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**MAIN CONCEPTS OF SUSTAINABLE DEVELOPMENT AND MOUNTAINOUS REGIONS (ON THE EXAMPLE OF THE CAUCASUS)**

Main concepts of sustainable development are focused on: The economic problems (sustainable development relies on and considers the rational use of exhaustible natural resources, development of resource-saving technologies, focus on inexhaustible and restorable resources, ecological production, minimization and reuse of waste); The social problems (sustainable development relies on and considers the stability of social and cultural systems, environmentally friendly and legally justified use of the national wealth, protection of cultural and historical values, publicity of decisions and maximum engagement of the society in the planning and management process); The ecological problems (sustainable development relies on and considers the integrity of ecological (biological, landscape) environment, maintenance of the viability and functioning mechanisms of ecosystems, improvement of stability and self-restoration mechanisms of the natural environment, due determination of the social-economic functions of the natural landscapes, ecology-oriented territorial (landscape) planning, landscape service and management, creation of the esthetic environment). All three concepts of sustainable development, despite the diversity of the considered issues, can be considered as components of a single system. They are interconnected and mutually determinative, and consequently, sustainable development, as a problem, is quite difficult to solve and is a long civic and scientific process, with more than one scientific branch related to it considering the objectives and opportunities of sustainable development at either branch, or component level.

Caucasia is one of the most important natural, ecological, geopolitical, religious, ethnic, transport, etc. crossroads of the world. The Caucasasia plays one of the most important geopolitical roles in the modern world, particularly in the Near East and Western Asia. Its role is also essential in the economic relations; however, this role is diminished by the different developmental trends of the countries of the region. The problems of the sustainable development of the Caucasasia can be solved only at the expense of the cooperation between the countries of the region.

**Keywords:** mountainous regions, sustainable development, concepts, Caucasus.

**Нодар Елізбарашвілі, Ніно Сулханіашвілі, Русудан Елізбарашвілі. ОСНОВНІ ПОНЯТТЯ СТАЛОГО РОЗВИТКУ І ГІРСЬКІ РЕГІОНИ (НА ПРИКЛАДІ КАВКАЗУ)**

Основні концепції сталого розвитку сфокусовані на: економічних проблемах (сталий розвиток спирається на раціональне використання вичерпних природних ресурсів і враховує їх раціональне використання, розробку ресурсозберігаючих технологій, зосередження уваги на невичерпних і відновлюваних ресурсах, екологічному виробництві, мінімізації та повторному використанні відходів); соціальних проблемах (сталий розвиток спирається і враховує стабільність соціальних і культурних систем, екологічно чисте і юридично обґрунтоване використання національного багатства, захист культурних та історичних цінностей, гласність рішень і максимальне залучення суспільства до планування і управління процесами); екологічних проблемах (сталий розвиток спирається і враховує цілісність екологічного (біологічного, ландшафтного) середовища, підтримку життєздатності і функціонування механізмів екосистем, поліпшення механізмів стійкості і самовідновлення природного середовища, визначення соціально-економічних функцій природних ландшафтів, еколого-орієнтоване територіальне (ландшафтне) планування, ландшафтне обслуговування та управління, створення естетичного середовища). Всі три концепції сталого розвитку, незважаючи на різноманітність питань, що досліджуються, можуть розглядатися як компоненти єдиної системи. Вони взаємопов'язані і взаємно детерміновані, а, отже, проблеми сталого розвитку досить складно вирішити. Це тривалий суспільний і науковий процес, з яким пов'язаний не одне науковий напрям, що розглядає цілі і можливості сталого розвитку на різних рівнях.

Кавказ є одним з найважливіших природних, екологічних, геополітичних, релігійних, етнічних, транспортних перехресть світу. Кавказ відіграє одну з найважливіших геополітичних ролей у сучасному світі, особливо на Близькому Сході і в Західній Азії. Його роль також важлива в економічних відносинах; однак ця роль зменшується внаслідок різних тенденцій розвитку країн регіону. Проблеми сталого розвитку Кавказу можуть бути вирішені лише за рахунок співпраці країн регіону.

