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## Review

# Development Appropriatenesses of Deserting Processes in The KAP and the PAR.

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**Main indications caused deserting of the Kur-Araz Plain\* (KAP) and the plains along Araz River (PAAR) of the Nakhichevan Autonomous Republic (NAR); current state of development parameters of the indications; their criteria and preventing ways've been shown in the article. Spread direction of the deserting, its intensity and areals were identified through implementation of monitoring of ecological changes for several times that intensify the deserting process. A map and cartogram (1: 600 000) of contest plan attracting intensity of the deserting and a scheme of environmental factors complex effect on deserting of vegetation have been compiled. Deserting criteria have been identified and it was recommended to divide them into: weak, medium, strong and very strong groups.**

**Key words:** deserting processes, natural ecosystems, ecological disbalance, soil erosion, vegetation cover, arid areas.

## INTRODUCTION

Ecological disbalance in all over the world, contamination and pollution of the environment, increase of steppe and deserting processes have caused much disturbs. Existing condition also effected onto other in-situ farms, agrarian landscapes with opportune ecological environment. That is why all international community has been joined to protection of the environment. An International Coordination Committee has been established by the initiative of the UN in 1993 to integrate all involvements on preventing the deserting process on the planet. The Symposium for Desert Problem held on 'Erosion and deserting in Euro-Asia' i.a.w. the Desert Convention of the UN in 1994 has been directed to development of industry together with the urbanization alongside with agriculture in

arid areas' adoption as well as solution of related problem of ecological changes. Importance of working out a project for joint research of erosion and ecological processes in the Kur-Araz Region according to the Azerbaijan representatives' propose participating at the Symposium has been noted.

Desertation is a process able to change any area into a desert in extremal condition resulted with subject to changes on the direction of soil-vegetation cover's getting arid in dry areas and decrease of biological productivity. There are not accurate criteria about desertation and its indication (according to its diagnosis) yet. On the result of ecological degradation of soils all around the world 3,3 billion ha (80%) agricultural lands were subjected to deserting in the arid areas. 21% of irrigated lands, 77% of dry-farming lands and 82% of pastures have become deserted on an average level. Main problems of

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desertation in global scale are: water erosion, deflation and erosion of vegetation cover.

Area of the arid soils where population of our Republic live is 5,2 thousand ha (60%). Main part of the arid areas are in the KAP where soils are often irrigated. One of the urgent problems of the Azerbaijan nature is degradation of the landscape and tendency to desertation. Processes of desertation and degradation of the landscape mainly occur in the KAP, Gobustan and NAR.

*\*Kur-Araz Plain (Kura-Araks – former Russian spelling)*

Deserting is going on the direction of biological productivity decrease of soil-vegetation cover, degradation of the biological potentiality and fool degradation of soils in extreme condition by complex effect of the natural and anthropogenic factors in these regions. Study of deserting, reasons of its generation, its prevention or reduce are actual problem of every country including Azerbaijan (for Azerbaijan it is the main problem).

## MATERIALS AND METHODS

As the research works carried out by us are multiprofiled the following ways were used as: morphological, floristic, geobotanical, bioecological, arealogical, economical, mathematical, monitoring, agrotechnical, expeditional, halfstationar, stationar, comparisional, experimental and others [State Committee for Statistics..., 2008; Aliyev, 2005; Anthropogenic infringement..., 2000; Natural conditions and, 1965; Flora of Azerbaijan, 1950-1961]. The basic object of the research are natural ecosystems and agro-landscapes subjected to degradation, bozqırılma, негодное состояние, deserting in KAP and in the PAAR NAR.

The following works and methodical means have been used in the work implementation: L.G.Ramenskiy (1937), B.V.Sochava (1950), Braun-Blanquet (1964), I.H.Beydemann (1954), P.D.Yaroshenko (1967, 1969), A.R.Shennikov (1951), B.G.Shakuri [2002; 2004; 2009], B.H.Aliyev (2005), G.Sh.Mammadov (2005; 2006; 2007).

