LOWER DANUBE REGION AS A MODEL FOR APPLICATION OF THE CONCEPT OF SUSTAINABLE AGRICULTURAL DEVELOPMENT[1]

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Abstract

Sustainable development represents complex proces which permeates all aspects of human society. Application of the concept of sustainable agricultural development can lead to improvement of all natural resources due to reduction of chemical materials and fertilizers utilization, favoring of autochthonous plant and animal species and development of ecological production in rural areas. Region which is characterized by good natural preconditions for implementation of sustainable development concept is the region of the Lower Danube. Those precoditions are presented mainly by water potential of Danube River and protected natural area National Park „Đerdap" with numerous endemic and relict species. Rational utilization of natural resources can enable sustainable development of this area in terms of production and services (agriculture, ecological food production, products with geographical indication, tourism, hospitality etc.). In this paper authors analyzed the state of main natural resources in the region of Lower Danube with the accent on biodiversity, land and water resources and their management. The authors gave directions for possible sustainable development of this area, with focus on rural areas and agricultural production.

Key words: *Lower Danube region, sustainability, agriculture*

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Introduction

Sustainable development represents complex proces which permeates all aspects of human society. Many human activities which include economy and constant fight for profit caused depletion of available natural resources and disturbance of nature balance. Sustainable development aims to satisfy the needs of global consumer society with, at the same time, reduction of negative impacts on environment. Due to its wide application, the sustainability concept aims to merge three aspects/pillars of the society: *pillar I* - sustainable development of economy and technology, *pillar II* - sustainable development based on social balance and *pillar III* - environmental protection and rational use of natural resouces. Assumption of sustainable development is based on the fact that society must carefully and rationaly manage economic, social and natural capital. It should be stressed that natural capital cannot be replaced by economic or social capital although it is possible to find the replacement for certain natural resources. These three pillars of sustainabillity are complementary and together enable multifunctionality of many natural resources.

In Serbia, in the last decade of XX century there was lesser pressure of agricultural chemicals on natural resurces due to lesser application of chemical in agricultural production. However, intensification of agricultural prodution which started again with the beginning of political transition process, may lead to numerous ecological problems, especially in rural areas.

Rural areas are defined as spaces which main characteristic is land utilisation for the purpose of agricultural and forestry production. Rural areas in Serbia are areas with population density of 150 inhabitants per km^2. In these areas, depopulation processes are becoming more and more expressed, villages are becoming „old“ which has negative impact on livestock production and grasslands quality (especialy in high mountain areas).

Poor regional planning and non-application of good agricultural practice may lead to depletion of biodiversity represented by genetic, species and ecosystems diversity, which provides sustainability and diversification of natural resources. Unplanned intensive agriculture may lead to leaking of fertilizers, pesticides and animal manure and to soil erosion which pollute surface and ground waters.

Concept of sustainable development considers, among other, larger production of so called ecological food, which can be defined as food produced using methods which exclude modern artificial substances such as pesticides, mineral fertilizers and as a food that does not contains GMO or is tretaed with irradiation, industrial solvents or chemical food additives[3]. Ecological food is produced in a way which is harmonized with national and international standards, and it is marked with label which verifies its origin, quality and safety. In sustainable agricultural development, this production method can merge and improve all capitals: environmental protection due to reduction of chemical materials and fertilizers use, non-usage of GMO, development of ecological production in rural areas which mobilize human resources and ensures economic profitability and development of rural areas. For application of this production it is necessary to educate people and to direct them to change their habbits toward sustainable business which demands a lot of time.

Area which is characterized by good natural preconditions for implementation of sustainable development concept Lower Danube Region. Those precoditions are water potentials of Danube River and protected natural area National Park „Đerdap“ with numerous endemic and relict species. Direction toward rational utilization of natural resources can enable sustainable development of this area in terms of production and services (ecological food production, products with geographical indication, tourism, hospitality and etc.).

Material and methods

Research is based on the results of quantitative and qualitative analysis of natural conditions and agricultural resources of the Lower Danube Region. Data were collected from available statistical documents as well as from many regional and strategic plans and developmental strategies. Data were analyzed using analytical-synthetical stratistical method.

