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POSSIBILITY OF USE OF WATER IN THE ECONOMY OF MONTENEGRO

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ABSTRACT

The paper analyzes some possibilities of using water in the economy of Montenegro. In the introductory part of the paper includes a review of water as one of the most important natural resources in the world and Montenegro. He then discusses the importance of geothermal source energy. Currently in Montenegro, there are several buildings with the use of GSHP systems. Montenegro has significant hydropower potential, which is utilized with only 17%. Besides the two existing hydropower on the river Zeta - Perućica and river Piva - Piva, the potential for the construction conventional hydropower have the river Morača, Komarnica, Lim, Ćehotina and Tara. Currently in Montenegro there are 7 small are hydropower the electric power system with the license manufacturers. Technical exploiting the energy potential of renewable energy sources in Montenegro is a very important and reflected in the possibility utilization of wind energy, solar radiation and biomass. Sustainable development of maritime transport in Montenegro implies simultaneously enabling economic development, social welfare and environmental protection. However, apart from Italy, Montenegro by sea is not associated with any other country. According to data of the Statistical Office of Montenegro (2014) in the port of Bar in 2013 with 220 ships was unloaded 621.300 tons of cargo, to overhaul the port Bijela came to 87 ships, have entered 409 cruise ships by transporting 314.961 passengers. Great potential for development of nautical tourism and the promotion of Montenegro as a tourist destination has Porto

Montenegro, a port that is a combination of spectacular destinations, marinas and services of the highest international standards.

Key words: Montenegro, water, geothermal energy, renewable energy, hydro potential, maritime traffic.

INTRODUCTION

As a consequence of global warming, widespread drought and polluted water systems, as opposed to a growing global population, the availability of clean drinking water will represent a first-rate challenge in the years to come. According to the American "Stratford" 2015 provided an increase of 17% in global demand of water, only to increase agricultural production. According to the same source, by 2025 the growing global population will increase the demand of consumption of drinking water for an incredible 40% (Zdravković, 2015). Provide access to fresh drinking water and provide basic sanitation for all, is a global task and challenge that defined the UN. This is also the reason why the UN General Assembly in 1992 passed a resolution according to which are 22 March of each year is designated as "World Water Day", the period from 2005 to 2015 was declared the International Decade for Action "Water for Life". International Bank for Reconstruction and Development (2003) in "ECSSD - Environmentally and Socially Sustainable Development Europe and Central Asia, Water Resources Management in South Eastern Europe" was approved by the new corporate strategy of water resources, which argues in favor of a stronger involvement of the World Bank, not only in relation to the improvement of water management, but also in connection with the rehabilitation of water resources and investing in them, where there is a need for development. Water management strategy of the World Bank makes a difference within a framework between: policies and investments in a broader sense affect the management of water resources at the river basin or tributary (for example, infrastructure for multipurpose storage, flood control, water quality and the protection of sources, the distribution of water, river basin institutions and management instruments) and policies and investments that affect water users (such as irrigation and drainage, water and sanitation, environmental protection, electricity production in hydropower). In the "Road Map Resource Montenegro," the Ministry of Economy Government of Montenegro (2011) points out:

1. Supplying the population with water (82%) takes place in Montenegro through water supply systems groundwater. Only the water supply system Herceg Novi work uses surface water Bilećkog Lake, and the water system uses surface water Pljevlja Otilovićkog Lake. The remaining 18% of the population is supplied with drinking water from their own water systems, directly from springs or from cisterns. About 40% of the rural population has no quality supply of drinking water,
2. For the needs of industry and mining, including thermoelectric facilities that use water for cooling during the period of their most intensive development and work (from 1978 to 1993), was used on average per year between 60 and 142 million m³ of water, or an average of about 97 million m³. Water consumption for the needs of industry from public water supply systems in the given period was approximately 5-12 million m³/year, an average of 9.5 million m³/year, while the biggest part of securing from their own sources (including water recycling),
3. The prevailing pollution in Montenegro wastewater concentrated sources - settlements and industry. In comparison to the quality classes that are provided by the "Regulation on categorization and classification of waters" shall be determined by the state of water quality. The quality of groundwater in natural conditions, with the exception of coastal aquifers Montenegro under the influence of the sea, for the most part of the year corresponds to the first class. In the continental part of Montenegro, the natural water quality in aquifers jeopardized only at a few locations, downstream from larger settlements and industry,
4. Extremely bad is the situation in regard to the treatment of waste water to be treated properly only in settlement Virpazar (Rijeka Crnojevića) and partially in Podgorica. Waste water in the coastal region of Montenegro discharged directly into the sea through the undersea drain without pre-treatment. Industrial wastewater treatment is carried out in a very small number of industrial plants, and even then there are no guarantees that it is done properly.

Our research evidence based on similar studies Zdravković (2015) indicates that the current transitional conditions, with the desired revival of the economy, there will be an "impact" to the water supply systems of settlements, that no serious work on the expansion of the network are will not be able to withstand the increased consumption. A particular problem is the pollution of underground water, which causes agriculture, food about in part because of the use of fertilizers, and the other due to wastewater from rural areas. Also, a big problem is the water pollution from unregulated landfills in Montenegro. Water and waste are inextricably linked and disastrous. Each waste sooner or later

reaches the groundwater and polluting them. It is durable and invisible to the human eye process. Montenegro will sooner or later feel the consequences of not caring for waste.

