



# **MANUAL FOR CITIZENS**

**HOW TO REDUCE THE NEGATIVE EFFECTS OF HUMAN ACTIVITIES ON  
ECOSYSTEMS AND WATER, SOIL AND AIR QUALITY.**

**WHAT IS THE IMPORTANCE OF THE ECOSYSTEM.**

**TIPS ON HOW TO PRESERVE ECOSYSTEMS IN SAFETY AND CLEANLINESS.**



Project CB007.2.32.142 - Preservation and restoration of transboundary ecosystems by improving the quality of river waters and soils

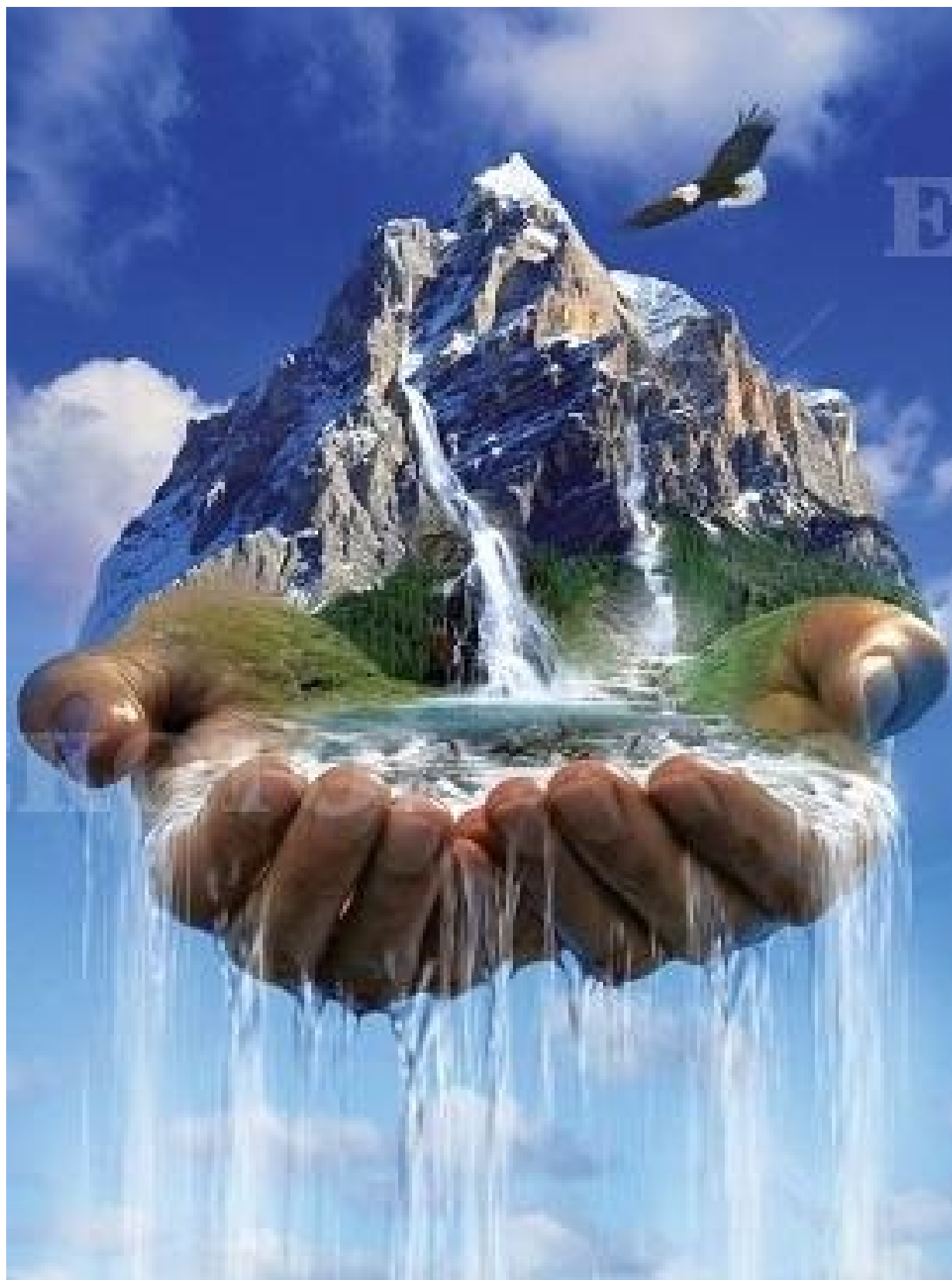
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## **WATER CONSERVATION AS A RESOURCE**

Water is the second most important component of the biosphere. It is believed that life on earth originated in an aquatic environment and from there moved to land. As a universal solvent, it participates in the cycle of substances in nature, helping plants to synthesize complex synthetic substances from elements of inorganic nature. Without water, life is unthinkable, without it living organisms would not exist. It is used everywhere - in everyday life, in industry and agriculture, for the needs of sports, tourism and transport. Unfortunately, this is happening, so modern civilization poses a problem of the greatest importance to nature - the reduction of water resources and their pollution. The development of industrial technologies and their new capacities makes water a "key problem" for the existence and protection of humanity.

