WATER IS LIFE

Handbook

Brief information about water, ideas, suggestions and practical advice

LET'S SAVE WATER

Erasmus+ project

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Contents

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Water

it is one of the most important resources on our planet and occurs in various forms, including rivers, lakes, seas, oceans, glaciers and groundwater. The main composition of water is hydrogen and oxygen atoms, which form the H2O molecule.

Drinking water is crucial for the survival of humans and many animals. Drinking water usually has a low concentration of salts and other impurities that can be dangerous for humans. Drinking water is obtained from a variety of sources, including groundwater, surface water, and groundwater.

Salt water is found in oceans and sea bays. This water contains a high concentration of salts, making it undrinkable for most animals. However, salt water can be removed by desalination, a process called desalination, making it drinkable and usable for humans and animals.

A brief history of water retention measures

In ancient times, many cultures developed methods for holding and distributing water for agricultural purposes. For example, in ancient Egypt, structures like the Nile dams were used to hold back water during periods of flooding and then used to irrigate fields during droughts. Similar methods were also used in ancient Rome, where aqueducts were built to ensure water supplies for the city.
In ancient Egypt, water management projects were very important for the country's survival and prosperity. Egypt is located in an arid and semi-desert environment, and food production depended on the irrigation of agricultural land. Therefore, different methods of water retention and distribution were developed in Egypt.
One of the most important projects was the Nile dams, which were built to hold back water during the flood season and then use it to irrigate fields during the dry season. Dams have been built since the Old Kingdom (approx. 2686 - 2181 BC), but the largest and most famous dams were built during the New Kingdom (approx. 1550 - 1070 BC).
In addition to dams, canals were also built in Egypt to distribute water. The largest and most famous of the canals was the Crocodile Canal, which was built during the Ptolemaic Kingdom (332 - 30 BC). This canal connected the Nile River to the Fayyum Oasis area, allowing for the irrigation of agricultural crops in the area.
Egyptian water management projects were very important for the economic and cultural development of the country. Thanks to them, the Egyptians could grow enough cereals, vegetables and fruits and could also devote themselves to the construction of monumental structures such as pyramids, temples and tombs. Water management was also important to the development of art, literature and religion, as many mythological stories related to gods and goddesses associated with water and irrigation.
In the Roman Empire, water management was also very important. The Roman Empire had a developed system of aqueducts that supplied water to the city. This system was based on resources that were located outside the city. Water was obtained from sources that were often tens of

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kilometers away from the city and then transported to the city through water pipes. Roman engineers were able to create aqueducts with long stretches that were also run over hills and valleys. The Roman Empire also built various irrigation canals and reservoirs. Many of them were used to irrigate agricultural areas and were important for food production. In addition, aqueducts were built to drain areas and remove excess water from places where there was a risk of flooding.
Water was also important for hygiene in the Roman Empire. In many towns and villages there were public baths where people could wash and refresh themselves. These baths were supplied with tap water and also had their own sewers.
Overall, it can be said that water management was very important for the Roman civilization. Water was needed for many aspects of life - from crop irrigation and food production, through public baths to aqueducts that provided drinking water for the population. The Roman Empire became known for its engineering prowess, and the water management projects it built were some of the most important of these.

In the Middle Ages, dam reservoirs were frequent elements of water management systems and were often built near monasteries and castles, where they were used for agricultural purposes as well as for the provision of drinking water.
In modern times, water management projects have become spectacular and complex. Many countries have built large dams to retain water for power generation and irrigation. The largest dams in the world are located in Asia and North America, with examples such as the Iron Gate on the Danube and the Hoover Dam in the USA.
Nowadays, water management projects are still important for the provision of drinking water, irrigation of agricultural areas, energy production and regulation of natural disasters such as floods. However, the current trend is to put more emphasis on sustainable and ecological solutions that minimize the impact on the environment and preserve the natural balance of ecosystems.
In Spain, water has always been important for agriculture and the economic development of the country. Water management measures in Spain date back to the Roman era, when Roman aqueducts and aqueducts were built. During the Middle Ages, various irrigation techniques were developed, such as the systematization and canalization of rivers and waterways.

Spain

In the 20th century, Spain faced many water management challenges, especially water scarcity and drought. In the 1960s, the government began building many dams and reservoirs to retain water, which were later used to irrigate agricultural crops, generate electricity, and supply drinking water. Spain is currently facing many water management challenges, including persistent drought and climate change. The government is therefore making efforts to use water more efficiently and supports solutions that improve water management and the protection of water resources.

Currently, there are many projects in Spain aimed at the renewal and modernization of existing water management infrastructures and at the use of new technologies to improve the use and management of water resources. In addition, the Spanish government also participates in

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international projects to protect water resources and supports research and innovation in the field of water management.
There have been several cases of mismanagement of water resources in Spain in the past. Some of them are:
1. Excessive pumping of groundwater: In the past, groundwater was pumped excessively in Spain to irrigate agricultural crops, which resulted in a decrease in the groundwater level and deterioration of water quality
2. Damage caused by dams: During the construction of dams and reservoirs to retain water, some areas were flooded, which could have a negative impact on the natural environment and destroy human habitations and fauna and flora.
3. Pollution of water resources: In the past, water in some areas was polluted with toxic substances and waste from industry, which could have a harmful effect on human health and the natural environment.
4. Persistent droughts: Spain faces persistent droughts and water shortages, which can have a negative impact on the country's agriculture and economic development.
In the past, these problems required improved management and use of water resources and better protection of the natural environment and water resources.

Slovakia

From the 8th century, water resources began to be used on the territory of Slovakia to irrigate agricultural land and power mills. In the Middle Ages, several hydrotechnical structures, such as navigation channels and water reservoirs, were built on the territory of Slovakia. Among the most important buildings are, for example, the Nitrian water canal from the 11th century, which was used for navigation on the Nitra river, but also for the irrigation of agricultural land and the water reservoirs in Španá dolina and Levicie, which were used for irrigation and powering mills.
In the 19th and 20th centuries, large-scale construction of hydropower and water management structures took place, which enabled better use of water resources and ensured water supplies for growing industrial needs. The most important buildings include Gabčíkovo - hydroelectric power plant, Liptovská Mara and Orava. In the 20th century, water sources also began to be used to supply the population with drinking water, when water purifiers and water mains were built.

Currently, the demand for water is increasing in Slovakia due to the growing population and industrial needs, which requires the sustainable and efficient use of water resources and the protection of water ecosystems.
Slovakia has abundant water resources, but even so there are problems with its sustainable use. Some measures that have been taken to protect water in Slovakia are:

1. Introduction of legislation to protect water resources: Slovakia has extensive legislation regarding water protection and water quality. Among the most important laws are the laws on water and water protection.
2. Construction of new wastewater treatment plants: Several new wastewater treatment plants have been built in Slovakia in recent years, which help to minimize water pollution by waste.

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3. Improving the protection of drinking water sources: Slovakia is trying to protect drinking water sources from pollution and minimize the risks associated with contamination. Measures that have been taken to protect drinking water include, for example, the introduction of protective zones around sources.
4. Introduction of programs to improve water use in agriculture: Slovakia is trying to improve the efficiency of water use in agriculture, where most of the water in Slovakia is used. Irrigation support programs are organized to save water and improve yields.

5. Improving the infrastructure for water resources management: Slovakia is investing in improving the infrastructure for managing water resources in order to more effectively monitor and manage the use of water in the country. Improvements include, for example, the modernization and construction of new water management facilities.

Features

Water itself on Earth has various properties that make it unique and necessary for many processes in nature. These features include:

High heat capacity: Water has a high capacity to absorb and release heat, making it ideal for regulating the temperature on Earth. The water also allows for a relatively stable temperature in the oceans, which is important for many marine animals.

High surface tension: Water has the ability to form a thin layer on its surface, making it ideal for many animals that can move on or settle on water.

High solubility: Water is a good solvent and can dissolve many substances, including salts, gases and organic compounds.

A unique property of ice: Water has the unique property of expanding when it turns to ice, which has important implications for water in the oceans and on land.

Essential for all forms of life: Water is a basic resource for all forms of life on Earth. Many organisms are directly dependent on water for survival and many others exist in it.

Factors and use

There are many factors that affect water quality, including nutrient pollution, chemicals, bacteria and viruses. Various technologies are used to purify and process water for drinking water and for many other purposes.

Water is also a source of energy and can be used to generate electricity using hydroelectric power plants. In addition, water can also be used in other futuristic technologies, such as the use of water vapor as fuel for vehicles and airplanes, or the use of water for hydroponic growing of plants in space.

Overall, water is a key element for life on Earth and its importance in various fields, from health and survival to energy and technology, is invaluable.

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The role of water and its function

Water and plants are basic elements of nature that have a significant impact on human life. Their interaction is complex and important for maintaining balance in ecosystems.

The role of water in plants is to transport nutrients and water from the roots to the leaves and other parts of the plant. Water also helps maintain the shape of the plant and protect it from harmful external influences. Most plants need enough water for their growth and reproduction.

Humans have a major impact on water resources, mainly by using water for their needs, such as drinking, agriculture and industry. When the amount of water in the sources decreases, plants suffer from lack of water and may die. This has a negative impact on ecosystems and can also impact the supply of food and other important resources for humans.

Plants are also important to humans because they provide food, oxygen and other resources. But people also affect plants, for example by changing the environment in which they grow, using pesticides and herbicides, or changing the genetic makeup of plants. This can have a negative impact on biodiversity and can have a long-term impact on ecosystems.

Overall, it is important to realize that water and plants are interconnected and have a significant impact on nature and human life. It is therefore important to protect these resources and maintain their balance for future generations.

Man also uses plants as a source of food, such as vegetables, fruits, cereals and others. Agricultural crops are often a source of profit for many countries and a link to trade chains across the globe. All these factors show that plants are important not only for ecosystems, but also for human life and culture.

However, some types of plants and water can also become a problem for human health and the environment if, for example, they are toxic or contaminated. In this case, air and water pollution can occur, which can lead to serious health problems for people and the environment.

Therefore, it is important to be aware of the role of water and plants in nature and how they relate to human life. In order to protect these resources, we need to learn about their interactions and impact on our world, and put measures in place to maintain and protect them for future generations.

Oceans - salt water

Composition of sea water and its function on the ecosystem

Seawater is composed of various minerals and salts that have dissolved in the oceans and seas. The main components of seawater are sodium chloride (salt), magnesium, calcium, potassium, sulfur, fluorine and other elements in smaller quantities. This composition of seawater plays a key role in maintaining the ecological balance in the oceans and seas. For example, sea water provides:

1. Habitat for many marine organisms that have developed special adaptations to life in salt water.

2. Transport of nutrients and minerals to the water system, which are necessary for seaweed, plankton and many types of fish.

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3. Regulation of climatic conditions, including the impact on changes in temperature and salinity of water, which have an impact on global climate patterns.

It is important to protect the oceans and seas because they are a key part of our planet's environment. Oceans and seas make up about 71% of the earth's surface and provide habitat for more than half of all living organisms on earth. In addition, oceans and seas are a source of food for many people and have a key influence on global climate conditions.

