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COP29 is a global manifestation of solidarity for a green world

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The article describes the history of the road to COP 29 and the provisions of the Paris Agreement adopted at the 21st conference of the UN Framework Convention on Climate Change. The declaration of 2024 as the "Year of Solidarity for the Green World" in the country by the Decree of the President of the Republic of Azerbaijan, the work done on the 29th "Conference of the Parties (COP)" that we will host, the role of ecosystems in climate change, inventory and protection of biodiversity, as well as the results of scientific research carried out in the direction of preventing species extinction and protecting genetic diversity have been covered in the article.

Keywords: *COP29, green world, climate change, biodiversity, ecosystems*

INTRODUCTION

The history of the road to COP 29 and the provisions of the Paris Agreement adopted at the 21st conference of the UN Framework Convention on Climate Change have been described in the paper. According to the Decree of the President of the Republic of Azerbaijan dated February 2, 2021, emphasizing one of Azerbaijan's five national priorities for socio-economic development until 2030, articulated as the "Country of Clean Environment and Green Growth" and also according to the Decree of the President of Azerbaijan Ilham Aliyev dated December 25, 2023, 2024 was declared the "Year of Solidarity for the Green World" in the country. In this approach, the major activity program is constantly focused on restoring contaminated areas, protecting forests, flora and fauna, fertilizing and greening arid lands, and reducing the detrimental consequences of climate change (Order No. 2469 of the President of the Republic of Azerbaijan dated February 2, 2021; Decree of the President of the Republic of Azerbaijan dated December 25, 2023)

In recent years, great efforts have been undertaken in our country to combat climate change. Karabakh, East Zangezur, and the Nakhchivan Autonomous Republic have been **declared "green energy" zones** by the President of the Republic of Azerbaijan. As is well known, the Paris Agreement was adopted at the 21st conference of the Parties to the UN Framework Convention on Climate Change in December 2015. It was decided that the 29th "Conference of the Parties (COP)", hosted by a different country every year, will be held in Baku from November 11 to 22.

Before diving into Cop29, the history of the issue should be taken into account.

In the declaration adopted by the UN member states in September 2000 "Millennium Declaration", in the sections on climate change, biodiversity, desertification, protection of forest and water resources, the optimal strategy for the global environmental crisis that will occur in the 21st century was developed. Azerbaijan joined the Convention on Biological Diversity adopted by the UN Commission on Environment (Rio de Janeiro, 2002) and determined its scientific directions for biodiversity conservation.

Humanity has reached such a stage in its development that scientific and technical progress has had a negative impact on nature, and inefficient use of natural resources leads to fundamental changes on a global scale - there is a

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danger of lack of life factors such as soil, water areas, air, flora, and fauna.

The world experience demonstrates that preserving biodiversity, which is the foundation of modern society's existence, is an important indicator of sustainable development and coping with the nature crisis (International Code of Botanical Nomenclature (Vienna Code) 2009,

To expand international cooperation in the field of biodiversity conservation, the Republic of Azerbaijan joined the UN Convention on Biological Diversity in 2000.

This is an actual problem of vital importance for human civilization, including the independent Republic of Azerbaijan. Because biodiversity integrity reflects the stability of ecosystems. The process of mass destruction of natural ecosystems is accelerating.

The State Commission on Genetic Resources of Biological Diversity, chaired by Academician Jalal Aliyev was created, to ensure the implementation of comprehensive measures to prevent the threat of extinction of the genetic resources of plants, animals and microorganisms by Order No. 848 of the National Leader Heydar Aliyev dated December 21, 2001, and "National strategy" was developed. Based on the materials of the commission, the "National Strategy and Action Plan for the Conservation and Sustainable Use of Biodiversity in the Republic of Azerbaijan" was approved by Order No. 1368 of the President of the Republic of Azerbaijan, dated March 24, 2006, and identification of biologically diverse ecosystems in regions and their evaluation for preservation, specifying the list of rare and endangered plant and animal species, ensuring the protection of their gene fund, and the expansion of natural areas, botanical gardens that specially protect them, conducting research on the conservation of biodiversity, organization of the second (2013) and third (2023) editions of the **"Red Book"** of the Republic of Azerbaijan, establishing new botanical gardens in large cities, etc. were set as a goal.