It is well known what large amounts of water are used in various production processes. As an example, we can cite: the production of one ton of cast iron, for which 100 cubic meters of water are used, for one ton of sugar -15 cubic meters of water, for one ton of synthetic fibers - 500 cubic meters of water. In this way, humanity, on the one hand, is constantly increasing its need for water, and on the other - this water is no longer usable due to its pollution and poses a serious danger to the flora and fauna of water bodies and humans.

In many countries, water pollution is threatening. Their population uses water of dubious quality. Rivers and lakes polluted with wastewater are most often used as water sources.

Water pollution in industry is primarily a consequence of chemicals used or produced in industry. Some of them have bactericidal properties and change the normal flora and fauna of water bodies. Most of these chemicals are toxic and dangerous to human health. The rapid pace of industrial development, the failure of a sufficient number of treatment plants, the poor operation of existing ones, frequent accidents in them, the lack of reverse cycles of industrial water use - these are the main reasons that increase water pollution.

Water pollution is also a consequence of detergents, which in the last 30-40 years represent more than 2/3 of the required detergents. In the production of chlorine from the synthesis of petroleum detergents and a number of other products, mercury is used or released, which is transferred to the suction water and settles on their bottom. There, under the action of some bacteria, mercury turns into soluble mercury compounds, which reach the fish in the food chain and poison them. The damage from detergents is great because they pass through purification plants without change. Their molecules are not susceptible to enzymes. Detergents also contain phosphates, so when they enter water bodies, they stimulate the growth of algae. After the death of algae, aquatic ecosystems are saturated with organic matter, which clogs water basins and their oxygen balance is disturbed.



The main water intakes of polluted industrial wastewater are rivers and lakes. Rivers in turn cause pollution of the sea and the world's oceans. Many rivers have become canals of dead water and canals with contaminated dirty water, which creates conditions for the spread of epidemics. Such waters are not only unsuitable for irrigation, but cannot be used for other purposes. The flora and fauna of the river are endangered. The harmful effects of polluted river water directly or indirectly threaten people.

The natural reservoirs of rivers are the sea. They accept polluted river waters, directly dispose of domestic and wastewater from thousands of industrial companies and factories located in port cities.

The oil industry and refineries are a serious source of pollution not only in the air but also in the seas. Thousands of tankers transport oil and petroleum products. Pollution occurs mainly when cleaning tanks and washing tanks. In the frequent and unforeseen accidents of tankers on the high seas, oil flows directly into the sea. Water polluted with oil prevents the penetration of oxygen, which endangers the life of organisms in seawater. Petroleum products are stuck under the scales and muscles of fish and endanger the people who consume them. The oil was also found to contain carcinogenic substances. The coastal waters of the Black Sea are periodically polluted with oil and oil products from domestic and foreign tankers.





Water polluted by industry has a toxic effect on living organisms. Life in such waters decreases sharply, and in some cases it is completely destroyed due to the disturbed oxygen regime. Irrigated areas and forests near poisoned water bodies are threatened by the harmful effects of polluted water. Irreversible disorders have been identified in the genetic apparatus of some plants and animals that are victims of harmful pollution.

The issue of protecting water sources from pollution and depletion is acute worldwide. The future of humanity is in question with regard to drinking water. Clean drinking water will be a high-value coin for goods that we currently consider a luxury.

Preserving the purity of water and providing the population with clean drinking water is an issue of important health, economic and social importance for all of humanity.

The products of the military industry - war chemicals - are often recklessly thrown into seawater.

In recent decades, radiation has led to serious pollution of the air, soil and water of our planet. The production of nuclear energy releases radioactive waste, mainly radioactive water, which is unreasonably released into the environment and pollutes it. Fish concentrate copper, lead and zinc in the body, and mollusks and crustaceans - calcium and sulfur, which are part of the radioactive waste. Fish contaminated with radioactive waste becomes dangerous for consumption. Radioactive contamination of seawater also occurs in accidents on nuclear ships and submarines. Examples of this can be numerous.

Removing threats to life on planet Earth is associated with preserving the purity of nature. The problem of all humanity can be solved by a broad prudent policy for the restoration of ecosystems - for clean skies, air and water.