RESEARCH METHODOLOGY

Water resources are an important factor in the development of Montenegrin economy. Today it is considered that water resources are most important to undeveloped countries and developing countries, where you structured economy of a country. However, water resources are increasingly being threatened sled excessive exploitation and inadequate protection. More and more the emphasizes the need to protect and control activities. Hereby adopted and implement the strategy, within which the main guidelines of how to rationally use the available water resources. To manage water resources means to use them, but in a rational manner and on a sustainable basis. Economic development of Montenegro will depend on the success of implementation of the adopted strategy on sustainable development and management of water resources. The subject of this work is some possibilities of using water for the Montenegrin economy. The whole information volume in this article was obtained through specific methods(method of comparison, descriptive methods, methods of induction and deduction), for the selective research, respecting all its stages from the methodological point of view: identification of the researched issue, research framework delimitation, information collection, data processing, analysis and interpretation drawing up the conclusions. Research also played an important role in the article, which consisted, on one hand, in the identification of other studies and articles on the same subject, and in the processing of some statistic data, on the other hand. Hence, the information sources used can be classified into governmental sources (statistic, ministerial and from research institutes), and into non-governmental sources (independent publications), both in domestic thus and in the international literature.

ANALYSIS AND DISCUSSION

In the cycle of movement of drinking water (water steam, rain, water in commercials and lakes, groundwater, water in glaciers) people can use only 0.05% of its total amount. Quantitatively speaking, the largest resources are in Asia (36%), followed by Latin America (26%), North America (15%). Africa has 11 % Europe 8 %, Australia and Oceania 4 % of water resources. Least of

water per year the surface (below the world average of 317.000 m^3/km^2) have Africa (134.000 m^3/km^2), Australia and Oceania (269.000 m^3/km^2) and Europe (277.000 m^3/km^2) and a maximum of South America (672.000 m^3/km^2). According Gigović (***) in 1989, the amount of water in the capita amounted to approximately 9.000 liters per year. However, according to the projection of population growth in 2025, every inhabitant on Earth can dispose of 5.100 liters per year. Observing the distribution of drinking water per capita, the difference in quantity water per capita is enormous. For example, in North America, the amount of water per capita is 19.000 liters, while Kuwait has at least water per capita (75 liters). According moderate demographic processes of the world's population will be from the current 6.3 billion by 2050 to increase to around 9 billion people. The annual amount of water per capita in Africa will be reduced from 4.870 in 2002 to 2.240 liters in 2050, in Asia from 3,580 to 2.590 liters. It is estimated that in the next 20 years, water use increased by about 40 %, and that 42 % of the world's population live in countries without drinking water. Therefore, effective water resources management (WRM) is essential for sustainable growth and for the fight against poverty. Inadequate water policies and inadequate institutions and regimes pricing draining the budgets of central and local are authorities and lead to mismanagement of water resources and poor service delivery. What is the situation in Montenegro?

Water potentials are one of the fundamental development potentials of Montenegro. The importance and exceptional characteristics of some natural values in Montenegro has been recognized by international organizations dealing with the conservation of natural values. In the framework of UNESCO protected basin of the river Tara (program Man and the Biosphere - MAB - since 1977), and Kotor and Risan bay (program of the World Cultural and Natural Heritage, since 1979 and since 1980). Skadar Lake National Park has the status of a "significant ornithological areas (IBA)" since 1989, and since 1995, Skadar Lake is on the list of internationally significant wetlands as habitat of water birds, in accordance with "Convention on Wetlands".

The Parliament of Montenegro in September 1991 adopted a Declaration on the Ecological State of Montenegro, which is committed to protecting its ecological identity, reconciling economic and social development with the principles of sustainable development. Special attention in these activities dedicated to water as a key resource for man and his civilization. Therefore, conservation and rational use of available water resources, and natural aquatic ecosystems, is a priority task for Montenegro. To this end, in 1995 passed the "Law on Water", which for the time in a modern way regulate this field. Many years of implementation of the new regulations and changes that have occurred in

international law, led to the launching of activities to amend the existing regulations and their harmonization with the achievements the European Union. The European Parliament and the Council of the European Union and 23 October 2000 adopted the “Water Framework Directive” 2000/60/EC-WFD. The adoption of this Directive, the European Union has fully restored its policy in the field of water. The main platform for the development of the Directive is to manage water resources at the level of river basins and positive experience in the application of EU law in the areas of water in the past 25 years. The new approach to water resources management sets Montenegro and new demands for amendments to the existing institutional framework and legislative basis. To this end, in December 2004 formed the "Directorate for Water", which is with the Ministry of Water Management of the Government of Montenegro in the previous period approached implementation objectives " Water Framework directive". Prepared and adopted new "Law on Water" ("Official Gazette of Montenegro", no.27/07) that is harmonized with European Union legislation and ratified international conventions and declarations (www.upravazavode.gov.me).