MATERIALS AND METHODS

Research materials were collected at Ganja State University during the expeditions conducted in the western region of Azerbaijan, and specially protected natural areas (Goygol National Park, Eldar Shami State Nature Reserve, Garayazi State Nature Reserve, Korchay State Nature Reserve), ecosystems, such as forest massifs, river basins, meadows, rocks, and plant litters, freshwater wetlands were separated as a biological monitoring network, scientific-research was continued in the direction of evaluation and forecasting of anthropogenic changes occurring in vegetation. Floristic, floristic-systematic, areological, ecological classical, and modern methods, and The International Code of Nomenclature for Cultivated Plants (2009) were used as the basis for the research. In 2013, the II edition of the "Red Book" of Azerbaijan was published, and in 2023, the III edition was published in connection with the 100th anniversary of the National Leader Heydar Aliyev. The team of Ganja State University actively participated in the preparation of both publications (Novruzov et al., 2013, 2023), the International Code of Nomenclature for Cultivated Plants (Vienna code) (2009).

RESULTS AND DISCUSSION

The problem is being solved by the joint efforts of the state and the people. Azerbaijan has 10 national parks, 10 state nature reserves, 2 unregistered reserves, 24 state nature sanctuaries, 2,083 trees over 100 years old, 37 geological and paleontological facilities, and 15 thousand hectares of endemic and valuable forest areas. The area of specially protected natural areas in the republic is 594939.1 hectares, constituting 7% of the total area.

In the first edition of the "Red Book" of Azerbaijan, 108 species of animals and 140 species of plants, which are rare, extinct, and endangered, and need to be protected, while in the second edition, 223 species of animals and 300 species of plants, in the third edition, 460 species of plants, 241 species of animals, including the names of 47 species of mushrooms were included. Another feature of the 3rd edition of the "Red Book" is the compilation of pink lists of flora and fauna species in this edition. 51 species of plants, 49 of which are higher and 2 of which are

primitive, are included in this list.

For the first time, it was discovered that the flora biodiversity of the Specially protected areas of the North-Eastern part of the Lesser Caucasus (Goygol National Park, Eldar Shami State Nature Reserve, Garayazi State Nature Reserve, Korchay State Nature Reserve) consists of 1208 species in 465 genera and 107 families and 187 species belonging to rocks and plant litters contain 106 genera in 34 families.

One of the main problems of modern biology in today's conditions, where the burden of anthropogenic impact on the environment is increasing, is to study and understand the species at the cenopopulation level to ensure the conservation and efficient use of biodiversity. Cenopopulation is the real form of existence of the species in nature. The strategy, structure, amount, and age spectrums (4 age periods, 9 age states), dynamics of the cenopopulations of rare grains in the North-east of the Lesser Caucasus were comprehensively studied and evaluated. The seed yield of grains, seed reserve in the soil, and germination capacity were studied, and the advantages of the regeneration of cenosis with seeds were theoretically and experimentally substantiated.

Taking into account the role of rivers in the uneven distribution of climate and relief, an inventory of the flora biodiversity of the river basins of the northeastern slope of the Lesser Caucasus (Kurakchay, Shamkirchay, Goshgarchay, Ganjachay, Aghstafachay), monitoring of rare and endangered species was carried out, the taxonomic structure was clarified, given the modern classification of vegetation, a system of measures for the protection of the gene fund was developed. It was found that the flora biodiversity of the Shamkirchay basin consists of 668 species belonging to 240 genera in 75 families, Kurekchay basin -870 species belonging to 370 genera in 95 families, Goshgarchay basin-410 species belonging to 110 genera in 50 families, Zayamchay basin-445 species belonging to 180 genera in 65 families, Ganjachay basin-602 species belonging to 98 genera in 60 families, and flora biodiversity of the Agstafachay basin was found to consist of 415 species belonging to 97 genera in 37 families, 36 species belonging to 26 genera in 20 families in the Shamkirchay basin, 32 species belonging to 27 genera in 20 families in the Kurakchay basin, 43 species belonging to 28 genera in 22 families in the Goshgarchay basin, 45 species belonging to 24 genera in 13 families in the Zayamchhay basin, 35 species belonging to 21 genera in 14 families in the Ganjachay basin, 36 species belonging to 22 genera in 8 families in the Aghstafachay basin have become rare and are in danger of extinction.