**Ключові слова:** гірські райони, сталий розвиток, концепції, Кавказ.

**Нодар Элизбарашивили, Нино Сулханишвили, Русудан Элизбарашивили. ОСНОВНЫЕ ПОНЯТИЯ УСТОЙЧИВОГО РАЗВИТИЯ И ГОРНЫЕ РЕГИОНЫ (НА ПРИМЕРЕ КAVKAZA)**

Основные концепции устойчивого развития сфокусированы на: экономических проблемах (устойчивое развитие опирается на рациональное использование исчерпаемых природных ресурсов и учитывает их рациональное использование, разработку ресурсосберегающих технологий, сосредоточение внимания на неисчерпаемых и восстанавливаемых ресурсах, экологическом производстве, минимизации и повторном использовании отходов); социальных проблемах (устойчивое развитие опирается и учитывает стабильность социальных и культурных систем, экологически чистое и юридически обоснованное использование национального богатства, защиту культурных и исторических ценностей, гласность решений и максимальное вовлечение общества в планирование и управление процессами); экологические проблемы (устойчивое развитие опирается и учитывает целостность экологической (биологической, ландшафтной) среды, поддержание жизнеспособности и функционирования механизмов экосистем, улучшение механизмов устойчивости и самовосстановления природной среды, определение социально-экономических функций природных ландшафтов, эколого-ориентированное территориальное (ландшафтное) планирование, ландшафтное обслуживание и управление, создание эстетической среды). Все три концепции устойчивого развития, несмотря на разнообразие исследуемых вопросов, могут рассматриваться как компоненты единой системы. Они взаимосвязаны и взаимно детерминированы, и, следовательно, устойчивое развитие, как проблему, довольно сложно решить. Это длительный общественный и научный процесс, с которым связано не одно научное направление, рассматривающее цели и возможности устойчивого развития на различных уровнях.

Кавказ является одним из важнейших природных, экологических, геополитических, религиозных, этнических, транспортных и др. перекрестков мира. Кавказ играет одну из важнейших геополитических ролей в современном мире, особенно на Ближнем Востоке и в Западной Азии. Его роль также важна в экономических отношениях; однако эта роль уменьшается из-за различных тенденций развития стран региона. Проблемы устойчивого развития Кавказа могут быть решены только за счет сотрудничества стран региона.

**Ключевые слова:** горные районы, устойчивое развитие, концепции, Кавказ.

**Introduction.** Caucasus is one of the most important natural, ecological, geopolitical, religious, ethnic, transport, etc. **crossroads** of the world. It is located between Eastern Europe, the Near East, Central Asia and North Africa. Traditionally, they draw the northern border of the Caucasia along the Kuma–Manych Depression, its western border - on the Black and Azov Seas, its southern border – along the administrative border between Turkey and Iran and its eastern border – on the Caspian Sea. In this view, the Caucasia includes four states; the area of the region is 440 thousand km<sup>2</sup>, its

population is 35 million with the population density of almost 80 per km<sup>2</sup>. Today, the international environmental organizations consider the Caucasia as one of the most important **eco-regions** and geographical formations of the world and area comprising the territories of 6 states: the south-western part of Russia (the North Caucasus), the countries of the Southern Caucasia: Georgia, Azerbaijan and Armenia and also portions of northeastern Turkey and northwestern Iran. In this view, the area of the Caucasia is 580 thousand km<sup>2</sup>.



**Fig. 1. Caucasus ecoregion (WWF Caucasus office, 2006)**

The Caucasus plays one of the **most important** geopolitical roles in the modern world, particularly in the Near East and Western Asia. Its role is also essential in the economic relations; however, this role is diminished by the different developmental trends of the countries of the region. The scales of the natural resource use are still large, and the environmental pollution and landscape transformation, as well as the negative outcomes of the anthropogenic impact on land resources and forests are still alarming. The problems of the sustainable development of the Caucasus can be solved only at the expense of the cooperation between the countries of the region. A good example is the Alpine region, which can be compared to the Caucasus in a certain respect. The outcomes of the transboundary cooperation of the Alpine and Carpathian countries have had a clear effect on the sustainable development of these regions, environmental protection and better life quality of the local people. Of the transboundary issues, certain trends of monitoring of

protected areas, transport and other communications, forest and water economies, agriculture, natural disasters and risks develop in a particularly intense and privileged mode.

Some of these trends are **particularly topical** for the Caucasus. It is considered that at this stage, the cooperation for the environmental protection and development of water resources, recreational economy and transport will be efficient. In the Caucasus, for the prevention of the processes of disintegration of a single cultural and natural area, the cooperation to develop the measures to mitigate the Climate Change and biodiversity degradation and to establish transboundary protected areas and ecological and transport corridors, is very important. Sharing the experience of the Alps and the Carpathian countries will be beneficial for the Caucasian region, particularly at the initial stage of information exchange and sharing.

