Conservation and Sustainable Management of Turkey’s Steppe Ecosystems Project

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I am learning the steppes

Teacher’s guide
I am learning the steppes

Teacher’s guide

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Dear Teachers,

Steppes constitute one of Turkey's most important and most sensitive ecosystems. The steppe ecosystems of Turkey comprise natural steppes, meadows, and rangelands. Steppe ecosystems are mainly seen in Central Anatolia, Eastern Anatolia, and Southeastern Anatolia regions. Steppe ecosystems in Turkey face threats such as habitat losses linked to investments, urbanization pressure, mining, overgrazing and afforestation practices in unsuitable areas and the effects of climate change.

In this context, Conservation and Sustainable Management of Turkey's Steppe Ecosystems Project is implemented by the Food and Agriculture Organization of the United Nations (FAO), the Ministry of Agriculture and Forestry General Directorate of Nature Conservation and National Parks (GDNCNP), General Directorate of Plant Production (GDPP) and General Directorate of Forestry (GDF) with the financial support of Global Environment Facility (GEF). The aim of the project is to ensure the effective management of protected areas and to promote conservation of steppe biodiversity in production landscapes so as to strengthen the efforts for the conservation of Turkey's steppe ecosystems. The works within the context of the project’s component on “enabling environment established for the effective conservation of steppe biodiversity across large landscapes” are carried out by Doğa Koruma Merkezi (DKM; Nature Conservation Centre).

The project is implemented in Kızılkuyu wildlife reserve, Tek tek mountains national park and Karacadağ steppes in Şanlıurfa.

In the project, diverse educational programs are implemented for different target groups, including teachers, students, experts and decision makers responsible for the management of protected areas. An educational program was designed for students, including wall painting and drama activities with the artists, poetry and drawing competitions among schools, and a kite festival with the artists. Additionally, nature corners displaying the features of steppes were established in certain schools.

As part of the education and awareness-raising program, an educational kit was prepared for teachers and students. This kit is a source document for increasing the knowledge, interest and awareness of children about the steppe ecosystems of Şanlıurfa. With this reference kit, you will be able to explore the diversity and importance of steppes from different perspectives such as history, biology, geography, sustainability, and climate change.
How to use the teacher’s guide?

The educational kit includes four activity books for students and a teacher’s guide. In each of the activity books, you will find different, fun and interesting activities. You can reproduce the activity pages in the activity books using a photocopier.

**Game – arts:** Students will get to know the biological diversity of the steppes by playing games and doing crafts.

**Literature – creative drama:** Students will learn about the steppe ecosystems by writing stories and role-playing about threatened or endangered species.

**Science – technology:** Students will collect data on biodiversity and prepare an action plan on the steppe ecosystems based on their findings, following similar steps of a scientist.

**Design – STEM:** By using the scientific method, students will develop projects to utilize the natural resources of the steppes sustainably and to conserve our planet.

**Communication – social media:** Students will launch a campaign to inform their peers about the current state of the steppe ecosystems and shoot a short film about the history and archeology of their location.

As the education psychologist Susan Issacs said, “We do not teach children anything, we give them opportunities to see, understand, feel and learn. Every child grows, tries and experiences on his or her own.” How can you guide them on these journeys?

1. **Send an invitation letter** to the class to mobilize them towards exploring local species in the region or investigating an environmental problem.

2. **Tell them a story.** Then, take them for a walk, allowing them to use all their senses. Afterwards, give them the opportunity to write their own stories by designing a hero.

3. **Bring interesting objects from nature into the classroom.** Let them discuss how they can utilize these objects in everyday life by examining them in terms of form and functionality.
What’s the steppe like?

Steppes are arid or semi-arid natural areas that are dominated by herbaceous plants. Aren’t there any trees in the steppes?

One of the most important features of the steppes is the low amount of precipitation. When precipitation falls below 500-600 mm per year, trees are not commonly seen. Therefore, only very old, remnant trees or drought-resistant shrubs can live in the steppes.

The structure of the steppe

The steppes are classified under grasslands, one of the main biogeographical groups in the world. Biogeography is a branch of geography that examines the distribution of living things on earth and the underlying reasons.

Tropical grasslands

Regions with tropical grasslands are hot throughout the year. There are two distinct seasons in these regions, namely arid and rainy. Savannas in Africa are examples of this group. Savannas are home to many remarkable species such as elephants, giraffes, rhinos, zebras, cheetahs, hyaenas, and lions.

Temperate grasslands

Shorter weeds are dominant in these regions, which receive about 250-600 mm of annual precipitation. In these regions, there are two seasons, one when plants grow and develop and the other when plants stay dormant. In the case of cold weather conditions, the plants stop growing and enter the dormancy period. In temperate grasslands, species such as gazelle, mouflon, wolf and jackal are present.


The importance of the steppe

Steppes are among the most important ecosystems for mammals, reptiles, butterflies and plants. Most of the herbaceous plants on earth exist in the steppes.

Steppes are the homeland of main staple foods such as, wheat, barley and oat. Besides their importance for animal husbandry, they are important areas of carbon storage in our world. Plants absorb carbon from the carbon dioxide in the air and produce their own nutrients by photosynthesis. Although they release carbon dioxide into the atmosphere through respiration, the amount of carbon dioxide they remove from the air is more than the amount they release into the atmosphere. Therefore, it can be said that steppe plants are especially important in carbon storage.
Common plants of the steppe

The most dominant species of the steppe belong to legumes (Leguminosae), mints (Lamiaceae), daisies (Asteraceae) and grasses (Poaceae) families. Milkvetch, a member of legumes, which has 439 species in our country, is the most common and most resilient plant of the steppe. It can withstand even the most difficult conditions with its deep roots, spiny stems, small and hairy leaves.

Milkvetch is one of the strongest protectors of the steppe soil. It appears in so many different shapes that make us think which paths it has followed to become this different and how it has evolved. Daisy family also exists in the steppe vegetation with many different species. When you see the species of daisies other than the most known, you wonder “Are they also daisies?”.

Another important family of the steppe vegetation is grasses. This family makes up the green cover of earth. Their pollination is aided by wind. Because of these features, they do not need showy flowers to attract the insects.

Animals of the steppe

Vast Şanlıurfa steppes are within an interesting geography. Low plains in the south are replaced by high plains in the north. In this region, there are animal species specific to Şanlıurfa steppes, which are adapted to a climate that can be considered semi-desert. According to scientific studies, a total of 376 animal species live in Şanlıurfa and 245 of them are birds, 47 are reptiles, 46 are mammals, 32 are freshwater fish and 6 are amphibia. Among these, 2 mammal species, namely Arabian sand gazelles and striped hyaena, 6 bird species, namely Northern bald ibis, Egyptian vulture, white-headed duck, sociable lapwing, great bustard and pallid scops owl, 2 reptile species, namely Bosc’s fringe-fingered lizard and Harran lizard, and 1 amphibian species, namely near eastern fire salamander are currently monitored by the 3rd Regional Directorate of Nature Conservation and National Parks and the monitoring studies will continue in the following years.

Steppes under threat

Steppes are the last cover that holds the soil. The steppes, which constitute the largest pastures in our country, have been under overgrazing pressure since the goat and the sheep were first domesticated. This results in the growth of spiky and bitter species that animals cannot feed on such as prickly thrift, milkvetch, spiny restharrow, harmal, and spurges. Therefore, characteristic steppe species decrease in number and disappear over time.

Overgrazing leads to deterioration in the steppe ecosystem’s health and erosion is exacerbated in some places. The most typical examples of this are the mobile sand dunes caused by wind erosion in the Karapınar district of Konya.

In addition to grazing, other threats to the steppes include investments, urbanization pressure, mining, afforestation practices in unsuitable areas, and climate change.
Plants of the steppe

Located in the driest and hottest region of Turkey, steppe vegetation predominates Şanlıurfa, due to low precipitation.

Steppe vegetation of Şanlıurfa
In Şanlıurfa, steppes cover 39% of the surface area and there are various steppe types regarding the physionomy (external appearance): Steppes dominated with grasses and broad-leaved plants or the ones dominated with milkvetch and prickly thrift species and sometimes lowland and mountain steppes with distributions of rare and endemic plants.

Plant species richness in Şanlıurfa steppes is not as high as the other steppes of Anatolia. However, depending on the climate and soil characteristics, Şanlıurfa steppes have unique plant species and plant communities formed by these species. The steppe vegetation comprises noteworthy species like perennial xerophytic plants, e.g. milkvetch, mullein, Phlomis spp., knapweeds, sainfoin, Onosma, globe thistle and thistle species.

Conservation and Sustainable Management of Turkey’s Steppe Ecosystems Project is implemented at Kızılkuyu wildlife reserve, Tek tek mountains national park and Karacadağ steppes in Şanlıurfa.
An important gene center
Especially, the ancestral forms of species such as wheat, barley, lentil, chickpeas are still found naturally in Şanlıurfa steppes, making this region an important gene center. The steppe-human interactions in Şanlıurfa go back thousands of years. Agriculture and animal husbandry are still the most important sources of livelihood in the region which is also the birthplace of agriculture and the domestication of animals.

Kızılkuyu wildlife reserve
Kızılkuyu wildlife reserve (WR) is one of the important protected areas in our country, which hosts the steppe ecosystem.