Unfortunately, oceans and seas are currently exposed to many threats, including pollution, overheating and acid rain, all of which have a negative impact on their ecological balance and ability to provide a habitat for many marine organisms. Therefore, it is important that we protect the oceans and seas to maintain their health and functionality for future generations and to maintain a healthy ecosystem.

Ocean currents have an important influence on climate patterns and ocean temperatures. These currents are created by a combination of wind forces, solar radiation and differences in water temperature and salinity. Water moves in cycles, creating ocean currents that are critical to the distribution of heat and nutrients in the oceans. These currents thus allow warm water to be transported from the tropics to the poles and cooler water to be transported from the poles to the equator.

Sea currents thus play a key role in regulating the temperature of the oceans and the overall climate conditions on Earth. For example, the Gulf Stream usually transports warm water from the Caribbean and the Gulf of Mexico into the Atlantic, resulting in warmer temperatures in the Atlantic and a significant impact on climate conditions in Europe.

In addition, evaporation from the oceans and seas has a significant impact on global climate conditions. Water evaporates from sea level into the atmosphere and is transported to different regions of the world where it condenses and falls as precipitation. This process is called the water cycle and is key to the distribution of rainfall and crops around the world.

However, in recent decades, changes in ocean temperature and an increase in evaporation from the oceans have been observed, resulting in changes in climate conditions and deterioration of the oceans and seas. Therefore, it is important to monitor and manage the impact of human activities on the oceans and seas in order to maintain their health and ensure their sustainability.

The oceans are the main sources of oxygen in the atmosphere, as more than 50% of the oxygen in the atmosphere is produced by phytoplankton - microscopic plants that live in the oceans. These plants produce oxygen as a byproduct of photosynthesis. Oxygen also dissolves in the ocean and is delivered to the atmosphere through physical processes such as waves and turbulent mixing.

The oceans also play a key role in storing carbon, which is produced by human activity, particularly the burning of fossil fuels. Carbon is bound to minerals and organic debris in the ocean, and much of it is deposited on the ocean floor. This process is called "ocean carbon sequestration" and is important for regulating the level of carbon dioxide (CO2) in the atmosphere.

However, excessive production of CO2 due to human activities, such as burning fossil fuels, leads to an increase in ocean acidity. This process is called "ocean acidification" and can have serious

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consequences for marine ecosystems, including coral reefs, which are very sensitive to changes in ocean pH.

Therefore, it is important that we manage and limit greenhouse gas emissions, as well as monitor changes in the chemical composition of the oceans and their impact on marine ecosystems. This will help us protect the oceans and their ability to produce oxygen and regulate climate conditions.

Global warming has a significant impact on the oceans and their ecosystems. The main consequences of global warming include rising ocean temperatures, rising sea levels, ocean acidification and changes in ocean currents.

The increase in ocean temperature affects many species of marine organisms that have adapted to certain temperature ranges. Changes in temperature can result in the migration of species to other areas, changes in their growth and reproduction, and can also increase the risk of overcrowding and destruction of marine ecosystems.

Sea level rise can have a negative impact on marine habitats that are sensitive to waves and tides. Sea level rise also increases the risk of flooding in industrial areas and in densely populated areas where many people live.

Ocean acidification, caused by an increase in the concentration of carbon dioxide (CO2) in the atmosphere, can have a negative effect on marine organisms that need a certain pH for their life. For example, coral reefs are very sensitive to changes in pH, and lowering it can lead to their death and loss of biodiversity.

Changes in ocean currents can affect the amount and types of fish and other organisms found in particular areas of the ocean. Changes in ocean currents can also affect the amount of nutrients that reach certain areas and affect the overall marine environment.

Ocean acidification is a process that occurs when the amount of oxygen and pH levels in the oceans change due to the absorption of excessive amounts of carbon dioxide (CO2) from the atmosphere. This process leads to a lowering of the pH level of the oceans, which means that the oceans are becoming more acidic.

This process of ocean acidification is caused by anthropogenic factors such as excessive emission of CO2 into the atmosphere from fossil fuels and other human activities. The oceans absorb about one-third of the emitted CO2, which dissolves in seawater to form carbonic acid (H2CO3), which lowers the pH level of the oceans.

This process has negative consequences for ocean ecosystems as well as for many marine organisms that depend on the correct pH level of the water. A decrease in the pH of the water level can cause coral reefs, which form an important habitat for many marine organisms, to break down. In addition, some species of marine organisms, such as molluscs that form calcite shells, may also be affected by more acidic water conditions. It is important to stop this ocean acidification process and minimize CO2 emissions into the atmosphere to protect the oceans and their ecosystems.

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Desalination

There are several ways to turn salty seawater into potable water, usually referred to as desalination processes. The most common methods include:

1. **Distillation**

This process involves heating seawater to evaporate it and separate it from salt and other impurities, then collecting the water vapor to cool and condense it back into liquid form. Condensed water is then drinkable because it does not contain salts and other impurities.

1.1 Distillation is a seawater desalination process that involves heating water to evaporate and separate salt and other impurities, and then collecting the condensed water. Advantages and disadvantages of distillation include:

Advantages:

- Distilled water is usually very clean and does not contain any impurities, bacteria or salts that can be dangerous to human health.

- This desalination process does not require any chemicals, so the water is safe and healthy to drink.

- Distilled water has a neutral pH value, which means it is suitable for anyone with sensitive skin or who deals with allergies or diseases that can be affected by the pH value of the water.

Disadvantages:

- Distillation requires a lot of energy and is therefore expensive to operate.

- The process of desalination by distillation is slow and may require a lot of time to produce a relatively small amount of potable water.

- Distilled water does not have all the minerals and trace elements that are healthy for the human body. Therefore, it is necessary to supply these elements to drinking water in other ways to ensure the necessary nutrition.

In any case, distillation can be useful for places with limited fresh water resources or for special uses, such as in pharmaceutical or biotech manufacturing.

Osmosis is a process

that uses a semi-permeable membrane to separate salt and other impurities from seawater. The water passes through the membrane into the second chamber, where drinking water is collected. This process is often used in industrial training facilities and also in smaller devices on ships or in shipping containers.

Osmosis is a seawater desalination process that uses a semipermeable membrane to separate salt and other impurities from the water. This process also has its advantages and disadvantages.

Advantages:

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- Osmosis is more energy efficient than distillation because it does not require high temperatures to separate salt and other impurities from water.

- This desalination process does not require any chemicals, so the water is safe and healthy to drink.

- The osmotic membrane allows only pure water to pass through, so the resulting water is usually very clean and free of impurities.

- Osmosis allows to desalinate a larger amount of water compared to distillation at the same time, because the process is faster.

Disadvantages:

- Osmosis can be sensitive to high pressure and temperatures, which can affect the performance of the osmotic membrane.

- The membrane can be damaged by possible contact with chemicals that can destroy the membrane and pollute the water.

- Similar to distillation, water obtained by osmosis does not have all the minerals and trace elements that are healthy for the human body.

Costs:

- Osmosis costs depend on the size and performance of the osmotic membrane. In general, osmosis is cheaper than distillation, but still requires some operation and maintenance costs.

Overall, osmosis may be preferable to distillation for drinking water production because it is more energy efficient and allows for the desalination of a greater amount of water compared to distillation at the same time.

Ion exchange

This process uses chemical reactions to separate salt and other impurities from seawater. The water is passed through a material that can trap salts and other impurities and replace them with ions that are not dangerous to human health. This process is often used in laboratories and industry to produce high quality drinking water.

Ion exchange is a water desalination process that uses chemical reactions to separate salt and other impurities from water. This process also has its advantages and disadvantages.

Advantages:

- Ion exchange is effective in removing harmful ions from water, including salts, metals and organic matter.

- This desalination process allows minerals and trace elements to be preserved in drinking water, which is healthy for the human body.

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- Ion exchange enables desalination of water in real time and enables the production of potable water on site.

Disadvantages:

- Ion exchange can be expensive because it uses chemical reactions to remove impurities from water.

- This process requires regular maintenance and replacement of ion exchange columns to be effective and provide quality drinking water.

- The resulting water may contain residues of chemicals and salts that were used for ion exchange in the desalination process.

Costs:

- The cost of ion exchange is usually higher than the cost of osmosis and other water desalination methods because it requires the use of chemicals and regular maintenance.

- Costs may vary depending on the size and performance of the ion exchange system and water quality requirements.

Overall, ion exchange is an effective desalination method and water, which allows the preservation of minerals and trace elements in drinking water, but requires regular maintenance and can be expensive compared to other water desalination methods.

Comparison of all three methods of seawater desalination

- distillation, osmosis and ion exchange - from the point of view of costs and production, it depends on specific circumstances, such as the size of production, availability of water and resources, water quality, etc. However, in general:

Distillation

- The operating costs of the distillation system are high, because you need energy to heat the water, which then has to be cooled and condensed, which is energy-intensive.

- The performance of the distillation system depends on the temperature and salinity of the seawater that is withdrawn. This means that the production of drinking water may be limited if the water temperature drops or if the salinity of seawater increases.

- Despite the high costs and limited production, distillation has the advantage of producing water without any chemicals and salts that could affect the taste or health effects of the water.

Osmosis

- The operating costs of the osmotic membrane are lower than the costs of distillation because the process does not need energy to heat the water.

- Osmosis is more effective in removing salts and other impurities from water, thus reducing the amount of waste and increasing the production of drinking water.

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- Despite lower costs and greater water production, reverse osmosis can be expensive to maintain and replace membranes and sensitive to input water quality that could cause membrane damage.

Ion exchange

- The cost of operating an ion exchange system can vary depending on the type of chemicals used, the size of the production and the quality of the water.

- Ion exchange is effective in removing harmful ions from water and allows minerals and trace elements to be preserved in drinking water.

- This process enables water desalination in real time and enables the production of potable water on site,

All these desalination processes have their advantages and disadvantages, and each of them is used depending on specific needs and conditions. In any case, producing drinking water from seawater is an energy- and technology-intensive process, and therefore usually more expensive than obtaining water from other sources.

The cost per liter of desalinated water varies depending on many factors, such as the cost of producing desalinated water, the distance and cost of transporting desalinated water, the cost of maintaining and operating the desalinated water, the cost of removing waste and salt from the desalinated water, and more. .

In general, it can be said that the production of desalinated water is more expensive than the production of fresh water, as it requires more energy and specialized technology. Costs can vary from a few cents per liter to several euros per liter, depending on specific factors.

In some cases, the cost of desalinated water may be competitive with the cost of other alternative water sources, such as imported fresh water or desalinated water from other sources. In other cases, desalinated water is used as a more expensive but essential water source, especially in areas with limited access to fresh water.

Nuclear energy could be a potential alternative for the energy-intensive process of seawater desalination. Nuclear energy uses a nuclear reaction to produce energy that is relatively efficient and clean with respect to greenhouse gas emissions.

However, there are also certain concerns and challenges associated with the use of nuclear power, such as safety measures and nuclear waste management. In addition, nuclear power has high costs for the construction of nuclear power plants and the extraction of nuclear fuel.

