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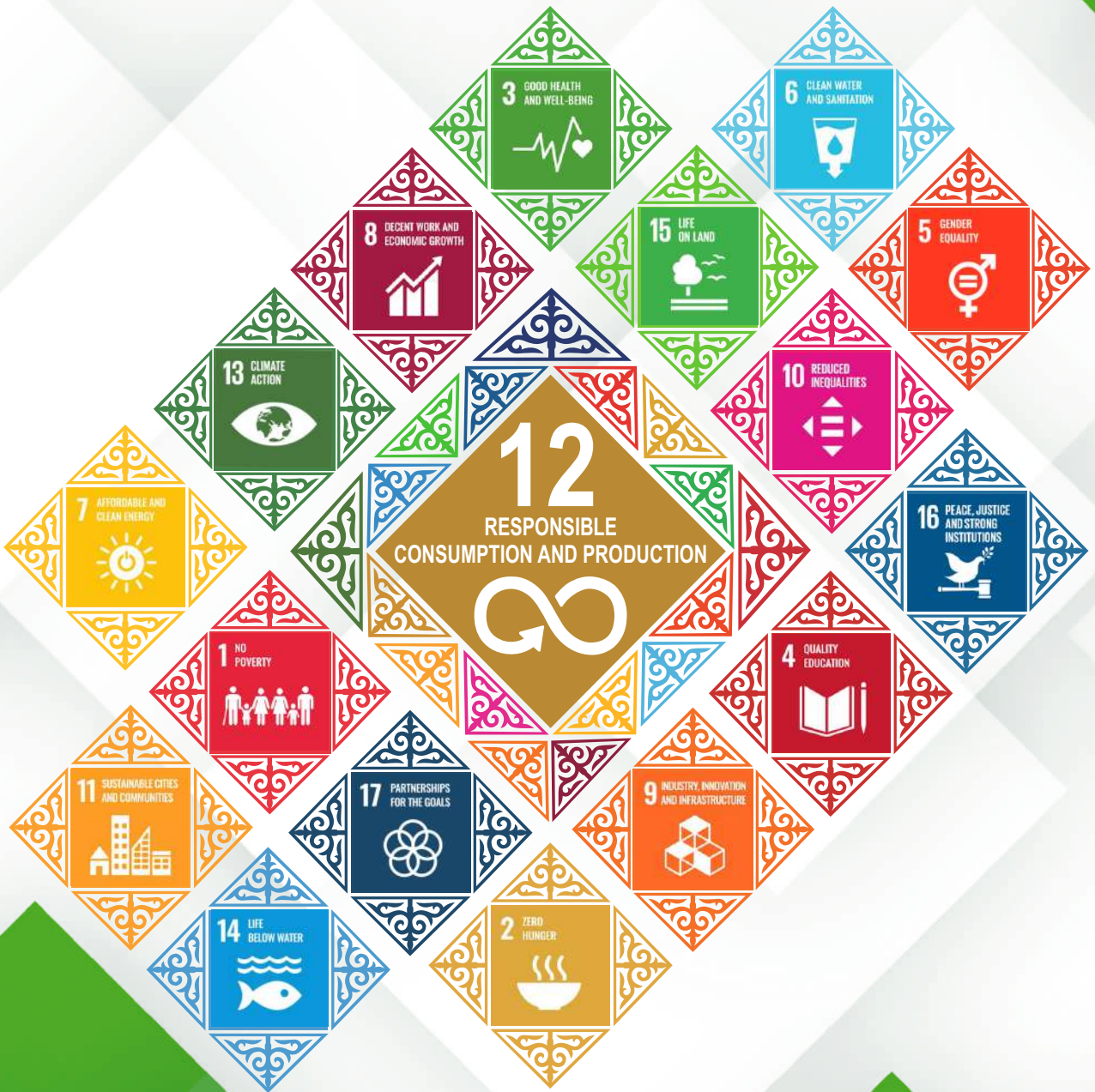
RESPONSIBLE CONSUMPTION AND THE ENVIRONMENT

METHODOLOGICAL GUIDE FOR STUDENTS



BISHKEK - 2020

UDC 502/504
LBC 20.1
O-80

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O-80 Responsible Consumption and the Environment: A Responsible Consumption Study Guide forschool clubs and extracurricular activities, as well as additional material./Comp. Duishenova J.K., Dzhunushalieva K.K., Mambetakunov U.E.B.: 2020.- 53p.

ISBN 978-9967-9297-3-9

The manual is intended for use in circle and extracurricular activities as additional teaching material, as well as in the lessons of natural-mathematical and social-humanitarian subjects.

The manual was prepared as part of the Global Search for Sustainable Schools project, financially supported by the Government of Japan through the UNEP 10YFP Trust Fund under the Sustainable Lifestyles and Education (SLE) Programme of the UN-led One-Planet Network (10-Year Framework of Programmes on Sustainable Consumption and Production Patterns).

This manual has been printed with the support of the OSCE in the framework of the projects “Engaging Stakeholders in Addressing Uranium Tailings Problems in Central Asia. Phase Two”, funded by the European Commission, and Environmental Governance and Green Economy.

Welcome to our website: http://ecoschool.kg/

ISBN 978-9967-9297-3-9 UDC 502/504

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CONTENT

INTRODUCTION

FRIENDS! Here is a guide to help you understand the challenges of sustainable use of natural resources through behaviour change.

As a result of human activity, due to the unreasonable consumption of resources, the planet Earth was under the threat of degradation.

Every day we see examples of an irrational attitude towards natural resources: water, soil, flora and fauna, minerals, etc. To prevent such an attitude, the most important thing is necessary – to educate in yourself and the people around you the elementary skills of responsible resource consumption, so that each person learns to be frugal. If we learn to respect nature, its resources, to daily responsible consumption, then we will not need new resources and industries that pollute the environment.

A person should be aware that the satisfaction of some needs gives rise to new ones, which can lead to an overproduction of resources. Man has two types of needs: biological (physiological) and social (material and spiritual). Some are satisfied as a result of labour costs for the production of food, material and spiritual values, while others are accustomed to receive free of charge: the need for water, air, solar energy, etc.

This guide will help to reveal the questions and identify the problems of the responsible use of natural and other resources.

BY STUDYING THE MANUAL, YOU WILL LEARN:

- *to realize that the sustainability of social, economic development and the state of the environment depend on the lifestyle of each person, society, state;*
- *to understand sustainable and unsustainable production and consumption patterns and their interrelationships (supply and demand, toxic substances, carbon dioxide (CO2) emissions, waste generation, health, working conditions, poverty, etc.);*
- *to analyze strategies and practical approaches existing in the field of sustainable production and consumption;*
- *to discuss the dilemmas and problems of sustainable consumption and production;*
- *to distinguish between needs, wants and habits;*
- *to critically assess your own behaviour as a consumer, taking into account the state of the environment, the needs of other people, cultures, countries and future generations;*
- *to anticipate possible problems associated with a sustainable and unstable lifestyle of each person;*
- *to feel responsibility, as a consumer of goods and services, for the environmental and social consequences of your behaviour.*

The manual is intended for use in extracurricular and circle extracurricular activities as additional teaching material, as well as in the lessons of natural and mathematical and social and humanitarian subjects.

LESSON 1. ENVIRONMENTAL PROBLEMS OF TODAY

Cross-curriculum communication: geography, biology, history, physics, Man and society, natural science.

Grade: 5-11.

Methods and techniques: discussion, group work, presentations.

Resources: Whatman paper, markers, stickers, computer, projector, smart boards, Internet sources.

Duration: 2 hours.

EXPECTED RESULTS: students will

- get acquainted with global environmental problems;
- be able to characterize the content of environmental problems;
- know how to analyze the causes of environmental problems;
- be able to reasonably substantiate their opinion.

LESSON STEPS

1. **Exercise "A Case from Life".** Share a positive or negative case that has an impact on the environment (3-5 minutes).
2. **Introductory word of the teacher** (5-7 minutes).

"Environmental problems of our time"

The environmental and sustainable development challenges we face today are rooted in changes that began in the world many decades ago. During this time, the socio-economic development of society has changed the attitude of mankind to nature.

Since 1950, **the population of the Earth has tripled** and reached 7.5 billion, the number of urban dwellers increased 4 times and exceeded 4 billion, the volume of production increased 12 times. **The use of chemical fertilizers has expanded,** the consumption of coal, oil, gas has grown 5 times, and the amount of waste has increased accordingly.

Figure 1. Illustrative photo
Source: https://energy.s-kon.ru/wp- content/uploads/2017/03/site5-569x357.jpg

Looking ahead, it's safe to say that these global development trends will continue to put increasing pressure on the environment.

By 2050, the world's population is expected to increase by almost a third to reach 10 billion. The use of natural resources worldwide could double by 2060. Water demand will increase by 55% by 2050 and energy demand by 30% by 2040.

The dramatic acceleration in development has brought many benefits, alleviating suffering and improving the well-being of people in many parts of the world. For example, the proportion of the population living in extreme poverty has dropped sharply, from 42% in 1981 to less than 10% in 2015. However, the same changes have caused significant damage to ecosystems. Today, about 75% of the planet's land mass and 40% of the world's marine environment have undergone major changes. The earth is experiencing an extremely rapid **decline in biodiversity**. Extinction is threatening more species today than ever before in human history. Some evidence even suggests a **sixth mass extinction** is occurring.

Many changes in the global climate system since the 1950s have also been unprecedented for decades and millennia. They are largely caused by **climate change** due to greenhouse gas emissions from human activities such as **fossil fuel burning**, agriculture and **deforestation.**

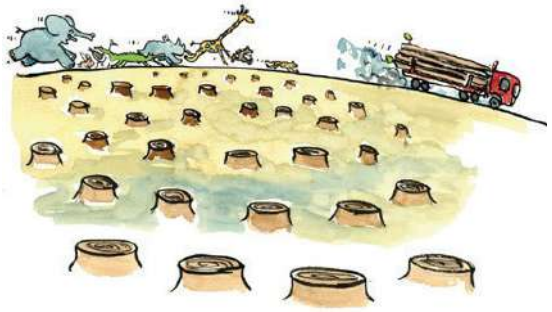
These phenomena cause enormous damage to human health and well-being. **The morbidity and premature mortality** in the world associated with environmental pollution is already three times higher than as a result of AIDS, tuberculosis and malaria combined.

The continuation of these processes will cause serious problems, since the impact on the environment will lead to the destruction of ecosystems, for example, such as the **arctic, coral reefs** or Amazonian forests, glaciers of Central Asia, etc.

Sudden and irreversible changes of this kind can severely disrupt nature's ability to provide essential human needs, including food and resources, clean water and fertile soils, and protection from natural disasters.

Source: Environment: Status and Outlook 2020. Executive Summary.
© European Environment Agency 2019.

3. Exercise "Web of problems" (10-15 minutes)
(you need to prepare ribbons or ropes in 6 colours in advance).



Each group is asked to characterize one environmental problem and a ribbon (rope) with a specific colour. For example, the environmental problem “Biodiversity loss” is green, climate change is blue, etc.:

a) loss of biodiversity;
b) depletion of natural resources: water, air, oil, coal, gas and other natural resources, including forests, rivers, lakes, oceans, soil, etc .;
c) climate change;
d) destructions of ecosystem;
e) morbidity and premature mortality due to environmental pollution;
f) the problem of garbage and waste (use of plastics, chemicals, etc.)

Algorithm of execution:

a) divide the class into 6 groups and choose a group leader;
b) take a specific place in the class with the group;
c) each group discusses the content of the selected problem, identifies links with other environmental problems;
d) the leader of the group, taking a ribbon or rope in his hand, looks for the main problem related to all or several problems;
e) after finding the interconnection of environmental problems, a “cobweb” should be obtained;
f) each group presents the resulting "web" or connection and at the same time indicates the ways of solving.

4. Video watching and discussion.

1st group	2nd group	3rd group	4th group
Environmental problems of the future	Ecology of the world	The planet is our common home	Pollution of nature. Think about it
https://youtu.be/BZRj0EsCs_w	https://youtu.be/Fn_COhiA72U	https://youtu.be/7lEKfWogzME	https://youtu.be/xFoUMtDOfJc

5. Exercise about interesting facts of ecology "What do I think about this?"

Read the text and give your opinion.

Interesting facts about ecology:

1. *The average car produces more than 0.5 kg of waste in the form of gas, less than every 35 kilometres.*
2. *In the state of Colorado (USA) there are special sensors that measure the pollution of the environment after each passing car. These sensors are also built into the curbs.*
3. *Just four litres of engine oil is enough to poison more than 4 million litres of clean drinking water.*
4. *On average, it turned out that the average house with several people emits more carbon dioxide than a new car.*
5. *The Amazon rainforest alone produces more than one fifth of the world's oxygen supply.*
6. *After recent research, it turned out that the cleanest air in the world "lives" on the island of Tasmania, which is located next to the continent of Australia.*
7. *Indoors the air is more than 25 times dirtier than the outside air.*
8. *California beaches are among the cleanest. However, recently, environmental volunteers carried out calculations of the collected waste and found that more than 330 thousand cigarette butts were collected in one day.*
9. *Conventional baby diapers account for at least one percent of all household waste in the United States and decompose within 250 years.*
10. *In the USA alone, more than two million plastic bottles are emptied and thrown away per hour. A very small part is sent for processing. According to a rough estimate, there are 230-270 thousand plastic bottles per day.*
11. *Sending spam annually consumes 33 billion kWh of electricity, which is accompanied by the emission of about 17 million tons of carbon dioxide into the atmosphere (like three million cars). This amount of consumed electricity is enough to supply 2.4 million homes.*

http://ecoalliance.com.ua/bbloteka/statt-z-ekolog/interesnyie-faktyi-ob-ekologii

6. Summing up and evaluation: "Ladder of success".

Draw a ladder in a three-step exercise book and mark how you learned the lesson:

- bottom step - did not understand;
- second step - a little help or correction is required;
- top step - I have mastered the material well and can do the work on my own.

7. Homework.

1. Answer the following questions in writing:

a) Is climate change the result of anthropogenic impact on nature? Justify the answer.

b) Justify the need for education and awareness raising as the first step to climate change mitigation, adaptation, impact reduction and early warning.

2. Read the material on the link or QR titled "Development of mountainous areas in Kyrgyzstan" and prepare a presentation:

http://www.welcome.kg/ru/kyrgyzstan/region/development/184.html

LESSON 2. "CONCEPT OF SUSTAINABLE DEVELOPMENT AND 17 GOALS"

Cross-curriculum communication: geography, biology, history, Man and society.
Grade: 8-11.
Methods and techniques: discussion, group work, presentations.
Resources: Whatman paper, markers, stickers, computer, projector, smart boards, Internet sources.
Duration: 2 hours.