## Experimental Tag

Purpose of the researches is a study of current status of the main indications caused desertation in the KAP and in the PAAR NAR and their development parameters, criteria and consequently definition of ways of the desert prevention. As one of the main indicators in common cenoetic appearance in order to solve the encouraged problems – status, structure, vegetation regime, grow and other factors of the vegetation cover have been researched in the certain areals of the KAP and in the PAAR NAR. Investigation of the ecological changes (monitoring) in arid areas where deserting is going on means mapping of deserting intensity of the areals as well as compiling of

cartograms for combat arrangements. First of all identification of the natural and anthropogenic factors of deserting, at the same time ecologically substantiate them, prognostication and diagnosing current status of the deserting process are required to solve the problem.

While studying degradation process of the soil-vegetation cover and using geographical and comparisional way as an ethalon subjected to erosion and deflation at the same time degraded and contaminated soils as well as areas of not degraded vegetation cover (natural, preservation mode) have been adopted. When researching degradation process in xerophyte bushes as an ethalon soils not subjected to erosion and degradation ecosystems have been taken.

Today speed and degree of the human activity passed over selfbalance ability of landscapes. Currently desert process is derived from nature, anthropogenic, zoogenic, edafic, technogenic and other factors. On the result of exhausted use degradation of the soil cover, destroy of natural plants, excessive pasturing of live-stock without any limit in poor productive pastures, degradation of hydrological systems and repeated salination of soils concerning to drainage-irrigation are the features resulting deserts. Desert process is not only related with intensiveness of anthropogenic activities. The major reason of this process's development is non-appropriates among anthropogenic load and potential abilities of the natural cenoeses. Anthropogenic effects being higher than potential possibilities of the landscapes has resulted with degradation of geo-complexes, reduce of productivity, generation of not sustainable complexes from the ecological point of view.

We can group the factors resulting deserts in arid zones as follows: 1. Degradation of vegetation cover and destroy of soil cover on the result of industrial, communal and irrigational construction / building; 2. Subjection of the vegetation cover to degradation related with extensive pasture; 3. Cutting of trees and bushes for the heating, building and other purposes; much more drying the soils concerning to intensive dry-farming land sowing them dry-farming land tillage – degradation and erosion; 4. Repeated salination in the condition of irrigational sowing, grow of saline takyrs (crazing), in foothill plains and flowless sunkens; 5. Degradation of landscapes in mining regions; 6. Global changes in the climate components. At the same time any evolution processes can finally get a complete indefinite character in an integrity of crisis character (oil output, cement production, carrier exploitation of mineral product et al) depending on the processes' speed and efficiency.

Thus desert is a process that result complete destroy of biological potentiality in extreme condition, changing a territory into a typical desert being a natural and anthropogenic unchangeable factor mutually depending on each-other occurred on the direction of reduce of biological

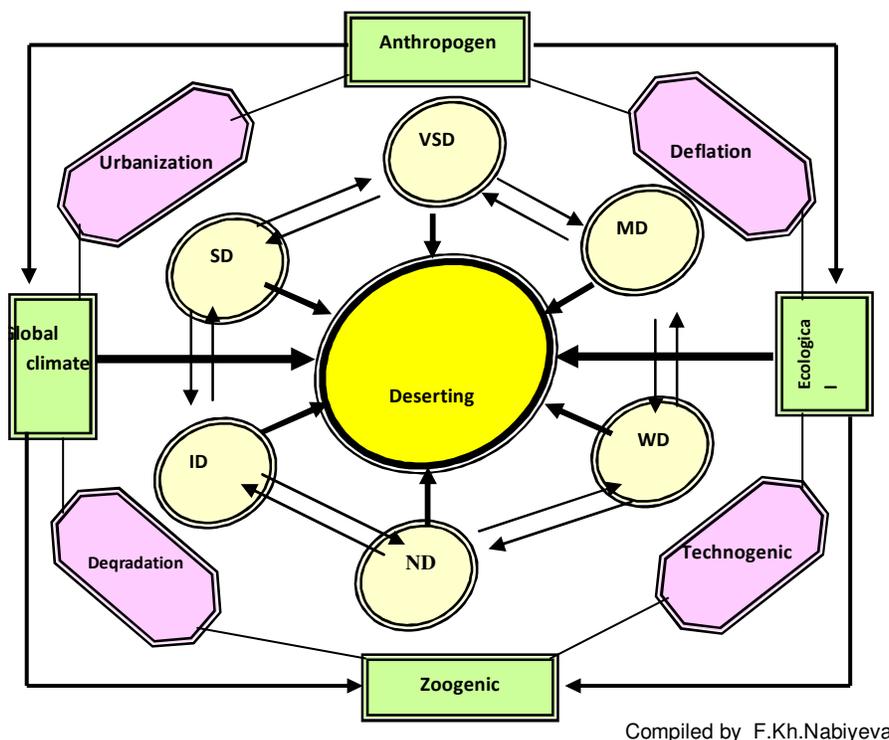
productivity of soil-vegetation cover in arid, half-arid and dry steppe lands.

