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MAJOR NEGATIVE EFFECTS ON PLANT DIVERSITY IN GANIKH-AGRICHAI VALLEY (WITHIN THE BORDERS OF AZERBAIJAN REPUBLIC)

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ABSTRACT: *In the present research, the following negative impacts on the plant diversity of the study area – Ganikh-Agrichai valley was studied: the fragmentation of natural habitats, contamination due to the lack of waste recycling, overgrazing, destruction of forests and shrubs for agricultural purposes and urbanization. Invasive species are also in the list of main negative impacts to plant diversity. It was determined that the proportion of transformed natural ecosystems by anthropogenic factors in the valley is about 80%: 20%., i.e. 4:1.*

KEYWORDS: Ganikh - Agrichai Valley, Plant Diversity, Transformation

INTRODUCTION

The study area of Ganikh Agrichai valley covers areas in lowlands of Balakan, Zagatala, Gakh, Sheki, Oghuz, Gabala, Ismayilli administrative districts of Azerbaijan Republic. Natural vegetation of the study area is represented by semi-desert, wetland, shrubland and forest vegetation (Geidman 1940; Prilipko 1950; Prilipko 1954; Sariyeva *et.al*. 2016). As a result of continuing floristic research that was conducted during 2013-2017 years in Ganikh-Agrichay valley there was established that there are 502 species, 28 subspecies and 1 variation of vascular plants united in 92 families and 330 genera. These amount of registered species and subspecies is equal to 11.6% of the flora of the Republic of Azerbaijan. Registered on the studied area 8 species (1.5%) were included in the I edition of the Red Book of the Republic of Azerbaijan, and 1 variation, 1subspecies and 18 species (3.7%) in the II edition. (Sariyeva 2017).

Biodiversity conservation as the main indicator of the biosphere's sustainability is currently the most important issue for many countries. As a republic joining the Convention on Biodiversity, the 5th National Report of Azerbaijan (2014) contains major abiotic, biotic and anthropogenic effects which threaten the biodiversity within country. The distribution of biodiversity in the study area directly related to plant cover, particularly to vascular plants. Therefore, the main goal of the present article is to research negative impacts affecting phyto-diversity in the study area.

THEORETICAL UNDERPINNING

Earth cover data are becoming increasingly important in understanding and managing the interaction of man and nature (Schlager *et al.* 2017). For estimating of the size and better visual representation of land cover indicators we also used Remote Sensing techniques.

The transformation of ecosystems is accompanied by a change in natural components, leading to a disruption in the metabolism, functioning and structure of the original ecosystems, which

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reduces the ability of ecological systems for self-restoration (Buzmakov 2012). It also, causes decreasing number of plant diversity. Plants organize the first link of the food chain and directly responses for energy flow, nutrient and information cycle. In the average one species of vascular plant provides directly or indirectly vital activity of 66 species of consuments (Golubev 1999).

MATERIALS AND METHOD

Identification of vascular plants

Identification of plant species conducted according to (Flora of Azerbaijan1950-1961) and (Pils G. 2006); the working names of the plants from (The Plant List 2013).

Remote sensing techniques

The land cover classes of study area was developed using supervised classification techniques based on multispectral satellite images using QGIS software.

The assessment of the ecological socio-economic status of the area – provided according to (Reimers 1990, Ismayilov *et al.* 2016).

RESULTS

The total area of Ganikh-Agrichai valley is 3473.11 km^2. 78.87% of the total area is consists of manmade ecosystems (agricultural, residential areas and water reservoirs), 21.13%. natural areas (Figure 1).

