Non-official translation

Protocol Decree N 23

ON APPROVING STRATEGY AND NATIONAL ACTION PLAN TO COMBAT DESERTIFICATION IN THE REPUBLIC OF ARMENIA

Approve Strategy and National Action Plan to Combat Desertification in the Republic of Armenia according to Annex.

May 27, 2015

RA Prime Minister
Hovik Abrahamyan

Annex to
RA Government decree N 23
Dated May 27, 2015

I.INTRODUCTION

1. Desertification as a global environmental problem

1) Desertification is defined as final stage of land degradation in arid zones. Desertification as a global environmental problem includes the integrity of undesirable processes and their consequences that occur in the environment resulting in reduction or elimination of the biological capacity of the area. That is why the fight against desertification includes not only the effective organization of the protection and use of natural ecosystems, their components and natural resources, but also mitigation efforts of the environmental factors that contribute to the disturbance of the ecological balance, including social and economic factors. Therefore, the effectiveness of the combat against desertification, first and foremost, is dependent on the in depth analysis of a given country's socio-economic conditions and disclosure of the natural resources potential. Desertification can be described as the final stage of land degradation in arid regions. Desertification, land degradation and drought effects are pronounced in poor rural areas. Desertification and land degradation problems are related to more than 110 countries around the world. About 1.5 billion people directly depend on arid lands.

2) In the final report of Rio + 20 it is stated, that desertification together with land degradation and drought are global problems the solution of which is to achieve land degradation neutrality which will promote mobilization of financial resources. Land degradation neutrality implies improvement of the land resources aimed at the growth of economic, social and environmental benefits. The working Group of UN Conference of Parties to the Convention to Combat Desertification 8 / COP.11 has developed the definition of land degradation neutrality which states: "Land degradation neutrality is a condition when healthy and fertile land resources and spatial scales needed to provide vital ecosystem services remain unchanged or increase during a certain period of time." At national level land degradation neutrality can be integrated into the policy through:

a. Inclusion of provisions on land degradation neutrality in the National Action Programme harmonized to the 10-year strategy of the Convention to Combat desertification.

b. Development of land degradation neutrality implementation programme.

2. Implementation procedure of “National action programme to combat desertification in Armenia”

1) “National Action Programme to Combat Desertification in Armenia” was approved by RA Government protocol decree N13 dated March 28, 2002. In the past the following activities were carried out with the assistance of international organizations:

a. The text of United Nations Convention to Combat Desertification was translated into Armenian and manuals highlighting desertification phenomena in Armenia were published;

b. Informational and educational seminars on the prevention of desertification phenomena were conducted in Vayots Dzor, Syunik and Ararat marzes;

c. In 2002-2004 priority landslide action plan was implemented in the settlements of the Republic of Armenia which also included studies on the landslide regime;

d. In 2003-2006 the projects "Restoration of lands affected by desertification in Garni community of the RA Kotayk marz" and "Geoengineering research activities in Makaravanq memorial section of the RA Tavush marz" in the result of which irrigated areas of Garni community were expanded, recommendations were made on the anti-landslide measures for the protection of Makaravand monument;

e. In 2002-2009 mitigation measures towards desertification were also implemented in the RA Tavush and Gexarqunik marzes within the project "NAural resources management and poverty reduction";

f. Within the framework of the "Millennium Challenges"program expansion of irrigated areas, as well as rehabilitation of drainage systems were implemented. Irrigated lands increased by around 1,300 hectares in comparison to 2007. Natural hayland improvement and irrigation activities were carried out within which around 12km irrigation systems were restored in the result of which more than 800 ha of distant natural pastures became usable;

g. Within the frameworks of the project "Reconstraction of irrigation system" 26 km water supply lines were restored, 238 deep wells were reconstructed and built, 310 km drainage network was cleaned and conducted.

2) To fulfill the commitments assumed by the UNCCD and "National Action Plan to Combat Desertification in Armenia" 5 national reports were elaborated and submitted to the Secretariat of the Convention. The latter were approved by the Secretariat and posted on the Convention's website (http://www.unccd.int).

3. 10-year strategy to combat desertification

1) In 2007 the 8th session of the COP of UNCCD adopted 10-year strategic plan which would cover the period **2008-2018 the main aim of which** is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability. As a result the following four "strategic objectives were defined:

a. To improve the living conditions of affected populations;

b. To improve the condition of affected ecosystems;

c. To generate global benefits through effective implementation of the UNCCD;

d. Mobilization of resources to support implementation of the Convention through building effective partnerships between national and international actors.

2) The strategy also contained the following five "operational objectives" that will guide the actions of all UNCCD stakeholders and partners in the short and medium term (3-5 years) with a view to supporting the attainment of the above-mentioned vision and strategic objectives. These include:

a. Implement advocacy, awareness raising and education related activities at international, national and local levels;

b. Contribute to decision-making processes;

c. Assist in the dissemination of scientific knowledge;

d. Identify needs to assist capacity building;

e. Assist mobilization of national, bilateral and multilateral financial and technological resources.

3) The developed "outcomes" are the short and medium-term effects intended by the objectives. The strategy also includes the framework of the activities which sets out roles and responsibilities of various institutions, agencies, partners and stakeholders of the Convention. Performance monitoring and reporting system was developed for the mentioned strategic objectives which are intended for the follow up of the convention implementation. The system was created using impact and effectiveness indicators. Moreover, reports on the implementation of the strategic plans including impact indicators should be prepared once in four years and the reports on the implementation of objectives including effectiveness indicators once in two years period.

4. UNCCD connection with those of "Biological Diversity" and "Climate Change"

1) Conservation of the biodiversity, climate change and land degradation/desertification are intimately connected processes.

2) Constant increase of greenhouse gases emitted into the Earth's atmosphere and the reduction of the green masses by the humanity contributes to the intensification of global warming which increases the negative impact of climate change on the biodiversity component.

It is reflected in the reduction of the number of populations and species, temporal-spatial changes of habitats and lifecycle of the species distribution, violation of the interactions, change of species demographic indicators, increase of mass outbreaks of diseases and pests, violation of the equilibrium between competing species, spread of invasive species and etc. These various changes profoundly impact the condition of the natural resources and the healthy lifestyles of the society.

3) Vegetation and the diversity of its physical structure contribute to the land preservation and soil formation, as well as regulation of the surface water flow and microclimate and absorption of precipitations by soils providing ecosystem services protection in arid and semi-arid areas.

Moreover, the violation of interconnection of ecosystem services in arid and semiarid areas is one of the key factors of desertification, when environmentally unacceptable long-term economy of the natural resources (mining, overgrazing, water and forest resources overexploitation, etc.) does not correspond to the terms ensuring favourable ecological conditions of natural ecosystems and landscapes. In the areas exposed to economic use the level of expression and the speed of desertification processes depend not only on unacceptable practices and methods of land use, but also on the lack of balance between land use and conservation. Prevention or mitigation of desertification processes in each specific region is possible only in the case of determination of the correlation of the natural resources potential "use-improvement-conservation" which will ensure the protection of landscape-ecological balance of the natural environment. The latter is one of the most important provisions of the European Landscape Convention, and can greatly contribute to the recovery of the degraded areas and the management process.

II. DESETIFICATION PHENOMENA IN THE REPUBLIC OF ARMENIA

5. Desertification criteria

The following desertification criteria were adopted by the Republic of Armenia:

1) Humidity factor reduction trend;
2) Increase of diurnal variation in air and soil temperatures;
3) The amplitude and increase of the absolute temperature;
4) Increased evaporation;
5) Decrease in precipitation amount;
6) Change in the soil formation processes;
7) Biodiversity decline;
8) Decrease of the river flow;
9) Intensification of the land degradation processes;
10) Chemical, physical, and biological deterioration of soil structure;
11) Increase of mudflows and erosion;
12) The decrease in efficiency of arable lands and reduction of humus;
13) Intensification of anthropogenic impact;
14) Land degradation neutrality.

6. Desertification factors. In the Republic of Armenia desertification factors are divided into two groups: natural and anthropogenic.

1) Natural factors are:

a. Droughts frequent at Ararat valley lowlands and foothill areas and some separate areas of Vayots Dzor and Syunik marzes;

b. Sandstorms caused by the invasion of tropical air masses and are intensely observed in Ararat valley, Vayk and Syunik marzes;

c. Moisture deficit caused by uneven distribution of seasonal and regional precipitation.

d. Geomorphological features (landforms, fragmentation density of the terrain and depth, steepness of the slopes and their orientation);

e. Landslide processes covering about 0.5 million km2 area (around 2% of the Republic's area) and developing on medium-altitude mountain areas;

f. Downpours- intensive on the average elevations of the mountain zone and occupy more than the half of the country;

g. Floods, particularly widespread in Ararat and Shirak plains, some adjacent areas to Lake Sevan, as well as in separate settlements of Syunik, Vayots Dzor and Lori marzes;

h. Natural salinization widespread in low-lying plains where the underground waters are close to the ground level.

2) The key weather-forming factor in the territory of the Republic during July-September is the tropical thermal cyclone formed in Arabian Peninsula (Thermal depression). Studies indicate that extreme high temperatures, intense droughts and sandstorms are conditioned by this baric/pressure field. On the average, thermal depression penetrates the territory of the Republic 17 times per year. The maximum number of 51 was observed in 2006, while the minimum (once) in 1967. The greatest incidence of this process when discussed by months is observed during July-August averaging to 7-8 days. The incidence of the thermal depression impact during 1978-2008 as compared to 1948-1978 increased by 61% (figure 1) which allows us to conclude that the incidence of summers with high

thermal background and scarce rainfall events has increased. About 1 278 950 hectares or 43% of the Republic's territory is occupied by semi-arid and arid sub-humid regions (Figure 2).

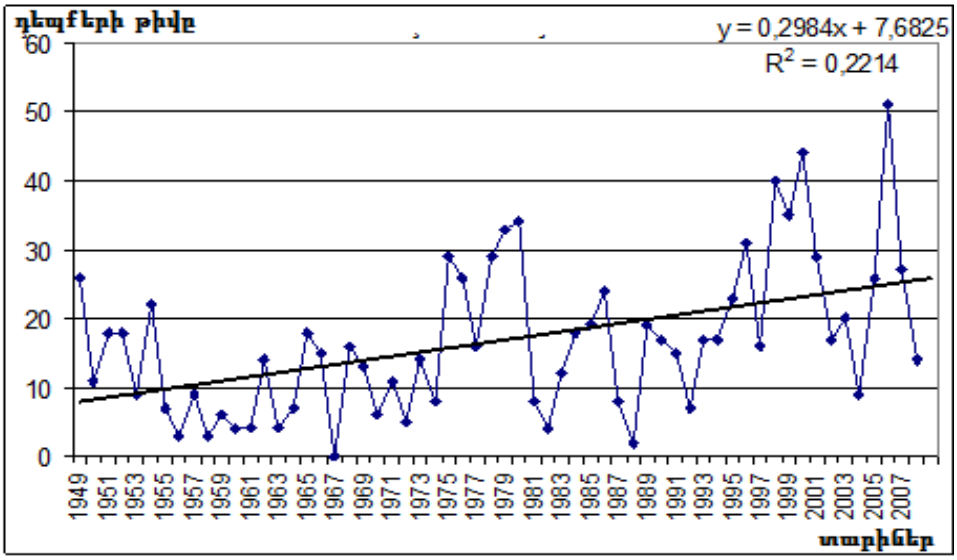


Figure 1. The number of days impacted by thermal cyclone for the period of 1948-2008

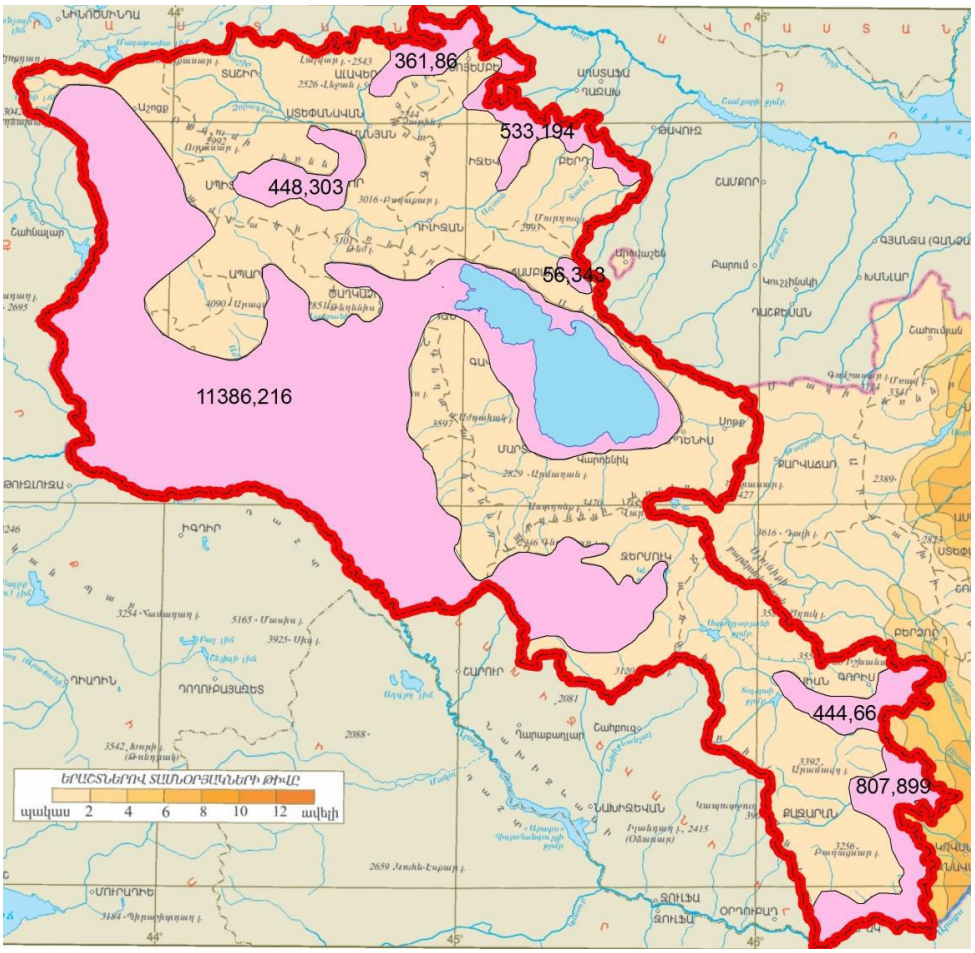


Figure 2. Drought areas of the Republic of Armenia (indicated in violet)

3) **Anthropogenic factors:**

a) Urban activity- Due to extreme lack of favourable lands for construction with use of areas with complex engineering-geological conditions such as steep slopes, areas with ragged relief, under risk of flooding, mudflows and other areas where exogenous geological processes, especially landslides are significantly intensified;

b) Agriculture-Related to the violation of ploughing rules, absence or inappropriate application of crop rotation techniques, ineffective use of irrigation water, overgrazing of pastures;

c) Irrigation and drainage network outages (including abstraction by small hydropower plants in the summer months) and their disrepair,

d) Road erosion- Related to the formation of ravines and rangelands, erosion hot-spots by water sprinkles on the steep slopes and at the traces of vehicle wheels;

e) Illegal logging;

f) Mining, especially with open-pit method;

g) Abuse of artesian water resources;

h) Soil contamination, from energy, industry, construction materials, utility, public utility and dung-heap sources;

i) Violation of biological diversity.

4) The analysis of the reports and summary reports of the RA Ministries of Nature Protection, Agriculture, Territorial Administration, Energy and Natural Resources, Emergency Situations, Municipalities, RoA National Academy of Sciences for the period of 2009-2013 indicate that due to anthropogenic impacts the threats to ecosystems haven't changed significantly as compared to the previous period. It should be noted that the loss of natural resources, as well as changes in ecosystem services in most of the cases are conditioned by complex influences, rather than with a single factor. Increase of degradation rate of ecosystems is conditioned by the activation of certain economic and social activities which is expressed in overexploitation of biological resources, mining operations and land privatization, as well as expansion of urban areas and noticeable revival of agriculture and development of tourism.

7. Characteristics of landscape desertification

1) Armenia's mountainous terrain contributed to the formation of 10 different landscape types (Figure 3). There are also a number of intrazonal ecosystems (wetlands, cliffs, cracks, stone accumulations), which are common for almost all apical zones. Studies confirm that during the geological development the evolution of the landscapes within the entire Armenian Plateau followed one general trend: that is the transformation of the slightly humid subtropical landscapes to variable humid forests and temperately humid meadow-steppe landscapes and, afterwards into turf-steppe and typical steppe landscape types. It means that the prevailing aridization trend continues to the present.