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Water purification is a process of removing substances, chemicals and unwanted pollutants from water. The purpose of purification is to create water suitable for a specific purpose. Most water purification is done for human use (drinking water), but it can also be used for other purposes such as medicine, pharmacy, agriculture and industry. Water purification methods can be physical, such as filtration or precipitation, biological and chemical, such as adding chlorine to water and using electromagnetic radiation with ultraviolet light. The purification process can reduce the concentration of substances and pollutants, including various dissolved particles, parasites, bacteria, algae, viruses and fungi. Drinking water quality standards are set by government or international standards. The standard usually includes minimum and maximum concentrations of pollutants according to their use in water.

Ecological condition of surface waters - is determined by the condition of the surface water body, estimated values of biological quality elements and physico-chemical and hydromorphological elements. The main problem is the inefficient use of water resources. For example, the share of water used in the industry with drinking properties is large, above the norm / about 10% / are water losses due to breakdowns in water supply networks, about 10% of drinking water is used for irrigation in yards. The entire industry consumes chlorides, sulfates, nitrates, total mineralization. Contamination with nitrates and sulfates is the result of irrational fertilization of arable land. The waters of the Danube River show pollution after the cities of Vidin, Svishtov and Ruse, but the river is mostly polluted by tributaries in the Bulgarian part. It should be emphasized that mostly the qualities of the Danube waters are formed above the Bulgarian part of the river.

For all these reasons, as well as insufficient water resources of the country have led to a deepening tendency to reduce the country's water resources. This trend has led to a water use regime applied in 23% of cities and 16% of villages. The districts of Lovech, Montana and others are particularly affected. The lack of water resources has led to the need to transfer water from one basin to another, and even from one area to another. Too often, these projects do not sufficiently assess the environmental impact of this intervention. These consequences can be very severe and lead to irreversible changes, especially in the mountainous regions of the country.

The main direction for improving the ecological condition of water in our country is their rational use, namely the introduction of circulating water supply, the introduction of technologies with little water and without water and the use of treated wastewater. All this will lead to significant water savings. Last but not least is the legal basis of the state for the protection of natural waters, as part of the natural environment. ([www.geografia.kabinata.com / 05.htm](http://www.geografia.kabinata.com/05.htm)).

The loss of unused water mass in irrigation reaches 40-50% of delivered water mass due to outdated irrigation methods, moral and physical wear of irrigation systems, low productivity, insufficient application of scientific and technological progress and others.

The European Parliament and the Council of 20 November 2001, which approved the list of priority substances in the field of water policy and amended Directive 2000/60 / EU. It proposes the first list of 33 substances or groups of substances to be considered as priority

pollutants (PPs) at the state level. On 17 July 2006, the European Commission adopted mandatory environmental quality standards for priority pollutants that Member States must meet by 2015 in order to achieve "satisfactory chemical status of surface waters". The group of priority pollutants includes: heavy metals, volatile organic compounds, polycyclic aromatic hydrocarbons, pesticides, alkylphenols, phthalenes and others. (Gasperi et al., 2008). Adsorption is one of the main methods used to remove PP from an aqueous medium. Mineral montmorillonite, modified with inorganic ions, can be used as an adsorbent to effectively remove surfactants from industrial wastewater. Among industrial wastewaters, wastewaters contaminated with phenol, phenol derivatives (chloro-, nitrophenols) and various classes of paints (acidic, basic, reactive, azo, etc.) pose a special hazard to open water bodies, soil and atmospheric air.

### **Biosorption**

Bulgarian scientists are successfully working on their efficient removal by applying a combined process of biosorption (biodegradation and adsorption) and pure adsorption on various mineral materials, waste products and dead biomass. Among the most commonly used methods for removing heavy metals from wastewater are adsorption, biosorption, ion exchange, and extraction (Vimala and Das, 2009; Shek et al., 2009). A mathematical model is often used to predict the removal of heavy metal ions from an aqueous medium by electrodialysis (Sadrazdeh et al., 2009). The reduction of Cu (II) was studied by heterogeneous photocatalysis with the participation of TiO<sub>2</sub>, Degussa P-25 and 254 nm UV-C lamp in an aqueous medium and consisted of 24 fractions of naphthalenesulfonic acids. In the first stage of crystallization, about 70% removal of the inorganic salt is achieved. The organic matter is then biodegraded under mesophilic conditions. Removal and regeneration of wastewater containing inorganic acids, basic hydroxides, salts and suspended solids are patented by a series of successive physicochemical processes: dissolution, ionization, chemical reaction and precipitation. As a result of this treatment, the simultaneous removal and separation of pollutants in the form of a solid mass - a precipitate deposited on selective electrodes is achieved.

