Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900

Issue 4/2018

NATURAL RESOURCES AND SUSTAINABLE DEVELOPMENT IN A MOUNTAIN ECONOMY

Viorica JELEV[1]

[1] ***Associate Professor Ph.D., Spiru Haret University, Faculty of Economic Sciences, Department of Economic Sciences, Fabricii Street, no. 46 G, sector 6, Bucharest, Romania, Telephone:+040213169783, Fax: +040213169793, E-mail: jelevviorica@yahoo.com***

How to cite: JELEV, V. (2018). "Natural Resources and Sustainable Development in a Mountain Economy." *Annals of Spiru Haret University. Economic Series, 18*(4), 75-93, doi: https://doi.org/10.26458/1845

Abstract

This paper presents the existing situation at national and world level, considering the available water resources, their vulnerability especially in the mountains areas, the impact of climate changes, and the possible conflicts regarding the intensification of water shortage in some regions of the world. I also present a case study on forests in Romania. Beginning with the general data mentioned above, we point out the specific peculiarities of the mountain area hydrology for identifying some aspects which are specific to the mountain water relationship. The analysis is necessary as no specifications regarding the mountain hilly or plain areas are made in the activity regarding waters management. Waters are managed unitary on river basins considering some general principles, unanimously recognized, well reflected into the national and international regulations. As a first stage, traditional economic activities are identified in the relationship of the mountain areas inhabitants with water but also some present approaches. The way the mountain areas inhabitants knew how to live together and capitalize water resources represents a model and impulse for returning to such sustainable solutions, but capitalizing the advantages of modern technologies. Each of these activities referring to waters which take place in the mountains area can represent ways for the research activity and future thorough studies from the technical, economic, social, cultural-traditional point of view and also for environment protection. A main preoccupation might have connection with the evolution of agricultural activities in the mountains area considering the climate

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900
Issue 4/2018

changes and a possible "migration" towards higher areas of some agricultural practices specific to lower areas. The paper also shows a small example of the regaining, by the locals of a community, of an important resource for their lives from the hands of corporations: the forests defaced by HOLZINDUSTRIE SCHWEIGHOFER and stop flooding villages.

Keywords: *management; water resources; vulnerability; mountains area; climate changes; spoil forest.*

JEL Classification: A12, N50, Q01

Introduction

Water is a liquid substance, finite, vulnerable, renewable, a natural resource which conditions and limits the economic and social development of the world, a raw material for productive activities, source of energy and transport way, determining factor in maintaining the ecologic balance, indispensable to the life on Earth. According to the Directive 2000/60 of the European Union in the field of water policy: *Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such.*

A correct management of water is highly important considering that the theoretic water resources of inner rivers of Romania are relatively reduced being only of about 1770 m^3 water per year and inhabitant while in other European countries these reserves are on an average of 2.5 times larger.

Considered as the white gold, water became everywhere in the world an important factor for economic development and growth and generally speaking of civilization. In comparison with the other natural resources, water has certain peculiarities, specific restrictions and multiple functions: a) it is a special means of production; b) from a free good (like air) it became an economic good obtaining the specific of production – commodity: c) it is a highly renewable resource, namely that it can be totally or partially recovered in certain conditions in the process of utilization; d) water cannot be replaced, being at the same time resource and environmental factor, indispensable to life on Earth; e) its behaviour is special, unfavourable, both when it is missing (droughts) and when it is in excess (floods).

The paper contains two parts:

1. Water-Statistical data;
2. Forests, a strategic natural resource, with a little case study.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900

Materials and Methods

In this paper we aimed to identify some data and information concerning the utilization and exploitation of water resources, especially in the mountain area, in order to highlight its specific features, based on the analysis of a relevant reference material. Statistical data on existing water resources at the national and international level, as well as some forecasts which put in evidence a possible water crisis around 2025 were studied.

Water Statistical Data

The mountains of Romania are a defined geographic, economic and social entity with relief, climate, natural and social-cultural heritage, a recognized identity in Europe and in the world.

Mountain areas are environmentally fragile areas that require support for specific protection, development and management, determined by the right to difference, recognized at European and world level, being a common heritage of value that must be recognized and preserved.

The main resources of Romania's mountains are represented by the forest and biodiversity fund, the fodder flora of the natural meadows, the mineral waters, the landscapes and the local anthropogenic factor, bearing the economic and cultural traditions, which determines the revaluation of the resources.

The mountainous area of Romania, representing the area delineated in accordance with the provisions of Government Decision no. 949/2002 for the approval of the delimitation criteria for the mountain area, constitutes a territory of national, economic, social and natural interest, benefiting from a distinct regulation regarding the ways of development and protection, the valorisation of resources, the stabilization of the population and the increase of economic power at local and national level, in the conditions of preserving the ecological balance and protection of the mountain natural environment, based on the international regulations on sustainable mountain development.

According to the law, the mountain policy aims at sustainable valorisation of mountain resources, landscape conservation and biodiversity, as well as the development of specific activities in this area, aiming, among other things, at achieving the following objectives:

a) Protection and conservation of natural resources;

b) Protection and conservation of protected natural areas;

c) Valorisation of available natural resources, within the limits of natural biological regeneration potential;

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900
Issue 4/2018

c) Application of agro-pedo-ameliorative measures to stop the degradation of agricultural and forest lands.