The vegetation of the river basin includes post-forest meadows and shrubs, tall grasses, subalpine meadows and steppes, alpine meadows, rock and plant litter, and forest plants. Each vegetation type is distinguished by unique formations. In the highlands, dozens of formations and associations emerge from understories and form meadows and steppes of various compositions.

Post-forest tall grasses manifest themselves in various forms. Subalpine vegetation is divided into formations, such as subalpine wet meadows, mesophile subalpine meadows, mesophile diverse herbaceous subalpine meadows, and dry subalpine meadows. The species composition of flowering plants is low in rock and plant litter vegetation; they mainly form microgroupings consisting of lichens and mosses. From the vegetation of river basins, 22 species were included in the III edition of the "Red Book" of Azerbaijan from the Ganjachay basin, 15 species from the Zayamchay basin, and 17 species from the Aghstafachay basin (Novruzov, 2020).

Distribution of 142 species belonging to 47 genera in 12 families was found in water meadows and marshy meadows.

For the first time, monitoring was carried out in the "Avey" State Historical-Cultural Reserve, famous for its Damjili spring, located in the territory of Gazakh district, which is rich in historical architectural and archaeological monuments (Fig. 2) The role of vegetation in protecting the ecological balance and regulating the climate was explained and it was considered appropriate to carry out propaganda work in this direction. "Avey" State Historical-Cultural Reserve is named after the "Avey" temple, a relic of the oldest Stone Age, a land of rich historical architecture and archaeological monuments. Archaeological and architectural monuments, as well as moveable and immovable historical and

cultural assets, are regarded as the reserve's primary property in its area. There are hundreds of cultural monuments of the Paleolithic, Mesolithic, Eneolithic, Middle Ages, Bronze, Copper and later historical centuries in these areas. There are 56 registered and dozens of newly discovered monuments in the reserve's territory, of which 1 is of world, 33 of national, and 22 of local importance. 15 of them belong to architectural, 36 to archaeological and 5 to decorative-applied art samples. There are 3 world-renowned monuments in the territory of the Gazakh region, one of which is the Damjili cave camp, covering the oldest period. Damjili cave camp is located in the southeast of Avey Mountain. It is an archaeological and natural monument. Its history dates back to the Paleolithic period. This cave is half-circular shaped, the front part is open. It is under limestone rocks. It is called Damjili Cave because of the drops of water seeping through the natural cracks. "Damjili" cave is a relic of the ancient stone age. The age of Damjili cave is two hundred thousand years (**https://avey-heritage.az/)**

Along with historical monuments, the reserve is also surrounded by rich vegetation. The role of specific monuments, flora and fauna of the reserve is irreplaceable in the preservation of a clean environment and ecological balance. The reserve is also rich in Avey Mountain, Goyazan Mountain and other monuments. The reserve is considered the most favorable place for tourism. The famous Azerbaijani poet Samad Vurgun called Damjili the 8th wonder of the world and the 1st wonder of Azerbaijan. It is important to organize tours of these areas for visitors to COP29.

The legendary ***Adiantum capillus-veneris* L.** hanging from the ceiling of the cave may be considered the emblem of the Damjili spring. ***Adiantum capillus-veneris* L.** (Maidenhair fern) (Figure 1). It is a short plant with creeping rhizomes and grows in wet places. It is a rare relict species. The leaves are bright green, broad-oblong, and feathery. Its height reaches 50-60 cm. The leaves are symmetrical and feather-shaped. The disks have 3-4 sections. It is light green. Segments are 2.5-3 cm long and 1.5-2 cm wide. Leaf petals are 15-20 cm long, black-brown, glossy, slender. The above-ground parts of the plant are used for scientific purposes and folk medicine. It produces spores all summer until autumn. They reproduce by spores. It grows in a humid environment. It is found in Ganja, in the center of the Lesser Caucasus, on the walls inside the wells. This species is native to North America, the Caribbean, the Mediterranean, Eurasia, and the Middle East . It is appropriate to include what was found for the first time in the reserve, in the new editions of the "**Red Book**" of Azerbaijan. (https://avey-heritage.az/; Red Book of the Republic of Azerbaijan, 2013, 2023)

Fig. 1. *Adiantum capillus-veneris* L.