### **Physicochemical methods**

Physico-chemical methods are used in the primary treatment of industrial wastewater. Although they require the use of expensive reagents, this group of methods is very effective. Physico-chemical methods are used to remove compounds that exist in the form of suspensions, emulsions, as well as dissolved inorganic and organic substances. Undissolved impurities can be divided into two main groups: pollutants that form kinetically unstable systems with water, so they can be released spontaneously; hydrophobic and hydrophilic highly dispersed systems that make up stable colloidal systems. Examples of such methods are: coagulation, flotation, adsorption, extraction, ion exchange, ultrafiltration, distillation, crystallization, electrolysis, evaporation, electrodialysis, desalination, reverse osmosis and others. Experiments were performed on the extraction of 4-nitrophenol and 2, 4-dinitrophenol on silicate based on  $\beta$ -cyclodextrin. In practice, in order to increase the efficiency of physico-chemical methods, combined procedures are increasingly used to remove stable compounds from the aqueous medium. A modified method for the removal of biodegradable compounds present in landfill wastewater by a combination of coagulation and Fenton oxidation has been successfully applied.

## **Electrochemical methods**

In recent years, there has been increased interest in the applicability of electrochemical methods in the treatment of water waste in the production of olive oil, domestic sewage, wastewater, tanning waste, textile waste. The main advantage of electrochemical methods is that they effectively remove pollutants from concentrated aqueous solutions. In addition, no new toxic waste is generated as a result of these processes. Electrochemical processes are heterogeneous in nature because the reaction takes place at the electrode-electrolyte interface. In recent years, several very efficient methods based on electrochemistry have been developed, namely electrocoagulation, electroflotation, photoelectrochemical oxidation, and electrosorption. High efficiency of pollutant removal by combined electrosorption process using large surface porous electrodes was determined.

In conclusion, if all aspects of water purity protection are covered, the following conclusions can be drawn:

- The first step in maintaining the cleanliness of water basins is to monitor the parameters that characterize water quality, in order to identify potential pollutants;
- Selection of an appropriate methodology for the purification of these waters on the basis of physical and chemical characteristics and toxicity of pollutants, ie. an assessment of the need for primary, secondary and effective methods that accompany each of these phases.
- The ultimate goal is to meet regulatory requirements for water quality, depending on the water intake set in the legislative system of each state.

Every product we use, whether it is clothes, a piece of bread or a laptop, needs water for its production. Even with the simplest cotton shirt, we must keep in mind the water needed to water the cotton from which the shirt is made, as well as the water used in the production process. If we trace and estimate the exact amount of water consumed, we will find that 2700 liters are needed to produce the most common cotton shirt.



## **EACH OF US LEAVES A TRACE**

This quantity is called the "water footprint". Using this method, we can calculate the water footprint of countries, companies and individuals.

Globally, the average water footprint per person is 1.24 million liters per year. Of course, this amount varies depending on various factors. The water footprint of a country is calculated by adding the amount of water needed to produce all the products that residents consume, incl. from imports, plus water that goes for direct consumption. In that sense, it is not surprising that highly developed industrial countries have a larger water footprint.

The concept of the water footprint, developed by the Dutch scientist Arjen Hokstra, is based on the thesis that the main impact on water resources comes from production and consumption. Therefore, problems related to water scarcity and pollution can be better analyzed when estimating consumption throughout the production process. According to Hoktri, water-related problems are caused by the global economic situation. An example in this regard are countries that import products that would require more water resources to produce (eg agricultural products), which further burdens the water reserves of exporting countries.



## **WHAT IS BEING DONE FOR WATER IN BULGARIA?**

The Danube is the largest river in Bulgaria, but it is still underestimated. The Bulgarian part of the river is still among the least affected. Almost 80% of coastal natural habitats and fish resources were destroyed in the twentieth century, and the rest is endangered. In recent years, work has been done on the protection and restoration of the floodplain forests of the Bulgarian Danube islands. The islands of Kovačev, Kozloduy, Esperanto and Aleko were forested with indigenous tree species. The project model for the restoration of the old

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Veselina riverbed near the village of Mindja, the Veliko Tarnovo region and the coastal wetlands of the Osam River near the villages of Balgarene and Obnova has been completed. The Kaikusha swamp in the Persina Nature Park is being restored. The project includes the improvement of the wetland water regime and the demonstration application of a biomass and solar energy heating installation in the Persina Nature Park building. The goal is to reduce electricity consumption and greenhouse gas emissions, as well as to create economic mechanisms for wetland regeneration and sustainable use of reeds as a local energy source. Coastal habitats are being rebuilt, reducing the risk of flooding along the Rusenski Lom and Beli Lom rivers. This is a project model that puts into practice the principle of "more space for rivers, greater safety for people".