Other alternatives that could be suitable for energy efficient desalination of seawater include solar energy, wind energy or hydropower. However, these alternatives have their advantages and disadvantages and depend on specific conditions that can affect their effectiveness and cost.

Determining a suitable alternative for seawater desalination depends on many factors, including available resources, climate, geographical conditions and the financial capabilities of a given country.

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In Europe, solar energy and wind energy could be suitable alternatives for seawater desalination. For example, Spain and Greece are known for their sunny and windy conditions that could be used to generate renewable energy for desalination of seawater.

In countries such as Sudan, Congo or Cameroon in Africa, solar energy or hydropower may be a more viable alternative for seawater desalination. These countries usually have a lot of sunlight or a lot of natural water resources that could be used to generate energy for desalination of seawater.

In general, countries with greater financial possibilities could invest more in effective technologies for seawater desalination, such as ion exchange or reverse osmosis.

However, even countries with limited financial resources can use renewable energy sources to produce energy for seawater desalination. In such cases, simpler technologies could be used, such as water distillation using solar energy.

Currently, there are many countries

that use desalinated water because they face drinking water supply problems or have limited access to fresh water. Countries that use desalinated water the most include:

1. Saudi Arabia - Saudi Arabia is one of the countries with the largest consumption of desalinated water in the world. It is mainly used to irrigate deserts and operate oil fields.

2. United Arab Emirates - This country uses desalinated water for irrigation and for the production of drinking water.

3. Israel - Israel has one of the largest desalination capacities in the world and uses desalinated water for irrigation and for the production of drinking water.

4. USA - The USA has many desalination plants and uses desalinated water mainly for irrigation and to produce drinking water in areas with a shortage of fresh water.

5. Australia - Australia is a country with major problems with the supply of drinking water and therefore uses desalinated water mainly for irrigation and for the production of drinking water.

6. Singapore - Singapore has very limited drinking water resources and therefore uses desalinated water to produce drinking water.

7. Spain - Spain has one of the largest desalination capacities in Europe and uses desalinated water mainly for irrigation and for the production of drinking water.

European countries and desalinated water

The European countries that use desalinated water the most are archipelago countries that have limited access to fresh water. These countries include:

1. Malta - is an island nation in the Mediterranean Sea and has limited fresh water resources because it is located in a dry and arid climate zone. Desalinated water is used to irrigate crops and produce drinking water.

2. Cyprus - is also an island state in the Mediterranean Sea with limited fresh water resources. Desalinated water is used for crop irrigation, in industry and for drinking water production.

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3. Spain - also has limited freshwater resources in some areas such as the southern coast and the Canary Islands. Desalinated water is used for crop irrigation, in industry and for drinking water production.

4. Portugal - has limited fresh water resources in some places and desalinated water is used for crop irrigation and industry.

5. Greece - Greece also has limited freshwater resources and desalinated water is used for crop irrigation, industry and drinking water production.

These countries have to rely on desalinated water as an alternative source of water due to limited access to fresh water.

Our regions

Rompido in Spain and Sabinov in Slovakia have different climates and rainfall patterns.

Rompido is located in the south of Spain, in the province of Huelva, and has a Mediterranean climate with mild winters and hot summers. The average annual rainfall in Rompid is around 600 mm, with most of the rainfall occurring in the winter months.

On the other hand, Sabinov is located in the east of Slovakia and has a continental climate with cold winters and warm summers. The average annual rainfall in Sabino is around 700 mm, with the highest amount of rainfall in the summer months.

Overall, Sabinov has a higher amount of rainfall than Rompido, although both areas experience seasonal variations in rainfall. While Rompido receives most of its precipitation in winter, Sabinov receives most of its precipitation in summer. It is important to note that these are generalizations only and rainfall patterns can vary significantly from year to year in both areas.

Climate change – Slovakia

Slovakia is located in Central Europe and has a climate that is influenced by continental influences. Water is very important for Slovakia and its territory is rich in rivers, streams, lakes and springs.

In the last 10 years, Slovakia has experienced extreme rainfall that has caused floods and other disasters. In 2010, for example, there were floods in the central part of the country, which had a great impact on the population and infrastructure. In 2014, floods hit mainly the south and east of Slovakia.

In addition to extreme rainfall, Slovakia also has a dry season, which can lead to water shortages and threaten the economy and the environment. In recent years, Slovakia has encountered such a problem, especially in the summer months.

Slovakia has many watercourses, the largest of which are the Danube, Váh, Hron, Hornád and Poprad. In recent years, various projects and measures have been implemented in Slovakia to

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protect waterways from pollution and to improve water quality. In addition, measures are also being taken to increase the water retention capacity of the land to minimize the effects of extreme rainfall and drought.

Sabinov is a town located in the Prešov Region in eastern Slovakia. In this region, rainfall and water flows depend on specific conditions and location.

In general, eastern Slovakia has a continental climate with a dry period in summer and more significant precipitation in other seasons. Natural conditions in the area and land use often affect the quantity and quality of water.

In the case of Sabinov, total precipitation reaches approximately 600-800 mm per year. The water usually flowed quickly from the hills and mountains into the surrounding rivers and streams. Sabinov is part of the Torysa river basin, which is one of the largest eastern Slovak rivers.

Climate change is becoming an increasingly significant and serious challenge for Slovakia and the whole world. In Slovakia, climate change is most visible in extreme weather conditions, such as droughts, floods, temperature increases and changes in flora and fauna.

For this reason, it is important that we adapt to climate change and implement measures to help protect water and mitigate its impact on the environment and human health.

One of the main measures to protect water in connection with climate change is increasing its quality and quantity. This can be achieved, for example, by introducing measures to reduce greenhouse gas emissions, as well as to protect and restore ecosystems that serve as natural water reservoirs.

Another important measure is the introduction of systems for the collection and recovery of rainwater, which can be used for watering plants and in other areas. In addition, using organic farming methods and implementing soil conservation measures can help prevent soil erosion and keep it in a healthy state, ensuring that water reaches underground reserves.

In connection with climate change and water protection, it is also important to invest in the modernization of water facilities and infrastructure, so that we can effectively manage water resources and ensure its sufficient quantity and quality for human needs and to protect the environment.

Climate change and its impact on water and ecosystems require comprehensive solutions and cooperation between different sectors and society as a whole. Therefore, it is important that we learn about climate change, its impact on the environment and the manifestations of this change in Slovakia, and take measures to solve it and protect water.

Northeast Slovakia

Northeastern Slovakia, including the Sabinov and Prešov regions, is experiencing many climate changes that affect the local environment, economy and society.

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One of the most striking trends is increasing temperatures. In recent decades, average temperatures have increased and the frequency of extreme heat events has also increased, which can have a negative impact on the health of the population and agricultural production.

Another problem is the lack of water during the summer seasons. Rainfall is irregular and often high, meaning that water is scarce during the dry season. This has an impact on agricultural production and also on the supply of drinking water to local residents.

In addition, the region often experiences extreme weather events such as storms, strong winds, rainfall and even floods that can cause damage to property and infrastructure.

These climate changes have a negative impact on the local economy, agriculture, road transport and the environment. To solve these problems, measures such as increasing the efficiency of water management, using renewable energy sources, building anti-flood measures and increasing the resilience of the area to climate change are being implemented.

In the area of Sabinov and Prešov, there are also other climate problems that they are trying to solve. One of them is the strengthening of water erosion and disturbance of soil stability. Changes in the intensity and amount of rainfall can cause soil erosion and reduce its quality. To solve this problem, measures are being introduced to protect the soil and improve its quality, such as agrotechnical practices, renewable energy sources and rational land use.

Another problem is forest fires, which are caused by a combination of drought and high temperatures. Forest fires have a significant impact on ecosystems and biodiversity and can also cause material damage. To mitigate this problem, measures are being introduced to prevent fires and improve the protection of nature and the environment.

At the same time, the impact of climate change on tourism, which is an important source of income for the region, is felt in the region. Changes in weather and natural conditions can affect tourism and the economy. To solve this problem, measures are being introduced for the sustainable development of tourism and the use of ecological and renewable energy sources in the tourism sector.

All in all, in the area of Sabinov and Prešov, they encounter many climate changes that have a negative impact on the environment, economy and society. To solve these problems, measures are being introduced to improve the region's resilience to climate change and ensure the sustainable development of the area.

Resilience

Resilience is the ability of a system, community or ecosystem to resist and adapt to change, crisis or stress and maintain its functions and structures. In relation to climate change, the term resilience is often used in the context of adapting to climate change and improving the ability of society and ecosystems to withstand the negative consequences of climate change. Resilience can include various measures such as improving water management, improving agricultural production, improving access to information and improving infrastructure.

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When building resilience, the so-called an integrated approach that includes coordinated and synergistic measures in different areas such as economy, environment, society and culture. An integrated approach makes it possible to solve different problems at once and thus increases the effectiveness and sustainability of measures to build resilience.

Climate change – Spain

Spain is experiencing various climate changes, including increasing temperature, drought and increasing extreme weather conditions.

Temperatures in Spain are rising much faster than in most other European countries, with the summer months getting hotter and hotter. Recent years have also seen prolonged periods of drought and extreme weather such as floods and storms.

Climate change is also affecting Spain in agriculture and forestry. For example, drought and high temperatures can affect crop yield and quality. In addition, climate change can affect biodiversity and can lead to a reduction in the number of plant and animal species.

In addition to the climate changes mentioned above, Spain is also experiencing rising sea and ocean levels, which can affect coastal areas and increase the risk of flooding. In addition, climate change may also affect tourism in the country, as many tourists are attracted by the sunny and warm weather.

In addition, Spain is also known for the occurrence of forest fires. Increased temperature and dry conditions increase the risk of wildfires, which can have a devastating effect on biodiversity and property in the area.

Given these climate challenges, the Spanish government has adopted several measures to mitigate climate change and adapt to new conditions. For example, the country has committed to the goal of achieving unsustainable greenhouse gas emissions by 2050 and to a significant increase in the share of renewable energy sources. In addition, the country supports measures to reduce the risk of forest fires and adapt to new climate conditions in coastal areas.

Spain is known for its considerable problems with water scarcity and drought. The country is one of the driest in Europe and struggles with long-term water supply problems. These problems are exacerbated by climate change, which contributes to the reduction of available water.

The main sources of water in Spain are rivers and underground supplies. Most areas in the country have a low supply of groundwater, which is slowly replenished and is easily affected by pollution. In addition, rivers in Spain often suffer from water shortages due to extreme drought and excessive construction along the coast.

Water supply problems are most pronounced in southern and central Spain, where water pressure is greatest due to rapid urban and agricultural growth. In some areas, unsustainable methods are used to obtain water, which contribute to soil degradation and water pollution.

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The Spanish government is trying to solve these problems through measures such as improving the efficiency of water use, increasing investments in water treatment and promoting new technologies for obtaining and managing water. In addition, the country strives to improve water control and resource management to minimize negative environmental impacts and ensure a sustainable water supply for future generations.

Seville and El Rompido are located in Andalusia, which is one of the driest regions in Spain. These areas therefore face many water and climate change problems.