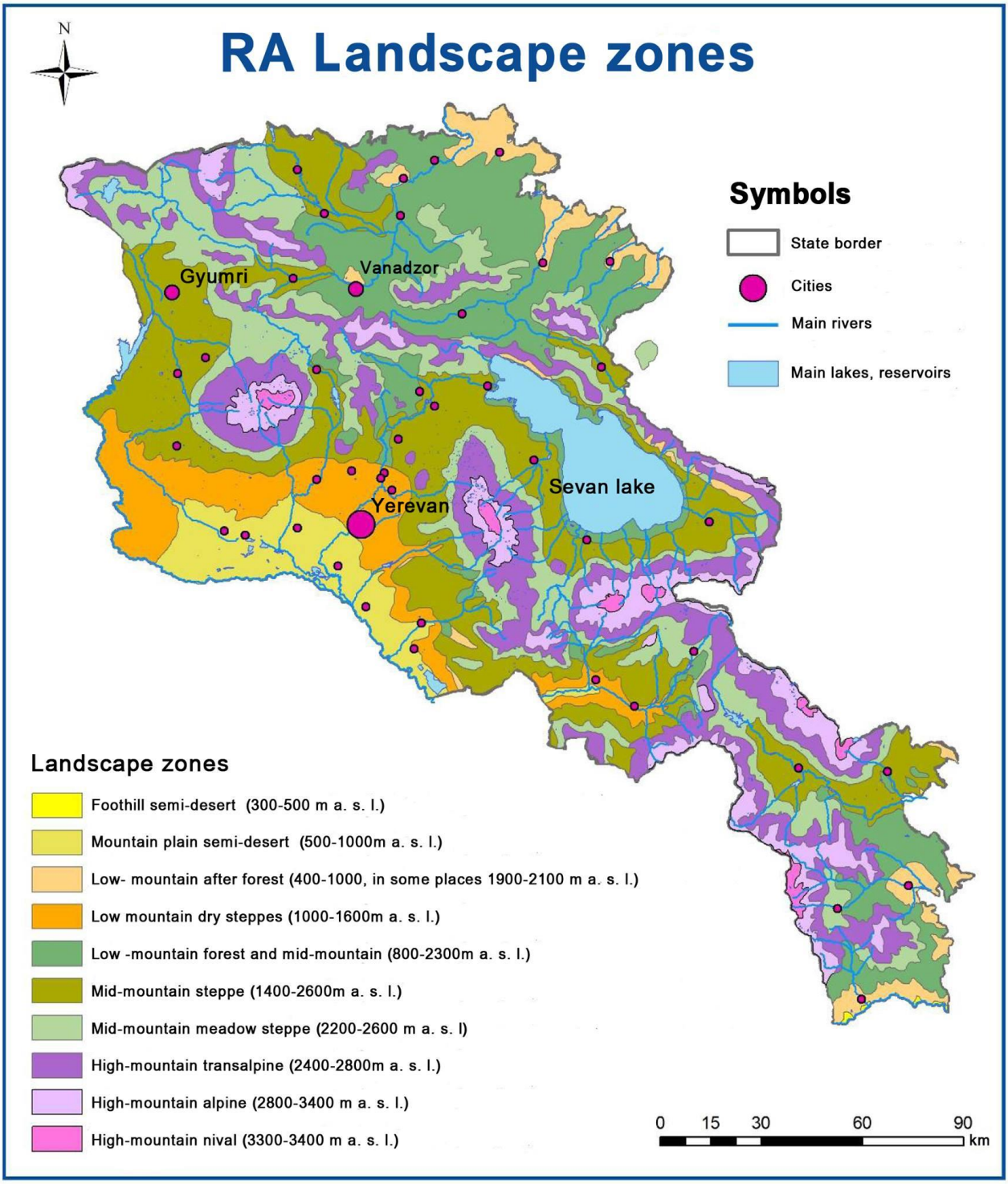


Figure 3. Landscape zones of the Republic of Armenia

2) Studies of the structure of the vertical zonation of the landscapes of the Republic of Armenia suggest that the spectra of the north-eastern, south-eastern and internal areas of the mountain landscapes significantly differ from each other. Two landscape-ecological ascending zonality series can be separated based on heat and humidity ratio differences. North-eastern and partially south-eastern portions of the Republic are characterized to be mesophyte, while the central

areas are ecological series of xerophyte landscapes. This character of the structure of the upland zoning is an important landscape-geophysical phenomenon peculiar to landscape aridity (Figure 4).

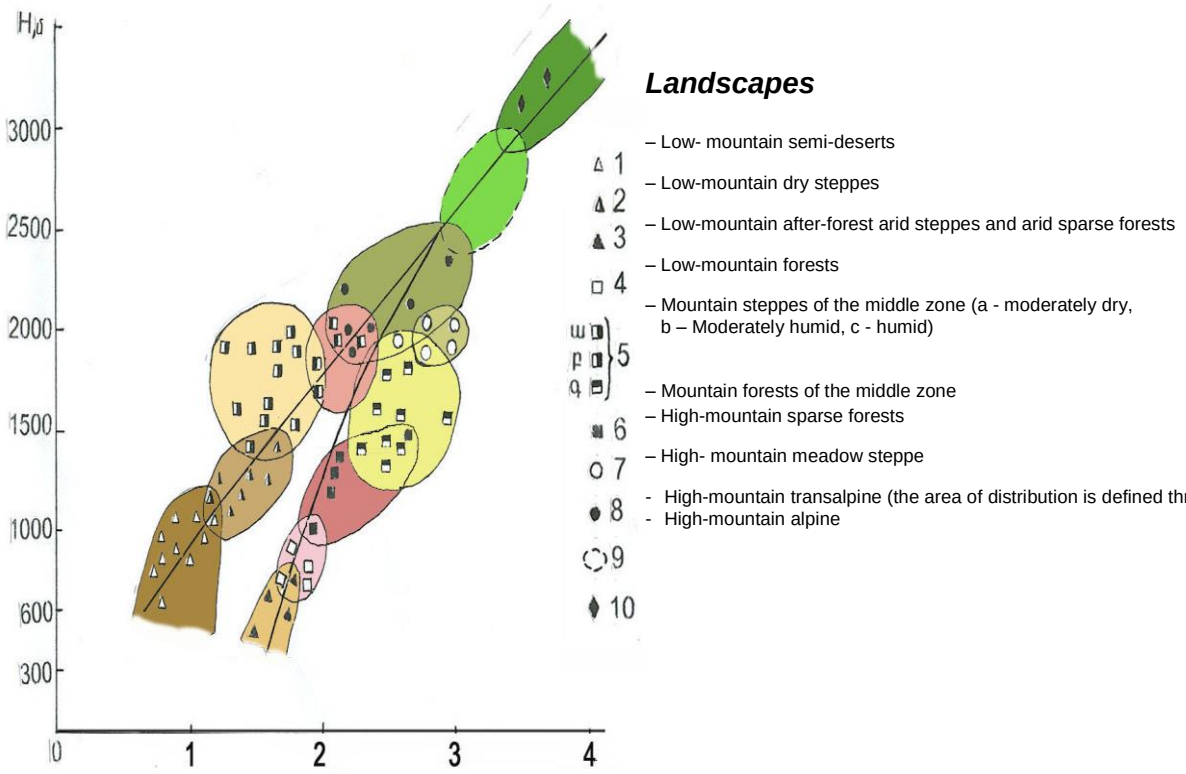


Figure 4. Elevation dependent change of aridization coefficient

3) In the northern, north-eastern and partially south-eastern portions of the country mesophyte series are formed which include lowland after-forests, arid steppes, arid sparse forests and forests, middle zone mountains, forest humid steppes and steppe meadows, highland mountain trans-alpine and alpine meadows. Xerophyte series is peculiar to the rest of Armenia's inner regions and includes lowland semi-deserts and dry steppes, mountain temperate-arid and humid steppes, sparse forests, meadow steppes of the middle zone, high-mountain trans-alpine and alpine meadows, as well as nival landscapes. The analysis shows that according to the degree of aridity 5 groups of landscapes can be identified. These include arid, semi-arid, slightly arid, semi-humid and humid landscapes. These are located in different hydrothermal areals in accordance with their typical aridity coefficient and various indicators of moisture conditions (figure 5). The formula of aridity coefficient by location is considered to be more appropriate criterion $K = \frac{r}{5.12^{\wedge} \sum_{X}^{IV} t^{\circ} + 306}$, where *K* is aridity factor, *r* is average annual precipitation, *t* is average monthly temperature during vegetation(from April to October, C°). The advantage of this formula is that all meteorological stations data are used without taking into account the distribution of interannual precipitation and temperatures.

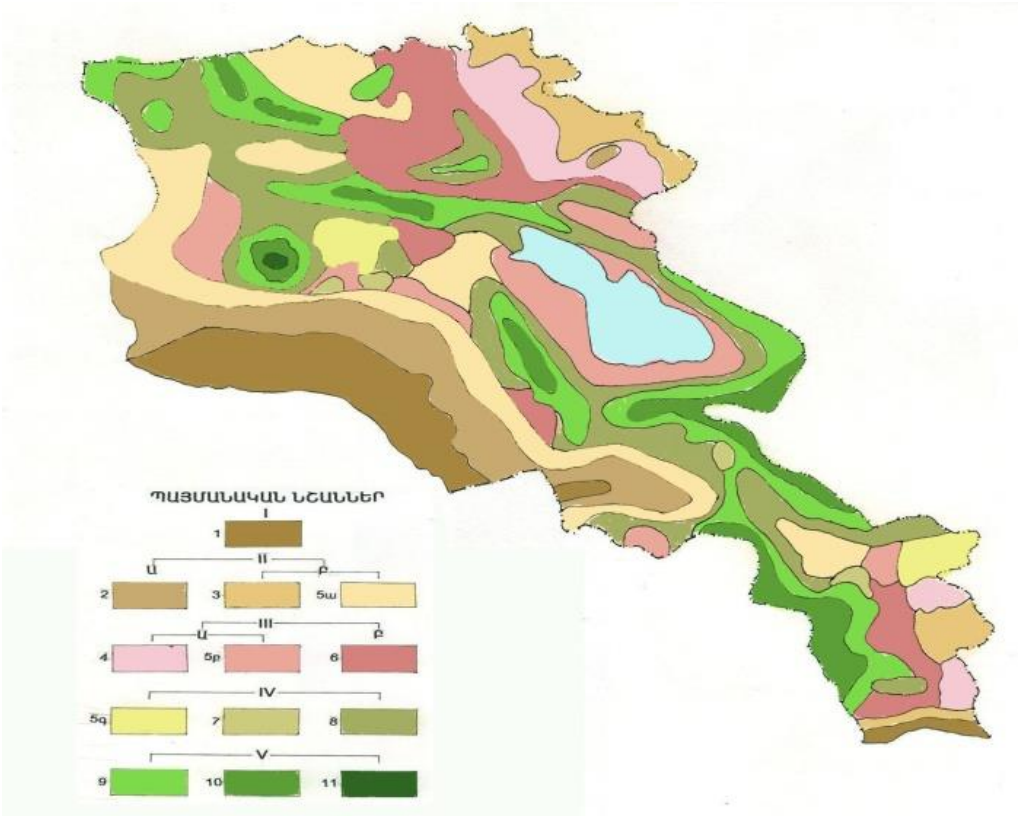
4) Thus, the analysis of the climatic range of the landscape-ecological series within the upland zoning of the country's area shows that mesophyte series is gradually passing into xerophyte series which is characterized with the following:

a. Lowland dry-steppes move upwards leaving the dry-steppes of the middle zone behind. The areals of the dry-steppes and the semi desert are the least mixing landscape types. Such an image was formed recently and apparently shows that the most arid landscapes expand;

b. Temperate dry and temperate humid steppe landscapes move upwards occupying the areals of the steppe meadows;

c. Steppe meadows and sparse forest landscapes almost entirely overlap each other which clearly proves the aridization trend transforming forests into sparse forests and then into meadow-steppes;

d. Subnival landscapes are substituted with alpine meadows (e.g. primary process of soil formation in the apical areas of Aragats and elements of unmixed meadow phytocenotic vegetation are observed).



I-arid (or<1.0) Insufficient humidity (i>3.3) (low mountain-semi desert),
II-semiarid (or<1.1-1.7),
A- Insufficient humidity (i=2.6-3.2) (2- low mountain dry steppe),
B- Temperately Insufficient humidity (i=1.6-2.5) (3- low mountain after-forest dry steppe and dry sparse forests: 5a- middle mountain temperate dry steppe),
III- slightly arid (Kam<1.8-2.5).
A- Temperately Insufficient humidity (i=1.6-2.5) (4-low mountain forests, 5b- middle mountain temperate humid steppe),
B- Optimal humidity (i=1.0-1.5) (6-middle mountain forest),
IV- Semi humid (Kam<2.6-3.0) optimal humidity (i=1.0-1.5) (5c- middle mountain humid steppe: 7- Middle mountain sparse forests. 8- Middle mountain stepped meadows)
V- Humid (Kam<3.1) excess moisture (i=1) (9-high mountain trans-alpine meadows:
10 - high-mountain alpine meadows, 11 - high-mountain nival).

Figure 5. Assessment of the RoA landscapes by degree of aridization

5) The characteristics of high-level zonality are the expression of aridity which is also the expression of newly formed climatic conditions and landscape-geophysical conditions of a given area.

6) While comparing landscapes of the quaternary and later eras (III-I millennia BC and modern), it appears that 37-38% of the present territory of Armenia was occupied by forests during III through I millennia BC. At present forested areas occupy only 11.17% of the country. This indicates that the anthropogenic factor (fires, deforestation, etc.) was activated in parallel to the aridization of the climate. The areas of steppes, dry steppes and semi deserts have dramatically expanded under the influence of similar factors respectively occupying 16% -36% and 6% -13%. Currently, desert landscapes (about 3%) are formed at Ararat Valley and different communities of Ararat and Armavir marzes with separate land parcels (saline soils, as well as soils under risk of salinization). Trans-alpine landscapes have expanded on this background increasing from 12% to 26% due to the expansion of dry meadow steppe landscapes and reduction of alpine landscape zone (Figure 6).

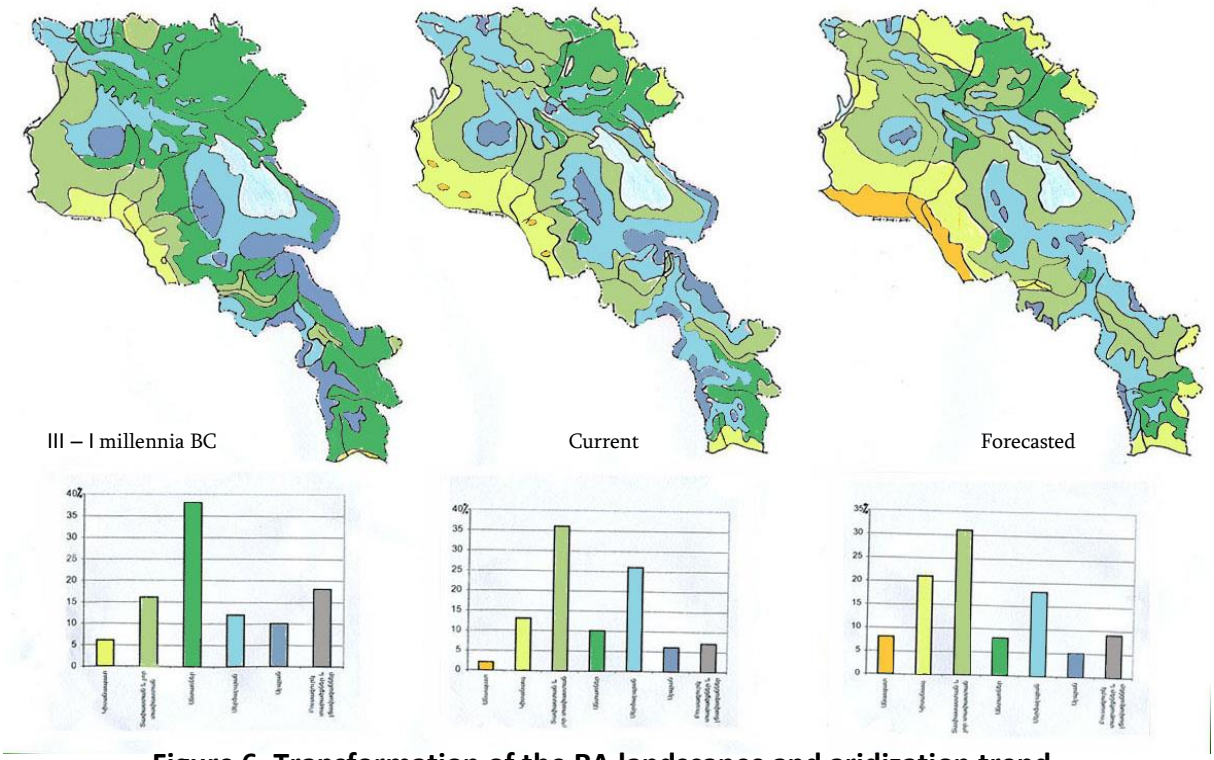


Figure 6. Transformation of the RA landscapes and aridization trend (in the after- quaternary period)

7) When analyzing the forecasted changes of the vegetation and soil covers and climatic conditions due to the global climate change, it appears that the areas currently occupied by landscapes will follow aridization trend in the coming decades as a result of which desert landscapes will occupy 7%, while semi deserts 20-21%, steppes and dry steppes 30-31%, forests 7-8%, subalpine zone about 17% and alpine zone 5% of the total territory. Thus, aridization processes that started through the III to I millennia BC will continue in the territory of Armenia during the coming decades contributing to desertification processes. Moreover, expansion of arid landscapes is conditioned not only by the climate change, but also growing pressure of the human factor on the natural environment.

8. The correlation between desertification and natural resources management

1) Desertification and the underlying phenomena not only promote the hindering and decline of economic development, but also have a negative impact on social, cultural and environmental sectors through acceleration of the effects of separate negative factors and intensification of existing social, political, economic, and environmental issues.