The following lines offer some simple but effective tips for reducing water consumption.



#### **WHAT CAN EACH OF US INDIVIDUALLY CONTRIBUTE TO WATER PROTECTION?**

1. Keeping faucets at home in good condition - one dripping faucet consumes over 70 liters of water per day.
2. Do not throw waste in the toilet, because each rinsing is 5-6 liters of water, and replace the old cistern with a new, more economical one.
3. Use a shower when bathing, not a bathtub.
4. Use faucets with aerators that mix water with air and significantly reduce consumption.
5. Let the detergents we use for cleaning at home be environmentally friendly, because in addition to not seriously polluting the water we use, we also protect our health.

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6. If we like cold water, instead of draining the tap, we can only keep a bottle of water in the refrigerator.
7. Use the dishwasher only when it is full. This will save 8-10 times more water than if we were standing right next to the sink with a pile of glasses and plates.
8. We should never water the plants in our yard with clean drinking water, but we should collect rainwater if possible or we can use it purified from a domestic treatment plant.
9. Forget about the septic tank and replace it with a modern small treatment plant. This will protect the groundwater in your yard from pollution, and you will have water for irrigation.

However, there is one important condition that we must accept or learn to accept: We must understand how valuable water is and begin to respect it.

Water is actually the source of our life and unfortunately it is not given in unlimited quantities. Only when we understand this can we learn to conserve water in nature to save life on Earth.

**CHECK THE FAUCET REGULARLY!** A damaged faucet can consume up to 75 liters of water per day. That means 2,250 liters of water per month.

**DO NOT USE THE TOILET AS A GARBAGE BASKET!** Each flush of the cistern consumes between 3 and 6 liters. Therefore, do not use the toilet to dispose of garbage.

**USE WATER-EFFICIENT MIXERS** Mixers with aerator mix water with air and thus reduce consumption. The aerator can be found at very low prices.

**STOP THE FAUCET WHEN YOU BRUSH YOUR TEETH!** It is not necessary to constantly run water while brushing your teeth. This way you save between 6-14 liters per day.

**SHOWER INSTEAD OF BATHTUB!** A quick shower refreshes and consumes much less water than if you take a bath. You can also feel it on the reduced water bill.

**USE ECOLOGICAL CLEANING PRODUCTS!** This is not only better for nature, but also for your health. And the difference in price compared to ordinary preparations is insignificant.

#### **HOW TO SAVE WATER?**

**KEEP A BOTTLE OF WATER IN THE REFRIGERATOR!** We run the faucet for a long time just to cool the drinking water. Instead, leave the bottle to cool in the refrigerator. Add a slice of lemon and you will get the perfect drink for hot summer days!

**USE WATER EFFECTIVE BOILER FOR WC!** In this way, a family with two children can save up to 850 liters of water per month. If you do not want to buy a new cistern, you can transform yours so that it consumes less water!

**COLLECT RAIN WATER!** Rainwater is very good for watering plants or lawns. It can be successfully used for washing cars or laundry. (For which you will need a very small amount of washing powder in this case).

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**USE THE DISHWASHER ONLY WHEN IT IS FULL! Dishwashers use 8 times less water to wash a bunch of dishes than if you wash them under running water. However, this only applies when the appliance is full!**

**REDUCE MEAT CONSUMPTION! About 15,500 liters of water are needed for the production of 1 kg of beef, and 3900 liters for the production of a kilogram of chicken. This amount naturally varies depending on the type of agriculture and the local climate. If you want to be useful to nature and do not want to give up meat - consume locally produced, organic farming product.**

#### **WHAT CAN YOU DO TO REDUCE WATER CONSUMPTION?**

Carefully monitor your water consumption for a week! Mark what you did!

I take a shower, not a bath. I stop the faucet when I brush my teeth. I only start the dishwasher when it is full. I only buy ecological cleaners. I use a water-saving cistern. I buy food of local origin. I don't eat meat. I don't pour oil into the sink. I installed an aerator on the taps. I told a friend why he was saving water.

As you know, alarming pollution with plastic particles is constantly found in rivers, seas, bottled and tap water around the world. Eco-organizations want urgent action to limit plastic bags, cups, bottles and dishes in Bulgaria.



Another serious problem around the world is clothes made of polyester and other artificial fabrics, which emit hundreds of thousands of small hairs with each wash. They are not retained by the filters of washing machines or water purification plants and thus freely enter the sea or drinking water.