Among the principles underpinning mountain policy, we mention:

1) Optimal valorisation of specific agricultural, fishery, forestry, energetic, industrial, handicraft, tourism and cultural resources existing on the territory of a locality or on a certain area constituted as a natural entity in the mountain area;

2) Diversification of economic and production activities in the mountain area without deterioration of the ecological balance or degradation of the natural environment;

3) Recognizing the objective existence of special natural conditions and the rights of the communities in the mountain area;

4) Development and improvement of the quality of life in the mountain area. Water and forests are strategic elements for any country.

Water is a liquid substance, finite, vulnerable, renewable, a natural resource which conditions and limits the economic and social development of the world, a raw material for productive activities, source of energy and transport way, determining factor in maintaining the ecologic balance, indispensable to the life on Earth. According to the Directive 2000/60 of the European Union in the field of water policy: *Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such.*

A correct management of water is highly important considering that the theoretic water resources of inner rivers of Romania are relatively reduced being only of about 1770 m^3 water per year and inhabitant while in other European countries these reserves are on an average of 2.5 times larger.

Considered as the white gold, water became everywhere in the world an important factor for economic development and growth and generally speaking of civilization. In comparison with the other natural resources, water has certain peculiarities, specific restrictions and multiple functions: a) it is a special means of production; b) from a free good (like air) it became an economic good obtaining the specific of production – commodity: c) it is a highly renewable resource, namely that it can be totally or partially recovered in certain conditions in the process of utilization; d) water cannot be replaced, being at the same time resource and environmental factor, indispensable to life on Earth; e) its behaviour is special, unfavourable, both when it is missing (droughts) and when it is in excess (floods).

From the surface area of the Earth, 510 million km^2 (70.8%) is covered by water and 149 million km^2 (29.2%) is covered by land [Jelev & Vasiliu, 2008a, b]. The

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900

average length of time of water storage in various natural surface or underground reservoirs is shown in Table 1 [Pidwirny, 2006]. A molecule of deep groundwater requires a renewable cycle of approximately 10 thousand years. If this deep water will be polluted, it takes 10,000 years or more to naturally return to the initial quality.

Table 1. The Average Length of Time of Water Storage in Various Reservoirs

Reservoir	Average Residence Time
Oceans	3,200 years
Glaciers	20 to 100 years
Seasonal Snow Cover	2 to 6 months
Soil Moisture	1 to 2 months
Groundwater: Shallow	100 to 200 years
Groundwater: Deep	10,000 years
Lakes	50 to 100 years
Rivers	2 to 6 months
Atmosphere	9 days

Source: Pidwirny, M. (2006). *The Hydrologic Cycle. Fundamentals of Physical Geography, 2nd Edition*. Date Viewed http://www.physicalgeography.net/fundamentals/8b.html.

On the next place are situated the oceans with a water *residence time* of 3,200 years and shallow groundwater with the residence and renewal time of 100-200 years. Regarding the total amount of water on Earth, it is estimated to 1,400 million km^3, distributed as follows:

- Total volume of fresh water: 37.8 million km^3 (2.7%);
- Total volume of seawater: 1,362.2 mil. km^3 (97.3%).

Paradoxically, although 70.8% of the planet is covered by water, only 0.46% of the fresh water on Earth can be directly used [Jelev & Vasiliu, 2008a, b], the remaining 99.54% is not accessible to human use because it is represented by:

- Atmospheric water vapours (0.04%);
- Glaciers and ice caps (77.19%);

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900
Issue 4/2018

- Lakes and swamps (0.35%);
- Ground waters and soil moisture (22.41%);
- Water courses (0.01%).

Available freshwater represents only about 0.0125% of all water on Earth.

Vulnerabilities Regarding Global Water Resources

The 20th century can be characterized by an amazing development of technology and industries and over fulfilment of the terrestrial space and a significant increase of population at the world level. The reverse of the medal refers to the high prejudices determined to the environment: global warming, melting glaciers, the thinning of ozone layer and, additionally, the exhaustion of natural water resources.

The consumption of water resources increased for at least six times. The following 15 years, the Earth will have 50% more inhabitants and waste waters reaching unbelievable values. Still, 1.1 billion people (1 of 5) have no access to the drinking water, 2.6 billion people live without proper hygiene conditions, 3.900 children die daily because they consume infested water, and 88% of the diseases existing at present are provoked by the lack of hygiene and the consumption of polluted water.

Victor Danilov-Danilyan, member of the Russian Academy of Sciences, considers that by 2020-2025 the crisis of water will touch the whole world. First of all Africa, Middle East, South and South East of Asia will be hit by this crisis. Two of the most populated countries, China and India, will also suffer by the lack of water in spite of the natural reserves of drinking water they have at present. It is very probable that soon countries such as Brazil, Russia, Canada and Australia, which have large quantities of water, should conclude agreements with the potentially affected countries in order to share these reserves.