One of the biggest problems is the lack of groundwater supplies, which are used to supply local residents and industry. Groundwater in Andalusia is rapidly depleting and unable to be replenished in sufficient quantities due to low rainfall. In addition, groundwater is threatened by pollution due to the use of pesticides, fertilizers and other chemicals in agriculture and industry.

In relation to climate change, Andalucia is facing increasingly frequent and intense periods of drought, which cause fires, soil deformation and economic losses. In some areas, the risk of floods that occur during periods of heavy rains also increases.

In an effort to solve these problems, both local and central governments are investing in projects to improve water management, increase the efficiency of its use and promote renewable energy sources. In addition, measures are being taken to improve water quality, prevent pollution, and use technologies for recycling waste water and retrieving water from the sea.

Current problems of water management

There are several main challenges that countries face in water management:

Lack of water -

Water scarcity is a problem that occurs in many areas of the world that experience drought and lack of rainfall. This problem is usually caused by climate change and increased water consumption. Lack of water can result in a shortage of drinking water and agricultural resources, which can lead to a reduction in agricultural production and a worsening of the economic situation. The solution can be effective and sustainable water management, which would enable better use of resources and effective management of dry periods.

Water pollution –

Water pollution can be caused by a variety of factors, including industrial wastes, sewage and agricultural pollutants. Polluted water can be harmful to human health and the environment. Ensuring clean water for people and animals is an important part of water management. Effective wastewater treatment and monitoring of water resources can help minimize water pollution.

Inefficient use of water –

Inefficient use of water Some areas of the world use water inefficiently, leading to waste and overuse of resources. This may have a negative impact on the quality and availability of water in the future. Efficient use of water is therefore important for maintaining a healthy environment and sustainable agricultural production. Implementing water-saving technologies, such as rainwater harvesting systems or the use of recycled wastewater, can help minimize inefficient water use.

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Excessive drainage –

In some cases, the soil can be excessively drained, leading to a lowering of the water table and a lack of water for plants and animals. Excessive drainage can be caused, for example, by intensive agricultural production or the construction of roads and buildings. Careful planning of construction and agricultural production that takes into account the needs of the water cycle and minimizes excessive drainage may be the solution.

Conflicts over water

In some areas of the world, conflicts occur due to water scarcity and the sharing of water resources. These conflicts can be between different people or between different groups of people within the same country. The solution may be the joint management of water resources and the fair distribution of water among all stakeholders.

Outdated infrastructure:

In some areas of the world, the infrastructure for water management is outdated and inefficient. This can lead to wastage of water resources and deterioration of water quality. Modernizing infrastructure, including waterways, wastewater treatment plants and irrigation systems, can help improve the efficiency of water management and minimize its negative impact on the environment.

Climate changes:

Climate change may affect water availability in some areas of the world. Increased temperature and lack of precipitation can lead to a decrease in the groundwater level and a lack of drinking water. The solution may be careful planning of construction and agricultural production that takes into account the needs of the water cycle and minimizes excessive drainage. In addition, various technologies such as rainwater harvesting and storage systems can be used to minimize the negative impact of climate change on water management.

Management problems in the area of Sabinov

Some of these water management problems also exist in the Sabinov area in Slovakia. For example, water scarcity can be a problem in the summer when the water table drops and rainfall is limited. This can lead to water shortages for plants and animals that need sufficient water to survive. A solution may be irrigation that uses water from a variety of sources to minimize the need for water from underground sources.

Another problem can be water pollution from sewage. This may be due to insufficient sewage network and sewage treatment plants. The solution may be to modernize the existing infrastructure for water management, including the construction of new sewage networks and wastewater treatment plants.

These problems have a global impact and require a global solution. It is necessary to invest in sustainable water management to ensure the availability of clean drinking water for future generations.

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Types of plants and trees that help retain water in the landscape.

There are several types of plants, including trees and shrubs, that are suitable for maintaining water in the landscape. In Eastern Slovakia, for example, the following could be used:

Poplars are fast-growing trees with powerful root systems that help hold soil in place and prevent erosion.

Ash: Ash is another tree with a massive root system that is able to retain water in the soil. In addition, ash is tolerant to different types of soil and climatic conditions.

Willow: Willows are fast-growing shrubs and trees that have the ability to spread quickly and cover large areas. In addition, willows have many uses, for example in biomass or as soil protection.

Oak: Oak is a tree with a large root system that can hold water deep in the soil where it can be used by plants.

Roses: Roses are shrubs that can be planted as ornamentals and can also help hold soil in place and prevent erosion.

Grasses: Some types of grasses, such as dogwood (Alopecurus pratensis) or sedges, have deep roots that are able to retain water in the soil and thus prevent its loss.

These types of plants are not designed to retain water in the landscape exclusively, and different types of plants are suitable in each area. It is important to consider local climate conditions, soil conditions and landscape features before selecting plants to retain water in a given area.

Some of the fruit trees that may be suitable for retaining water in gardens are:

Pear (Pyrus communis)

Apple (Malus domestica)

Plum (Prunus domestica)

Cherry (Prunus avium)

Kiwi (Actinidia deliciosa)

Peach (Prunus persica)

In addition, there are other plants that may be suitable for retaining water in the garden, such as:

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Dandelion (Taraxacum officinale)

it has several advantages over turfing in gardens. Some even consider it a useful herb. Here are some of the benefits of dandelion:

Dandelion has a deep root system that helps break down hard soil and increase its permeability to water and oxygen.

Dandelion has many minerals and vitamins that can be useful for human health. Dandelion leaves contain vitamins A, C and K, as well as minerals such as calcium, magnesium and potassium.

Dandelion can be used as a natural remedy to improve digestion and as a diuretic.

Dandelions can serve as food for some insects, such as butterflies and bees.

Dandelion can be used as a natural pest control agent. Dandelion extract can help control certain types of pests, such as ticks and mealybugs.

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Dandelion can serve as a natural garden decoration. Dandelion flowers can be attractive to bees and butterflies and can also be used as a dried decoration.

Of course, in some cases the dandelion can be considered an unwanted species and considered a weed. In such cases, it is recommended to remove it to prevent its uncontrolled expansion. However, if properly controlled, dandelions can be useful in the garden and have some of the benefits we've mentioned.

Medicinal plants as water retainers

1. Viola tricolor - This plant has deep roots that can turn into caterpillars and help retain moisture in the soil.

2. Tanacetum vulgare - This plant has deep roots that can be used to keep the soil moist. In addition, wormwood contains essential oils that can be effective in fighting insects.

3. St. John's wort (Alchemilla vulgaris) - This plant has leaves that are able to retain water. In addition, it can also be used as a diuretic.

4. True Chamomile (Matricaria chamomilla) - This plant has deep roots and can be used as a natural means of maintaining moisture in the soil. In addition, chamomile has anti-inflammatory effects and can also be used as a sedative.

5. Pink Sedum (Sedum spectabile) - This plant has fleshy leaves that are able to retain water. In addition, it can also be used as a natural remedy for burns and skin problems.

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It is important to note that these plants may not be suitable for every type of soil and climate. It is necessary to find out about the plants that are suitable for the area and climatic conditions, so that they are effective in maintaining moisture in the soil.

Yarrow (Achillea millefolium) - has similar properties to dandelion, creates a strong root system and can be used as a green fertilizer.

Melilotus officinalis - has a strong root system and can be used as a green fertilizer.

Japanese sakura (Prunus serrulata) - has a wide root system that can help retain moisture in the soil.

The choice of plants depends on specific climatic and soil conditions and on the preferences of the gardener.

Bushes

Canadian fescue (Lonicera canadensis) - bushes that grow to a height of approximately 1.5 meters and have an excellent root system.

Blood thistle (Berberis thunbergii) - shrubs that have a deep root system and can retain water in the soil.

Juniper (Juniperus communis) - a low tree that has a strong root system and can retain water in the soil.

Root willow (Salix babylonica) - a tree that has flat roots and can retain water in the soil.

Common viburnum (Viburnum opulus) - a shrub that has a deep root system and can be used to stabilize slopes.

Common strawberry (Fragaria vesca) - a perennial that has flat roots and can maintain moisture in the soil.

Blueberries (Vaccinium spp.) - perennial shrubs that produce small fruits and have a shallow and wide root system that helps retain moisture in the soil.

Raspberries (Rubus idaeus) - perennial plants that produce small fruits and have flat roots that help retain moisture in the soil.

Strawberries (Fragaria spp.) - perennial plants that produce small fruits and have flat roots that help retain moisture in the soil.

Currants (Ribes spp.) - perennial shrubs that produce small fruits and have a shallow root system that helps retain moisture in the soil.

Figs (Ficus carica) - trees that produce sweet fruit and have soft roots that help retain moisture in the soil.

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Plants and trees suitable for clayey, heavy and dry soils

Oak (Quercus spp.) - Oaks are trees that have deep roots and are very drought tolerant. They are also of great importance for ecosystems.

Birch (Betula spp.) - Birches are trees that grow even on poor soil and are resistant to drought. In addition, they have antibacterial properties and have a healing effect.

Cedar (Cedrus spp.) - Cedars are trees that are adapted to dry conditions and have deep roots that can draw moisture even from deeper layers of the soil.

Lavender (Lavandula spp.) - Lavender is a plant that has many uses, including for decorating gardens. It grows well on dry and stony soils.

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Rosemary (Rosmarinus spp.) - Rosemary is a spice that is often used in cooking. In addition, it grows well on dry and stony soils.

Trees

Considering climate change and the changing climate conditions in Sabino, I would recommend focusing on hardy and adaptable fruit tree species that are suitable for the area. Some of the options include:

Fruit trees

Apple tree – Apple tree are suitable for mild and cooler climates, which is the case of Sabinov. Hardy varieties include 'Idared', 'Jonathan' and 'Golden Delicious'.

Plums - Plums are hardy trees that are suitable for the given climatic conditions. The varieties 'Stanley', 'Opál' and 'Herman' are suitable in Sabino.

Kiwifruit - Kiwifruit are native to warmer areas, but can grow in cooler areas with proper care. Suitable varieties for Sabins are 'Issai', 'Jenny' and 'Ken's Red'.

Pears - Pears are another option that is suitable for mild and cooler climates. Hardy varieties include, for example, 'Bartlett', 'D'Anjou' and 'Moonglow'.

Cherries - Cherries are suitable for colder areas and are very disease resistant. Suitable varieties for the Sabins are 'Meteor', 'Kordia' and 'Skeena'.

Gooseberries - they are suitable for colder areas and are very resistant to diseases. Suitable varieties for Sabinos are 'Hinnomaki Red' and 'Invicta'.

It is important to choose the types of fruit trees that are suitable for the specific climatic conditions in Sabino. Before planting, it is advisable to consult with local horticultural and fruit growing experts, who could help choose the most suitable species for the area.

Forest stands

Certain types of trees and forest cover can improve water retention on dry soils and prevent the landscape from drying out. These species include, for example, oak, birch, alder, spruce, fir and others.

Oak and birch are typical trees of Central European forests and are also found in Slovakia. Oak stands are suitable for improving water retention in areas with moderate rainfall. Oak has a powerful root system that can retain and maintain water in the soil even during dry periods. Birch, on the other hand, prefers wetter soils and can grow well in areas with higher rainfall.