Extended pastures of KAP and the PAAR NAR are being used as winter pastures since the ancient period. Winter pastures area of the KAP was reduced 3 million ha to 1 million ha. In the pastures of the area 100 thousands of live-stock of the country and neighbour countries used to be pastured during winter months. Productivity in the foothill areas decreased 2-3 times, which shows that productivity of soils in these areas are becoming less day-by-day. At present 240 thousand ha of 635 thousand of summer pastures are remaining under capture. 43,8% of 350 thousand ha land covering 20 regions have been subjected to erosion, and 14,2% of them are face-to-face with threat of more strong erosion. There is a winter pasture of 38574 ha in the Nakhichevan AR. Available pasture areas are 20961 ha that are enough for pasturing of about 30 thousand live-stock only according to standards. However, according to the information of the last 2010 majority of 704 thousand cattle and small cattle of the region are served here. That is why the lands have been trampled down and erosion process was increased very much. One of the most general factors resulting degradation of the winter pastures is getting the lands more salinated and strengthening of repeatedly salination here. Thus, natural vegetation cover under high anthropogenic tension has deepened degradation of desert phytocenoses with fluctuation of different degree and of local character

As climate was dry and soils were with heavy mechanical content, carbonate, salinated as well as vegetation cover rare they resulted wide development of erosion processes in summer pastures of the 3-rd Period. Ecological status of 30-35% of all lands got worse in the region. The main trend of the agriculture is cereal growing, forage growing and live-stock breeding here. However, cut off natural forests and bushes in many places, implementation of sowing on very slopy areas and not holding agrotechnical instructions, not taking into account ecological condition of erosion-threatened areas have resulted lineal and surface erosion development. While speaking about ecological problems on the regions existence of how worse ecological condition of the plain zones where are mostly located refugees subjected to armenian aggression becomes clearer. Development and spread of surface wash depend on many natural and anthropogenic factors in the sowing areas. The major of them are annual plants growing on very slopy areas and absence of soil-protecting sowing circulation. It is considered that land funds' separation into categories in the farm area is important taking into account relief property of the area, slopes inclination, drainage degree of soil as well as protection ability of lands by the cultivated plants from erosion and deflation when planning presentday agriculture. And combat arrangements appropriating to the ecological condition of the area should be carried out in the lands belonged to these categories.