Results and discussion

Lower Danube region (Carpathian area) is located in eastern Serbia and includes territory of the following municipalities: Golubac, Kučevo, Majdanpek, Kladovo and Negotin. This region gravitates toward the

[3] Allen, Gary J. & Albala, Ken, ed. (2007). The business of food: encyclopedia of the food and drink industries. ABC-CLIO. p. 288. ISBN 978-0-313-33725-3.

Danube River and orographically it belongs to southern Carpathians. It is the area of 732,35 km^2 and includes Iron Gate and NP "Đerdap". Climatic and soil factors are favorable for improvement of agricutural production and the Danube River represents the largest water potential of all municipalities. *Capacities of natural resources and vunerability of the National Park „Đerdap“ and its protected area, which includes the largest part of Carpathian area, predispose this area for reaffirmation and development of traditional agriculture and integral and organic production of healthy food with special quality characteristics, based on methods of traditional production. (Nikolić,Popović, 2010:205).*

Precondition for production of healthy food lies in presence and quality of natural resources: air, soil, water and climatic conditions. It should be stressed that present demographic trends show that the number of people in rural areas is in decrease. Migration of people from villages to cities leads to abandonment of agricultural areas and decreasing the possibilities for sustainable development.

Pedological characteristics indicate that the Lower Danube region has various soil types. At territory of municipalities in Lower Danube region the following soil types can be found: chernozem, cambisol, podzol, alluvial deposits, vertisol, sand soils, pseudogley, dystric cambisol and luvisol. Variety of soil types enabled growing of various crops.

Hydro potential of the Danube River, represents the key developmental potential of all local communities. Together with rivers: Timok, Sikolska reka, Jasenička reka, Slatinska reka, Zamna, Pek and its tributaries, it represents the river network of great importance, especially in the part Corridor VII- river Danube, which opens the possibilities for investing, easier connecting of domestic market with foreign market and easier spatial distribution of various final products.

Efforts are made regarding multilateral cooperation with surrounding countries at all levels, for the purpose of strengtening of Republic of Serbia foreign policy. Networking and creating the space for development of all economy subjects is an important step after period of crisis, sanctions and decreasing of economic activities. Work on corridor 7 - Danube basin (Pan-European transport corridor 7), aims to help sustainable development of Republic of Serbia, especially Lower Danube region, by using the potential of the Danube River. Priorities are:

- development of transport, energetics and information-communication technologies (ICT) along the Danube River;
- environmental protection and sustainable use of natural resources in Danube River basin;
- economic development and strengtening of regional cooperation and partnership in the Danube region;
- creation of safe navigation system in Danube River basin;
- establishment of knowledge economy trough cooperation in the Danube region and active role of science for achievement of strategic goals.

Table 1. *Share of agricultural area in total area in municipalities of Lower Danube*

Municipality	**Area (km^2)**	**Agricultural area (%)**	**Number of settlements**
Golubac	367	42,3	24
Negotin	1.089	64,7	39
Kučevo	721	47,7	26
Kladovo	630	45,7	23
Majdanpek	932	21,6	14
Lower Danube region – total	3.739	-	126

Source: *Municipalities and regions in the Republic of Serbia, 2011., RZS, Belgrade.*

According to available data it can be concluded that at the area of Lower Danube there are good natural conditions for development of agricultural production. These municipalities can be considered as rural because they have less than 150 inhabitants per square kilometre (Golubac - 27,2 inhabitants/km^2, Negotin - 39,9 inhabitants/ km^2 , Kučevo - 34,45 inhabitants/ km^2, Kladovo - 37,48 inhabitants/ km^2, Majdanpek - 25,43 inhabitants/ km^2). The share of agricultural land in total area in most municipalities is about 50%, with the smallest percent in Majdanpek municipality and the largest percent in Negotin municipality (Table 1.).