Alder is a typical type of forest tree that occurs in wet areas with high groundwater levels. Alder stands can retain large amounts of water and create suitable habitats for many species of animals and plants.

Spruce and fir are trees that occur in mountainous areas, including Slovakia. These species can retain and maintain water in the soil even in areas with less rainfall. In addition, spruce and fir provide shelter for various animal species and are used in forestry for wood production.

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Planting these types of trees and woodlands can help improve water retention on dry soils and prevent landscape drying.

Measures

Certain measures could be taken to improve water conservation in the area, such as:

Planting trees and plants that help retain water and improve soil quality.

Implementation of rainwater harvesting and irrigation systems that allow for the collection and reuse of rainwater.

Supporting farmers and gardeners to use ecological cultivation methods that minimize the use of chemicals and improve soil and water quality.

Creating buffer zones and barriers that reduce the risk of erosion and improve water retention.

These measures can help improve water protection in the area of Sabinov and eastern Slovakia as a whole.

Planting trees and woodlands on dry soils that retain water and help prevent the land from drying out.

Construction of ponds and reservoirs to retain rainwater. These water sources can then be used to irrigate agricultural crops and irrigate parks and gardens.

Transfer of rainwater through puddles and drainage channels to places where it can be retained.

Building beds and catch basins in places where rainwater can settle and soak into the soil.

Planting plants that retain water and improve soil quality.

Using mulch that retains moisture in the soil and helps prevent drying out.

Construction of local rainwater harvesting systems for collecting rainwater from the surrounding walls and roofs of buildings.

Implementation of soil erosion control measures that increase the soil's ability to retain water.

Using good quality and suitable types of soil for agricultural purposes that have better water holding capacity.

Using agricultural techniques, such as irrigation systems, that reduce water use.

Construction of canals and riverbeds related to the restoration of watercourses.

Construction of gutter channels for collecting rainwater.

Reducing excessive drainage, which can lower the groundwater table and lead to desiccation of the landscape.

Using low-pressure irrigation systems that allow gradual release of water.

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The construction of green walls that improve the microclimate and increase the ability of the soil to retain water.

Planting wetlands and swampy areas that are able to retain and purify water and also serve as refuges for various species of animals and plants.

Reducing asphalt surfaces that make it impossible for water to soak into the soil.

Support and promotion of horticulture, which increases the number of gardens and reduces the amount of concrete surfaces.

Creating educational programs and campaigns to improve public awareness of the importance of water retention and the importance of its proper use.

These measures can help conserve water in countries affected by drying up and improve its quality. In addition, they contribute to a more sustainable and responsible management of our planet's resources.

Measures to retain water in gardens

in home gardens, they can help improve soil water retention and minimize the amount of water that runs off the property. Here are some recommendations on how to achieve this:

Creating beds with less demanding plants - Grass is beautiful, but it needs a lot of water. Planting beds with plants that have lower water requirements can help reduce water use and improve soil water retention.

Planting trees and shrubs - Trees and shrubs can help improve soil water retention and minimize water runoff. Their roots can hold water and improve the quality of the soil.

Creating Mulch - Mulching the soil with organic materials such as grass or leaves can help retain moisture in the soil and reduce the need for watering.

Installing rainwater tanks - Rainwater tanks can help collect rainwater and irrigate the garden. This reduces the need to use potable water for gardening.

Creating a pond - Creating a pond can be a beautiful and functional part of the garden. It can be used to collect water and improve soil quality.

Use of pebbles and gravel - Using pebbles and gravel for paths and paths in the garden can help minimize the amount of water that runs off the property.

Use of sprinkler hoses - Sprinkler hoses are an economical and effective option for watering plants. They can be used to irrigate the roots of plants directly, so the amount of water lost through evaporation is minimal.

Creating a flower bed with local plant species - Local plant species are adapted to the climatic conditions in the given region. Planting them can help improve biodiversity in the garden while reducing water consumption as they are adapted to the climatic conditions of the area.

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Use of quality soil substrates - Using quality soil substrates that improve water retention in the soil can be helpful for planting plants and minimize the need for watering.

Improving soil quality - Improving soil quality by adding organic fertilizers or compost can help improve soil water retention.

Planting plants with different root systems - Planting plants with different root systems, such as molluscs or deep-rooted plants, can help improve soil water retention.

Soil retention

is the soil's ability to retain water that falls on its surface from the atmosphere. This ability depends on many factors, such as the type of soil, its structure, the content of organic matter and the amount of vegetation in the area.

Soil retention is a key factor in water management and the fight against climate change. High soil retention can improve soil quality, promote plant growth, and prevent soil erosion and runoff. Improving soil retention can also improve surface and groundwater water quality by helping to eliminate toxic substances and pollution from the landscape.

There are several ways to improve soil retention, including adding organic matter such as compost, mulching, and planting vegetation that can help improve soil structure and water-holding capacity. Other measures include retaining water where it falls from the atmosphere, such as using rain gardens and stagnant ponds, and using technologies that allow water to be captured and stored for later use.

Danger of drying out

Drought can have a negative impact on a variety of soil types, including clay soils. Clay soils tend to harden during the dry season, which can result in reduced fertility and quality.
One of the main dangers of drought for clay soils is the deterioration of their structure. Clay soils are high in aluminum and silicic acid, which become harder and heavier during drought, which can cause soil hardening. If the soil hardens, it can become more difficult for plant roots to penetrate it and get the nutrients they need. This can result in reduced crop production and deterioration in crop quality.
In addition, drought can also cause soil erosion on clay soils. As soil hardens, it can be more prone to erosion when exposed to stronger winds and rain. Soil erosion can cause the loss of fertile soil layers and reduce soil quality, which can result in reduced yields in the future.
Finally, drought can also increase the risk of wildfires, which can cause even more damage to clay soils and native vegetation. In case of drought, it is recommended to apply measures to maintain soil moisture, such as irrigation and mulching, to minimize the negative effects of drought on clay soils.
Clay soil tends to shrink when there is a lack of water, which can cause damage to structures and infrastructure that rest on it. During dry periods, the soil can change to a harder and less flexible material, which can cause it to shrink and crack. This shrinkage can also result in building foundations collapsing and other infrastructure damage that can be expensive to repair.
Therefore, it is important to take into account the characteristics of the soil and the water regime of the area when planning and building infrastructure, as well as during gardening and agricultural activities. In the case of clay soils, it is important to minimize their exposure to dry periods, as well as

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to regularly monitor the condition of buildings and infrastructure built on them. If necessary, measures can be taken to keep the soil moist and prevent it from shrinking.
Clay soils tend to shrink when water evaporates, roughly 8-15% of their volume. This means that if we were to evaporate 100% of the water from clay soil, its volume could be reduced by this percentage range. This process can lead to cracks in the soil, which can have a negative impact on buildings and infrastructure.

Optimum soil moisture for clay loam soils in the Sabinovo region depends on many factors, such as climatic and precipitation conditions, soil type, agricultural technique used, etc. In general, it is ideal to maintain a constant soil moisture between 50 and 75% of the water reservoir capacity for clayey, oily soils. However, this value can be affected by various factors, such as the intensity of precipitation, temperature and air humidity, etc.

Therefore, it would be advisable to consider local conditions and agricultural research recommendations when determining the optimum soil moisture for a given region.
The effect you describe is called a hydrologic slide. This is a phenomenon where water from heavy rainfall or snowmelt reaches the upper layers of the soil and causes the soil layer to become unstable and begin to move. This can cause a range of problems such as landslides, landslides and other forms of soil erosion and degradation.

In clayey soils, this effect occurs due to their tendency to shrink and crack during dry periods. Then, when heavy rainfall occurs, the water quickly soaks into the soil and fills these cracks. This causes the soil to become even more unstable as compressive forces and stresses build up in it. When these forces reach a critical level, a landslide can occur.

The main factors that influence the occurrence of a hydrological landslide are the amount and intensity of precipitation, the type of soil, the slope of the slope and the vegetation cover. Therefore, it is important to implement appropriate protective measures against soil erosion, such as terraces, irrigation systems, or the use of appropriate agricultural techniques and crops.
The importance of optimal soil moisture. Proper soil moisture is important to maintain soil cohesion. At optimal soil moisture, the soil particles are firmly connected, which allows maintaining its structure and cohesion. If the soil dries out, these connections will weaken, which can lead to accelerated drying and cracking, and at the same time to a decrease in its stability. This increases the risk of landslides during heavy rain or other extreme weather conditions. Therefore, it is important to keep the soil at optimum moisture to minimize the risk of such problems.
In the experiment, if we put dried clay in a container with water, it turns into mud and the whole structure falls apart, but we do not observe this phenomenon with clay that has a certain amount of moisture. When dried clay soil is placed in water, it can quickly break down and form mud. This is because when the soil particles dry out, they lose the water that holds them together and causes them to be tightly bound. When soil comes into contact with water, the opposite effect - the particles begin to absorb water and increase their volume. This can lead to their disintegration and the formation of mud.

With soil that has a certain amount of moisture, this breakdown does not occur because the soil maintains an optimal level of moisture that allows the soil particles to hold tightly together and

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maintain their structure. This is why it is important to keep the soil at optimum moisture to prevent the rapid breakdown of the soil structure and the formation of mud. A lack or excess of water can affect the capillarity and permeability of the soil.
When there is a lack of water in the soil, the capillary activity decreases, because the amount of water that can be mobile in the pore space decreases. This can lead to an increase in soil cohesion and the formation of cracks, which reduces its permeability. In the case of clay heavy plastic soils, the lack of water can lead to the formation of dry and hard crusts, which prevent the penetration of water into the soil.

On the other hand, excess water can lead to soil saturation, which can increase the water pressure in the pore space and reduce capillary activity. It can also lead to wetting of the soil and the formation of layers with reduced permeability, which can cause an increase in soil cohesion and a decrease in capillary activity.

The optimum soil moisture for clay heavy plastic soils depends on the specific type of soil and climatic conditions in the region. In the Sabinova region, the optimal soil moisture should be between 50% and 70% of its maximum water capacity to guarantee sufficient soil permeability and prevent landslides.
Capillary activity is the ability of a liquid (eg water) to penetrate a narrow space, such as between soil particles. This ability is due to a force less than gravity, which allows the liquid to penetrate into space even against the action of gravity. Capillary activity operates in different types of soils and affects soil properties such as its ability to retain moisture and permeability.
Fields and tillage
During the process of mowing and harvesting, there is significant damage to vegetation and changes in the soil structure, which can lead to increased evaporation of water from the soil. During mowing and harvesting, the vegetation cover that would otherwise protect the soil from direct sunlight and wind is usually removed. This can lead to increased evaporation of water from the soil and deterioration of its condition. Therefore, it is important in agricultural activities to maintain the soil cover and to minimize damage during the mowing and harvesting process in order to minimize soil drying and preserve its quality and fertility.
Reducing tillage and implementing permaculture can be one way to improve soil quality and conserve soil moisture. With permaculture, we emphasize growing plants that require less water and at the same time produce a greater amount of organic matter, which can improve the structure and retain moisture in the soil.
In addition, it would be advisable to consider other options for maintaining soil moisture. These can include, for example, agrotechnical measures such as mulching, which can help conserve soil moisture. Another way could be to adapt to local conditions and grow crops that are adapted to more drought with less need for irrigation.
It is important that we try to minimize the impact of human activity on the quality and quantity of water in the soil.