Figure 1 presents with the red colour the areas of the world affected in future by the lack of water, with the yellow colour – the areas with deficiencies considering the economic potential of water and with the blue colour – the areas that will not be confronted with the lack of water (IWMI, 2000). The colour white represents the areas where estimations have not been done. In order to counteract the global warming, some measures can be taken, such as:

- To settle controlled flooding areas and strengthening dikes;
- Protective hydro-engineering works against floods and some urban stocking systems in case of abundant rain falls;
- To consolidate harbour infrastructure and defending works in the area of the Black Sea Coast.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900

Issue 4/2018

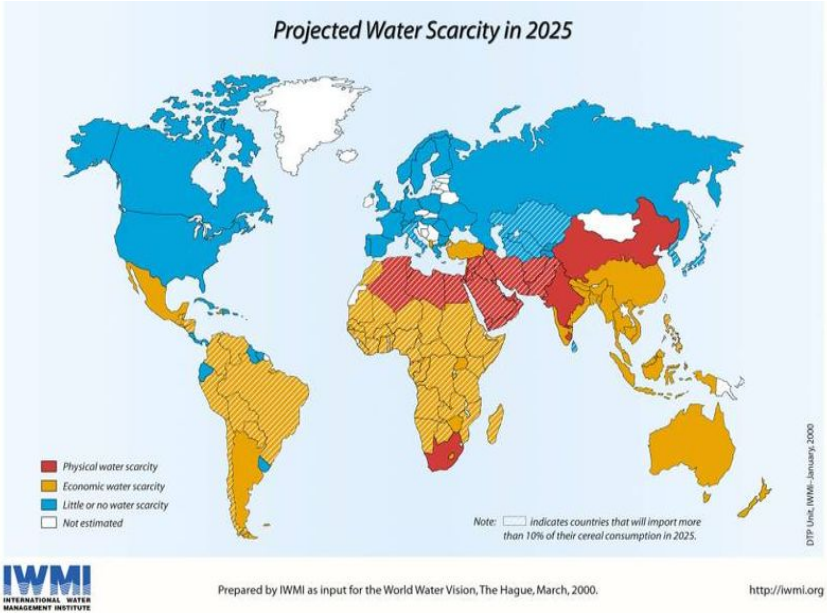

Fig. 1. Areas that Will Face Physical and Economic Water Scarcity in 2025
Source: IWMI, 2000. *Projected Water Scarcity in 2025*. International Water Management Institute Study.

Realizing such complex and multiple economic, social, environmental, tourist and aesthetic functions, water resources are crucial to our model of growth and development, including at present, when our country is a Member State of the European Union. This is the reason why water resources of the country should be analyzed considering their contradictory behaviour produced by the regime of precipitations, hydrographic network distribution, the vagaries of rivers, natural lakes and groundwater layer. The evolution of water management in Romania was influenced by the hydrologic torrential regime of inland rivers characterized by a very high variability in time and space of 1:200 between the minimum and maximum water flow in case of rivers reaching 1/1,000 and even 1/2,000. The total theoretic resource of Romania's water is 134.6 billions m^3, where 40 billion m^3 represent inland rivers, 85 billion m^3 from the Danube (Romania's side) and 9.6 billion m^3 from underground area (Table 2). Total resource utilized is about 38.35 billion m^3/year.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900
Issue 4/2018

Referring to the present day population of the country, it results a specific usable resource in natural regime of 2,660 m^3/inhabitant and year considering also the share of the Danube and a specific theoretic resource of about 1,770 m^3/inhabitant and year, this considering only the share of inland rivers or 5,956 m^3/inhabitant and year including the Danube and the underground waters in comparison with: 566,666 m^3/year/ inhabitant – Island; 102,262 m^3/year/inhabitant – Canada; 82,554 m^3/year/inhabitant – Norway; 68,395 m^3/year/inhabitant – Peru; 46,100 m^3/year/ inhabitant – Venezuela; 44,166 m^3/year/inhabitant – Brazil; 10,291 m^3/year/inhabitant – The USA; 31,410 m^3/year/inhabitant – Russia; 23,187 m^3/year/inhabitant – Croatia; 20,957 m^3/year/ inhabitant – Finland; 19,857 m^3/year/inhabitant – Serbia and Montenegro; 16,294 m^3/year/inhabitant – Slovenia; 11,881 m^3/year/inhabitant – Hungary; 10,256 m^3/year/inhabitant – Austria. According to these data, our country is in the category of countries with relatively low water resources in line with other countries.

Table 2. Potential Water Resources Technically Used for 2010

Billions m^3

Source	Theoretic resource	Utilizable resource	Water requirements
The Danube (the section of)	85.00	20.00	3.43
Inland rivers	40.00	13.68	3.38
Underground	9.60	4.67	0.67
Total	134.60	38.35	7.48

Source: (ANAR, 2013)

Romania has about 4,864 water ways with a total length of about 78,000 km. The characteristics of the main rivers are presented in table 3. Considering their quality, waters are classified in the following categories: class I – very good, class II – good, class III – moderate state, class IV – low state, class V – bad state. For example, in 2012, Romania's surface waters, according to the total length of supervised rivers of 31,621 km, were ranged into the following quality classes: 59.1% class I and II (good and very good), 40.7% class III (moderate condition) and only 0.2% were considered waters of low or bad condition (table 4). For a total supervised length less than 21,161 km in 2011, the classification was of 66.86%

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900

class I and II (good and very good), 32.54% class III (moderate condition) and only 6% low and bad condition waters (INS 2012).

