Module 2.
Topic 2.2.1. Examples and plans of thematic and interdisciplinary lessons using interactive learning toolkit “Climate box"

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Biology lesson "Biodiversity is the result of organic evolution"

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BIOLOGY CLASS

I. Today's lesson. "Biodiversity is the result of organic evolution"

II. The purpose of the lesson.

To show the role of biodiversity in retention of stability of ecosystems and how stability can be disrupted due to climate change; to instill responsibility in children and youth for the consequences of their actions, and to develop critical thinking.

III. Lesson plan.

- getting new knowledge about the role of various factors affecting biodiversity;
- getting new knowledge about the impact of climate change on biodiversity and the most vulnerable animal and plant species;
- getting new knowledge about the importance of biodiversity for maintaining ecological balance in nature;
- environmental education and climate literacy, formation of a civil position and responsible attitude towards the environment.

IV. Type and form of the lesson: Introduction to new material; conversation, lecture.

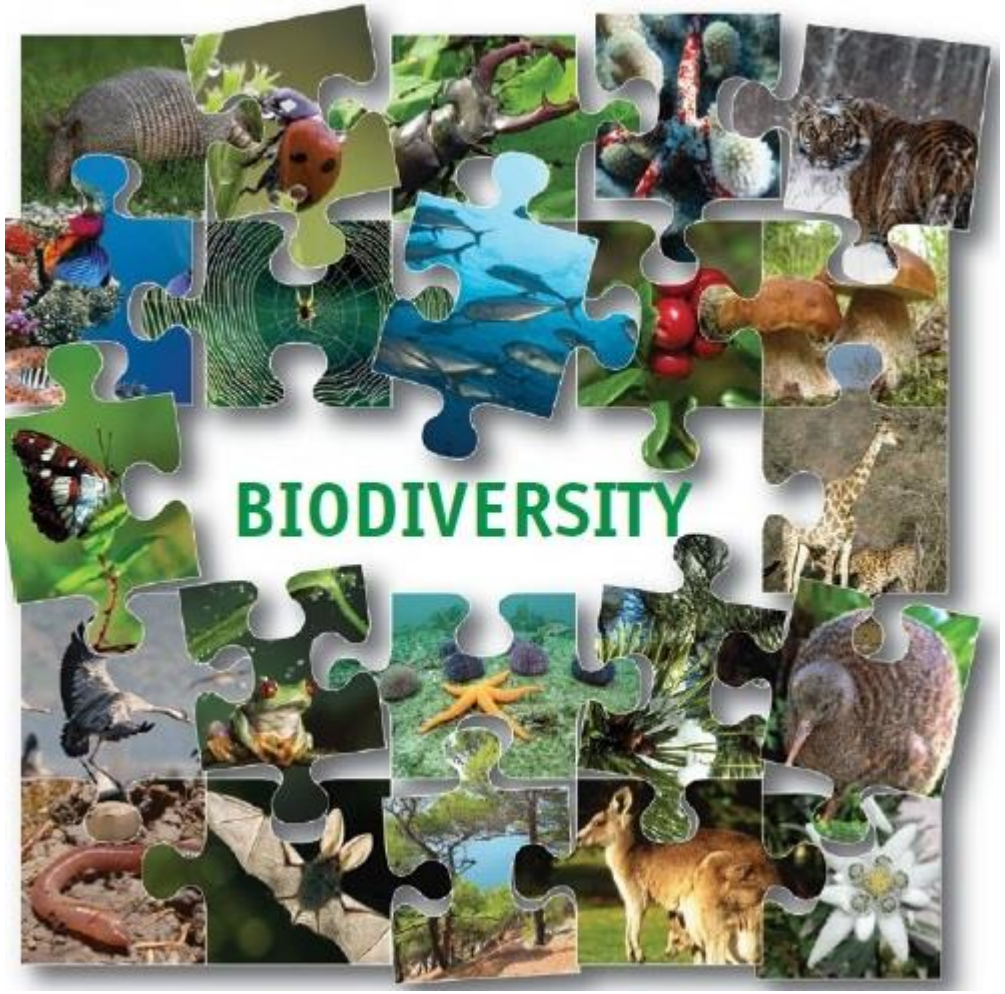
V. Equipment.

Presentation "Biodiversity is the result of organic evolution";
Map: "Natural Area";
Interactive learning toolkit "Climate Box".

VI. Course of the lesson:

1. Organizational aspect.	
The teacher's action	**The students' action**
Checking students' preparation for the class, availability of textbooks and notebooks.	Prepare workplace, notebooks, pens, pencils required for the lesson.
2. Checking homework.	
Conduct a survey of students on learned material: The biosphere is....? Evolution is ....? Species are...? Population is...? What is the biotic community and what kinds of communities do you know?	Students answer the questions.
3. Actualization of knowledge.	
Topic-based conversation. We are surrounded by a great world of various living creatures such as plants, animals, and microorganisms that form a variety of combinations in different parts of our planet. Do you think species have changed in different epochs of Earth's history? If yes, why? Are all natural areas equally populated with plants and animals? Where is the living world as diverse as possible in terms of the number of species? Why?	Conversation with students. They answer questions and debate for clarification and appropriate answers.