2) From environmental point of view, unbalanced development of the economy negatively impacts the environment, aggravates current ecological situation and finally accelerates desertification processes. Thus, the correlation between the desertification processes and economic situation is often two-sided, interrelated and usually the influence of the latter is more prevalent. To evaluate the impact of desertification processes on the economy first of all it is necessary to separate the expenditures that the government spends on:

a. Study of desertification factors;
b. Prevention of desertification impacts;
c. Measures aimed at the mitigation of desertification impacts;
d. Measures aimed at the elimination of desertification impacts;

3) The sum of the above mentioned expenditures can be regarded as the expression of the direct value that any government implements to prevent and reduce/mitigate impacts of desertification and eliminate their consequences. In practice it is impossible to clearly divide the cost and the measures according to the above criteria, because they are often parallel.

4) In Armenia the processes of desertification are most closely related to the following branches of economy:

a. ***Agriculture***: where the most serious environmental problems are: water loss in the result of inefficient irrigation, soil salinization, erosion, soil pollution with agricultural wastes. The latter result in the degradation of natural ecosystems, change and loss of biodiversity which finally leads to deep quantitative and qualitative changes of ecosystem services;

b. ***Forestry***: where the deforestation in the result of different socio-economic problems and high demand of wood still exceeds the capacity of natural regeneration of the forest. This is facilitated by the availability of wood, rise of energy prices and low solvency of socially vulnerable classes of the population. Wood continues to be the main source of fuel for population of the communities living near the forests;

c. ***The use of natural resources***: where thousand hectares of land are covered with open mines and tailings. According to the land balance of RA, lands of industrial, mining and other significance occupied 29.36 thousand ha in 2009, 12.5 thousand ha in 2010, 33.0 thousand ha in 2011, 33.6 thousand ha in 2012 and 34.9 thousand ha in 2013. This means that the surface of used lands gradually increases, especially at the expense of mining lands. One of the most disturbing facts is the open-cast mining where more than 7 thousands ha of agricultural lands have been removed from circulation because of extraction of building materials;

d. Hydropower: where during the design and exploitation of small hydropower stations aquatic fauna needs are not taken into account, meanwhile the effect of change of water regime of mountain rivers on coastal and aquatic ecosystems and on the biodiversity neither was rated nor studied. In 2014 the monitoring carried out by the working group created within the Expert Committee on Lake Sevan revealed that small HPS built on the spawning rivers mainly do not have

fish ladders and fish protection structures, directly threaten the existence of pubescent fish species which swim up the river to reach spawning areas. In addition, some small hydro plants do not retain the established amount for the acceptable environmental flows which in its turn leads to the degradation of river ecosystems.

5) In Armenia the deepening correlation of desertification and the economy negatively impact the social state of the population, which is reflected in direct and indirect impacts.

6) ***6)Direct impacts*** include material damages caused to the population by desertification processes, which brings about a need of additional expenditures aimed at the elimination of their consequences. Negative impacts of desertification on the social conditions of the population are displayed in the following ways:

a. Decrease of income due to the following: Reduction of the soil fertility; Raggedness of Land plots; Reduction of the land surface; Reduction of volumes of bioresources used by the population; Additional expenditures aimed at elimination or mitigation of negative impacts of desertification.

b. Worsening of housing conditions due to which many settlements are currently being abandoned. Moreover, migration processes follow two-directional trend emigration and inner migration. Inner migration is characterized by migration of rural people to the cities and lowlands, especially to Ararat valley. Form this respect the situation is especially alarming in the border and mountainous areas, where there is a significant decline of economic potential.

7) Indirect impacts are connected with country's economic base, which determines the actual social situation of the population.

9. Desertification risk assessment map, according to desertification risk ratio of $\frac{P}{E_0} \leq 0.65$ proposed by the Convention

1) Determination of desertification risk probability is an extremely difficult task. Therefore, desertification risk issues have been observed by using desertification risk factor $\frac{P}{E_0} \leq 0.65$(P is the average annual precipitation level, E0 is potential evaporation) and the most vulnerable areas of Armenia have been separated and mapped based on the obtained data (Figure 7). The advantage of a map prepared with the above-mentioned formula is that it can be compared with maps of other regions of the world prepared by the same method. Approximated calculations indicate that about 7233 km^2 (24.3 %) of Armenia's territory are under risk of desertification, while an area of 14519 km^2 undergoes (48.8 %) (in Lori and Tavush marzes on elevations of 900-1000 to 2000-2200 m and in the inner regions on 1500-1600 to 2800-3000m) desertification and these processes will be accelerated under the influence of global climate change. Desertification processes are not reflected only on an area of 6742 km^2 (22.6 %).

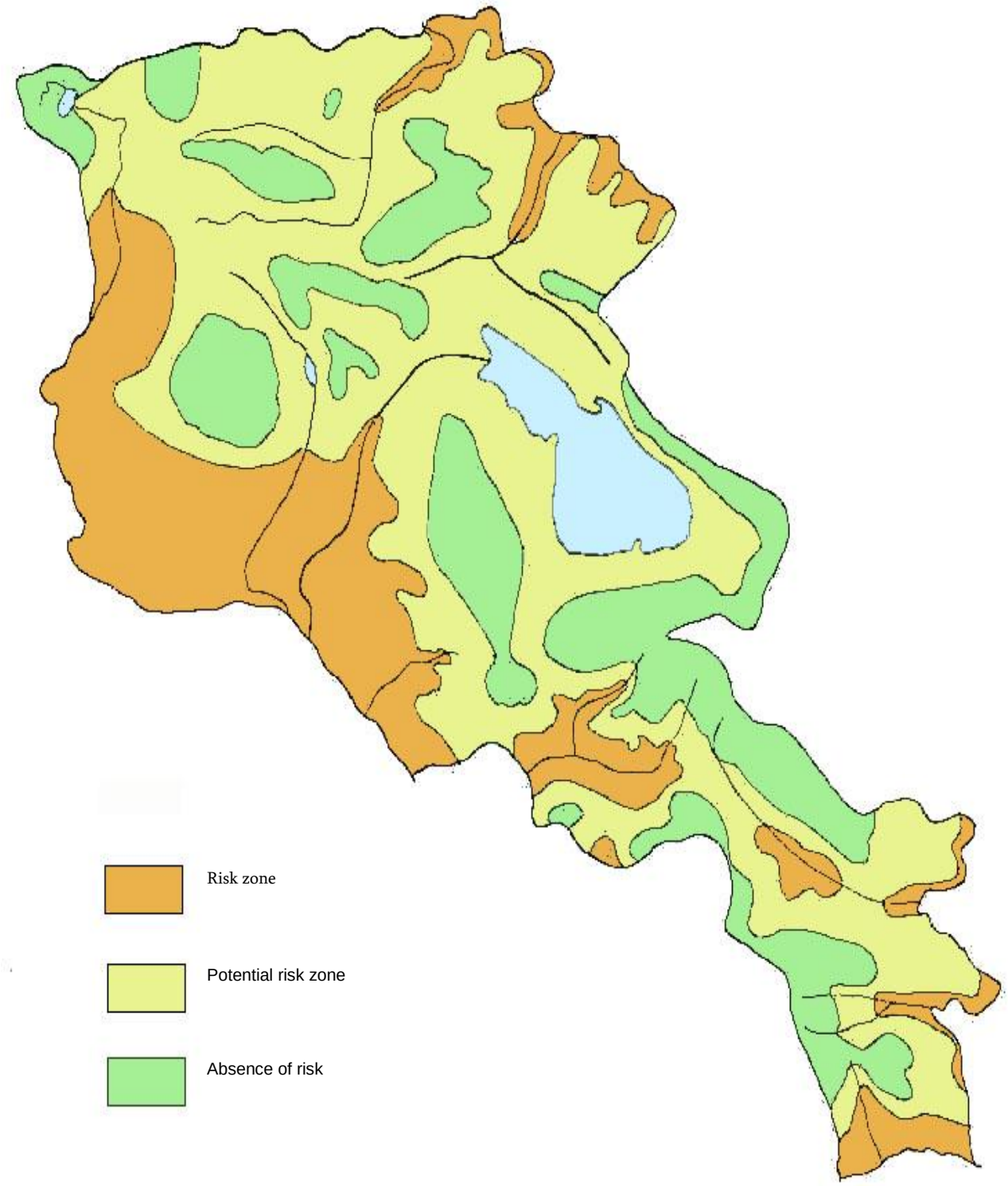


Figure 7 Desertification risk zone in Armenia

III. NATURAL RESOURCES OF ARMENIA AND ECONOMIC MECHANISMS OF THEIR UTILIZATION

10. Natural resources

1) **Soils.** The Republic of Armenia is not rich in soil resources, but is distinguished by the variety of soil cover comprised of the following zones. (Table 1).

Table 1.

Soil zones and types*

Zones	Marzes	Soil types	Area		Elevation, m ASL
			Thous. ha	%	
Semi desert	Aragatsotn Ararat Armavir Kotayk Yerevan	1.Semi desert gray 2. Irrigated, meadow gray 3. Paleohidromorf, cohesive, alkaline 4. Saline-alkaline	152 53 2 29	5.8 2.0 0.1 1.1	850-1250
		Total	**236**	**9.0**	
Dry steppe	Aragatsotn Ararat Kotayk Syunik Vayoc Dzor	Brown	242	9.2	1250-1900
Steppe	Aragatsotn Ararat Gegharkunik Lori, Kotayk Syunik Vayoc Dzor Shirak	1. Black soils 2. Meadow black soils 3. Valley-terrace 4. Soil-grounds	718 13 48 18	27.4 0.5 1.8 0.7	1300-2450
		Total	797	30.4	
Forest	Aragatsotn Ararat Gegharkunik Lori, Kotayk Syunik Vayoc Dzor Shirak	Forest grey Turf-carbone Brown	133 15 564	5.2 0.6 21.6	500-2400
		Total	712	27.4	
Mountain meadow	Aragatsotn Ararat Gegharkunik Lori, Kotayk Syunik Vayoc Dzor Tavush	Mountain meadow Meadow-steppe	346 283	13.2 10.8	2200-4000
		Total	629	24.0	
Total			**2616**	**100**	

*

2) **Water Resources.** One of the primary objectives of combating desertification in Armenia is the correct estimation, distribution of water resource and their protection from pollution. Surface water resources of the Republic amount to 6250 million m^3 per annum, while the approved groundwater resources amount to 1,200 million m^3. The density ratio of Armenia's river network is 0.8 km/km^2. It belongs to the Caspian Sea basin. Rivers have mixed type of feeding, including snowmelt, groundwater and rain events. The river flows undergo significant changes during the year. The average annual flow is about 7,187 mlrd m^3 and during low-flow years it reaches 5.2 mlrd m^3. The geographical position of the Republic is such that almost all rivers flow outside of its boundaries. In the summer and autumn, when water demand reaches its maximum, annual flow constitutes 20-25%, in winter it constitutes 10-12% of the total flow, while in spring it is around 55-70%. The Republic of Armenia is not rich in lakes. Lake Sevan is the largest lake of the Republic and the entire Caucasus. The surface of the lake as of December 31, 2013 amounted to 1275.28 km^2 and the level mark reached 1900.16m. Remaining lakes of the Republic (Kari, Akna, Sev and etc.) are small and are mainly located in high-mountain areas. Lakes Arpi and Parz are located in the middle mountain zone. Ayghr is one of low-lying lakes feeding from underground water resources. Underground water resources are estimated to be 4,017 billion m^3 and are distributed unevenly throughout the territory of the Republic. These are represented by springs, wetlands and groundwater flows (artesian and ground). Around 70% of the water resources flow towards Ararat valley. The estimated water resources of the valley are located from 40 to 300 m deep underground. Deep waters are mainly used for drinking and economic purposes. Upper water horizons (up to 40 m depth) are used only for agricultural and industrial purposes. The fluctuation of the groundwater levels is around 1 meter during the year. 75 reservoirs with the total capacity of 986.0 million m^3 are constructed in Armenia to meet irrigation needs. Only Mantash reservoir was constructed to satisfy both drinking and economic needs. It is planned to construct ten additional water reservoirs with the total capacity of 396 mln m^3.

3) **Biodiversity**. Geographic characteristics and location in the intersection of migratory routes for migratory animals and birds, diversity of landscape and altitudinal zones, active processes of speciation have created favourable conditions for the formation of the rich and unique biodiversity of Armenia. More than 4,500 fungi species, 9,000 species of higher and lower plants are registered within the territory of the Republic. Armenia is one of the top countries in the world where density of the vegetation per 1 km^2 is calculated to be about 107 species. Fauna is represented by about 17 500 species of invertebrate and vertebrate animals. Gene pool is rich not only with many endemic species, wild relatives of cultivated and domesticated species, but also with valuable useful species. Biodiversity has an environmental and socio-economic importance in Armenia, where the components of the biodiversity have been used for centuries and are still being actively used in various areas of social life, including in agriculture, food processing, construction, pharmaceuticals and etc.

4) **Minerals.** The Republic of Armenia has a territory rich in mineral resources. According to archaeological data, mineral deposits of copper, gold, iron and other minerals have been known since ancient times, and some of them were even partially exploited. The known mineral resources of Armenia are divided into the following groups:

a. Metal minerals – including copper-molybdenum deposits (Syunik and Lori), pyroclastic deposits (Syunik and Lori), gold deposits (Gegharkunik and Kotayk regions), iron deposits (Kotayk, Gegharkunik, Tavush, Shirak);

b. Non-metal minerals – including Artik tuff, Anipemza pumice and tuff, Aragats perlite, Sarigyugh bentonite clays, Tumanyan fire-clays, Avan salt, Jrvezh gypsum clay deposits;

c. Mineral waters - Jermuk hot (Karlsbad twin), Hankavan and Litchk (Essentuk twin), Arzakan and Bjni lukewarm (Vichy Analogs), Dilijan cold (Borjomi twin), Ararat and Tatev lukewarm (Narzan type) water deposits, as well as Narzan type sulphate mineral waters are known in Ijevan, saline-alkaline mineralized waters like Arzni, Getamej and Avazan are widespread in the areas adjacent to Yerevan.

5) The known **organic fuel reserves** of Armenia are consisting of coal, shale, turf, bitumen, bituminous sand deposits, as well as traces of gas. According to the data provided by individual experts and researchers, unapproved organic fuel reserves of Armenia are as follows:

a. Explored coal and shale reserves are approximately 400 mln. Tonnes;

b. Explored reserves of shale in Dilijan mine are about 6 mt, while the prospective resources are estimated to be 128 mt;

c. Resources of coal in Ijevan mine are estimated to be about 100 mt;

d. Prospective resources of oil and gas layers exist in the regions of Armavir, Ararat, Kotayq and Gegharqunik.

6) **New and renewable energy resources**. Armenia's area is endowed with significant solar energy potential. The average amount of solar energy flow captured on a horizontal surface per 1m2 constitutes 1720 kWh/m 2 per annum (the average European is 1000 kWh/m2). Lake Sevan can be considered record-keeper with the duration of the sunny days that constituted 2800 hours. The direct solar radiation per annum in the total territory of the Republic is about 65-70% which from the point of view of using concentration collectors is quite peculiar. The development of meteorological information base allows us to give a rough estimate of the wind generated energy resources. The theoretical potential is estimated to be 10.7 TWh, out of which only 1.6 TWh is technically available in case of using 15% capacity utilization factor. Pushkin and Sisian Mountain Passes and Aragats Mount are especially convenient for installation of netlike wind-generation equipment. Wind flow duration in these areas reaches up to 5200 hours/years per annum, while the minimum wind speed is 5-6 m/sec. Economically viable potential of the netlike wind-energy generators is characterized by 15-20 MW and 40-50 GWh/year. Armenia has significant resources and opportunities of geothermal energy for electricity and heat production. According to various specialists 150-200 MW of electricity generation is quite realistic under condition of price lower than 5 U.S. cents / kWh(Currently it is 10.6 cent in the RA). Use of geothermal energy for heating purposes is more promising. Central volcanic belt is promising from the territorial perspective. Geological work at this area allowed exploration of prospective geothermal and thermal-rock mines (Jermaghbyur, Sisian and etc.).

7) **Recreational resources.** The Republic of Armenia is quite rich in recreational resources, which is conditioned by geological-geographic position and landscape diversity, climatic favourable conditions with curing effect, availability of mineral water, forests, natural and historical-cultural unique monuments. These resources are essential to the country's socio-economic development.

The following natural resources with their favourableness play a big role in the development of recreational potential:

a. Diversity of landscapes of high zonality;
b. Climatic resources;
c. Water resources, including rich mineral resources;
d. Geometric and geological favourable conditions of relief;
e. Plant-animal resources;
f. Rare objects of nature (monuments of nature).

11. Specially Protected Nature Areas of Armenia

1) Currently, the following specially protected nature areas (hereafter SPNAs) are present in the Republic of Armenia:

a. 3 State reserves ("Khosrov forest", "Shikahogh" and "Erebuni") occupying 35 439.6 ha which makes about 1.19 % of Armenia's total area;

b. 4 National parks ("Sevan", "Dilijan", "Lake Arpi" and "Arevik") occupying 236 802.1 ha which makes about 7.96 % of Armenia's total area;

c. 232 Natural monuments;

d. 27 State Sanctuaries occupying 117 565.74 ha which makes about 3.95 % of Armenia's total area.

2) Semi-desert and steppe landscapes are still insufficiently represented in SPNAs of Armenia. As to water landscapes, without Lake Sevan mirror their area makes 2495.08 ha or 0,08 % of Armenia's total area. Therefore in the process of creation of new SPNAs it is essential to pay attention to water areas and wetlands which are rich in rare biodiversity and original symbioses.