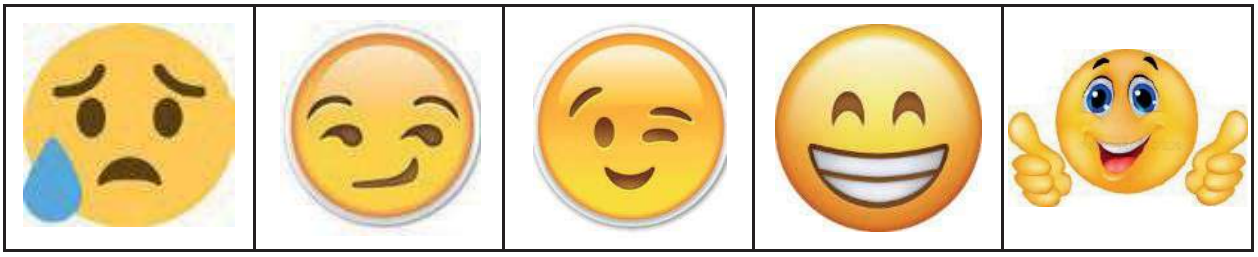
EXPECTED RESULTS: students will

- understand the term “sustainable development”;
- know that there are three components of the aspect of sustainable development;
- get acquainted with 17 Sustainable Development Goals;
- be able to express and defend their opinion.

LESSON STEPS

1. Exercise "My emoji is my mood."

Choose your emoji mood and explain why you chose it?



2. Exercise "Kurzhun of ideas".

In the conditional "kurzhun", briefly write down all your thoughts and assumptions on this topic. You must correct all opinions during the lesson: remove unnecessary ones and leave the most necessary ones in your opinion. In the course of the lesson, you should return to kurjun again and systematize the **knowledge, skills and practical skills you have accumulated during the lesson.**

3. Working with text. Reception "Insert".

Insert - the method of marking the text in the process of reading it.

V	+	-	?
I knew it	A new for me	I thought otherwise	Not understood, there are question

Rules:

1. *make notes using two or more icons;*
2. *Insert icons as you read in the margins;*
3. *After reading the text once, return to your original predictions;*
4. *Remember what you knew or assumed about this topic before, it may happen that the number of icons increases;*
5. *Complete the table.*

Reading text: "SUSTAINABLE DEVELOPMENT".

Humanity in the last century was focused on rapid economic growth, which led to an unprecedented harmful effect on the biosphere. And as a result, contradictions arose between the growing needs of the world community and the limited possibilities of the biosphere to meet them. It was proved that the elimination of the arisen contradictions and further improvement of the quality of life of people is possible only within the framework of stable socio-economic development, which does not destroy the natural biotic mechanism of self-regulation of Nature.

The term sustainable development is translated from English as "*sustainable development*", although the word sustainable has other meanings: "sustained, self-sustained", "lasting, continuous", "reinforced", "protected", "viable".

The World Conservation Strategy (1980), presented by the International Union for Conservation of Nature and Natural Resources, emphasized that for development to be sustainable, it is necessary to take into account not only its economic aspects, but also social and environmental ones.

Since the mid-1970s, UNEP (United Nations Environment Program) has extensively used the concept of "development without destruction", and later the concept of "ecodevelopment" has become widespread, meaning environmentally sound development, i.e. development that has the least impact on the environment.

Remember! *Sustainable development (SD) is a dynamic process of economic, environmental and social change. In the conditions of SD, the use of natural resources, economics, achievements of science and technology, personal development and changes in the management of society are coordinated with each other. SD strengthens the current and future potential to improve the quality of life of humankind and future generations.*

4. Read the text, discuss with the group, and give a 3-minute presentation.
Reading text: "SUSTAINABLE DEVELOPMENT CONCEPT".

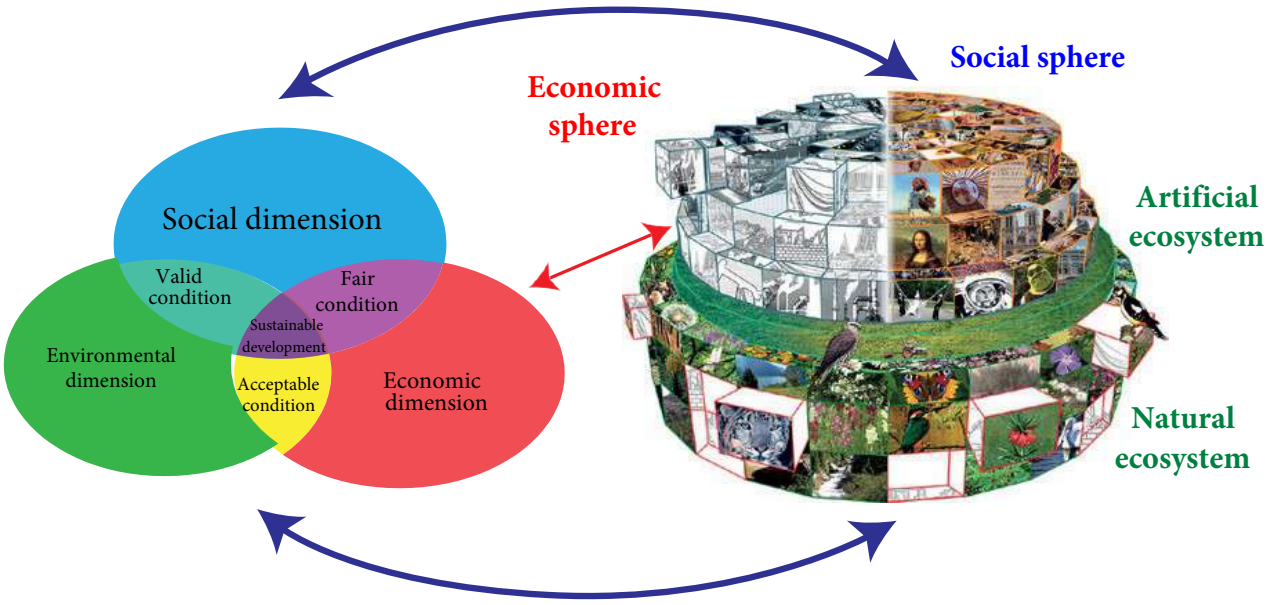


Figure 2. Model of sustainable development

The Sustainable Development Concept unites three areas: economy, society and natural capital.

The Sustainable Development Model can be structurally represented as a truncated pyramid, the foundation of which is natural ecosystems, since only the entire set of species makes the Earth's surface suitable for supporting life. Biosphere ecosystem mechanisms allow the planet to maintain an unstable balance between overheating and hypothermia of the planet's atmosphere, regulate the gas composition of the atmosphere and maintain stable parameters of the environment suitable for our existence. Natural ecosystems form a favourable habitat for living organisms and provide conditions for sustainable development, because it is Life that creates the conditions for Life!

Each type of ecosystem can be considered as the foundation that supports Life as such, and therefore the entire system of our society. Above natural ecosystems in this model, there is a plane of artificial (anthropogenic) ecosystems - these are gardens, parks, fields, arable lands. These ecosystems are organized differently, they are closely related to human life and do not fully fulfill the ecosystem functions of environmental regulation, because most of their energy/biomass is used by humans for their own needs.

Above the basic foundation, the socio-economic plane is being built. The organization of the social and economic spheres of life is based on the use of the resources of natural ecosystems.

An important element of this model is the understanding that the destruction of the foundation will lead to the fact that the upper parts of the pyramid will not be able to exist. Natural ecosystems form a favourable habitat for living organisms and provide conditions for sustainable development. The loss and reduction of biodiversity causes irreparable damage to the capabilities of the biosphere for ecosystems to carry out their functions, among which we can highlight: creation of an environment favourable for life, regulation and stabilization of the climate, water regulation, reduction of the number of natural disasters, soil formation, maintenance of the cycle of chemical elements, etc. if you remove the foundation, everything will collapse. The problem is that not only will the model collapse, like an economic default or a cultural revolution, a life cycle may be disrupted.

As long as natural ecosystems retain their original composition and structure, these communities can flexibly respond to climate fluctuations, mitigate its sharp jumps and reduce the consequences of negative phenomena. The preservation of the vegetation cover prevents the loss of the fertile layer on the mountain slopes, prevents the formation of destructive floods and mudflows, which bring enormous losses.

Thus, the preserved natural ecosystems of Kyrgyzstan are powerful centres for the stabilization of not only mountainous, but also adjacent plain territories. Today, with socio-economic development, it is necessary to find such conditions and solutions under which natural ecosystems will be preserved and will further support the existence of Life on Earth!

Based on materials from the BIOM Ecological Movement
http://www.biom.kg/activities/policy

5. Read the text on "17 SDGs" and have a small group discussion.
Issues for discussion:

1). Why does humanity need **17 SUSTAINABLE DEVELOPMENT GOALS** (SDGs)?
2). What is being done in the Kyrgyz Republic to achieve the 17 SDG goals?
3). What can you do for the sustainable development of your city, village, district, region?

Reading text: 17 SUSTAINABLE DEVELOPMENT GOALS

On September 25, 2015, in New York, 193 UN Member States unanimously adopted a new Post-2015 Agenda for Sustainable Development, that is, from 2016 to 2030 to ensure a sustainable future.

The 17 Sustainable Development Goals address the most important economic, social, environmental and governance issues of our time. Each country has committed itself to fulfill 17 SD goals, including the Kyrgyz Republic (KR). Currently, the SDGs are included in government programs in all sectors.

The Kyrgyz Republic adopted the National Sustainable Development Strategy until 2040 (NSDS KR). Kyrgyzstan cannot copy someone's development model based on other models. The NSDS of the Kyrgyz Republic is the basis for the development of a person and the whole society and is aimed at creating conditions for the development of every person living in our country, ensuring his well-being. The economic policy of the state will be focused on providing jobs, decent wages, environmentally friendly production with the use of new "green" technologies.

The widespread introduction of information technologies in production and management should become a priority of development policy. Each region will make a worthy contribution to the economic development of the country, and favourable conditions for the life of the population will be created in each region.

The future is inextricably linked with the preservation of the Kyrgyz Republic (KR) as a country of snow-white peaks and emerald lakes. Citizens of the Kyrgyz Republic should unite around the desire to be among successful environmentally oriented countries, first of all changing themselves, their place in nature, developing the economy, taking into account the interests of future generations.

6. Watching videos and discussing.

First group	Second group	Third group	Fourth group
In simple words about the SDGs	17 Sustainable Development Goals	What are the Sustainable Development Goals?	The role of youth in achieving the Sustainable Development Goals (SDGs)
https://www.youtube.com/watch?v=EMysUyLZxm4	https://youtu.be/Fn_COhiA72U	https://www.youtube.com/watch?v=qKWoOQXC-5U	https://www.youtube.com/watch?v=vY3FyJlnIKs

7. Problems and dilemmas. Read the question, discuss in the group and choose the most appropriate option, or present and justify your answer.

In some Central Asian countries, as elsewhere in the world, the urban population is increasing. What, in your opinion, are the most serious environmental impacts of urban lifestyles that society must reckon with?

1. *An intense pace of life leading to stress.*
2. *High level of energy and resource consumption.*
3. *The formation of a huge amount of household and industrial waste.*
4. *High noise level.*
5. *Loss of connection between man and nature.*

Source: Green Package "Glaciers of Central Asia"

8. Homework. Write an essay on the topic "The 17 Sustainable Development Goals and my contribution to their achievement", highlighting the main problems, show their interrelation, and your personal ways of solving them.

LESSON 3. ISSUES OF SUSTAINABLE CONSUMPTION IN TRADITIONS OF THE KYRGYZ PEOPLE

Cross-curriculum communication: geography, biology, history, mathematics, geometry.
Grade: 8-11.
Methods and techniques: discussion, group work.
Resources: Whatman paper, markers, stickers, computer, projector, smart boards, Internet sources.
Duration: 4 hours.

EXPECTED RESULTS: students will

- discuss sustainable consumption in the traditions of the Kyrgyz people;
- be able to compare with previous knowledge about the traditions of the Kyrgyz people in the field of responsible consumption;
- learn to analyze the features of the responsible attitude of the Kyrgyz people to nature;
- be able to voice their opinions and speak in class.

LESSON STEPS

1. Exercise "I know, I want to know, I learned."

1st step: Before acquaintance with the text, on their own or in a group, students fill out the first and second columns of the table "I know", "I want to know".
2nd step: In the course of acquaintance with the text, fill in the "Learned" column.

I know	I want to know	I found out

3rd step: Summing up, comparing the content of the graphs.
2. Working with text. Exercise "Double diary".

Extracts from the text	Questions and comments

The sheet is divided in half. On the left side, fragments of text are recorded that made the greatest impression, evoked some memories or associations with episodes from their own life. On the right side, it is proposed to comment: what made you write this particular quote? What thoughts did she generate? What questions do you have? When reading the text, you should stop from time to time and make similar notes in the table.

READING TEXTS

I. Text "How did our ancestors understand nature?"

Our ancestors understood that man is part of nature. Therefore, they tried to live in harmony with nature, without harming it. In order to satisfy their daily needs, our ancestors strove to learn about the environment, to receive information about it.

Figure 3.©Photo by Maxim Claytor. Naryn region, Aksay valley. Lake Kul Suu

A careful attitude towards nature became the central concept in the development of the world, and they realized the consequences of a careless attitude towards nature. The process of life of the nomadic Kyrgyz proceeded in conditions of respect for nature, in compliance with centuries-old traditional knowledge and accumulated life experience. The traditional nomadic economy, in essence, was resource-saving, nature-restoring, waste-free, i.e. from a modern point of view, environmentally friendly and rational. Strict observance of the accumulated traditional ecological knowledge was the way of life and behaviour of the nomads. Weighted, tested measures and mechanisms ensured stability and balance in the relationship between Man and Nature, helped them to survive for millennia.

A unique environmental management system based on seasonal rotation of pastures was developed in the process of adaptation to local weather and climatic conditions. As nomads, the Kyrgyz have always lived in close contact with nature. From their shelter to their clothing, everything was designed to adapt to changes in the weather and changing places of nomadism. From time immemorial, the Kyrgyz people have protected and appreciated their nature. This is evidenced by such prohibitions:

- A bonfire or fire in nature should not be left untouched, so as not to damage its wealth and people.
- Do not pollute rivers and water, lakes, streams with waste.
- Trees cannot be cut down unnecessarily, since they are living beings; their owner will punish a person for this.
- You cannot pluck feathers and down from a living bird, otherwise it will affect the person himself: he will suffer from the pain that a bird or animal experiences during these actions.
- You cannot gouge out the eyes of an animal and perform any actions aimed at tormenting this animal, since the "forest spirit" will punish a person in the same way.

They are often found in traditional proverbs and sayings such as:

«Чөптү кордосоң, көзгө зыян [Chөptu kordosong, kөzgө zyyan]» – «If you humiliate the hay, you will clog your eyes». In folk medicine, the Kyrgyz used medicinal herbs such as Russian knapweed for the treatment of epilepsy and fever, eremurus for intestinal diseases, and thermopsis in the treatment of bronchial asthma. All this information testifies to the rationality of the world outlook of the Kyrgyz.