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Evaporation of water

The energy balance of the impact of solar radiation and water evaporation may differ depending on the type of surface. In forests, there is less evaporation of water compared to land without vegetation or with a metal roof, because the trees prevent the direct impact of sunlight on the land and thus reduce the amount of heat that is released into the atmosphere. Trees also prevent wind in dry areas and thus maintain moisture in the soil.

On the other hand, on land without vegetation or on the tin roof of a house, water evaporation is greater compared to a forest, because these surfaces absorb more solar radiation and therefore release more heat into the surrounding environment, increasing the rate of water evaporation. Therefore, it is important to take into account different factors when determining the energy balance and the amount of water evaporated depending on the type of surface.
Concrete and asphalt surfaces have a high UV, which means they reflect a lot of sunlight back into the atmosphere. This increases the temperature of the air above the surface and creates the so-called warm island effect. This effect can make the air over cities and concrete surfaces several degrees warmer than the surrounding air. Such places may therefore be more prone to the occurrence of severe storms, as warmer air can lead to more intense air rising and storm formation. This effect can be more pronounced during hot and dry periods, when the conditions for the formation of storms are more favorable.
The heat island effect (Urban Heat Island) is a phenomenon that describes the increased temperature in urban areas compared to the surroundings. Cities have more asphalt roads, concrete buildings, and other artificial surfaces that absorb solar radiation and release heat. This effect can lead to an increase in temperature by up to several degrees Celsius compared to the surroundings and can have a negative impact on the environment and the health of the inhabitants.

The Sun

The solar energy captured by a deciduous tree depends on several factors, including the location of the tree, the time of year, the quality of the lighting, and other environmental conditions. However, we can calculate a rough estimate.

In general, the average solar energy reaching the ground is about 1000 watts per square meter (W/m^2) when it is a sunny day and the sun's rays strike the surface perpendicularly. As the sun's rays pass through the atmosphere, this energy can be reduced due to various factors such as atmospheric absorption and scattering of light.

In the case of a deciduous tree with a crown of 10 meters in diameter and an area of 80 square meters, it is important to note that not all the energy falling on the tree crown will be absorbed. Some energy will be reflected, absorbed by the soil or other objects in the vicinity.

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If we assume that the tree is placed in a place with sunlight, we can make a rough estimate of the captured solar energy. A canopy area of 80 square meters can receive about 500 to 800 watts (W) of solar energy on a sunny day, with this estimate depending on factors such as location, season, and lighting quality.

It is important to note that this value is a rough estimate and may vary depending on the specific situation. In addition, other factors must be taken into account, such as the composition of the leaves, their condition and the efficient use of solar energy by the tree.

This estimate serves only as a rough idea, and the exact value would require more precise measurements and study of the particular tree and its surroundings.
Water evaporation from trees, also known as transpiration, depends on many factors such as tree species, ambient conditions, season and water availability. There are many variables that oré must be taken into account in the exact calculation. However, here I will provide a rough estimate of vapor based on several factors.

Latent latent heat is the amount of heat used to change one gram of water from liquid to vapor at the same temperature. For water at ordinary temperature (around 20 °C), the stored latent heat is approximately 2260 kilojoules per kilogram (kJ/kg).

If we assume that a deciduous tree with a crown of approx. 10 meters in diameter and an area of approx. 80 m² is capable of transpiration of a similar intensity as other deciduous trees, we can make a rough estimation of evaporation based on the average transpiration coefficient for different types of trees.

The average transpiration coefficient for trees ranges from approximately 2-5 mm of water per day per 1 m². Considering the area of 80 m², we can expect that this tree will evaporate approximately 160 - 400 mm of water per day.

If we use the conversion of units, 1 mm of water on an area of 1 m² is equal to 1 liter of water. Therefore, this tree could evaporate approximately 160-400 liters of water per day.

Again, this estimate is rough and the actual vapor depends on many variables. Temperature, humidity, water availability, and other factors can affect a tree's actual transpiration. An accurate vapor would require more precise measurements and study of a particular tree and its surroundings. Trees have the ability to contribute to landscape cooling compared to concrete surfaces and other urbanized areas. There are several ways trees contribute to cooling the environment:

1. Shading of solar radiation: Deciduous trees provide natural shade, which reduces the amount of solar radiation that hits the ground and surrounding surfaces. This shadow effect reduces the heat load and can create cooler microclimates under the trees.

2. Evapotranspiration: Trees transpire through their leaves, which is the process by which water evaporates from the leaves and into the air. This process has a cooling effect similar to sweating in

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humans. The water vapor from the leaves consumes heat, which lowers the temperature of the surrounding environment.

3. Absorption and reflection of heat: Deciduous trees have the ability to absorb some of the solar radiation through their leaves and bark, preventing it from hitting the surrounding surfaces. They can also reflect some parts of the radiation, which will reduce the absorbed heat.

4. Ventilation: Trees can create natural ventilation in their surroundings. Their branches and leaves can influence the direction of the wind and increase air circulation, which helps to remove heat and improve comfort near the trees.

Compared to concrete surfaces, trees therefore have the potential to significantly reduce temperatures and create cooler microclimates in urbanized areas. Concrete surfaces tend to absorb and retain more heat, which leads to the so-called an urban heat island where temperatures are higher compared to the surrounding countryside.

It is important to remember that the cooling effect of trees depends on their type, planting density and location. For maximum effect, it is advisable to plan and design green spaces in the urban environment, with the aim of creating optimal microclimates.
Some tips for planting:

1. Selection of suitable tree species: When planting trees, it is important to choose species that have large, dense leaves that provide sufficient shade. Deciduous trees with branched crowns are particularly effective in shading sunlight and cooling the surroundings.

2. Planning the location: When planning the planting of trees, consider their location so that they shade the desired areas as effectively as possible. Place them to provide shade on sidewalks, parking lots, patios, and buildings. Regular rows of trees can create cool corridor effects.

3. Use of vertical space: In addition to planting trees on the ground, you can also use vertical space in the urban environment. Various types of climbing plants and climbing trees on buildings and fences can provide additional shade and cooling.

4. Avoiding concrete surfaces: When urbanising, try to minimize the use of concrete surfaces, which tend to absorb and retain heat. Instead, consider using permeable surfaces, such as grass or surface-drained surfaces, which allow water absorption and temperature reduction.

5. Maintaining greenery: It is important to keep trees and greenery in good health. Regular tree care, watering and pruning help maintain their vitality and ability to provide shade and cool the environment.

6. Use of smart urban plans: When designing and planning the development of urban areas, it is appropriate to take into account green infrastructure and tree belts. Using smart city plans and urban planning solutions can help create a sustainable and cooler urban environment.

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Growing food (fruits, vegetables) and other proposals

In the garden - Growing food in the garden can be useful to minimize the need to buy and transport food, improve biodiversity in the garden and minimize water consumption.

Using Low Pressure Irrigation Systems - Drip Irrigation - Low pressure irrigation systems can be useful for minimizing water usage when watering plants.

Planting High Density Plants - Planting high density plants can help minimize the space for water evaporation and improve water retention in the soil.

Choosing the right time to irrigate - Irrigation at the right time can help reduce water consumption and minimize water runoff from the property.

Using Drippers - Drippers can be useful to minimize water loss when watering plants.

Using natural methods for water drainage - Using natural methods for water drainage, such as creating beds with gently sloping surfaces, can help improve soil water retention and minimize water runoff.

Rainwater use - Collecting rainwater using containers or collection systems can be useful for watering plants and minimizing potable water use.

Reducing asphalt surfaces - Reducing asphalt surfaces and replacing them with grass or other permeable surfaces can help minimize water runoff and improve soil water retention.

Using Mulch - Using mulch can help improve soil water retention and minimize water evaporation from the soil.

These water retention measures can be simple and effective solutions to minimize water loss and improve soil water retention in home gardens.

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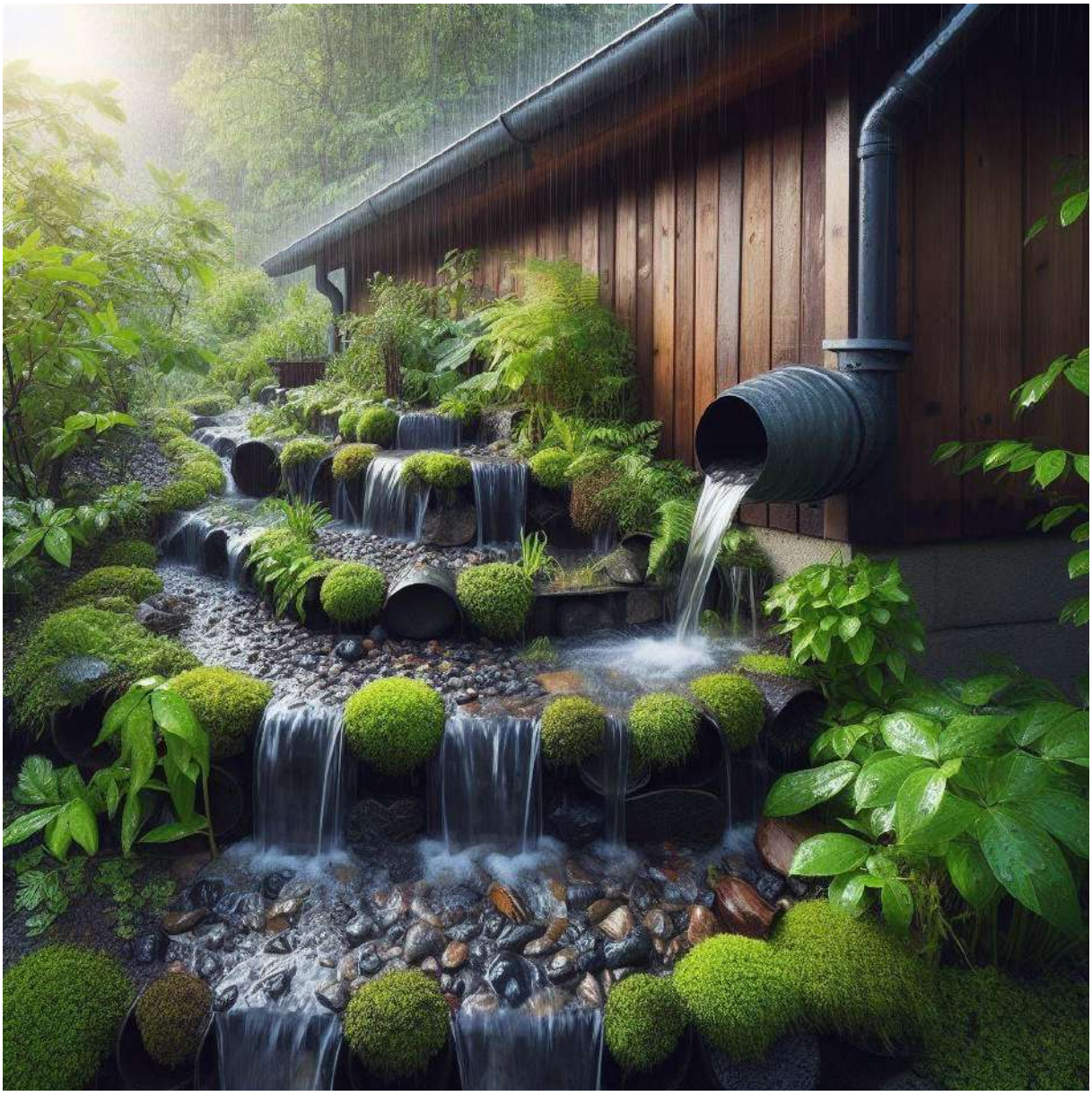
Retention of rainwater

Several measures can be taken to save rainwater from the roofs of houses:

Installing rain tanks - Installing rain tanks allows you to capture and store rainwater from your roof for later use.