Population

According to the last census of population, households and dwellings in 2011, in the Lower Danube region live almost 100.000 people which is, in compare to 2002, less for about 20.000 people (Table 2.). Reasons for decreasing of population number in Republic of Serbia and in this region should be found in economics situation which lead to population migration, decrease of fertility, increase of number of old population.

Table 2. *Population number in Lower Danube Region*

Municipality	**Population number, 2002**	**Population number, 2011**	**Absolute increase-decrease, 2011 - 2002**
Golubac	9.913	8.161	-1.752
Urban settlements	-	-	-
Other settlements	9.913	8.161	-1.752
Kučevo	18.808	15.490	-3.318
Urban settlements	4.506	3.950	-556
Other settlements	14.302	11.540	-2.762
Majdanpek	23.703	18.179	-5.524
Urban settlements	13.203	10.035	-3.168
Other settlements	10.500	8.144	-2.356
Kladovo	23.613	20.635	-2.978
Urban settlements	10.218	9.768	-450
Other settlements	13.395	10.867	-2.528
Negotin	43.418	36.879	-6.539
Urban settlements	17.758	16.716	-1.042
Other settlements	25.660	20.163	-5.497
Lower Danube area - total	119.455	99.344	-20.111

Source: *Census of population 2002, Census of population, households and dwellings in the Republic of Serbia 2011, first results , RZS.*

About 50% of total population in the region is older than 44 years of age and population under 30 years of age is about 32% of entire population number. In rural areas live 45.684 people that is about 38% of total population number while other 73.771 i.e. 62% of population live outside urban settlements (Table 3.). Considering that so far there are only preliminary results of 2011 Census, according to which in the region the number of people decresed for are almost 20.000 people, it remains to be seen to what extent the change in the population age structure occured.

Table 3. *The age structure of population in the region of Lower Danube*

Age structure	Lower Danube region			
	Urban settlements		Other settlements	
	number	% of total population number in the region	number	% of total population number in the region
Population under 20 years of age	10.911	9,13	13.115	10,98
Population of 20-24 years of age	3.318	2,78	3.573	2,99
Population of 25-29 years of age	3.204	2,68	4.198	3,51
Population of 30-34 years of age	3.017	2,53	4.119	3,45
Population of 35-39 years of age	3.061	2,56	3.671	3,073
Population of 40-44 years of age	3.718	3,11	3.899	3,26
Population of 44 years of age	18.455	15,45	41.196	34,49
Total	45.684	38,24	73.771	61,76

Source: *Author's calculation based on data from Population Census in 2002, RZS.*

Agriculture

In municipalities of Lower Danube Region there are favorable natural conditions for development of plant and animal agricultural production. However, besides unfavorable age structure, there is also large fragmentation of estates, weak clustering of agricultural producers and lack of organized production and sale which could be a problem in the proces of sustainable development.

In the structure of used land, arable land and gardens represent main form of organization in three out of five observed municipalities (Table 4). Presence of arable mail and gardens in total agricultural area is 60,41% at territory of Kladovo municipality, in Golubac municipality 54,84% and in Negotin municipality 51,64%. In Kučevo municipality share of arable

land and gardens is 45,18%, while the smallest areas under arable land and gardens are in Majdanpek municipality - 32,43%. Of entire agricultural area in the Lower Danube region, which is about 170.000 ha, about 50% is arable land and gardens, 3,38% are orchards, 2,42% are vineyards and 44% are meadows and pastures.

Table 4. *Structure of used land in 2010*

Municipality	**Agricultural area (ha)**	**Arable land and gardens (ha)**	**Orchards (ha)**	**Vineyards (ha)**	**Meadows (ha)**	**Pastures (ha)**
Golubac	15.530	8.525	588	237	2.626	3.550
Negotin	70.461	36.388	1.112	2.800	18.145	11.918
Kučevo	34.366	15.525	2.365	137	8.094	8.214
Kladovo	28.806	17.401	289	869	7.104	3.141
Majdanpek	20.089	6.515	1.372	49	9.467	2.682
Lower Danube region – total	169.252	84.354	5.726	4.092	45.436	29.505

Source: *Municipalities and regions in the Republic of Serbia, 2011., RZS, Belgrade*.