II. Text "Dwelling of the Kyrgyz".

Boz uy (yurt) is the most important part of the Kyrgyz nomadic culture, one of the main symbols of the Kyrgyz worldview and part of their way of life. It has been a safe home for many centuries and it was not for nothing that it was called "Kyrgyz House" ("Kyrgyz Uy"). Easily transported from place to place, warm in winter and keeping cool in summer, for many centuries it accompanied a Kyrgyz pastoralist leading a nomadic lifestyle. It symbolizes family, earth and the Universe and accompanies all stages of a person's life from birth to death. Most of the Kyrgyz culture is associated with yurts, from important rituals and ceremonies to handicrafts and traditional crafts. The design and functionality of the yurt are designed in such a way that it is comfortable, easy to carry from place to place and serve regardless of the season.

Figure 4. World Nomad Games, 2018. Jailoo Kyrchyn. Issyk-Kul region. Photo by KNIA KABAR

Yurts are easily disassembled and carried from place to place, they can be insulated for the winter or, conversely, made cooler for the summer. Shyrdak and tush-kiyiz (felt carpets and embroidered wall panels), which can be seen in the yurt, are also inspired by natural forms. The outer side is made of felt and wool, warm water-repellent materials that are easy to repair. The lattice circle in the center of the yurt dome forms one of the most important symbols of the family and the Universe - tunduk. It is covered by a small piece of felt, which folds back in good weather and is used to ventilate the room; in bad weather the tunduk is closed.

III. Text "Kyrgyz Textile". Kyrgyz textiles feature designs inspired by nature. It is made from materials that are easy to find in the mountains and their surroundings.
Felt and wool are especially common.

Shyrdak - cult felt carpets, their ornaments are stylized abstract images of sheep, goats, dogs, flowers. Hand-made shyrdaks are much more expensive than those

made on the machine. Shyrdaks are hung on the walls or they cover the floor. Such a carpet can serve from several years to decades.

Tush-kiyiz (wall rug) - extended wall carpets made of soft fabric to decorate a yurt.

Figure 5. Photo by Natalia Kozina, Khushbakht Zaydulloev. Kyrgyz shyrdaks

IV. Text "Applied art of the Kyrgyz". Kurak - patchwork. The name "kurak" comes from the word "kura" which means stitching together or composing from separate parts.

This technique is used to sew hats, baby clothes, cradle blankets, wedding curtains, mattresses, pillows, saddle covers, bags or carpets. It is believed that the rags have magical properties: for example, a kyrk kynuk shirt is sewn from rags from forty neighbors on the fortieth day of a newborn. Black and white patches are especially appreciated, which are used for geometric patterns: camel's eye, crane, amulet, star.

Ala-kiyiz – another kind of felt carpets, reminiscent of shyrdak, but the manufacturing process here is completely different. While large canvases of felt are used for shyrdak, ala-kiyiz is made from small pieces of felt laid on topof each other. After that, the entire carpet is soaked in warm water and rolled up to join the layers, The result is a canvas without clear boundaries, which seem to flow into one another, creating a drawing. Although ala-kiyiz are not as strong as shyrdaks, their patterns are more colourful and complex.

Figure 6. Ala kiyiz and chiy. Illustration from the book "Kyrgyz patterns"

Chiy – is a herbaceous plant found in the steppe, from the dry stems of which mats are woven. They can be ordinary or with some patterns. Chiy is often used in yurts as additional insulation or placed under carpets to keep out moisture. These mats also play an important role in the felting process in the manufacture of shyrdaks and ala-kiyiz.

V. Text "Clothes of the Kyrgyz".

The Kyrgyz clothing reflects the nomadic way of life, features of different regions are visible. Natural materials prevail: wool, felt, leather, rough fabrics. The design uses designs and themes inspired by nature and tribal traditions.

Ak Kalpak – men's headdress, made of white felt.

Men also wore chapan, a high-necked coat and suede or leather trousers.

Women often wore **beldemchi**, a skirt with a slit in the front that was worn over a basic robe or dress.

Figure 7. From open sources on the Internet

For special occasions, it was customary to wear dresses with ruffles on the sleeves and a skirt, complete with embroidered vests and cone-shaped hats with feathers in the upper part (the so-called shөkylө). Even married women wore an **elechek** headdress - a multi-meter fabric, usually white, wrapped around the head. It can be safely called one of the striking examples of responsible consumption. During migrations and camps, Elechek protected his head from heat and cold, wind, and if there were injuries and injuries on the way, he was used as a bandage and performed different functions.

VI. Text "Raising Children". Since ancient times, the Kyrgyz have had a rich experience of material and spiritual culture, including the traditions of raising children. These are beshik, beshik yry, toys and play songs, children's labour, children's tools, children's folklore, etc. The Kyrgyz paid great attention to the upbringing of the younger generation, making sure that children from an early age become full-fledged members of society. The tradition of parents and elders in the family to take their children with them to visit relatives, on that, played the role of the main way of introducing children to society, played the role of a life school for the formation of a culture of behaviour and served as a condition for the enrichment of his spiritual world.

Figure 8. Drawing from the collection of Kuluypa Akmatova Jailoo Games, published by PF Rural Development Fund

In the course of communication, they developed the ability to reckon not only with their desires and feelings, but also with the desires and feelings of other people; instilled an emotional-value and evaluative attitude towards others and themselves, towards nature, animals; fostered tolerance, sensitivity and trust towards other people.

Children from an early age were taught life skills and abilities, instilled knowledge that will be useful in everyday life, for example: caring for livestock, meeting and seeing off guests, the ability to distinguish certain types of medicinal herbs, plants, plant and care for trees, make objects everyday life from natural materials; taught to perform responsible chores, as the parents believed that participation in everyday affairs gives the child a practical upbringing. The children, assimilating the economic life of the family, were accustomed to a responsible lifestyle in harmony with the natural environment.

With these methods and ways of upbringing, the Kyrgyz gave children all-round development. Instilling in children a love and respect for nature, the Kyrgyz often used blessing words - **ubal** (sin), **soop** (good), **yiyik** (holy). They had a profound effect on the mind of the child. The Kyrgyz taught their children to work hard: plant trees, lay trails for animals, take great care of injured animals and plants, clean springs.

VII. **Text "Nomadic cattle breeding".** *The annual cycle of migrations included the change of pastures: kyshtoo (wintering), jazdoo (spring nomad), jailoo (summer nomad), kuzdөө (autumn nomad).*

The people said: *«Jaz - araket, jai - bereke, kuz - kireshe, kysh - chygasha» - «Spring is action, summer is good to give, autumn is profit, winter is consumption».*

Nomadic pastoralism provided seasonal use of pastures and protected them from degradation. For **winter** pastures, territories were used that were well protected from snow storms and winds, for **summer** pastures - areas with rich vegetation and good water supply, for **spring-autumn** pastures - snowless areas with lush spring vegetation, and in autumn - young shoots of shrubs and dwarf shrubs.

Figure 9. Photo by Ekaterina Ivaschenko for http://www.fergana.info/

Such a system made it possible to maintain high productivity of pastures and their rational use for a very long time. They strictly adhered to **7 rules for the use of pastures**:

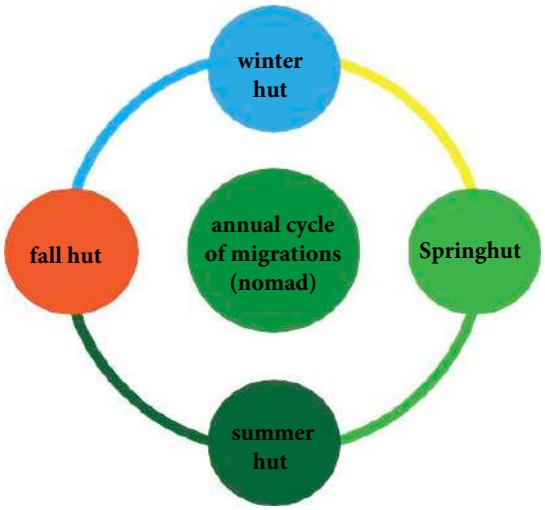


Figure 10. Annual migration cycle

1. Seasonal use of pastures. Kөktөө or jazdoo - spring, jailoo - summer, kyzdөө - autumn and kyshtoo - winter pastures.

It is necessary to divide the lands intended for winter, summer, autumn, spring pastures. Each site must only be used for one season so that soil and vegetation can fully recover during the other three seasons.

2. The rule for assessing the condition of the pasture (jurt-chaluu) before the nomad.

Usually the village elder goes to the summer pasture site to determine how ready the pasture is; readiness indicators are weather conditions, soil moisture level, grass height and the presence of certain plant species.

3. The rule of maintaining stable ties in the community (ajyrashaar ayak-tulөө beruu).

Before leaving for a nomadic camp, ajyrashaar ayak was necessarily performed, saying goodbye to relatives and neighbours in the winter stall and receiving their good wishes. Before leaving, they spread out a tablecloth on which they laid out bread and boorsoks, butter and cream, and asked for blessings: "old nomadic camp, provide support, new nomadic camp, bless." When arriving at a nomad camp, they were obliged to see and say hello to their summer nomad neighbours and start life in a new place with a holiday. Such ceremonies also helped maintain good relations in the community.

4. Rule when moving to jailoo.

The nomadic camps have always been a great holiday for both the breeders and the entire village; the pastoralists dressed in their best attire before the nomad, because the whole village was going to see them off. First, the aksakals and elders of the village went on horseback, then the baibiche, small and nursing children, adolescents, the last were men and young guys with animals. It was very important not to tire or overheat the cattle, so they walked with a measured and calm step.

5. The rule for changing the camp (jurt-kotoruu).

On the jailoo, every 15–20 days, it is necessary to change the place of nomadism, thus it is possible to prevent soil erosion and ammonia poisoning, which is formed when manure accumulates. This migration occurs vertically.

6. The rule of caring for animals when grazing livestock.

Animals on jailoo are not fenced and rarely tied so that they can move as naturally as possible. Sheep are grazed farthest from the nomad, then cattle, mares graze closest to the yurts, since they are milked several times a day on the jailoo.

7. The rule of careful attitude to nomadism.

Special attention was paid to the purity of the nomad; garbage was always collected and taken away when moving, ashes were poured onto the jailoo in a fenced-in place and away from the river mouth so that the wind would not blow it away. Pouring salt for animals can only be on stones, as salt corrodes the soil and promotes erosion. The defining rule was to leave the nomad in its original form.

VIII. Text "Traditional Knowledge".

The nomadic way of life of the Kyrgyz and the natural conditions in which they lived had a significant impact on the formation of traditional knowledge, social and economic practices of life, aimed at respecting nature and the world around them.

Traditional knowledge is a system of accumulated practical knowledge, skills and practical skills embodied in the traditional way of life, life support and transmitted by historically established communities from generation to generation, inherent in the people, associated with the specific locality of their residence - one of the indicators of the nation's self-identification.

Traditional knowledge of animal husbandry and pasture use is based on ancient practices and measures for the sustainable use of land, soil and vegetation for the livelihood of the population. They contain knowledge and practices on moving livestock, grazing, soil and vegetation restoration, harvesting and using feed, breeding and keeping livestock, veterinary medicine, and animal care.

Prohibitions related to nature

jurtundu bulgaba - Do not leave garbage after the wandering. *It was a requirement to burn all unnecessary and unnecessary, and they also said that "the genies should not dance in the place of the garbage of our camp."*

Akkan suuga tүkүrbөө, bulakty bulgaba - Do not spit into the water that flows, do not muddy the spring. *It meant to save water, not to pollute it, to open the channel and the source of springs so that they could flow on their own.*

Suunun da suragy bar - Water also has a demand. *That is, the time will come to answer for excessive water consumption.*

Jerdi beker kazba, chyrpykty beker kyiba - Do not dig the earth in vain, do not chop a branch unnecessarily.

Jalgyz tal korson kyibay jur - Do not chop down a lonely tree. *Meant to have compassion for loneliness.*

Akipress. Kyrgyz code. Author Kulipa Akmatova. http://kgcode.akipress.org/unews/un_post:14293

3. Discussion of the content of the texts according to the written comments.

4. Summing up, assessment, comparison of the content of the graphs.

I know	I want to know	I found out

5. Homework - independent work:

- Collect examples of traditional nature conservation knowledge and skills of the Kyrgyz people. Based on the collected material, prepare a presentation in PowerPoint for 3 minutes;
- To identify the advantages and disadvantages of using industrial carpets, shyrdaks, ala-kiyiz: environmental friendliness, practicality, impact on health, etc.;
- Prepare an essay on the topic "Features of the Kyrgyz national dress: age, status, seasonality, environmental friendliness";
- Pick a topic and do your research:
  - geometric aspects in the construction of a yurt: the Pythagorean theorem, the theorem of sines, the theorem of cosines, finding the angles of a triangle;
  - environmental friendliness and aspects of responsible consumption in the structure of the yurt;
  - principles of responsible consumption in everyday life of the Kyrgyz: food, household items, hygiene.
- Which of the 17 SDGs are related to the topics discussed in the lesson? Prepare a short message.

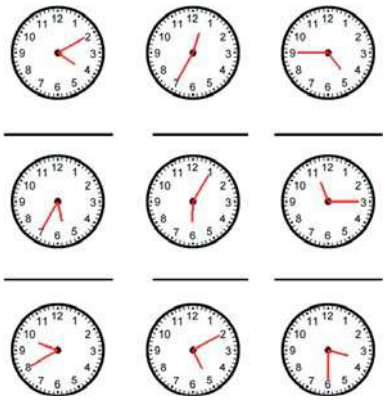
LESSON 4. PROBLEM OF WASTE DISPOSAL AND THE "ZERO WASTE" CONCEPT

Cross-curriculum communication: geography, biology, physics.
Grade: 8-11.
Duration: 2 hours.
Resources: computer, projector.

EXPECTED RESULTS: students will

- get acquainted with the types of waste;
- discuss the problem of garbage in the world and in Kyrgyzstan;
- get acquainted with the four principles of responsible consumption and give their opinion on their application.

LESSON STEPS



1. Exercise "Mood time".

Show your mood through Mood Time and explain why this time was chosen.