The steppes in Kızılkuyu WR are the lowland steppes. WR has been used extensively for grazing due to its large plains. Common herbaceous plants in the field include grasses, such as bulbous bluegrass, animated oat, barbed goat grass, Japanese brom; thorny plants, such as hillside milkvetch, oriental globe thistle; and broadleaved perennials, such as “kara çalba” phlomis and oriental phlomis.

Important plant areas in the WR are between Keberli and Kızılkuyu villages, southeast of Kızılkuyu village, rocky areas in the northeast of Bildim village and the stony region in the north of İkizce village. According to the most recent study on the site, the WR hosts 252 plant taxa; 5 of which are endemic. In addition, this area, which is used extensively by Arabian sand gazelles, one of the symbol species of our country and steppes, is among the priority conservation areas.

Tek tek mountains national park
Tek tek mountains national park is an important protected area that hosts examples of lowland steppes and shrublands in Şanlıurfa.

For many years, the national park had been covered with shrubs dominated by terebinth trees, it has now turned into herbaceous steppes and bare rocks due to excessive cutting and overgrazing.

Today, remaining terebinth trees are in a small area and are under protection. Rüstem valley and Silesor creek are among the important natural sites within the National Park.

These areas are also rich in terms of geophyte species. According to the studies carried out in the area, there are 254 plant taxa, 6 of which are endemic.

The most widespread plants in the Tek
Mountains National Park are the eryngos.

While the endemic species in the area are under pressure especially due to agricultural practices and animal husbandry, species such as conehead thyme, Tournefort’s gundelia are also threatened due to excessive and uncontrolled collection of plants for purposes, such as, consumption as food, medical use, etc.

**Karacadağ steppes**

Karacadağ steppes contain examples of lowland and mountain steppes in Şanlıurfa in relatively protected parts of the area, such as around the TRT transmitter and the military area.

These steppes began losing their naturalness due to overgrazing and transformation of steppes into agricultural fields. Karacadağ, which is an extinct volcano, does not yet have a protection status.

In terms of plant species, the prominent sites in the area are the Karabahçe mountain road, Kollubaba hill and Simo creek.

Karacadağ vegetation comprises Tournefort’s gundelia and Astragalus plumosus dominated communities observed in open rocky areas at 1 000 m - 1 500 m, and gum tragacanth, milkvetch, oriental phlomis and Armenian Jerusalem sage dominated communities at 1 500 m - 1 950 m.

Among these communities, bulbous species that bloom early in spring; crocus, autumn colchium, grape hyacinth and “star of Bethlehem” are significant.

In Karacadağ, besides the steppe vegetation, there are also areas with partial oak stands. Other types of trees and shrubs in the area are Brant’s oak, Aleppo oak, smooth hackberry, azarole, oriental hawthorn and Syrian pear.

The plant diversity in Karacadağ is mostly under grazing pressure. In the area, 332 plant taxa, 15 of which are endemic, have been defined, belonging to 44 different families and 199 different genera. Three of these endemics only exist in Karacadağ in the world.

**Threats**

The lowland steppes in Şanlıurfa are threatened by the conversion of steppes into agricultural lands, especially due to the increase in mechanization in agricultural activities.

Increasing construction pressure,
irrigation projects, energy investments and mining activities cause irreversible loss of steppes. Another important factor damaging the vegetation of Şanlıurfa steppes is overgrazing.

Other factors that threaten steppe ecosystems and the species they host include illegal hunting and species trafficking, excessive plant collection and intensive agricultural activities in the region. Today, the steppes continue to exist in stony or rocky areas as islets that contain the remains of natural vegetation between agricultural lands and grazing areas. Other factors that negatively affect the biological diversity of steppes are the lack of awareness of the importance of steppe species in the region, and conservation studies focusing on these species being largely limited to protected areas.

To mitigate these threats, works on the protection and sustainable management of the steppes are becoming crucial.
Animals of the steppe

Vast Şanlıurfa steppes are within an interesting geography. Low plains in the south are replaced by high plains in the north. In this region, there are animal species specific to Şanlıurfa steppes, which are adapted to a climate that can be considered semi-desert. According to scientific studies, a total of 376 animal species live in Şanlıurfa and 245 of them are birds, 47 are reptiles, 46 are mammals, 32 are freshwater fish and 6 are amphibia. Among these, 2 mammal species, namely Arabian sand gazelles and striped hyaena, 6 bird species, namely Northern bald ibis, Egyptian vulture, white-headed duck, sociable lapwing, great bustard and pallid scops owl, 2 reptile species, namely Bosc’s fringe-fingered lizard and Harran lizard, and 1 amphibian species, namely near eastern fire salamander are currently monitored by the 3rd Regional Directorate of Nature Conservation and national parks and the monitoring studies will continue in the following years.

Kızılkuyu WR
Kızılkuyu wildlife reserve is the only area in our country where the Arabian sand gazelle is naturally found. In addition to Arabian sand gazelle, mammal species in this area are lynx, golden jackal, red fox, European hare, Eurasian badger, Indian crested porcupine, long-eared hedgehog, marbled polecats, beech marten and Palestine mole rat. Arabian sand gazelle and marbled polecats have “Vulnerable” (VU) status at the global scale. In addition to bird species like cream-colored cursor, see-see partridge, red-wattled lapwing, sociable lapwing, blue-cheeked bee-eater, pale rockfinch, yellow-throated sparrow and pinta-tailed sandgrouse, there are also important reptile species, such as Levantine viper, desert black cobra and long-nosed worm snake.

Tek tek mountains
national park
Tek tek mountains national park contains diverse habitats with its deep valleys, woodlands, caves, rocky-stony areas, and lowland steppes. Species such as grey wolf, red fox, least weasel, European hare, beech marten, Indian crested porcupine, long-eared hedgehog, and the Euphrates jerboa are the mammal species of this area. The grey wolf has a regulatory role in the steppe ecosystems by virtue of being at the top of the food chain and keeping the population density of the species it preys on at a certain level. Red fox and beech marten, two predatory species, play an important ecological role especially by keeping the population levels of small rodent species in balance. The European hare in this area is an important food source for predatory birds. 

great tit
mammal species. The red-wattled lapwing, pale rockfinch, see-see partridge and desert lark are the bird species recorded in the area. Levantine viper, desert monitor and western leopard gecko are among the important reptile species that live in Tek tek mountains. The butterfly species observed in the area, namely large salmon Arab and African migrant, live in arid areas in more southern latitudes, such as North Africa and the Middle East, and the northernmost edge of their distribution in the world is Şanlıurfa.

**Karacadağ steppes**

Mammalian species of Karacadağ steppes are grey wolf, red fox, Eurasian badger, European hare, wild boar, marbled polecat, Palestine mole rat, Indian crested porcupine and long-eared hedgehog. The grey wolf, the red fox and the marbled pole cat play an important ecological role especially by keeping populations of small rodent species at a certain level. Spectacled warbler, pale rockfinch and see-see partridge are among the important bird species known to live in the area. Being the only known breeding site of spectacled warbler in Turkey, Karacadağ steppe has a special importance. Endemic cricket species are also observed in this area.

**Threats**

Conversion of steppes into agricultural fields leads to habitat loss and fragmentation. This, as a result, narrows the habitats of the animals that use these areas. Insecticides used in agricultural lands pollute soil and water resources. Presence of clean water resources is very important for life on steppes, especially for arid regions like Şanlıurfa. The expansion of residential areas and industrial zones towards the steppes is another reason for habitat loss. This situation affects not only the settlement areas but also the wildlife surrounding them. Excessive and uncontrolled grazing poses a threat to the biodiversity of the steppes, which accommodate many endemic plant species. Especially some butterfly species lay their eggs on specific plant species. The larvae hatching from the eggs feed on these plants, so the life cycle of these butterfly species depends on the existence of these plant species.

Illegal hunting and collection in our country are some other threats to steppe animals. Poaching puts great pressure on the threatened species; therefore, animals such as Anatolian mouflon and Arabian sand gazelle came to the brink of extinction in the 1960s. Today, we owe their existence to the conservation of the species, their reproduction at the breeding stations and their release into their former habitats.
Let's conserve the steppes

Şanlıurfa is an important residential area in terms of history, religion, archeology and agriculture. The oldest temple in the world, namely Göbeklitepe, is located here. The city resides within the borders of the Fertile Crescent, a region known as the birthplace of agriculture in the world. Moreover, the historical Silk road passes through this region. In addition, ancient cities such as Nevalı Çori and Akarçay tepe are archaeologically invaluable. Availability of water resources and fertile soil, thanks to the Euphrates and Tigris rivers, and its uninterrupted settlement history and distinct civil architecture make Şanlıurfa unique.

The city hosts the most advanced artistic and religious works of its era that marked the period in terms of sculptures, architecture and mosaics. In summary, Şanlıurfa is an important city that needs to be protected in terms of cultural heritage. Considering its natural heritage, there are grains and legumes that initiated agriculture such as wheat, lentil and chickpeas, as well as animal species, primarily gazelles and hyaenas.

Therefore, Şanlıurfa is one of the important insurances of the future of our planet with its steppes that are considered gene centers.

Unfortunately, the steppes, the last cover that holds the soil, are subject to various threats. In the face of these threats, conservation of the Şanlıurfa steppes depends on the availability of sustainable solutions. Hence, what is sustainability?

**Sustainability**

Sustainability is our ability to meet our needs without sacrificing the needs of future generations. Even if environmental protection is the first thing that comes to mind when speaking of sustainability, the concept of sustainability is a holistic approach that combines environmental, economic, and social dimensions.