Green Roofs - Installing a green roof means covering your roof with vegetation and soil, which allows rainwater to be captured and stored while helping to insulate your home.

Rain Gardens - Creating rain gardens can help capture and retain rainwater from your roof, minimizing runoff and promoting the infiltration process.



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Systems for draining and pumping rainwater - Installing systems for draining and pumping rainwater allows the captured water to be used for various purposes, such as watering the garden or flushing toilets.

Connecting rainwater to an irrigation system - If you have an irrigation system for your garden, you can connect it to rainbuses and use the captured rainwater for irrigation.

Setting up your roof drain properly - Setting up your roof drain so that water is directed to a place where you can catch it can be an effective way to catch rainwater.

These measures are useful not only for saving rainwater, but also for reducing water costs and improving environmental sustainability.

Garden containers for rainwater

Retaining rainwater using rainwater tanks from roofs is a useful practice that has many benefits. One of the main benefits is that it reduces pressure on local water resources and can help protect local flora and fauna. At the same time, it helps reduce the cost of water, which we normally use for watering gardens, washing cars and other similar purposes.

If we have a roof area of 200 m2 in the Sabinov area and store rainwater using containers, we can save a significant amount of water. The exact amount depends on many factors, such as the amount of precipitation that falls on our roof, the capacity of the containers to hold the water, and the efficiency of the water collection.

However, if we assume an average annual rainfall of 800 mm and use a water collection efficiency factor of 0.8, then a 200 m2 roof would save approximately 128,000 liters of water between March and November. This amount would be sufficient for watering gardens, washing cars and other needs, thus reducing the need to use municipal water.

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In the area of Sabinov, the average annual precipitation is around 700 to 800 mm, from which we could assume that approximately 60% to 70% of the total annual precipitation could rain during the summer (from May to October). This would mean that, on average, 420 to 560 mm of precipitation could fall in the summer months.

If we assume that a 200 m2 roof receives an average of 500 mm of rain per year and that we have a 2000 liter water collection tank, this could provide us with enough water for garden irrigation and other purposes during the dry season .

In the period from May to October, i.e. in 6 months, we could expect an average of 210 m3 of precipitation to fall on a roof with an area of 200 m2 (based on the assumption of average precipitation in Sabinov). If we had a water collection tank with a volume of 2000 liters, it could catch approximately 12.6 m3 of water for you during this period of time.

Green roofs

Green roofs have a significant impact on cooling the city and improving air quality. Their advantage is that they increase the green area in the urban environment, improve the microclimate, reduce the ambient air temperature and absorb solar energy. If we had a green roof with an area of 200 m2 covered with grass, such a roof could absorb approximately 10-15% of the solar energy. This could have the effect of reducing the temperature in the room under the roof by several degrees, and thus also improving the comfort in the interior. The cooling would be more pronounced during the summer months when temperatures are highest. Green roofs have an even greater cooling effect because the grass or other plants on the roof absorb sunlight and evaporate water through the process of transpiration. This lowers the ambient air temperature and improves air quality. If we had a green roof with suitable plants, the temperature around the roof could be reduced by 2-3 degrees Celsius. However, it is important to note that the specific amount of solar energy absorbed by a green roof depends on many factors, such as the type and density of plants, the orientation and slope of the roof, local climatic conditions, and other factors. Therefore, it is important to keep in mind that the resulting impact will depend on the specific implementation of the green roof.

Rain gardens

Rain gardens are an ecological feature that allows rainwater to be retained and filtered that would otherwise flow into a drain or stream and cause flooding problems. Rain gardens are designed to retain and slowly soak water into the soil, while being populated with plants that help clean the water of impurities.

The appropriate size of a rain garden depends on many factors, such as local climatic conditions, the size and slope of the plot, and the amount of rainfall. It would be possible to design several smaller rain gardens on a plot of land of 8 ares, which would be spread over the entire area of the plot where they would be most needed.

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In general, the size of a rain garden should be designed to hold at least the first 2.5 centimeters of rainfall per area, as this is the typical amount of rainwater that falls during most storms. This size depends on various factors, including the type of soil, the slope of the terrain and the type of plants used for the green roof.

Rain gardens with a total area of 200 to 300 m2 could be designed on a plot of land measuring 8 ares. In the event that larger rain gardens are decided upon, it would be important to ensure that they are properly designed and calculated to avoid water runoff issues. It is also important to choose suitable plants that can quickly absorb water and at the same time clean it of impurities. When designing plants for rain gardens, the climatic conditions of the location must be considered, as well as the type of soil and the amount of rainfall. For Sabins in the Slovak Republic, which has a Central European climate, I would suggest the following plants for rain gardens:

- Common viburnum (Viburnum opulus) - this shrub with white flowers and red fruits is suitable for planting in rain gardens because it has radial roots that can quickly soak up water and at the same time clean it of impurities.

- Pale yellow sedge (Lysimachia nummularia) - this type of grass has creeping roots and forms a dense grass screen, which is suitable for soil stabilization and water retention in rain gardens.

- Common heather (Calluna vulgaris) - this type of grass also has creeping roots and forms a dense grass screen, which is suitable for soil stabilization and water retention in rain gardens. In addition, it is also very resistant to drought.

For El Rompido, Spain, which has a subtropical Mediterranean climate, I would suggest the following rain garden plants:

- Salvia fruticosa - this type of aromatic grass has distinctive purple flowers and is very resistant to drought. Its roots are also suitable for retaining and filtering rainwater.

- Oleander (Nerium oleander) - this type of shrub has large and distinctive flowers in various colors and is very resistant to drought and salt. Its roots are also suitable for retaining and filtering rainwater.

- Jasmine bud (Jasminum polyanthum) - this type of climbing shrub has distinctive white-pink flowers and is very resistant to drought and heat. Its roots are also suitable for retaining and filtering rainwater. It is important to choose suitable plants for the given place.

Factors such as exposure, elevation, soil type, and rainfall should also be considered when designing plants for rain gardens. Therefore, different plants can be recommended for each specific location.In general, plants suitable for rain gardens should be able to grow well in wet soil while being drought tolerant. Plants should be able to bind water from the soil, which means they should have a well-developed root system. In addition, rain garden plants should be able to adapt well to different conditions in the rain garden, such as varying amounts of rainfall, temperature, and sunlight.

When choosing specific plants, it is therefore advisable to consult with horticultural experts who have experience in designing rain gardens for specific locations and climates.

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Small water cycle,

also known as the water cycle, is the process by which water on Earth passes through various phases and cycles between the atmosphere, hydrosphere, and geosphere. This cycle is important for sustaining life on Earth because it ensures the availability of water for plants and animals.

The water cycle begins with solar radiation, which heats the Earth's surface and water sources. The water then evaporates and passes into the atmosphere as water vapor. This process is called evapotranspiration. Water can also evaporate directly from rivers, lakes and oceans, and this process is called direct evaporation.

The water vapor in the atmosphere then condenses into small water droplets and forms clouds. As these clouds become heavier than air, they fall to the ground as precipitation, such as rain, snow, or hail. This process is called condensation and precipitation.

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Precitipation

is the process of significant precipitation of atmospheric gases, liquids or particles on the surface or in the volume layer of the material. In meteorology, the term precipitation is most often used to denote precipitation in the form of rain, snow, hail or drizzle.

Precipitation occurs when water vapor in the atmosphere condenses into liquid or solid particles. This process can occur when saturated air cools, reducing its ability to hold water vapor. Precipitation can be local or global and the occurrence of precipitation can be affected by many factors such as temperature, humidity, pressure and wind speed.

Precipitation is an important factor in the water cycle and controls the amount of water that reaches the Earth's surface. Precipitation is critical for plant growth and providing drinking water sources for humans and animals. The amount and distribution of precipitation can have a significant impact on ecosystems, landforms and climatic conditions in a given region.

Water that falls on the ground can be retained in various reservoirs such as soil, groundwater, rivers and lakes. This process is called infiltration. Water can also be diverted to other places by runoff and then pass into rivers that return to oceans and other water bodies.

The water cycle is constantly repeating itself and is affected by many factors such as temperature, precipitation, wind conditions and geographical location. Other factors that affect the small water cycle are, for example, global warming, deforestation, urbanization and water pollution.

The water cycle is critical for sustaining ecosystems and for supporting human life. Water pollution and disruption of the natural flow of water can have a negative impact on the environment and human health. Therefore, it is important to protect and maintain water quality and ensure that the water cycle can take place in a natural rhythm.

Water is the source of life for all living organisms on Earth and is a critical element for ecosystems and human health. Unfortunately, water is also a source of pollution and contamination due to various industrial and human activities. Some of the most significant water pollutants include:

Industry:

The industrial sector generates a huge amount of waste, which can contain dangerous chemicals and pollute water. The industrial operations they use, such as refineries, chemical factories and manufacturing plants, are the most significant sources of water pollution. Industrial waste may contain heavy metals, hazardous chemicals and hazardous organic compounds.

Agriculture:

Agriculture can be a source of water pollution due to the use of pesticides and fertilizers, which can contain dangerous chemicals and contaminate soil and water. Excessive use of pesticides and fertilizers can also lead to eutrophication, which means the overgrowth of algae and other aquatic plants due to an excess supply of nutrients to the water.

Eutrophication

is the process of excessive accumulation of nutrients in soil or water ecosystems. This process can occur when excessive amounts of nitrogen and phosphorus enter aquatic ecosystems, which can come from sewage, fertilizers, pesticides, and other sources of pollution. These nutrients promote

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the growth of algae and other aquatic plants, which can lead to excessive growth and the formation of dense growth that can impede the free flow of water and reduce its quality.

Eutrophication can have serious consequences for aquatic ecosystems. As algae and other aquatic plants grow quickly, they can quickly use up the water's oxygen, which can lead to a lack of it for other organisms, up to the mass death of animals. Excessive growth of algae and other aquatic plants can also impede fishing and tourism activities in a given aquatic ecosystem.