2. Working with text (work in small groups). Read the text and draw up a concept map.

CONCEPT MAP. The relationship between concepts is direction nodes. The analysis of structural interactions between the concepts of the subject area is an effective tool for displaying the conceptual system of a person. The formation of conceptual thinking (of a higher order) contributes to better memorization, extraction of knowledge from memory, increases the ability to apply knowledge in new situations. It may look schematically as follows (Fig. 11):

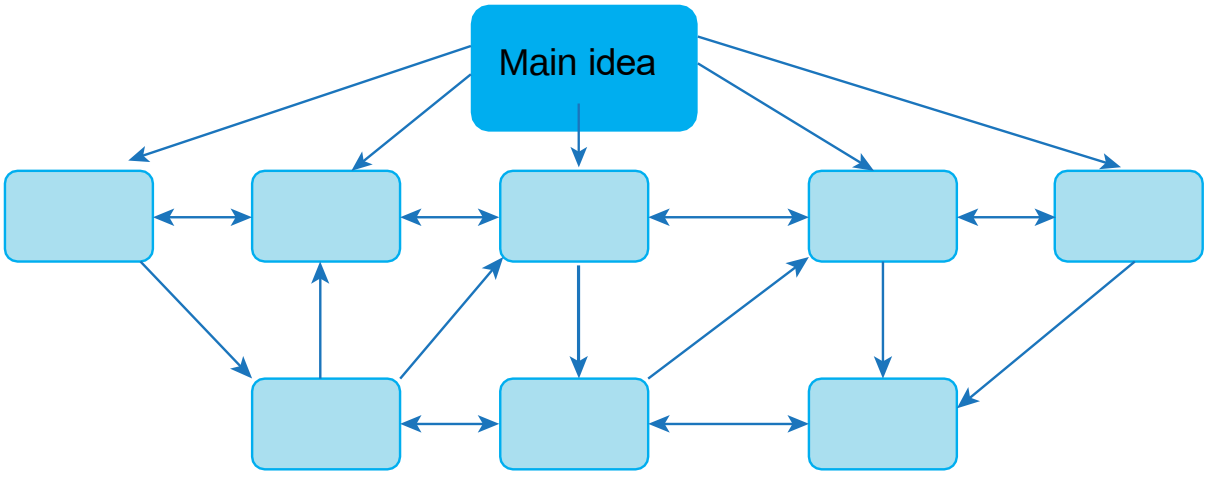


Figure 11. Sample Concept Map

Text for reading: «TYPES OF WASTE OF HUMAN LIFE, INDUSTRY, CONSTRUCTION AND THE POSSIBILITY OF THEIR PROCESSING».

1st group

Mankind faced the problem of waste, or garbage, many centuries ago, with the emergence and growth of cities. Waste from people and animals were thrown out into the street, which created difficulties for movement and contributed to the spread of diseases.

With the development of civilization, a sewage system appeared, garbage began to be taken out of cities, there were fewer animals in them. But at the same time, the volume of garbage produced by people has also increased. Landfill areas are increasing more and more.

Waste is divided into two large groups - production waste and consumption waste. To meet the needs of one modern person for food, clothing, housing and other things in one year, an average of 20 tons of various raw materials are consumed. But only 10% of raw materials go into the final product, and 90% turn into waste, which more and more pollute and poison our planet. Every year, along with the growth of production, the amount of its waste also grows.

When products go from production to consumption, again, a very large part of it goes to waste. And it turns out that the main part of the work in its life, the human community spends on the production of waste. In addition, we waste most of our labour and thoughtlessly waste natural resources, we also pollute and poison the environment with waste, causing irreparable harm to our health and nature as a whole.

2nd group

A significant part of the waste generated in the field of consumption is solid household waste (MSW), we often call it garbage. It becomes such when we mix it, i.e. dump in one heap or in one container. When collected separately, it constitutes a valuable raw material. Almost all of its parts (with the exception of radioactive, hazardous chemical and infectious substances that require burial, destruction or neutralization) can be used as raw materials. About 70% of solid waste is recyclable (metal, paper, plastic, cloth, etc.), and it can be sent for recycling. Most of the remaining MSW is plant and food waste, which must be microbiologically treated. These are composting and vermicomposting (processing by worms) to obtain valuable organic fertilizers and feed; it is anaerobic (biogas) processing with the production of a valuable energy resource - biogas and highly efficient liquid organic fertilizer.

The metal is sent to be smelted. The production of one ton of steel from scrap metal requires 74% less energy consumption than the production of it from ore. In the production of aluminium from cans for drinks, energy consumption is only 5-10% of what is required when obtaining the same amount of aluminium from bauxite. In addition, in the production of metal from recycled materials, air and water pollution is reduced several times.

Making paper from recycled paper rather than wood saves you from deforestation and cuts energy consumption by three-quarters. Water consumption for its production is also cut in half, and water waste is less polluted than when making paper from wood.

3rd group

A significant part of MSW, the share of which is increasing every year, is made up of plastics, of which most are thermoplastics, which can be melted and produced new products. If you add a mineral filler to 20-30% of plastic waste, you get a great tile. If you use organic matter as a filler (paper, cardboard, fabric, etc.), you can get an excellent finishing tile.

Compared to the currently widely used fibreboard and chipboard, in the manufacture of which substances harmful to health are used, it is much higher in quality and environmentally friendly.

Recently, the garment industry has developed greatly in Bishkek, a lot of production wastes have appeared. Meanwhile, the leftover fabric is a valuable raw material. A wide range of products can be obtained from them. They can be used as a filler in the recycling of plastic waste and are suitable for a wide range of nonwovens.

Glass waste (5-7%) occupies a significant share in MSW. Some of them (whole bottles) can be reused, the rest (cullet) can be disposed of (remelted). Some of the glass can be sent to the production of the products from which the cullet was obtained. Glass waste can also be used to make excellent building materials. One of them is foam glass. It is the most durable, strong, fireproof, heat-insulating material resistant to aggressive environments.

2-4% of the total volume of solid waste is rubber waste. To dispose of it in order to obtain new products, the waste must be crushed. However, due to the high elasticity of rubber, this is a rather difficult and costly task. To make it brittle, it is deeply cooled and only then crushed. This comes at a cost. At present, there are simple technologies for obtaining motor fuel from rubber waste. Its cost is quite low, and these technologies are quite competitive. There are such facilities in the Russian Federation and the People's Republic of China.

Construction waste constitutes a significant part of the waste. They are formed during the repair of roads, buildings, and the construction of new structures. They can also be disposed of, but you need to sort them first. Metal, plastic, wood are separated, and each of these components is processed according to its own technology. The mineral part, which is the bulk of construction waste, is crushed and can be used instead of gravel, crushed stone, sand during construction work.

4th group

When using secondary raw materials, ore and forest resources are preserved. There are several schemes for MSW management:

- according to the currently most common scheme, the waste mixture is disposed of in a landfill. Its advantage is the removal of garbage from the place of its formation. But she has a lot of shortcomings. This is the alienation of land for landfills, pollution of the biosphere, the threat of the spread of diseases, the destruction of raw materials.
- according to another, widely implemented at the present time, the mixture of waste is sent to sorting, where it is divided into separate types of raw materials sent for processing. When working according to this scheme, the waste at the place of its formation is laid out in separate containers and sent to consumers. Instead of high costs for organizing and operating waste landfills or sorting solid waste, you can profit from the sale of raw materials. To do this, you need to install additional containers for the separate collection of waste in places of their generation.

3. **Presentation of the results of group work.** Discussion. Questions and Answers.

4. **Information on the topic "5R: how to live by the principle of" Zero waste".** Determine which of the 17 SDGs the issues addressed in the text relate to.

WHAT IS THE ZERO WASTE CONCEPT?

"Zero Waste" is currently the most popular environmental concept. Previously, they tried to apply this principle only to production, and few people believed that ordinary modern people can do without garbage in their everyday life. **Frenchwoman Bea Johnson** proved with the example of her family that this is possible. She told us about five simple principles that underpin a zero-waste lifestyle, and we adapted them to our realities.

Figure 12. Refuse-give up unnecessary purchases

Step 1 Refuse!

The first commandment of a citizen of the planet is **not to buy too much.** Environmental problems start with overconsumption. **Perhaps the most harmful unnecessary thing is plastic packaging.** In stores, almost all products are already packed, and sometimes we do not have the opportunity to buy goods by weight in our containers. But where there is such an option, it should be used.

Get an eco-kit for every day so that you always have it at hand:

- **fabric shopping bag** (so as not to take plastic bags);
- **eco bags** for products by weight;
- **food container** (so as not to buy lunch in a disposable package);
- **water bottle** (to give up plastic bottles);
- **mug for drinks** (so as not to use disposable cups).

These five simple things can help you cut your trash footprint dramatically.

Step 2 Reduce!

Bea Johnson was convinced from her own experience that 80% of the things that a modern person has in an apartment, in fact, he does not need. But they may be needed by someone else.

Therefore, Bea handed over almost her entire wardrobe to the second hand without regret. **She only has 15 pieces of clothing left, and is proud to say that she can make 50 different outfits out of them**. You can reduce consumption in any area of your life. For example, Bea became convinced that the *acquisition of many things and other things* ***that have to be changed every month do not make any sense.*** The Frenchwoman uses vinegar and olive soap to clean the apartment (what can we do?), And coconut oil for skin care, and that was enough.

Figure 13. Reduse - reduce purchases

Step 3 Reuse!

Figure 14. Reuse

THE PURCHASED ITEM SHOULD LAST LONG AND SUITABLE FOR DIFFERENT PURPOSES. And ideally, when it is worn out, the manufacturer will take it for recycling. AND IF THE THING JUST STOPPING TO BE NECESSARY - IT CAN BE GIVEN TO OTHER PEOPLE. The Beah family benefited greatly from this approach: they cut spending by 40%. If many do this, manufacturers will have to rethink their irresponsible policies. After all, most of the goods, from a car to a kettle, are specially made short-lived so that the buyer would come for a new purchase as soon as possible.

Step 4 Recycle!

This item is in fourth place, not first, because recycling does not solve all the problems.

If you pick up disposable items in supermarkets every day and then take giant bags to separate collection points, your lifestyle is far from sustainable. The problem is that only part of the waste can be recycled into an equally valuable product. For example, plastic scrap will only be used for building materials, and after use they will go to the landfill. In many cases, recycling only briefly extends the life cycle of items, and in the end they end up in a garbage heap or in an incinerator. You need to hand over for recycling that small amount of waste that cannot be used in any way.

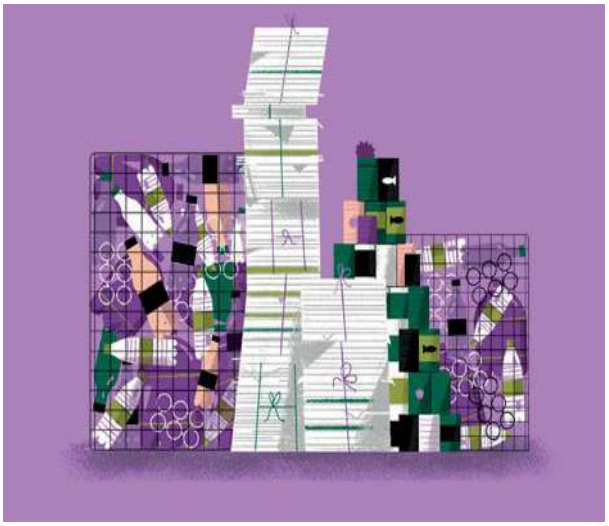


Figure 15. Recycle

Step 5 Rot!

ORGANIC WASTE makes up a third of all household waste, and it is because of them that many have to take out a bucket every day. But even cleanings and stubs can be used. With the help of the **COMPOST PIT (which should be in all homes and schools),** they turn into useful fertilizer for plants. City dwellers can equip their kitchens with a **dispenser** - an electrical appliance that shreds organic waste right under the sink. They enter the sewer system, and biogas is made from them at the treatment plant.

Figure 16. Rot

Important to remember!

Sustainable consumption of goods and services is consumption that has a minimal impact on nature, promotes social justice and is economically acceptable, which meets the basic needs of the world's population.

5. Homework.

Supplement the information in the text "How to deal with garbage in other countries" for the following countries: Vietnam, Cambodia, Philippines, Uganda, South Africa, Namibia, Brazil, Suriname. Compare waste disposal methods with how it is done in the Kyrgyz Republic.

HOW TO FIGHT GARBAGE IN OTHER COUNTRIES

In Germany, about 45 million tons of recycled waste is incinerated per year in special factories, which also benefits the population.

Gas turbines generate electricity and exhaust gases, after cleaning, are used for heating. At the same time, emissions into the atmosphere enter through special filters. Such factories are recognized as environmentally friendly.

In Japan, recycled waste is also incinerated, and the waste incineration plant's treatment facilities are so efficient that the gardens around these small thermal power plants are fragrant. Electricity is sold to local energy companies, and even ash goes into business - whole islands are poured out of it, on which prestigious residential areas are then erected.

Garbage is also incinerated in Denmark. In Copenhagen, an incineration plant heats the city and supplies electricity to residents. The plant's chimneys emit non - toxic smoke that does not have an unpleasant odour. Moreover, on the roof of the factory, 85 meters high, a ski slope was built, which is open all year round. The surface of the slope is covered with recycled plastic, and you can slide on it as well as on snow.

Based on materials from the Internet

6. Assessing and summing up the lesson.

Pick one of these emojis and answer these three questions. Develops critical thinking, independence, contributes to the analysis of situations.

	**I have a lot to work on.**
	**I understood everything!**
	**Hurrah! I understood everything!**

LESSON 5. HISTORY OF THE PAPER. RECYCLING WASTE PAPER IN HOME CONDITIONS.

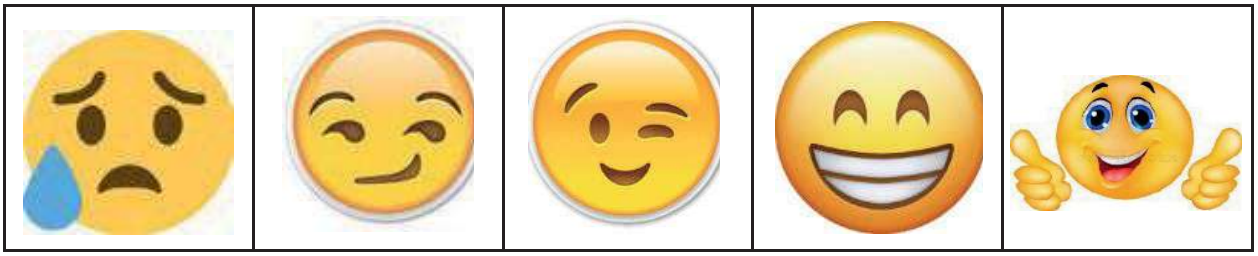
Cross-curriculum communication: chemistry.
Grade: 8-9.
Methods and techniques: group work, reading text.
Resources: old newspapers, gouache.
Duration: 2 hours.

EXPECTED RESULTS: students will

- study the history of the appearance of paper;
- discuss the technology of making paper;
- make paper at home.

LESSON STEPS

Motivation. Question: Choose from these emoticons the one that you liked and explain why you chose it.