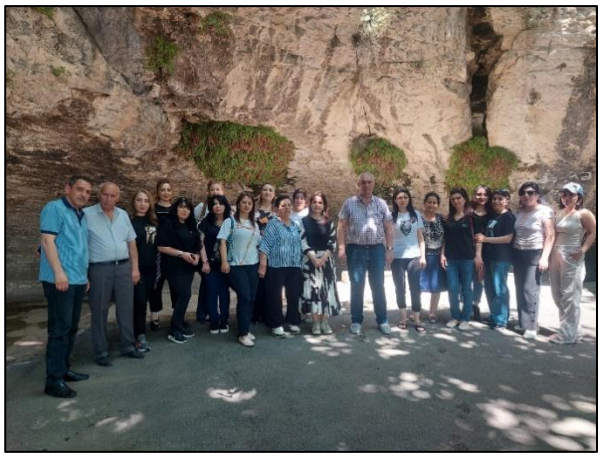

Fig. 2. The staff of the Ganja State University and the reserve in Damjili Cave (2024).

Semidesert with warmwood and salsola, and steppes play a major role in the vegetation of the reserve. The dendroflora of the forests consists of white poplar *(Populus alba* L.), black poplar *(Populus nigra* L.), Caucasian walnut *(Pterocaria*

fraxinifolia (Lam.) Spach., willow *(Salix caprea* L.), silver berry *(Elaeagnus angustifolia* L.), elm *(Ulmus glabra* Huds.), oak *(Quercus iberica* Stev), juniper *(Yuniperus oblonga),* hawthorn *(Crataegus collina* Charm.), Tussilago, Athel tamarisk *(Tamarix kotschyi Bunge),* barberry *(Berberis vulgaris* L.), garland thorn *(Paliurus* Hill.), peacock flower *(Caesaloina),* dog-rose *(Rosa canina* L), sheep fescue *(Festuca ovina* L., *F.supina* L.), alpine meadow-grass (*Poa alpina* L.), feather grass species (*S.barbata, S.capillata* L., *S.caspia* C.Koch.), blackberry (*Ruscus canensis* L.), White dead-nettle, forage kochia (*Kochia prostrata* (L.) Schrad.), scilla (*Scilla caucasica* Misz.), snowdrop (*Galanthus transcaucasicus* Fomin), goatgrass (*Aegilops* L.), spear thistle *(Cirsium vulgare* L.), eremopyrum (*Eremopurum* Ledeb.), bromus (*Bromus* L.), cheeseweed (*Malva parviflora* L.), valerian (*Valerianella cornicularia* C.A.Mey.), dandelions (*Taraxacum oficinale* Veig.), salsify (*Tragapogon collinus* DC.), rockfoils (*Saxifraga adscendens* L.), corn speedwell (*Veronica arvensis*), catnip (N*epeta cataria*), white dead-nettle (*Lamium album* L.), yarrows (*Achilla biberstenii* Afan.), bentgrass (*Agrostis* L.), Atraphaxis (*Atraphaxis caucasica* (Hoffm.) Pavlov), mulberry (*Morus alba* L., *M.nigra* L.), buttercup (*R.arvensis* L., *R.caucasicus* Bieb.), stinging nettle (*Urtica dioica* L.), Ferula caspica (*Ferula caspica* M.Bieb, from the village of Yukhari Dashsalahli, it is in the Red Book*),* etc. (Asgarov, 2016; Novruzov, 2020; Alverdiyeva, Novruzov, 2014)

The flora of the reserve is rich in lichens and mosses. On large rocks, the following lichen species are widespread: Acarospora badiofusca, *Caloplaca caesiorufa, C.decipiens, C.erythrocarpa, C. ferruginea, V.acrotella, V.floerkeana, V.glaucina, V.ferruginea, Endopyrenium hepaticum, E.rufescens, Endocarpon adscendens, V.nigrescens, Diplischistes ocellatus, Coniocybe grasilenta, Lecidea convexa, L.lapicida, Rhizocarpon cinerovirens, R.geographicum, R.geminatum, L.frustulosa, L.polytropa, Lecanora cenisea və s.,*mamırların *Andrea rupestris, Polytrichum formosum, P.piliferum, Saelania glaucescens, Dicranella heteromalia, Cynodontium polycarpum, Dichodontium pellucidum, Dicranum fuscescens, D.mayus, D.scoparium, Tortella tortuosa, Schistidium convertum* and so on (Alverdiyeva, Novruzov, 2014).