Figure 1. River Tara - largest and most beautiful mountain river in Montenegro, water rivers is so clears that Tara is known as the "Tear of Europe", Available from: http:// www.panacomp.net (18.10 2015).

The analyzes, which are carried out for the "Water Master Plan of Montenegro", indicating that Montenegro according to Tomović (2008) has an average of 30,000 m³ of water per capita per year, which makes it a country very rich in water. According to international criteria for assessing the wealth of water, divided into five groups, it is considered that the area is extremely rich in water if there are more than 20.000 m³ of water per capita per year.

Table 1. Overview the amount of water generated in the territory of Montenegro - own water

River - basin	Average flow (m³/s)	The volume of runoff 106 (m³/year)
Ibar	5.97	188.05
Lim	60.56	1.907.60
Ćehotina	17.07	537.70
Tara	77.70	2.447.50
Piva	72.69	2.289.70
Other	0.70	22.05
Total: Black	234.69	7.392.60
Morača	161.60	5.090.37
Skadarsko	84.70	2.668.03
Ulcinj -	28.00	882.00
Boka	60.00	1.890.00
Trebišnjica	23.95	754.42
Other	1.75	55.12
Total:	360.00	11.339.84
Total	594.69	18.732.54

Source: Tomović (2008).

On the territory of Montenegro formed a number of important watercourses that drain to the Black and the Adriatic Sea. The total area of the Black Sea basin is 7.545 km² and the Adriatic 6.268km². Significant watercourses of the Adriatic basin are: Morača, Zeta, River Crnojevića and Cijevna, which gravitate toward the Skadar Lake and from which swollen river Bojana towards the Adriatic Sea. Significant rivers of the Black Sea basin are: Piva, Tara, Ćehotina, Lim and Ibar. The highest average flow which belongs to the Black Sea basin has a river Tara 77.70 m³/s, and the smallest river Ibar 5.97 m³/s. The biggest volume of runoff 106 (m³/year) has river Piva - 2.289.70, and the smallest river Ibar

188.05. The highest average flow that belongs to the Adriatic basin has river Morača 161.60 m³/s, and the smallest river Trebišnjica 23.95 m³/s. The biggest are volume of runoff 106 (m³/yearhas also, river Morača - 5.090.37, and the smallest river Trebišnjica 754.42. On the territory of Montenegro formed the flow of 594.69 m³/s own water, or annually around 18.732.54 m³ average runoff 43 l/s. Flow is equivalent to layer of swelling from 1356 mm.

Table 2. Summary of quantities of water that flows from other areas - transit waters

Watercourse	Average flow (m³/s)	Volume of runoff 106 (m³/year)	Comes from
Lim	8.64	272.1	Albania
Ćehotina	0.23	7.2	Bosnia and Herzegovina
Tara	3.0	94.4	Bosnia and Herzegovina
Piva	2.51	79.0	Bosnia and Herzegovina
Cijevna	14.63	460.8	Albania
Total	**29.0**	**913.5**	

Source: Tomović (2008).

Total transit waters from the territory of the Republic of Montenegro are quantitatively small, are about 29.0m³/s, or about 913.5 million m³ per year. Transit waters are equivalent layer swelling 66 mm annually, or make a small addition to their own waters. The highest specific runoff 60 l/s/km² in the basin Morače, slightly less swelling than 40 do 50 l/s/km² in river basins Pive and Tare. Specifically swelling in the river basin Lim is quite variable in the upper course is about 40 l/s/km², and on leaving Montenegro below 30 l/s/km². River Ibar and Ćehotina have a minimum value of runoff from 14 to 20 l/s/km². Average swelling in the Adriatic Sea basin is about 59.5 l/s/km², and in the Black Sea basin around 31 l/s/km².

Balance of surface waters in the territory of Montenegro shows that annually average precipitation 1.815 mm, and swelling of inland waters 1.356 mm, while the arrival of transit water 66 mm and the total outflow 1.422 mm with evaporation 459 mm. In Montenegro, therefore, falls 25.1 billion cubic meters of water, swells its own waters around 18.8 billion cubic meters, evaporation into the atmosphere returns to about 6.3 billion m³ of water. Great value of the coefficient of runoff indicates that about 80 % of precipitation in the Adriatic basin swells in the form of river runoff, and in the Black Sea 70 % (Tomović, 2008). Despite water resources, about 35% of the territory of Montenegro

suffers from a chronic lack of water, which is only solvable hydro technical. In fact, a large part of the territory of Montenegro, where the largest amounts of sediment (Orijen, Lovćen, Rumija and Katunska area), suffers due to water shortages, because it irretrievably lost in the karts underground. So that the total runoff amounts Q_o= 604 m^3/s, and average 44 l/s/km^2 (world average runoff is 6.9). Potential groundwater are estimated at around 14.000 l/s (www.upravazavode.gov.me).

