

REGULARITIES OF THE DESERTIFICATION PROCESSES IN SHIRVAN TERRITORY OF AZERBAIJAN

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The main indications of desertification in Shirvan plain, contemporary condition of their development parameters, their criteria and prevention ways are stated in the article. By repeatedly conducted monitorings of the ecologic modifications amplifying the desertification process its spreading direction, intensity and the areas have been determined. In the modern desert cenoses unfavourable aridity, salinization, removal by wind cause formation of local biotypes of xerophytes which adapt to disastrous factors. The criteria of desertification have been defined, and it's weak, average, strong, and very strong groups have been recommended.

INTRODUCTION

Disturbance of the ecological balance on the Earth, pollution of the environment, growth of the steppization and desertification processes caused great concern. The condition influenced on other natural-industry spheres, agro-landscapes with favourable ecologic environment as well. All international society has adhere to protection of the environment for this reason. By initiation of the United National Organizations the interstate Coordination Committee was created in 1993 with the aim to prevent desertification process on the Earth. The symposium about Erosion and Desertification in Eurasia conducted in compliance with the desertification convention on desertification problem of the United National Organization in 1994 [1] was directed on solution of the problem of joint development of industry and urbanization alongside with agriculture in development of the arid territories and creation of the ecological modifications. The importance of preparation of the joint research of ecological processes and erosion in Shirvan region (includes 9 administrative districts) of Azerbaijan was stated by the offer of the Azerbaijani representatives in the symposium.

Now in Azerbaijan spent researches for prevention of negative results of desertification and antropogenous factors on soils and plant cover. Influence of antropogenous factors as a natural factors in the formation of desertification are undeniable.

Desertification is a process which leads to unavoidable modifications in direction of aridization of soil-vegetation cover and reduction of biologic productivity in arid

zones, which may turn the territory into desert under extreme conditions. There are still no precise criteria of desertification and its indication (by diagnosis). All over the world 3,3 billion hectare (80%) of the agricultural soils in arid territories have undergone desertification as a result of ecological degradation of the lands. 21% of the irrigated lands, 77% of the dry lands and 82% of the pastures have undergone average desertification [2]. The main problems of desertification may be water erosion, deflation and degradation of vegetation.

In Azerbaijan Republic the square of the populated arid territories is 5,2 thousand hectares (60%). The main part of the arid territories is located in intensive irrigated Kur-Araz lowland, Shirvan, Mil, Mughan plains. Desertification and landscape degradation processes occur mainly here. Among the important problems of Azerbaijan ecology are tendency to landscape degradation and the desertification. In these regions desertification goes in direction of reduction of biological productivity of the soil-vegetation cover, reduction of the biologic potential under influence of the natural and antropogenous factors, full degradation of the lands under extreme circumstances. Research on desertification, revaluation of its causes, its prevention or reduction being the actual matter is the main problem of each affected country and of Azerbaijan as well.

OBJECTIVES AND METHODS

The main object of the research are degraded, steppe, useless, deserted natural ecosystems and agrolandscapes. Scientific-research works conducted are multiprofile, morphologic,

systematic, floristic, geobotanical, bioecological, industrial, mathematical, monitoring, agrotechnical, phenological, expeditionary, semiportable, stationary, vegetation resources, comparison and other methods were used [3]. Investigations were carried out in 11 administrative districts of lowland and mountain parts of Shirvan region of Azerbaijan from 2008 to 2013 years.

During implementation of the researches the various methodology [4-11] were used. Under studying of degradation process of the soil-vegetation cover used the methods of the geographic comparison. As a standard there were taken the soils exposed to erosion and deflation, at the same time destroyed and polluted soils and the areas where vegetation was not destroyed (natural, reserve regime). During research of degradation process in xerophyte brush and woods ecosystems where the soils had not been exposed to degradation and erosion [12-14, 2, 15-17].

RESULTS AND ANALYSES

The purpose of the research is study of the main indicators of desertification in this territory and their development parameters, modern condition, criteria and by this way definition of ways of prevention of desertification. Some of the main indicators measures for solution of the put problems is condition of vegetation, its structure, vegetation regime, development and other factors in total senotic reflection for concrete area of Shirvan plains. Research (monitoring) of ecological modifications in the arid territories exposed to desertification, definition of intensity of desertification in some areas are the main problems put forward. For solution of the problem firstly natural and anthropogenic factors of desertification should be defined, at the same time they should be ecologically based, modern condition of desertification in different ecosystems should be forecasted and diagnosed [2, 15-17].

At present the speed and degree of human activity has exceeded self-regulation ability of the landscapes. At present time desertification process is engendered by natural, anthropogenic, zoogenic, edaphic, technogenic and other factors. Destruction of the soil and natural vegetation, excessive pasture of cattle on grasslands with weak productivity, violation of hydrologic systems and repeatedly salinization of soil as a result of old drainage irrigation are signs leading to desertification. Desertification process is not connected just with intensification of the anthropogenic activity. The main reason of development of this process is disbalance between anthropogenic loading and potential opportunities of natural cenoses. Naturally, preference of the anthropogenic influences from potential opportunities of landscapes caused destruction of geological complexes, reduction of productivity, formation of ecologically unstable complexes.