12. Economic mechanisms of use of natural resources

1) Economic mechanisms of natural resource use play a significant role in the regulation of environmental protection and natural resources use sectors, which in combination with capacities related to restrictions and supervision make the environmental management functions complete.

2) Economic mechanisms of environmental protection and natural resources use for the Republic of Armenia were established in the beginning of the 1990s, but came into force only in 1998 through the RA law on "Environmental and natural resources use charges" where the concepts of environmental protection and natural resources use payments, types of payers and payments, procedures of their calculation and payment, liabilities for violations and other definitions were introduced. The RA law on "The Rates of the environmental charges" adopted on December 20, 2006, established the rates of charges for the pollution of the atmosphere from mobile and static sources, water pollution, waste disposal, as well as production and import of goods impacting the environment. The RA Government decree N 864 dated December 30, 1998 on "Natural resources use fees" established the rates of charges for water use, use of solid minerals, underground freshwaters and mineral waters, extracted resources of salt and bio-resources. Due to the enforcement of these legal acts the sum of the environmental and natural resources use charges increased up to 30 billion AMD in 2013 as compared to 600 million AMD collected in 1999, providing 50 times growth.

3) **Economic mechanism of use of land resources.** The nature and the types of land resources use mechanism of the Republic of Armenia are conditioned by the forms of ownership and

are regulated by the RA law on “Land tax”, as well as Land Code and Civil Code of the Republic of Armenia. Land can be used on paid basis. Land use fee is established in the form of land tax which is levied in accordance with the legislation of the Republic of Armenia. The law is meant to ensure the application of economic levers in the sphere of land use. Land tax is a mandatory fee charged from the land users that is allocated to the state or municipal budget. The amount of the payment is not related to the outcomes of the taxpayer’s economic performance and is established per land surface unit in the form of annual fixed charge. The following are subject to taxation by land tax-for agricultural lands, estimated net income determined according to cadastral evaluation of lands, for non-agricultural lands, value of land according to cadastral assessment. State land cadastral data of Armenia is approved or indexed by the RoA government on annual basis. A number of benefits relating to the land taxation are set. Budgetary institutions and organizations, as well as state reserves and sanctuaries, national parks and arboretums, botanical gardens and lands of historical-cultural significance are exempt from the tax, except for lands under rent and official use. To explore the role of the land tax as an economic lever of regulation of rational land use it is important to estimate how the main issues for which the above discussed tax is meant are ensured, particularly as source for replenishment of state and municipal budgets, source of collection of financial means for the solution of environmental issues of land use, economic leverage promoting rational land use practices. Besides a number of RA Government decrees (RA Government decrees N 1026-N, dated July 20, 2006, N750-N dated May 26, 2006, 1277-N dated August 24, 2006 etc.) regulate the following:

a. Disturbance of the fertile layer of the soil, contamination and littering,

b. Soil contamination with radioactive and chemical materials, industrial wastes, wastewaters, pesticides and mineral fertilizers in quantities exceeding acceptable standards.

c. Implementation of activities causing land degradation under the influence of water and wind, swamping, flooding, salination (repeated salination), solidification and desertion (total drying) of lands; omission of implementation of measures aimed at land improvement, land protection from water and wind alterations, as well as obligatory preventative measures aimed at elimination of impacts of negative processes aggravating land conditions, including measures aimed at prevention of damage and elimination of lands and their fertile layers, natural resources, paleontological, historical and cultural heredity objects.

d. Development of erosion processes, reduction of the content of organic compounds, and degradation of agricultural lands due to violation of standards of conducting agricultural activities, mandatory measures aimed at land preservation and improvement, as well as damage to the agricultural lands, decrease of fertility and cadastral value, overgrazing of pastures due to avoidance of conduction of agro-technical measures, use of soil in a manner that eliminates of continuously damages other natural resources and etc.

e. In order to accurately estimate impacts various ratios are used, which are used by the environmental value of the land resource, contamination risk degree, pollution levels, depth and other parameters.

4) **Economic mechanism of use of water resources.** In Armenia water resources use is regulated by: RA water code end RA law on "Environmental and natural resources use charges". Relations in the sphere of aquatic resources use are regulated by contracts where water use volumes, terms, rates of payment and other conditions are indicated. Water users are bound to pay for the water

use according to rates and procedures approved by the Government of Armenia. According to the RA Government decree N 1110-N "On approving procedure of impact assessment on water resources caused by economic activity" approved on August 14, 2003, the impact on water resources is defined as a direct or indirect impact of pollutants, which also includes quantities of pollutants, permissible levels of harmful substances, duration of exposure, impact of the harmful substances and prevention costs relating to excessive water use. Assessment of impacts of polluted water resources due to economic activity includes compensation of product losses of quantitative and qualitative nature due to reduction of water, forest and land resources in conditions of contaminated media, compensation of additional services required for rehabilitation of polluted aquatic resources, recovery of the health of infected population due to use of polluted water resources and net work loss due to reduction of labour productivity (including absence from work), as well as compensation costs of industrial production losses due to the impact of pollution on main funds.

5) ***Economic mechanism of use of biological resources.*** In Armenia biological resources use regulated by the following legal acts: RA Forest Code, RA Land Code, RA Law on Flora, RA Law on Fauna, RA Law on Nature Protection and Payments for Use of Natural Resources, RA Law on the Rates of Nature Protection charges. The use of biological resources is performed on paid basis and with the established rates. The Law on Compensation Tariffs for Damages to Fauna and Flora due to Environmental Offences regulates the following activities of legal and physical entities:

a. Use of natural resources without obtained permits (License), concluded contracts in accordance with the established procedures or by violation of conditions established in such contracts;

b. Non-regulated use of fertilizers, other products and pesticides resulting in damage to the fauna;

c. Destruction of rare, threatened and species on the Red list, their eggs, habitats and/or conducting other actions that result in the reduction of number of these animal species and degradation of habitats;

d. Violation of hunting and fishing rules subscribed by the legislation;

e. Other legal violations related to use and protection of wildlife, which result in damage to fauna.

6) ***Economic mechanism of use of mineral resources.*** In Armenia the use of minerals, including minerals extraction, is regulated by the RA Mining Code. Exploitation of subsoil is payable except for cases when extraction of non-metallic minerals are carried out in the plots allocated to them for their own needs(regardless of ownership), regional geological studies are implemented(volcanic, seismological, mnonitoring of exogenous geological phenomena, including engineering and geological, hydrogeological studies, etc.), create mineralogical, paleontological and other collections, carry out studies, description and conservation of unique geological formations, natural monuments. During the exploitation of mine the appropriate payments are made in accordance with the requirements of RA Mining Code, Article 61, paragraph 2. Mineral extraction is carried out on the basis of the permit granted by the competent authority accompanied by ore extraction plan which has undergone appropriate expertise, ore extraction agreement and mining act which are integral parts of the permit. Minerals extraction permits are issued for the entire period of

mine exploitation but not more than 50 years, which is calculated on the basis of technical and economic criteria of the given mine's mineral resources extraction.

7) **Economic mechanism of use of SPNAs.** In conformity with the provisions set by the RA legislation all the charges for the use of resources within SPNAs (commercial fishing, haymaking, timber harvesting, etc.) fines levied for environmental violations and compensation for the recovery of damages caused to the nature are paid to the state budget. The application of different economic mechanisms in SPNAs is regulated by the law on "Specially Protected Nature Areas". The scope and possibilities of application of economic mechanisms, depending on the categories and conservation regime of SPNAs differ. The application of new mechanisms of SPNAs requires more research and analysis. Their use must be consistent with the chosen development strategy for the sector and be in line with the implementation of structural and economic reforms.

IV. PROBLEMS OF SOCIAL SECURITY IN ARMENIA

13. Current state of social security of the population

1) The analysis of anthropogenic factors contributing to desertification shows that there is a direct connection between desertification and poverty of the population conditioned by socio-economic situation relating to formation of economic relations, as well as demographic processes. The opportunities for investment and formation of efficient relations in the field of social security peculiar to developed countries are limited due to unsatisfactory rates of development of certain branches of economy, slow growth of gross domestic product, national income and state budget revenues and existence of the shadow economy.

2) ***GDP figures***: The development of almost all sectors of economy through the period of 2004-2008 contributed to the two-digit growth of the gross domestic product, GDP, constituting 11.6 % on the average (figure 8). But the global economic crisis seriously endangered the country's economic stabilisation. Already in 2009, 14.1% decline in the economy was recorded. And despite the fact that tendency of GDP growth was recorded as compared to previous years, but a number of the leading branches of the economy were still in a deep crisis. Positive changes were registered in 2010. GDP growth at 7.2% was quite significant in 2012, but it was still not enough to reach the level recorded in 2008.

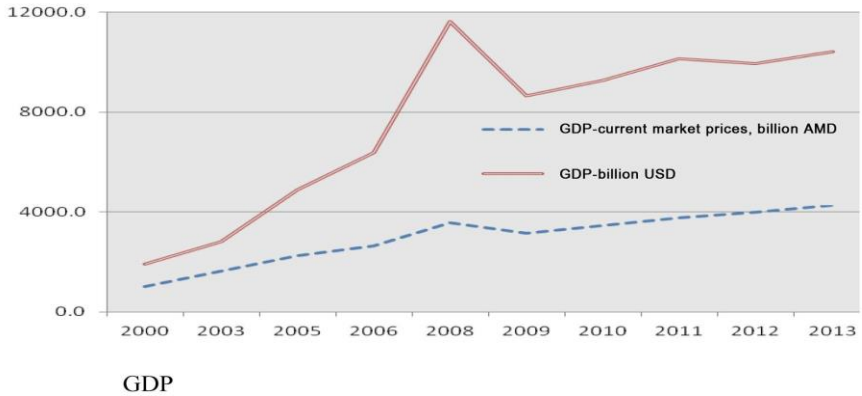


Figure 8. The dynamics of the GDP (source: RA NSS):

3) ***Industry:*** An economic growth of 9.7% was well as registered in 2010 as compared to the drop of 7.6 % registered in 2009 which contributed with 1.4 percentage points to the growth of GDP in 2010. After the two-digit growth indicator (13.9%) registered in the country, a decrease in the volume of industrial production was recorded and already in 2013 as compared to the previous year, it amounted to 6.8%. Mining industry develops rather intensely, but inefficient operation practices and absence of production of final metal products do not ensure the expected economic outcomes. Some increase in the field of extraction of non-ferrous and precious metals was registered, while decline tendencies still persist in the field of extraction of non-metallic minerals, like construction materials (sand, stones and etc). The economic growth of the recent years is characterized by growth in exports, but it was mostly confined to the mineral concentrates.

4) ***Agriculture:*** Until 2008 the state in the field of agriculture was relatively good, as of 2000-2008 comparable prices the average annual growth amounted to 38.5%. In 2009 economic decline (a drop from 23.7% to 17.5%) was registered which was mainly conditioned by unfavourable climatic conditions, which in turn negatively affected GDP growth by 2.7 percentage points. According to the data of 2010-2013, a growth GDP in agriculture provided growth of its share to the country's GDP from 18.4 % to 21.5 % (http://www.armstat.am/file/doc/99489233.pdf)). According to the studies conducted by the National Statistical Service (hereinafter referred to as NSS), 21% of farming economies do not cultivate their lands due to lack of economic benefit (Table 3). Though some activation in the field of land cultivation with bank funding is registered, but every fourth farmer faces financial difficulties. Currently, the majority of the gross agricultural products are provided by the private sector (Tables 4, 5). In the result of inefficient cultivation of agricultural lands the need for implementation of serious ameliorative measures on large areas has become urgent (Figure 9). The absence of such land-reclamation measures will result in land degradation (http://www.armstat.am/file/article/poverty_2013a_2.pdf)).

Table 3.

Reasons for non cultivation of land among the landowners by poverty quintile groups, 2011/2012 years, %

Reasons	Total	Consumption aggregate quintile groups				
		First	Second	Third	Fourth	Fifth
Too far	9.2/8.2	4.1/11.2	12.8/17.0	10.3/14.3	8.7/14.8	9.5/13.3
The soil is of poor quality	11.2/7.8	10/11.6	12.3/14.1	12/14.5	10.6/14.6	11.1/12.7
The land is not irrigated	15.8/19.0	19.3/13.4	14.5/17.8	13.3/14.6	14.6/11.8	17.4/15.0
It is not profitable to cultivate	23.8/21.2	21.1/23.4	23/22.4	23/22.1	26.2/24.4	24.1/22.8
Lack of financial means	22/28.7	33/22.2	25.3/13.6	23.4/14.6	20.7/13.3	15.9/18.0
Sick, the elderly	12.9/10.2	8.9/13.5	10/11.0	13.4/15.1	14.1/12.8	14.5/12.7
Other	5.1/4.9	3.6/4.7	2.1/4.1	4.6/4.8	5.1/8.3	7.5/5.5

Table 4.

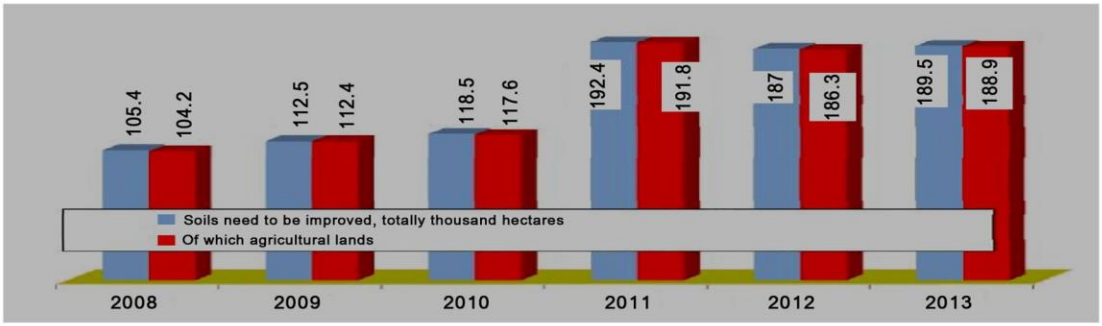
Quantity of cattle heads in the RA as of January 1, 2010-2014 (thousand head)

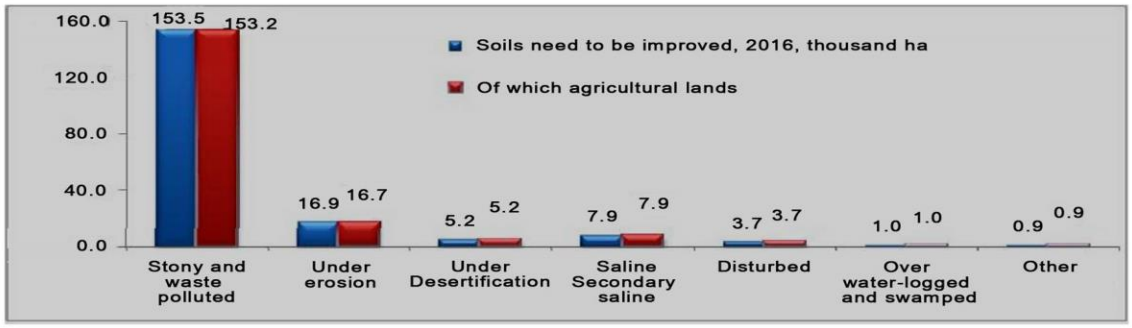
Farm animals, as of 1 January	2010	2011	2012	2013	2014
Cattle	570.6	571.4	599.2	661.0	677.6
Of which cows	273.9	272.6	283.3	303.3	309.6
Pig	112.6	114.8	108.1	145.0	139.8
Sheep and goat	511.0	532.5	590.2	674.7	717.6
Poultry	4134.6	3462.5	4023.5	4050.0	4101.0

Table 5.

Indicators of agricultural crops

Agricultural crops	Sown area, (ha)					Gross harvest (thousand tons)				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
Grain and legume	171.6	159.3	157.8	172.2	178.4	374.9	326.4	440.7	456.1	548.8
Vegetables	23.9	23.5	25.0	25.2	25.4	819.8	707.6	787.1	849.0	876.0
Garden crops	6.2	4.5	5.8	5.1	5.4	216.1	132.5	180.9	205.1	208.1
Potatoes	32.0	28.4	28.7	31.2	30.7	593.6	482.0	557.3	647.2	660.5
Total	**300.0**	**283.6**	**286.7**	**304.2**	**318.1**	**2004.4**	**1648.5**	**1966.0**	**2157.4**	**2293.4**





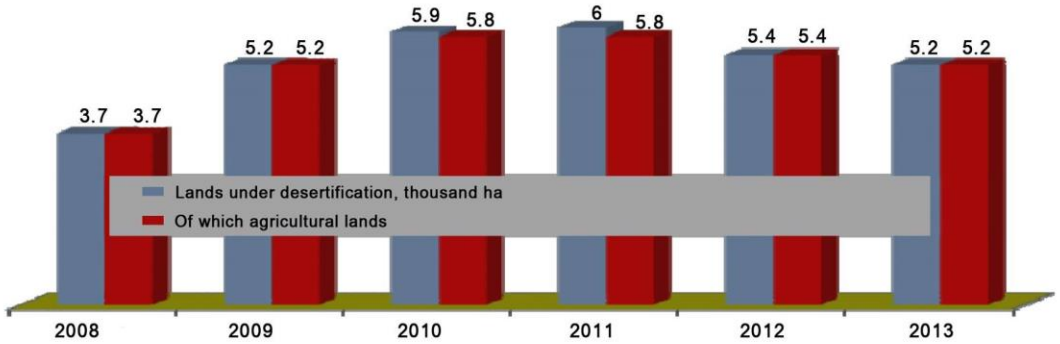


Figure 9. Soils in need of improvement

5) ***Ensuring energy security:*** Improvement of energy efficiency and further development of renewable energy sources are main objectives of the national policy. It should be noted, that the maximum share of renewable energy recorded in 2010 was 39.5% (Table 6), which later dropped, and in 2012 amounted to 28.8 %. The share of alternative energy is still small, but it is of strategic importance to Armenia. Global action plan for sustainable development adopted during Rio Conference in 1992 and the following summits, the principles outlined in Johannesburg summit, "European strategy on energy supply security, competitiveness and sustainability" reflected in the European Commission's Green Book and a number of other obligations related to environmental conventions ratified by the Republic of Armenia served as basis for the energy supply security of the RA.