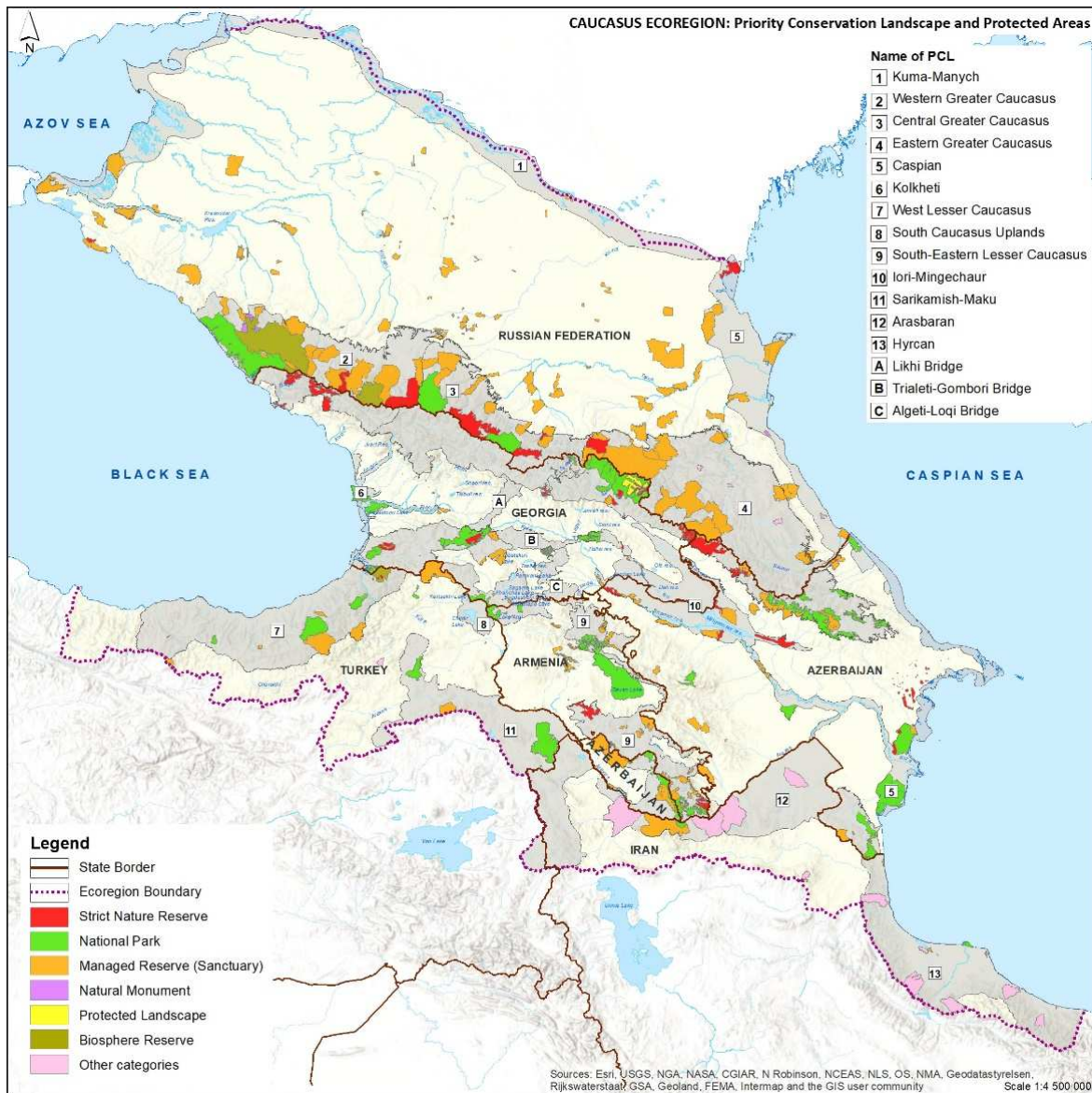


Fig. 2. Regional ecological planning of Caucasus - Priority conservation landscapes and protected areas (WWF Caucasus office, 2018)

The **management and regulation** of the natural environment and natural resources of the Caucasus, as that of a mountainous region, is associated with the international and local (national) market and traditional legal mechanisms. The experience evidences that only their harmonization and optimization yield the sustainable and desirable outcome. Following the historical-geographical peculiarities of the Caucasia, the experience of the Alpine and Carpathian countries will not do good if copied directly. In addition to the possible legal agreements between the countries, for the regional management and regulation of the environment and resources, the spatial (experience of Russia), landscape (experience of Germany as a necessary instrument) and regional (experience of a number of European countries) planning methodology, joint monitoring of land resource use, etc. can be employed efficiently.

