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WATER ISSUES

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PHOTO THOMAS DE LUZE

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FRUIT DISASTER - HUGE LOSSES AFTER FROSTS

Posted on 25 April 2024 by Agata Pavlinec

Categories: Issue 8/2024, News, Onet
Tags: frost, frosts, losses, prices

In late March and the first half of April, the weather pleasantly surprised, and with record warm temperatures, nature began to vigorously awaken. Unfortunately, winter has returned, and fruit growers, gardeners and grape growers have been particularly hard hit. It is already clear that post-frost losses will be not insignificant, which will certainly affect this year's fruit prices. However, growers do not give up and bravely fight the vagaries of the aura.

Arctic air attacked orchards, vineyards, plantations

All to blame is the low that came over Poland from the North Sea. Arctic air brought with it overnight frosts - thermometers in some regions of the country indicated -4°C. According to IMGW-PIB, warming is not expected until tomorrow.

Unfortunately, a week of low temperatures has left its mark on crops. Robert Binkiewicz, an expert from Agrosimex, reported in a cyclical orchard announcement on April 23 that in most regions of Poland, post-frost losses are very high. In Greater Poland, where as much as -8°C has been recorded in places, much of the crop is quite damaged. Particularly high losses were observed in apple, cherry and sweet cherry orchards, which were just in full bloom.

Piotr Pasik, president of the National Cherry Producers Association, in an interview with the sad24.pl portal, reported that cherry orchards in the Sandomierz region, the Powisle region of Lublin, Kujawy and Greater Poland have suffered the most. Locally, losses are said to be as high as 40-50 percent. Radio Kielce, in turn, reported that in Sandomierz's apple orchards, frost losses could reach up to 80-90 percent. Indeed, this year's frosts attacked not only at the ground itself, but even 2 meters above the ground.

Other fruits also fell victim to the capricious April. The family plantation "Strawberries at Musialik's" from Piekary Slaskie reported on its Facebook profile that overnight an eight-degree frost destroyed much of the crop, despite the fact that it was covered with agro-fiber. "Dziennik Bałtycki" quoted statements from Kashubian growers who are just starting to count losses after the frosts. The owner of the 8-hectare plantation in Stężyca, Lukasz Dułak, estimates that up to 70 percent may have been affected. crops. All indications are that last year's prices reaching as high as PLN 15/kg will be beaten this season.

pic. Strawberries at Musialik's

Difficult fight against frosts

For many fruit growers, April's post-frost losses can be the disaster of the season - so few are giving up without a fight. Unfortunately, the agro-textile only helps with low frosts. Hence, modern orchards use hail nets or undercropping sprinklers, and apply special fertilizers during the day. Orchardists also carry out smokejumping, which partially protects trees from low temperatures.

Desperate grape growers have been battling frost for nights over the past week. Entire families and local communities mobilized. At the historic Milosz vineyard in Laz, mounds of straw and wood were built between the rows of vines, and bonfires were lit. Reportedly, up to 90 percent could be saved. plants. A helicopter flew over the Lubuska Vineyard in Zabor all night to stir the air and protect the vines. Unfortunately, it didn't work everywhere. The president of the Lower Silesia Vineyards Association, Marek Dymkowski, in an interview with bankier.pl, estimated that after a week of frosts and freezes, losses in Lower Silesia are colossal, up to 100 percent. In some locations. Alarming news is also coming from Lubuskie and Opole provinces.

Grzegorz Kasprzak of the Paradise Strawberry farm sprinkled the agrofiber-covered bushes all night to keep them from freezing. Field irrigation was also set up at Frank's strawberry plantation in Slubice. Nowhere was it without serious damage. Owners of raspberry and blueberry plantations also fought for their crops. Many growers have several rough nights in a row behind them, extra expenses and an uncertain future.

pic. Strawberries at Musialik's

Can farmers count on compensation for post-frost losses?

A number of municipalities have already announced the possibility of submitting written applications for the estimation of damage to crops caused by spring frosts. The relevant applications supported by photographic documentation will then be forwarded to the Agency for Modernization and Restructuring of Agriculture. Farmers who in 2023. suffered losses after frost, drought, heavy rains and other adverse weather events received a total of 490 million zlotys from AMiRR, which still did not fully compensate for the losses. Time will tell if, and to what extent, state support will compensate fruit and wine growers for this year's losses.

Photo. main: courtesy of Strawberry at Musialik's

DROUGHT AID - FARMERS HAVE ALREADY RECEIVED MORE THAN PLN 445 MILLION IN COMPENSATION

Posted on 24 April 2024 by Łukasz Machalica

Drought aid is the state's response to the adverse effects of weather phenomena on farmers. The call for applications ended on March 15 of this year. According to the Agency for Restructuring and Modernization of Agriculture, as much as PLN 445.6 million in support went to 58,000. farmers.

Categories: Issue 8/2024, News, Onet
Tags: agriculture, Drought, drought aid

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Drought aid - what is it?

From February 29 to March 15, the Agency for the Restructuring and Modernization of Agriculture accepted applications from agricultural producers who applied for financial support as a result of 2023 weather damage. Damage caused by factors such as drought, torrential rain, flooding, spring frost, adverse winter effects, lightning, hurricane, landslide or avalanches or hail was compensated. We have already described the rates farmers could count on in a previous article in *Water Matters*.

The total amount of financial support awarded may not exceed 80 percent. the amount of income reduction from crop production. An exception is farms located in areas with natural limitations - there the amount of income reduction from average annual crop production can be 90 percent. All rates are regulated in accordance with Art. 25 para. 8 of Regulation 2022/2472 of the Commission of the European Union.

Drought aid - results so far

This is not the first such initiative in Poland. The previous call lasted until October 30, 2023. At that time, farmers could apply for funding if their farms suffered damage from spring frost, hail or hurricane 2023. Losses may have affected crops of fruit trees and strawberries. Such compensation was due to farmers who lost between 30 and 70 percent during this period. agricultural crops.

A total of more than 133,000 were registered under the *Drought Aid 2023* program. applications. As of the end of March, farmers had received PLN 41 million. At this point, according to the ARMA, the amount of subsidies has increased to PLN 445.6 million. The agency will update the data as more disbursements are made.

Climate change and its impact on agriculture in 2023

The agricultural industry in recent years has been exposed to many adverse factors and phenomena, mainly due to weather conditions. As a result, damage to farms continues to increase. All this is due to the increasingly worrisome consequences of global warming, which is associated with increasing natural disasters and weather anomalies.