The largest participation in the sowing structure have grains, whose participation is from 37,57% in Kladovo, to 58,28% in Golubac (Table 5.). Production of industrial crops is the most intensive at the territory of Golubac, with participation of 9,84%. At the territory of Majdanpek municipality there is no production of industrial crops. Production of vegetables is the most intensive at teritory of Kladovo (13,84%) and in Majdanpek (11,47%). Areas under feed crops are the largest in Golubac (21,10%), Majdanpek (20,40%) and Kladovo (18,42%). Almost half of the agricultural land is under crops which are mainly presented by grains and feed crops (Table. 5).

Table 5. *Structure of seeded arable land, in 2010*

Municipality	Arable land and gardens (ha)	Grains (ha)	Industrial plants (ha)	Vegetables (ha)	Feed crops (ha)
Golubac	8.525	4.969	130	733	1.799
Negotin	36.388	19.822	3.582	3.548	4.571
Kučevo	15.525	6.841	31	571	2.603
Kladovo	17.401	6.539	886	2.409	3.206
Majdanpek	6.515	3.448	-	747	1.329
Lower Danube region – total	84.354	41.619	4.629	8.008	13.508

Source: *Municipalities and regions in the Republic of Serbia, 2011., RZS, Belgrade*

Important characteristic of the Lower Danube region is natural potential for development of orchard and vineyard production. These claims are confermed by data about surfaces under these crops. The largest areas under orchards are in Kučevo (6,88%) and Majdanpek (6,82%), while the largest areas under vineyards are in Kladovo (4,18%) and Negotin (3,97%). Climatic and geographical conditions are favorable for growing of high quality sorts of grape vine, but wrong use of agrotechnical measures may significantly reduce the potential yield.

Areas under meadows and pastures, which are present in the sowing structure, emphasize the potential of this area for feed crops production and engagement of local population in pasture cattle breeding. The largest areas under pastures are in Kučevo (23,90%) and Golubac (22.86%), and the largest areas under natural meadows are in Majdanpek (47,13%) and Negotin (26%).

Cattle breeding in the Republic of Serbia suffers the consequences of low investing in this sector of agriculture. There is a trend of low agrarian support, unstable and unsure purchase channels of raw meat and milk, which does not enable the producers optimal prices. Therefore, there is a degradation of cattle fund in all segments of cattle breeding. According to limited data, it can be conluded that at the territory of Lower Danube there is a decrease of cattle production regardless of favorable natural conditions for its development.

By implementation of Alpine Convention, Protocol on mountain agriculture, Agenda 21 and new FAO iniciative, Iniciative Sustainable agriculture and rural development (SARD) represents the frame which includes all interested parties, and which supports the transition to sustainable agriculture and rural areas development. This iniciative helps reaching set objectives by supporting pilot projects and creating of capacities necessary for village communities and other interested parties to get the resources easier (technological, market, information etc.); it also stimulates good agricultural practice and fairer employment in agriculture. Together with application of local action plans and developmental strategies, the Lower Danube Region could realized its potentials and achieve satisfying level of sustainable development.

Biodiversity

Biodiversity of Lower Danube is characterized by presence of many areas protected by the law such as National park „Đerdap“ and natural reserve „Golubački grad“. According to the Law on national parks (Official Gazette of RS., no. 39/93 and 44/93.), national park can be defined as „area which by its ecological, biogeographical and other characteristics represents natural area of great importance with ecosystems and landscapes of special values in terms of origin and diversity of vegetation, flora and fauna and if it has one or more of the following features: representative biological, geomorphological, geological, hidrological and other forms and proceses of cultural-historical values with representative features of these values created in interaction of man and its environment.“