Table 6.

The share of the renewable energy within the total, %

2000	2005	2010	2011	2012
21.16	28.07	39.48	33.56	28.81

6) ***The demographic situation and migration processes:*** After 1990s social-economic and political realities of the Republic of Armenia resulted in a dramatic demographic change, leading to a decrease of indicators of fertility, mortality, external migration (Table 7). Moreover, if in 1990, around 80 000 births were registered, than in 2001 this indicator dropped about 2 times resulting in 32 065 births. If in 1990, 22.0 thousand deaths were recorded (6.2 deaths per 1000 people), than in 2011 it was 28 030 (8.6 deaths per 1000 people). It turns out that the permanent population of the RA decreased by 196.4 thousand people. During the last decade natural growth by 105.7 thousand was recorded. Migration is one of serious demographic challenges of Armenia. According to the results of the selective survey conducted within the framework of the Integrated Living Conditions Survey (ILCS) in 2010 and 2012 about 11% of household members aged 15 and above were involved in the external and internal migration movements since January 1, 2007. Main reasons for migration were the lack of workplaces, family reasons and etc. The share of the family members aged 15 and above involved in migration processes since early 2009 and remaining there as of 2012 makes up 40.8%. It is worth noting that the prevailing indicators of labour migration among migrants are a matter of concern.

Table 7.

The dynamics of change of population quantity and its components (thousands people) (Source: NSS)

Year	The number of population (at the beginning of the year)	Natural growth	Migration residue	The number of population (at the end of the year)	Annual growth/ decline, %
1990	3514.9	57.9	1.7	3574.5	1.70
1992	3633.3	44.7	-214.3	3463.7	-4.67
1995	3260.3	24.1	-35.6	3248.8	-0.35
1996	3248.8	23.2	-26.0	3246.0	-0.09
2001	3215.3	8.1	-10.5	3212.9	-0.07
2005	3215.8	11.1	-7.7	3219.2	0.11
2006	3219.2	10.4	-6.7	3222.9	0.12
2007	3222.9	13.3	-6.1	3230.1	0.22
2008	3230.1	13.8	-5.9	3238.0	0.26

2009	3238.0	16.8	-5.3	3249.5	0.36
2010	3249.5	16.9	-3.8	3262.6	0.40
2011	3018.9	15.3	-12.8	3021.4	0.26
2012	3021.4	14.9	-9.4	3026.9	0.18
2013	3026.9	14.6	-24.1	3017.4	-0.31

7) ***Social security:*** The anti-corruption policy implemented by the Republic of Armenia was primarily aimed at maintaining the same level of social expanses in the sphere of social defence.
Although consolidated budget expenditures on social transfers are increasing year after year they still remain rather limited over GDP. In case payment of social transfer is halted and households cannot compensate this loss due to lack of sufficient resources, the poverty rate will increase significantly. The overall level of poverty will increase by 18.4 percentage points, or 51% (from 35.8% to 54.2%). The situation will become more severe, especially for the population receiving social transfers (Table 8).

Table 8.

Expenses of social sectors from consolidated budget over GDP expressed in %

Sectors	2008	2009	2010	2011	2012	2013
Education	2.9	3.9	3.7	3.6	3.3	3.1
Health	1.4	1.8	1.6	1.7	1.6	1.5
Culture, information, sports, religion	0.4	0.6	0.6	0.8	0.7	0.6
Social benefits, pensions	5.8	7.7	7.1	6.8	7.3	7.0

8) ***Health care:*** Currently, there are 129 hospitals and 514 outpatient facilities in the Republic (See http://www.armstat.am/file/article/soc_13_17-18.pdf). In parallel to this the level of healthcare within the population is still very low, especially at rural areas and among the poor population. If at least 41.6 percent of the average level population seek medical advice or treatment than this percent drops down to 30 and 24.1% for the poor and extremely poor, respectively. The main reason for this is self-treatment making up 52 and financial state making up 25 percent of the population (See http://www.armstat.am/am/?nid=81&id=1618).

9) ***Educational system:*** Addressing desertification issues requires efficiency of necessary activities which is essentially dependent on the respective educational level of the society. Moreover, the educational system should be based on the principle of continuous environmental education, covering all age groups and layers of society. From this perspective covering the knowledge on environment in the republic is reflected in school and university educational programs, but in depth knowledge receive only students who have an appropriate occupational education. However, environmental education should not be limited only to the availability of educational programs and their improvement. According to the results of a census, 99.9% of Armenia's population is literate. General education is accessible to everyone. Unlike primary education, enrolment in higher grades of secondary school, high school and occupational educational institutions is relatively low, and the difference of enrolment between poor and non-poor population is quite noticeable.
High costs associated with higher education, education, finding a job after graduation, low probability of high salaries are the main reasons that can explain drop-outs of the poor population of certain age class after graduation of secondary education. The unit weight of the learners of higher educational

institutions dramatically differs by poverty rate. In non-poor households it amounts to 20.3%, in poor 8.7% and extremely poor 4.5%, respectively. However, the level of involvement in the educational system is quite high and is described with an increasing trend with variable development (Figure 10).

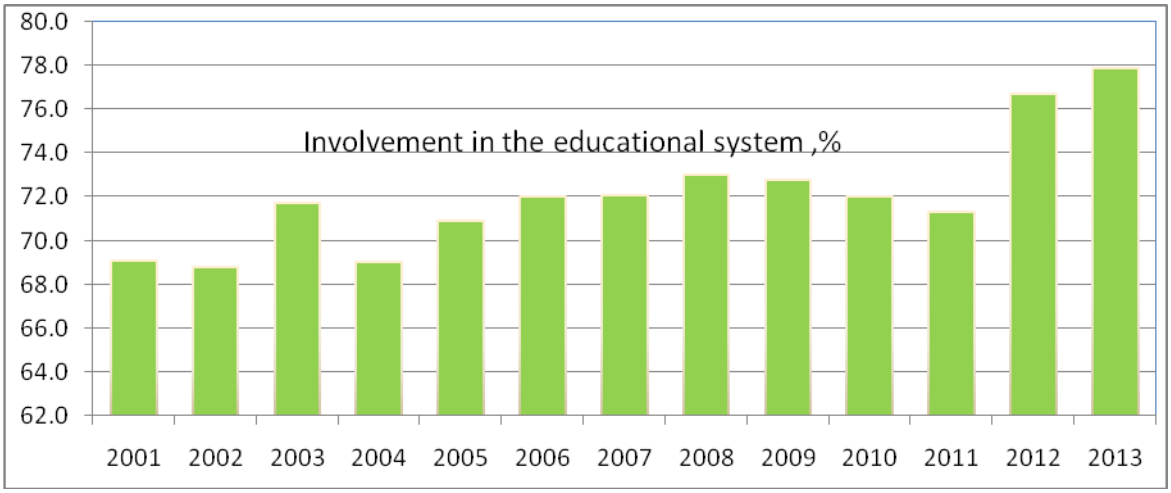


Figure 10. Percentage of enrolment of learners (state and non-state secondary pre-vocational, secondary and higher educational institutions) from the corresponding age population

10) **Living conditions of the population:** The majority of households of the Republic (93 %) as of 2011 are property owners. In urban areas, households mostly live in apartment buildings, 69.4%, whereas in rural residencies in private houses (90.1%) The proportion of the rural and urban population residing in hostels, temporary and other types of shelters is about 4 %. A significant proportion of the population with a need for housing (shelter) still have serious problems with accruing it. Particularly, the problem is connected with high prices, unavailable conditions of mortgage services, unsatisfactory condition of state regulation of the sector.

650495 flats in multi-apartment buildings and residential houses are supplied with natural gas as of 2013. It covers about 75.5% of the apartment fund of the Republic. Moreover, about 92 percent of urban and 57.6 percent of rural settlements are supplied with natural gas. Other people who use firewood for heating and preparation of food are at serious threat.

Practically all urban areas and most of rural settlements are included in the centralized water supply system. The situation differs in the sphere of proper treatment and disposal of sewage water. Although sewage water is almost completely collected in urban settlements final treatment (biological treatment) is still not organized. Wastewaters are discharged into natural channels, reservoirs and lakes, contributing to (including groundwater) the pollution of natural water channels.

Waste collection is one of serious problems of the Republic. Waste collection and its removal to landfills are organized, while the landfills do not correspond to sanitary standards and pose a serious threat in terms of pollution of the environment. These are mainly located in high risk areas. The most vulnerable among these are water sources and agricultural lands. Due to scattered landfills that do not meet sanitary standards lands are proved to be polluted with wastes.

14. Employment and unemployment of the population

1) State policy in the **sphere of employment** is aimed at creation of decent, full and productive employment conditions, relief of the labour-market tension, increase of the competitiveness of job seekers, effective recruitment of vacancies created by employers. The period between 2000 and 2013 of the employment Policy is characterized as a period of law reforms of the employment sector and institutional regulation of the state service system of employment. During 2008-2013 an average of 1172.1 thousand people were engaged in the economy. Employment indicator dropped down by 1.6 percent or 19.3 thousand people lost their jobs for various reasons.

It should be noted that on the opposite to the decrease of the number of people employed, an increase of employment in private sector by 0.5% was registered. The maximum number of employed was registered in 2010 and constituted 1185.2 thousand people. In the early years of the crisis it fell by more than 20.5 thousand people, however, later due to the economic revival of the private sector in 2010 the indicator was almost restored. At present 1163.8 thousand people are engaged in the economy 78.3% of which are employed in the private sector (Table 9). It should be noted that the inventory of unrecorded economy and full employment in the informal sector is still underway. The analysis of the informal employment is based on the number of jobs. Therefore, employment by its nature (formal and informal) will be greater than the number of people employed. Among countries in transition in 2008-2013 Armenia registered the highest average 17.7% level of unemployment due to lack of jobs. During the mentioned years the number of unemployed decreased by 3%, while the unemployment rate by 0.2 percentage points. Relatively high level of unemployment of 19.0%.was recorded in 2010.

Table 9.

Main indicators of the labour market of the RA for the period of 2008-2013, source. RA NSS

thousand people	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Labour resources	2376.9	2397.6	2389.7	2286.3	2260.8	2189.1
Economically active population	1414.6	1418.8	1463.3	1440.9	1418.3	1388.4
Economically non-active population	962.3	978.9	926.3	845.4	842.5	800.7
Employed	1183.1	1152.8	1185.2	1175.1	1172.8	1163.8
Unemployed	231.6	265.9	277.8	265.5	245.2	224.6
The level of economic activity, %	59.5	59.2	61.2	63.0	62.7	63.4
The level of employment, %	49.8	48.1	49.6	51.4	51.9	48.1
The level of unemployment, %	16.4	18.7	19.0	18.4	17.3	16.2
The growth rate of the average nominal salary, %	117.8	109.9	106.9	105.3	104.7	104.8

2) Poverty: Sustainable economic development in the early 2000s led to the rise of wages, stabilization of the employment level and increase of spending from the budget on social sectors. All this together with growing flow of private transfers contributed to significant reduction of the poverty. Regional political situation following Armenia's independence, the blockade and the deep energy crisis completely demoralized the country's economy and the poverty level of the population rose to 55% (Table 10). Currently, in Armenia degree of poverty is calculated by the World Bank's third method, poverty line (during 1996-2003 1st and during 2004-2008 - 2nd methods were used). In 2012

the poverty level in Armenia made up 32.4% as compared to 27.6% registered in 2008. The weight of the very poor in 2012 made up 13.5% as compared to 12.6% registered in 2008. While the level of the extremely poor in 2012 made up 2.8% as compared to 1.6% registered in 2008 (Table 11). It should be noted that certain habits of the population's lifestyle have undergone significant changes. In particular, a decrease of food consumption (31.5%), substitution of expensive food with cheap one (59.2%), suspension or reduction of acquisition of non-food products (48.3%), reduction of entertainment (66.1%) and social meetings (64.6%) and other changes are observed. According to the observations and calculations, Armenia needs 69.4 billion AMD or the sum making up 1.7% of the GDP for poverty eradication assuming that social support is mainly targeted to the poor. In addition to the social support and provision of high targeting that is already directed to the extremely poor, eradication of extreme poverty will require 2.0 billion or 0.1% of GDP. International experience suggests that targeting of social assistance is unlikely to be perfect, thus the actual resources needed for poverty reduction are much more. As compared to resources required to ensure efficient targeting, the minimum necessary resources for poverty reduction should at least be doubled in the countries with free market economies. In general, the change in the level of poverty is conditioned by the change of consumption aggregate used for assessing living standards and the level of inequality of its distribution. The increase of the general level of poverty by 4.79 percentage points during 2008-2012 is resulted from both the consumption and distribution components.

Table 10.

The level of poverty in Armenia during 2001-2012, source: RA NSS, ILCS

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
By the methodology of 1996	50.9	49.7	42.9	39.0	---	---	---	---	---	---		
By the methodology of 2004	---	---	---	34.6	29.8	26.5	25.0	23.5	28.7	28.9		
By the methodology of 2009	---	---	---	53.5	---	---	---	27.6	34.1	35.8	35.0	32,4

Table 11.

The dynamics of poverty indicators for 2004 and 2008-2012 (according the methodology of 2009, in percentage), source: RA NSS, ILCS 2004 and 2008-2012

Years	Poor	Including very poor	Of which extremely poor	Non-poor
2004	53.5	32.6	4.4	46.5
2008	27.6	12.6	1.6	72.4
2009	34.1	20.1	3.6	65.9
2010	35.8	21.3	3.0	64.2
2011	35.0	19.9	3.7	65.0
2012	32.4	13.5	2.8	67.6

V. DESERTIFICATION RELATED LEGISLATION OF THE REPUBLIC OF ARMENIA

15. After the adoption of the RA Land Code, on January 14, 2002 the RA government adopted decree N 26 on "Establishing authorised bodies in the sphere of national management of land resources". The system of the authorised bodies and the scope of their authorities, as well as the list of legal acts ensuring the implementation of the Land Code were established. Later the scope of the authorised bodies in the field of land relations was clarified by a number of acts, including laws on "Specially Protected Nature Areas" and "Environmental control", as well as the Forest and Mining Codes.

16. The RA "Mining Code" was adopted on November 28, 2011. The Code provides a number of provisions relating to the protection of land relations (paragraphs 11 and 13 of the third part of Article 59, paragraphs 1 and 3 of the first part of Article 64 and the first part of Article 67). The Code provides for the concept of "re-cultivation" which assumes restoration measures aimed at the recovery of disturbed lands for conserving the nature and the environment envisaged by the design of extraction of minerals or geological exploration program (part 2 of Article 49, paragraph 8 of the first part of Article 50).

17. Main directions of activities of the RA Ministry Nature Protection aimed at ensuring national security strategy were approved on April 8, 2010 by Decree N 387 of the RA Government. According to the above decision, internal threats include forest and land degradation, desertification, deficiency in the level of environmental education of the public and lack of awareness. Reforms of economic mechanisms are expected to be continued through improvement of the methods of economic evaluation of natural resources and gradual approximation of the rates of natural resources use and conservation of nature to the real economic value (size) of natural resource use and the environmental damage. Decree N 1192-N adopted by the RA Government on August 18, 2011 sets monitoring methodology of industrially polluted soils. RA Government decree N 1396-N adopted on September 8, 2011 regulates the relations related to efficient and purposeful use of the soil's fertile layer, particularly the responsibilities of landowners and land users, jurisdictions of community heads and governors, counting and recording of data on removal, storage, transportation and use of the fertile layer of soil. Action program on agrochemical research and increasing soil fertility for the period of 2012-2014 was approved on April 12, 2012 by decree N 442-N. The procedures of use and calculation of allocation size of capital for conservation of nature and the environment was approved on August 23, 2012 by decree N 1079-N of the RA Government. For the fulfilment of the requirements of the above decision, the procedure of calculating estimates of re-cultivation activities and indexing was approved on December 24, 2012 by the order N 365-N of the Minister of Nature Protection. The procedure on civil protection, identification of dangerous areas, sterilization and disinfection of radiological, chemical and bacteriological products was established on October 4, 2012 by the RA government's decision N 1297-N.

18. Comparative analysis of these legal acts shows that land protection measures are implemented in the following directions: on one hand, the legislation stipulates the responsibilities of land owners and land users, sets out the principles and criteria of envisaged activities, and on the other hand provides methodological guidelines for regulating relations arising in the field of land

protection. However, it should be noted that the general policy of the mentioned field has imperfections related to the lack of planning of measure and oftentimes situational decisions are made with no account to the short- and long-term planning principle of environmental measures. It can also be registered, that the population is not informed about and involved in the decision-making process which also reduces the effectiveness of application of decisions. From this prospective, the coverage of decisions should be improved allowing for the improvement of cooperation between the public administration and local self-government bodies.