Natural vegetation of the investigated areas is differed by its great diversity. This diversity is not attracted only in current natural & historical condition, people's increasing anthropogenic effect but it is also seen in the past difficult and long way of evolution, forming of changing geological periods. Geological structure of the Republic subjected to many changes, the area passed to continental phase of its development after waters going away at the end of the Sarmat Period. During the Pont Era Sarmat Sea already has gradually gone away, Eastern Caucasus joined with Iranian mountainous slopes and finally migration of xerophyte elements started from there to the area. In the 3-rd Period on the background of the Ancient Mediterranean flora floristic stations of "Kolkhid" and "Hirkan" have been derived not depending from each-other. And in Sarmat Century 3 main floristic provinces already existed in Caucasus. 2 of them being mezophyl provinces (the "Kolkhid" and "Hirkan" floras), and the third one has formed the xerophyte flora. At the end of the Pont Era in some released areas of the sea an opportunity was created to form flora of xerophyte type i.e. desert and semi-desert vegetation, and since the beginning of the 4-th Period steppe flora. In the KAP area *Pinus eldarica* Medw., *Ficus carica* L. et al, and in the area of the NAR *Anabasis eugeniae* Ilijin, *Campanula karakuschensis* Grossh., *Thlaspi rostratum* N.Busch, *Peltaropsis grossheimii* N.Busch, *Ammochloa palastinea* Boiss. Et al are considered to xerophytes of the 4-th Period. The species existed in the 3-rd Period of the Caucasian flora itself were formed surrounding by components of Front Asia, Mediterranean, Eastern Asia and by the species migrated from the North. Soil and plant ecosystems degradation in arid and very dry areas alongwith the complex effect of the ecological factors global changes occurred in its flora and vegetation cover render a strong effect. Deserting process in the KAP and in the PAAR on the result of formation of arid and continental climatic condition in ancient times, steppe of the existing vegetation types, getting rare of the grass cover, reduce of the productivity, worsening of its botanical content, gradual destroy of its productive soil. These natural processes run very intensive and fast in the NAR where continentality degree is higher. The Shirvan Plain where deserting process develops most intensively is a salinated-grey soils' spread area (Kurdamir Desert). Draught index in these ecosystems is 4, radiation balance – 45-47 kkal/cm<sup>2</sup>, heat energy consumed for evaporation – 15-17 kkal/cm<sup>2</sup>, solar radiation – 127-130 kkal/cm<sup>2</sup>, continentality degree – 45% and surface evaporation – 4-times more than sediments amount. 87% of the defined 45 factors of deserting process are related with irrational use of natural resources by people and only 13% are related with natural disasters.

Desert originators mainly are: climate, hydrological, geomorphological and biological factors. Soil & vegetation cover functiones like the most active factor of deserting



Compiled by F.Kh.Nabiyeva

A scheme. Environmental factors complex effect on deserting of vegetation

process and initial appearance and development of this process are followed by their direct transformation. Salination, draught, erosion of lands reduce their productivity, fasten their degradation; on the result the whole complex of the landscape is destroyed. Vegetation cover identifies speed and degree of deserting process alongwith the other factors. Their destroy basically effect onto the other factors too. Taking into account that climatic factors have got a great role in desserting process forming and continuation effect of the KAP and PAAR onto the desserting process has been actually studied on the base of the field researches and meteorological indices. Total radiation within the desert is  $130-133 \text{ k/kal cm}^2$ . Average monthly temperature in July (the hottest month) is  $25-27^{\circ}\text{C}$ . Maximum temperature of the air in the western regions reaches to  $40-43^{\circ}\text{C}$  during a year. The coldest moth of January is characterized by  $+1$  to  $+3^{\circ}$  of average monthly temperature. Also depending on the peculiarities of the relief ( $16-24^{\circ}$ ) absolute “-” temperature falls below ‘0’ in January. Comparative annual humidity is 20-30%. Surface evaporation is 3-3,5 times higher than amount of the atmosphere sediments. ‘Greenhouse effect’ resulting with heat of lower stages of the troposphere, gas ( $\text{SO}_2\dots$ ) accumulation, accumulation of aerodust substances in the troposphere, pollution of soil and waters by oil, chemical pollution, technogenic degradation of soils et al factors and such anthropogenic factors strongly effecting onto desert formation are presentday global problems (scheme).

Deserting process in the KAP and the PAAR NAR has been studied on the scientific bases, the main inications resulted with deserting process, their development parametres, current status, categories were identified and prevention ways were ascertained. Direction of the ecological changes spread intensifying the deserting process, their areals and intensity have been identified. Flora spectra have been prepared by identification of the plant species spread in the KAP and the PAAR NAR. Present-day flora of the KAP has been concentrated in the spectrum was represented with 1570 species within 140 families and 680 general; and present-day flora of the PAAR was represented with 1280 species within 119 families and 584 genera. 9 types, 23 class formations, 13 group formations, 6 subgroup formations, 248 formations, about 2500 associations, microgroupings and local biotypes have been identified for natural ecosystems and their vegetation during the research.

Amount of the local biotypes on the background of geobotanical ways have been found on the base of our personal thoughts and big experiences bu using the formula:  $B=K+L+M$ .

