the traditional monostructural economy, lack of production capacities and infrastructure, as well as insufficient

human resources, it is difficult to determine proper sustainable development trajectory for the rural areas of dominant regressive type.

Rural settlements of this type are characterised with unfavourable demographic, economic and infrastructural potential, on one side, and preserved ecosystems and rich biodiversity, on the other. The main environmental and social problems of this region is intensive depopulation, population ageing, bad condition of physical and economic infrastructure, isolation from urban centers, the lack of adequate services (in the first place health and educational), rural poverty, small size rural settlements and abandoned villages. In order to diminish rural shrinkage and to revitalise agricultural households it is necessary adequately supported social connections and equal opportunities for inhabitants, especially for elder, women and children, with accessible health care, education and other services. Those measures should contribute to the decrease in poverty and social exclusion. The conservation of natural capital is essential for sustainable rural development of mountainous, peripheral, and border rural areas which can be only achieved with adequate human resources, production capacities, and infrastructure.

## CONCLUSIONS

On the basis of the performed analyses, it can be concluded that the rural areas in Serbia can be divided into four basic types. In progressive type sustainable development strategies should be based on their human and economic potentials, in relation to the urban proximity and influences. The urban – rural relationships should be analysed very systematically prior to sustainable development strategies and decision making and processes of implementing. Development strategies in stagnant type should emphasise natural, economic and human potentials and infrastructure, as essential base for future improvement of their sustainable structural characteristics. Further sustainable development of regressive type of rural areas is particularly ecologically challenging because of their heterogeneity. Therefore, a broader vision and different solutions are necessary, especially in terms of introduction of clean technologies in order to improve the quality of environment and also to minimise negative impact on population health. Sustainable development in rural areas in dominant regressive type should be based on preserved cultural heritage and natural resources, as well as, development of eco-tourism. Additionally, potential of those ecosystems must be used only in accordance to strategically and planned actions. Economic and demographic pressure on the environment is not high, but there are indices of changes, mainly through traditional cattle grazing, loss of quality biomass and illegally disposed waste. The differences between the defined types of rural areas are significant and must be incorporated into the national rural development policy and development planning at local levels.

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