According to IMGW-PIB, in 2023, Poland's area average air temperature was 10.0°C, which exceeded the annual multi-year average (1991-2020 period) by 1.3°C. The year was the second warmest in Poland since 1951, just after 2019, which was 0.2°C warmer and the hottest in the history of measurements. The anomaly index continues to climb. This was also the case last year. This can also be seen in the cumulative precipitation, which exceeded multi-year averages and was accompanied by unusually high temperatures. These are extreme differences that affect agriculture and generate damage to crops.

Projections for 2024 and future drought aid rates for farmers

The year 2024 did not start optimistically for farm owners. February recorded record high temperatures in many areas around the world. According to the Institute of Meteorology and Water Management - National Research Institute, more meteorological records were set in

Poland on February 28. The average air temperature anomaly was as much as +6°C over the average of the last 30 years of measurements. February in 2021. recorded a temperature of 22.1°C, a record for the month over the past 30 years.

The same is true of March, which turned out to be extremely warm. The highest recorded temperature occurred in Tarnow on March 30 and was 25.5°C. This should come as no surprise, given that this year's March was the warmest in Poland since at least 1951. Even more alarming is the fact that the past March is the tenth consecutive warmest month in the history of meteorological measurements.

The latest experimental long-term forecasts leave no illusions - the climate will continue to warm, and there are more anomalies ahead. One of the latest forecasts predicts that both June, July and August will record new atmospheric records, with average air temperatures consistently above normal. Farmers face further challenges, as losses in their industry will continue to be severe, and there is no expectation that the situation will improve in the coming years. That's why it's important that drought relief still works, and that the state supports activities that are most vulnerable to the effects of climate change.

HEAT WAVES KILL, OCEANS GETTING WARMER

Posted on 23 April 2024 by Agata Pavlinec

Not a month goes by without climate change making its brutal mark on the lives of communities in different parts of the world. In early April, Africa's Sahel region was hit by heat waves of unprecedented intensity. In Mali and Burkina Faso, the situation is most tragic - people are dying, and it is difficult for local authorities to even estimate the scale of the phenomenon. There is talk of hundreds or even thousands of victims. The hot weather is also affecting other regions.

Categories: Issue 8/2024, News, Onet
Tags: Africa, climate change, heat, high temperatures

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Heat waves in West Africa

Already in late March, unusually high temperatures were observed in the Sahel region. In the first days of April, thermometers in Burkina Faso indicated 45°C, and in Mali even 48.5°C. Minimum daily temperatures were over 30°C. A heat wave reaching above 40°C also swept through Senegal, Guinea, Niger, Nigeria and Chad. In these countries, temperatures were 1.5°C higher than the average for April. According to international experts, this is an obvious impact of global climate change, while the weakening El Niño is already responsible for only 0.2°C of this year's anomaly. Burkina Faso's National Meteorological Agency forecasts a continuation of the heat wave, with maximum temperatures in Ouagadougou expected to reach 41-43°C by the end of the week. Similar forecasts were made by the MALI-METEO Meteorological Agency.

Why are people dying of heat in Africa?

In Mali's capital, Bamako, 102 people died in the intensive care unit from April 1 to 4, more than half of them over the age of 60. In comparison, for the entire month of April last year, 130 deaths were reported there. According to representatives of the World Weather Attribution (WWA), an international group of scientists studying climate change, it is difficult to know precisely how many casualties have really been claimed by this year's hot weather in the Sahel region. They are believed to be hundreds or even thousands dead. The main causes of death are dehydration and heatstroke.

How is it possible that weather anomalies are giving so much trouble to Africans accustomed to heat? Analysts explain that the current heat wave is not only severe, but also very long. The recorded five-day maxima are rated as a rarity on the scale of 200 years. To make matters worse, they fall during Ramadan, when Muslims traditionally fast and are more exhausted. The situation is not improved by increasingly prolonged power outages resulting from the debt restructuring program of Mali's state-owned electricity company EDM.

In Bamako and Ouagadougou itself, people are also dying because of poorly developed infrastructure. Rapid urbanization has been associated with a drastic reduction in green spaces, and concrete cities have become heat-accumulating islands. Meanwhile, sectors such as energy, water management and health care leave much to be desired.

Offshore heat waves in New Zealand

Africa is not the only place where spring has brought unexpectedly high temperatures. The European agency Copernicus reported that March was the tenth consecutive hottest month on record. The Earth's average temperature was 14.14°C, 0.73°C higher than the 1991-2020 average.

Researchers at the University of Auckland in New Zealand have published a study confirming a continuous and unprecedented rise in temperatures in the Hauraki Gulf region in the north of the country. Analysis of data from 1967-2023 showed that since 2012. The number of days characterized as marine heat waves (MHV) has increased significantly. We're talking about a situation where the water temperature for at least five days in a row is warmer than the 90th percentile of the average local temperature over the past 30 years. Such waves are usually long-lasting and affect large areas of the water surface, affecting various ecosystems. In 2022. In New Zealand, they were recorded for a record 313 days!

Marine heat waves are increasingly observed in the Atlantic, Pacific and Indian oceans and are associated with the mass extinction of many fish and coral species and the forced migration of huge populations. In New Zealand, due to MHV, a proliferation of sea urchins of the species Centrostephanus rodgersii has been observed wreaking havoc on the seabed, displacing native seaweed species. The precious marine sponges, when exposed to high temperatures, change their consistency, peel off from the rocks and die. The losses in terms of biological diversity are already unquantifiable, and next years are expected to be... even warmer!

WORLD EARTH DAY, THE MOST IMPORTANT DAY FOR OUR PLANET

Posted on 22 April 2024 by Łukasz Machalica

As every year, April 22 marks World Earth Day, a reminder to protect the environment. This holiday mobilizes action on behalf of the Earth, and the occasion is marked by numerous events around the world, involving millions of people concerned about the future of our planet.

Categories: Issue 8/2024, News, Onet

Tags: ecology, environment, environmental protection, World Earth Day

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World Earth Day - history

The concept of the modern environmental movement, known as World Earth Day (Earth Day), was born in the United States in 1970. Its creation was a response to escalating pollution problems, such as numerous oil spills, the massive use of leaded fuel and the alarming rate of wildlife degradation. Earth Day has quickly become a platform to unite citizens with different political and social views, emphasizing the priority of protecting the future of our planet.

The event has gained international recognition and attracted the attention of leaders from around the world, leading to its annual celebration. In the first year after its inauguration, Earth Day helped establish the first environmental legislation in the United States, including laws on environmental education, air quality and workplace safety. It is now the largest environmental movement in the world, as evidenced by the continued growth of the number of individuals and organizations involved. According to the Earth Day website, the movement is already mobilizing one billion people and working with more than 75,000. partners to minimize the negative human impact on the environment. This year's celebration is the 54th. The anniversary of this significant event.