Table 3. The Characteristics of the Main Rivers

Source	Length		Catchment area		Annual medium flow
	Total	In Romania	In Romania	% of total area	
	Km		Km^2	%	m^3/s
The Danube	2 857	1 075	237 104	29	5 700,00
Tisa	962	61	3 237	2	
Someş	427	376	15 740	99	125,00
Crişul	1 212	171	14 860	54	24,90
Mureş	789	766	27 890	94	178,00
Bega	252	178	2 362	66	17,50
Siret	698	571	42 890	96	269,00
Prut	917	742	10 990	39	94,70

Source: „Romanian Waters" National Administration – A.N.A.R.

The main source of Romania's water is represented by the inland rivers. As we showed before, a basic characteristic of this resource category is the very high variability in time and space. Regarding the mountains area, this totalizes half of the drainage volume. There are areas in the world, for example Central Asia, where nearly 80% of water resources are concentrated in the mountains. The specific average flow can vary from one 1/s and km^2 in low areas up to 40 l/s and km^2 in high areas.

Another characteristic is the very strong variability in time, so that in spring, important high floods take place, followed by long periods of drought. Underground water resources consist of water stocks existing in the phreatic aquifers layers and in the very deep layers. The distribution of underground runoff/drainage varies for the large tectonic units on the territory of the country such as:

- 0.5-1 l/s and km^2 in North Dobrogea;
- 0.5-2 l/s and km^2 in Moldavian Plateau;
- 0.1-3 l/s and km^2 in the Depression of Transylvania and Panonic Depression;
- 0.1-5 l/s and km^2 in North Dobrogea and the Danube Platform;
- 5-20 l/s and km^2 in the Carpathians area especially in the Southern Carpathians and in the karsts area of the Jiu and Cerna basin.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900
Issue 4/2018

Table 4. The Quality of Surface Waters in 2012

Hydrographic basins	Total length per monitored body of water	from which			
		Class I and II Good and very good condition	Class III Moderate condition	Class IV Low condition	Class V Bad condition
Total	**31 621**	**18 691**	**12 877**	**11**	**42**
Tisa	1 093	1 001	92	-	-
Someş	2 696	1 413	1 262	-	21
Crişuri	2 196	1 544	652	-	-
Mureş-Aranca	4 557	2 866	1 691	-	-
Banat Area*)	2 330	1 747	583	-	-
Jiu	1 312	915	397	-	-
Olt	3 279	2 081	1 198	-	-
Vedea	920	94	794	11	21
Argeş	2 141	1 034	1 107	-	-
Ialomiţa	1 392	413	979	-	-
Siret	5 614	3 861	1 753	-	-

Source: „Romanian Waters" National Administration – A.N.A.R.
*) Bega, Caras, Timiş, Cerna, Nera

Considering the quality from the preliminary analysis of "at risk" water bodies in our country, on the whole, the conclusion is that from 2,356 permanent fresh water bodies, especially the ones in the mountains areas, 57% are not deteriorated by major anthropic influences being in a very good and good ecological status. Regarding rainfalls, there are important differences among regions from 1,200-1,400 mm per year in the high mountains regions and 400-500 mm in the main agricultural areas in the south half of the country. In the mountains area, owing to the lithological constitution, the permeability is low and the underground water is at small depth situated in the slope deposits or at the foot of the mountains. Sometimes, during the seepage period, waters can mineralize, coming to the surface as mineral waters, for example in Dâmboviţa district (Vulcana, Pucioasa, Pietroşiţa, Bezdead, Ochiuri) representing an inestimable patrimony.

Considering the high importance of water for the mountains area, in the Strategy for the sustainable development of the mountains area, at chapter 1, entitled *Principles on the sustainable development of the mountains area,* it is stipulated at

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900

point 4, that for a sustainable development of the mountains area, considering the European pattern, it is necessary to estimate correspondingly the agricultural policy and sustainable development, making reference among other basic principles to the conservation of natural resources such as: soil, water, air and to the biologic diversity and productivity of these natural resources.