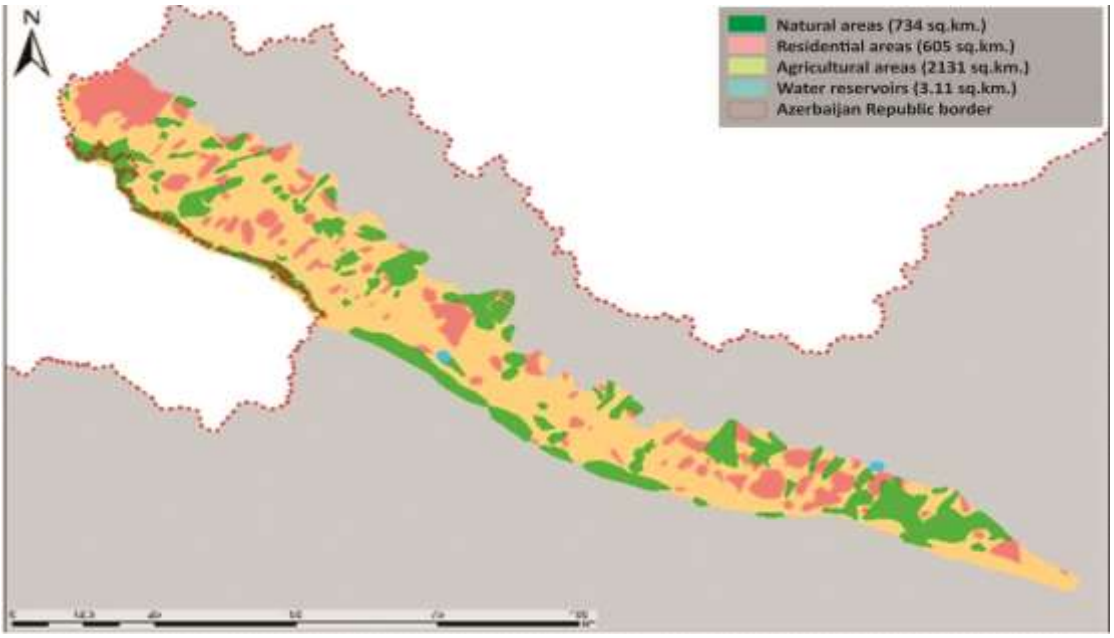

Figure. 1 Land use indicators in the study area

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According to Reimers (Reimers 1992, Ismailov *et al*. 2016), in order to have the maximal ecological and socio-economic effects in a given area while using the natural resources the proportion of anthropogenic transformed ecosystems and natural ecosystems should be 40%: 60%. Rational ecological balance (100% utility) occurs when, this ratio is equal to 2: 3. Based on the figures presented above, we conclude that this proportion is significantly affected in the area we research and is about 80%: 20%, i.e. 4:1. Therefore the anthropogenic transformation of natural ecosystems is a major factor leading to the declination in phyto-diversity.

Due to excessive loading of the semi-desert phytocenosis, used as winter pastures and village pastures, it had been strongly degraded. The warm climate, lack of project cover and species diversity compared to other types of plant species, make semi-deserts more sensitive to the anthropogenic impacts. The area of semi-desert phytocenosis provided in the article of (Geidman 1940) about the vegetation cover of the north-western part of valley, the area of semi-desert phytocenosis spreads is considerably smaller compared to the modern one, and in some areas the floral composition is substantially different from the present.

The article mentions about the existence of the perennials like *Artemisia lerchiana* Weber, *Limonium meyeri* Boiss O.Kuntze, *Salsola dendroides* Pall., *Galium humifusum* M.Bieb, *Medicago caerulea* Less. ex Ledeb, *Petrosimonia brachiata* Pall. along with ephemerals in the floristic composition of semi-desert phytocenosis in the areas of Mosul, Lalali and Danachi villages. In addition to the species shown, semi-deserts with floristic composition, including new species *Capparis spinosa* L., *Alhagi maurorum* Medik, *Cynanchum acutum* L.as well, still exist in small area around the village of Leleli. However, expansion of semi-deserts once studied areas to the surrounding areas, salinization of soil in Danachi and Leleli villages, domination of halophytic plants *Bassia prostrata* (L.) Beck., *Reaumuria alternifolia* (Labill.) Britten, *Atriplex verrucifera* M. Bieb., a sharp reduction in phytocenosis project cover (20-30%) and linear erosion was observed during expeditions to the area during 2013-2017.