Goals of World Earth Day

The organizers of World Earth Day focus not only on initiating concrete actions to improve the environment, but also on raising environmental awareness and shaping pro-environmental attitudes in society. The movement's founders are also keen to systematically expand the definition of "environment" to include factors that directly affect our daily lives, such as the creation of social justice jobs, which is crucial in the context of the growing problem of global warming. In addition, World Earth Day prioritizes social equity in taking conservation action, as manifested through active collaboration with marginalized communities, who are often most affected by climate change.

Worldwide initiatives

The theme of this year's World Earth Day is "Planet versus plastics." Accordingly, the organizers are calling for a 60 percent reduction in the production of all plastics, with special emphasis on plastic. By 2040. As Kathleen Rogers, president of Earth Day, points out, the Planet vs. Plastics campaign is a call for mobilization and immediate action to end the scourge of plastics and protect the health of every living thing on our planet. As part of this campaign, the "Babies vs. Plastics" report was published to raise public awareness of the problem.

World Earth Day is an initiative that inspires many other activities. Here are some examples:

- The Canopy Project: a project working with partners around the world to reforest areas in urgent need of restoration. The venture focuses mainly on regions whose residents are particularly vulnerable to the effects of climate change.

- Fashion for the Earth: An initiative to promote sustainable fashion, i.e., eco-friendly clothing supplies. The organizers highlight the problems of today's fashion industry, such as labor exploitation, exploitation of natural resources and the generation of huge amounts of waste, emphasizing the need for education and improvement in these areas.

- Great Global Cleanup: An activity that encourages local communities around the world to actively participate in cleaning up local areas. The organization's official website features a constantly updated map with actions organized in different parts of the world in support of this goal.

World Earth Day in Poland

In Poland, as in other countries, the biggest ecological holiday is celebrated with great vigor. It involves not only government bodies, but also local authorities and numerous citizens. Various initiatives are being organized in major cities across the country, including educational fairs, joint garbage collection events and cultural events. In Katowice, for example, the Katowice Waterworks is actively involved, promoting pro-environmental behavior among residents. One of the company's flagship projects is #KranówkaKatowicka, aimed at promoting drinking tap water. On the other hand, additional stops of the Problem Waste Collection Vehicles have been planned for World Earth Day in Wroclaw.

MONITORING WATER QUALITY FROM SPACE. AUSTRALIAN AQUAWATCH PROJECT

Posted on 21 April 2024 by Izabela Łuba

Monitoring water quality from space. Australian AquaWatch project

Categories: Issue 8/2024, News, Onet

Tags: AquaWatch, space, United Kingdom, water quality

Monitoring of water quality is an essential part of assessing and forecasting the state of the water environment. It forms the basis for taking corrective or preventive measures. One of the most innovative solutions in this area is the Australian AquaWatch project, based on monitoring water quality from space. It was launched in 2023, and work is currently underway to adapt it in the UK.

AquaWatch - monitoring water quality from space and land

AquaWatch is a mission of the Australian National Science Agency (CSIRO) carried out in cooperation with Smartsat CRS and other partners, launched in Q1 2023. It is the first system of its kind to monitor the Earth's water quality from space, providing near real-time data and forecasts.

AquaWatch is based on the use of several technologies. The first involves monitoring water quality using hyperspectral optical sensors deployed on Earth satellites. The second technology, on the other hand, is sensors located in or just above the surface of the water, which allow in-situ detection of any deviations from the norm. Their role is important not only for acquiring accurate data in specific areas, but also for guaranteeing the remote sensing capabilities of images seen from space.

The combination of satellite and in-situ sensors, as well as the analysis of the data they provide, creates an integrated system that provides the ability to accurately monitor water quality and detect phenomena that negatively affect it, such as, but not limited to the presence of blue-green algae or sewage or spill pollution, posing a major risk not only to aquatic ecosystems but also to the economy.

As CSIRO chief executive Larry Marshall himself put it: *AquaWatch is all about integrating Earth observation with other scientific capabilities such as in-situ sensing, ecosystem modeling, engineering, data analysis and artificial intelligence.*

The AquaWatch system is designed to monitor all inland water bodies, including lakes, agricultural dams, reservoirs, streams, rivers, coastal lagoons, estuaries, and coastal waters and coral reefs, including the Great Barrier Reef.

pic. CSIRO

UK implements water quality monitoring with AquaWatch system

Starting in 2023. CSIRO's AquaWatch has set up a number of sites to monitor water quality in Australia. The technology was primarily tailored to domestic needs, but it is so versatile that it can be successfully implemented in other countries as well. This is exactly the step that the United Kingdom has decided to take. As part of the multi-year UK-Australia Space Bridge initiative, funded by the UK Space Agency's International Bilateral Fund in cooperation with the Australian Space Agency, funds (3 million Australian dollars) have been provided for the development of the AquaWatch system in Australia and its deployment in the UK. This action is expected to enable the development of a world-class system to monitor water quality both in these countries and around the world.

The AquaWatch implementation in the UK is being carried out at Plymouth Marine Laboratory (PML). The system will be used to monitor water quality in the Tamar Bridge area, where there is a high risk of anthropological pollution in the form of sewage and heavy metals from the mine. In addition to this, work is also underway at PML to develop a system using AquaWatch infrastructure to monitor the impact on water quality of increasingly frequent floods.

https://wodnesprawy.pl/scieki-kosmiczny-pomysl-brytyjczykow-na-monitorowan/

Why is AquaWatch a breakthrough in water quality monitoring?

AquaWatch is a breakthrough in water quality monitoring for many reasons. Above all, it provides access to up-to-date data and forecasts for early warning of harmful phenomena such as algal blooms and pollution, and more effective management. The timely data provided is also a key tool to help communities better understand and manage the impact of these events on human health and the health of aquatic ecosystems.

In addition, monitoring and effective management of water quality and aquatic ecosystems will reduce the negative economic impact on industries that depend on a safe and healthy aquatic environment, such as fishing, tourism and recreation. The project will provide communities and decision-makers with a valuable tool to better understand and protect water resources in the face of increasing climate pressures and extreme weather events.

APPLE CONTRIBUTES TO THE ENVIRONMENT BY INVESTING IN WATER AND CLEAN ENERGY

Posted on 20 April 2024 by Iwona Szyprowska-Głodzik

Who among us is not familiar with Apple products? Such people are few and far between, and no wonder. Apple is a global leader in technology, but also creates itself as a pioneer in the field of ecology, committing itself to protecting the environment by investing in water and clean energy. The company, known for its innovation, has ambitious goals for decarbonization and reducing its carbon footprint. Apple aims to achieve climate neutrality in all areas of its business by 2030. This strategy not only strengthens its position in the market, but also contributes to the global fight against climate change.