## HOW TO PROTECT THE SOIL?



We call the earth the upper layer of the earth's surface, the base on which life on our planet originated. Plants are attached to the soil and extract nutrients and water from it through their roots. Land is perceived as a living system, because it is inhabited by many living organisms, in addition, it is constantly in the process of formation or decay (erosion). Soil formation takes a long time. The formation of a layer of 30 centimeters takes 1,000 to 10,000 years, a process so long that the soil can be considered a non-renewable resource. Factors influencing soil formation are substrate, living organisms (plants, animals, human activity, microorganisms), climate, topography and meteorological conditions. Soil is more than an inert environment - it is a dynamic, living system composed of organic and mineral components, which functions in a network of cavities and pores filled with liquids and gases. The structure of these components determines the basic type of soil - there are more than 300 types of soil in Europe alone. In addition, the soil contains living organisms - bacteria, worms, rodents.

### The importance of soil

The chemical, physical and biological properties of the soil change both vertically and horizontally. Soil is formed by a combination of all factors that affect rocks and organic materials - climate, vegetation, soil organisms and weather. If some of these factors change, it also affects the soil. Soil is a complex system in which important biological, chemical and geological processes take place. In the upper layer of 30 centimeters per hectare of soil, there are on average about 25 tons of soil organisms - bacteria, fungi, worms, trees, shrimp and beetles. Organisms such as snails, mice and earthworms make up 50 to 75 percent of the total weight of living organisms on arable land. In a layer of one to five millimeters per hectare, earthworms absorb 18 to 40 tons of soil that passes to the surface. The flora and fauna of the soil convert organic matter into humus, which is then combined with the mineral mass.



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In addition, worms create and maintain airways in the soil that are important for plant roots. Soil is essential for the growth of cereals, fiber and wood and is an important component of all terrestrial ecosystems. Unlike the issues of protection of the atmosphere and hydrosphere, people have only recently begun to understand the need to preserve the soil.

Due to its static nature, for various reasons, it easily absorbs all harmful substances that are released into the environment. Because the decomposition period of these substances is much longer when they are in the soil than in the air or water, the problem often remains hidden for a long time.

Unlike air and water, soil can be privately owned, which makes it difficult to protect and makes it dependent on the will of the owner and manager.

### **The main problems with land in Bulgaria**

Bulgaria is characterized by an extremely large variety of soils, regardless of its small territory. This is due to different reliefs, climatic, plant and geological conditions. Long-term land use has also contributed to their diversification. It is rightly pointed out that "... the territory of Bulgaria is a real museum of soil with a series of specific soils, typical for Southeast Europe" / V. Koinov, 1964 /.

Due to the exceptional relief diversity and the presence of many mountains, the share of arable land is small - only 43% of the total area. With high fertility, only about 15% of arable land, in low fertility about 33%. Today, the so-called "disturbed soil" is a serious challenge. Their share is growing alarmingly, reducing the size of arable land. Annually, industry and construction "absorb" up to 4,000 ha of arable land, and the other part is transferred to the forest fund due to degradation or pollution. The prospects for the coming years are even weaker than expectations that surface digging will cover another 30,000 ha of first-class land.

### **WHAT PEOPLE CAN DO**

In some cases, the soil can regain its former properties after removing the source of contamination - but the question remains as to how much is needed. In other cases, the soil cannot achieve its previous quality, but after skillful treatment its condition improves and becomes acceptable.

Strategic approaches to soil pollution require both preventive measures and the restoration of contaminated soil and groundwater. Preventive measures include reducing industrial pollution and protecting soil and groundwater. There are various technologies for treating contaminated soil - excavation, washing and removal of contaminants. Strategic attacks on soil compaction require preventive measures and restoration of contaminated soil and groundwater. Preventive measures include reducing industrial pollution and protecting soil and groundwater. There are various technologies for treating contaminated soil - excavation,

washing and removal of contaminants.



## **HOW TO PREVENT AIR POLLUTION?**

### **Methods for limiting air pollution**

Possible measures to reduce soil pollution include: the use of bio-fertilizers that help increase soil fertility; promoting the use of herbicides that do not adversely affect the soil; pre-treatment of toxic waste to reduce its toxicity before disposal. Waste recycling is also one of the factors that contributes to the reduction of soil pollution, as well as the reduction of the use of disposable plastic products. Organic farming also contributes to protecting the soil from pollution. Soil erosion is also a problem in soil protection. Taking measures to prevent it is also part of the soil protection process. Modern approaches to soil protection often include measures such as the construction of modern wastewater treatment plants, waste gases and others. Among the recommended measures is the optimization of norms for fertilization and watering according to modern requirements and good practices, as well as the application of little waste or non-waste technologies in industry and agriculture and others. It lasts a long time without food, but you have to breathe constantly. Therefore, we can refuse if we are offered contaminated food or water, but we are forced to breathe the air that is currently around us, even when it is polluted and dangerous to health. Dirty air is the cause of many diseases. The most important thing is not to allow pollutants to enter the atmosphere. When we take measures to maintain clean air, we take care of our own health. but we are forced to breathe the air that is currently around us, even when it is polluted and dangerous to health. Dirty air is the cause of many diseases. The most important thing is not to allow pollutants to enter the atmosphere. When we take measures to maintain clean air, we take care of our own health. but we are forced to breathe the air that is currently around us, even when it is polluted and dangerous to health. Dirty air is the cause of many diseases. The most important thing is not to allow pollutants to enter the atmosphere. When we take measures to maintain clean air, we take care of our own health.