Let’s give an example to better understand sustainability: Think of a piggy bank, even if you spend as much as you want, it will not empty, it continuously replenishes. Could such a piggy bank be possible? From this point of view, the depletion of the natural resources of our planet means the emptying of the piggy bank.
Let's conserve the steppes

Unfortunately, the resources are not endless and are running out quickly. This shows us the importance of the concept of sustainability.

Sustainability means being aware of our actions that have an impact on nature, taking responsibility for what we consume and conserving the natural resources of our planet in order not to take away the rights of future generations, that is to say, keeping the piggy bank always full.

Sustainability is also associated with development. It aims to improve the quality of life of the people, including future generations, by integrating sustainable development, economic growth, social development, and nature conservation.

Sustainability is not only about factors threatening nature, but also about rights that protect all people and future generations. These rights include social, economic, civil, political, cultural, and environmental safeguards. Sustainability also aims to meet not only physical needs of individuals, but also their social and cultural needs, and to distribute all rights equally.

As a result, sustainable development is conducted in three different dimensions as follows: nature, society, and economy. When considering the sustainability of natural resources, ecosystems, and steppes, it is instrumental to delve into the ecosystem services of the steppe.
Ecosystem services
The ecosystem is a self-contained system, in which living things interact with each other and their environment.

Ecosystem services include goods and services that all ecosystems on earth provide for humans and other living things. In the Millennium Ecosystem Assessment Report, the services provided by nature are grouped under four categories:

1. Provisioning services
2. Regulating services
3. Cultural services
4. Supporting services

Provisioning services
Among the ecosystem services, these ones are the most known and the most studied. They include goods obtained directly from ecosystems. Fruits, vegetables, cereals, aquatic products, wood products and freshwater are examples of these services.

Regulating services
Unlike the provisioning services, these include the benefits obtained from the results of natural processes, not the goods directly supplied from nature. Examples of regulating services are air quality regulation, flood control, water purification, erosion control, reduction of agricultural pests and pollination.

Cultural services
Undoubtedly, nature nourishes our spiritual world. In this sense, ecosystems enhance our aesthetic experience, they are relaxing, they make us happy and they inspire us. Ecotourism and recreational activities carried out in nature are related to cultural services.

Supporting services
Unlike other services, these are the elements and natural processes that support the existence of all ecosystem goods and services and ensure life on earth. Processes such as food cycle, water cycle, soil formation and habitat provision are examples of supporting services.

Steppes provide many of the provisioning, regulating, cultural and supporting ecosystem services locally, regionally, nationally and even globally. What should we do to conserve the steppes so that the steppes can continue to deliver all these ecosystem services? There are many things that can be done. One of them is to develop nature-based solutions, especially in terms of sustainability.
Nature-based solutions
The International Union for Conservation of Nature (IUCN) defines nature-based solutions as “actions to protect, sustainably manage and restore natural and modified ecosystems in ways that address societal challenges effectively and adaptively, to provide both human well-being and biodiversity benefits”. More generally, “nature-based solutions” is a term used to describe alternative and innovative approaches to environmental problems such as flood, water scarcity or soil erosion using natural capital.

For example, the common method of infrastructure in a city is building of artificial structures, namely “gray” infrastructure. Nature-based solutions encompass the “green” infrastructure with the use of natural resources. Other examples against climate change are the construction of sea walls, reservoirs, dams and drainage systems. These are “gray” solutions. The “green” here, the nature-based solution, is to restore and conserve coral reefs and mangrove belts to increase resistance to floods and sea level rise.

These solutions enhance vegetation cover to reduce landslide risks and create permeable green areas to help regenerate groundwater in areas exposed to water scarcity.

Nature-based solutions address extreme dependence on unsustainable gray infrastructure. Problems with gray infrastructure are obvious: this infrastructure is irreversible, dependent on limited resources, and often temporary. As problems with climate change intensify, gray solutions need to be improved and replaced. Projects with nature-based solutions that involve a good planning and management model, which improves, conserves and renews natural elements, help conserve nature, create habitats for threatened species, reduce carbon emissions and restore aesthetic natural beauty to communities, and consequently protect human welfare and biodiversity.

Arabian sand gazelle
Diversity of the steppe is explored through colours.

Target group: Age 6+
Duration: 40 min.

Materials: Cardstocks, colors of the steppe activity sheet, scissors, and crayons

Student’s activity book: The steppe is an ecosystem

Activity type: Game – arts

Appropriate time: Spring, summer, and fall

Preparation: A route for walking is determined

Implementation:
Students are asked what they know about the diversity of living things in the steppe. Then, it is announced that they will make a discovery on this issue using the colors and the Colors of the Steppe Activity Sheet is distributed.

During the walk, students are asked to find objects in the colors that are on the activity sheet and note their numbers as tally marks. At the end of the walk, which colors are seen most and the functions of the colors in nature are discussed.
Activity 2  Literature – creative drama

Once upon a time

The relationships between the living things in the ecosystem are grasped through the game.

Target group: Age 6+
Duration: 30 min.

Materials: A cloth bag, once upon a time activity sheet that include the names of the trees

Student’s activity book: the steppe is an ecosystem

Activity type: Literature – creative drama

Appropriate time: Spring, summer, and fall

Preparation: A woodland is chosen, and names of the trees in this area are written on papers, which are then folded and placed in the bag.

Implementation:
Students are taken to the designated area and they are asked to form a circle. After that, they are asked to say the tree names they know. They discuss whether there are those trees in the woodland. Then, the ecosystem services provided by the trees such as cleaning the air, habitat provision for living creatures and erosion control by holding the soil with their roots are discussed.

It is announced that a game is to be played. They are asked to draw a piece of paper from the displayed bag and find the tree that is named on the paper. Those who cannot find the tree are assisted.
Students are invited to form a circle again. This time, they are told that they should do this by linking arms tightly.

It is stated that each student represents a tree. It is explained that in the story to be read, a tree will encounter an unfortunate situation and start falling and the other students will try to keep it standing by supporting it.

At the end of the game, the similarity between this exercise and the functioning of the ecosystem is discussed.
Steppe ecosystem

Types of steppes are explored.

Target group: Age 10+

Duration: 40 min.

Materials: A blindfold, steppe key activity sheet and pencil

Student’s activity book: The steppe is an ecosystem

Activity type: Science – technology

Appropriate time: Spring, summer, and fall

Preparation: An area and a route are chosen

Implementation:
Students are taken to the designated area and asked to look around for a few minutes in silence. They are asked to share what they see when the time is up. They are asked to close their eyes and focus on the sounds for a few minutes. They share what they have heard at the end of this period. One of them is blindfolded, the other becomes a guide and moves his friend around. The guide leads the blindfolded student to touch a tree bark, feel the wetness of a mossy rock, smell a flower or understand how flat or rough the area around him is. After ten minutes, the roles change, this time the previous guide is blindfolded and tries to feel the nature by touching, smelling and hearing. At the end of the exercise, students share their experiences.

Students are asked what they know about the steppe. It is then stated that mostly herbaceous plants are seen in the steppes. Factors such as the amount of precipitation, ground water, height and soil that influence which herbaceous plants grow on the steppe are discussed. It is revealed that there are different types of steppes and the Steppe Key Activity Sheet is distributed. A walk is announced, and students are asked to stop at certain points in this walk to examine their surroundings, and to determine the type of steppe using the key on their activity sheet. A talk on which steppe type they have seen on the walking route is carried out.
Activity 4  Science  technology

A Different way to look at the steppe

Steppe is explored through observation with different tools.

Target group: Age 11+

Duration: 30 min.

Materials: The window of the steppe activity sheet, pencil

Student’s activity book: The steppe is an ecosystem

Activity type: Science – technology

Appropriate time: Spring, summer, and fall

Preparation: A route is chosen

Implementation:
Students are asked what can be done to look at the steppes from a different perspective. After receiving their opinions, the Window of the Steppe Activity Sheet is distributed. The white part inside the green square on the sheet is cut out and a window is opened. Students are told that they will make observations by looking through this window.

The group goes on a walk and stop at certain points during the walk. Students are asked to observe their environment from the windows for a while. They are directed to get to know the living things they see and discover the interaction between them.

At the end of the walk, observations are shared and factors that threaten all the living things are discussed. In the months of harvesting cereals such as wheat, barley, corn, and rice, it is stated that farmers get rid of the roots and stems left in the soil after the harvest by burning the stubble, which is normally a banned method that decreases the soil productivity. The damages resulting from stubble burning are mentioned, and it is told that stubble burning causes elimination of beneficial creatures and organic matter in the soil, deterioration of the carbon and nitrogen balance, decrease in productivity and water holding capacity of the soil, and air pollution.

Regarding the harmful effects of stubble burning, students are shown a movie about the subject on page: https://www.tarimtv.gov.tr/tr/video-detay/aniz-yakmayin-12948.
What does the steppe provide?

Ecosystem services of the steppe are explored.

Target group: Age 10+

Duration: 45 min.

Materials: what does the steppe provide?
Activity sheet and pencil

Student’s activity book: the steppe is an ecosystem

Activity type: Design – STEM

Appropriate time: All seasons

Preparation: A hiking route is chosen.

Implementation:
Students are asked what ecosystem is. After receiving the answers, the concept of ecosystem is explained and information about ecosystem services is given.

Students are informed that a walk will be taken, and they will be asked to make observations about the provisioning, regulating, cultural and supporting ecosystem services of the steppe, where the activity will take place.