#### Main aspects of methodology of sustainable de-

**velopment.** In the Caucasus, the major difficulties in view of the sustainable development are associated with the conservation of the **biological and landscape diversity**, optimal water resource management, use of forest resources and appropriate development of agriculture. The hampering factor on the way of inventory, scientific study and protection of biological and landscape diversity is permanent political oppositions [1,2,3,4]. The same is true with the problems of water resource management, which are a major enduring concern for both, the international and the non-governmental organizations. The problems of using forest resources are aggravated following the Climate Change and result in the process of desertification of the region. The efficiency of the use of forest resources depends on the transboundary cooperation, particularly, on the establishment of the transboundary protected areas of forest landscapes in semiarid and semi-humid climatic areas.

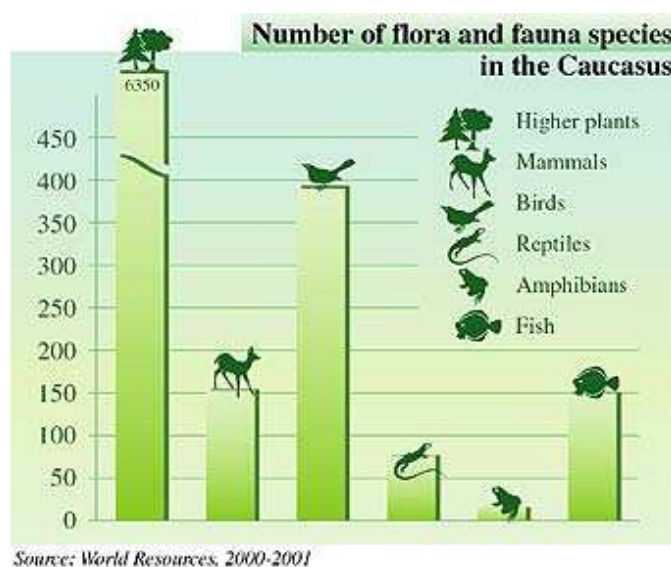


Fig. 3. Members of flora and fauna species in the Caucasus [4]

The agriculture in the Caucasus is based on the agrarian diversity, rich heritage and traditions, and the threat of its transformation is associated with the intervention of the gene-modified and invasion species. A single country, solely at its own efforts, is unable to overcome the scales of transformation of cultural plants, and therefore, the problem is regional with its nature, while agriculture is the basis of economics and social wellbeing of the population in the Caucasian countries.

The majority of the **environmental problems** in the Caucasus are associated with the economic activities, in particular, with ore mining and processing. The problems are seen also with fuel and energy industry (oil, gas and coal mining), electrical power generation and chemical, metallurgical and building materials industries. Oil-processing plants are located on the coasts of the Black and Caspian Seas what further complicates the grave ecological situation in the region. Often, oil and oil products get in the water and cause significant pollution of the Sea areas.

An important polluting factor is the **open-pit min-**

**ing** of various ore deposits (ferrous and non-ferrous metals, manganese, etc.) totally devastating the natural environment. As a rule, at such locations, no re-cultivation works are accomplished, or their scales are so small that the ore waste freely dissipates in the environment and pollutes surface waters and atmosphere. The 1990s were **particularly harmful** for the Caucasian forests. The forest vegetation on the territories adjacent to the large settled areas, near the roads and at easily accessible locations was almost totally destroyed. The devastation and degradation of the forests was followed by the activation of geodynamic processes (mudflow currents, landslides, snow avalanches, erosion, etc.), reduction of the water resources, increase in the amount of dust and soot in the atmospheric air, etc. [3].

The operation of two major sources of **radioactive pollution**, two nuclear stations (in Armenia and Russia) is hazardous for the Caucasia. Similarly, problematic is the military techniques and materials survived on the abandoned military bases, which have been the cause of radiating the population for several times.