Among the specific objectives of the Strategy of sustainable development of the mountains area, it is stipulated at point c): *The improvement of the administration of water and soil resources by farmers including in the areas altered by severe erosion processes of soil or confronted with the loss of nutrients.*

Otherwise, all aspects connected to the water management present peculiarities in relationship with the mountains area. Among them, we mention the following:

- Rainfalls and increased humidity.
- Heavy rain and flash floods.
- The presence of alpine lakes, mineral water springs and protected natural areas.
- Special importance for water drainage formation and prevention, for downstream floods, from the alpine meadows area of juniper trees and mountain forests.
- Supplementary difficulties caused for different activities due to the slopes and intense phenomena of erosion induced by irrational deforestation.
- The decrease of glaciers volume and surface or the snow layer as a result of climate changes with an impact on the seepage in the mountains and downstream area.
- High difficulties regarding the centralized water supplying and sewerage system in the conditions of mountains and a higher degree of dwellings dissemination.
- Favourable conditions for large and small size hydrotechnical works including hydropower stations, hydroelectric pumping stations, micro-hydropower stations.
- Reduced siltation phenomena of storage reservoir.
- Traditional utilization of the energetic potential of water by water mills, so called *pive* in Romanian popular language, windlasses, saw mills, gold stamp mills etc.
- Source of water for developing economic activities specific to the mountain area: mining, pisciculture and sportive fishing.
- Utilities to transport materials on water ways.
- High potential for tourism.
- Biodiversity, special natural and landscape conditions for setting up an important number of protected areas.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900
Issue 4/2018

The sensitivity of the mountains water at the long distance trans-boundary air pollution determines the utilization of alpine lakes in monitoring this anthropic phenomenon considering that after many years ago the unjustified presence of some polluting factors in the upstream basin of the Pad River in Italy, placed in high altitude area, deprived of terrestrial sources of pollution.

Results and Discussions

Considering the bibliographic analysis carried out, we will present and comment some results regarding water's role, the main areas of its use as well as the peculiarities connected to its utilization in the mountain areas.

The Importance of Water

Water plays an important role in the geochemical, climatic, biologic and geophysical natural processes and also in the terrestrial crust. As a civilization and cultural element, water plays a determining part in human's life and also in economy, being utilized in:

- water supply for population, industry and agriculture;
- as means of transportation;
- as source of energy;
- as means for health protection;
- for reducing the risk of drought and floods.

We will try to point out some peculiarities regarding water utilization for different activities especially in the mountains area such as: mining industry, mineral waters exploitation, water supply and sewage in mountain settlements, transportation, especially rafting, hydraulic energy and hydraulic wheels, favourable conditions for some hydraulic machines utilization without electric power consumption, torrential correction works, building of hydropower stations, dams and storage reservoir, etc.

Mining industry

The mining activities in the mountains area belong for many times to the traditional activities considering the long periods they have developed. For example at Roşia Montană such activities have been developed since the Roman Empire. A special problem regarding the mining activity is the pollution of surface and underground waters as a consequence of the draining off some mine waters even after the respective mining activities finished. Thus, from the old mining galleries (about 140 km), 20 litres of acid waters drain each second into Roşia brook and here pollution propagates upstream for tens of kilometres into the Abrud and Arieş rivers.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900

Issue 4/2018

The negative impact of mining over waters is expressed by frequent, sometimes permanent overtaking of maximum admissible concentrations in the surface waters. All these things strictly impose the carrying out legislation and an adequate institutional framework in order to ensure the administration of these mines even after they are closed, with an annual allotment of the necessary funds

Mineral Waters – An Inestimable Patrimony of Romanian People

A remarkable natural wealth of the mountains area is represented by the mineral waters (fig. 2). Romania is one of the richest countries in hydromineral resources having over 60% of the mineral waters resources of Europe. The mineral waters resources of Romania have remarkable quality springs with large flows.

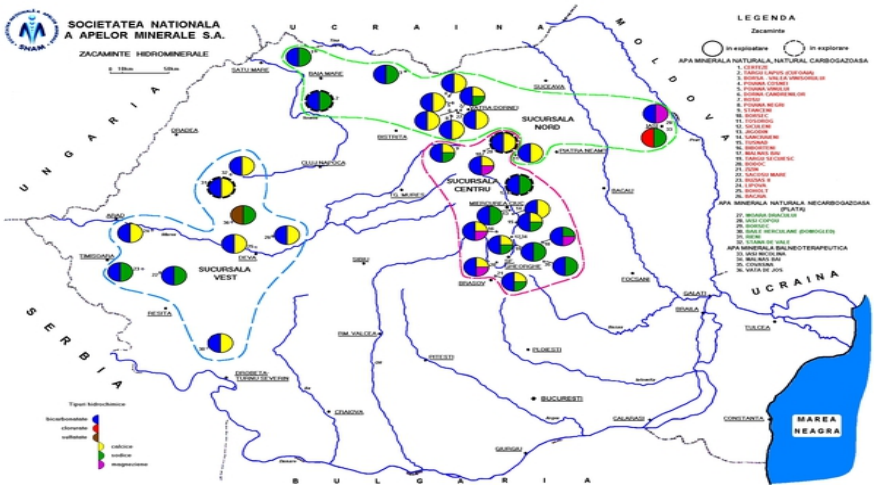

Fig. 2. Map with the Main Distribution of Mineral Water Springs
Source: SNAM, 2014

The market of mineral waters in Romania can be considered a dynamic market in development with annual rhythms of over 22% with fluent production which overtake (exceed) 558 millions litres annually. The potential market for the natural mineral water as a food product consists of the whole population of Romania, where about 23 millions of persons who transit the country (foreign tourists) are added. The estimation of annual mineral water request is about 558 million litres, pessimistically speaking, and a rate of turnover of about $ 108,493,222.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900
Issue 4/2018