Ailanthus altissima (Mill.) Swingle of Chinese origin, American origin *Erigeron canadensis* L., *Eupatorium cannabinum* L. are considered as invasive species for many countries of the world as well for Azerbaijan Republic.

DISCUSSION OF RESEARCH

Depending on the purpose of industrial enterprises located in the area, Ganikh-Agrichai valley is one of the regions of the republic where the environment is less polluted with hazardous waste. The amount of hazardous waste emitted from the industry, agricultural, household and automobile transports here is around 25,000 tons per year (National Atlas of AR 2014).

One of the reasons for the decline in biodiversity in modern times is the invasive species. The tree of heaven - *Ailanthus altissima* (Mill. Swingle) was cultivated as a decorative plant in the valley area from the middle of the last century (Flora of Azerbaijan 1953). Currently, it has significantly penetrated the forests in the study area. It has also been observed that the species has been penetrated in the low-mountainous forests, too (Ibrahimov *et.al.* 2014). It does not demand water and nutrients in soil, and can be reproduced by both vegetative and generative ways. Each year, it generates a large number of seeds, spreading winged seeds easily through the water and the wind to the surrounding areas. Due to the presence of secondary metabolites in the composition, the absence of natural pests and being not edible for the cattle, its number is increasing and it forces the local species out the area of spread.

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Erigeron canadensis L. is a species mainly spread in the open plain in the valley, in the urban environment and in various environmental conditions within natural vegetation. Thanks to the airborne seeds spreading through the wind, it spreads to large areas.

Eupatorium cannabinum L. is a woody perennial herb that prefers to inhabit and invade moist habitats such as swamps, marshes and stream banks. It forms dense monotypic stands that compete with and eventually crowd out native species. This species also has the ability to alter the nutrient structure of habitats it invades (Global Invasive Species Database 2018).

The most dangerous factor for the vegetation of the valley is human factor. The favourable geographical location led to the population's dense settlement here from ancient times, destruction of the forests and arranging of agricultural areas instead of it. At present, plain forests, which have an intense canopy in the area, are available only in the form of very small spots. Forests are subject to deforestation and polluted with domestic waste. The worst situation is in the area where the riparian forests spread. The riparian forests in the valley are in poor condition due to cattle grazing along the left bank of the Ganikh River. It is clear from the state of the grass, the enclosures for the animals.

Riparian forests on the shores of Sincanchay in the Oghuz region, low-mountainous forests around the Khanagah village of Ismayilli region are dumped with various domestic wastes (Figure 2a, b).

Figure. 2a Pollution of riparian forests on the shores of Sincanchay in the Oghuz region

Figure. 2b Pollution of forests by domestic wastes around the Khanagah village of Ismayilli region

During the expedition to the territory of Kepanekchi village of Zagatala region on October 15, 2017, it was revealed that the villagers had planned to defrost and transform 94.2 ha of plain forests, located at about 300 m distance from the Ganikh river, for agricultural area next year.

The recent area of xerophytic shrubs and semi-desert phytocenosis, located in the foothills of Dashsuz range of the Sheki region, has been significantly reduced in connection with the expansion of agricultural area in the valley and using it under construction, for purposes of cattle grazing.

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Despite being the Specially Protected Nature Area, the lands in the Sheki State Nature Sanctuary are carried for construction and for various purposes. It deprives the plants of their habitat. (Figure 3)

Figure. 3 Traces of land removal in Sheki State Nature Sanctuary

Besides, above mentioned biotic negative affected factors to plant diversity in Ganikh-Agrichai valley we observed also abiotic factor. The natural bushland formed in the dynamic part of the flooded rivers - Sinchay, Kishchay and Dashagilchay in the valley almost disappear during the high waters of these rivers.