At the end of the walk, students are divided into four groups, and each group is provided with the What Does the Steppe Provide Activity Sheet. Each group is asked to choose one group of ecosystems services and discuss what measures can be taken to ensure that these services continue without a decline.

At the end of the specified time, the groups share their work with others. This exercise can be turned into a project where the four seasons of the steppe can be observed. A photo exhibition can be organized at the end of the project.
Steppe collage

Parts of the plants of the steppe such as leaves, stems, flowers, and roots are examined with an arts and crafts activity.

Target group: Age 7+
Duration: 30-45 min.
Materials: parts of a plant activity sheet, baskets, colored cardstocks, glue sticks, scissors, crayons.
Student’s activity book: the steppe is an ecosystem
Activity type: Game – Arts
Appropriate time: Spring, summer, and fall
Preparation: Cardstocks are cut to A4 size and a walking route is chosen.
Implementation:
Students are asked about the parts of a plant. Parts of a Plant Activity Sheet is then handed out and it is made sure that the sheets are filled in.

A walk is announced, and baskets are distributed. Fallen tree leaves, small branches, and seeds are collected during the walk. After the walk, collected treasures are shared and each item is talked about. It is discussed which part of the plant these items are. Their texture, color and other physical properties are examined. A cardstock is handed out to each student. They are asked to share the glue sticks and the crayons. They are requested to create a collage on the cardstock using the natural materials they collected. These collages are then exhibited.
Activity 7  Science - technology

Steppe’s food web

The food web among the living things in the steppe is grasped.

Target group: Age 10+
Duration: 30 min.
Materials: Steppe’s food web activity sheet, pencils
Student’s activity book: The steppe is an ecosystem
Activity type: Science – technology
Appropriate time: Spring, summer, and fall
Preparation: A route is chosen.

Implementation:
Students are taken for a hike on the specified route and told to examine the interactions between living things during the walk.

At the end of the hike, they are asked to share their observations. It is expressed that the flow of matter and energy in an ecosystem occurs through the food web. It is explained that there are three groups in the food web as producers, consumers, and decomposers.

It is discussed that the producers are plants. Herbivores, carnivores, and omnivores in the group of consumers are introduced. The importance of decomposers is explained.

Students are handed out the Steppe Food Web Activity Sheet and asked to show the feeding relationships on the paper through arrows. At the end of the exercise, it is discussed how complex the food web can be, and if one of these creatures disappears all the living things in the web can be affected.
Activity 8  Science - technology

Let’s discover the steppe

How to make direct and indirect observations are learned.

Target group: Ages 9+

Duration: 40 min.

Materials: Steppe Hunt Activity Sheet and pencil

Student’s activity book: The Steppe Is an Ecosystem

Activity type: Science – Technology

Appropriate time: Spring, summer, and fall

Preparation: A route is chosen.

Implementation:
Students are asked what they know about the steppe. It is explained that all will go on a hunt and signs of plants and animals living in the steppe will be sought for.

Before starting the hike, students are told to close their eyes, listen to the sounds, and try to feel the smells.

Questions are asked: Which colors, which shapes, which patterns do you see? How is the relationship of plants with soil, air and water? How are they related to the other living things? Do the plants live alone or in a community?

Examine the leaves and stems of plants. Do they have flowers? Pay attention to whether there are seeds in them.

Students are handed out the Steppe Hunt Activity Sheet and asked to spot the things on the sheet. At the end of the hike, observations are shared. It is explained that direct and indirect observations will be made in nature. It is stated that plants are easily observed, but even if the animals themselves are not noticed, they can also be observed indirectly thanks to the signs they leave on nature. For example, the mounds on the ground indicate the presence of moles.
How do plants reproduce?

How plants reproduce is learned.

Target group: Age 9+

Duration: 40 min.

Materials:
- how do plants reproduce
  Activity sheet and pencil

Student’s activity book: the steppe is an ecosystem

Activity type: observation – examination

Appropriate time: spring, summer, and fall

Preparation: A route is chosen.

Implementation:
Students are asked how a new plant emerges. It is told that some plants such as ferns reproduce by spores, and some plants such as strawberries produce runners. It is stated that many plants also multiply by seed germination. Differences between “enclosed” seeds and “naked” seeds are explained to the students.

It is explained that plants such as black pine, scots pine, cedar and fir have cones that carry seeds. These are stated to be the plants with “naked” seeds. In plants with “enclosed” seeds, the seed is explained to be in the fruit. It is revealed that the fruit can be fleshy, as in apples, or a pod, as in peas.

How Do Plants Reproduce Activity Sheet is handed out and all go for a walk. During this walk, the seeds of the plants are observed. At the end of the walk, these observations are shared with the group.

With a study spanning one year, plant samples are collected, and a project is launched to establish a herbarium. Collaboration with the Department of Biology of Harran University is established, and the support of experts is sought for the establishment of the herbarium.
Activity 10 Communication – social media

How do seeds disperse?

Seed diversity is explored.

Target group: Age 10+

Duration: 40 min.

Materials: how do seeds disperse activity sheet and pencils

Student’s activity book: the steppe is an ecosystem

Activity type: communication – social media

Appropriate time: Spring, summer, and fall

Preparation: A route is chosen.

Implementation:
Students are asked what they know about seeds. How Do Seeds Disperse? The Activity Sheet is distributed, and dispersion of seeds is discussed. Then a walk ensues.

During the walk, all stop at certain points and photos of the seeds of the plants are taken.

At the end of the walk, students are divided into groups of four. Groups share the photos they have taken with each other. Then, how the seeds in the photos can disperse is discussed. By opening a social media account, for example an Instagram account, seed photos are regularly shared.
Steppe kingdom

Parts of the plants of the steppe, such as leaves, stems, flowers, and roots are examined with an arts and crafts activity.

Target group: Ages 6-13

Duration: 40 min.

Materials: Parts of a Plant Activity Sheet, cardstock, scissors, glue sticks, crayons

Student’s activity book: Plants of the Steppe

Activity type: Game – Arts

Appropriate time: Spring, summer, and fall

Preparation: Cardstocks are cut into strips.

Implementation:
Students are asked what they imagine when speaking of steppes. Then the steppe is introduced briefly. They are asked to imagine that they have a kingdom in the steppes.

Each student is given a strip and asked to connect the tips of the strip to fit around their heads with the help of adhesive tape, thus, forming a crown template.

Then, they are asked to design a crown by imagining that they have a kingdom and using the steppe plants they see around them. After everyone completes his/her crown, they form a circle and wear their crowns.

Students are asked what their kingdom is like (What kind of place is your kingdom? How do you treat those who live in the kingdom?, etc.). It is asked if anyone knows about the plants they have used when making their crowns. Volunteering students can be selected and the plants on their crowns can be identified by using the guides.

Finally, the Parts of a Plant Activity Sheet is handed out, and the exercise on the sheet is completed, and they are asked which parts of the plants they have used on their crowns.
The leaf guide

Parts of the plants of the steppe such as leaves, stems, flowers, and roots are examined with an arts and crafts activity.

Target group: Age 7+

Duration: 30-45 min.

Materials: Leaf cards, permanent markers, The Leaf Guide Activity Sheet, guidebooks

Student’s activity book: Plants of the Steppe

Activity type: Game – Arts

Appropriate time: Spring, summer, and fall

Preparation: A route on which the students can observe different types of leaves is chosen.

Implementation:
Students are divided into groups and each group is given a leaf card and a permanent marker. A spokesperson from each group shares what is written on the card with the rest of the students. Then, it is announced that a walk will be held, and a variety of leaves will be observed.

Each group is given a Leaf Guide Activity Sheet and told to find similar leaves (simple leaf, linear leaf, egg-shaped leaf, compound leaf, palmate leaf, pinnate leaf, etc.) during the walk.

When the walk ends, the collected leaves and their functions are discussed.
Activity 13  Literature – creative drama

Haiku of the steppe

Plants of the steppe are discovered through poetry and a connection with nature is established.

Target group: Age 9+

Duration: 40 min.

Materials: “Haiku of the Steppe” Activity Sheet and crayons

Student’s activity book: Plants of the Steppe

Activity type: Literature – Creative Drama

Appropriate time: All seasons

Preparation: A short hiking route is chosen.

Implementation:
Students are asked how artists can be inspired by nature. Then, there is a talk of haiku, a form of Japanese poem writing.

It is explained that haiku is composed of 17 syllables in the form of 5-7-5 in 3 lines, focuses the reader on the moment, and includes descriptions of nature. These poems are explained to be a way to slow down the fast-moving world, and it is stated that as famous haiku poet, Basho said “Haiku is what is happening here, right now, in this moment”.

Students are handed out the activity sheets and directed to take a short walk. During this walk, they are asked to make observations, find inspirations in these observations, and express their feelings with a haiku.

At the end of the walk, students share their haiku with each other and chat about how nature is a rich source of inspiration.
Let's discover the plants

Various interesting plants are discovered through observation.

Target group: Age 7+

Duration: 40 min.

Materials: Plant Hunt Activity Sheet, pencil

Student’s activity book: Plants of the Steppe

Activity type: Observation

Appropriate time: Spring, summer, and fall

Preparation: A route, on which the students can observe woody and herbaceous plants, leaves, seeds, flowers, and fruits, is chosen.

Implementation:
Students are inquired on what they know about plants. Then, it is announced that a plant hunt will be carried out.

At the beginning of the walk, students are encouraged to close their eyes, listen to the sounds, and feel the smells in the surroundings.