The project of water supply of the Montenegrin coastal and Cetinje is one of the most important development programs of the Republic of Montenegro, with a direct impact on the main strategic orientation of economic development of Montenegro - tourism. The deficit in water supply of the Montenegrin coast lasts for more than 30 years, and the problem is particularly culminated during the summer months, which significantly affects the quality of the tourism offer. Made are numbers of studies, which are supposed to help in the selection winning solutions and the main project for construction of regional water supply system, which stipulates that the water from springs Karuč transported to municipalities in the Montenegrin coast. For this project a Public company "Coast Regional Water Supply", which in the past 15 years in the construction of this system has invested about 17 million €. These resources was pierced tunnel Ina, built reservoir Đurmani, part of the pipeline between Budva and Herceg Novi, as well as a portion of buildings in this part of the route. However, due to the lack of quality assets, works on this building cannot take place for several years (www.mrt.gov.me*)*.

Our research evidence based on similar studies Misailović (2006), indicates that for rational problem solving water in Montenegro apply to general technical and technological principles that are at the same time the basis for the adoption of appropriate legal solutions:

1. To inland waters in, which are formed on the territory of Montenegro, shall be, in terms of both quantity and quality, use planning, repeatedly and rational; spatial and temporal occurrence disparities water must be equalized and the creation of water storage in reservoirs multifunction systems and transport water from areas where it has - to remote areas where it is needed; water quality needs to improve facilities for the preparation of drinking water, modern technology and with minimum energy consumption; the right must be used for local water sources, and regional system with great distance from other municipalities transported only the necessary amount of water,

2. The quality of water from the territory of Montenegro after use and pollution must be repaired construction of the wastewater treatment plant before releasing into watercourses; states should stimulate the introduction of modern and replacement of outdated wastewater treatment technologies; at any time it is necessary to flush the biological minimum of reservoirs and flow regime for processing of small water in watercourses; an example of the "polluter pays" principle and construction discharges treated wastewater over space operation clean water,
3. Flood protection of internal waters will be realized performing required works and measures, including: the construction of line protection systems in vulnerable zones (passive defense); development of storage basins to reduce flood waves (active defense); applying to investment measures - spatial planning, which addresses or restrict construction in vulnerable areas, in order to stop the constant increase in potential flood damage; application of anti-erosion protection measures accumulation system so that they could carry out their multi-valued functions,
4. Transit waters must be used in Montenegro in order to close the water management balance in the future. In addition, all solutions in the use of transit waters will be problematic because of the poor quality of waters flowing from upstream countries - this quality is below the allowable limit, and it is difficult to influence. European framework directive for water provides hope that the upstream basin state of repair. Therefore it requires the active participation of the state in international cooperation when are it comes to water.

Geothermal energy is attracting increasing attention in terms of energy, not only because of the financial support, but also because it is a reliable source of renewable energy that does not emit CO_2. The big advantage of geothermal energy compared to other renewable energy sources is the fact that geothermal power plants generate electricity 24 hours a day, seven days a week, regardless of weather conditions, and the costs of investment in geothermal energy are relatively smaller than the cost of investing in other renewable energy sources. It is anticipated that by 2030, the production cost of electricity from geothermal energy amount to 7.3 cents/kWh, which is less than the predicted price of wind energy 8.1 cent/kWh or solar energy 12.5 cents/kWh. Also, it is assumed that by 2015 the installed capacity of geothermal energy will rise by 89% and installed capacity to 12 GW with, as it was in 2009, will rise to almost 21 GW by 2015. If the installed capacity according comprehends the continent, the review would look as follows: Asia 47.6 % North America 42.3 %, Europe 10 %, Latin

America 0.10 %. Geothermal energy is exploited in over 20 countries worldwide, and is considered to be Iceland, which plans to fully launch fossil fuels, have the highest production, followed him to Indonesia (3.200 MW), Philippines (3.246MW) and Mexico (1.481 MW) (Zelenko,***).

According to Kažić and Tombarević (2015) is currently in Montenegro, there are several buildings with the use of GSHP systems (3 administrative buildings that use ground water through open systems and 1 school with a closed vertical system - geo probe). One of the administrative structures (ATLAS Center) includes a Residential part. Facilities EUROPOINT and ATLAS center with GSHP - open systems and appropriate HVAC installation which is used for heating and cooling the building. GSHP systems in these buildings are supplied with water from underground wells over a depth of 35 m to 40 m, a diameter of about 200 mm.

Figure 2. Atlas Center in Podgorica - uses system GSHP, Available from: http://nekretnine.me (19.10 2015).