1. ***Brainstorming (questions):*** What do you know about paper? What is the importance of paper for our life? What do we get paper from? Which of the 17 SDGs are related to the issues discussed in today's topic?
2. ***Working with text. Reception "Reading by marking".*** If you find familiar information in the text, then mark with a tick "V", new information - with a plus sign "+", Do not agree with the information - sign "-", if it is not clear - sign "?"

Reading text: "History of the origin of paper".

Paper (presumably from Italian bambagia, or Tatar boomug - cotton) is a fibrous material with mineral additives in the form of sheets for writing, drawing, packaging and other things, obtained from cellulose: plants, as well as recyclable materials (rags and waste paper).

Before the advent of paper, papyrus, widely known in ancient Egypt, was used for writing. From him came the English name of the paper. It was made from the core of the reed. In addition to it, parchment invented in the Pergamon kingdom was also used, which was made from specially treated animal skin. Its main advantage over papyrus was its relative durability and reusability. However, among the minuses was a rather high complexity of its manufacture and, accordingly, a high cost.

The first paper, the predecessor of the current one, was known in ancient China. Around 105 A.D. Chinese dignitary Tsai Lun invented the first industrial method of making paper. First, a fibrous mass was prepared, which was scooped up with a special form-mesh. The water that was in this mass seeped through the holes in the grid, leaving only an even layer of future paper. Wood and other plant material, shredded and cooked in vats with a sticky substance, were used as material for the paper pulp.

From China, already in the 6th century, the recipe for making paper migrated to Japan, and then to other Asian countries. In the 8th century, after the victory of the Arabs over the Chinese, the secret of papermaking became known in the Middle East. The city of Samarkand has become a kind of centre for the paper industry of this region. In the XI-XII centuries, this secret came to Europe. First of all, to countries such as France, Italy and Spain. Of these, paper production has spread to other European countries.

In Italy, the papermaking process has been slightly modified. The Arab mill was replaced by the so-called crush, which made it possible to prepare paper pulp of higher quality. Animal glue was used as a sticky substance.

Own papermaking came to Russia in the middle of the 16th century, during the reign of Ivan the Terrible. The paper most likely took its Russian name from the Tatar word "boom" (cotton), which came in the 13th century. Then Khan Batu, who attacked Russia, conducted a census of the population of the occupied lands using this Chinese invention.

After the appearance of the paper-making machine invented by the Frenchman Louis Robber in 1799, the volume of paper production increased significantly.

Based on materials from the Internet

3. Discussion and exchange of information on the studied text "History of the origin of paper". Questions and Answers.

4. Work in small groups. Preparation of the presentation. After reading the text, each group prepares a presentation with additional information to this text.

READING TEXT: “Paper making technology”.

To prepare paper, you need plant substances with a sufficiently long fibre, which, when mixed with water, will give a homogeneous, plastic, paper pulp. Semi-finished products for paper production can be:

- wood pulp or cellulose;
- cellulose of annual plants (straw, cane, hemp, rice and others);
- semi-cellulose;
- waste paper;
- rag half-mass;
- for special types of paper: asbestos, wool and other textile fibres.

Paper production consists of the following processes:

- preparation of paper pulp (grinding and mixing of components, sizing, filling and colouring of paper pulp);
- production of paper pulp on a paper machine (dilution with water and cleaning the pulp from impurities, ebb, pressing and drying, as well as initial finishing);
- final finishing (calendering, cutting);
- sorting and packing.

When milled, the fibres are given the required thickness and physical properties. To make paper suitable for writing and to give it hydrophobic properties, rosin glue, paraffin emulsion, alumina and other substances that promote adhesion (the so-called sizing) are introduced into the paper pulp; starch, animal glue are added to increase the bond between the fibres and increase the mechanical strength and stiffness; to increase the strength of paper in a wet state - urea and melamine-formaldehyde resins. To increase the whiteness, smoothness,

softness and opacity, as well as to improve the printing properties of the paper, mineral fillers (kaolin, chalk, talc) are introduced; to add colour and increase whiteness - aniline (less often mineral) dyes. Some types of paper, for example, absorbent and electrical insulating, are produced without sizing and filling. Hemp paper and rice paper are whiter than wood pulp paper and therefore often do not require additional chemical bleaching of the fibres.

The finished paper pulp is pumped from the preparatory department to the mixing tank, from where it is fed to the paper machine. The mass is preliminarily diluted with circulating water and passed through cleaning equipment (sandboxes, vortex and centrifugal cleaners and knot catchers).

The most common is the so-called canteen (flat mesh) papermaking machine. It consists of a netting, pressing and drying parts, a calendar and a roll. The pulp flows out in a continuous flow onto the moving closed-loop mesh of the machine, where ebb, dehydration and compaction of the paper web takes place. Further dewatering and compaction of the web is carried out in the press section, formed by several roller presses, between the shafts of which the paper web is transported in one piece during the whole process by a felt that serves as an elastic pad. The final removal of water takes place in the drying section, where the paper web alternately contacts its surfaces with steam-heated drying cylinders arranged in a staggered manner in two tiers. The surface of the paper is smooth due to the fact that it is pressed against the cylinders by the upper and lower felts. The resulting paper web is wound on rolls on a reel, which is a forced rotating cylinder, against which the roller with the paper wound on it is pressed.

The paper can then be processed in a supercalender, which is a vertical battery of 5-8 metal rolls. When moving between the shafts from top to bottom, the web becomes smoother, compacted and levelled up in thickness.

Sources: 1. http://ru.wikipedia.org/wiki/Бумага/
2.http://www.karachev-city.ru/blog/istorija_pojavlenija_bumagi/2011-08-09-30

5. Practical task. Make a list of ways to recycle paper at home

Sample list

1. *Storage of pencils, clothespins, puzzles, buttons, beads and other small items.*
2. *Storage of vegetables and fruits in winter.*
3. *Storage of toys (blocks, constructor, etc.).*
4. *Storage of cereals and bulk materials in the kitchen.*
5. *Storage and transportation of things when moving.*
6. *Making crafts and souvenirs.*
7. *Making useful and decorative things for home decoration (design of photo frames, boxes, decorative chests, etc.).*
8. *Making paper for creation*

6. Summing up the results of the lesson, assessment. Six Thinking Hats method. Express your position on today's lesson using the colours of the six hats.

	**Red hat. Emotions. Intuition, feelings and premonitions. There is no need to justify feelings. How do I feel about this?**
	**White hat. Information. Questions. What information do we have? What other information do we need?**
	**Black hat. Caution. Judgment. Assessment. Is it true? Will this work? What are the disadvantages? What's wrong here?**
	**Yellow hat. Benefits. Why is it worth doing? What are the benefits? Why can this be done? Why does it work?**
	**Green hat. Creation. Various ideas. New ideas. Suggestions. Possible solutions and actions. Alternative solutions and actions.**
	**Blue hat. Organization of thinking. Generalization. What have we achieved? What needs to be done next?**

7. Homework:

a) making paper at home.

Required materials: old newspaper, water, frame.

Algorithm of actions:

1. Tear the paper (use old newspapers) into small pieces (no more than 2x2 cm), cover with a little water and leave overnight.
2. When the newspaper is soaked, add more water and grind the paper with a mixer so that small pieces or fibres of the paper can be distinguished.
3. Make a stretcher.
4. Pull the nylon over the photo frame. Tie the ends.
5. Fill the bowl with the resulting paper pulp and immerse the frame in it. Gently lift the frame, keeping it horizontal.
6. After the water has drained off, the frame is turned over to the top with a net, and all excess moisture is removed with a sponge.

7. Next, the frame is removed. The paper dries up in a few hours.
8. The resulting paper is ironed through thin gauze or newspaper. ***Note:*** in order to obtain coloured paper, you can apply the staining of the resulting mass with a dye (eg: gouache).

b) making fuel (firewood) balls from paper.

Necessary materials: old newspapers, used paper, a container for soaking paper (bucket, pan or basin), water.

Algorithm of actions:

1. Shred the paper. Fill a container halfway with water and put shredded paper in it. Leave it for half an hour or an hour until the paper softens.
2. After an hour, form balls about the size of a tennis ball out of the wet paper.
3. Spread the resulting balls in the sun and leave them to dry completely.
4. Once dry, these balls can be used to light a fire in the hearth, in the stove.

Figure 17. Waste paper fuel balls

LESSON 6. GREEN CONSUMPTION

Cross-curriculum communication: Man and society, geography.
Grade: 9-11.
Duration: 2 hours.
Resources: computer, projector, Internet sources.

EXPECTED RESULTS: students will

- understand what “green” consumption is, tasks and principles of “green” consumption;
- will discuss the “Basic Principles of Green Consumption”.

LESSON STEPS

1. Information on the topic. Questions: What is green consumption? Objectives and principles of green consumption.

«Green consumption is not a new fashion, it is a new quality of life. Traditionally, most often in matters of consumer choice, we focus on stereotypes existing in society. These stereotypes are constantly dictating to us everywhere: “this is good, and this is bad”, “this is prestigious, this is not”.

The quality of life is not so much the level of our consumption (the more, the more expensive and more prestigious - the better), but the presence of the environment necessary for a full life and human health. These are clean air and water, safe food and a rhythm of life corresponding to the natural needs of the human body, instead of the constant stress, race for career, money and status.

2. Working with text. Pair work. Read the text in pairs, retell to each other. Align the content of this text with the 17 SDGs. Identify connections and talk in class.

READING TEXT: Basic Principles of Green Consumption.

1st pair. A manufacturer produces a product when there is a demand from the population. If people stop buying products, sooner or later they are removed from production. And when the demand for new products arises, the companies begin to compete among themselves - who is better, more and, most importantly, will produce it cheaper. These are the laws of the market.

Therefore, if we - consumers begin to prefer environmentally friendly products, manufacturers will begin to produce more of them. To buy ecological products, you need to know the following criteria:

- *safety of production for the environment;*
- *quality and quantity of packaging (recyclability);*
- *product service life and quality of its manufacture;*
- *possibility of its reuse and recycling;*
- *method of waste disposal after product consumption;*
- *distance the product is transported.*

It is necessary to pay attention to the last criterion. It is important for several reasons: transportation wastes energy, time and financial resources, pollutes the environment, and by buying locally produced food you are contributing to strengthening the local economy.

Everyone knows that price is an important criterion when choosing a purchase. We constantly hear information that environmentally friendly products are more expensive. This is actually the case. Indeed, prices for ecological products are also higher because they include the cost of safe waste disposal.

At the same time, it should be remembered that environmentally friendly products contain fewer components hazardous to health.

At the same time, we must always understand that, according to the laws of the market, products for which there is a demand are becoming cheaper and cheaper, as manufacturers begin to compete for the attention of the buyer and find ways to reduce costs. Therefore, you need to make the right choice!

2nd pair. Excess consumption. Excess consumption is one of the side effects of a market economy. Manufacturers are trying to expand their product offerings in order to maintain their position in the market, and stimulate demand in all possible ways - from attractive packaging to expensive advertising methods. They are doing everything they can to win the competition, but that doesn't mean we should be manipulated.

The manufacturer offers - the buyer chooses. If we are responsible for our purchases, then we:

- *we buy only what we really need;*
- *we do not create unnecessary trash either in our house or in landfills;*
- *we choose the best (environmentally friendly and healthy), i.e. we support manufacturers who care about quality and take into account the interests of consumers.*

3rd pair. Why are we buying? We buy in order to establish and improve our status, to be like everyone else, or, conversely, to be different from others. And, of course, because we are being pressured by a giant army of manufacturers, corporations who spend billions to encourage us to buy more.

Reflect on your recent purchases.

Figure 18. Consumer society. Drawing from the Internet

Is there anything you don't use or could easily do without? The next time you feel the urge to buy something unplanned, stop for a few seconds and ask yourself these questions:

1. *Why did I suddenly want to buy this thing?*
2. *Am I attracted to the product itself or was I influenced by advertising?*
3. *Will this thing fill my life with joy or will it just take up extra space?*
4. *Is there any pattern in my purchases?*
5. *Do I make more unnecessary purchases in a bad mood?*

4th pair. Let's become a responsible professional shopper. Eco-friendly shopping for health, benefits and convenience is a great choice. We must consider the environmental implications of each purchase by asking ourselves:

1. *Does the production of this product and packaging harm the environment (and, therefore, your quality of life, your health)?*
2. *Will unnecessary packaging replenish the mountains of garbage?*
3. *Is it possible to reuse the product after using it?*
4. *Did you buy a product brought from far away, while there was a high-quality local analogue nearby?*

Figure 19. Responsible consumption

Before we start teaching others the principles of green consumption, we must try for ourselves:

1. *Train yourself to always check the expiration dates of products, ask to present certificates for the products sold and, if necessary, return defective goods.*
2. *Always carefully read the product information on the package or label.*
3. *Find out if the packaging is recyclable, made from renewable materials, and is not toxic.*
4. *Choose products with a minimum amount of packaging.*
5. *Under equal conditions, choose goods of local production.*
6. *When choosing a product, make sure that it itself, its use or disposal does not harm the environment and the human body.*
7. *Buy ecolabelled products.*
8. *Plan your purchases so you don't buy unnecessary things.*

All these methods are the basis of "green" consumption!

If we strive to comply with these principles, then as a professional buyer we are forcing the manufacturer and the seller to supply only environmentally friendly and healthy products to the market. In addition, there will be less rubbish in the house, and more money will remain in the famil budget.

Source: http://greenbelarus.info/files/downloads/kak_vospitat_zelyonogo_potrebitelya.pdf

3. Discussion of the results of paired work.

4. Assignment to the house. Think back to your family's purchases over the past week and answer the questions in writing:

1. Why did you or a member of your family suddenly want to buy this thing?
2. Are you attracted by the product itself or did you make a purchase under the influence of advertising?
3. Will this thing fill your life with joy or just take up extra space?
4. Is there any pattern in your purchases?
5. Do you or your family members, friends make more unnecessary purchases in a bad mood?
6. Which of the 17 SDGs can this topic be linked to?

LESSON 7. COMPREHENSIVE ASSESSMENT OF THE ENVIRONMENTAL STATE OF THE SCHOOL TERRITORY

Cross-curriculum communication: biology, geography, mathematics, art, physics.

— (Geography 6-7 grades - drawing up a plan for a school site, studying geographical designations, cardinal points, soil composition, soil diversity. Biology 6-7 grades - classification of plants, the role of leaf fall in plant life, seasonality in plant life, landscaping. Mathematics - determine area of the school area. Art - drawing natural objects, corners of the school area Biology (11 grades) - human influence on the OS (building, paths, trampling).

Grade: 6-11.

Duration: 4-6 hours.

Resources: tape measure, compass.

EXPECTED RESULTS: students will

- Understand the role of the school playground in the educational institution, in the organization of recreation, sanitary and hygienic significance;
- use the territory and functional areas of the school site;
- participate in the planning and improvement of the school site;
- to conduct a comprehensive assessment of the ecological state of the school territory.