Questions are asked: Which colors, which shapes, which patterns do you see? How is the relationship of plants with soil, air, and water? How are they related to other living things? Do the plants live alone or in a community?

Examine the leaves and stems of plants. Do they have flowers? Pay attention to whether there are seeds in them.

Students are encouraged to collect the leaves, seeds, etc. on the way. At the end of the walk, these samples are glued to the Plant Hunt Activity Sheet.

Students are invited to share the objects they have found interesting. These are discussed, and students are divided into groups and encouraged to make short videos about plants. These videos are later shared via a YouTube channel that they are expected to open.
Plant diversity is discovered through observations.

Target group: Age 7+
Duration: 40 min.
Materials: Plant Diversity Activity Sheet, pencils
Student’s activity book: Plants of the Steppe
Activity type: Science – Technology
Appropriate time: Spring, summer, and fall
Preparation: A route, on which different plant species can be observed, is chosen.
Implementation: Students are asked how plants emerge. They are directed to share what they know about the first plants.

It is explained that the life on earth started about 3.5 billion years ago, and the first ancestors of plants were green algae.

The students are divided into groups and each group is asked to cut out the cards on the Plant Diversity Activity Sheet. It is announced that they will walk along a route and students will find plants similar to the ones on the cards.

After the walk, the groups are invited to set some criteria and classify the plants on the cards. At the end of the exercise, taxonomy and how plants are classified are briefly discussed.

The classification of living things within certain categories and by certain rules is performed by the science of taxonomy. Looking at the origins of the word taxonomy, we go back to Ancient Greek. In ancient Greek, the word “taxis” meant arrangement. There are many categories in the classification of living things. Such groups used in the definition of tiers are given names such as family, kingdom, order, species, and genus. Names expressing a certain group in this way are called taxa.
Hooray for spring!

Harbingers of spring are explored through arts and crafts.

Target group: Age 7+
Duration: 40 min.

Materials: Hooray for Spring Activity Sheet, cardstocks, crayons, paper baking cups, popsicle sticks, buttons, glue sticks and scissors

Student’s activity book: Plants of the Steppe

Activity type: Communication – Social media

Appropriate time: Spring

Preparation: Crafting supplies are prepared.

Implementation:
Students are asked about the harbingers of spring. It is told that birds start to sing, trees sprout, streams begin to flow fast, tadpoles appear in puddles, storks arrive, almonds bloom, plants from iris family show up, bees, butterflies and insects begin to appear, and tortoises wake up from hibernation.

The students are provided with the opportunity to make flowers and butterflies by means of Hooray for Spring Activity Sheet and craft supplies.

At the end of the exercise, the relationship between plants and insects is inquired and the importance of pollination is explained. It is explained that in spring, the air surrounding us is filled with pollens flowing with the wind, that pollens are microscopic particles that carry the male reproductive cells of plants, when one of these particles is placed on the sticky stigma of a flower, the male reproductive cell is merged with the female reproductive cell and this is called fertilization. It is revealed that the seeds, which are the units of plant propagation, are formed as a result of fertilization and pollination is the process in which the pollens are carried from the male organ to the female organ.

Students are divided into groups and asked to make a video about the importance of pollination. Then, a YouTube channel is opened and these videos are shared on that platform.
Activity 17  Science - technology

Living things are everywhere

Roles of plants in the ecosystem are explored through observations.

Target group: Age 10+

Duration: 30-45 min.

Materials: Living Things Are Everywhere Activity Sheet, crayons

Student’s activity book: Plants of the Steppe

Activity type: Science – Technology

Appropriate time: All seasons

Preparation: A route on which the students can observe different types of leaves is chosen.

Implementation:
Students are asked about the importance of plants. After listening to their responses, the ecosystem services provided by the plants are mentioned: Their roles in the carbon cycle, that they clean the air, provide oxygen, beautify the environment, provide many economic opportunities for people, provide food, protect the water, provide a diversity of life through creating microclimates, and create shelter for wildlife.

The students are divided into groups and each group is directed to a plant. Living Things Are Everywhere Activity Sheet is handed out to the groups. The first group is invited to make observations in a diameter of 1m around the plant, the second group’s diameter being 2m, and the third and fourth groups’ being 3m and 4m, respectively. The living things hosted by the plants and signs about these creatures are sought.

At the end of the exercise, each group shares their findings and the activity is finalized by enabling them to write slogans about the plants.
Activity 18  Game – arts

Pollination infographic

Parts of the plants of the steppe, such as leaves, stems, flowers, and roots are examined with an arts and crafts activity.

Target group: Age 9+

Duration: 30-40 min.

Materials: Pollination Infographic Activity Sheet, crayons

Student’s activity book: Plants of the Steppe

Activity type: Game – Arts

Appropriate time: Spring

Implementation:
First, students are reminded that the air around us is filled with pollens flying with the wind in spring and their experiences on this subject are asked. It is stated that pollens are microscopic particles that carry male reproductive cells of plants; pollination is the process of transporting the pollens from male organ to female organ. The importance of butterflies and bees in the process of pollination is mentioned.

All students hold hands and form circles and are divided into groups of three.

In the groups, two people hold hands and bridge while the other person stays in the middle. One student becomes “it” and the teacher gives instructions. Students are given names. The person in the middle represents the steppe fritillary butterfly, and the people who hold the butterfly represent the teasel plant.

Three calls are given by the teacher. When the “Steppe fritillary” call is given, the butterfly tries to find a new plant by leaving the teasel plant. Meanwhile, the “it” tries to snatch the place of one of the butterflies. When “Teasel” is called, all keep their places, but the Teasel plants change among themselves. When the “ecosystem” call is given, all students move, interchange and create new groups of three. The game continues this way, with arbitrary calls. As for the assessment, Pollination Infographic Activity Sheet is distributed, and students are asked to complete it.
Wildflowers

Wildflower diversity of the steppes is explored.

Target group: Age 9+
Duration: 40 min.
Materials: Flowers are Different Activity Sheet, crayons, scissors, hole puncher and yarn.
Student’s activity book: Plants of the Steppe
Activity type: Game – Arts
Appropriate time: Spring, summer, and fall
Preparation: A natural area is chosen.
Implementation:
Students are brought to the specified area and asked to examine the wildflowers there for a while. They are encouraged to share their observations at the end of this period.

Students’ attention is drawn to the flower section of the plants, and it is stated that the leaves of the flowers are called petals. Flowers are Different Activity Sheet is distributed and students are asked to find flowers similar to the ones on the sheet.

At the end of the exercise, observations are shared. Then, the students are directed to color the flowers on the activity sheet. Those who finish the coloring cut out the flowers, which are tied with yarn and a wall ornament is prepared.
Activity 20  Science - technology

Amateur botanist

Plant diversity in a certain area is explored with an observation activity.

Target group: Age 9+

Duration: 15-20 min.

Materials: Amateur Botanist Activity Sheet, pencils, a camera, a plant guide

Student’s activity book: Plants of the Steppe

Activity type: Science – Technology

Appropriate time: All seasons

Preparation: A hiking route is chosen

Implementation:
Students are asked about occupations dealing with plants. Biologists, botanists, agronomists, food engineers, chemists, pharmacists, nature conservationists, photographers, artists... Priority is given to the botanists among these professions. How a botanist works is explained.

Amateur botany is mentioned. It is stated that the amateur enthusiasts engaged in the fields of butterfly watching, bird watching, or other nature-related matters make important contributions to the scientific world.

It is said that the first condition of being an amateur botanist is to get an observation book, a pencil and a guidebook and to walk around the land. It is explained that taking observations, notes and photographs, sharing them on a blog, joining relevant communities, and participating in voluntary work will lead to specialization over time.

Amateur Botanist Activity Sheet is handed to the students and all go for a walk. Students record their observations in their notebooks. At the end of the walk, observations are shared.
Animal diversity

Animal diversity of the steppe is explored through a game.

Target group: Ages 6-10

Duration: 30 min.

Materials: Animal Diversity Activity Sheet and yarn

Student’s activity book: Animals of the Steppe

Activity type: Game – Arts

Appropriate time: Spring, summer, and fall

Preparation: An area fit for the game is chosen, Animal cards are hung hidden on the plants and a hiking route is determined.

Implementation:
Students form a circle. A simple game is announced to be played to explore the diversity of animals. The boundaries of the play area are indicated and animal cards are stated to be hidden within these boundaries.

Students are asked to find these cards.

At the end of the game, they walk along a designated route and seek traces and signs of the animals shown on the cards.
Activity 22  Science – Technology

Animal behavior

Animal behaviours in a certain area are explored through observations.

**Target group:** Age 9+

**Duration:** 40 min.

**Materials:** Animal Behavior Activity Sheet, binoculars, a camera

**Student’s activity book:** Animals of the Steppe

**Activity type:** Science – Technology

**Appropriate time:** Spring, summer, and fall

**Preparation:** A hiking route is chosen to be used on a sunny day.

**Implementation:**
Students are told about making observations. It is stated that observing animals is more difficult than observing plants, as they are mobile. It is told that studying animal behaviours provides us with lots of information about nature and evolution.

Students are given binoculars, Animal Behavior Activity Sheet and pencils and asked to make observations along the specified route and a time period is specified for this. They are told to record their observations on the Animal Behavior Activity Sheet. When the time is up, students share their observations.
Let’s make a crested lark

A steppe bird, the crested lark, is introduced.

Target group: Ages 7-10

Duration: 40 min.