## Atmosphere

Although carbon dioxide is the biggest cause of global warming and climate change, it is not the only one. Many other gaseous compounds or particles, known as "climate change agents," affect the amount of solar energy (including heat) that the Earth retains. For example, methane is a very strong cause of climate change, as well as an air pollutant resulting from agricultural activities, closely related to livestock and meat consumption. Dust particles are another pollutant that affects both climate change and air quality. Depending on their composition, they can have a cooling or heating effect on the climate locally and globally. For example, soot, which is one of the components of fine dust particles and is the result of incomplete combustion of fuel, absorbs solar and infrared radiation into the atmosphere and thus leads to heating. Measures to reduce the emissions of rapidly degrading agents such as soot, methane, ozone or ozone precursors have a beneficial effect on both human health and the climate. Sources of greenhouse gas emissions and air pollutants are the same. Therefore, limiting the emission of one or the other has potential benefits, including cost savings. However, in the past, some measures, among other things, were promoted as climatic, but they had unwanted negative effects on air quality. For example, in many countries, diesel cars are encouraged to emit high levels of air pollutants. Similarly, promoting the burning of renewable wood has unfortunately led to high levels of dust particles in the air in some regions of Europe. We need to learn from this type of case and make sure that the consequences of the measures we choose to implement are well understood and taken into account. The links between climate change and air quality are not limited to the most common pollutants released into the atmosphere from the same sources. Climate change can also exacerbate problems related to air pollution. Climate change is expected to affect the local climate in many regions around the world, including the frequency of periods of excessive heat or no wind. Most sunlight and higher temperatures can not only prolong periods of elevated ozone levels, but also further increase peak ozone levels. This is certainly not good news for many areas in Europe, where elevated groundwater ozone levels are often observed. The links between climate change and air quality are not limited to the most common pollutants released into the atmosphere from the same sources. Climate change can also exacerbate problems related to air pollution. Climate change is expected to affect the local climate in many regions around the world, including the frequency of periods of excessive heat or no wind. Most sunlight and higher temperatures can not only prolong periods of elevated ozone levels, but also further increase peak ozone levels. This is certainly not good news for many areas in Europe, where elevated groundwater ozone levels are often observed. The links between climate change and air quality are not limited to the most common pollutants released into the atmosphere from the same sources. Climate change can also exacerbate problems related to air pollution. Climate change is expected to affect the local climate in many regions around the world, including the frequency of periods of excessive heat or no wind. Most sunlight and higher temperatures can not only prolong periods of elevated ozone levels, but also further increase peak ozone levels. This is certainly not good news for many areas in Europe, where elevated groundwater ozone levels are often observed. including the frequency of periods of excessive heat or no wind. Most sunlight and higher temperatures can not only prolong periods of elevated ozone levels, but also further increase peak ozone levels. This is certainly

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### **Wastewater treatment plants**

Power plants and some industrial plants that use coal as fuel are among the biggest air pollutants.



In order to limit pollution, treatment plants are being built. Polluted air passes through special filters and dust collectors, through water and various aqueous solutions, which pollute pollutants and turn them into harmless substances. At the same time, new