The scales of transit shipments of **energy carriers** in the Caucasus **are expanding**; the trade between the mining regions (Central Asia, Azerbaijan, Iran, Northern Caucasus) and buying Europe is expanding as well. This contributes to the increased risk of technogenic disasters both, in the land areas and in the areas of the Mediterranean, Black and the Caspian Seas.

An **important source** of environmental pollution in the Caucasus is the road and railway transport. Despite the fact that with these transports, the environmental pollution is more local, its scales have an extremely negative impact on the large settled areas and on the population living near the traffic centers. A great part of the road transport is outdated or technically faulty and the major portion of the tires used is secondary and easily wearable, while the vehicle petrol is of a poor quality.

The most topical **ecological challenges** of the Caucasus are frequent droughts and decreased precipitation amounts as a result of the Climate Change. Frequent droughts are particularly hazardous in the lowland and hilly areas in the eastern part of the Caucasia and volcanic plateaus of Javakheti (Georgia) and Armenia.

Evaporation in these regions exceeds the amount of atmospheric precipitations almost by twice, what will be further aggravated on the background of the Climate Change [2].

In recent years, the **population growth** in the Caucasian region has not been as high as in the Asian, African or Latin American countries. An increasing environmental impact as a result of the high population density is seen in the intermountain lowland, basins and hilly regions. The depopulation of the mountain regions is common for all countries of the Southern Caucasus, but this is hardly true with the similar areas of the Northern Caucasus, where the population, though slowly, but increases. In the Caucasus, particularly densely populated are the industrial and traffic centers, the Black and Caspian Sea coastlines and areas with fertile agricultural lands. The majority of the Caucasian population (up to 60%) lives in the urban areas and a regular urbanization growth is observed. The population density is low in the mountainous and arid regions and bogged and degraded areas.

Table 1

*Population and its forecast in the Caucasian countries, million people*

Country	Qty, 2013	Qty, 2050	Dynamics, %
Turkey	80	94	+9
Russia	143	133	-10
<i>Northern Caucasian republics</i>	5.3	5.5	+9
Iran	81	95	+8.5
Azerbaijan	10	11	+9
Armenia	3.0	2.7	- 11
Georgia	3.7	3.0	-12

**Results.** Mountains always played a **great role** in the history and development of humankind. They are an essential source of water, forest and many mineral resources, biologically and ethically outstanding area and territory with a high potential for recreational economy. Presently, 10% of the world population lives in the mountains and three times more people use the natural resources formed in the mountains (water in the first instance).

**The natural environment** of the mountains is **in-stable** due to several factors: high temperature amplitude (promoting physical weathering), low pressure, difference between the expositions, water erosion, high snow cover, relief inclination, low soil fertility and poorly developed road infrastructure. This is why, the mountain ecosystems lose stability and are subject to intense degradation under the human impact. The natural environment self-restoration mechanisms are also weak in the mountains.

Mountains have been used by a man since the ancient times mostly as the **safe** environment suitable for self-defense. For example, several thousands of years ago, in Europe, the intermountain gorges in the Alps were populated more densely than their adjacent hills and plains. People were busy with land cultivation up to 2000 m above sea level. They gained rich harvest of cereal crops, vegetables, cannabis, flex, etc. [10].

Today, more than 700 million people live in the

mountains. Their majority lives in the mountainous regions of Central and South America, Asia and Africa. Following the natural conditions and little land areas of the mentioned mountainous regions, it can be said that the mountainous regions are distinguished for very high population density, i.e. they are **over-populated**. In Europe, high population density in the mountainous areas is fixed in the Alps only. The mountains of the Northern hemisphere: The Cordilleras and Scandinavian and Siberian mountain systems are almost deserted.

The natural conditions and resources of the mountainous areas are difficult to use, and as a result, mountain dwellers have to adapt themselves to the extreme conditions and fight for survival. For millennia, the people living in the mountains have created **unusual and specific** forms of agriculture in response to the conditions unfavorable for land cultivation (in terms of insufficient lands and agroclimatic resources) on the one hand and conditions favorable for cattle-breeding on the other hand. Traditional forms of land use in the mountains were developed over the river and artificially created terraces, while cattle-breeding was a common activity on fertile summer pastures and in hey-meadows.

Mountains are rich in many kinds of natural resources, with **drinking water**, hydro energy, solar and wind energy. Thermal and mineral waters are the most valuable resources. Mountains have many kinds of ore deposits, with ferrous and precious metals, building and

facing materials as the most important ones.