Materials: Let’s Make a Crested Lark Activity Sheet, cardstocks, crayons, paper fasteners and yarn

Student’s activity book: Animals of the Steppe

Activity type: Game – Arts

Appropriate time: Spring, summer, and fall

Preparation: Supplies for the activity are prepared.

Implementation:
Students are asked about the birds that they know exist in the steppes. Information regarding the crested lark, a steppe bird, is given.

Attention is drawn to the pronounced crest of the 16–18 cm-long bird. It is explained that the bottom of the wing appears reddish during the flight. It is pointed out that it has a thin, dark line on its chest, a beak with its upper edge bent down and a strong voice, with a song in the form of tree-lee-peeyoo.

Students are handed out the Let’s Make a Crested Lark Activity Sheet and asked to make a bird using the template.

At the end of the exercise, a dialogue on what can be done to conserve crested larks ensues.
Let’s make a crested lark

**Activity 24**

**Bird bingo**

Birds of the steppe are explored through a game.

**Target group:** Age 10+

**Duration:** 40 min.

**Materials:** Bird Bingo Activity Sheet, cloth bag, paper, pencil, bingo chips and bird guidebook

**Student’s activity book:** Animals of the Steppe

**Activity type:** Game – Arts

**Appropriate time:** Spring, summer, and fall

**Preparation:** A route is chosen.

**Implementation:**

Students are asked what they know about birds. It is announced that there will be a walk and birdwatching.

During the walk, the birds that are observed are identified using the bird guidebook.

At the end of the walk, what students learned about the birds during the event is discussed. Then, the Bird Bingo game is announced to be played and the students are divided into groups of four. Bingo and bird cards are prepared. Bird cards are put in a cloth bag. Each player is given a bingo card. A bird card is drawn from the bag, and if the picture drawn from the bag is also on the student’s bingo card, it is covered with a chip. When all the bird pictures in the first line of the bingo card is covered, the owner of the card goes loudly “First Bingo” (“birinci çinko” in Turkish) and when all pictures on two lines are covered, the player goes “Second Bingo” (“ikinci çinko” in Turkish). When all bird pictures on three lines in a bingo card are covered, the player goes “Third Bingo” (“tombala” in Turkish) and wins the game.
Activity 25  Science - technology

Let’s count the butterflies

Butterfly diversity of the steppe is discovered.

Target group: Age 10+

Duration: 30 min.

Materials: Let’s Count the Butterflies Activity Sheet

Student’s activity book: Animals of the Steppe

Activity type: Science – Technology

Appropriate time: Spring, summer, and fall

Preparation: A route is chosen to be used on a sunny day.

Implementation:
Students form a circle. Brief information about the butterflies is given.

It is announced that there will be a walk and butterflies will be observed during this walk.

Students are shown the butterflies that could be seen there and information on these butterflies is given. Let’s Count the Butterflies Activity Sheet which has photographs of the butterflies is handed out to each group. During the walk, students mark the butterfly species they see and their numbers on their sheets.

At the end of the exercise, a conversation on the observed butterflies takes place.
Activity 26  Literature - creative drama

Life cycle

Life cycle of the butterfly; egg, larva, pupa and adult stages are explained.

Target group: Ages 6-10

Duration: 40 min.

Materials: Life Cycle of the Butterfly Activity Sheet, The Princess and the Butterfly King Story, crayons

Student’s activity book: Animals of the Steppe

Activity type: Literature – Creative Drama

Appropriate time: All seasons

Implementation:
Students are asked what they know about butterflies. Then, it is stated that a fairytale is to be told. The tale of Princess and the Butterfly King is narrated.

At the end of the story, the Life Cycle of the Butterfly Activity Sheet is distributed to the children and the stages in the story are shown on this sheet.

What the butterfly, the hero of the fairy tale, did is inquired. Children are asked to comment on how the tale could continue.

Note: The story includes the life cycle of a butterfly from hatching to a caterpillar, from making its cocoon to transforming into a butterfly and taking its place in the ecosystem on a beautiful sunny day.
The princess and the butterfly

A beautiful, dainty princess lived in the big oak forest. Yet, this princess had a problem. She was the princess of the forest, but she could not walk in the woods; in a few minutes, she would sneeze, cough, turn red and could not breathe. As this made her terribly upset, she would stay in her palace and stay away from everyone. A princess of the forest that could not stroll around the forest, what a pity!

One day, a king comes to visit the forest. The Butterfly King... Before long, his reputation becomes known; he could solve every problem, with a tiny flap of his wings he could change the far end of the world.

The princess grows curious and decides to consult the Butterfly King. She tells him about her problem, even telling him makes her sad and she starts to cry. The Butterfly King listens to the princess patiently and asks: “Well, I will find a solution to your problem, but it will be a little difficult. You are a dainty princess; can you bear it?” Princess replies “I have to put up with difficulties, can there be a princess of the forest who can’t wander in the woods?” She is determined.

The Butterfly King believes the Princess. He takes the princess to a tree, and gently flaps his wings. The princess suddenly turns into a caterpillar. Butterfly King says, “Listen to me now, eat the leaves of this tree, eat as if you have the biggest appetite of all creatures on earth...” and he walks away. The princess freezes, she does not have much of an appetite. She looks around from the leaf she is on. Then, she forces herself and begins to eat the leaf she is standing on until she notices a shadow over her.

When she realizes that this is a bird of prey, it occurs to her that she may have predators. She should both feed on leaves and protect herself from these predators. So, a new life begins for the Princess. In no time, the caterpillar Princess turns into a voracious one and grows bigger and bigger.
One day, the Princess is surprised at seeing the Butterfly King. She even forgets that she is a caterpillar, as she gets used to her new life. The Butterfly King says, “Very good Princess, now you can move to the second stage, wait until I come back.” He says and flaps his wings. The princess suddenly finds herself in a cocoon. She cannot breathe at first and gets scared.

She tries to breathe deeply and then realizes that she can actually breathe. When she gets over this, it becomes very difficult to stay still and wait. She begins to dream. She dreams that she walks in the woods. A while later the princess loses track of time, she dives into a world of dreams. She sleeps, wakes up and dreams.

On a sunny day, when the Princess wakes up from her sleep, she sees the Butterfly King. The king looks at him with admiration. The princess now turns into a butterfly. The Butterfly King says, “You are now ready to wander in the forest, Princess, good luck!” He says and goes away.

The princess is still puzzled, but only finds time to thank Butterfly King before he disappears. When she is alone, she sees her reflection in the water. She notices her colorful wings and flies away and lands on a flower. She tells him about one of her dreams from when she was in the cocoon. Flower likes the story and honors the Princess with his balsam.

Since then, the Butterfly Princess flies from flower to flower and tells a story to each. The flowers remember this gentle and delicate butterfly as steppe fritillary. Everyone knows that the steppe fritillary wanders the grasslands and steppes on sunny days.
Activity 27  Science – Technology

Threatened species

The factors threatening the animal species are discovered.

Target group: Age 10+

Duration: 40 min.

Materials: Let’s Get to Know the Arabian Sand Gazelle Activity Sheet, paper and pencils

Student’s activity book: Animals of the Steppe

Activity type: Science – Technology
Appropriate time: All seasons

Implementation:
Students are inquired about the endangered species of the world and our country. It is explained that species such as polar bears and gray whales are endangered species of the world and species such as the Mediterranean monk seal, sea turtle and bald ibis are endangered species of our country. It is stated that the Arabian sand gazelle, which is under protection in Kızılkuyu Wildlife Reserve of Şanlıurfa, is one of them. It is told that the Arabian sand gazelles that are bred in the Reserve are released back to the wilderness.

Students are divided into groups and each group receives the Let’s Get to Know the Arabian Sand Gazelle Activity Sheet. They are asked to answer the questions in order.

The Arabian sand gazelle is stated to be a herbivorous, horned mammal. Attention is drawn to the arc shape of the horns and the large eyes. It is stated that thanks to its earth tones, the Arabian sand gazelle can easily blend in with the steppe vegetation.

It is explained that Arabian sand gazelles are agile animals, they live in herds, they can run for 200-250 meters without stopping in case of a threat, and their speed reaches 60-70 km per hour when they run under threat. Arabian sand gazelles are threatened by such acts as over-hunting, conversion of their habitats to agricultural lands and intensive use of pesticides in agriculture.

At the end of the exercise, each group shares with the others how they would protect the Arabian sand gazelles.
Nature conservation

It is understood that ecosystems are not static, constant, or steady systems.

**Target group:** Age 10+

**Duration:** 40 min.

**Materials:** Nature Conservation Activity Sheet, paper and pencils

**Student’s activity book:** Animals of the Steppe

**Activity type:** Discussion

**Appropriate time:** All seasons

**Preparation:** Cards are prepared.

**Implementation:**
Students are asked about the ecosystems that they know. It is stated that there are ecosystems covering a small area, as well as ecosystems covering large areas such as forests, steppes, lakes and deserts. The aquarium ecosystem is mentioned as an example. Just as an organism cannot exist alone, it is stated that an ecosystem cannot exist alone; there are also relations between ecosystems, for example, the steppe ecosystem begins next to a forest ecosystem.

It is said that ecosystems are not static, constant, or steady systems, and there is a continual change in their structure, functioning, and interactions.

Students are divided into groups and Nature Conservation Activity Sheet is distributed to each group. The groups are then asked to select a field and prepare a 10-item action plan to protect the animals living in this field.