Categories: Issue 8/2024, News, Onet

Tags: Apple, clean energy, environmental protection, renewables, water

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Apple as a global environmental player

Apple Inc. as a leader in technology, demonstrates its commitment to sustainability not only by offering innovative products, but also by promoting responsible business practices. The company is actively working to optimize its supply chain, from raw material extraction to manufacturing processes to recycling of used equipment. Apple has introduced strict ethical and environmental standards for its suppliers, forcing them to implement more sustainable methods of operation.

As part of its green strategy, the company has invested billions of dollars in building solar and wind farms that provide the energy needed for its global operations. These investments not only meet the company's clean energy needs, but also help promote green energy in local markets, stimulating the economy and creating new jobs.

The company is not limited to commercial activities. It also works with a variety of environmental and industry organizations around the world to promote sustainable practices globally. It also invests in educational and social initiatives to raise awareness about sustainability. By organizing workshops, trainings and information campaigns, it seeks to raise environmental awareness among consumers and encourage them to make more conscious choices.

Through these actions, Apple is not only modifying its internal procedures, but also actively influencing the attitudes and behavior of consumers and business partners, shaping a global approach to sustainability.

Innovations in renewable energy

As part of its long-term strategy to achieve carbon neutrality by 2030, it is stepping up investment in clean energy. Today, 18 gigawatts of clean electricity power the company's global operations and supply chain, more than triple the amount in 2020. These investments include the development of new solar farms in the United States and Europe to meet customer demand for energy to charge and power appliances.

Apple also aims to globally reduce greenhouse gas emissions associated with customer use of their devices, with the goal of ensuring that every watt of energy used to charge devices comes from clean sources by 2030. In the United States, the company is investing in solar farm projects in Michigan that are expected to provide 132 megawatts of clean energy this year. In Spain, it is working with international solar development platform ib vogt on a project that will provide 105 megawatts of solar power when it comes online in late 2024.

Additionally, in India, Apple has partnered with leading renewable energy developer CleanMax to invest in six rooftop solar projects with a total capacity of 14.4 megawatts. These projects are expected to supply power to Apple's offices, two retail stores in the country and other operations.

https://wodnesprawy.pl/kolejne-elektrownie-wodorowe-w-europie-uruchomione/

Commitment to water conservation

Apple is stepping up its water conservation efforts, actively engaging in sustainable water management in the places where it has operations. The company has pledged to renew 100 percent. consumed fresh water in their corporate operations in regions experiencing high water stress. Over the next 20 years, Apple plans to recycle nearly 26.5 billion liters of water. Since 2023, the company has invested more than $8 million in initiatives to restore drinking water supplies in areas facing water shortages.

Apple's involvement in projects

1. The Dos Rios Norte project in Northern California - a collaboration with River Partners - aims to restore the natural functioning of a floodplain terrain over 300 hectares where the Sacramento River, Feather River and Butte Creek meet. The project aims to plant hundreds of thousands of native plants and restore the historic flood plain, which will help protect the region from flooding and increase ecosystem resilience.

2. The Colorado River Valley Forest Protection Project in the state of Arizona - a collaboration with the Salt River Project - involves protecting some 12,000 acres of forest from wildfires. The project is based on a strategic plan of conservation cuts (thinning), which aims to protect water resources from the effects of fires and ensure the continued use of local water resources.

3. Initiating a complete replenishment of water resources in India - Working with the Uptime Catalyst Facility has enabled Apple to achieve the goal of a complete replenishment of water resources consumed for its corporate operations in India. The project provides communities with access to clean, affordable drinking water through more than 300 water stations.

4. International Water Stewardship Standard certification - Apple's data center in Prineville, Oregon has become the first facility of its kind in the world to receive AWS certification for responsible water stewardship. The company has also helped 20 of its suppliers' plants gain this certification, and water management training has been given to plants in southern India and around Shanghai and Suzhou in China.

Apple's green bonds

Apple is funding its clean energy initiatives by issuing green bonds. The first such issuance took place in 2019, and the funds raised were used for renewable energy projects, including the development of photovoltaic farms in Michigan and solar projects in Texas. Since 2016, Apple has issued green bonds with a total value of $4.7 billion, of which about $3.4 billion has been invested so far.

Environmental impact of the investment

Sustainability throughout the supply chain plays a key role in corporate efforts focused on environmental protection. Apple, as a global corporation, is taking a number of measures to minimize the environmental impact of its operations. The company consistently strives to use renewable energy and reduce carbon emissions, which contributes to decarbonization and promotes the development of a more sustainable future. By continuing to invest in clean energy and water management, Apple is playing a key role in shaping a greener reality.

HOW DOES BIODIVERSITY AFFECT OUR MENTAL HEALTH? SMARTPHONES HELPED WITH RESEARCH

Posted on 19 April 2024 by Zespół redakcyjny

In the face of climate change, the need to nurture green spaces in urbanized, gated areas is increasingly emphasized. How important is contact with nature to our health and well-being? In a recent study, using a smartphone app, researchers examined how biodiversity affects residents' mental health. The study provides new perspectives on the importance of integrating natural elements into urban spaces.

Categories: Issue 8/2024, News, Onet
Tags: biodiversity, climate change, concretosis, green spaces, health

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What affects our physical and mental health?

The impact of climatic and environmental conditions on human physical and mental health is a topic that is increasingly featured in scientific and media debates. Available research shows the complexity of this issue, especially in the context of urbanization and the effects of climate change.

Certainly, our physical health is influenced by sunlight, which plays a key role in the synthesis of vitamin D, which has important implications for the prevention of cancer, autoimmune diseases and the prevention of rickets in children . In turn, urban vegetation can contribute to lower levels of pollutants such as particulates and nitrogen oxides, which are emitted by vehicles and industry. Studies have shown that trees in cities can significantly reduce pollution levels, resulting in a lower risk of respiratory and cardiovascular diseases .

The impact of nature on mental health is a topic that requires a deeper understanding. Research on the impact of the natural environment on psychological well-being is often limited to general determinants, leaving out specific elements like trees, fowl or water. For example, biodiversity and direct contact with nature can be crucial to our psychological well-being, though unfortunately many studies are based on artificial scenarios .

Instead, it has been proven that access to green spaces in cities, which are part of a biodiverse ecosystem, can improve both mental and physical health. One example is increased physical activity among residents with access to parks and other green spaces .