The temperature of ground water throughout the year ranging from 12 °C to 14°C, and the system comes with the temperature changed by ± 5 ºC to 10 ºC. Overall, although the energy point of view, the most economical, the impact of these systems on the environment is potentially problematic. In fact, those systems consume a relatively large amount of water (150 - 200 l/h per kW), which in this case represents a significant resource of potable water. The increasing use / extraction of groundwater can lead to lowering their level of

underground resources and depletion of drinking water. The current rules for the use of GSHP systems apply only to the use of water to the public good. Thus, under current regulations, it is necessary to ask if a concession is pumped out more than 86 m³/day (about 1 l/s). In the case of private ownership of land where the borehole does not require concession, regardless of whether the water exceeds the limits for use of the border. Elementary School "Milan Vuković" in Podgorica also used GSHP system. Thermal pump is used for heating and cooling the building is associated with the earth closed vertical system - geo probe. In the tubes is a mixture of water and anti-freeze (70 % water and 30 % glycol). Underground heat exchanger consists of two vertical wells depth of 70 m. Electrical strength heat pumps is 2 kW with efficiency coefficient EER (COP) ≈4. In the final stage of construction of the facility (ECO building) to be cooled and heated using GTE: is heated using GSHP with open system, cooled by "direct" system through the ceiling, through which cooling water is ground water directly from boreholes, air cooling for ventilation is done through air chambers, whose refrigerators are supplied "directly" cold water from boreholes and partially undercooked water used in the process control humidity. Borehole - the source at a depth of 30 – 35 m, while used as sink shallow wells on the surface. In cooling mode, the heat pump is only in the role of "auxiliary" cooling devices within control humidity in the house, in order to prevent condensation on the cooling ceilings. In winter, the heat pump operates in the GSHP and supplies thermal energy air chambers that allow air heating object (Kažić and Tombarević, 2015).

Montenegro is committed to join the developed countries in Europe and to attempt zest the include in their development, but in that their effort she has a huge backlog in terms of economic, technological, administrative and human resources, as well as most of the former socialist countries. For its part, the European Union has developed methodology for acceptance of these countries, which has the task to prevent the destruction of the economies of these countries, but on the other hand to enable these countries, rapid development and gradually strengthening the competitiveness of their economies, and within them and their rural development (Mirković, 2010).

Our research evidence based on similar studies Đokovic and Živanić (2011) indicates that the technical usable energy potential of renewable energy sources in Montenegro is significant. Thus, according to the Ministry for the Environment, Land and Sea Italy (2007), the most attractive locations for the utilization of wind energy potential in Montenegro: riparian zone: maximum wind speed in the country were measured in the area of Rumija, hinterland Petrovac, the hinterland of Herceg Novi and Orahovac. In all these areas

average wind speed exceeds 6 m/s; the mean wind speed in the hills around Nikšić amounts 5.5 - 6.5 m/s. The existing infrastructure of roads and electricity networks provides a good basis for the development of projects for the use of wind energy potential. Considering only the most suitable area to install wind generators (with a capacity factors greater than 25 %), the Ministry for the Environment, Land and Sea Italy (2007) concludes that the Republic of Montenegro has wind energy potential of 100 MW, counting only areas with the highest wind (where the wind speed over 7 m/s). If we take into account the zones with medium potential, this value reached nearly 400 MW. Utilization of the said energy potential to produce electricity could provide 20-25 % of annual energy consumption in Montenegro.

Figure 3. Are we going to see such this picture -Montenegro has a good basis for the use of wind energy, Available from: http:// www.greenhome.co.me (20.10 2015).

Montenegro also, according to the Ministry for the Environment, Land and Sea Italy (2007) shows great potential for the introduction of a system for using solar energy, since the number of hours of sunshine (insulations) is more than 2.000 hours per year for most of the territory of Montenegro and more than 2.500 hours per year along the coastline. Therefore, the amount of solar radiation in Montenegro, especially in the coastal and central area, can be compared with the amount of solar radiation in Greece or southern Italy. Specifically, Podgorica has a higher annual amount of solar energy (1602 kWh / m2) compared to other cities in Southeastern Europe (such as Rome or Athens), and therefore the coastal and central regions of Montenegro, recommends the use of solar thermal energy, primarily with the help of passive solar architecture and active solar architecture (solar collectors for water heating and space heating in homes and tourist facilities).

Montenegro has a great potential for the use of the energy potential of biomass, which is primarily related to the forestry sector, and then to the agriculture sector. According to the Ministry for the Environment, Land and Sea Italy (2007) for the assessment of the energy potential of forest biomass represent 36 %, arable land 28 %, while 33 % of the total land area representing undefined type, that is a mix between crop areas and natural vegetation. Distribution of land intended for agricultural purposes in the whole territory of Montenegro is quite uneven: out of 21 municipalities on the territory of 5 municipalities of more than 50 % of the total agricultural land in Montenegro. The most frequent types of rural areas are green areas, permanent pasture and meadows, which make up 87 % of the total agricultural land. The average rate of utilization of land for agricultural purposes is about 12 %. The forestry sector, according to the Ministry for the Environment, Land and Sea Italy (2007) is particularly important and interesting for power systems using biomass as fuel. The potentially available volume of wood from the forest fund of Montenegro, annually, is estimated at 2.6 m^3/ha/ year, while the current rate of utilization of wood from the forest fund is about 1 m^3/ha/ year. An estimated are increase of between 850.000 m^3/year and 1.050.000 m^3/year (including the average share of 30 % of waste from wood processing industry).