The fight against eutrophication can involve various measures. These include controlling sources of pollution such as sewage and fertilizers, improving landscape and soil management to minimize nutrient leaching into aquatic ecosystems, and applying chemical and biological agents that can help control excessive growth of algae and other aquatic plants.

Households:

Households can be a source of water pollution due to the use of dangerous chemicals and drug residues that can be discharged into waste water. Household wastewater can also contain dangerous bacterial and viral contaminants that can endanger human and animal health.

Mining:

Mining and ore processing can be a source of water pollution. The production of metals and mining products can contain toxic chemicals that can be dangerous to the environment and health.

Construction industry:

The construction industry can be a source of water pollution due to the discharge of concrete residues and other construction materials into the water. These materials may contain heavy metals and other hazardous chemicals that can contaminate water sources.

Transportation:

The transport sector can be a source of water pollution due to leakage of motor oils, fuels and other hazardous substances. These substances can enter water sources and endanger the health of aquatic organisms and people.

Oil extraction and processing:

This industry can be a source of water pollution due to the release of oil and other hazardous substances into water sources. Such spills can have catastrophic consequences for ecosystems and human health.

Depending on the location and characteristics of the industry, any of these sectors may be a greater source of water pollution. In some cases, water pollution can be caused by a combination of several factors, which can lead to an even greater threat to water resources and ecosystems.

Therefore, it is important that we realize the impact of our activities on water and work to minimize their negative impact. This includes taking measures to protect water resources and keep water clean for current and future generations.

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Possible water transfer proposals in the future

Solar heating: This solution could be suitable for areas with high solar exposure and low humidity. One option is to use solar water heaters to produce steam, which could then be collected and condensed into water.

Irrigation of the sea: One possibility could be the use of solar pumps to pump water from the sea and irrigate it directly to the coast. This solution could be advantageous for areas with low levels of pollution and where water would be available.

Use of nanorobot technology: Nanorobots could be programmed to search for water in the soil and then irrigate. This solution could be suitable for areas with low humidity and little water.

Use of clouds: This solution could be suitable for areas with high moisture content in the atmosphere. One possibility would be to use chemicals to create rain and fill reservoirs with water.

Use of artificial intelligent systems: With the use of sensors and artificial intelligent systems, it would be possible to monitor the moisture level of the soil and irrigate it at regular intervals. This solution could be suitable for areas with a higher level of technological infrastructure.

Desalination

Desalination is technically possible and is already being done in many parts of the world. This technology is called reverse osmosis. The process involves forcing seawater through a membrane that allows water molecules to pass through but blocks salts and other impurities. The result is clean water that can be used for irrigation, drinking or other purposes.

Although possible, this process is expensive to operate and maintain and also has an impact on the environment. When constructing a seawater pipeline, it is also important to consider the impact on residents and ecosystems in the areas. In addition, even if the result is clean water, the process of removing salts from seawater is energy intensive and can have an impact on climate change.

Planting of trees and forest stands

on dry soils that retain water and help prevent the land from drying out. Planting trees and forest stands on dry land is one of the most effective ways to conserve water. Dry climatic conditions can cause significant water scarcity problems that affect not only ecosystems but also human populations. Therefore, it is important to consider solutions that will help improve the situation and minimize the impact on the environment.

Trees and forests have many beneficial properties for retaining water in the landscape. Water from rain and snow collects in the soil, where it is stored and slowly discharged into rivers, lakes and underground reservoirs. The roots of trees and vegetation increase the amount of pores in the soil, improving its water-holding capacity and helping to prevent flooding. As trees grow, they also become a source of food for many animals, contributing to the overall balance of the ecosystem.

In addition to increasing the amount of water retained, trees also help protect landscapes from drying out. Trees provide shade that helps keep the soil moist and thus prevent rapid evaporation of water. The shade from trees and vegetation also helps to reduce the temperature, which for some

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plants and animals is crucial for their survival. In addition, since trees reduce the amount of solar radiation that reaches the surface of the soil, they prevent it from overheating and thus reduce soil fatigue.

It is also important to emphasize that natural forests and stands are much more effective at retaining and filtering water than artificial ones that are not adapted to local conditions. Therefore, it is important that the planting of trees and stands is in accordance with the local environment and climatic conditions.

In conclusion, we can say that planting trees and forest stands is an important step in water protection and sustainable development of the country. This step can be included in a water resource conservation plan to help prevent soil drying and water resource pollution.

In addition, the planting of trees and vegetation can be part of projects aimed at restoring damaged areas and restoring ecosystems. For example, after forest fires or deforestation, the planting of new trees and vegetation is crucial for restoring the ecosystem and rebalancing the landscape.

In conclusion, it can be concluded that the planting of trees and forest stands on dry lands is an important step in protecting and improving the state of water in the country. In addition to retaining water and helping to prevent soil drying out, they increase the amount of pores in the soil and thus improve its ability to retain water. The planting of trees and vegetation should always be adapted to local conditions and climatic conditions in order to be as efficient as possible and to minimize the impact on the environment.

Real recommendations

Maintaining sufficient freshwater in the country is critical for economic and social development. There are several ways to keep fresh water in the country:

1. Building reservoirs to retain water can be a very effective way to keep fresh water in the country. Reservoirs can hold water during rainy periods and release it during dry periods to minimize damage to crops and nature.

2. Restoring wetlands can help maintain fresh water in the landscape. Wetlands have the ability to retain water and prevent its evaporation. In addition, they can serve as a home for various types of plants and animals.

3. Construction of canals can help in water collection and distribution. Canals can be fed by rivers and serve as a distribution system for fresh water.

4. Savings measures, such as the installation of energy-saving rainwater harvesting equipment, can be an effective way to maintain fresh water in the country. These measures can help minimize water loss and keep fresh water in the soil.

5. Use of seawater desalination technologies: In some areas where fresh water is scarce, seawater desalination can be an effective way to ensure access to fresh water. However, in such cases, the use of renewable energy sources for the production of energy for seawater desalination should be considered in order to minimize the impact on the environment.

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Other ways to keep fresh water in the country are improving the efficiency of irrigation systems, implementing technologies to minimize water loss during its distribution and harvesting rainwater for further use.

Improving the efficiency of irrigation systems can help minimize water loss when irrigating agricultural crops and ensure that water is used to maximize yields. Technologies aimed at improving efficiency include, for example, drip irrigation, which minimizes water loss through evaporation and enables precise dosing of water to each plant, thereby minimizing water consumption.

In some areas, storing water in reservoirs or lakes can be an effective way to maintain fresh water. This can be particularly important in low rainfall areas where dry spells are common. In such cases, it is important to have water level monitoring systems in reservoirs and lakes to minimize water losses due to overflow.

In addition, it is possible to minimize water losses during the distribution and collection of rainwater for further use. In some areas, rainwater can be collected from houses and buildings and then used for garden irrigation or cleaning vehicles. This process can be further improved by installing tanks to collect rainwater and use this water when needed for toilet flushing or other processes that do not require potable water.

There are some issues with wetlands and reservoirs. Since these bodies of water are natural reservoirs of water, they can be a breeding ground for mosquitoes that can carry diseases. To prevent this, it is important to regularly check and clean these bodies of water.

Another problem can be water contamination if waste and toxic substances accumulate in reservoirs or wetlands. These substances can negatively affect water quality and can be harmful to human and animal health. Therefore, it is important to monitor and control water quality and regularly clean these water bodies.

In addition, green infrastructure can be more expensive and more difficult to maintain compared to traditional water retention methods. It is important to consider the costs and benefits and choose the most appropriate method of maintaining fresh water for a particular area and its needs.

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1st international meeting in Slovakia

Prešov – View from Water tower

Prešov – museum

A tour of the city of Prešov

Cathedral of St. John the Baptist in Prešov

Šariš castle

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Košice - golden treasure and certificates

Košice forests - lecture by Michal Kravčík

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Košice - KVP landscape restoration

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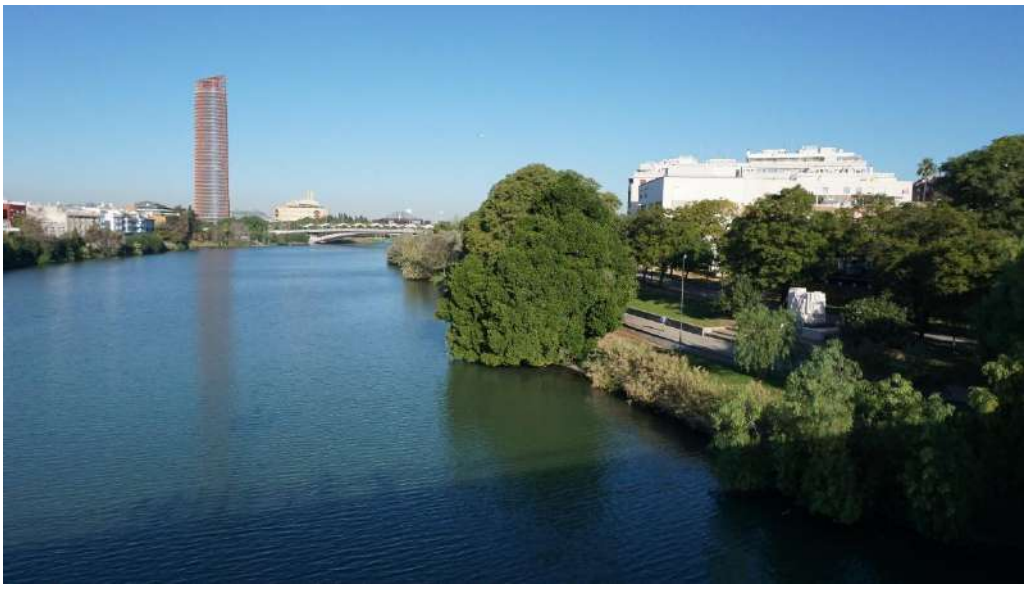
2nd international meeting in Spain

Sevilla – Setas De Sevilla

Plaza Espana

Cathedral



River: Guadalquivir

Punta Umbria - Atlantic ocean

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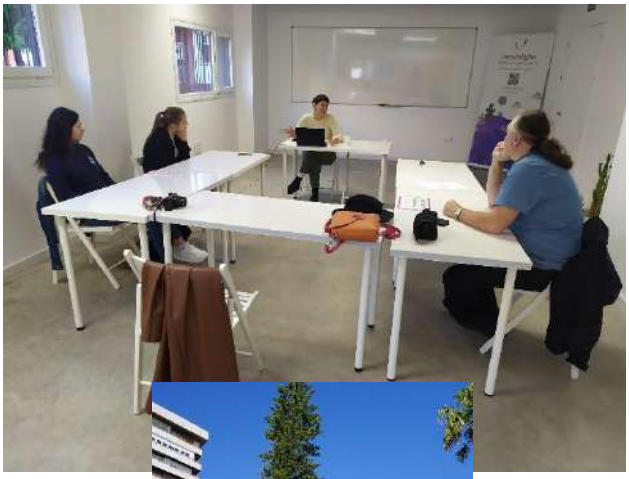
Huelva



Huelva – Pacto Verde – project meeting

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