Biodiversity and smartphone research

The aim of the study was to analyze the impact of biodiversity on human psychological well-being. The analysis focused on understanding whether mental health depends not only on the overall amount of green space, but also on the variety of individual natural elements in a given space. The study focused on three main research questions:

1. Are occasional interactions with certain elements of nature associated with better mental health, and are these associations long-lasting?

2. Is there a correlation between increased natural features and better well-being, suggesting that greater biodiversity in an area has more beneficial effects on the mental health of residents?

3. How important is the diversity of components of the natural environment to the relationship between contact with nature and psychological well-being?

The study used the Urban Mind mobile app, which is a tool for monitoring the impact of the environment on mental health. The application made it possible to perform multiple measurements in real time, eliminating an error called "recal bias." A total of 7829 users downloaded the app, of which 1998 users carried out at least 25 percent. scheduled ecological assessments, thus meeting the minimum criteria for participation.

During the study, participants' demographics such as age, gender, ethnicity, socioeconomic status, sleep quality and mental health information were also collected. Over the course of 14 days, participants made 42 momentary ecological assessments, three per day, excluding hours spent sleeping. As part of these evaluations, participants were required to submit photos and short audio clips that documented their surroundings.

The analysis included assessments of well-being, the environment and biodiversity. All collected data were analyzed in detail to understand the relationship between exposure to natural agents and participants' mental health.

https://wodnesprawy.pl/pierwsza-globalna-mapa-zamieszkiwania-ludzi-w-pobli/

What did the research show?

The study's authors note that their work has some limitations. One is that the research group consists solely of smartphone users, with an average age of 35.5 years, making the sample demographically unrepresentative of the entire population. In addition, there is speculation that those voluntarily using the Urban Mind app may be more aware of or interested in the impact of nature on mental health, which may have influenced the bias in their responses, especially since the goals of the study were clearly communicated from the beginning.

Nevertheless, this study is a pioneering effort to assess the impact of daily interactions with various elements of biodiversity on mental health, conducted in the context of real-world conditions and real-time, taking into account the individual characteristics of the participants.

The final results of the study provided answers to the three key questions posed by the hypothesis. First, the positive impact of natural environmental elements on human well-being has been identified. For example, the excitement of meeting birds and observing vegetation and trees may be more lasting, unlike the sensations of watching water or listening to its noise. Second, increasing biodiversity has been found to have a lasting and positive impact on mental health. Third, it was shown that each additional natural element in the participant's environment, increased their level of satisfaction.

In the article, I used, among other things. From the works:

Holick, MF. "Vitamin D Deficiency." The New England journal of medicine, 2007

Nowak, DJ, Crane, DE, Stevens, JC. "Air pollution removal by urban trees and shrubs in the United States." Urban forestry & urban greening, 2006

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CATASTROPHIC FLOODING IN DUBAI EXPOSES LACK OF PREPARATION FOR CLIMATE CHANGE

Posted on 18 April 2024 by Agata Pavlinec

Never before has such heavy rainfall been recorded in the desert United Arab Emirates. Flash flooding in Dubai began on Tuesday, April 16, and within 24 hours paralyzed the entire city and led to the closure of one of the world's busiest airports. Questions are multiplying not only about the causes of the disaster, but also about obvious deficiencies in the flood control infrastructure.

Categories: Issue 8/2024, News, Onet
Tags: climate change, Dubai, flood, water and sewage infrastructure, water infrastructure

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A year of rain in one day

The Emirati government's press office reported that in less than 24 hours, weather stations in Al Ajn, located in the west of the country, recorded 254 mm of rain - more than the region's annual total. A total of five locations across the country recorded more than 200 mm of rainfall. April's flooding in Dubai and neighboring cities is believed to be the worst in 75 years. Streets turned into streams, the main road from Dubai to Abu Dhabi was closed, many flooded cars were abandoned. In Ras Al Khaimah, a 70-year-old man died when floods lifted his car. Supplies to stores were halted, and many citizens were unable to leave their homes. Elevators have stopped working in Dubai's skyscrapers.

Public offices and schools will remain closed until Friday to avoid exposing the public to the threat of high water levels. In UAE neighbor Oman, flooding has already claimed the lives of at least 19 people, including ten children heading to school. Today, the weather in the Emirates has already stabilized, but residents of Dubai, Abu Dhabi and Sharjah have had to deal with thick fog. The National Center for Meteorology issued a yellow warning as a result, appealing to drivers to be extremely cautious.

What caused the flooding in Dubai?

Heavy rains in the UAE have triggered a wave of suspicion in the media about artificial weather manipulation. In fact, since the 1990s, Emirati authorities have been using a technology called cloud seeding to increase rainfall in the rain-thirsty region. We're talking about spraying clouds with special compounds, such as powdered silver iodide, which causes condensation in the air and induces rain. The Emirates' aircraft fleet has one of the most advanced cloud seeding systems in the world. This time, however, the government denied reports of sky-high operations, pointing out that the flooding in Dubai is solely the result of natural weather phenomena, and seeding is never carried out if the forecast says there is a serious threat.

Meanwhile, the National Meteorological Center has warned of rainy weather since Sunday, April 14. According to his experts, there was a collision between a low in the upper layers of the atmosphere and the low pressure above the earth's surface, which acted like a piston and provoked the development of a massive storm. The rain over the Emirates was part of a low-level system that stretched over the Arabian Peninsula and also caused flooding in Oman and southeastern Iran.

Climate change is responsible for the intensity of the phenomenon, as meteorologists from other countries around the world have confirmed. Prof. Dim Coumou of the University of Amsterdam said in an interview with Reuters news agency that the heavy rains in the Emirates are typical of the convection process resulting from global climate warming. According to Gabi Hegerl, a climate scientist at the University of Edinburgh, the situation in many parts of the world will worsen in this regard.

https://wodnesprawy.pl/zielona-retencja-niby-mala-a-jednak-wielka-gdansk/

Infrastructure deficiencies increase costs

The flooding in Dubai proved that even wealthy and highly developed cities in the Arabian Peninsula cannot ignore climate change. In an area

where rainfall occurs several times a year, city planners have not provided for adequate drainage infrastructure. Water flooding Dubai's streets is therefore not an unusual phenomenon, but for the first time in decades the situation has gone completely out of control.

In 2021. A 10-kilometer drainage canal, buried 45 meters underground, has been completed. It drains water from 40 percent of the area of the city and is part of a broader investment project to prevent flooding, but its scale is still insufficient, and transformation of existing infrastructure is difficult and very expensive. Also, buildings in cities are not equipped for the possibility of rapidly rising water levels.