Montenegro has a significant hydroelectric potential, which is utilized with only 17 % of the total hydropower potential. In addition to the two existing hydroelectric power plants on the river Zeta - Perućica and river Piva - Piva, the potential to build conventional hydroelectric power plants are rivers: Morača, Komarnica, Lim, Ćehotina and Tara. In the basins of these rivers, there are significant hydropower potential of the first, second or third tributaries for construction of small hydropower. Currently in Montenegro, there are seven small hydropower connection to the electricity system with the manufacturer's license: „Head Zete", „Waterfall Zete", „River Mušovića", „Šavnik", „Lijeva Rijeka", „Podgor" and „River Crnojevića" property Electro- Economy of Montenegro. Energy Development Strategy of Montenegro until 2025 defined as priorities for the construction of hydropower on Morača and Komarnica as the most investigated watercourses. On the basis of tenders I, and, Tender II and issued energy permits Country Montenegro has granted 16 concessions for the construction of 38 small hydro power on the following rivers: Bistrica - right tributary, Bistrica, Šekularska, Babinopoljska, Grlja, Bjelojevićka, Crnja, Zaslapnica, Vrnbnica, Tušinja, Komarača, Murinska river, Trepačka, Raštak, Vrelo and watercourse without a name - Upper basin Morače (www.oie-res.me).

Figure 4. Hydropower Perućica - is the oldest hydropower in Montenegro (begun with the work in 1960), Available from: http:// www.epcg.com (21.10 2015).

However, according Rakočević et al (2015), an analysis of the current status of small hydropower leads to the conclusion that currently lack the basics, strategic planning regarding development of small hydro power in Montenegro, linking plans for development of the energy sector with the water, environment, spatial planning and construction, as well as clearly defined steps, criteria, time frame and financial framework of the approval process of small hydropower. Lack of strategic documents, action plans, and are surface surveillance monitoring of the implementation of the defined goals points to the lack of human capacities of key institutions dealing with the realm of energy and water management. On the other hand, in these frameworks comes to the realization of projects of small hydro power, which are not accompanied by sufficient analysis of their impact on the entire energy system, as well as harmonization of guidelines development. Therefore, according Rakočević et al (2015) in the planning of small hydropower should analyze existing consumption, distribution and state of infrastructure, the need for the development of certain geographic areas, existing use, vulnerability and quality of water and the environment. Only with this kind of planning, constant monitoring of the implementation and its impact on the current situation, review the defined goals and clear guidelines for development can be said to be small hydropower plants develop in a sustainable direction…

Electro- economy Montenegro has the capacity to produce electricity total installed capacity of 868 MW, with a possible multi-year average production of 2.670 MWh / year. However, the consumption of electricity in Montenegro mainly in need of constant energy (over 60 % in the normal operation of the system). According to the plans electric commercial enterprises in Serbia, Montenegro and the Republic Srpska (studies from 1997) power system of Montenegro, based on available existing capacity, depending on the hydrological situation, requires the following additional amounts of energy (GWh / year) in the dry year 4900, in a typical year 4000, in the rainy year 3500(Milentijević et al, 2002).

Montenegro as one of the signatories to the Agreement on Establishment Energy Community has obligation of harmonization of legislation with European Union directives in the field of energy. In the area of renewable energy is the most important directive 2009/28/EC on the promotion of energy from renewable sources. This directive is significant in that it defines the individual national targets for all EU-27 countries. National targets have been defined with a view to the EU as a whole reached 20% of energy from renewable sources in final energy consumption. The Energy Community Treaty on 10 ministerial meeting committed member countries and thus Montenegro to implement Directive 2009/28/EC as defined in Montenegro in accordance with the methodology of the directive, based on the base year 2009, national target share of renewable energy sources in gross final energy consumption by 33 % by 2020. Montenegro in May 2010 adopted the "Law on Energy" which is harmonized with the relevant EU directives (www.oie-res.me).

Sustainable development of maritime transport means at the same time enabling economic development, social welfare and environmental protection. Maritime planning, which must surely be under the traffic science and profession, can no longer be based on meeting the traffic demand, but must be controlled by traffic growth and targeted by direct modeling options to induce the desired demand. The understanding of the transport system requires an integrated approach and knowledge of the basic principles of sustainable development. It involves the systematic study of broader issues - from geo - traffic analysis and dynamics of traffic flows to the elements of transport policy - and regulatory infrastructure, external costs of transport, safety and environmental protection in transport, spatial planning, and new technologies in the function of traffic development.

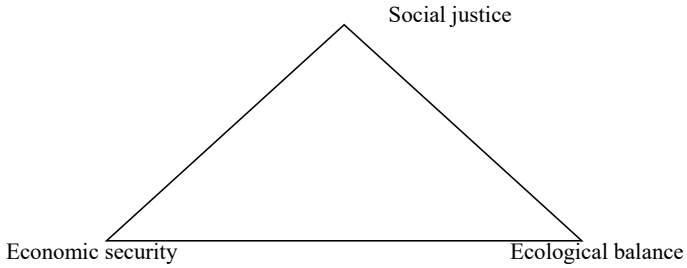

Figure 5. "Magic triangle" of sustainable development (Pokrajac, 2009).