Transportation – Rafting

Rafting along the Mureş River is attested by documents since Dacian-Roman period. In Moldavia it was mentioned for the first time since Stefan the Great times, in a document for customs exemption for various goods, some of them being for rafts. The document signed by the King on 13 March 1466 was given to the inhabitants of the village Negoieşti. Within centuries, rafting was an important activity for the inhabitants of the mountain area and in our country it was practiced for larger or shorter periods of time, with different intensities on rivers such as: the Olt, Siret, Moldova, Prut, Someş, Vaser, Gurghiu as on. Rafting largest period of time on the Bistriţa River, along the Siret River up to Galati, we can consider without making a mistake, that rafting on the Bistriţa River is the admiral ship for rafting in Romania [Cojocaru-Tuiac, 2014].

In time, this activity has been updated, especially after the introduction of the steel blend. Hydrotechnical arrangements and regularization and the river bed calibration works have been done especially for increasing rafting efficiency. All these activities permitted an increase of the wood quantity transported by a raft, its volume increasing from 30 m^3 to 300 m^3. Annually, in the peak period, 2 million m^3 of wood were transported along the Bistriţa River.

Since the hydroenergetic arrangement of rivers, especially for the Bistriţa River, this activity has diminished constantly until it completely disappeared. Beginning with 30 June 1960 when the Bistriţa was blocked by the hydropower station at Bicaz, this activity sporadically took place upstream the large storage reservoir. 1969 was the last year of rafting activities [Cojocaru-Tuiac, 2014].

Pisciculture and Sportive Fishing

In 2002 there were 25 ha of salmon farms, in 2012 their area increased to 69.23 ha and 85 registered units. Still considering the lack of funds, both salmon farms and the cyprinid ones work at reduced capacity (about 60% in the salmon farms). The major problems are regarding water, drought, upstream water consumption, the pollution in the forestry exploitation with the Forest Code provisions violation, gravel pits construction without authorization or micro-hydropower stations.

Hydraulic Energy – Hydraulic Wheels

Hydraulic wheels were the most ingenious way of traditional capitalization of water hydraulic energy. A hydraulic wheel utilizes rivers energy to directly produce a mechanical work.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900

Water Mills

The well-known hydraulic wheels made by popular craftsmen are water mills. They can be of different types:

- mills with hydraulic wheels with upper supply;
- mills with supply;
- water mills with turbine.

In the area of the mountains it is possible to construct large hydropower plants of high power, considering the extremely high hydropower potential of the rivers in the mountains. As a rule, such hydroengineering works have multiple functions: to produce electric power, water supplying for population and industry, irrigations, floods protection etc.

Forests, a Strategic Natural Resource

Forest is an intrinsic part of the human life environment that also has an important role to play in creating and preserving it. Together with other types of terrestrial ecosystems, the forest enters into the composition of the terrestrial living environment, in which man lives and develops. The presence and appearance of the forest is a hallmark of many climate zones, and its massive deforestation can lead to radical changes in microclimate and relief, the thermal and hydrological characteristics of the soils, the soils, and a marked change in the environment as a whole. This is related to the great role the forest has in the development of the relief, the formation of the properties of the layer of air near the soil and the soil itself as well as in their preservation over long periods of time.

Case Study: The Spaces Developed by Holzindustrie Schweighofer

In the era of globalization without frontiers and without the slightest economic and political morality, more than ever, the culture of economic patriotism and national dignity, as well as a culture of natural rebellion (Psalm 4, 4) and civic justice within the limits of domination and common sense (Romans 14: 17). In this context, we are irremediably wrong if we do not sufficiently wrestle and do not react as it is to get our country back!

If the identity of a nation in permanent evolution and construction "is not inherited but conquered by every generation," as the great anthropologist Claude Levi Straus said, the more anthropic and material substance of a nation must be defended and regained by each generation separately.

A concrete example of natural reaction gave Avram Iancu of Alba, when in January 2017, only 150 people succeeded to drive Holzindustrie Schweighofer out of

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900
Issue 4/2018

their commune, revolted by the way the forests behind their homes are exploited, thus undermining their existence.

The fundamental connection of the locals to the mountain and to the earth in general was so strong, as well as the reasons why they reacted with so much vehemence that the corporatists withdrew without hesitation and the state authorities gave up "the right policy" and have not reacted in force, as called for by the new laws in such situations, which, unfortunately, protects corporate citizens from their own citizens who defend themselves at home...! Thus the locals took their fate in their own hands and decided their own economic destiny for survival. And this reaction can be a temporary solution of "mountain economy" in the current context, until Romania returns to its historical and natural origin.

Deforestation has a negative influence on leakage on the slopes, therefore, after rain torrents, whole villages, bridges and roads are immersed in water. Forests can break the torrents, stopping their destructive force and may have a major role in the hydrological cycle. The precipitation water is accumulated somewhat in the forested areas; otherwise the place is dry, without any vegetation. Where there is no forest, the wind will no longer resist it and will carry rainfall on a much larger surface. Solar radiation is reflected more strongly in regions without forests, that's why in the plain the summers are harder to bear than in hilly and mountain regions. Defects contribute 34.5% to soil degradation. Relief in the slope and lack of vegetation favour drought and floods.