A wave of harsh criticism was levied at the management and staff of Dubai International Airport, which, despite its technological sophistication, failed to show stranded passengers the support they needed for hours. People slept on the floors, food and water were distributed haphazardly, and information was lacking. The Dubai flood has thus become painful proof of the importance of climate change adaptation not only at the infrastructure level, but also at the crisis management level.

TOGETAIR CLIMATE SUMMIT IN THE CLOUDS

Posted on 17 April 2024 by Agnieszka Hobot

The 5th edition of the TOGETAIR 2024 International Climate Summit will be held in Warsaw on April 22-23. The largest environmental event in Poland will unite representatives of business, administration and science in the EU's tallest building, VARSO TOWER.

Categories: Issue 8/2024, News

Tags: climate change, Climate summit, ecology, sustainability

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In the face of ongoing climate and environmental change, developing effective strategies for sustainable development is becoming essential for the future of our planet. The 5th edition of the TOGETAIR Climate Summit provides a platform for discussion and cooperation between representatives of business, government, NGOs and universities. The event is an opportunity to share experiences, ideas and expert recommendations that can contribute to the achievement of ambitious climate and environmental goals.

TOGETAIR 2024 International Climate Summit coming soon

Organized by the Clean Air Foundation and the Positive Ideas Foundation. The summit will be held in the impressive VARSO PLACE and VARSO TOWER, which is the tallest building in the European Union. Confirmed guests include Minister of Digitization Krzysztof Gawkowski, Minister of Funds and Regional Policy Katarzyna Pełczyńska-Nałęcz, Minister Tomasz Siemoniak and representatives of the European Investment Bank and the US Embassy. The summit focuses on the theme "CLIMATE CARE," promoting climate care as a key element of international cooperation.

pic. TOGETAIR

Shared vision, action plan and finances

This year's summit focuses on promoting sustainable development through innovative approaches to ecology and environmental crisis management. The first day of the event will discuss GOZ, the move toward climate neutrality and decarbonization of industry. The second day will begin with discussions on smog, thermal modernization of buildings, the role of the Green Deal in agriculture and new technologies in natural resource management. There will also be an expert voice on biodiversity conservation. You can learn more about the details and agenda of this year's TOGETAIR 2024 Climate Summit at the organizer's website: https://togetair.eu/agenda/. Participants will have the opportunity not only to gain knowledge, but also to directly exchange experiences with experts in various fields.

Two days, one goal - CLIMATE CARE

TOGETAIR is not only a venue for lectures and panel discussions, but also a platform for the dynamic exchange of ideas and experiences in the format of key notes and power speeches. A significant part of the event are roundtables where environmental thought leaders, politicians, business and academic representatives can discuss and formulate recommendations together. This is a unique opportunity to build strong international relationships that can contribute to better understanding and effective solutions to environmental problems.

By combining Polish and international forces, the TOGETAIR summit is becoming a catalyst for important climate and environmental initiatives. Participation is a step toward collective action for a better future for our planet. The challenges ahead require a global approach and integrated efforts that will continue long after the event.

The discussions and meetings that will take place during the two-day summit will not only influence the formation of environmental policies, but also inspire participants to further promote and implement sustainable practices in their own environments. The ultimate goal of TOGETAIR is not only to exchange knowledge, but also to create a sustainable, effective and inspiring platform for cooperation to protect our planet.

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pic. main: TOGETAIR

MORE HYDROGEN POWER PLANTS IN EUROPE LAUNCHED

Posted on 16 April 2024 by Izabela Łuba

The statement Water is the coal of the future, which was made in 1874. in Jules Verne's novel The Mysterious Island, seemed irrational until recently. Hydrogen is now poised to become the world's main energy fuel in the coming years. The hydrogen-related buoyancy, meanwhile, is translating into new hydrogen power plants popping up like mushrooms in Europe. Just in the past few days, two more have been launched in Hungary and Austria.

Categories: Issue 8/2024, News, Onet
Tags: green hydrogen, hydrogen, hydrogen power plants

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Hydrogen power plants are the basis for Europe's sustainable development

Green hydrogen is a resource that is the future of European energy and transportation free of greenhouse gas emissions that contribute to climate change. It is produced by electrolysis, which uses only energy from renewable sources. Green hydrogen is able to effectively replace coal, oil and natural gas, as it has a calorific value of 33.3 . In addition, its combustion by hydrogen power plants or vehicles generates no pollution. The byproduct of this process is only water.

The potential of hydrogen has long been recognized by the EU. For example, in July 2020. The EC, in a bid to accelerate the development of green hydrogen in member countries and to ensure that its role is important in achieving a climate-neutral Europe by 2050, proposed a hydrogen strategy for a climate-neutral Europe. In 2023. In turn, the Parliament and the EU Council have agreed on mandatory national targets for infrastructure deployment. According to them, by 2031, hydrogen refueling stations are to be distributed on the EU's main roads at least every 200 kilometers.

Additional steps toward the hydrogenization of Europe also include the EC's planned €6.9 billion for IPCEI's Hy2Infra project, which we wrote more about in the 5/2024 issue of Water Matters. Green hydrogen and its resulting benefits are also being noticed by companies, both private and public utilities. This is evidenced by the recently launched hydrogen power plants.

MOL has launched the largest hydrogen power plant in Central and Eastern Europe in Hungary

MOL Group, which is a Hungarian oil and gas processing company, is well aware that hydrogen is the fuel of the future. That's why it has put into operation in Százhalombatta (in Hungary) one of the largest green hydrogen plants in Europe and the largest in the Central and Eastern European region, with a total capacity of 10 MW. The cost of this investment was 22 million euros, with the benefits it is capable of bringing are invaluable.

The Százhalombatta hydrogen power plant will be able to produce 1,600 t per year. pure green hydrogen. Instead, its main task is to support the Hungarian oil and gas company's refinery operations. The hydrogen produced by the plants is expected to gradually replace the natural gas previously used in the fuel production process. As a result, the company will be able to reduce the carbon dioxide emissions generated by the Danube refinery by 25,000. t. annually. This value is much better illustrated in the words of MOL Group CEO József Molnár: *we manage to reduce carbon dioxide emissions to a degree comparable to removing some 5,500 vehicles from traffic overnight.*

The investment in Százhalombatta is one of the activities in line with the MOL Group's *Shape Tomorrow* corporate strategy. It is also to include more hydrogen power plants, at the other two refineries, to achieve a more sustainable fuel production process.

https://wodnesprawy.pl/stacje-wodorowe-w-polsce-czy-czeka-nas-rewolucja-pa/

Vienna also bets on green hydrogen

The second hydrogen power plant recently launched in Europe is the first of its kind in Vienna. It is located in the Simmering district on the premises of gas and electricity distributor Wiener Netze, which, together with the city's electricity and district heating company Wien Energie and transport company Wiener Linien, is responsible for its operation. All of these companies are owned by Austria's largest utility, Wiener Stadtwerke.