The mountains in the world are distinguished for their biological and landscape diversity and wonderful and unique nature. Consequently, mountains are the best place for the scientists for experimental observations and clearly demonstrate the peculiarities of the global course of tectonic, geodynamic, climatic and biological phenomena and processes.

The natural diversity of the mountains **depends on** several factors, in particular: geographical location, altitude and exposition of the site, distance from oceans and seas, wind direction and types and scales of human economic activities. The mountains still have vast areas where the wildlife endemism and relicts are accumulated what further augments their ecological and scholastic importance.. The Worldwide Fund for Nature (WWF), in developing the national and global environmental projects, makes the principal accent on the areas distinguished for the natural diversity and values of the mountainous areas [8].

Unfortunately, most of the endemism and relicts found in the mountainous regions are registered in the **Red Lists** of a number of countries as critically endangered or threatened species. The conservation of the biodiversity of the mountainous areas and protection of the endangered wildlife are one of the primary challenges and concerns of the civilized world.

Mountains are particularly rich in **recreational resources**, in particular, in efficient and beautiful sceneries, esthetic sites, clear and transparent air, and diversified flora and fauna. Mountains are a natural shelter and corridor for many wildlife species and they are used by the lowland and high-mountain animals to get together, mix and move to different geographical areas.

All over the world, mountains are distinguished for high **potential** for tourism development. People are attracted by the unique nature, ethnic and cultural diversity, mineral and drinking waters, efficient sceneries and ecologically pure foodstuff of the mountains. It is the well-organized tourist infrastructure generating incomes for local people, changing the economic profile and minimizing the anthropogenic load on the mountainous areas.

More than one types of **tourism are developed** in the mountains, with sports, eco-, adventure and health (wellness) tourism being noteworthy. Complex relief conditions support the conservation of the biodiversity in the mountains, what, together their altitudinal distribution, is another most important resource to develop cognitive tourism (scientific, educational tourism).

The nature in the mountains is extremely sensitive, vulnerable and **unstable**. Mountains instantly reflect the natural processes, human impact and outcomes of different calamities. Mountains are particularly sensitive to climate changes, which have a speedy effect on the areas and volumes of glaciers, vegetation development, water resources, etc. At present, mountains are the best indicator of the global climate change.

Mountains are distinguished for **high risks** as a result of natural and anthropogenic factors. The most important natural factors are volcanoes and earthquakes, landslides, avalanches, floods, etc. In the mountains, the human factor becomes increasingly important, mostly in

connection to the mining industry, forest exploitation and road construction. Due to the rapidly changing climatic conditions and increasing economic activity of people, conservation of the natural diversity of the mountains is one of the most important objectives of the humankind.

Since the ancient times, the mountains were considered one of the most important barriers to **the spread of civilization**. Despite this, many kinds of original peoples, cultures and traditions have been formed in the mountains. The isolation between the peoples living in the same mountain system (e.g. the Caucasus region) was so significant that it even led to the formation of different languages. Dagestan, which is the house of about 30 different peoples, is a good example.

Presently, there is a **growing interest** in the mountains and their natural resources. Mountains are developed swiftly all over the world: people build big water-reservoirs, develop new ore deposits and build roads and communications in the mountains; besides, tourism develops and the scales of using summer pastures and number of temporal (seasonal) settlements increase in the mountains.

An intense use of the natural resources in the mountainous areas followed by the degradation and depletion of the natural biodiversity has several trends. The following trends **are global** [10]:

- Increasing number of cattle on the subalpine and alpine pastures and degradation of their productivity.
- Depletion of the diversity of high-mountain vegetation following overgrazing and over-use of the mountain vegetation to make curative herbs.
- Degradation of high - and average-mountain forests.
- Activation of erosive (geodynamic) processes.
- Intense washout of humus soil layer.
- Reduction of water resources.
- Limitation of animal habitats, routes of their migration and ecological corridors.
- Extremely poor social infrastructure and extremely low quality of life of the population of the mountain regions.