VI. THE STARTEGY OF COMBATING DESERTIFICATION IN THE REPUBLIC OF ARMENIA

19. UNCCD decision 3/COP.8 urges affected member countries to harmonise their action programs of combating desertification with the 10-year strategy of UNCCD implementation. Affected member countries should transform their action programs into strategic documents where land degradation and sustainable land use issues should be taken into account while planning intersectoral projects/programs and strategies.

20. Desertification issues relevant for Armenia, their causes and factors have been identified in the result of the analysis. Complex measures aimed at the improvement of the socio-economic situation may contribute to the prevention/elimination or mitigation of the latter. These include:

1) Improvement of legislation and management system;
2) Improvement of natural resources use mechanisms;
3) Expansion of research activities and improvement of monitoring system;
4) Improvement of educational system;
5) Ensuring public awareness;
6) Implementation of joint activities within the scope of Rio conventions;
7) Ensuring international cooperation.

21. It should be noted that this system of complex measures completely reflects the nature of the international obligations of the Republic of Armenia by sectors, including those regarding such environmental conventions of the United Nations as “Biodiversity”, “Climate Change” and “to Combat Desertification”. Thus, the following is of particular importance in the activities aimed at prevention/mitigation or elimination of the processes of desertification:

1) Development and implementation of joint projects within the conventions;
2) Establishment of regional and sub-regional cooperation.

22. It is high time to introduce “Green economy” model in the country’s development basis. The latter stipulates the development of such branches of economy which are economically more profitable and on a long-term basis improve the ecological environment and living conditions. The following are among “Green economy” branches: renewable sources of energy, biofuels, energy efficiency increase, resources saving, waste recycling, ecological construction, organic agriculture, ecological tourism, ecosystem services. In case of “Green economy” development it is necessary to review management principles of economy, to establish more stringent environmental standards and to introduce new "green" technologies. The transition to "green economy" will contribute to the solutions of changes due to climate change. Based on this approach in 2014 with financial support from the Asian Development Bank Gyumri city community development draft plan of RA Shirak

marz has been elaborated which aims to improve the population's quality of life and contribute to the introduction of adaptation measures against climate change. It is necessary to continue this process by developing relevant programs at regional level.

23. Improvement of legislation. Improvement of legislation in the process of combating desertification is consistent with the 2nd operative objective of the 10-year strategy of the "Convention to combat desertification…", which implies creation of favourable conditions for decision-making concerning mitigation of land degradation and drought consequences and harmonization of legal basis targeted at sustainable land use. The compliance of the legislation supporting nature conservation and natural resources use has primary importance in the process of combating desertification. In this respect the following issues are highlighted:

1) The use of promotional economic mechanisms which requires setting by law standards for classification of areas subjected to desertification and their legal regime.

2) The introduction of new financial and economic mechanisms in the environmental sector is ensured by RA Government protocol decree N 16 dated April 25, 2013 "On the approval of the concept of creating innovative financial mechanism" which envisages the introduction of the concept "ecosystem services". The issues related to "ecosystem services" are not sufficiently regulated, including purification of water and ambient air, soil fertility maintenance and restoration of degraded lands, ensuring the safety of plant and animal habitats. It will be necessary to develop a new legal acts for the application of the principles of "Ecosystem services payments," in particular, draft law regulating relations connected with ecosystem services payments and related legal acts.

3) Food and Agriculture Organization has developed the "Land Cover Classification System", which envisages the distribution of lands according to the following classification:

a. Non-vegetated areas;
b. Aquatic lands;
c. Pastures;
d. Shrubs;
e. Forests;
f. Cultivated areas.

4) This classification allows having real image of land resources which is derived from the local as well as space-based data. It is appropriate to assess land cover by means of Remote Sensing, but the variety of forms of land use and changes restrict the possibilities of such research method. Therefore it is necessary to use different methods to assess the condition of soil cover.

5) Such classification system for soil coverage is not yet formed in Armenia, however, using land balances of various years it is possible to calculate and get some information about land cover. The decrease of non vegetated lands and growth of grazing lands is related to the clarification of land categories. Expansion of aquatic lands, reduction of forest and shrub areas is mainly due to the increase of Lake Sevan water level. Reduction tendency of arable lands is the result of land category change. To modernize land monitoring issue of Republic of Armenia lands it is necessary to make appropriate addition in the Land Code of RA including the concept "Land Cover Classification System".

6) Fundamental changes in the environmental situation in the country are possible only through the active implementation of environmental policy. One of the proffered option of these

changes is the adoption of law “On strategic planning of environmental issues,” which will define the basic principles of strategic planning of environmental issues, the planning period, planning mechanisms, linkages of environmental strategic plans with other strategic plans, the principles and procedures for monitoring and evaluation for the implementation of strategic environmental projects, responsibility and accountability rules for environmental strategic plans developers and implementers, procedures to ensure transparency and openness of the strategic documents.

7) Relevant changes and amendments should be made to the laws on “Environmental Education and upbringing” and “Education” of the Republic of Armenia that will assist in focusing on building relevant capacities not only in the sphere of education but also during the development of strategic plan for public awareness raising.

24. Improvement of the management system. Improvement of management system in the process of combating desertification is consistent with the 2nd operational objective of the 10-year strategy of the "Convention to combat desertification…", which assumes analysis of institutional basis of sustainable management of lands, creation or strengthening/development and decentralization of institutional mechanisms. The success of combating desertification is first of all conditioned by implementation of joint strategy of activities in the sphere of nature protection. From this respect, the enhancement of mechanism of management activities, improvement of ecological planning and integration of environmental and other policies while implementing economic reforms are key issues of any state. Efficient use of natural resources and environment-friendly harmonious joint activities suggest the existence of relevant management system which under conditions of high-degree social consciousness, perfect legislation and rule of law ensures the work of counterbalancing active mechanisms of the control and regulation of natural resource use and environmental protection in the country. While landscape planning the improvement of management system also suggests contribution of such principles as inventory, development of geo-ecological assessment criteria, identification of regional development objectives and development of the concepts, identification of priorities and development of relevant actions. Here the planning of the road-map and obtainment of final results at the local, regional and national level management are of crucial importance. To ensure the implementation of the state policy on natural resources use and nature protection improvement of state management system should aim at the coordination of the activities of organizations dealing with environmental issues, expansion of powers of regional administrative and local self-government bodies and resettlement system. For the coordination of the activities of organizations dealing with environmental issues and implementation of joint state policy it is necessary to prioritize the development of the following directions of strategic importance.

1) Improvement of environmental monitoring system: Currently, a number of organizations are engaged in the implementation of environmental monitoring in the Republic. These organizations work on different levels. It is required to coordinate collection and analyses of indicators. Environmental monitoring is regulated by a number of legal acts, in particular the RA Government decrees N 198-N dated January 25, 2007, No 1440-N dated November 13, 2008, No 1441-N dated November 13, 2008, N 120-N of the RA Government as of 22.01.2009 "On approving the procedure of organization and implementation of monitoring of flora", decree N 121-N as of 22.01.2009 "On approving the procedure of organization and implementation of monitoring of fauna", decree N 276-N as of 19.02.2009 "On approving soil monitoring procedure", and the order of

the Minister of Agriculture N 234-N as of 11.10.2007 "On approving the forms for data collection for state monitoring of forests". It is necessary to form a unified and coordinated database of monitoring data which will ensure comprehensive assessment of the state of the environment and natural resources. Such information will guide governmental agencies in policy formulation and decision making in management related issues. The improvement of environmental monitoring system will enable setting ecological tension standards and developing appropriate assessment range for Armenia.

2) Introduction of program of measures ensuring the availability of objectives at different levels of management in the sphere of natural resources use and environmental protection: Majority of environmental programs has a sectoral nature and do not contain the essential elements of strategic planning in Armenia. Most of the existing environmental programs are not aligned with the state strategic development plans and the legal basis for the strategic planning of environmental issues is not at place. The level of participation of the civil society and the business sector in the development and implementation of this program is unsatisfactory and their involvement in the strategic planning process is not properly implemented. Monitoring and evaluation system of implementation of programs and projects, accountability, as well as transparency and publicity of related documents are inadequate. The adoption of action program related to the concept of strategic planning of environmental issues is envisaged in accordance with RA Government protocol decision N5 as of 06.02.2014 "On approving the concept of strategic planning of environmental issues". The latter should be aimed at the following objectives:

a. Strengthening of the state control over the environment.

b. Insurance of increasing volumes of reforestation and forest regeneration, combating desertification, conservation of biological and landscape diversity.

c. Expansion of the system of protected areas and improvement of their management mechanisms.

d. Development and implementation of new approaches towards raising public awareness relating to environmental issues and ecological education and upbringing.

25. Improvement of economic mechanisms of natural resources use. The improvement of economic mechanisms of natural resources use in combating desertification is consistent with the 2nd operative objective of the 10-year strategy of the "Convention to combat desertification…", specifically with the establishment or strengthening of inter-sectoral institutional mechanisms envisaged by Bonn Declaration. The survival of human society is conditioned by the joint nature of natural resource use and environmental protection, which objectively suggests the provision of the unbreakable and synchronous link of use and protection of natural resources, which in turn requires a systematic approach towards ensuring the following.

1) Ensuring the interaction between human society and the natural resources and coexistence of ecosystem balance;

2) Improvement of environmental targeting of technological and technical basis of the potential of natural resources use to ensure harmonious combination of processes of effective use and economy of natural resources;

3) Establishment and development of binding legal concurrent system of environmental measures (programs) envisaged by the legislation and functioning on the expense of funds formed by the users of natural resources and other financial investments.

26. Currently, economic mechanisms of natural resources use of the Republic of Armenia do not correspond to modern methods, because the rates are not based on scientifically proven principles and methodological basis of damage assessment to various components of the environment are inconsistent with the legislation of natural resources use and environmental protection payment system. The distortion of cost-benefit analysis, as well as the main macroeconomic indicators is conditioned by non-compliance of rates of natural resources use and environmental protection payment system and the current system. The application of economic mechanisms in the field of natural resource use is more important under conditions of market relations, many types of property and the competitive environment. These ensure the exercise of "the polluters and users pay" principle and healthy competition. To improve the current environmental situation of Armenia and minimize the pressure of economy on the environment the following should be implemented:

1) Increase of efficiency in the use of natural resources of Armenia;
2) Reproduction of natural resources and use restriction over non-renewable portion of natural resource;
3) Gradual reduction of impacts on the environment up to ecologically acceptable levels;
4) Significant increase in revenue of the country from the use of natural resources.

27. To achieve these objectives it is necessary to:

1) Implement reform of natural resources inventory and economic evaluation system, improve natural resources use limitation and licensing systems;
2) Implement gradual reform of the tax system, aimed at the substitution of tax payments with resource payments, thus reducing the rates of other types of taxes;
3) Improve financing mechanisms of reproduction of natural resources and environmental conservation; ensure formation and further development of labour and services market in these areas;
4) Ensure prospecting, exploration and evaluation of natural resources of strategic importance and severe deficiency; gradual increase in volumes of these natural resources and further improvement methods;
5) Ensure the development of new techniques and technologies of exploration, reproduction, use and maintenance of natural resources, as well as increase of the share of the secondary resource use and improvement of waste utilization level;
6) Enhance activities targeted at conservation of biodiversity and landscapes; ensure the development of network of SPNAs and areas with unique natural resources and characteristics;
7) Ensure implementation of foreign policy relevant to Armenia's national interests in the sphere of environmental protection.

28. The improvement of mechanisms of economic assessment methods of natural resources and their use on paid basis and setting of tariffs will contribute to the rational use of natural resources, reproduction and protection of environment. Under conditions of market relations, multi-form property and competitive environment the application of economic mechanisms in the sphere of natural resources use is of great importance, including:

1) These are the key in achieving sustainable development from ecological point of view;
2) Are far more efficient than other levers;
3) Ensure the implementation of the principle “user pays”;

4) Ensure generation of financial resources (cash flow increase) for environmental investments and replenishment of the state budget;

5) Are compatible with the overall strategy of economic reforms;

6) Ensure the healthy competition in the sphere of natural resources use, which finally results in rational use of nature resources;

7) Help consumers and producers reaching long-term decisions;

8) Are useful in solution of issues related to various sources of pollution.

29. Use of water resources. Protection of water resources and improvement of economic mechanisms of effective use have a crucial importance in the process of combating desertification.

1) Total water abstraction makes up around 41% of the managed water resources in the republic. It is characterized with a great portion of loses which covers a great percentage /more than 80 %/ especially in water supply system of the population. During the last years, water abstraction stabilized making up around 3 billion m^3 /figure 11/. Agriculture is the largest water-using economic sector which made up half of total amount of water use in 2013 /Figure 12/. Development of fish breeding industry led to the use of large amount of ground waters; in 2013 it made up 38.3 % of total amount. Water abstraction from the underground resources made up 45.5 % of total water abstraction. Because of inadequate treatment of wastewaters every year thousands of tons of pollutants are being discharged into the natural water courses, mainly rivers. In 2013, it amounted to 215 000 tons.

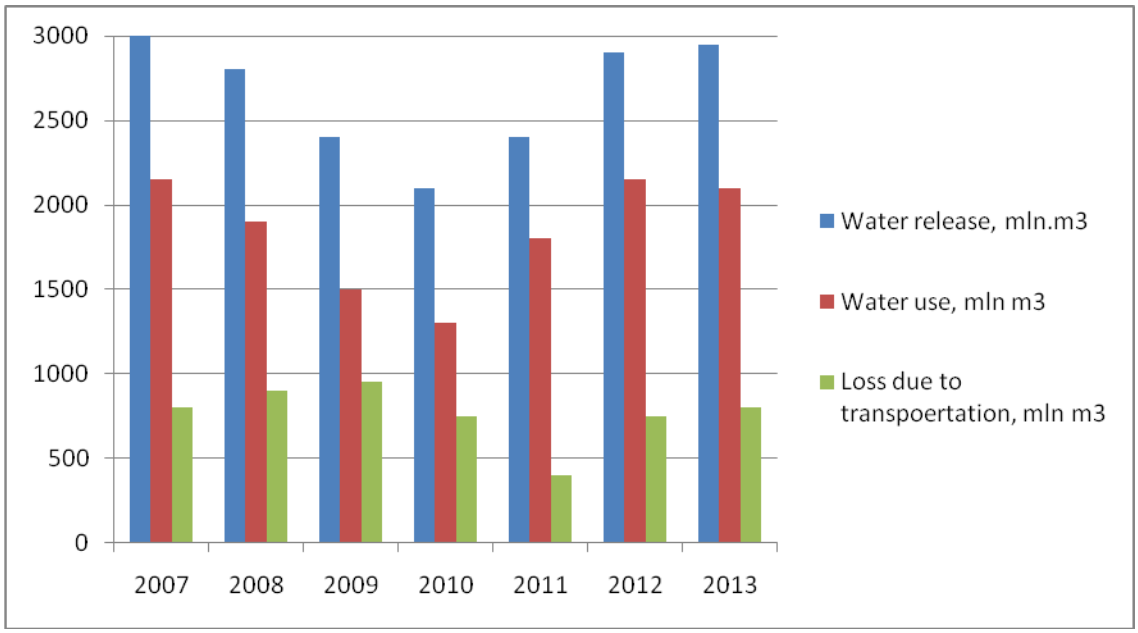


Figure 11. Dynamics of water abstraction and use in the Republic of Armenia

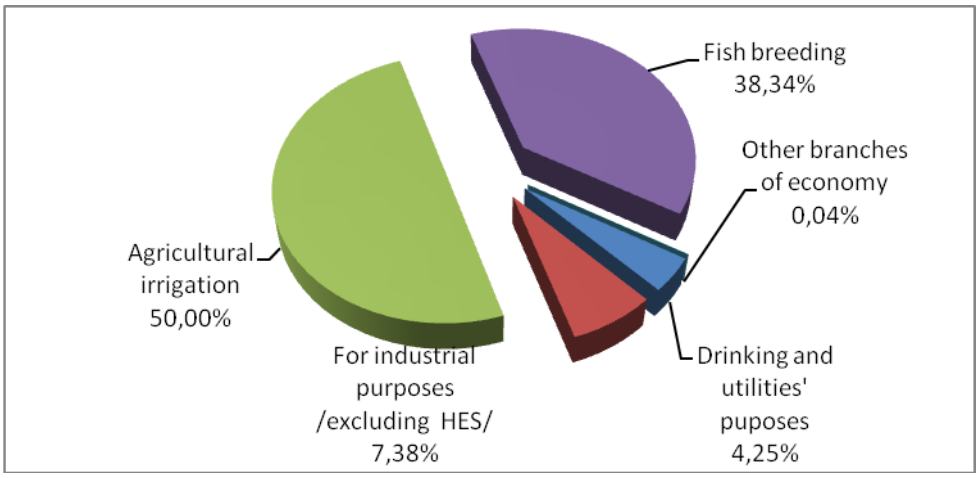


Figure 12. Water use according to purpose in 2013, as compared to the total %

2) Armenia's realistic hydro-energy potential of energy significance is estimated to be 1750 megawatt or 5.5 billion kilowatt-hours from which 500 megawatt or 2 billion kilowatt-hours is unutilized. Based on different estimates, the theoretical potential varies between 7-8 billion kilowatt-hours which constitutes around one third of whole resources. Technically accessible potential of two big rivers (Hrazdan and Vorotan) practically is being utilized. The potential of Pambak-Dzoraget-Debed, which is considered to be the third relatively large system, is not utilized (except Dzorahek - 26 megawatt). Energy production volumes of the two cascade power stations (in case of working with irrigation regime of Sevan-Hrazdan hydropower cascade) and small HPSs make up around 1500 /GWth/ or 20% of the technically available potential. Realization of economically justified hydropower potential will allow fulfilling 50% of existing electricity demand which will protect Armenia from energetic crisis. Therefore, it will ensure economic development, increase sustainability of reforms and also strengthen the state's political position.