The construction and commissioning of a hydrogen power plant in Vienna amounted to 110 million euros. The plant is capable of producing up to 1.3 t. green hydrogen per day, which will be used both for the companies' own use and made available to private transport operators. It will mainly find use in refueling buses and trucks, using a hydrogen station opened near the power plant.

It is possible that in the future the hydrogen power plant opened in the Simmering district will also provide power for the Donaustadt district heating and CHP plant. All thanks to the fact that Wien Energie has been conducting tests since last July to make it possible to mix hydrogen with natural gas, and then use such a mixture in steam and gas turbines to generate heat and electricity.

The hydrogen power plants put into operation in Austria and Hungary, although they have quite different purposes, are excellent proof that green hydrogen has great potential not only ecologically, but also economically. Consequently, further investments in hydrogen power plants in Europe are only a matter of time.

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pic. main: molgroup

DOWNPOURS AND THUNDERSTORMS ARE COMING OVER POLAND. IMGW ISSUED WARNINGS - CURRENT WEATHER FORECAST

Posted on 15 April 2024 by Iwona Szyprowska-Głodzik

Our country has just left a calm and sunny aura, and outside the windows we see rain, which will gain strength in the coming days. Downpours and thunderstorms are coming over Poland, which could lead to local flooding and even floods. This weather situation poses a threat to the security and infrastructure of the affected areas. Where has IMGW-BIP already issued warnings?

Categories: Issue 8/2024, News, Onet
Tags: flood, waterlogging, weather

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Meteorological situation in the coming days - violent downpours and thunderstorms await us. Strong winds will blow

According to the Institute of Meteorology and Water Management - National Research Institute, the coming days will bring heavy downpours, especially in the western, southern and southeastern parts of the country. By Friday, 15 to 30 mm of rain will fall there, and up to 50-70 mm in the mountains. On the weekend (April 20-21), meanwhile, precipitation may reach 30 to 50 mm, and in mountainous regions up to 100-120 mm. We can expect rain with snow, hail and sleet especially in the foothills and mountainous regions. Heavy rainfall and thunderstorms are forecast in the east and southeast of the country, with up to 25 mm of rain possible in one day. Strong winds with gusts of up to 70 km/h will also blow.

https://wodnesprawy.pl/przerwana-zapora-na-rzece-ural-gigantyczna-powodz/

IMGW-BIP first degree alerts: thunderstorms

IMGW-BIP has issued first-level warnings for thunderstorms in many regions of Poland. There is a particular threat in the provinces:

- Silesia (in the districts of Żywiec, Bielsko-Biała, Bielsko-Biała, Cieszyn, Pszczyna, Wodzislawski, Jastrzębie-Zdrój, Rybnik, Rybnik, and Racibórz);
- Lesser Poland (in the districts of Tatrzański, nowotarski, myślenicki, suski, wadowicki, oświęcimski, limanowski, wielicki, bocheński, Kraków, krakowski);
- West Pomerania,
- lubuskie;
- Pomerania (in western counties);
- Greater Poland (excluding eastern counties);
- Lower Silesia (in northwestern and western counties).

IMGW-BIP first degree alerts: heavy rain with thunderstorms

The IMGW-BIP has also issued first-level warnings for heavy rain in the provinces:

- Lesser Poland (in the districts of Nowy Sącz, Nowy Sącz, Gorlice).
- Subcarpathian (in the southern counties of Jasielsk, Krosno, Strzyżowski, Brzozowski, Sanok, Lesko, Bieszczady, Przemysl);

Massive downpours are coming - we should be prepared

In view of the forecasted heavy rainfall, IMGW-BIP, together with local emergency management units, recommend that residents and local authorities take appropriate preparatory measures for the possibility of situations such as flooding or waterlogging. It is advisable to regularly monitor announcements issued by local emergency management centers, take care of the patency of sewerage systems, and check the technical condition of dams and dikes. In addition, it's a good idea to protect your property in backyards or balconies from potential damage.

What will the May weekend be like?

Weather forecasts for the upcoming long May weekend in Poland indicate the possibility of friendlier weather than we might expect based on observations of current weather and trends from previous years. After a relatively cool and rainy period in the second half of April, preliminary meteorological forecasts for the end of the month predict an increase in temperatures that could reach values between 15 and 20°C. Although rainfall is still forecast, it will be fleeting. Optimistic weather forecasts are boosting prospects for a successful holiday, encouraging people to plan outdoor activities.

WORLD CANAL CONFERENCE 2024 IN POLAND

Posted on 15 April 2024 by Łukasz Machalica

The history of inland waterways in Poland dates back to the Middle Ages, when rivers such as the Vistula were major transportation routes. The current challenges of IWT are different, focusing on adapting the industry to sustainability considerations and the consequences of climate change. Among other issues, the World Canal Conference - WCC2024, to be held June 24-26, 2024, is dedicated to these issues. in Bydgoszcz. The annual celebration of shipping and inland water enthusiasts will provide an opportunity to exchange experiences and views internationally. "Water Matters" provided media sponsorship for the event.

Categories: Issue 8/2024, News
Tags: Bydgoszcz, Channels, rivers

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pic. Bydgoszcz Information Center

World Canals Conference

The World Canals Conference is an international event with a long tradition: the first conference was organized in 1988, and since then there have been 34 editions. The event changes location every year between countries on three continents. In previous years, discussions on inland waterways were held in Germany, the US and China, among others. As the organizer writes, *The World Canals Conference is an opportunity to bring together hundreds of canal enthusiasts, professionals and scholars from around the world to share best practices for canals, including canal or historic preservation, revitalization of canal systems, port areas, canal trails and amenities; presentation or interpretation of canals and corridors - their history and various elements of the.*

World Canal Conference - location of this year's edition

After more than three decades of an international event, the time has finally come for Poland. Bydgoszcz, the heart and co-capital of the Kuyavian-Pomeranian region, has been chosen as the next host of the World Canals Coference. The choice is not accidental: the history of Bydgoszcz has been intertwined with inland waterways since the dawn of time, which have permanently grown into its landscape: two socially and economically significant rivers - the Brda and the Vistula - flow through here; the Bydgoszcz Canal, celebrating its 250th anniversary this year, was also of great importance for the city's development.

Sessions of the conference will be held in two historic locations of Bydgoszcz's Old Town. The first is the restored Chamber Theater, with stage traditions dating back to the mid-19th century. The other is the Rothera Mills - former grain mills on the charming Mill Island, whose restored, huge spaces now function as a modern Science and Culture Center.