It is known that for the last half a century, **the forest index** of the mountainous regions has decreased a lot and even halved at some locations (e.g. the Pamirs, the Tian Shan), while mountain forests have an extremely great and sometimes, a decisive ecological importance. They perform soil-protecting and water-regulation functions; they serve as a preventive measure against floods, floods and undesirable geodynamic processes, and support the formation of sound environment and conservation of biodiversity. Development of cattle-breeding in the mountains mostly influences the upper mountain forests, which are most unstable of the forest ecosystems. Large scales of grazing and haymaking hamper the forest self-restoration ability and because of this, the regulation of cattle-breeding in the mountains, together with the rational use of forests, is an important precondition for the development of the mountainous areas.

A man's **technogenic** activity in the mountainous areas can take different forms, but its outcomes are mostly associated with the problem of water resource regula-

tion. Particularly grave is the situation with the water resource formation and use in the mountainous areas of arid regions. The decreasing volume of water resources is immediately associated with the global climate change and human's economic activity. The problems related to

the use of water resources are expected to aggravate in such regions. Such state of affairs has its effect not only on the population of mountains and lowlands, but also on the relations between the states, which use the resources of transboundary rivers.



Fig. 4. Forest area in Caucasus [11]

Construction of the water reservoirs in the mountainous regions of the world has a several hundred-year-long histories. It is established that only large water reservoirs (with the depth of 100 to 150 m) **have an impact on the environment**. Presently, there are several tens of such reservoirs in the world. Most water reservoirs are built across the rivers in the mountainous regions in the moderate, subtropical or tropical zones. On the one hand, they help regulate the water resources efficiently, but on the other hand, they contribute to an increasing seismic pressure, flooding the riverside terraces, forests and meadows, which are of a particular significance for the mountain dwellers, changes of the microclimate, underground water level, generic structure of the wildlife, their migration routes, etc.

Thus, the development of the mountainous areas must be done in the right and purposeful manner, by considering **the principles of sustainable development** [1]. Otherwise, the migration of the people of the mountainous regions, irrational and rapacious use of the natural resources, degradation of cultural and ethnic values, different kinds of conflicts and level of poverty of the mountain dwellers will intensify further. The United Nations Organization pays permanent attention to the development of mountains, and it has adopted a number of documents stressing the need for, goals and expected

outcomes of the sustainable development of mountains.

**Principal benchmarks of the sustainable development of the mountainous areas.** At present, the sustainable development of the mountainous areas is one of the **principal goals** of more than one states of the world, and special laws have been adopted to regulate the issues related to the mountains, ensure the social and economic motivation of the population, development of infrastructure, etc. It is assumed that without a state support, it will be impossible to retain people in the mountains.

A particular importance is given to **the scientific study** of the mountainous areas, demonstration of the problems associated with the nature conservation in the mountains, study of the mountain people's lives and traditions, identification of the recreational and resource potential, sustainable territorial planning and spatial development. The efficiency of territorial planning depends on the prevention of the environmental problems possible only through the realization of the landscape-based approach and landscape planning principles [1].

One of the reasons for the topicality of the scientific study of the mountains is **the global climate change**. Almost universal rise in air temperature and increase in precipitations have had an effect on the landscape, glacial, bio-geographic and hydrological features of many mountain systems. A general decrease in the areas cov-

ered with glaciers, duration of snow cover and strength indicators, as well as the change (rise) of the upper limit of the forest and rise in summer temperatures and precipitations are more intense in the mountains of the tropical, subtropical and moderate zones. Such processes take place on the background of iridizations of the hilly zones adjoining the mountains making it necessary to review the policy of using and obtaining many different kinds of natural resources.

Solving the problems associated with the mountains is not a prerogative of a single branch of economy and can be reached only through **complex and multisectoral** approaches. It is also assumed that any action must aim at the simultaneous conservation of the natural and cultural values and economic and social motivation rather than preferences. In the mountainous regions of Europe, only the demonstration of the recreational values or tourism development is not deemed the real means to motivate the population or to combat depopulation. So, this is the way to maintain the mountain population, who will be given the possibility and incentive for a dignified life.

As a rule, a subsidized approach, i.e. introduction of various kinds of preferences, is a **widely spread** practice in the mountains. Such an approach diminishes the populations' initiative, rational and efficient resource use and realization of the principles of sustainable development. The mountainous regions of Europe, owing to optimal planning, have been deemed the areas of interest of people and business for recent decades. This is particularly true with the ecological agriculture, development of alternative power sources, local handicraft industry, cultivation of herbs, recreation, etc.