B is sum of the local biotypes and K, L and M are repeated variants here. The new mathematical forms cmpiled to define the project cover and productivity of the local biotypes have been used by us. General threat of deserting have been defined by the formula:  $\text{GTD} = \text{BD} + \text{CS} + \text{TD} + \text{IDD} + \text{EANE} + \text{DEH}$ . Here BD expresses

background level of the deserting process; CS – current status of the deserting process; TD – temps of the deserting process; IDD – inner danger of the deserting process; EANE – effect of animal kingdom onto natural environment; DEH – direct effect of a human. According to the formula the following groups of deserting have been accepted: week, middle, strong and very strong. Monitoring research and cameral, laboratory-analitic activities have been carried out to develop the GTD unite.

A map of 1:100000 scale attracting intensity of deserting process that was compiled by us, a cardogramme for assigned contest arrangements, flora spectra of KAP and the PAAR NAR could assist to investigate steppe and deserting process in the analogical areas as well as to study of the bioecological features of those areas. It is possible to identify deserting criteria, inner danger, in other related areas, present-day xerophytes local biotypes, project cover, productivity in arid areas et al using new formulas compiled and applied by us on the base of monitoring research and cameral laboratory-analytic operations. Study results of flora, vegetation, new floristic and phytocenoological properties, deserting process' appropriateness of the existing natural ecosystems of the KAP and the PAAR NAR could create ability for relevant changed condition new updated technological, agrotechnical, engineering-technical operations implementation. That will provide, in its turn correct, rational and sustainable use of soil and vegetation cover on the base of the restoration of destroyed ecological balance.

## REFERENCES

- Aliyev BH (2005). Deserting problems in Azerbaijan and ways of its solution. Baku: "Ziya-Nurlan", p. 668  
 Aliyev BH (2007). Managment of summer and winter pastures of Azerebaijan. Baku: "Ziya-Nurlan", p. 509

- Anthropogenic infringement of ecosystems (AIE) (2000), [http // www. sci. aha. ru/ATL/ra 32 e. htm](http://www.sci.aha.ru/ATL/ra32e.htm)  
 Beydemann EN (1954). Methods of fenological observations at geobotanical researches. M.-L. AS USSR, 128 p.  
 Braun-Blanquet J (1964). Pflanzen sociologie. Grund-zügeder vegetation skunde. 3 Auflage, Wien-New York, Springer Verlag, 830 s.  
 Flora of Azerbaijan. Baku (FAB) (1950-1961). Volumes. I-VIII, P/h of the AS of the Azerbaijan SSR.  
 Mammedov G.Sh. (2007). Soil study and bases of soil geography / Textbook. Baku: Elm, 664 p.  
 Mammedov GSH (2005). Soil/Land map of the Nakhichevan A.R. Nakhichevan Encyclopedia. Istanbul, Bakanlar Media, II Part, p.104-105.  
 Mammedov GSH (2007). Social, economical and ecological bases of rational use of the land resources of Azerbaijan. Baku: Elm, p. 854  
 Mammedov GSH, Khalilov MY (2006). Ecology, environment and human being. Baku: Elm, p. 608  
 Natural conditions and resources of the Kur-Araz Plain (1965). P/h of AS of the Azerbaijan SSR, Baku, p. 200  
 Ramenskiy LG (1937). Registration and discription of vegetation.M, P/h of VASKhNIL, p.100.  
 Shakuri BH (2002). Ecological-genetical and geochemical properties of the Nakhichevan AR and their change under the effect of erosional processes. Baku: Elm, p. 278  
 Shakuri BH (2004). Some theoretical and practical problems of deserting process in the plain and foothill regions of the Azerbaijan Republic. Baku: MBM, 188 p.  
 Shakuri BH, Mardanly AH (2009). Ecosystems of the Nakhichevan AR, exogenic and anthropogenic processes' effects onto them, renovation necessity of natural balance. Baku: p. 256  
 Shennikov AP (1951). Ecology of plants. P/h. Sovetskaya Nauka. M.  
 Sochava B.V.(1950). Study of flora and vegetation. // At the book: Handbok of a traveller and specialist of local lore. V.2., M.: Geographgiz, p.463.  
 State Committee for Satistics of the Azerbaycan Republic (2008). Bulletin, № 24.  
 Yaroshenko PD (1967). To the methods of weight definition grasses according to height of the bulk and projective cover. J. Botany, №4, p.36-39.  
 Yaroshenko PD (1969). Geobotany. M. p.198