At the end of the exercise, action plans are shared. A project is developed to put into practice one of these action plans. Support from the Biology Department of Harran University is to be sought for the implementation of this project.
Target group: Age 10+

Duration: 40 min.

Materials: Village Council Activity Sheet, and pencils

Student’s activity book: Animals of the Steppe

Activity type: Literature – Creative Drama

Appropriate time: All seasons

Implementation:
Ask students what they know about the functioning of a village and how decisions are made in a village. Talk about how things such as transportation, water, electricity, construction works are accomplished.

Students are divided into groups of six and the Village Council Activity Sheet is handed out to each group. It is explained to the students that the grassland in a village will be converted into an animal farm, and municipalities and construction companies want to open this grassland for construction. It is explained that the public and a local non-governmental organization (NGO) do not want this and a meeting will be held in the village council led by the village headman (muhtar). Students are asked to choose a role card and then reenact the meeting accordingly.

At the end of the exercise, the groups share their reenactions with others. They are asked how they would behave in real life, in such a case, and the importance of participatory behavior in urban issues is discussed.
Nature-friendly farm

How nature-friendly animal husbandry can be done is understood through drawing.

Target group: Age 10+
Duration: 40 min.
Materials: Nature-Friendly Animal Husbandry Activity Sheet and pencil
Student’s activity book: Animals of the Steppe
Activity type: Game – Arts
Appropriate time: All seasons
Implementation:

Students are asked what they know about animal husbandry. Then, problems related to animal husbandry are discussed. The pressure of overgrazing on the steppe is explained.

The students are asked the following questions:
How can eco-friendly husbandry be planned?
► How will electricity be obtained in an animal farm?
► How will it be heated?
► How will the transportation?
► How will the food be produced?

► Where will the water come from?
► What will be done with the waste?

Students are handed a Nature Friendly Animal Husbandry Activity Sheet and asked to design a sustainable farm without consuming natural resources and depict it in a drawing. Drawings are exhibited at the end of the study.
My handprint in nature

Our influence on nature is contemplated through an arts and crafts activity.

Target group: Ages 8-10

Duration: 40 min.

Materials: My Handprint in Nature Activity Sheet, crayons, scissors

Student’s activity book: Life on the Steppe

Activity type: Game – Arts

Appropriate time: All seasons

Implementation:
Ask students about their activities in daily life and how these activities may affect nature. For example, ask them to consider whether these activities are causing carbon emissions, the biggest cause of climate change.

Hand out the My Handprint in Nature Activity Sheet. Ask the students whether a meal can be prepared without creating any waste in the process from purchasing until it is cooked and served.

Ask students to find solutions to reduce carbon emissions and have them write these on the fingers of the other hand on the page. Inform students that they can decorate these handprints with crayons.

At the end of the work, ensure that the handprints are cut out and displayed.
Activity 32  Design – STEM

Ecosystem services

Ecosystem services of the steppe are understood.

Target group: Age 10+

Duration: 40 min.

Materials: Ecosystem Services Activity Sheet, paper and pencils

Student’s activity book: Life on the Steppe

Activity type: Design – STEM

Appropriate time: All seasons

Preparation: Cards are prepared.

Implementation:
Students are asked about the ecosystems that they know. It is stated that there are ecosystems covering a small area as well as ecosystems covering large areas such as forests, steppes, lakes and deserts.

Students are told about ecosystem services, i.e. services provided by the natural environment and that people benefit from; services such as provision of food, clean water, regulation of air quality, water cycle, climate, erosion control, recreational activities, biomass production and enabling people to survive and live in prosperity.

Students are divided into groups and Ecosystem Services cards are distributed to each group. They are asked to cut these cards out and match those in Group 1 to those in Group 2. For example, producers provide food. Soil protects the climate. Light and heat are important for agriculture.

An ecosystem service is selected with the students and a project related to this service is developed.
Activity 33  Communication - social media

My ecological footprint

The concept of ecological footprint is learned.

Target group: Age 10+

Duration: 40 min.

Materials: My Ecological Footprint Activity Sheet and pencils

Student’s activity book: Life on the Steppe

Activity type: Communication – Social media

Appropriate time: All seasons

Implementation:
Students are asked which environmentally-friendly practices they carry out in their lives. Then, it is inquired whether they have heard of the concept of ecological footprint.

The concept of ecological footprint is explained, and it is pointed out that we can contribute to the reduction of carbon emissions by taking individual measures.

My Ecological Footprint Activity Sheet is handed out and students are asked to fill it in and do a self-assessment. These assessments are shared and what measures can be taken individually, socially or institutionally to reduce carbon emissions are discussed.

Children are asked to prepare a short video clip on Ecological Footprint and share it via social media.
Activity 34  Literature - creative drama

**Story of the steppe**

Factors threatening the steppes are explored through creative drama.

**Target group:** Age 10+

**Duration:** 40 min.

**Materials:** Write A Story Activity Sheet, Cause and Effect cubes and pencils

**Student’s activity book:** Life on the Steppe

**Activity type:** Literature – Creative Drama

**Appropriate time:** All seasons

**Implementation:**
Students are asked what human activities cause climate change. Then, the probable consequences of climate change are discussed.

The students are divided into groups, and Cause and Effect Cubes are handed out to each group and they are asked to assemble the cubes on paper.

The participants in each group roll the Cause and Effect dice one by one. Each student tries to establish a relationship between the two issues on the dice. After everyone in the group completes this process, a cause and an effect are selected, and a story is created using these.

At the end of the exercise, the groups share their stories with each other.
Greenhouse effect

The greenhouse effect, which is caused by human activity and results in climate change is learned.

Target group: Age 11+
Duration: 30 min.
Materials: Greenhouse Effect Activity Sheet and pencils
Student’s activity book: Life on the Steppe
Activity type: Design – STEM
Appropriate time: All seasons
Implementation:
Students are asked what they know about climate change and the greenhouse effect. Greenhouse Effect Activity Sheet is then distributed, and an explanation is made.

Students are divided into four groups and each group is given a topic related to the reduction of greenhouse gases. Groups are given some time to think and form their opinions. At the end of this period, they are asked to choose a group spokesperson and share this group’s views with the other groups.

After each speech, opinions of the students in other groups are also taken.

Topics that can be given to the groups:
1. Consider your daily consumption of water, electricity, fuel, and food. What can be done as an individual to reduce consumption?
2. Consider your daily waste amount. What can be done to reduce waste?
3. Imagine that a shoe factory will be established in your surrounding. What effects might this factory have on the environment?
4. Large enterprises open factories in less developed countries to reduce costs, owing to the cheap labor. See where your clothes are made and address the subject in terms of human rights, equality and justice.

One of the topics is chosen with the students and then transformed into a project.
People’s level of awareness about climate change is determined by conducting a survey.

Target group: Age 10+

Duration: 30 min.

Materials: Climate Change Questionnaire and pencils

Student’s activity book: Life on the Steppe

Activity type: Science – Technology

Appropriate time: All seasons

Implementation:
Students are asked what they know about climate change. They are asked how this issue is handled in the environment that they live in. Students are then divided into groups of two and the Climate Change Questionnaire is distributed to everyone. The two students in a group are asked to interview each other using the questionnaire.

After the interviews, the students form a circle and the questionnaire results are evaluated. Things that can be done to increase the sensitivity of the society on this issue are discussed.
**My waste-free lunch**

How much waste is produced in food production and ways to reduce this waste are learned.

**Target group:** Age 10+

**Duration:** 40 min.

**Materials:** My Waste-Free Lunch Activity Sheet, crayons and scissors

**Student’s activity book:** Life on the Steppe

**Activity type:** Game – Arts

**Appropriate time:** All seasons

**Implementation:**
Ask students about their last lunch. Then, ask how much waste must have been produced during the preparation of this meal. Talk about what this waste could be.

Distribute My Waste-Free Lunch Activity Sheet and ask students whether a meal can be prepared, from purchase to preparation, cooking and finally serving, without any waste.

Discuss how such a meal can be prepared. Talk about ways to reduce, recycle and reuse waste.

Finally, talk about composting, which is a way to reclaim organic waste.
**Activity 38  Science – technology**

**Waste hunt**

The waste produced in daily life is recognized and ways to produce less waste are explored.

**Target group:** Age 10+

**Duration:** 40 min.

**Materials:** Waste Hunt Activity Sheet, a trash can in the classroom, a pair of tongs, mobile phones, crayons, and scissors

**Student’s activity book:** Life on the Steppe

**Activity type:** Science – Technology

**Appropriate time:** All seasons

**Implementation:**

Students are asked what types of waste are produced in the classroom. Classification of waste is requested such as paper, glass, plastic, etc. Then, it is announced that the waste in the classroom trash can will be examined.

With the help of a pair of tongs, the waste in the trash can is removed one by one. What can be recycled, what can be reused, what can be decomposed, and what can be reduced are discussed. These observations are transferred onto the Waste Hunt Observation Sheet.

Students are divided into groups. The Zero Waste campaign (https://sifiratik.gov.tr) is reminded and students are asked to shoot a short movie with their mobile phones, which explains what they can do as individuals on this matter. By sharing these movies on social media, awareness in the society is increased.
Three questions, one action

How much waste is produced in food production and ways to reduce this waste are learned.

Target group: Age 10+

Duration: 40 min.

Materials: Three Questions, One Action Activity Sheet and crayons

Student’s activity book: Life on the Steppe

Activity type: Game – Arts

Appropriate time: All seasons

Implementation:

Students are asked for which daily activities energy is needed. How is this energy need met?