Conclusions

In older literature, strategic reserves represent those reserves that are constituted at the level of a country in order to ensure the smooth running of economic and social activities in special situations (natural calamities, cataclysms, ecological catastrophes, etc.), as well as in crisis situations or war. I am not referring to these exceptional situations, but to the natural reserves of the country that are currently lacking, their rational use or irrational plunder is contributing to the medium and long term development of a country. Equally important is the connection with the National Security, which should contain a special chapter dedicated to the country's strategic natural reserves.

This work highlights a number of peculiarities of mountain aquatic ecosystems and how to support natural resources illegally exploited by foreign corporations.

As a consequence, vulnerability specific to water systems to climate change, pollution, high exploitation is significantly marked in the mountain area.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900

Man who has lived in the mountains for centuries has always known to consider nature as a real friend and determined the crystalline waters "to work". Mountain water has had also an important part in the mountain economy in many fields of activity. Many of the hydraulic traditional machines, creations of some anonymous popular craftsmen, are the forerunners of the modern hydraulic machines, an example of the waters renewable energy capitalization. These machines have the name of some western inventors, though, in order to respect the historic truth, they should be mentioned in the present day scientific works.

The way the mountains people knew how to live and capitalize water resources may represent an impulse for returning to such sustainable solutions, capitalizing at a higher level the advantages of modern technologies utilizing directly the hydraulic engines instead of the electric ones for various mechanic activities.

Each of water utilization proficiencies, mentioned in the paper, can represent directions for future research and profound studies from the technical, economic, social, cultural-traditional and surrounding environment protection.

The lack of morality in the economic field, as well as the lack of reaction of those who find abuses of any kind and bear them with stoicism is the expression of a moral deficit of the society as a whole and a lack of personal belief which has disastrous community effects. Hence, the need for mechanisms able to ensure the social morality and, as well, for a controlling court in this respect.

The crisis we are going through is not exclusive a crisis of the economic-political-administrative system, but it is also an anthropological and spiritual crisis that further increases the radius of the vicious circle of waste, fear, consumerism, selfishness and hedonism to the extreme.

I think the time has come to question the people who have scattered or buried our national fortune and take our fate in our own hands, as suggested by the German Chancellor, not long ago.

Politics but also the Church can help the economic development of a society or a country, because financial investments also imply an ethical investment in the Christian sense, as this bioethical investment is the moral guarantor of a healthy and sustainable local economy.

The policy on strategic natural reserves must be closely linked to joint projects with the EU, the common vision on the exploitation of natural resources in all countries, not just in Romania.

To sum up, here is a short, straight and secure way towards a genuine and responsible mountain and national economy, where no multinational corporation will dare to treat us as slaves, but only as equal and worthy partners to defend national and planetary natural resources.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900
Issue 4/2018

References

1. Jelev, I. (1989a). *Hydraulic Studies for Introduction and Utilization in the Hydro Amelioration Networks of Some Water Pumping and Raising Devices, without Consumption of Electric Energy*. Hydraulic Engineering Research Institute (in Romanian).
2. Jelev, I. (1989b). *The Hydraulic Study of Water Transients for the 1 000 Mw Hydropumping Power Station, Tarniţa-Lăpuşteşti*. Hydraulic Engineering Research Institute (in Romanian).
3. Giurgiu, V. & Clinciu, I. 2008. "The Arrangements of Torrential Hydrographic Basins." *Sylvology,* Vol. VI, Romanian Academy Printing House, Bucharest (in Romanian).
4. IWMI 2000. *Projected Water Scarcity in 2025*. International Water Management Institute Study.
5. Jelev, I. & Vasiliu, D. (2008a). "The Global Aspects of Water Resources." *National Symposium "Energy-Environments-Sustainable Development Components",* Romanian Academy, Commission for Energetic", 14 May (in Romanian).
6. Jelev, I. & Vasiliu, D. (2008b). "Integrated Management of Water." *Conference-Integrated Management of Water,* Polytechnic University, Bucharest, organized in the frame of CEEX Project "WEB Platform for the integrated managements of waters" (in Romanian).
7. ANAR (2013). *Synthesis of Waters Quality in Romania, 2013*. The annual report of the National Administration „Romanian Waters" (in Romanian).
8. Ardelean, I. F. F. (2012). *The Ethnographic Area Ineu. From the History of the Ethno-Cultural Realities of the Area.* Ph. D. Thesis, University of Oradea (in Romanian).
9. Arjocu, F. (2009). *The Largest Area with Water Mills in Romania and South-East Europe – Rudăria (Eftimie Murgu)*. http://drumliber.ro/cel-mai-mare-parc-cu-mori-de-apa-din-se-europei-rudaria-eftimie-murgu/ (In Romanian). Retrieved 2014.
10. INS (2012). *Statistic Year Book of Romania*. The National Institute of Statistics (in Romanian).
11. MADR (2013). *National Strategic Orientation for the Carpathians Development*. http:// agroromania.manager.ro/articole/legislatie/orientari-strategice-nationale-pentru-dezvoltarea-durabila-a-carpatilor-(2014-2020)-15359.html, (in Romanian). Retrieved 2014.
12. Jelev, I. & Jelev, V. (2017). **"**Water – An Essential Element for the Mountain Area Economy." *Mountain Development Conference. Current and Predictable Challenges.* Organizer CEMONT Montana Economics Centre, Costin C. Kiritescu National Institute of the Romanian Academy, June 24.
13. ASTRA (2014). *The Museum of Traditional Popular Civilization. Distillery with Hydraulic Wheel from Sârbeşti, Gorj County.* http://www. muzeulinaerliber.ro/index.php?option=com_phocagallery&view=category&id=1873:povarna-cu-roata-hidraulica-de-la-sarbesti-judet-gorj-nr-25&Itemid =0 (in Romanian).
14. Cojocaru-Tuiac, C. (2014). *Rafting in the History of Romania – From Turks to Sovromlemn*. Historia.ro, http://www.historia.ro/exclusiv_web/general/articol/plutaritul-istoria-romaniei-otomani-sovromlemn (in Romanian). Retrieved 2014.