The factors of desertification process in arid zones may be classified as next: 1. Extermination of vegetation and

destruction of soil as industrial, communal reasons and irrigation building; 2. Degradation of vegetation as a result of excessive pasture; 3. Cutting of trees and bushes for use as fuel, for building and etc., more drying –degradation and erosion of the soils under non-irrigated agriculture; 4. Repeated salinization in condition of irrigated agriculture, increase of salinities in submountain plains and stagnant pits; 5. Destruction of landscapes in mining regions; 6. Global variabilities in climatic elements. At the same time any evolution processes, subject to their speed and profit, in the finally may have crisis character, in whole may get quite indefinite character (oil production, cement production, quarry exploitation of mineral wealth and etc.).

Thereby, desertification –results of natural and anthropogenic factor with firm modification in interdependency occurring in direction of reduction of biological productivity of soil in arid, semiarid and dry steppes. It is a process of full destruction and degradation of biological potential, transformation of a territory in typical desert in extremal conditions.

Since ancient times the large pasture fields of Shirvan zone have been used as winter pastures. In this territory the square of winter pastures reduced from 3 mln hectares to 1 mln hectares. In winter months in the pastures of the territory about 100 thousands of cattle of the republic and of neighbouring countries pastures. In submontane territories the productivity reduced in 2-3 times, and this indicates that fertility of soil in these territories is falling with the lapse of time. At present in Azerbaijan 240 thousands hectares of 635 thousands hectares of summer pastures are under occupation. 43,8% of 350 thousands hectares of lands area covering 20 districts has incurred erosion, and 14,2% of them has faced more severe erosion danger. In 2010 year according to region information major portion of 704 thousands of cattle are kept here. That is why the soils were trampled down and erosion process increased manyfold. One of the most major factors caused worsening of winter pastures are salinization of soil, strengthening of repeated salinization process. Thereby, natural vegetation exposed to various degree of fluctuation under high anthropogenic tension and especially deepened degradation of desert phytocenose having local character.

In the third period plateau dry climate, hard mechanic structure, carbonate, salinity of the soils and rare vegetation caused wide development of erosion processes. The condition of 30-35% of the all soil in the region worsened. Here the main direction of the agriculture is grain-growing, foddering and cattle-breeding. However, in many places cutting of natural forests and bushwoods, carrying out of sowing in very inclined slopes and not observing agrotechnical rules, not observation of ecological condition of the areas with erosion danger caused development of linear and superficial erosion. Speaking about ecological problems in the regions it becomes clear how bad is present ecological situation of lowland territories where mostly

placed refugees and forced migrants exposed to armenian aggression. Development and spreading of superficial erosion in sowing lands depend on a number of natural and anthropogenic factors. The main of those is cultivation of one-year plants on vary declined slopes and absence of land protecting sowing circulation. Nowwhile planing the agrigulture it is important to foresee relief feature of the territory, inclination of the slopes and erosion degree of the soil, as well as ability of the cultivated plants to protect the soils from erosion and deflation, and division into categories of land funds in the teritory of the farms. And in the soils referring to these categories there have implemented struggle measures according to ecological codition of that area.

Natural vegetation of the researched territories differs by its great variety [15,18]. This variety is reflected not only in modern natural-historical situation, growing anthropogenic tension of the people, but also in the past long and complex evolution process and formation of changing geological periods. Geological structure of the territory of Azerbaijan was exposed to many modifications, in the end of the Sarmat period. After drawing out of the waters part of the territory stepped into continental phase. In Pont era of Sarmat period sea slowly went away, Eastern Caucasus connected with mountain slopes of Iran and as a result it started migration of xerophyte elements from there into the territory. In the Trio period against the background of the Ancient Mediterranean Sea florathere formed “Kolkhid” and “Hirkan” floristic centers not depending from each other. During Sarmat era 3 main flora province existed on the Caucasus. Two of the being mesohile province formed as “Kolkhid” and “Hirkan” floras, and the third formed as xerophyte flora. In the end of Pont era on the places released from the sea there were created conditions for formation of xerophyte type of flora, to be more exact, desert and semidesert vegetation, but from the beginning of the fourth period – for formation of the steppe flora. In the territory *Pinus eldarica* Medw., *Ficus carica* L. and etc. referres to the third period xerothermic relicts and etc. The species existing in trio period of Caucasus flora formed surrounded by Southwest Asia, Mediterranean Sea, Eastern Asia elements and species migrated from the north.