Sustainable development of the mountainous areas needs a complex understanding and satisfaction of the interests of local people on the one hand and of the state and private businesses on the other hand. Realization of the **state policy** needs demonstration of both, strategic or global and regional and local problems and developmental trends. In this case, an essential role is given to the analysis of global and regional challenges and planning the ways to adapt to them. As for such challenges, they are seen with any field of sustainable development.

The need for developing **individual and purposeful** plans of sustainable development of the mountainous region is also widely recognized. Such plans cannot be universal or equally efficient for all mountainous areas. A particular attention must be paid to the transboundary cooperation as well mainly in the form of the development of a single network of protected areas and road infrastructure.

**The World Community** actively works to improve the welfare of the population in the mountainous regions and support the sustainable development of the mountains. There are a number of international agreements, conventions and examples of transboundary cooperation helping the improvement of the living environment and social-economic support of the local population. Despite such actions, mountains are still considered "difficult-to-reach" areas and ecologically unstable environment and often stay beyond the concern of authorities and businesses. This is particularly true with the developing countries where most of the mountain population still live in extreme poverty and have complex ecological

problems.

The situation totally changed following the famous Rio de Janeiro Conference of 1992, i.e. after they had a **special discussion** of the principles and means of sustainable development of the mountainous areas, support of the local people and communities, development of cooperation and sharing experience. Development of rural communities of people of the mountainous areas in the countries of Central Asia (Kazakhstan, Uzbekistan and Tajikistan) and Alpine countries (Germany, Switzerland, Austria, France, Italy, etc.) with the purpose of sharing experience and cooperating is a good example [5]. As a result of cooperation, a set of actions ensuring the protection of the mountainous areas to conserve the biodiversity and form of a single network of the areas protected with ecological corridors was identified. Later, a similar cooperation was established for the purpose of sustainable development of the mountainous areas of the Central Americas and South-East Asian and Carpathian countries and the above-listed European countries.

Thus, Rio-92 turned out to be decisive in "activating" the topic of sustainable development of more than one mountainous regions of the world what should have been realized through the sharing of the **international experience** and engagement of the local people. The past years revealed some negative trends threatening the sustainable development [5, 6]:

- On the background of the rapid climate change in the mountainous regions, the intensity and frequency of natural calamities increased, the areas covered with glaciers decreased and problems of drinking water-supply for the local and lowland population occurred.
- Several major armed conflicts happened (in the Caucasus, Pamirs, Central America, Ethiopia, etc.) hampering the trends of sustainable development.
- High rates of urbanization and intense migration processes.
- The rapidly growing number of the world population and world economy has led to the increased demand for various ore deposits increasing the scales of environmental degradation of the mountainous regions.

#### **Conclusion – Main concepts of sustainable development.**

The **economic concept** of sustainable development relies on and considers the rational use of exhaustible natural resources, development of resource-saving technologies, focus on inexhaustible and renewable resources, ecological production, minimization and reuse of waste.

The **social concept** of sustainable development relies on and considers the stability of social and cultural systems, environmentally friendly and legally justified use of the national wealth, protection of cultural and historical values, publicity of decisions and maximum engagement of the society in the planning and management process.

The **ecological concept** of sustainable development relies on and considers the integrity of ecological (biological, landscape) environment, maintenance of the viability and functioning mechanisms of ecosystems, improvement of stability and self-restoration mechanisms of the natural environment, due determination of the



social-economic functions of the natural landscapes, ecology-oriented territorial (landscape) planning, landscape service and management, creation of the esthetic environment [1].

All three concepts of sustainable development, despite the diversity of the considered issues, can be considered as components of a **single system**. They are interconnected and mutually determinative. Consequently, sustainable development, as a problem, is quite difficult to solve and is a long civic and scientific process, with more than one scientific branch related to it considering the objectives and opportunities of sustainable development at either branch, or component level.

**The history of mankind** knows many problems, with most of them having clear geographical peculiari-

ties. They are seen at all: local, regional and global levels. Presently, particularly topical is the talks about global ecologic, economic, social and political problems, which are most thoroughly reviewed by geography. The complex nature of geographical analysis, study of the spatial and time peculiarities of the natural, social, economic and ecological phenomena and processes, research of natural and modified (natural-anthropogenic) landscapes, possibility to interrelate planetary and regional ecological problems make the science of geography particularly topical. At present, the study of the spatial (local, regional and global) peculiarities of sustainable development is the main objective of geography what makes it outstand among other branches of science.

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