National park „Đerdap“ spreads on 63.608 ha and includes 43 highly protected species and 124 protected plant species. Relict species in national park are: Turkish Hazel (*Corylus colurna*), English walnut *(Juglans regia)*, Beech *(Fagus moesiaca),* Oriental Beech (*Fagus orientalis)*, *Acer intermedium*, European nettle tree (*Celtis australis)*, etc. In National Park „Đerdap“ there are also endemic species of Balkan penisula: *Erysimum commatum*, *Hieracium mermoreum*, *Achillea clypeolata*, *Dianthus petraeus*, *Silene flavescens*, *Acer intermedium*, *Alyssum petraeum*, *Coronilla elegans*, *Sesleria rigida*, *Cerastium banaticum* and Winter savory (*Satureia kitaibeli*). In this area also live many animal species such as: wild boar, lynx, deer, roe deer, mute swan, Pygmy cormorant, white-tailed Eagle, Golden Eagle, and viper.

Biodiversity of this area represents an important link with countries of Eastern Europe since Carpathian area is located from Bratislava in Slovakia to Iron Gate, where Danube enters Romania, in length of 450 km. This could lead to creation of different strategies of sustainable development promotion in the countries - signatories of Carpathian convention.

Besides NP "Đerdap" at territory of Lower Danube region are located six nature monuments and three nature reserves. At territory of Negotin municipality there is nature reserve Bukovo and nature monuments Zamna and Vratna while at territory of Kučevo municipality there is nature monument Velika pećina. Nature monument Valja Prerast - Rudna glava and Nature reserve Mustafa - Felješane are located in Majdanpek municipality. NP Đerdap and Mustafa - Felješane are listed as potential emerald areas in Republic of Serbia and it should be emphasized that NP "Đerdap" is marked as area of importance for plants (*Important Plants Area* - IPA), birds (*Important Birds Area* - IBA) and daily butterflies (*Prime Buterffly Area* - PBA).

Action plan for agro-biodiversity, instrument of Common Agricultural Policy (CAP), is adopted in 2001 and it provides the basis for introduction of biodiversity in European Union agricultural politics. Priorities of this plan are:

- Improvement and support of agricultural production favorable for environment and those systems which directly benefit biodiversity;
- Support to sustainable agricultural activities in area of rich biodiversity;
- Preservation and strengtening of favorable ecological structure; and
- Promotion of activities for the purpose of preservation of local and endangered cattle or plant species.

Hospitality

One of the pillars of development and improvement in Lower Danube Region is development of services, mainly hospitality and tourist offer. Development of hospitality will strengthen the position of Lower Danube Region at the map of European touristic organisation, considering that this area has natural potentials and cultural-historical heritage from the Roman age. Cultural heritage such as Viminacium, Wine roads - Wine resorts, Roman limes and medieval fortification are favorable for development of all forms of tourist offer and attraction of large number of

foreign and domestic tourists. Gastronomic offer may consist of agro-food products with geographical indication. Domestic agro-food products must be protected for the purpose of possibility of higher price and better position at domestic and international market, ensuring recognition of protected product at the market, direct link of product with geographical area, which gives it additional value and protection of product from copying.

Creation of basis for attraction of foreign and domestic investments will create conditions for regional development and utilisation of its potentials. One of the ways to stimulate agricultural production is to use the possibilities for production of products with geographical indication such as natural products (stone, marble, wool, etc.), agricultural products (tomato, paprika, peas, etc.), agro-food products (cheeses, wines, meat products, etc.), as well as products of old crafts. High quality of products is necessary because „quality, design, reliability and safety are the things that sell the product“ (Р. Стефановић et al., 2009). It should be stated that only products produced in enough quantities are recongnizable at larger market so it is necessary to „support local producers to establish cooperatives to strenghten their market position and promote their food products while simultaneosly contributing to the promotion of touristic offer of ther region“ (Жаклина Стојановић et al., 2010).