186 species belonging to 36 genera and 25 families were found in the territory of the reserve. Of these, 21 species are trees, 24 are shrubs, and 141 are herbs. 4 species of ferns belonging to 3 genera in 2 families, 18 species of lichens belonging to 11 genera in 9 families, and 12 species of mosses belonging to 11 genera in 10 families were also found in the reserve. 5 formations and 16 associations were observed in the area.

Shir-shir waterfall of the Gadabay district is one of the floristically rich areas that have been studied in recent times and plays an important role in climate regulation (Figure 3).

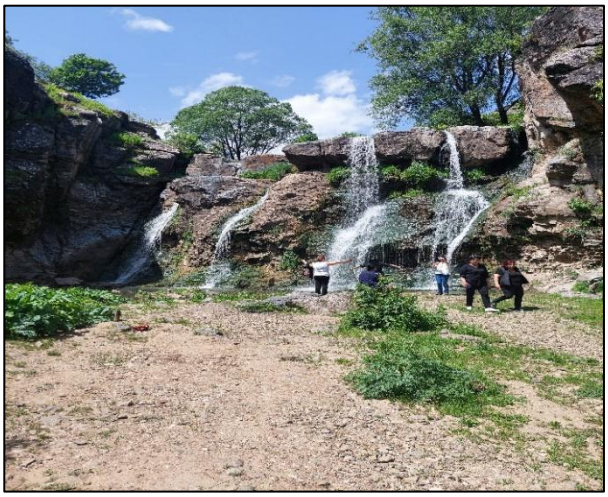

Fig. 3. Shir-shir waterfall of the Gadabay district.

The waterfall is located in the area of the Duzyurd-Miskinli plateau at the foot of the Khachagaya mountain in the middle and high mountain zones of the Lesser Caucasus. Jurassic, Cretaceous, Paleogene and Anthropocene sediments are common. For the first time, monitoring was conducted around the waterfall and Hachagaya (Fig. 4). Hachagaya Mountain is located between Tovuz and Gadabay districts, at an altitude of 2200 meters. *Botrychium lunarium, Ophioglossum lusitanicum, Osmunda regalius, Cheilanthes pteridioides, Asplinium septentronale, Cystopteris montana* of ferns form a storeyed background on the rocks in the waterfall. On the rocks, species of the genera Saxifraga, Campanella, Dianthus,

Heracleum, Sedum, Thymus, Plantago form a characteristic background. Oak (*Quercus sp.*), beech (*Fagus orientalis*), and Caucasian hornbeam (*Carpinus caucasica*) trees are common in the forests. There are subalpine and alpine meadows in the highlands. Forests rise here to 2000 - 2400 m. Caucasian oak (*Quercus macranthera*), oriental beech (Fagus orientalis), silver birch (*Betula pendula*), redbud maple (*Acer trautvetteri*), Sorbus boissieri (*Sorbus boisseri*), bird cherry (*Padus racemosa*) are found in high mountain forests. The subalpine vegetation of the area covers heights of 1800-2600 m. European blueberry (*Vaccinium myrtiUus*), windflower (*Anemone fasciculata*), Betonica (*Betonica orientalis*), glutinous sage (*Salvia glutinosa*), Papaver (*Papaver fugax*), wolfsbane (*Aconitum nasutum*), crested gentian (*Gentiana septemfida*), hungarian mullein (*Verbascum* sp.), Caucasian crane's-bill (*Geranium ibericum*), cornish bellflower (*Campanula alliariifolia*), raspberry (*Rubus idaeus*), heal-all (*Prunella vulgaris*), etc. are found there. The main plants of the Alpine altitude belong to the families of cereals and sedges. These plants create alpine meadows. The main composition of "alpine carpets" is caraway (*Carum caucasicum*), lady's mantles (*Alchemilla caucasica*), plantago (*Plantago saxatilis*), red clover (*Trifolium ambiguum*), sedge (*Carex tristis*), Steven dandelion (*Taraxacum stevenii*), sibbaldia (*Sibbaldia parvifolia*), toothed bellflower (*Campanula tridentata*), sandwort (*Minuartia aizoides*).
Fauna. Wild goat (*bezoar ibex*) (*Capra aegagrus*), roe deer (*Capreolus capreolus*), brown bear (*Ursus arctos*), wolf (*Canis lupus)* are found in these territories. From birds, bearded reedling (*Panurus biarmicus*), osprey (*Pandion haliaetus*), Spanish sparrow (*Passer hispaniolensis*), rock sparrow (*Petronia petronia*), Caucasian grouse (*Lyrurus mlokosiewiczi*), Caucasian snowcock (*Tetraogallus caucasicus*), etc. are found. The main plants of the alpine altitude belong to the grains and sedge family. These plants create "alpine carpets" there. The main composition of "alpine carpets" is caraway, lady's mantles, plantago, red clover, sedge, Steven dandelion, sibbaldia, toothed bellflower, sandwort (Asgarov, 2016) 214 species of flowering plants belonging to 38 genera of 18 families, 7 species of ferns belonging to 7 genera of 7 families, 21 species of lichens belonging to 18 genera of 9 families, 14 species of mosses belonging to 12 genera of 9 families were found in Shir-Shir waterfall. For visitors to COP29, it is important to organize excursions to these areas.