VI. Course of the lesson:



4. Lesson plan. Questions to study.
1. What is biodiversity?
2. Taxonomic diversity of the animal world of the earth.
3. Factors affecting biodiversity, including climate change.
4. Evolution of biodiversity.
5. Decrease in biodiversity under human influence.
6. How to preserve biodiversity?

VI. Course of the lesson:

5. The main part.	
Question 1.	**Materials from the "Climate Box":**
	Section 2.2. How climate change affects plants and animals?
1. What is biodiversity? Types of biodiversity: genetic; species; landscape or ecosystem. All types of biological diversity are interconnected. The diversity of ecosystems and landscapes makes conditions for the formation of new species. Increasing species diversity in turn increases the overall genetic potential of living organisms in the Biosphere. Each species contributes to diversity. Biodiversity plays a crucial role in the stability of the biosphere, from which people get the resources for their existence.	**Topic: What is biodiversity and why is it so important?** Biodiversity plays a crucial role in the stability of the biosphere, from which people get the resources for their existence. Hence rational use of the plant and animal genofond in combination with its long-term conservation is important. This aim can be achieved only with a clear understanding of the processes occurring in the biosphere, the relations and interdependencies between the components of ecosystems. (UN conference on environment and development, Rio de Janeiro 1992).
Question 2.	
Taxonomic diversity of the animal world of the earth.	-

VI. Course of the lesson:

Question 3.	Materials from the "Climate Box":
	Section 2.2. How climate change affects plants and animals.
Factors affecting biodiversity. Why did evolution take place differently in the tropics and beyond the Arctic Circle, on the plains and in the highlands, in shallow waters and in the deep depressions of the World's Oceans? Let's see hypotheses that explain biological diversity. - evolutionary time. - environmental time. - the stability of the climate, seasonal fluctuations.	**Topic: What are the threats to biodiversity?** In addition to human economic activity, changes in natural conditions such as temperature changes, forest fires, melting of permafrost, drainage of wetlands, fluctuations in the level of the World Ocean, etc. have a significant impact on biodiversity.
Question 4.	
Evolution of biodiversity. In the history of the organic world, there were periods of growth and decline of biodiversity, when some groups of organisms entered the life, replacing others.	**Topic: Great extinctions and climate change.** There are five major "great extinctions" related to climate change. After the extinction, life was restored, but it wasn't at all like the old one. It took millions of years to restore.

VI. Course of the lesson:

Question 5.	Materials from the "Climate Box":
	Section 2.2. How climate change affects plants and animals.
Decrease in biodiversity under human influence. The extinction of animal species occurred throughout the history of the animal world, but this process was extremely slow, over geological periods of time. One of the major reasons for the decrease in biodiversity is the reduction of the total area of small species' habitat due to anthropogenic activities. This leads to a destructive chain-type reaction that begins with the probable loss of rare species. The rarity of a species is the best indicator of its vulnerability.	**Topic: Which of the animals before the other responds to climate change.** In the last century, under the influence of human activity and dramatic climate change, the rate of extinction of species across the planet is many times higher than natural. Examples: the reduction of the Northern Polar ice cap threatens the population of polar bears, seals, Arctic foxes and other Arctic animals. The habitats of tundra animals such as deer and lemmings are changing. In other parts of the world, lakes and small rivers disappear, forest belts dry up, and plains burn out earlier than usual. All this is a threat to some species.
Question 6.	
How to preserve biodiversity.	**Topics:** How to preserve biodiversity. National park. Wildlife reserves. Ecotourism: harmony of nature and man. What is the Red Line and what is it for?

VII. Solve a situational problem to solidify the material.

Questionnaire:

1. What is biodiversity?
2. What are the factors that affect biodiversity?
3. How does biodiversity decrease under human influence?
4. How to preserve biodiversity?

Situational issue:

By the movement of polar bears, scientists can most clearly assess how the climate is changing. Analysis of the bears movement showed that they clock up about 80-100 kilometers per month, moving mainly along the coasts, and they go no further than one or two kilometers inside the continents. But the appearance of some of them has been repeatedly noticed.

How can this behavior of polar bears be explained?

What is the threat to their population?

VII. Solve a situational problem to solidify the material.

Correct answer. Argument.

The main food for polar bears is a seal on an ice floe. They don't really need land, they just build dens on it and breed their offspring. But the ice is rapidly melting, retreating from the coastline further and further. And with longer and longer ice-free seasons, the sea becomes free of ice. Bears are not adapted to hunting in water. They have to look for food on the shore, such as dead birds, eggs of small animals. Despite the fact that polar bears are still trying not to go deep into the continents, hunger is increasingly forcing them to look for food wherever it's possible.

These factors make the polar bear population vulnerable to warming and can lead to a severe decline in numbers, and possibly complete extinction.

VIII. Lesson summary (reflection).

What did you learn in the class?
What plants and animals do you know in our region that are in decline?
What is the reason for this?
What we can do to save them?

VIX. Home assignment.

Prepare a report on one of the animal or plant species whose populations are most vulnerable to climate change. What can you do to save it?

THANKS FOR YOUR ATTENTION!

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