3) A new troubling problem has occurred in Ararat valley during recent years related to decrease of underground (artesian) water volumes and reduction of aquifers. According to the "Assessment study of underground water resources of Ararat valley" developed within "Clean energy and water" project (USAID, 2014), the situation as of 2013 is that 1235 boreholes with total discharge of 50.5 m3/s have been exploited in the positive pressure zone of artesian basin of Ararat valley breaching the assigned average annual water use quantity of 20.8 m3/s and exceeding it 2.4-4.5 times. Main users of artesian water resources are fish farms and water abstraction for this purpose made up 35.5m3/s. As a result, upper soil layers were artificially dehydrated and trends of changes of natural ecosystems became notable, with acceleration of flora and fauna species change in parallel to development of desertification processes. On the other hand, in some areas turf-formation and eutrophication processes have occurred. However, the real scale and effects of this phenomenon have not been studied yet, and there is certainly a need for permanent monitoring. In order to contribute to the restoration of former levels of artesian waters as well as solve irrigation problems adequate water use is to be exercised, which also includes study of construction of small financially justified water reservoirs and introduction of efficient irrigation systems (drip irrigation, etc.). This may include study and introduction of modern technologies allowing for the assessment of the irrigation need depending on weather conditions (water demand of plants).

30. Use of mineral resources: More than 100 types of mineral resources can be found in the Republic. A number of metallurgical processing plants and enterprises established on rich metal base, such as Qajaran, Kapan, Alaverdi, Akhtala, Ararat and etc. are found in the Republic. Currently, 19 tailing dumps exist. Total lands transferred to mining enterprises make up 11600 ha, of which 1500 ha are used under tailing dumps. Extensive development of the mining industry significantly harms the environment. In terms of environmental protection tailing dumps are considered to be more dangerous since intensive and prolonged influence of accumulated pollutants on landscape components leads to complete destruction and activation of further erosion activities and loss of biogenic productivity. Occurring transformation of the properties of atmospheric air and gas composition leads to the pollution with toxic industrial materials. Rugged landscapes can contribute to the occurrence of polluting leakages occupying vast areas during emergency situations. Any mining project design should include an assessment of environmental impacts, environmental management plan and monitoring program, social impact assessment, storage and protection of removed soil layers and in parallel to extraction of barren rock. Exploitation of natural resources is prohibited by the legislation of the Republic of Armenia from the point of view of national security and protection of human life and health, historical heritage, nature and environment. A new concept of "man-made mine" is suggested to be introduced into the mineral resources legislation which is defined as an accumulation of mineral resources on earth's surface or in pits and tailing dumps developed based on study, extraction, processing and enrichment of minerals, which have been geologically and economically evaluated. Man-made mines are Armenia's exclusive property and can be exploited for extraction of minerals in the manner prescribed by law. Their exploitation will contribute to the resolution of a number of environmental issues, including waste reduction accumulated in tailing dumps. Fundamental provisions of safe exploitation of tailing dumps are set in "Safe management of tailing dumps of the Republic of Armenia" manual developed in 2011 which summarizes minimum requirements of tailing dump exploitation and is applicable to all supporting structures, including tailing dumps, dams, sedimentation wells and sumps, drainage systems, pipelines, etc. Due to mining activities, the issue of environmental pollution is closely related to the implementation of monitoring observations. However, monitoring of man-made pollution is in initial stage. Absence of monitoring data has a negative impact on the RA legislative and executive power relevant decision making processes (elimination of leakages of tailing dumps, land use restrictions, land recultivation, etc.). A unified national policy and development strategy of underground resources of RA which would serve as a basis for the elaboration of efficient and flexible action plan for development of mining industry are not at place.

31. Land use: The basis for compulsory termination of land rights are provided in the Article 102 of the Land Code of the Republic of Armenia. In particular, idling/non-use of agricultural lands for three years leads to compulsive termination of land use rights through judicial procedures. However, mentioned article is not applicable in practice because of costs related with authorization and registration of land rights, while inability of land cultivation can also have negative impact on land's qualitative features and contributes to land degradation. Considering that application of administrative methods is associated with some complications, there is necessity to apply economic mechanisms to the given issue. Particularly:

1) Expansion of agricultural farms (cooperatives, consolidation) resulting in provision of agricultural equipment, fertilizer and seeds by preferential terms determined by the RA government for consolidated farms, as well as discounts for irrigation water use fees. It is worth mentioning that in accordance with Article 26 of RA Civil Code, citizens have right to engage in business activities without state registration if they sign a cooperation agreement on production of agricultural products. Provisions concerning cooperation agreements are set in Article 1038.1 of law.

2) Increase of volumes of high-value organic products, which is an additional guarantee for a more efficient use of resource potential and for farms to export their products.

3) Increase of mechanization level of agricultural activities which will contribute to the increase of production volumes of agricultural products, reduction of unit man-hours of manual labour, as well as reduction of expenses.

4) Improvement of physical, chemical and biological land composition organically, as well as encouragement of organic agriculture development in the form of state support.

5) Introduction and dissemination of new technologies and innovations in land cultivation sphere which being less costly will ensure more productivity.

6) Implementation of state support projects aimed at raising the level of access to loans and for acquisition of the main resources used in agriculture (fertilizer, fuel, seed), technical measures.

32. It is necessary to study dangerous meteorological phenomena, as well as synoptic processes which formulate them, their spatial and temporal changes in global climate change conditions, and the causes of increase of frequency of anomalous weather conditions in the RA. In order to achieve mentioned objective it is necessary to carry out the following:

1) Conduct statistical analysis of dangerous meteorological phenomena and study of the frequency of their activation and weakening;

2) Conduct study of general circulation changes of atmosphere in the RA area in the last 60 years which will help to clarify the reasons of increasing dangerous meteorological phenomena;

3) Creation of an information base of indicators in geographic information system (GIS) which will characterize meteorological phenomena;

4) Mapping of distribution features of dangerous meteorological phenomena, as well as the average, minimum and maximum dimensions based on spatial and increasing regularities;

5) Grouping and classification of synoptic processes shaping dangerous meteorological phenomena considering the origin and mobility of those processes, as well as synoptic peculiarities of impact on climate conditions of RA.

33. In the result of implementation of the above mentioned activities impact of spatial-temporal changes of dangerous meteorological phenomena on agricultural crops, the reasons of increasing trends of occurrence of these phenomena, as well as increase and decrease of frequency of synoptic processes shaping these phenomena and dynamic changes and reasons of behind it will be defined. Classification of synoptic processes shaping dangerous meteorological phenomena, their statistical analysis, studies of increase and decrease of frequencies will significantly increase the accuracy of prediction of these phenomena which will considerably reduce damages caused to agriculture from these phenomena.

34. Application of land degradation neutrality principles: A number of options exist for achievement of land degradation neutrality. To combine these options type, level, duration, and size

of land degradation, background potential and self-regeneration capacity (natural features) of land resources, priorities of national characteristics and capacities, as well as prevention of land degradation, sustainable management of land resources and restoration of degraded lands should be taken into consideration. Prevention and reduction of land degradation can be achieved through land use planning and introduction of international practices of sustainable land management in a given area through consideration of the potential and self restoration capacity of the land resources.

The following interlinked activities are important for the achievement of land degradation neutrality:

1) Determination of spatial units and functional groups for land degradation neutrality implementation;

2) Assessment of land degradation type, size and determination of degradation level based on baseline data;

3) Determination of causes of land degradation and measures for prevention, reduction and elimination of the mentioned phenomenon;

4) Elaboration of land degradation neutrality monitoring indicators;

5) Development of institutional and technical capacities, encouraging mechanisms and cooperation relating to land degradation neutrality;

6) Ensuring inter-sectoral cooperation and relevant flow of financial resources directed to the achievement of land degradation neutrality.

35. Use of biological resources: Improvement of economic mechanisms for protection and sustainable use of biological resources has crucial importance in combating desertification processes, without which it is impossible to ensure their sustainable use.

1) Forests are integral part of Armenia's biological resources. According to data obtained through remote sensing conducted by German international cooperation (GIZ) in 2011, RA forests occupy 332.333 ha or make up about 11.17% of RA's total area. Current trends of anthropogenic impacts on forest ecosystems, overexploitation of forest resources, irregular loggings, grazing, mowing and other activities result in the decline of high-value forests, occurrence of changes in species composition and structure, as well as decline of natural restoration capacity and productivity of forests. RA Government decision N 1535-N had some positive impact on prevention of illegal forest loggings allowing for extraction of up to 8 cubic meters of firewood free of charge for the families residing in forest adjacent communities. In recent years, instability of ecosystems in logged forests and their surrounding areas is notable, snow-failed areas, as well as erosion, landslides, erosion-mudflow activation processes, drying of springs, formation of dust clouds and other phenomena that cause huge damages to communities and agricultural lands are increasing. Outbreaks of pests and diseases (especially leaf eating insects) can also result in qualitative changes of forest ecosystems which require urgent implementation of forest conservation activities. Overall, through the period between 2003 and 2013 air chemical treatment activities against forest pests and diseases were conducted on 76786 ha area. Forest fire volumes increased during the last decade. In 2003 forest fires were registered only on 3.92 ha area, while in 2013 it increased to 91.575 ha. Main causes of forest fire occurrence include burning of agricultural lands of the surrounding areas. Complex landscape types, poor condition of forest road network, lack of supporting technical equipment for extinguishment of fires hinder effective implementation of fire-fighting activities. The known criteria used for the assessment of degradation level of forest ecosystems include: lands partially or

completely destructed due to fires, dry or drying forests that have lost their natural immunity due to pests and diseases, completely logged forest areas with no natural regrowth capacity and, sparse lands located on erosion-affected wide areas. Almost all these criteria are characteristic and descriptive of the current state of Armenia's forest ecosystems. The improvement of the latter requires proper planning and implementation of long term, consistent, comprehensive, balanced and costly activities.

2) Among biological resources industrial fish stocks of the Lake Sevan have a unique importance. "Sig" reserves have been depleted as it was considered to be the main industrial species. During recent decades, a tendency of decline in quantitative indicators of industrial fish was observed. A slight increase was registered in 2013, which was a result of emergence of reproduction of Sig in the lake during 2011-2012 and a decrease of anthropogenic impact due to scarcity of fish stock. Today industrial fish stock is at the minimum. Long-pincer crab "Pontastacus Laptodactylus Eschscholtz" is the second widespread industrial species in the Lake Sevan. The latter penetrated the lake during 1980s as a result of casual introduction. By occupying a free ecological niche and gradually adapting to new environmental conditions long-pincer crab quantitatively developed and took on a major role of assimilation of organic sludge. After reduction of fish stock in the lake this hydrobionet was manly exposed to anthropogenic impact. Industrial resources of the hydrobionet reduced significantly during 2005-2013, although a sharp quantitative increase was registered in 2013.

3) Armenia's rich agro-biodiversity together with ecosystem sustainability and characteristics ensuring the integrity of biocenosis are a prerequisite for the country's economic development. Agricultural branches like crop cultivating, animal breeding, beekeeping, fishing as well as some important areas of light/textile and food industries are depending on useful wild plant and animal species within the territory of the country. The role of agro biodiversity relating to protection of quantitative and qualitative features of ecosystem services is highly valuable, particularly for conservation of genetic resources and selection of crops and domestic animal species, acquisition of medicine and production of new substances through biotechnology as a precondition for population's welfare.

4) The solution of issues related to the protection of biological resources and their efficient use is provided in "Armenia's strategy and national programme of biodiversity".

36. Recreational industry: Spatial-temporal scientifically justified planning of various functions of recreation industry, establishment of norms of permissible load and capacity of sustainability levels of natural systems are important factors for prevention and mitigation of desertification processes.

1) Recreational industry is based on and creates bases for further development of the field of natural resource use, industry, agriculture, transport, communication, trade and culture. It also regulates inter-sectoral relations and sometimes radically changes them.

Development of recreational industry will contribute not only to economic growth, but also to the creation of new jobs. It will also contribute to:

a. Increase of populations' social, educational and aesthetic levels, development of new cultural centres and many form of national art;

b. Rapid development of Republic's transport and other infrastructure;

c. Use of areas not included in production sector, and especially settlement of high mountainous abandoned villages as touristic centres;

d. Creation of wide network of non manufacturing sectors, trade and other services in the republic;

e. Activation of Armenian ancient ethnic crafts and household activities;

f. Improvement of agriculture and creation of wide network of greenhouses.

2) Thus, development of recreation and related sectors have great importance for increasing population's material and moral level, activation of economy, enhancement of national income, solution of issues related to rising development level in different regions, and as its final result at the decrease of anthropogenic factors activating desertification processes. In this regard, for the contribution to the development of recreation it is necessary to:

a. Implement cadastral studies of Armenia's recreational resources taking into consideration vulnerability of flora and fauna;

b. Define measures for recreation development in different landscapes;

c. Assess impact of recreational activities on Specially Protected Nature Areas and damaged ecosystems and define measures for recreation development in these areas;

d. Elaborate short- and long- term programmes of recreational development.

37. Use of Specially Protected Nature Areas: To ensure effective management of Specially Protected Nature Areas firstly it is necessary to solve the issue related to sustainable and purposeful funding of conservation of lands. Long term management of Specially Protected Nature Areas requires more expenses than provides income opportunities, while possible income opportunities are mainly centred on the local population. SPNAs should contribute to the implementation of community development projects focusing on the improvement of the population's livelihood which can create a positive attitude towards their protection. The success of these projects is mainly based on existing financial resources (state support, donor organizations) and also active and motivated people wishing to invest. Potential benefits will greatly be dependent on individual circumstances and developments. Therefore, realistic profit possibilities should be assessed for each SPNA. Achievement of economic benefits is possible through efficient management of SPNAs which can be direct or indirect, permanent or one-time. Organization of tourism and regulated recreation can be examples of receiving economic benefits. It is worth mentioning, that sustainable and continuously growing funding of Armenia's SPNAs is conditioned by the professionalism of staff of managing organizations and the existence of relevant technical equipments and logistics for the implementation of activities. The directions of improvement of economic mechanisms SPNA use are provided in "National strategy, program of conservation and use of SPNAs of the Republic of Armenia" (RA Government decree N1059-A, dated September 25, 2014).

38. Extension of scientific activities and improvement of monitoring system to combat desertification

1) Extension of scientific activities and improvement of monitoring system to combat desertification is in line with the 3rd operative objective of 10-year strategy of UN Convention to Combat Desertification, which envisages creation of a monitoring base by the application of scientific-technical knowledge and analyses of impact trends on ecosystem functions and structure.

2) Causes of desertification and results of scientific research used in the enhancement of efficiency to combat desertification are important preconditions for formulation and implementation of national policy aimed at the prevention and mitigation of desertification processes. Necessary complex scientific studies require significant capital investments, application of progressive methods and techniques, serious approach to nature conservation issues, improvement of ecology and scientific prediction of possible negative phenomena. Moreover, the main directions of scientific-research activities are already formed in Armenia and there is a relevant valuable experience. From this perspective, studies on identification of desertification processes and monitoring of the state of components of environment have traditional character. National Academy of Sciences of the Republic of Armenia, different ministries (RA ministries of Education and Science, Nature protection, Agriculture, Energy and Natural Resources) as well as scientific organizations and educational institutions conducted and still conduct relevant studies. In particular, lectures on desertification issues have been introduced in Yerevan State University and Armenian State Pedagogical University. Many scientific topics were supported by state financing, dozens of scientific articles and monographs were published in local and international journals and numerous master and PhD theses were prepared.

3) In Armenia in terms of combating desertification, the predominating scientific study areas for conservation of natural resources and their effective use can be the following:

a. Identification of quantitative and qualitative indicators of different landscapes and impact of human activities on them:

b. Elaboration of strategy regulating anthropogenic impact on environment;

c. Elaboration of new monitoring methods of the state of anthropogenic biogeocenosis;

d. Elaboration and introduction of new system for assessing and predicting droughts;

e. Improvement of land cultivation system;

f. Prevention of secondary salinization of irrigated lands;

g. Development and introduction of agro-forest reclamation activities;

h. Improvement of pastures;

i. Elaboration of directions for efficient use of slops for agricultural purposes;

j. Conservation and sustainable use of biodiversity.