Annals of Spiru Haret University.
Economic Series
Since 2000
ISSN:2393-1795 ISSN-L:2068-6900

Issue 4/2018

15. Ene, G. (2014). *Hydraulic Energy*. https://lefo.wikispaces.com/Ene+Georgian+Energia+Hidraulica+Povarna, alvanul, roata cu făcaie (in Romanian). Retrieved 2014.
16. EPFL (2002). *The Numerical Simulation of the Unsteady Turbulent Flow in a Draft Tube.* http://biblion.epfl.ch/epfl/theses/2002/2527/2527_html/node129.html. Flindt project.
17. Lupu, N. (2014). *Mountain Pisciculture.* http://www.scribd.com/doc/228335309/1-piscicultură-montană (in Romanian). Retrieved 2014.
18. Miclea, I. (2013). *I Care for – Romania Eternal Lands (I) Millenary Civilization, I-Agriculture*. http://sanuuitam.blogspot.ro/2013/10/romania-pamanturi-eterne-i.html. (in Romanian). Retrieved 2014.
19. Muzeu Reghin (2014). *Popular Installations*. http://muzeureghin.xhost.ro/instalatii.html (in Romanian). Retrieved 2014.
20. Pavel, D. & Voia, I. (1981). *From the Runner with Vertical Axis (So Called "Făcaie" in Romanian) to the Modern Hydraulic Turbines*. Scientific and Encyclopaedic Printing House (in Romanian).
21. Pidwirny, M. (2006). *The Hydrologic Cycle*. *Fundamentals of Physical Geography, 2nd Edition*. Date Viewed http://www.physicalgeography.net/fundamentals/8b.html.
22. Primăria-Făgăraş (2014). *Everything about the Făgăraş County*. *Traditional Installations*. http://primariafagaras.ro/detalii_pagina_tfe.php?id=5, (in Romanian). Retrieved 2014.
23. Ranislav, A. & Ciutu, A. (2011). *Traditional Technologies Using Other Sources of Primary Energy*. http://www.google.ro/url?url=http://euinvat.bluepink.ro/wpcontent/uploads/2011/07/tehnologitraditionalebazatepeutilizareaaltorsursedeenergieprimara (in Romanian). Retrieved 2014.
24. ROMSILVA (2014). *Fishing for Recreation/Sports.* http://www.rosilva.ro/articole/pescuit_sportiv_p_118.htm (in Romanian). Retrieved 2014.
25. RMGC (2014). *The Water from Roşia Montană.* http://www.rmgc.ro/proiectul-rosia-montana/mediu-apa-la-rosia-montana.html (in Romanian). Retrieved 2014.
26. SNAM (2014). *The Map of Mineral Water Springs Managed by the National Society of Mineral Waters.* http://storage0.dms.mpinteractiv.ro/media/1/186/3927/10285848/1/harta-ape.jpg (in Romanian). Retrieved 2014.
27. Ţara Beiuşului (2014). *Peasant Technical Installations*. *Water Mills from Beiuş County*. http://www.tarabeiusului.ro/tara-beiusului/depresiunea-beiusului/instalatii-tehnice (in Romanian). Retrieved 2014.
28. Varga, V. (2009). *The Mill with "Elevator" (So Called "Alvan" in Romanian) from Ciocmani – Unique Mill in the World.* Graiul Sălajului. http://www.graiulsalajului.ro/moara-cu-alvan-din-ciocmani-unicat-in-lume-a-10290) (in Romanian). Retrieved 2014.
29. Wikimedia (2014). *Saw Mill*. http://upload.wikimedia.org/Wikipedia/commons/8/86/Joag%C4%83r_sa%C5%AD_ferestre%C5%AD_de_munte.JPG, (in Romanian). Retrieved 2014.
30. Wikipedia (2014). *Hydropower. Micro and Pico Hydropower Plants.* https://ro.wikipedia.org/wiki/Energie_hidraulic%C4%83 (in Romanian). Retrieved 2014.

DOCTORAL AND POSTDOCTORAL PAPERS