Fig. 4. The staff of the Ganja State University and Dokuz Eylul University of Turkey (Izmir) in the Hachagaya mountain of Gadabay district (2023).

The wonderful Damcili cave, a relic of the ancient stone age with a history of 200 000 years, in the Avey State Historical and Cultural Reserve in the territory of Gazakh region, rich in historical architectural and archeological monuments, and the Shir-Shir waterfall, located on Hachagaya mountain in the Gadabay region, can be considered as an excursion route for the guests coming to COP29. The effect of climate change on the flora and fauna of both areas is clearly observed. It is appropriate to include Adiantum capillus-venereis L. hanging from the ceiling of Damcili cave in the next "Red books" of Azerbaijan.

REFERENCES

Alverdiyeva S., Novruzov V. (2014) Summary of lichens of Azerbaijan. Baku: Elm, 237 p. (in Russian).

Asgarov A.M. (2016) The flora of Azerbaijan. Baku: TEAS PRESS, 444 p. (in Azerbaijani).

Bayramova A.A. (2013) Flora biodiversity of specially protected natural areas of the western

region of Azerbaijan. Baku: Elm, 2013, 327 p. (in Azerbaijani).

Flora of USSR (1934) Andiantum genus. M.: Academy of Sciences of USSR, **V. 1:** 80. -302 (in Russian).

Hajiyev V.D. et al. (1990) Highland vegetation of the Lesser Caucasus (within Azerbaijan). Baku: Elm, pp. 23-28 (in Russian).

International Code of Botanical Nomenclature (Vienna Code) (2009) M.; Saint Petersburg, 282 p.

İsmayilova Z.M., Guliyeva R.Z. (2013) Number and age spectra of cenopopulations of *Agrostis planifolia* C.Koch and *Agrostis lazica* Balansa in various plant associations. *Journal of "Agrarnaya nauka"*, **I:** 23-28 (in Russian)

Novruzov V.S. (2020) Flora biodiversity and dynamics of river basins in the northern part of the Lesser Caucasus. *Azerbaijan Journal of Botany*, **I:** 8-12 (in Azerbaijani)

Novruzov V.S., Aslanova Y.A., Guliyeva R.Z. (2022) Rock vegetation and plant litter and cenopopulation dynamics of the Lesser Caucasus. Ganja, 210 p. (in Azerbaijani)

Novruzov V.S., Bayramova A.A. (2011). The role of specially protected natural areas in the conservation of biodiversity. Baku: Elm, pp.38-46 (in Azerbaijani).

Novruzov V.S., Guliyeva G.M. (2017) Cryophilic meadows and tall grass as a special type of intrazonal vegetation. *J. Agrarnaya nauka (M.).* **2:** 20-22:

Order No. 2469 of the President of the Republic of Azerbaijan dated February 2, 2021, Decree of the President of the Republic of Azerbaijan dated December 25, 2023.

Red Book of the Republic of Azerbaijan (2013, 2023) Baku: Elm

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