4) It is also worth noting, that desertification issues are out of focus of economics, sociology, engineering, technical, chemical and geological sciences. These fields must focus on ecological modelling, structured analysis and prediction of desertification processes, as well as elaboration of concrete ways and methods for combating desertification. From this perspective, the social-economic studies have special importance highlighting ways of development of productive forces, protection and improvement of historical traditions of agriculture. With regards to desertification issues, the state plays an important role in timely implementation and enhancement of productivity and importance of scientific-research activities. The main objectives of the state are the following:

a. Enhancement of regional and international cooperation and coordination focusing on the acquisition of financial, human, administrative and technical resources;

b. Enhancement of biological, agronomical, agricultural, hydrological and meteorological national centers;

c. Encouragement and financing of the activities aimed at acquisition and adaptation of modern techniques;

d. Promotion of scientific studies (Master, PhD, Doctoral) giving priority to those scientific-research topics which relate to UN conventions on "Biodiversity", "Climate Change" and "to Combat Desertification;

e. Ensure the implementation of joint scientific projects/programs on "Global Warming" allowing for implementation of country's obligations assumed by environmental conventions within bilateral and multilateral international cooperation, as well as obtainment of collaborators.

5) Spatial-temporal visualization of desertification, the reveal of integral spatial models, database creation is possible through the introduction of geographic information systems. It is necessary to pay much attention to the application of remote sensing data when developing a new method for environmental monitoring that can provide for operational monitoring and forecasting of droughts in arid and semi-arid regions. As to the improvement of monitoring system in combating desertification, the effective organization and implementation of land monitoring is prioritized. The following are considered to be important components of land monitoring:

a. Implementation of laboratory research of soils throughout monitoring by accredited laboratories;

b. Organization of land monitoring by state managing authorized bodies in the field of land protection and use, as well as coordination of activities of local self-government bodies in this sphere;

c. Implementation of land monitoring with respect to pollution of lands by chemical and radioactive materials, erosion, eutrophication, salinization, landslides and other impacts exacerbating land condition;

d. Entering received data and summary information into land monitoring information database by authorized state bodies which is considered to be an integral part of environmental information unified database;

e. Ensuring the availability of land monitoring data.

39. Improvement of educational system aimed at desertification issues

1) Improvement of educational system in combating desertification is in compliance with the 3rd operative objective of the 10-year strategy of "Convention to Combat Desertification", in particular, knowledge disclosure at international and local levels and enhancing availability for its use.

2) Serious shortcomings and gaps still exist in Armenia's educational sector, particularly in terms of integration into the international process of "Education for sustainable development" and implementation of activities at the local level. These include:

a. In educational programs very little time is allocated to topics related to UN Conventions on "Biodiversity", "Climate Change" and "to Combat desertification" which hinders the completeness of ecological education and upbringing;

b. Lack of highly qualified professional staff armed with comprehensive knowledge, teaching methods and approaches;

c. Lack of necessary materials, organizational and financial possibilities for education and upbringing;

d. Lack of training for awareness rising on environmental issues.

3) All these hinder the formation of coordinated scientific outlook of learners and right understanding of modern environmental issues. The main direction of improvement of educational system should be the harmonious development of environmental and educational policy. This process implies the introduction of key environmental topics of sustainable development into all levels of educational system in performing formal and informal education.

4) The above mentioned process can be ensured due to the review of authorities of environmental and educational state and local governing bodies as well as local self governments. Besides, there is a need to deepen cooperation between interagency coordinating committees "Ecological education" and "Education for sustainable development" and nongovernmental organizations. The solution of above mentioned issues should be aimed at:

a. Exclusion of duplication of authorities of state and local governing bodies in environmental and educational sectors;

b. Right selection of personal;

c. Investment of new mechanisms for encouragement of educational activities of nongovernmental organizations;

d. Implementation of reviewing and standardization processes of curriculum, educational and methodological manuals, textbooks and other educational documents of three-level educational system / bachelor, master, PhD/;

e. Adjustment of quantitative and qualitative indicators in the process of preparing of specialists in agroecology and climate change;

f. Improvement of software maintenance, methodological, personnel and informational abundance of education-related entities, ensuring transparency of activities and interest of audience;

g. Optimization of the third degree educational system involving laboratory experimental capacities and personnel potential of leading higher educational institutions;

h. Provision of scientific-methodological base of issues related to desertification, climate change and biodiversity conservation in all levels of educational system as well as creation of information database;

i. Creation of affiliated network of libraries.

5) The efficiency of mentioned activities will significantly contribute to the activation of dissemination of relevant knowledge on environment, which requires to:

a. Create educational materials and manuals on "Education for sustainable development" strategy's environmental key topics;

b. Prepare interactive games, booklets, advertisements and other exoteric educational and informational materials on UN Conventions on "Biodiversity", "Climate Change" and " to Combat desertification" on different educational levels;

c. Include topics related to mentioned conventions in various educational courses.

40. Ensuring public awareness and participatory activities

1) Ensuring public awareness and participatory activities is in line with the 1st operative objective of the 10-year strategy of "Convention to Combat Desertification" which assumes the implementation of promotional, informational and disclosure (on strategy's main concepts, convention's provisions, etc.) activities at national and local levels through determination and

consolidation of target groups using mass media and communication means. It aims at getting necessary public opinion on decision-making processes in combating desertification.

2) The situation in Armenia's ecosystems dictates that ecological mentality currently needs to be fundamentally changed. Although, there has been a great progress in the establishment of environmental legislation of the Republic, but in real life it can only operate under conditions of availability of common system of environmental education and upbringing.

3) The effectiveness of combating desertification in Armenia is firstly conditioned by public awareness on main expressions of desertification, national, economic and social reasons stimulating it and by awareness of environmental legislation. Thereby public perception of consequences of activities implemented in the environment will be strengthened which will allow the population consciously get involved in the solution of environmental problems. To do so the following is required:

a. Determine beneficiaries/target groups based on the knowledge about desertification and needs assessment results in the demonstration areas of desertification phenomena of the population of local self-government bodies, communities, entrepreneurs, NGOs ;

b. Elaborate a relevant activity concept for each group;

c. Select and develop communication methods which suggest the participation of a wide groups of beneficiaries where activities and obligations of each entity should be outlined, and it will also ensure the transparency of campaign for target groups.

4) There is also a need to create a unified information system which would allow state authorities to collect environmental information through surveys from different groups of population, analyze it and then disseminate the information ensuring participation of different layers of population in decision-making processes. As a result, beneficiaries will be informed about issues concerning desertification at the international, national and regional levels, as well as the possible synergism related to biodiversity adaptation activities aiming at mitigation of climate change. Formation and management of unified information system assumes definition of information and monitoring indicators and compiling of annual and long-term projects for their implementation. In this regard it is necessary to create a new webpage "Combating desertification in Armenia" in the Ministry of Nature protection website. The content of information database should be consistent with the requirements and content of "Shared Environmental Information System of Armenia" project which is currently being implemented in Armenia by joint efforts of the National Statistical Service and Ministry of Nature Protection of RA and technical support of Environmental Agency of Europe.

41. Implementation of joint activities within Rio Conventions

1) Implementation of joint activities within Rio Conventions is in compliance with the 3rd operative objective of 10-year strategy of Convention "to Combat Desertification" particularly in regards with the support to the coordination of activities within convention. Besides, it is also in compliance with the 4th operative objective which envisages capacity building in mitigation of land degradation and drought effects through strengthening of synergic link among 3 conventions adopted in Rio and other conventions.

2) The Republic of Armenia is currently a member of many conventions. Joint projects that are being implemented within the scope of these conventions give an opportunity to avoid duplications such as:

a. Improvement of legislation;
b. Management of studies;
c. Improvement of monitoring;
d. Environmental impact assessment;
e. Rising public awareness level;
f. Preparation of personnel;
g. Development of early warning system.

3) Analyzing international obligations undertaken by Armenia in the field of environmental protection the interconnection and complementation of the latter becomes apparent and makes bases for the implementation of coordinated bilateral and multilateral actions. Such an approach will not only contribute to the effectiveness of combating desertification but also will ensure favourable conditions for expansion of international cooperation. To achieve this it is necessary to identify existing synergic relationship between Rio conventions in Armenia and elaborate a joint action plan.

42. International cooperation

1) International cooperation is in compliance with the 5th operative objective of the 10-year strategy of Convention "to Combat Desertification" which urges the countries "to consolidate financial and technological resources at national, bilateral and multilateral levels and use them in more targeted and coordinated way". Under these conditions it will be necessary to involve all available sources and financing conditions which must be in harmony with intersectoral relations.

2) Armenia's political, economic and environmental issues are conditioned by its geographical location which has equal value in the development and deepening of desertification processes. From this perspective, combating desertification is impossible without multilateral international cooperation. The importance of international cooperation is also expressed in Articles 11-12 of the UN Convention "to Combat Desertification" as a favourable precondition ensuring implementation of provisions of the convention at the international level.

43. Priorities of strategy to combat desertification

1) Taking into consideration issues of strategy to combat desertification in Armenia, as well as analysis of this document, the following can be accepted as priorities of the strategy:

a. Improvement of desertification-related legislation
b. Enhancement of land management efficiency
c. Public awareness rising on desertification issues and their solutions
d. Implementation of joint activities within Rio conventions and establishment of international cooperation.

VII. NATIONAL ACTION PLAN TO COMBAT DESERTIFICATION FOR THE PERIOD OF 2015-2020

44. Objective of the action plan. The aim of the national action plan to combat desertification for the period of 2015-2020 (Table 12) is to ensure the implementation of realistic activities contributing to the achievement of strategic objectives and setting rational deadlines which is based on the 10-year strategic program adopted during the 8th conference of Parties of UN Convention "to Combat Desertification".

45. Content of the action program. This plan covers four groups of activities which are in compliance with above mentioned strategic priorities. The objectives, implementers, timeframes, funding and expected results for each activity are highlighted.

46. Funding sources.

1) The following can be considered funding sources for action plan to combat desertification in Armenia:

a. State budget of the Republic of Armenia;

b. Investment of businessmen, foundations, non-governmental and other organizations at national level;

c. International sources.

2) Financing of the project implementation can be organized at the expense of above mentioned separate funds, as well as in combination.

47. Expected outcomes from the implementation of national action plan. The expected outcomes from the implementation of the given project in terms of its global implementation refer to the followings:

1) Improvement of relevant legislation
2) Enhancement of land management effectiveness
3) Public awareness raising on desertification issues and their solution
4) Increased effectiveness of joint actions and expansion of international cooperation within Rio Conventions.

48. Implementation risks of the action plan. The effectiveness of implementation of this project is based on the mitigation or prevention of a number of possible risk factors. Risk factors, their possible impacts and necessary prevention activities are shown in table 13.

Table 13.

Risk factors, their possible impacts and necessary prevention activities

N/N	Risks	Results	Mitigation or prevention activities	Responsible entities
1.	Lack of financing	Plan is not being implemented	**a**/ Prospect of appropriate expenditures in the state budget b/ Negotiations with donors	RA Ministry of Nature Protection, RA Ministry of Finance
2.	Lack of awareness of beneficiaries on activities relating to national action plan	Failure of participatory processes to combat desertification	Awareness raising activities on objectives, planned activities and expected outcomes of national action plan	RA Ministry of Nature Protection, Mass-media (by agreement)

3.	Indifference or weak involvement in the plan implementation by stakeholders	Plan does not serve to its objectives	Explanatory and awareness raising activities on social-economic impacts of desertification	RA Ministry of Nature Protection
4.	Delays in elaboration of draft legal acts, discussions and approval procedures mentioned in the plan	Hampering the process of combating desertification	Establishment of responsible entities involved in elaboration of draft legal acts and discussions and preparation of the timetable	RA Ministry of Nature Protection

49. Monitoring and assessment of action plan

1) The aim of monitoring implementation and assessment of this plan is to ensure its effective implementation within envisaged timetable. It will enable learning lessons from implementation results and making appropriate changes and adjustments in case of necessity; it will also ensure objectivity, transparency and corporate responsibility of appropriate actions.

2) All activities envisaged by project are subject to annual monitoring. From this perspective, monitoring standards are the following:

a. Envisaged period for the implementation of each activity;

b. Compliance of implementation of activities with its objectives;

c. Cost of financial means allocated for the implementation of each activity annually;

d. Reports on the implementation of each action in defined deadlines and format;

e. Level of involvement and share of implemented activities of stakeholders in implementing actions.

3) Monitoring and assessment of the plan are being implemented by coordinating council of UN Convention “to Combat Desertification” acting under the Ministry of Nature Protection of RA.

Table 12.

NATIONAL ACTION PROGRAMME TO COMBAT DESERTIFICATION IN ARMENIA FOR 2015-2020

N/N	Name of activity	Objective	Implementing entity	Implementation deadline	Funding	Expected outcomes
1. IMPROVEMENT OF LEGISLATION						
1.1	Elaboration of draft law on "Legal regime of areas exposed to desertification"	Set criteria and legal regime of areas exposed to desertification.	RA Ministry of Nature Protection, RA Ministry of Agriculture, RA Ministry of Territorial Administration and Emergency Situations	2020	Other sources not prohibited by the RA legislation	Restoration of areas exposed to desertification
1.2	Elaboration of draft law on changes and amendments in the RA Land Code	Ensure monitoring of land pollution state. Introduce necessary provisions on land cover classification system.	RA Ministry of Nature Protection, RA Ministry of Agriculture	2017	Other sources not prohibited by the RA legislation	Creation of structured information database on lands' qualitative indicators and ensuring information access
2. IMPROVEMENT OF MANAGEMENT SYSTEM						
2.1	Establishment of coordination council under the Ministry of Nature Protection of RA on the implementation of UNCCD. Order of the Minister of Nature Protection	Ensuring the effectiveness of the implementation of UNCCD	RA Ministry of Nature Protection	2015	Financial implications are not required	The effectiveness of the implementation of UNCCD raised
2.2	Creation of structured and unified information database of monitoring Order of the Minister of Nature Protection	Ensuring of multilateral assessment of the state of ecological and natural resources	RA Ministry of Nature Protection	2017	Other sources not prohibited by the RA legislation	Defining of ecological tension's criteria and elaboration of evaluation scheme
2.3	Development of agricultural farms' enlargement project	Introduction and dissemination of new	RA Ministry of Agriculture, RA Ministry of Territorial	2018	Other sources not prohibited by the RA	Agricultural production growth and cost

	RA Government decree	techniques and innovations for effective land cultivation	Administration and Emergency Situations, RA State Committee of Real Estate Cadastre, RA Ministry of Nature Protection		legislation	reduction
2.4	Introduction of drought monitoring and prediction system Order of the RA Minister of Territorial Administration and Emergency Situations	Improvement of drought monitoring, creation of early warning system, as well as improvement of economy planning	RA Ministry of Emergency Situations	2020	Other sources not prohibited by RA legislation	Improved system of drought monitoring, early warning system of drought
2.5	Elaboration of complex action plan to combat land degradation RA Government decree	Ensuring of long-term productivity of lands	RA Ministry of Nature Protection, RA Ministry of Agriculture, RA Ministry of Territorial Administration and Emergency Situations	2018	Other sources not prohibited by RA legislation	Reduction of lands' salinization, eutrophication and erosion, increase of soil productivity
2.6	Land degradation neutrality project. RA Government decree	Definition of target indicators of land degradation neutrality, prevention of land degradation.	RA Ministry of Nature Protection, RA Ministry of Agriculture, RA Ministry of Territorial Administration and Emergency Situations	2018	Other sources not prohibited by RA legislation	Degraded lands are restored, further land degradation is minimized
2.7	Defining and implementation of priority research topics relating to desertification issues Decisions of the Presidium of NAS RA	Ensuring of protection and efficient use of natural resources	RA Ministry of Nature Protection, RA Ministry of Agriculture, RA National Academy of Sciences (by agreement)	2018	Other sources not prohibited by RA legislation	Results of scientific researchers are being used in managerial decision-making procedures
2.8	Development of short and long term projects for the development of the recreational potential RA Government decree	Cadastre of recreational resources and defining of criteria for recreational development	RA Ministry of Nature Protection, RA Ministry of Territorial Administration and Emergency Situations	2017	Other sources not prohibited by RA legislation	Recrational infrastuctures developed
2.9	Creation of new webpage "Combating desertification in Armenia" in the website of the Ministry of Nature	Formation of joint information system	RA Ministry of Nature Protection	2017	Other sources not prohibited by RA legislation	Participation of different layers of society in decision making processes ensured

	Protection of the RA Order of the RA Minister of Nature Protection					
3. Ensuring of public awareness and participatory activities						
3.1	Elaboration of awareness raising projects on desertification, land degradation and drought issues RA Government decree	Ensuring public participation in the process of solving desertification, land degradation and drought-related issues	RA Ministry of Nature Protection, RA Ministry of Agriculture, RA Ministry of Education and Science	2016	Other sources not prohibited by RA legislation	Public active engagement in desertification's solution issues
4. Joint activities within Rio conventions and international cooperation						
4.1	Identification of existing synergic connections between Rio conventions in Armenia and elaboration of joint projects	Increase of effectiveness of activities of Rio conventions	RA Ministry of Nature Protection	2018	Other sources not prohibited by RA legislation	Refrain from duplication of activities implementing within convention and saving of material resources
4.2	Professional trainings program on Rio conventions for employees of educational institutions.	Knowledge on Rio Conventions	RA Ministry of Nature Protection, RA Ministry of Science and Education	2018	Other sources not prohibited by RA legislation	Professional knowledge increase of employees of educational institutions
4.3	Elaboration of regional and sub-regional joint projects Ineternational agreement	Expansion of regional and sub-regional cooperation with countries	RA Ministry of Nature Protection, RA Ministry of Agriculture, RA Ministry of Territorial Administration and Emergency Situations	2018	Other sources not prohibited by RA legislation	The solution of desertification issues is being carried out within international cooperation