The positive and negative features of the energy resources used on earth are discussed.

What can be done to use energy less and more efficiently at home is discussed. Three Questions One Action Activity Sheet is handed out to each participant. It is explained that this activity sheet is prepared with inspiration from the electrical socket frame and students are asked to write phrases on these frames to remind them to turn off unnecessary lights at home, in the office, and school.

They are allowed to decorate these frames as they wish.
Target group: Age 10+
Duration: 40 min.
Materials: Act Now Cards and pencils
Student’s activity book: Life on the Steppe
Activity type: Game
Appropriate time: All seasons

Implementation:
Students are asked what they know about climate change. The video on https://youtu.be/lyz8kBuKGHk is watched and a game is announced to be played about simple measures that can be taken in daily life to reduce the impact of climate change.

Students are divided into groups and each group is given the Act Now Cards. Cards are dealt among the players. A volunteer starts the game and reads out the action on his/her card, then asks others what they can do about it. Then, on the second player’s turn, he/she also explains the action on his/her card and asks the players what to do with that action. The game continues this way. Whether these actions are sustainable is also discussed.

Students are divided into groups, asked to shoot short videos about climate change and these videos are published on social media.
Glossary

A

Abiotic factors: Non-living chemical and physical parts of the environment that affect living organisms and the functioning of ecosystems such as light, temperature, precipitation, soil and rocks.

Agricultural field: Lands with soil, topography and other ecological features that are suitable for the production of plant, animal and aquaculture products, lands that are already utilized for this purpose and that can be transformed to be suitable for the production of plant, animal and aquaculture products by economical zoning, restoration and reclamation.

B

Biocontrol: Using other living organisms against pests, diseases and weeds in agricultural production to keep the harmful agents below the level of economic damage.

Biodiversity: The variety and richness of plant and animal species in a certain area; the diversity of living things in that area, an indicator of a healthy habitat.

Biomass: The general name for all non-fossilized biological material derived from living organisms or organisms that lived until recently. Biomass, which is a source of energy, is used for production of fuel from these biological substances or for other industrial purposes. It sources energy generation from crops such as corn, wheat, etc., and herbs, moss, algae at sea, animal waste, agricultural waste, fertilizers and industrial waste, and all organic waste from households.

Biotic factors: Living organisms in an environment such as plants, animals, and microorganisms.

Botany: The science that studies plants; plant science.

C

Carbon cycle: The circulation of carbon atoms among the atmosphere, oceans, and the earth as a result of physical, geological, chemical and other processes. Most carbon is available in the form of carbon dioxide. The carbon is exchanged among the atmosphere, lithosphere, biosphere and hydrosphere.

Carbon footprint: Total greenhouse gas emissions from production and fossil fuels used in the country, carbon emitted during the production process of products imported from abroad, the country’s share in emissions from international trade and non-fossil carbon emissions.

Climate change: Changes in climate that are attributed directly or indirectly to human
activity, alter the composition of the global atmosphere and are in addition to natural climate variability observed over comparable time periods.

**Climate change adaptation:** The process of developing, strengthening and implementing strategies to combat the adverse effects of climate change and taking appropriate action to prevent or minimise the damage they can cause, or taking advantage of opportunities that may arise.

**Climate change mitigation:** Measures for controlling, reducing and sequestration of greenhouse gases causing climate change result from human activities.

**Compost:** Product made of decomposing organic waste in an oxygen or oxygen-free environment. Compost is a mixture of decayed plants and vegetable waste that is added to the soil to help plants grow.

**Ecologist:** A person dealing with ecology, expert in ecology, naturalist.

**Ecology:** A branch of science that examines the relationships of living organisms and environment and how the organisms interact with each other and their environment, individually or together. Ecology examines the relationships between the living organisms such as plants, soil, animals, and humans, and the non-living organisms in the environment such as climate, surface features, and parent material.

**Ecosystem:** Natural structures consisting of living organisms (plant, animal and micro-organism groups) that live and interact with each other in a specific environment and the non-living organisms. Forests, deserts, meadows, city parks, mountains are examples of ecosystems.

**Ecosystem services:** Services provided by the natural environment from which people benefit. Services such as provision of food and clean water, maintaining the air quality, ensuring the water cycle, regulation of climate, erosion control, recreational services, ecotourism, biomass production, and enabling people to survive and live in prosperity.

**Endemic:** A plant or animal that lives or grows naturally only in one specific region on Earth. It is a region-specific animal/plant species that lives/grows only in a certain region and cannot live/grow elsewhere in the world due to the ecological conditions of the region it is located at.

**Ecological footprint:** Impact of human activities measured in terms of the area of biologically productive land and water required to produce the goods consumed by an individual, community or activity and to assimilate the waste generated.

**Ecological relationships:** The relationships of living organisms with their habitats and with each other.
Energy efficiency: Minimizing the amount of energy consumed without reducing the quantity and quality in production and without preventing economic development and social welfare. Using less energy to perform the same task.

Energy saving: Efforts to reduce energy consumption. Energy savings can be achieved with efficient energy use and/or low energy consumption from conventional energy sources. Turning off an unnecessary light is energy saving. To provide lightening by using a more efficient bulb is the efficient use of energy.

Erosion: Abrasion and degradation of a land by processes such as breakdown, drift, thawing, moving and mass movement caused by streams, rain, wind, glaciers, waves, gravity or other geological factors.

Green infrastructure: It is defined as a tool to provide ecological, economic, and social benefits through nature-based solutions, to help understand the benefits nature offers and to mobilize investments that sustain and improve these benefits.

Greenhouse effect: The atmosphere of the earth surrounds it like a blanket, preventing the energy emitted by the sun from escaping the earth. Thus, the temperature of the earth reaches an average of 16 degrees which we currently experience. However, some gases in the atmosphere that we call greenhouse gases cause the atmosphere to retain more heat. As the amount of these gases increases, the atmosphere’s energy retention property and therefore the temperature of the earth increases. The resulting effect is called the greenhouse effect.

Greenhouse gas: Gases, such as carbon dioxide, methane, nitrogen oxides, ozone, chlorofluorocarbons, and water vapor that regulate the heat balance of the earth. Due to industrialization, rising living standards and increasing population, energy need and fossil fuel use increase, and the amount of greenhouse gases increases accordingly. This increase exacerbates the natural greenhouse effect and causes the earth to get even warmer.

Herbarium: It is the place where dried plant samples are arranged and stored by a certain system. Plant samples collected from nature are press-dried and adhered on special cardboard. On the cardboard are the familial and species name of the plant sample and the place where the sample was collected,
the altitude and the date it was collected, the name of the person collecting the sample, the name of the person who named the sample and other information. Samples are grouped as species, genus and family. It is stored horizontally in special cabinets.

Land cover: Physical land cover, usually expressed in terms of vegetation or lack of vegetation. Although it is related to land use, these two terms are not synonymous.

Land cover change: The changes that occur in the land cover as a result of the use or management of the land by people.

Land use: 1. Types of human use of an area such as residential, park, commerce, industry, reinforcement areas. 2. Management, modification and processing of the land in order to transform the natural or wild environment into a residential area or semi-natural areas such as groves, rangelands and cultivated fields.

Natural resources: Resources that exist without any actions of humankind and occur depending on certain conditions in the natural environment. Air, water, soil, vegetation, animals, and minerals are the natural resources of the world. Natural resources of the world are vital for the survival and development of the human population.

Nature-based solutions: Actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits (IUCN).

Population: A group of individuals of the same species living in a particular area.

Population Dynamics: Investigation of time-dependent numerical changes in the population and their reasons.

Rangeland: 1) Land allocated to one or more villages or towns to graze their animals, separately or jointly, and to take advantage of the vegetation. 2) The place allocated for grazing and vegetation benefits or used for this purpose since ancient times.
Recycling: The process of converting the waste resulting from human consumption, which can be reclaimed, into a secondary raw material with some chemical and physical processes and including these secondary substances in the production process. Materials such as paper, cardboard, glass, plastic and metal can be recycled.

Renewable energy: Energy obtained from the energy flow that exists in the natural processes that are continuous. Renewable energy sources can be listed as solar energy, wind energy, geothermal energy, hydraulic energy, biomass energy and hydrogen energy.

Sociology: A discipline that studies the interaction of society and human; social science.

Sustainability: Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable development goals: A collection of 17 global goals designed to be a blueprint to achieve a better and more sustainable future for all and to address the global challenges related to ending extreme poverty, protecting the planet, and ensuring that all people live in peace and justice by 2030.

Taxon: The common name of all units organized in a hierarchy from the domain to the subspecies in the classification of living things.

Water cycle: The name given to the general cycle of water from the oceans and seas to the atmosphere, from the atmosphere to the earth and back to the seas and oceans.

Waste: 1. All of the substances that occur at all stages from production to consumption and are no longer useful to the user. 2. Any substance or material, which is discharged or left in the environment by the producer or the real or legal person that actually possesses the item, or which must be disposed of (Waste Management Regulation of the Ministry of Environment and Urbanization).

Zoology: Animal science. A sub-branch of biology that examines animals in various aspects (habitats, life history, behaviors, feeding, breeding, etc.).
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“Conservation and Sustainable Management of Turkey’s Steppe Ecosystems Project”
GCP/TUR/061/GFF

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Republic of Turkey Ministry of Agriculture and Forestry General Directorate of Nature Conservation and National Parks
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