LESSON STEPS

1. **Introductory word of the teacher:**

The threat of climate change is of concern to people around the world. High levels of greenhouse gases are warming our planet, and the carbon dioxide (CO2) created by humans is having a devastating impact on habitats and wildlife. An ecologically clean, high-grade external environment, along with other factors, is an important prerequisite for the preservation and strengthening of human health and development. Green spaces play an important role in the regulation of the microclimate: they protect the soil, walls of houses, sidewalks from excessive overheating, moisturize and purify the air. They capture 70-80% of aerosols and dust from the air. On a hot summer day, on a lawn path, the air temperature at a height of 1.5 m from the ground is almost 2.5 ° C lower than on an asphalt pavement.

Green spaces also absorb sound waves, reducing external noise emissions.

2. **Brainstorming: Are you happy with our school grounds in terms of landscaping? What suggestions do you have for improving the landscaping of the school grounds?**
3. **Discussions on the responses received.**
4. **Information of the teacher about the problem.**

Together with you, we can create microreserves, huts for wintering insects, areas with artificial nests and bird feeders, geobotanical grounds, arboretums, etc. on the school site. plant species typical for this area, equip a demonstration place for recreation with a campfire with removed turf, here you can also study the effect of trampling on the condition and composition of roadside vegetation, study the sanitary and hygienic state of the school playground, develop your own school playground project.

5. **Acquaintance with the layout of the school grounds.** Walking around the school grounds with the teacher.

Practical work No. 1. "Conducting research."

Research execution algorithm:

1. Make a map of the microdistrict, including closely located residential buildings, shops, offices, roads, parks, squares, boulevards, etc.
2. Mark the location of the school on the map.
3. Measure with a tape measure (or in steps) the distance to the nearest residential building, store, household, road. Plot the data on the map and in table 1.
4. On the map of the school lot, mark the following areas:
   a) training and experimental zone (areas of various crops, flower and ornamental plants, meteorological and geographical area);
   a) physical culture and sports zone;
   b) recreation area (playground for outdoor games);
   d) economic zone.
5. Enter the results of the assessment into the table, if necessary add the columns you need.

Measurements performed	Results	Sanitary and hygienic standards (not less), km
Pedestrian accessibility of the school		In urban areas: 0.5 km In rural areas: no more than 2 km for primary school; no more than 3 km for 5-11 grades.
Distance from home to school or back one way		The distance from home to school or vice versa should not take more than 30 minutes one way
Landscaping of the territory		Landscaping of the territory of at least 50% of the area of the school territory

Processing of results and conclusions.

Analyze the layout of the school area and draw a conclusion about its compliance with sanitary and hygienic standards, using the following additional data:

- the sports ground should be located in the depth of the site and separated from the windows of classrooms by a strip of green spaces;
- schools should provide a recreation area for outdoor games and recreation for students, as well as for the implementation of educational programs in the fresh air;
- the economic zone should be located on the side of the entrance to the production premises of the canteen and have a separate entrance from the street, etc .;
- to collect waste on the territory of the economic zone, a site is equipped, on which garbage collectors (containers) are installed. The site is located at a distance of at least 25 m from the entrance to the catering unit, windows of classrooms, offices and is equipped with a waterproof hard coating, the dimensions of which exceed the base area of the containers by 1 m in all directions. Waste bins should have tight-fitting lids;
- entrances and entrances to the territory, driveways, paths to outbuildings, to areas for waste bins are covered with asphalt, concrete and other hard surfaces;
- the school grounds must have outdoor artificial lighting;
- trees are planted at a distance of at least 15 m, and shrubs - at least 5 m from the school building.
- it is forbidden to use trees and shrubs with poisonous fruits for landscaping;
- It is not allowed to use basements and basements for training rooms, offices, laboratories, training workshops, medical premises, sports, dance and assembly halls.

Practical work No. 2. "Pollution of the atmosphere with dust particles."

Equipment: flat-bottomed flask 500 ml, funnel D-56, filters (fine sieve, piece of cloth, gauze), water.

Work execution algorithm

1. Collect the leaves of shrubs and trees in various places of the school area: from the side of residential buildings, the motorway and in the depths of the school area (4-5 leaves each).
2. Separately rinse the leaves of each area in boiled water (in 100 ml) and filter the resulting solution. Compare the degree of dust content by the degree of filter contamination and draw conclusions.
3. Record the results in the table (see table 2).
4. Calculate the number of trees and shrubs on the site, and then calculate the amount of dust settling on the green spaces of the school site, if during the spring-summer period 23 kg settles on elm, 39 kg for willow, 33 kg for maple, poplar - 34 kg, ash - 27 kg, lilac - 16 kg, acacia - 0.2 kg of dust.
5. What plants can be recommended for the school area, taking into account the climatic conditions, growth rate, aesthetic value of these plants?
6. Calculate how much water per day evaporates the lawn of the school area if 200 g of

Table 2

Plant location	Comparative degree of dustiness (visual)		
	high	medium	small
From the side of residential buildings			
By the road			
In the depths of the site			

Practical work 3. "How the flower clock works on the school grounds."

Purpose: to demonstrate the biorhythms of plants using the example of a flower clock according to the "flora clock" by K. Linnaeus

Work execution algorithm

1. Get acquainted with the plants, then plant them on a separate plot and check how the flower clock works in the area.
2. Observe flower clocks: how weather conditions affect their condition.
3. Make sure of the direct influence of the external environment on the life of plants.

Flower clock

Plant	Flowers	
	Open at:	close at:
Rosehip	4 a.m	7 p.m
Chicory	5 a.m	3 p.m
Poppy	6 a.m	2 p.m
Dandelion	6 a.m	3 p.m
Silene	9 a.m	9 p.m
Calendula	9 a.m	4 p.m
Day-lily	5 a.m	8 p.m
Carnation pierced	8 a.m	1 p.m
Oxalis	10 a.m	11 p.m

Practical work 4. "Determination of noise pollution in school territory."
Equipment: sound level meter.
Work execution algorithm
Use a sound level meter to measure the noise level in the school grounds:

1) from the side of the residential area;
2) at the green lane on the side of the road;
3) at the green stripe on the side of the school.

Processing of results and conclusions

Draw conclusions about the noise level in the school area and the role of green spaces in sound absorption (the standard noise level in the school area is 40 dBA). Summarize the obtained data and draw a conclusion about the ecological state of the school territory and ways to improve it.

Practical work 5. "Determination of the species composition of the vegetation of the near-field territory".
Equipment: Plant guides, pegs, twine, 1 m ruler.

1. **Algorithm of work execution**
   1) Determine the species composition of trees, shrubs.
   2) Choose several sites, measuring 1m x 1m, on the lawns of the school territory.
   3) Determine the species composition of herbaceous plants.
   4) Calculate the total number of species.
   5) Describe the condition and maintenance of lawns.
2. **Treatment of results and conclusions**

Make a conclusion about the correctness of the selection of green spaces by species composition and make specific proposals to improve the layout of the school territory.

Information for conclusions

On the leaf surface of one adult plant, dust is deposited during the summer period: rough elm - up to 23 kg, Canadian poplar - up to 34 kg, ash - up to 27 kg, lilac - up to 1.6 kg, willow - up to 38 kg, acacia - up to 0,2 kg, maple - up to 33 kg, narrow-leaved elk - up to 2 kg.

Good absorbers of lead on roadsides are yellow acacia, linden. The most resistant to air pollution with gases are poplar, white willow, American maple, white acacia, lilac, warty birch, narrow-leaved elk, barberry, etc.

7. **Homework. Project work (team work). Prepare a project for the improvement of the school area (diagram).**

A) creation of recreation areas;
B) a place for the disposal of organic waste (compost pit, etc.);
C) a place for exercise (sports, biology, geography, meteorological sites, an arboretum, a mini-greenhouse, a greenhouse, houses for wintering insects, birdhouses, etc.);
D) paths, alleys, paths on the school grounds;
E) for the implementation of which of the 17 SDGs is this work being carried out?

LESSON 8. NECESSARY HABITS FOR RESPONSIBLE CONSUMPTION.

Cross-curriculum communication: geography, biology, physics, chemistry, etc.
Grade: 5-11.
Duration: 4 hours.
Methods and techniques: work in groups - "Gallery", discussion.

Resources: Whatman paper, chalk, blackboard, markers, coloured pencils, drawing paper, Internet sources, interactive whiteboard.

EXPECTED RESULTS: students will

- discuss the necessary responsible consumption habits;
- list and disseminate information on responsible consumption;
- learn to use the necessary responsible consumption habits in everyday life, in school, etc.

LESSON STEPS

1. **Exercise "Draw your mood."**
   We draw our mood individually for 3-5 minutes and discuss the drawings.
2. **Questions:** What is need and desire? What's the difference between them? What is a habit? How does it affect our daily life? What influences the formation of habits?
3. **Watching videos and discussing** https://www.youtube.com/watch?v=WZIpJdXZOUE

4. **Introductory word of the teacher:**

Need and desires. A need, a need for something that requires satisfaction. An urgent need. Feel the need for something. Growing needs. (Explanatory dictionary Ozhegov online).

Desire - internal attraction, the desire to achieve something, to possess something. (Explanatory Dictionary of Ushakov. D.N. Ushakov. 1935-1940).

Habit is an established way of behaviour, the implementation of which in a certain situation acquires the character of needs for the individual, which “induce him to perform some actions and deeds. When a habit is formed, an action is repeatedly performed, a pleasant emotional experience caused by the very implementation of this action is extremely important, since it is “learned, has become automatic and is performed without effort.

(https://ru.wikipedia.org/wiki/).

A habit in psychology is any regularly repeated type of behaviour that does not require reflection and is more acquired than innate. It can relate to any field of activity (from eating and sleeping to thinking and reacting) and is formed through reinforcement and repetition.

Distinguish between **positive and negative habits**. Positive habits (for example, the habits of a rational work regime at the machine tool, sanitary and hygienic habits, cultural habits in everyday life, etc.) are an important condition for labour productivity, compliance of behaviour with social norms, a condition for health protection. By facilitating the observance of certain rules, habits are of great help in organizing a person's personal and social life. Negative habits (disordered and negligent work performance, violation of cultural norms, etc.) have the opposite effect. Today we will be discussing the habits associated with responsible consumption, and to understand this issue, we will do some practical work.

5. Practical work 1:

Development of the "Calendar of Responsible Consumption".

Work recommendation

1. Develop a 12-sheet wall calendar for 2021.
2. Place an infographic that will help you quickly and easily understand a particular topic of responsible consumption.
3. Provide information in a concise form.
   For example: on the ecological footprint of a person (January); on the types of household waste (March); on product labeling (April), on separate waste collection in the city, on minimalism as a lifestyle, on resource conservation in everyday life and environmentally friendly cleaning, on the use of natural and organic cosmetics (the text is given below).
4. On each page of the calendar, provide a checklist for responsible consumption, which will help the consumer to apply and adopt new habits in his life.
5. It is possible to provide on each page a QR-code, which leads to the knowledge base with extended multimedia information on a specific topic.
6. You can provide a calendar for sale. All funds received from the sale of the Calendar of Responsible Consumption for 2021 should be used to promote and make information about responsible consumption more accessible.
7. Write a summary on each page about the link to the 12 SDGs or others.

Calendar design information

1. How to save energy?

- Turn on your computer only when necessary.
- Turn off your computer when you are not using it: during your lunch break and at night.
- Set the computer to sleep.
- Do not use screensaver.
- Turn on office equipment as needed.
- Turn off the lights when you are the last to leave.
- Avoid using an air conditioner.

2. How to move intelligently?

- Share the machine with colleagues.
- Buy hybrid or small cars.
- Drive your car more slowly.
- Use public transport.
- Ride your bike or walk to work if you live close enough.
- Work from home whenever possible.
- Avoid business trips - arrange online negotiations.
- Turn off lights and air conditioning when you leave the house.

3. How to use cookware responsibly?

- Bring meals in reusable packaging.
- Use dishes that can be washed and reused.
- Do not buy water in plastic containers.
- Use your mug.
- Avoid using paper towels.
- Present mugs to colleagues.
- Do not pour a lot of water while you wash the dishes.
- Repair leaking taps in a timely manner.

4. How to create a favourable environment for study and work?

- Keep curtains open in cold weather.
- Use natural light whenever possible.
- Avoid toxic cleaning agents - a cloth dampened with water is sufficient to wipe off the dust.
- Do not keep the window open in winter - provide quick ventilation.
- Make sure that furniture or other objects do not block heating and cooling of the room.
- Place indoor plants in the workplace.
- Give potted flowers to your colleagues.

5. How to make rational decisions?

- When replacing equipment, buy energy-saving multifunctional appliances.
- Measure water and electricity costs.
- Buy cartridges that can be refilled.
- Buy recycled and chlorine-free paper.
- Organize the collection of waste for recycling.
- Create separate collection points for waste.
- Purchase reusable tableware.
- Install water filters in the kitchen.
- Install a toilet flush with a low water consumption.
- Prohibit smoking indoors.
- Use energy saving lamps.
- Buy office supplies.

Practical Work 2: «Fair Trade[1] Principles». Find and study information about Fair Trade principles. Write an essay on the "10 principles of fair trade" using online sources.

6. Summing up the lesson and assessment. Algorithm of the task execution.

1) Individually write a mini-essay on the topic: "For me, the information about ... was interesting."
2) Mutual appreciation "Two stars - one wish." Assess the work of your classmates in the group. Identify two positive points - "two stars", and one point that deserves improvement - "desire."
3) Those interested can tell about the results of their work.

7.Assignment at home. Practical work 3. Team work. Development of an information poster on the theme: "Lines of behaviour for sustainable development of society."

Work execution algorithm

1. Divide into teams of your choice.
2. Examine the contents of the table.
3. Consider the design of the information poster.
4. When developing a design, consider the correspondence of the content to the design.
5. Find links to the relevant SDGs in the actions outlined in the **Lines of Conduct for Sustainable Development** table below.

Resources: watercolours, coloured pencils, Whatman paper, brushes, photographs, drawings, etc.

Table "Lines of behaviour for sustainable development of society."

STRIVE	AVOID
LIFESTYLE	
• Work - rest: 50/50; • Have time for family and self-improvement.	• Work for consumption.
EAT WELL	
• Buy locally produced food; • Go down the food chain (eat vegetables); • Buy fresh food; • Eat for the season; • Eat less red meat; • Buy “fair products”; • Make compost; • Take a string bag when going shopping.	• Buy imported products; • Eat a lot of meat; • Buy canned food; • Eat out of season; • Buy GMOs; • Eat red meat; • Buy products from global corporations; • Throw away the remains of products; • Buy (take for free) plastic and paper bags in stores.

1 **«Fair trade»** — an organized social movement advocating fair standards for international labour, environmental and social regulation, as well as public policies for labelled and unlabeled goods, from handicrafts to agricultural products.