Implication to Research and Practise

Due to favorable natural and geographical conditions for a long time, the territory of the Ganikh-Agrichay valley attracted the attention of researchers from the point of view of agricultural development. Except recent publications (Sariyeva *et.al* 2016, Sariyeva *et.al* 2017) there are no scientific literature about carried out floristic studies in this region. As a final stage of previous studies this article presenting current state of negative effects to plant diversity and we think it is reliable source and can be useful for both-ecologists and botanists that are interested in biodiversity of this area. Besides, estimated sizes and the ratio of manmade and natural ecosystems also should be noticed by government for the future rational land management.

Future Research

Taking into account the number of vascular plants included to the II edition of the Red Book of Azerbaijan Republic(2013) (1 variation, 1 subspecies and 18 species); high level of anthropogenic impact on environment in studied area and progress ability of invasive species in disturbed areas we think future research should cover ecology of individual plants, especially invasive species.

CONCLUSION

The major factor leading to decrease of phyto-diversity in the valley currently is the human factor. Transformation of natural ecosystems as a result of anthropogenic impacts on the area

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decreases the number of phyto-diversity; causing degradation of the plant cover, which directly and indirectly affects the other components of the ecosystem.

REFERENCES

Buzmakov S. A. (2012) Anthropogenic transformation of the natural environment Geographic Bulletin Ecology and Nature Management., pp.46-50. http://kafbop.psu.ru/files/Buzmakov_atps.pdf

CBD Fifth National Report – Azerbaijan (2014). https//www.cbd.int/doc/world/az/az-nr-05-en.pdf (Accessed 10.12.2017)

Flora of Azerbaijan (1950-1961). Publishing House of the Academy of Sciences of the AzSSR, Vol.1-8. Baku.

Flora of Azerbaijan (1953) Publishing House of the Academy of Sciences of the AzSSR, Vol.6.

Geideman T. S. (1940). A brief outline of the vegetation of the Zaqatala-Balakan lowland. Sc.. works of Botany inst. of Az SSR, vol. IX, Baku, pp.179-240.

Global Invasive Species Database (2018) http://issg.org/database/species/search.asp?st=sss&sn=&rn=Azerbaijan&ri=18485&hci=-1&ei=-1&fr=1&sts=&lang=EN (Retrieved 11 February)

Golubev G. N. (1999). Geoecology. Moscow.

Ibrahimov Z. A., Ashrafov SA (2014). Invasive species aggressive for dendroflora and representing threat to biodiversity in Azerbaijan, ASAU's scientific works, Is. 1, Ganja, pp. 90-92.

Ismailov N. M., Mamedova A. O., Sadigova N. A. (2016). Ecology and Ecosystems, Nature Management, Baku.

National atlas of Azerbaijan Republic (2014), Baku.

Pils G. (2006). Flowers of Turkey, A photo guide. Austria.

Prilipko L. I. (1950) A short geobotanical sketch of the southern slopes of the Greater Caucasus (within Azerbaijan) Sc. works of Botany inst. of Az SSR, Vol 25, pp. 118-145.

Prilipko L. I. (1954) Forest vegetation of Azerbaijan, Baku.

Reimers N.F. (1992) Protection of nature and the human environment: Dictionary-reference, Moscow.

Sariyeva G. R. (2017). Analysis of flora of Ganikh-Agrichai valley (within borders of Azerbaijan Republic), (unpublished source).

Sariyeva G. R., Gurbanov E. M. (2016). Phytocenological structure of arid woodland and shrubland landscapes in the Ganikh-Agrichai valley. News of Baku University, series of Natural Science, Is.2, pp-44-51.

Sariyeva G. R., Sadıgova N. A., Abbasov A. Sh. (2017). Characteristic of mutual influence of some plant and animal species in Ganikh-Agrichai valley. Materials of III International Scientific Conference on 'Ecology: nature and society problems'. 26-27 December, Baku. pp. 282-284.

Schlager P., Bayramov E. (2017) Classification techniques of land use and land cover. Ppt for RS master course, Baku.

The Plant List. (Version 1.1. 2013) http://www.theplantlist.org/) Accsessed 11 January, 2018.

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