Protected agro-food products which make Lower Danube area and Carpathian region distinguished from other regions are: Rtanjski čaj (Winter savory), Homoljski ovčji sir (Homolje sheep cheese), Homoljski kozji sir (Homolje goat cheese), Homoljski kravlji sir (Homolje cow cheese), Homoljski med (Homolje honey). According to data from 2011, in year 2010/11 at territory of Timok region is registrated 9 wine producers and 16 sorts of vine with protected indication of geographical origin. Another agroo-food product with protected indication of geographical origin is Caviar of Cladovo produced by special technological process and traditional recipe of this region[4]. These products are legally protected by adoption of the Law on indications of geographical origin („Official Gazette RS“ br.18/2010) in 2010. According to this law, geographical origin indication is indication which identifies certain products as a product of certain territory, region or locality where certain quality, reputation or other characteristics of the product can be essentially attributed to its geographical origin and whose

[4] http://www.zis.gov.rs/intellectual-property-rights/inidications-of-geographical-origin/list-of-igo.91.html

production and/or manufacture and/or preparation are conducted on a certin limited area.

Production of known agrofood products of this area is in direct connection with preservation of environment that is sustainable use of natural resources. For example, production of Caviar of Kladovo depends on preservation of water resources quality in this part of Danube River and production of Homolje honey is in direct relation to preservation of environmental quality of Homolje mountain and its surrounding.

Management of the environment - problem of communal waste

In Republic of Serbia there are 164 public landfills which do not comply with technical conditions prescribed in EU and 3.251 wild landfills[5]. Urban population in serbia, produce in average about 1kg of comunal waste per capita daily while village population in average produce about 0,7 kg of waste per capita daily. Amount of agricultural waste produced in Serbia is about 13 million tons/annualy and it includes waste of plant and animal origin. In Lower Danube region annualy is produced about 12.379 t of communal waste[6] (Table 6.) and projections indicate that till 2020. these amounts will significantly increase.

Table 6. *Amount of comunal waste produced anually in the Lower Danube region and projections for 2020*

Municipality	**Population number, Census 2002**	**Amount of produced waste in 2009, in tonns**	**Projection of produced waste amounts in 2020, in tonns**
Golubac	9.392	1.045	1.485
Kučevo	17.825	1.792	2.544
Majdanpek	21.691	2.415	3.429
Kladovo	22.640	2.520	3.579
Negotin	41.380	4.607	6.542
Lower Danube area - total	112.928	12.379	17.579

Source: *National strategy of waste management for period 2010-2019.*

Government of RS in 2003 adopted National Strategy of waste management for period 2003-2008 which represents the first document

[5] Report on environment in Republic of Serbia, 2010.
[6] Year 2009

for waste managament complied with EU legislative in this field. Adoption of this document is in compliance with sustainable development principle considering that one of key postulate of sustainable development is reductiona and recycling of waste that is more efficient use of resources. Law on waste management („Official gazette of Republic of Serbia“, no. 36/09 and 88/10) regulates the question of waste management and responsibilities regarding this issue. Besides this law, waste management is regulated also by te Law on integral prevention and control of environment pollution („Official gazette of Republic of Serbia“, no. 135/04), Law on packaging and packaging waste („Official gazette of Republic of Serbia“, no. 36/09) and Law on environmental potection („Official gazette of Republic of Serbia“, no. 135/2004 and 36/2009). Based on the Law on waste management, in 2010 is adopted the strategy on waste management for period 2010-2019 which should contribute to more efficient solving of problem of waste in Serbia.

At territory of Lower Danube there is large number of old landfills which must be removed for the purpose of human health and environment preservation (Table 7).

Table 7. *Presence of landfills at Lower Danube territory*

Municipality	**Public landfills**	**Old and wild landfills**
Golubac	0	42
Kučevo	1	0
Majdanpek	1	18
Kladovo	1	51
Negotin	1	130
Lower Danube area - total	4	241

Source: http://www.sepa.gov.rs/index.php?menu=10013&id=1007&akcija=showExternal

Solving of this situation requires creation of strategies and action plans of waste management in the municipalities of this region. The largest number of old and wild landfills has Negotin municipality whose local authorities supported creation of Plan for waste management in Negotin municipality which is finalizied in 2008. Main goal of this plan is to contribute to their sustainable development by developing system for control of waste generation, reduction of waste impact on environment, improvement of efficiency of resources, attracting of investors, increasing of economic possibilites that arise from waste and enable proper disposal of waste.