CLEAN UP	
• Use a broom instead of a vacuum cleaner; • Buy ecological detergents; • Wash at a low temperature; • Use less detergent and rinse aid; • Dry your clothes outside; • Use washing machines and dishwashers only when fully loaded; •Do not throw garbage in the sink or toilet; •Buy ozone-friendly products.	• Use a vacuum cleaner; • Buy chlorine-containing detergents; • Washable at high temperature; • Use rinse aid when washing; • Dry clothes in an electric dryer; • Use washing machines and dishwashers at partial load; • Avoid emissions of ozone depleting substances into the atmosphere.
REPAIR AND FURNITURE	
• Choose natural building and finishing materials; • Buy furniture: • used; • from natural materials; • local production..	• Choose synthetic materials; • Buy furniture: made of synthetic materials, imported.
AT WORK	
• Use less paper for printing; • Use electronic communications,calendars; • Refill cartridges; • Have your own mug.	• Print whenever you need; • Use written communication; • Purchase new non-recyclable cartridges; • Drink from plastic cups.
SAVE ENERGY	
• Use LED bulbs; • Use energy saving electrical appliances; • Create additional insulation; • In winter,keep the thermostat at an acceptably low temperature; • Turn off the light when leaving the room; • Turn off computers,TVs and monitors when not in use; • Unplug small appliances and chargers when not in use.	•Use incandescent bulbs; • Use high-power devices; • Open windows when heating is • Turn on the thermostat to a high level; • Leave the lights on when leaving the room; • Leave computers and monitors turned on when not in use •Boil more water than necessary.
DRESS SMART	
• Wear what you bought, if possible,restore; • Buy only what you really need; • Buy something that will last longer; • Give clothes to those in need; • Hand over worn-out clothing for recycling; • Visit "second hand"; • Choose eco-friendly fabrics; • Choose products according to the principle of "Fair trade".	• Purchase a new wardrobe every season; • Buy low-quality, quickly worn clothes; • Throw away clothes that may still be worn; • Choose synthetic fabrics; • Buy mass-produced leather goods.

MOVE MORE	
• Travel by land transport; • Use a bike; • Use public transport; • Go to shops near your home; • Share the car; • Use ecological fuel; • Buy hybrid or small cars; • Drive your car more slowly; • Do not wash your car often; • Use a bucket, not a hose, to wash the machine.	• Travel by air; • Use a car; • Use the car alone; • Use traditional fuel; • Buy non-environmentally friendly cars; • Drive the car at high speed; • Frequently wash the car; • Visit car washes where unsustainable technologies are used.
SAVE WATER	
• Use water filters; • Take a shower, not a bath; • Take a shower for less than 5 minutes; • Turn off the water when brushing your teeth or soaping; • Use a toilet flush with a low water consumption; • Use valves or showerheads with low water flow; • Regularly monitor and repair water leaks.	• Buy bottled water; • To take a bath; • Take a shower for more than 5 minutes; • Brush your teeth with water on; • Use toilets with high flow rates; • Use valves and showerheads with high flow rates.
DRINKS	
• Use reusable bottles and thermoses; • Use reusable filters when brewing coffee; • Turn off the coffee maker; • Drink natural juices; • Drink locally produced beer and wine, or avoid alcohol altogether; • Avoid plastic tubes and cups; • Remember the packaging when choosing a drink.	• Use disposable bottles; • Use disposable filters; • Keep the coffee maker hot; • Drink imported drinks; • Use plastic tubes and other plastic products.
COOK WISELY	
• Buy appliances with low electricity consumption; • Boil as much water as needed; • Keep the refrigerator at an acceptably high temperature; • Defrost the refrigerator regularly; • Turn on the oven for 4-5 minutes. before baking; • Cook in a thin bottom dish; • Avoid using the microwave; • Choose labeled food packaging № 4 or № 5; • Bring reusable picnic tableware.	• Buy equipment with a high level of energy consumption; • Keep the refrigerator at a very low temperature; • Switch on the oven for more than 5 minutes. before baking; • Cook in a dish with a thick bottom; • Heat food in plastic in the microwave; • Take disposable tableware for a picnic.

LESSON 9. CLIMATE CHANGE

Cross-curriculum communication: geography, biology, physics, chemistry, etc.
Grade: 6-11.
Duration: 2 hours.
Methods and techniques: "Listing" - brainstorming, "Logs", "Reflective screen", watching videos, slide presentation, group work.
Resources: Whatman paper, chalk, blackboard, markers, coloured pencils, drawing paper, Internet access, interactive whiteboard.

EXPECTED RESULTS: students will

- investigate the dependence of climate change on the level of natural resource use and resource management;
- develop concrete actions to mitigate climate change.

LESSON STEPS

1. **Exercise "Draw the state of the weather".** Draw the current state of the weather and relate to your mood.
2. **Brainstorming "Making lists".** Make a list of words and sentences that describe climate change. After making the list, pass it to a neighboring group for discussion. Groups that have received a list of sentences or words from other groups, choose one of the options that you agree with. Justify your choice.
3. **Discussion:** Why is climate change happening? What actions are needed to mitigate climate change? How do we feel climate change?
4. **Prepare a presentation on "Climate Change".**

Approximate content of the presentation:

Slide 1. Climate change is a very urgent problem facing humanity and this is due to its consequences. Over the past century, temperatures have started to rise strangely. For 100 years, the planet has warmed by almost a degree. The effects of climate change will affect all aspects of life on Earth. These consequences include: melting glaciers, rising water levels in the World Ocean, drought, disappearance of biodiversity, and an increase in cataclysms.

Slide 2. From courses in geography, biology, physics, you know that the Earth's atmosphere is the Earth's air envelope, consisting of 73% nitrogen, 21% oxygen and other gases, mixtures. When studying the problems of climate change, it is necessary to distinguish between the concepts of "climate" and "weather".

Weather is the state of the atmosphere in a given area (air temperature, pressure, wind direction and strength, cloudiness, precipitation for a certain time) (day, week, month, year).

Climate is a long-term weather regime typical for a particular territory.

Slide 3. Remember from the course of geography in grades 6-7-8 how the Earth's climate is formed. What factors influence the formation of the climate in a particular area?

Slide 4. The climate on Earth was constantly changing, but it happened very slowly.

Over the past century and a half, this process has been proceeding at a rapid pace. This is due to an increase in greenhouse gases that trap heat near the Earth's surface (like a blanket) and warm the planet. The reasons for the increase in greenhouse gases are (anthropogenic):

- burning of fossil fuels (oil, coal and gas);
- reduction of forest area (including due to fires);
- decomposition of organic waste in landfills.

5. Watching the video: “These events happened in 2020”.
https://www.youtube.com/watch?v=l-l1skSkE-I

6. Discuss the content of the video and answer the question: What to do?

Sample student responses:

- transition to renewable energy;
- introduction of energy saving technologies;
- take adequate measures to preserve forests;
- limit the use of disposable packaging;
- organize waste processing.

7. Reading the text. Reception "Logs". Working in groups. Write down your thoughts in the “Flight Journals” before starting to study the text and after reading the material. The "logbook" can be drawn up as indicated in the table.

Table

What do I know from the text? (before study)	What new have I learned from the text? / New information

READING TEXT: CLIMATE CHANGE

1st group. Climate change is one of the main environmental problems of our time: unpredictable weather affects the quality and production of food, the sea level rises, and the risk of natural disasters increases.

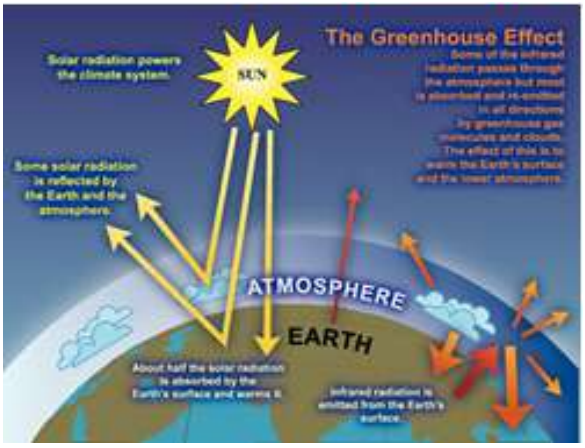


Figure 20. Greenhouse effect model.
Source: **https://www.ipcc.ch/**

All of these problems are the consequences of climate change, they are global and have an unprecedented scale. If not decisive action is taken today, then the subsequent adaptation to climate change will require a lot of effort and expense.

INTERGOVERNMENTAL GROUP OF EXPERTS ON CLIMATE CHANGE

The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) to provide objective scientific evidence.

n 2013, the most complete data on the anthropogenic impact on climate change were presented. The Intergovernmental Panel on Climate Change has released its Fifth Assessment Report, which looks at climate change scientifically. The conclusions of the report are unambiguous: climate change is real and human activity is the main cause of it.

FIFTH ASSESSMENT REPORT

The report provides a comprehensive assessment of sea level rise and its causes over the past several decades. It also provides an estimate of the total CO_2 emissions since the pre-industrial period, and establishes the allowable future emissions to keep the warming process below 2 ° C. About half of this maximum allowable volume had already been released into the atmosphere by 2011. Thanks to the IPCC report, we have the following information:

- Between 1880 and 2012, the global average temperature increased by 0.85 ° C.
- The oceans have warmed, ice and snow have decreased and ocean levels have risen.

- Between 1901 and 2010, the world average sea level rose by 19 cm as a result of warming that melted the ice. Since 1979, the volume of ice cover in the Arctic Ocean has been decreasing every decade by 0.45–0.51 million square meters. km.
- Given the current concentration of greenhouse gases and their continuing emissions, it is very likely that by the end of this century, the average global temperature will rise by 1–2 ° C over 1990 levels and by 1.5–2.5 ° C over 1990 levels. pre-industrial era. Warming of oceans and melting of ice will continue. It is estimated that by 2065, the world average sea level will rise by 24-30 cm, and by 2100 - by 40-63 cm, compared with the level of 1986-2005. Most of the effects of climate change will persist for several centuries, even if greenhouse gas emissions stop altogether.

There is worrying evidence that thresholds have already been exceeded, leading to irreversible changes in the ecosystems and climate system of our planet. As a result of warming and droughts, ecosystems such as the Amazon rainforest and the Arctic tundra are reaching their tipping point. The volume of mountain glaciers is shrinking at an alarming rate, and many generations in the future will face the consequences of this phenomenon, such as reduced drinking water supplies during the dry months.

Group 2. GLOBAL WARMING AT 1.5 ° C. In October 2018, the IPCC published a Special Report on Global Warming by 1.5 ° C. The report highlights a number of climate change impacts that could have been avoided by limiting global warming to 1.5 ° C versus 2 ° C, or more.

For example, by 2100, global ocean level rise will be 10 cm lower with a global warming of 1.5 ° C, compared to 2 ° C. It is plausible that with a global warming of 1.5 ° C, the Arctic Ocean would be free of sea ice in summer once a century, and in the case of a warming of 2 ° C - once a decade. Coral reefs will decline by 70 to 90 percent in a 1.5 ° C global warming, while virtually all (> 99 percent) will be lost in a 2 ° C warming.

The report concludes that limiting global warming to 1.5 ° C will require “fast and far-reaching” transitions in land, energy, industrial systems, as well as buildings, transportation and cities. Global human-induced carbon dioxide (CO_2) emissions will need to be reduced by almost 45% by 2030 from 2010 levels, reaching “net zero” by about 2050. This means that all remaining emissions must be balanced by removing CO_2 from the air.

Group 3. UN REGULATORY AND LEGAL DOCUMENTS. United Nations Framework Convention on Climate Change (UNFCCC)

Organizations of the UN system are most active in saving our planet. In 1992, the United Nations Framework Convention on Climate Change was adopted at the Planet Earth Summit, which was the first step towards tackling climate change. At the moment, the composition of the states parties to the Convention is almost universal - 197 states have ratified the Convention and are parties to it. The main goal of the Convention is to prevent “dangerous anthropogenic impact on the climate system”.

Kyoto Protocol

In 1995, countries began negotiations to strengthen the global response to climate change. The Kyoto Protocol was adopted two years later. This document obliges the developed countries - parties to the protocol - to reduce greenhouse gas emissions. The first commitment period began in 2008 and ended in 2012.

The second period began on January 1, 2013 and will end in 2020. 196 states are parties to the Kyoto Protocol.

Paris Agreement

The 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change on December 12, 2015, adopted a landmark agreement to combat climate change and accelerate the action needed to achieve sustainable low-carbon development. The Paris Agreement builds on the mandate of the Convention and, for the first time in history, brings all peoples together to take decisive steps to combat

and mitigate climate change and help developing countries to do so. The main goal of the Paris Agreement is to strengthen the global response to climate change in order to keep the rise in global temperature within 2 ° C this century and even try to bring it down to 1.5 ° C.

The Paris Agreement was signed at UN Headquarters in New York on April 22, 2016, on the International Day of Mother Earth, by the heads of 175 states. This was a record number of countries that signed an international agreement in one day.

Group 4. 2019 UNITED NATIONS CLIMATE SUMMIT 4 group. 2019 UNITED NATIONS CLIMATE SUMMIT.

In September 2019, the UN Secretary General hosted a Climate Summit to discuss issues in this area. World leaders gave presentations on the actions and planned activities ahead of the 2020 UN Climate Conference. The Secretary-General appointed Luis Alfonso de Alba, a former Mexican diplomat, as his Special Envoy, who oversaw the preparations for the Summit. The summit focused on the key areas that are most relevant to meeting the challenges of climate change - heavy industry, natural solutions, cities, energy and climate finance. World leaders reported on action and forward-looking action plans that they will report on in 2020 at the UN Climate Conference, where commitments will be updated and possibly expanded. At the close of the Summit, the Secretary General noted that a positive dynamic has been set, cooperation has been strengthened, new goals have been set, but there is still a long way to go.

NOBEL WORLD PRIZE. The 2007 Nobel Peace Prize winners are the Intergovernmental Panel on Climate Change (IPCC) and former US Vice President Al Gore. They were honored with this award for research and dissemination of information on anthropogenic causes of climate change, as well as for the development of possible measures to combat such change.

Source: www.un.org

8. Summing up and assessment.

Exercise: Reflective Screen. Give your comments on the following plan:	
1) today I found out ... 2) it was interesting ... 3) it was difficult ... 4) I did (a) tasks ... 5) I realized that ... 6) now I can ... 7) I felt that ...	8) I purchased ... 9) I learned ... 10) I did it ... 11) I could ... 12) I'll try ... 13) I was surprised that ...