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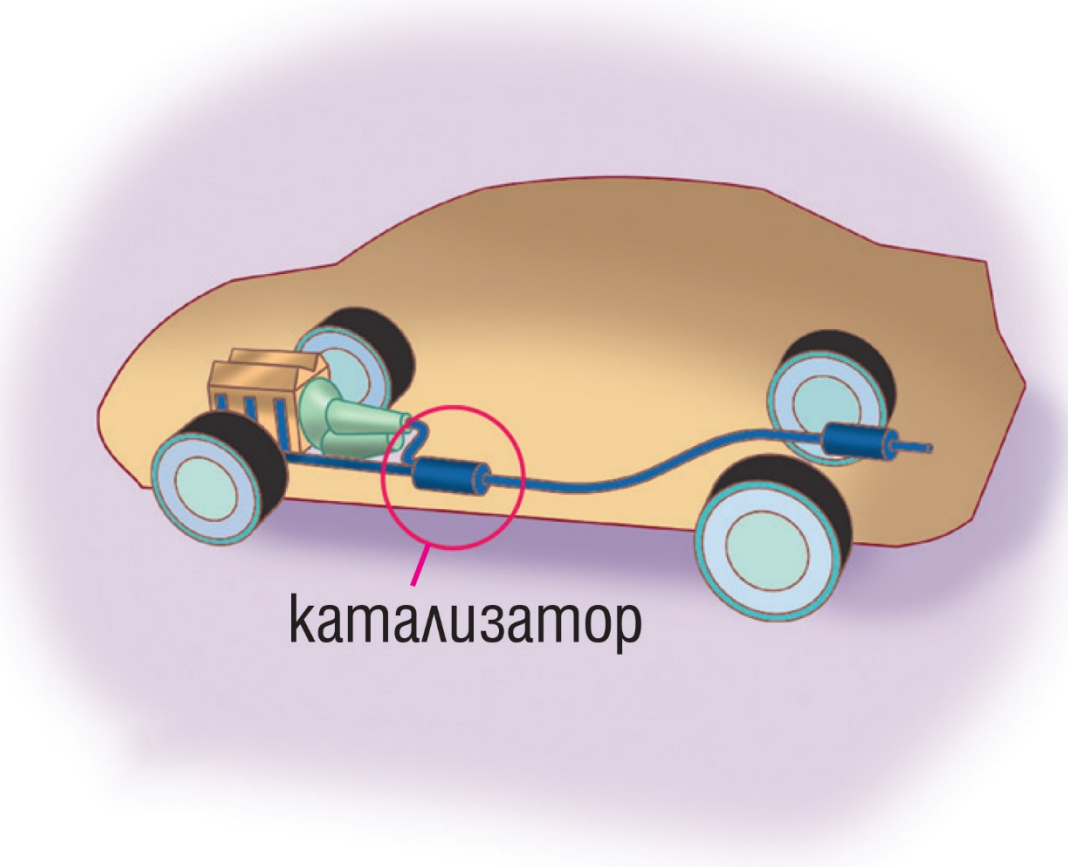
production methods are being introduced that save fuel and emit fewer pollutants.



Wastewater treatment plant in Germany



### **Reduction of harmful gases from cars**



Catalysts are mounted on cars. The toxic substances released by the car's engine are converted into water vapor, nitrogen and other harmless gases. New engines are being developed that consume more fuel and emit less carbon dioxide. More and more electric cars are being produced that do not pollute the air.

### Use of energy sources that do not pollute the air



Fuels (coal, oil, natural gas) should be used more economically, because they are the main air pollutants associated with human activity. In recent years, the production of energy from natural sources that do not pollute the environment has increased significantly. Such are the Sun, water, wind, heat from the earth's intestines and others.

Solar panels and wind turbines produce electricity without air pollution.



### **Plants purify the air**

As you know, plants in their diet clean the air of carbon dioxide and enrich it with oxygen. In addition, plants retain dust particles and other air pollutants as filters. That is why it is very important not to cut down forests, not to allow forest fires and to plant new trees.

Creating new parks and gardens and arranging settlements helps maintain clean air and human health.



*Indoor plants help purify the air.*

### **Preservation of clean air indoors**

People spend most of their time indoors - at home, at school, at work. The air in these rooms is often more polluted than outside. Smoking is prohibited in all public buildings because tobacco smoke in them is a dangerous air pollutant. So do not allow smoking in your presence. Ventilate the classroom and rooms in your homes frequently. Keep it clean - house dust is a pollutant in the air you breathe.

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## HOW TO PROTECT YOURSELF FROM POLLUTED AIR?

Harmful substances in the air cause headaches, coughs, tears, itching and skin rashes. They cause various diseases of the respiratory organs, heart, skin and eyes. Avoid busy intersections and other places with polluted air. If you are in a very polluted environment, breathe through gauze or a special mask that filters the air.

Each of us can do something for the environment. Here are ten simple ways to preserve nature. Simple but effective ::

1. Stop the water;
2. Take a quick shower, don't take a bath;
3. Open the windows wide, but briefly;
4. Avoid batteries;
5. Switch off electrical appliances;
6. Place the lid on the pot;
7. Electric kettle instead of hob;
8. Do not use a hair dryer;
9. Give up disposable glasses;
10. Avoid plastic bags;

### Sources:

- HANDBOOK ON APPLIED ECOLOGY - Edited by Prof. Canko Jablanski prof. Georgi Petkov, THRACIAN UNIVERSITY FACULTY OF AGRICULTURE, Norwegian Cooperation Program with Bulgaria - Project: "Assessment, reduction and prevention of air, water and soil pollution in the Stara Zagora region", ref. № 2008/115236

### Links:

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