In municipalities of the Lower Danube there is no treatment of waste waters and they are directly discharged into recipient. Of total number of households in the Lower Danube region only 18.159 households are connected to the sewage system (about 45%) and that is mainly in urban areas. Totaly discharged waste waters at the level of the entire region are 3.717 thousand m3 annualy and the largest amounts are produced in Majdanpek municipality where is produced almost half of total amount of waste waters. The smallest amount amount of waste waters is produced at territory of Golubac municipality i.e. 197 thousand m3 annualy that is about 5%, which is municipality with the lowest number of households in the region (Table 8).

Table 8. *Waste waters at Lower Danube territory*

Municipality	Total number of households*	Totally discharged waste waters, thous. m^3	Treated waste waters, thous. m^3	Number of households connected to the water supply system	Number of households connected to the sewerage system
Golubac	2.801	197	0	3.578	328
Kučevo	6.360	520	0	2.150	1.945
Majdanpek	7.357	1.768	0	5.897	5.200
Kladovo	8.427	369	0	10.599	4.506
Negotin	15.087	863	0	9.624	6.180
Lower Danube area – total	40.032	3.717	0	31.848	18.159

Source: *Municipalities and regions in the Republic of Serbia, 2011., RZS, Belgrade.*
Note: * *Census 2011, Preliminary results.*

Regulating the question of adequate waste management includes regulating the issue of communal waste waters. Moving toward sustainable development of this region includes solving of this issue by establishment of the system for acceptance and waste water treatment. According to the Law on waters („Official gazette of Republic of Serbia", no. 30/10) there is an obligation of waste water treatment till the level which does not affect standards of recipients quality i.e. till the level which is in compliance with the maximal emission limits. European strategy for Danube region considers renewal and preservation of Danube river quality, managment of ecological risks and environment preservation.

Conclusion

Lower Danube region can be considered as a region with excellent natural resources for implementation of sustainable development principles which would improve the quality of life of local population, especially in rural areas, and decrease migrations toward urban areas and which would preserve environment and biodiversity of protected natural habitats.

Sustainable development of Lower Danube region considers activities at reduction of depopulation trend and enabling of conditions for equal development of all municipalities in the region. Possible consequence of lack of system support to integral village development is poor social-economic development of rural areas and migration of population from villages to cities and abandoning of large agricultural areas. Rural areas are uninhabited and marginalized, especially mountain villages, with low traffic and communal infrastructure.

Conditions which should be satisfied to enable sustainable development of area consider the following: balanced development of rural and urban areas and closer integration of municipal institutions in the region, strengthen the concept of regional competitiveness and connectivity, improvement of communal infrastructure, protection and use of nautural resources based on principles of sustainable development, public participation in planning and adoption of good practice priciples, development of local economy based on available natural resources and respecting principles of environmental protection.

Sustainable development considers optimal management of waters, preservation and improvement of water quality and their rational use. In the Lower Danube region it considers consistent application of regulations which refer to water protection, increasing access to quality water of rural population, establishment of instalations for waste water treatment, establishment of economic valuation of water services, by application of principle „polluter pays" and „user pays" and ensuring public participation and involvement of water users in all phases of water management.

Sustainable land use in the area of the Lower Danube should include consistent application of legislation relating to the use and protection of land resources as well as prevention of degradation trough changes in land use. All plans and programs for protected areas management should

be in accordance with modern international standards and european directives. For the purpose of environmental preservation in Serbia, regarding agriculture, it is important to implement good agricultural practice, integral production principles and new clean technologies into production.

Sustainable agricultural production must be economically payable and ecologically acceptable, it must be pillar of rural development and rural population existance. Goals of sustainable agriculture must include investing in clean technologies which will reduce pollution originated from agriculture, preserve biodiversity and natural landscapes, preservation of traditional farming systems, concern about animal welfare, preservation of soil i.e. increase of areas under organic and other ecollogial agricultural production systems and growth of public awerness regarding environmental issues.

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