According to Pokrajac (2009) "magic triangle" of sustainable development with regard to economic security includes: (1) increasing the productivity and production of useful goods and services, (2) poverty reduction, (3) ensuring a fair distribution of resources and the constant improvement of equality in all aspects of economic, (4) ensuring employment, earnings, new investment, trade and distribution of goods, (5) the promotion of innovation and entrepreneurship. Social justice refers to: (1) ensuring and encouraging cultural diversity, (2) maintaining and supporting institutions of social systems, (3) support social justice and gender and racial equality, (4) facilitating participation in decision-making of all segments of society, (5) providing equal educational opportunities for all. Finally ecological balance includes: (1) the provision and maintenance of genetic diversity (2) to support biological production, (3) development of resistance to the negative effects on the environment, as well as encouraging and facilitating recovery in the event of the emergence of negative impacts, (4) ensuring a clean environment and a stable climate, (5) promoting eco-efficiency in all parts of society.

According to Vidas (2010), the International Maritime Organization guidelines distinguish three categories - criteria for particularly sensitive sea area: environmental, includes, among other things, uniqueness, sensitivity and exposure eco composition; social, economic and cultural, for example the importance of tourism and fisheries for the economy of the coastal state; but also for its social and development interests, the existence of archaeological and other historical and maritime sites; science and education, for example large areas of importance for scientific research and the existence of special opportunities for the implementation of educational activities. In proclaiming an area sensitive sea area, the International Maritime Organization to consider three interrelated components: the specific characteristics of the area; exposure of the area potentially harmful impacts of international maritime navigation and

the existence of protective measures under the jurisdiction of the International Maritime Organization, which would be adopting respond to identification(existing and foreseeable) the risks posed by this sea area, or to its special characteristics, entered international shipping.

The debate about the negative impact of transport industry on the environment was opened in Europe in the early nineties, the adoption of "Green Book" on the impact of transport on the environment (A Community Strategy for "Sustainable Mobility", 1992), in parallel with maintaining “Earth Summit" and the adoption of Rio - Declaration on Environment and Development (Earth Summit, 1992). The main driver for the development of maritime transport is a growth of world trade. Maritime trade takes roughly two-thirds of overall commodity exchange. In the last ten years, strong global economic growth by an average of 4 % contributed significantly to the growth of maritime trade. Looking ahead, the maritime routes might become with more traffic. As a result, maritime trade could resume annual growth of 3.3 % until 2020, even if the growth of certain products in the maritime sector varies considerably due to changes in trade patterns of the countries. Forecasts for the European Union predict an increase around 125 % in volume of cargo transportation by sea between in 2005 and 2030, which is a clear indicator of the growing importance of maritime transport. Today, 90 % of Europe's external trade and close to 40 % passes through the inner harbor (Damić, 2009). Using the official data of the Statistical Office of Montenegro come to the data that is in the port of Bar in 2013 with 220 ship unloaded 621.300 tons of cargo, that in the same period for repairs in the port Bijela came 87 ships, and that in the Montenegrin waters in 2013 arrived by 409 passenger ships - cruise ships carrying 314.961 passengers. That is, the total number of vessels that arrived by in Montenegrin territorial waters in 2013 amounted to 3.786, out of which 3.192 came by sea, and 594 vessels have been delivered road through the mainland. For vessels recorded entrance 15.788 persons. This is another piece of evidence that shows that Montenegro has become a favorite tourist destination yachting, it is an attractive tourist destination; a large number of the world's nautical.

Figure 6. Marina Porto Montenegro favorite locations worldwide of yachting of clients and cosmopolitan , Available from: http:// www.portomontenegro.com (22.102015).

However, according to the Ministry of Sustainable Development and Tourism of the Government of Montenegro (2015), except Italy, Montenegro by sea is not associated with any other country. Regular boat bond exists between the sea port of Bar and the Italian ports of Bari, Barletta and Ancona. On the route Kamenari - Lepetani organized transportation vehicles and passenger ferry. In addition, there is no regular ship traffic in inland waterway linking the coastal towns of Montenegro. It is therefore necessary to consider the possibility of introducing hydro - boats, capacity of about 250 passengers, which would for example from Kotor to Ulcinj arrived about 90 minutes, which combined with the construction of the pier at the airport Tivat, provide faster transfer of tourists but also the local population in the seaside section. For the improvement of ship traffic would be a significant construction of border crossing Virpazar. With the exception of the marina Porto Montenegro (has 4+ anchors) which has prescribed infrastructure for liquid and solid waste from vessels, other marina in Budva (Montenegro has 3+ anchors, Bar 2+ port, the port of Kotor, Prčanj and Herceg Novi have 1 +) does not contain the rules set by the Regulation on categorization of minimum standards in terms of infrastructure and services. Thus, the port of Porto Montenegro has great potential for development of nautical tourism and the promotion of Montenegro as a tourist destination because the port is a combination of spectacular destinations, marinas and services of the highest international standards. Marina has 250 berths for yachts

from 12 to 150 meters in length, and the plan is to build another 185 berths, of which more than 50 will be intended for super yachts longer than 45 meters.