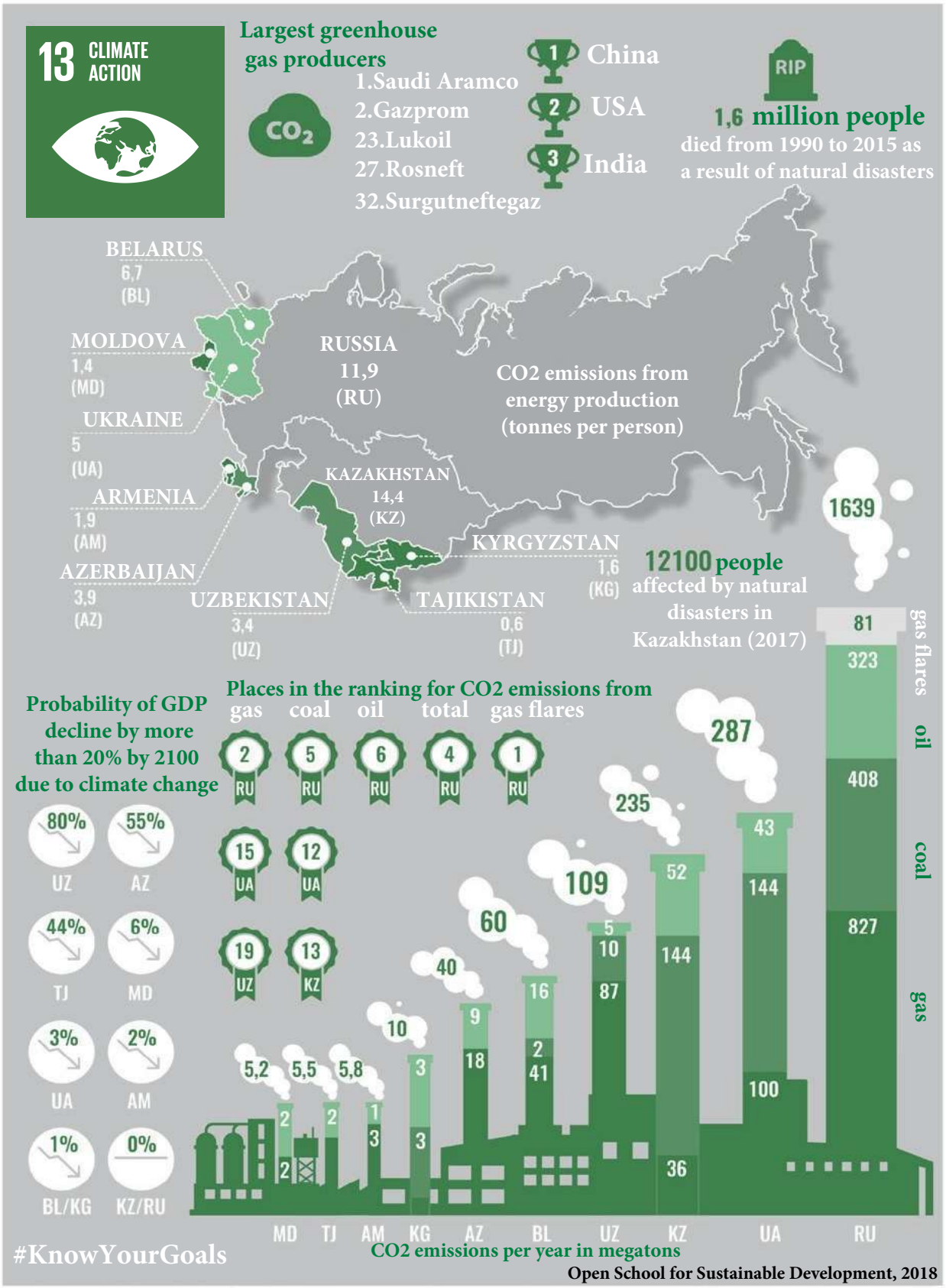
9. Homework. Watch videos and write mini-essays on: "Forecasts of Earth Climate Change"

1. **"What is the greenhouse effect?"** https://youtu.be/hHvokk4H9Pc

2. **"How do greenhouse gases actually work?"** https://youtu.be/wJt8HV8S728

3. This topic is the 13th SDG, find links with the rest of the SDGs and draw common ground.

4. Explore infographics and write a one-page analytic message.



the presented map does not express the point of view of OSSD regarding the legal status of any countries and territories

LESSON 10. ENVIRONMENTAL FOOTPRINT AND CLIMATE CHANGE

Cross-curriculum communication: geography, Man and society, mathematics, etc.
Grade: 9-11.
Duration: 2 hours.
Methods and techniques: "Basket of ideas, concepts, etc.", group work.
Resources: Whatman paper, chalk, blackboard, markers, coloured pencils, drawing paper, Internet sources, interactive whiteboard.

Figure 21. Photo by Vidar Nodli-Mathisen. Windmills in Spain

EXPECTED RESULTS: students will

- learn the concepts of "linear economy", "cyclical economy", "ecological footprint", "ecological calculator";
- will be able to distinguish between the concepts of "linear and cyclical economy";
- can link climate change to waste;
- will be able to calculate their ecological footprint.

LESSON STEPS

1. ***Exercise "Greetings in different languages"***
2. **Reception "Basket of ideas, concepts, etc.".** *The teacher's question is: what is responsible consumption?*

   1. Remember and write down in a notebook everything you know about responsible consumption (individual work, duration 12 minutes).

   2. Exchange information in groups (no more than three minutes).

   3. Each group in a circle names one piece of information or fact, while not repeating what was said earlier (a list of ideas is drawn up).
3. **Viewing videos:**

1. **What is the Ecological Footprint?** https://youtu.be/1jyZ_Xi5rp8

2. **Your ecological footprint** https://youtu.be/ruLPnK4HrUU

4. TEXT FOR READING: "ENVIRONMENTAL FOOTPRINT".

Today all over the world the concept of "ecological footprint" is used to assess the impact of human activity on the environment or the level of consumption of bio-sphere resources. Ecological footprint is a measure of human impact on the environment, which allows us to calculate the size of the adjacent territory necessary for the production of environmental resources we consume and the absorption of waste (Wikipedia).

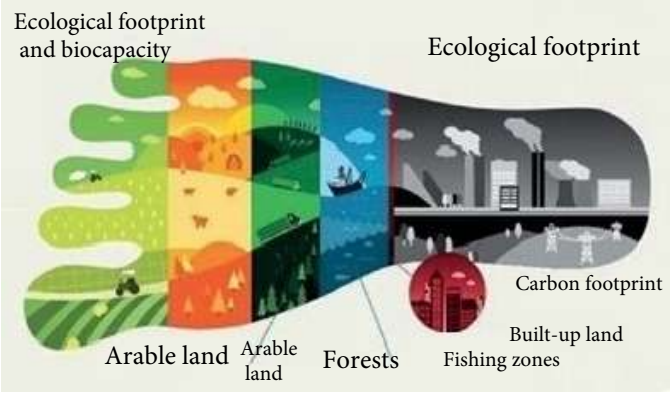


Figure 22. Ecofootprint
http://greendriver.ru/ecofootprint/

There is another definition: "Ecological footprint is a measure of the consumption of renewable natural resources by the human population, be it a country, a region or the whole world." According to the Food and Agriculture Organization of the United Nations, the ecological footprint of the world is as follows: every year 12 million hectares of land become unusable in the world, 5.7 million hectares of forests are destroyed for various needs or disappear due to natural disasters.

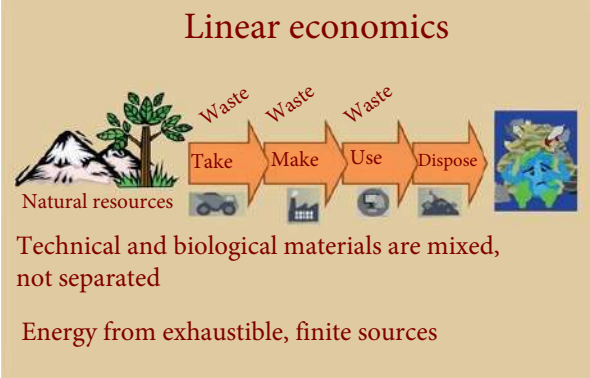


Figure 23. Linear Economics

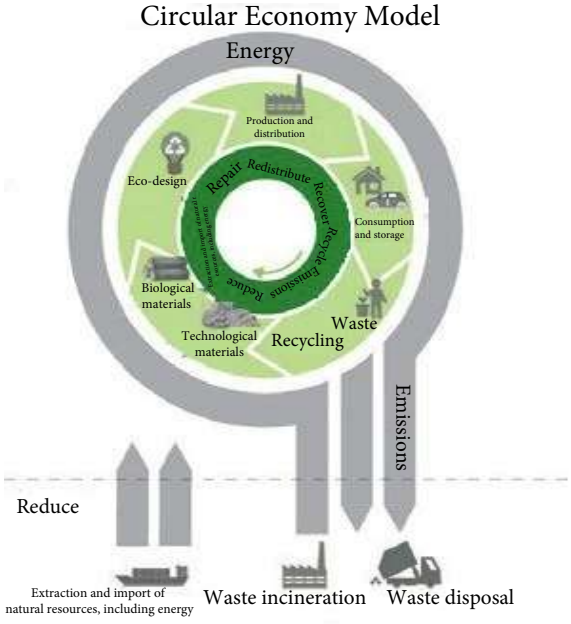


Figure 24. Circular economy model. Posted by Downpour-Asia

In Kyrgyzstan, the number of pasture lands prone to soil erosion is growing every year. In the Kyrgyz Republic, according to experts, 60-70% of pasture lands are subject to degradation. This is due to improper land use. The main reason is the intensive use of pastures.

The number of livestock is growing in the country, but mechanisms for the correct use of pastures are not being introduced. This problem of land degradation and desertification in the countries of Central Asia is urgent, it poses a threat not only to ecosystems, but negatively affects the living standards of the population and economic development of the country.

The main factor affecting the increase in the ecological footprint of mankind is the nature of production. Most of what we produce is trash, production waste and goods are thrown away. This production process is called “linear economy”, organized in accordance with the chain “take - produce - throw away” (Fig. 23). Companies extract raw materials, use them to make goods, sell the goods to the consumer, who then throws them away when they no longer fulfill their purpose. There is a modern formula for economics called “Circularl economics”.

A circular economy is an industrial system that is restorative. It replaces the concept of end of life with the concept of recovery and transition to the use of renewable energy sources. The circular economy eliminates the use of toxic chemicals that prevent reuse, and aims to eliminate waste through improved development (design) of materials, products, systems (Fig. 25).

Figure 25. Poster of NGO "Akmena"

5. Task. Design your poster "Linear and Circular Economy".

Examples in Figures 23-25.

6. Teacher Information: Footprint Calculator.

Ecological Footprint Calculates The Global Footprint Network (GFN) is an international research institute with branches in North America, Europe and Asia. The set of methods developed by the GFN allows countries (as well as regions, cities and even individual households) to measure their consumption of natural capital and compare it with the volume of available reserves of renewable resources.

When asked: why calculate the ecological footprint? - can be answered in the following way: the degree of humanity's impact on nature depends on how much energy and water a person spends, how much is thrown into waste, what food (in what package), how much we eat, what furniture and clothes we choose. ... Therefore, without changing the habits and behaviour of people, no prohibitions and laws will help people stop the destruction of the environment.

The Ecological Footprint Calculator is one of the easiest ways to find out how your lifestyle affects the sustainability of the globe. The more we spend on food, items and energy, the more footprint we leave.

Reduce your footprint by adhering to the following guidelines for responsible consumption

Materials: https://csrjournal.com/14576-ekologicheskij-sled-yarkij-otpechatok-chelovecheskoj-nravstvennosti.html

- Install a meter for a more economical electricity tariff.
- Install heat regulators for the battery, as well as water meters.
- Check if windows and doors are well insulated.
- Defrost the refrigerator regularly.
- Turn off the engine when the machine is stationary.
- Walk more, ride your bike.
- Choose vehicles that consume little fuel.
- Give preference to trains over air travel.
- Sort trash.
- Buy products from recycled materials.
- Only throw trash in trash cans.

7. **Summing up and evaluation: "Keywords".**

Use the keywords of the lessons "Footprint", "Footprint Calculator", "Linear and Circular Economy" and "Responsible Consumption" to come up with a story.

8. **Homework.** Calculate the size of your ecological footprint and think about what you could do to reduce it. Choose one of the listed sites to calculate your footprint:

http://ecosled.wwf.ru/	http://jalajalg.positium.ee/?lang=RU	https:// footprintcalculator.henkel.com
		

Save the result and bring it to the next lesson to compare with the results of one-graders. Write an essay on "What is the Impact of My Ecological Footprint on Climate Change and the Other SDGs?"

GLOSSARY

- **Biodiversity (biological diversity)** — is the diversity of life in all its manifestations, as well as an indicator of the complexity of a biological system, the diversity of its components. Also, biodiversity is understood as diversity at three levels of organization: genetic diversity (diversity of genes and their variants - alleles), species diversity (diversity of species in ecosystems) and, finally, ecosystem diversity, that is, the diversity of ecosystems themselves.
- **Paper** (presumably from Italian bambagia or tat. Boomug - cotton) is a fibrous material with mineral additives in the form of sheets for writing, drawing, packaging and other things, obtained from cellulose: plants, as well as recyclable materials (rags and waste paper).
- **Arboretum** (from the Greek δένδρο - tree) - a territory allotted for open ground cultivation of woody plants (trees, shrubs, lianas), placed according to systematic, geographical, ecological, decorative and other characteristics. Arboretums have a scientific, educational, cultural and educational or experimental and production purpose. They are usually located in botanical gardens.
- **Disposer** – electric food waste disposer.
- **Climate** is a long-term weather regime, typical for a given area of the Earth, like the average weather for many years.
- **Nobel Prize** (Swedish Nobelpriset, English Nobel Prize) — one of the most prestigious international prizes, awarded annually for outstanding scientific research, revolutionary inventions or major contributions to culture or society.
- **Paris Agreement** — an agreement within the framework of the UN Framework Convention on Climate Change, which regulates measures to reduce carbon dioxide content in the atmosphere from 2020.
- **Planet** (ancient Greek πλανήτης, alternative form Old Greek πλάνης - "wanderer") — a celestial body orbiting a star or its remnants, massive enough to become rounded under the influence of its own gravity.
- **Traditional knowledge** is a system of accumulated practical knowledge, skills and abilities embodied in the traditional way of life, life support and transmitted by historically established communities from generation to generation, inherent in the people, associated with the specific locality of their residence - one of the indicators of the nation's self-identification.
- **Ecological Footprint** is a measure of the consumption of renewable natural resources by a human population, be it a country, a region or the whole world.
- **Ecological footprint** is a measure of human impact on the environment, which allows us to calculate the size of the adjacent territory required for the production of environmental resources we consume and the absorption of waste.
- **Ecosystem, or ecological system** (the ancient Greek οἶκος — dwelling, habitation and σύστημα - system), - biological system (biogeocenosis), consisting of a community of living organisms (biocenosis), their habitat (biotope), communication systems, wasp - the existing exchange of substances and energy between them. One of the basic concepts of ecology.

SOURCES:

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