Degradation of soil and vegetation in arid and very dry territories are strongly influenced not only as complex influence of ecological factors, but also by global modifications occurring of flora and vegetation. Desertification in the territory historically happened as a result of formation of arid and continental climate condition, steppification of existing vegetation types, depletion of grass cover, reduction of productivity, worsening of botanic structure, gradually collapse of the fertile soil layer. Shirvan plain where there is the most intensive development of desertification process, is the territory of

large spread of saline-steppe (Shirvan desert -Picture) soils. In these ecosystems aridity index is 4, radiation balance is 45-47 kilocal/sm², heat energy spent for evaporation is 15-17 kilocal/sm², sun radiation is 127-130 kilocal/sm², continentality degree is 45% and surface evaporation is 4 times more than rate of precipitations. 87% of 45 defined factors of desertification relate to uneffective use of natural resources by people and just 13% relates to natural events.

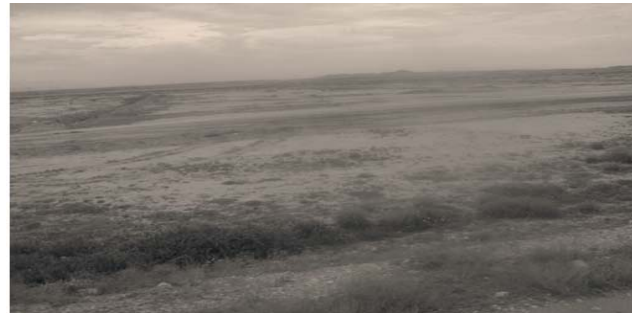


Fig.1. Territory under erosion processes in Shirvan Region

Desertification is created mainly by climatic, hydrologic, geomorphologic and biologic factors (Fig. 1). Soil-vegetation cover acts as the most active factor of desertification and initial formaton and development of this process is directly escorted by their trasformation. Salinization, desiccation, erosion of the soils reduces their fertility, proceeds degradation, as a result the whole complex of the landscape is disturbed. Vegetation alongside with other factors determines the speed and degree of desertification. Their destruction substantially influences ther factors.

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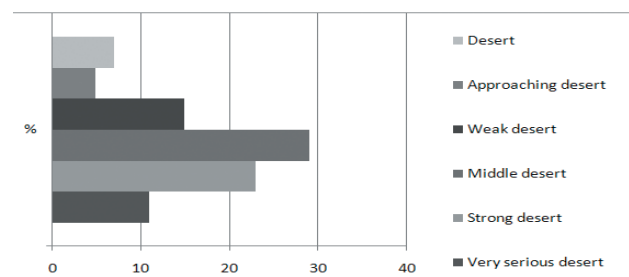


Fig. 2. The rate of desertification in Shirvan territory

Foreseeing great role of the climatic factors in formation and development of desertification process its influence in territorial desertification has been studied on the base of factual steppe researches and meteorology indicators. Radiation within plain is 130-133 kcal/sm² in total. In the hottest month of July the average monthly temperature is 25-27°C. The maximal weather temperature in western regions reaches 40-43°C during a year. The coldest month of January is characterized by 1-3°C positive average monthly temperature. As well as depending on relief features (16-

240C) absolute negative temperature goes down than 00C in January. Relative dampness during a year is 20-30%. Superficial evaporation is more than rate of atmospheric precipitation falling 3-3,5 times. "Hothouse profit" causing heating of the lower layers of the troposphere, concentration of gases, aeroash substances in troposphere, pollution of the soil and waters by oil, chemical pollution, anthropogenic destruction of soils and etc. such natural and anthropogenic factors hardly influencing formation of desertification are modern global problems.

Desertification process in the territory has been studied on the scientific bases and the main indications causing desertification, their development parameters, modern condition, factors have been identified and the ways of their prevention have been defined. Direction of spreading, intensity and areals of the ecological modifications amplifying desertification process have been determined.

CONCLUSION

On the basis of the monitoring research and office laboratory-analytic works criterias, internal danger of desertification, modern xerophytic biotypes, project cover, fertility in arid territories and etc. in compiling areas can be determined. Research results of the flora of natural ecosystems, vegetation existing in the territory, new floristic and phytosociology features, regularities of desertification process gives opportunity for implementation of the new modern technological, agrotechnical, engineering-technical works in compliance with changed situation. And this in turn will provide proper, effective and continually usage of soil and vegetation cover on the basis of restoration of the destroyed ecological balance.

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ЗАКОНОМЕРНОСТИ ПРОЦЕССОВ ОПУСТЫНИВАНИЯ НА ШИРВАНСКОЙ ТЕРРИТОРИИ АЗЕРБАЙДЖАНА

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В статье рассматриваются основные причины опустынивания на Ширванской равнине, нынешнее состояние параметров развития, критерии и профилактика предотвращения этого процесса. При проведении повторных мониторингов и экологической оценки, определены причины усиления процессов опустынивания, их направление и область их интенсивности. В состоянии современных пустынных ценозов выявлены засушливость, засоление, негативное действие ветров, что приводит к образованию локальных биотипов ксерофитов, адаптирующихся к данным факторам. Были определены критерии опустынивания, выявлены и рекомендованы слабые, средние, сильные и очень сильные группы.