The Port of Bar owns significant competitive advantages in relation to the Northern Adriatic ports, shortening the transit time and creating savings in the cost of maritime transport. Is integrated with the railway Belgrade - Bar railway and road network of roads, is also a major trading port of Montenegro, which carries out more than 95 % of total turnover. Marina Bar is a marine port that is due to its favorable geographic position ideal as a starting point for cruises along the Montenegrin coast. Port of Kotor is the sea port and its resources and strategic development are directed towards passenger transport, cruise ships and nautical tourism. Receives a large number of cruisers, yachts and tourists, and has no built superstructure for the reception of passengers, are already used temporary facilities (container). Port Budva is set aside as an attractive location is ideal for nautical tourism. It has 330 commercial berths, which are divided into 17 sections. Also, include the Skadar Lake, which has enormous potential for improving water transport by introducing regular shipping lines, and especially to better connect Montenegro with neighboring Albania (Virpazar - Skadar). Sailing on Lake Skadar and visit attractive locations such as: Plavnica, Virpazar, Rijeka Crnojevića represents an attractive segment of weekend tourism. This area can be connected with the Coast by navigation along the Bojana River or through combination of navigation on the lake with bus transportation to the coast.

CONCLUSION

Our research evidence based on similar studies Wolff and Stein (1999), Sanctuary and Tropp (2004), Nieuwoudt et al (2004), Van der Zaag and Savenije (2006), Ministry of Economy Government of Montenegro (2011), Lund et al (2012), Rajović and Bulatović (2013), Rajović and Bulatović (2014), Bulatović and Rajović (2015), indicates the following:

1. Effective water resource management (WRM) is essential for sustainable growth and fight poverty. Poor river basin management increases economic damage and leads to an increased loss of life caused by floods, droughts, landslides and erosion. Low water quality carries health, damages fisheries, tourism and recreational activities, and leads to the disappearance of ecosystems. The low level of services of potable water supply adversely affects the well-being of local communities, while unreliable supply of water for irrigation leads to loss of livelihood. Poor inter- sector allocation

of water can lead to lack of water supply for irrigation, hydropower, water supply and ecosystem maintenance. Inadequate water policies and inadequate institutions and mode of pricing draining the budgets of central and local authorities and lead to poor management of water resources and poor services provided,

2. Water protection is practiced by monitoring water quality and sources of pollution, preventing, limiting and forbidding activities and behaviors that can affect water pollution and the environment, and other activities aimed at protection and improvement of quality and dedicated usability water. Data on sources of pollution, systems for wastewater discharge shall be entered in the cadastre of water protection. The obligation of keeping the "water books" should be implemented in Montenegro. Data on watercourses and other waters, sources and stocks water, water pollution and water facilities should be taken in a unique and comprehensive system of keeping these documents. The best way is to establish the system of water-related documents in accordance with the possibilities of a computer system, which would enable their optimal use, amendment, updating and expansion of the database,
3. The existing water supply systems of Montenegro mainly provide water for urban and municipal centers, while other settlements with the bookmark rural areas not covered by the public water supply. In the interior areas that are covered by public water systems there are considerable differences in the connection. Namely, out of total population of Montenegro 65 - 70% is supplied with water through water supply systems of municipal centers and significant local areas, while just over 30% of the population in rural areas supplied with water from their own water and individually - using sources, construction of wells for groundwater abstraction or construction of cisterns to collect atmospheric waters. Town water supply systems mainly supply suburban and rural settlements from their area. Some of them can be treated as municipal water supply systems since they cover almost all the villages in the municipality. Urban water supply systems cover, apart from 40 towns, 174 suburban and rural settlements (total 214),
4. The average water consumption in Montenegro is extremely high, twice higher than the consumption in Western Europe (where the average consumes about 150 liters per capita per day). Higher consumption in Montenegro (besides the climate conditions), of unintended water consumption (especially in households, but also with consumers in suburban areas for watering gardens) and unreasonably huge losses in water supply systems. In addition to rational consumption, problems in

water supply are related to the lack of water in a part of the coastal region of Montenegro and the majority of our rural areas.

In order to realize the concept of sustainable communities, according to Miles (2002), Higgins et al (2004), Wright et al (2011) that is secured future and prevent planetary catastrophe that produces risk society, it is necessary a profound transformation in all fields on which the present social form. Experience shows that the introduction of quality systems is closely linked to organizational changes and that the necessary involvement of all stakeholders in the economy and society. The imperative of modern society is reflected in the reduction of the intervention over nature, and greater use of knowledge, information and new technologies. Instruments and measures of economic - environmental policy in this way should have a decisive and irreplaceable role. In order to protect surface water and groundwater is necessary to replace existing technologies with clean technologies, build and equip the landfill in a way to minimize impact on surface and groundwater, as well as remediate current unregulated landfills waste. To protect the quality of water is necessary to control construction in areas where it would threaten the quality of drinking water sources and groundwater sources used or planned for the water supply. Areas where there are water sources must be protected against intentional or accidental pollution, as well as the other influences which may adversely affect the safety of water, which is necessary to implement the decisions of the source protection.

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