Objectives of the conference

Each edition of the WCC features a new theme, a new perspective on water management and inland waterway issues. The main goal remains the mutual exchange of views, ideas and plans on investments and solutions applied to waterways around the world. This year's meetings are also a good opportunity to discuss the development of inland waterways in Poland and put them in an international context. The event will be attended by experts from the IWT community, including politicians, scientists, tourism industry workers, NGO representatives and entrepreneurs.

This year's conference will focus on three main subject areas:

- Speeches in the Ecology and Technology session will be devoted to presenting environmental issues related to rivers and canals, including resource and ecosystem protection and environmentally friendly modern technologies.

- Speeches in the Water, Heritage and Tourism session will focus on the tourist and recreational use of rivers and canals, as one of the important meanings of the combination of economy and environment. A special session on water museums is also planned.

- Man and his activities are an indispensable part of the human-water environment relationship, including rivers and canals. The speeches in the session will focus on defining the catalog of human impacts in time and space. In addition, the session will present revitalization projects for rivers, canals and waterways to counteract historical and current negative impacts.

Schedule of the event

The program is divided into three days and consists of various activities. In addition to discussion sessions in the main congress buildings, there will also be a number of thematic excursions. Participants and guests of WCC2024 will have the opportunity to visit hydrotechnical facilities and power plants around the Brda-Vistula estuary, take a walk along the Bydgoszcz Canal and visit a museum dedicated to it, as well as go to the Lower Vistula Valley. The organizers encourage people to come a few days earlier: the weekend preceding the conference, June 22-23, the annual Bydgoszcz Water Festival "Ster na Bydgoszcz" will be held on the Brda - the largest summer water festival in the city center.

Registration

Anyone interested in attending the conference is invited to register at the organizer's official website. There are four ticket packages, which differ in additional services and amenities.

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pic. main: Robert Sawicki, Bydgoszcz Information Center

WILL THE 2024 OLYMPICS BE A DISASTER FOR TAHITI?

Posted on 14 April 2024 by Agata Pavlinec

This year's Olympics will be held primarily in Paris, but competition among surfers is scheduled for 15,000 miles away. Tahiti km. There is no doubt that this largest of French Polynesia's islands will provide wave lovers with optimal conditions to showcase their skills. However, Tahiti's local communities are expressing concern about the potentially negative impact the Olympics could have on the environment and traditional lifestyles. The question arises: who will ultimately gain and who will lose from hosting this prestigious international sports event?

Categories: Issue 8/2024, News, Onet
Tags: games, Olympics, Paris, Tahiti

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Teahupo'o - the black jewel of Polynesia

Surfing as a sport will appear at this year's Games for the second time. The overseas territories of France, more specifically the small village of Teahupo'o on the southeastern coast of Tahiti, were chosen as the arena for the struggle. The local black beach has gained notoriety among surfers over the past 20 years for its massive waves as high as 3-7 meters. Since 1999. World Surfing League competitions are held here every year.

Despite this popularity, Teahupo'o has remained a quiet, non-commercialized settlement with a single dead-end asphalt street and modest food offerings. The Olympics will come to the village for just a week, but they have already been electrifying the local community and environmental activists around the world for months. Especially since the original plans included the construction of new roads and hotels in Tahiti. After violent protests, the scale of preparations has been significantly reduced, with accommodation for athletes and spectators to be provided by local residents and a specially prepared yacht.

pic. Localize/Unsplash

Will the coral reef survive the Olympics?

Preparations for the Tahiti Olympics encountered a major obstacle in December 2023. A barge intended to support the construction of a new observation tower for the judges got stuck on an offshore coral reef during the voyage and snapped off a section of it. The incident sparked understandable protests and outrage. It is thanks to the reef that the waves at Teahupo'o are so unique, while the reef is home to dozens of species of fish that the local community makes a living from.

After the accident, more than 200,000 people signed an online petition against the project, which includes drilling two-meter-deep wells into the reef. Environmental activists fear that in addition to disrupting the coastal ecosystem, the intervention could attract the algae *Gambierdiscus toxicus.* They produce dangerous toxins that seep into the bodies of fish and seafood, causing a serious poisoning in humans called ciguatera. Its effects can be fatal.

The president of French Polynesia halted work on a new aluminum tower, and after considering various scenarios, a more economical design was adopted. The structure will be implemented, but is expected to be 5 tons lighter and 50^{m2} smaller. The number of people and equipment that will be allowed on the tower during the Olympic competition has also been restricted. In addition, local teams are involved in the creation of the installation to ensure transparency of operations.

https://wodnesprawy.pl/olimpiada-w-paryzu-rozpoczyna-ere-budowania-ekologi/

How will the Olympics affect Tahiti?

Time will tell if the precautions taken will preserve the reef at Teahupo'o in its original state. The Paris Olympics, for the time being, are being advertised as the first green Games, and the controversy in Tahiti somewhat contradicts the image being built by the organizers. There is no denying that a sports event of this magnitude can also entail positive phenomena. A sizable number of residents plan to rent their homes to the thousands of fans who will come to watch the struggle on the waves. Their spending will strengthen the local economy and has the potential to provide a much-needed boost to the local community.

On the other hand, Tahitian society has remained true to its culture and traditions for thousands of years, very closely linked to nature. According to the daily Le Monde, life here is between farming and fishing, between the sea and the lagoon. According to many residents, the possible upgrades and new infrastructure will not necessarily fit in with local heritage. Polynesians, meanwhile, want to preserve the unique character of Teahupo'o Beach, which is one of the few such secluded surfing locations in the world.

The Olympic Committee, meanwhile, assures that the customs and wishes of the people of Tahiti will be respected. To this end, since January this year. monthly meetings are held with the local community, and an information office has been opened on site. For the time being, work on the tower, due to be completed on May 13, is proceeding as planned and without further objections. So there is a chance that this year's Olympics will nevertheless set an important precedent for holding major events with respect for the local environment and culture.

WHAT IS NOISE POLLUTION AND HOW DOES IT AFFECT WHALES?

Posted on 13 April 2024 by Łukasz Machalica

Many species of aquatic mammals, including cetaceans, use sound for communication and daily migration, which can be hampered by noise pollution. But what exactly is it and how does it affect whales and their migrations? We delve into the latest scientific findings to answer these questions.

Categories: Issue 8/2024, News, Onet

Tags: bashing, pollution, underwater noise, whale

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Noise pollution

Sources of noise can be diverse and accompany us on a daily basis. Whether it's noisy music at a party, passing cars, verbal communication between crowds of people, or the use of electrical appliances. We speak of the phenomenon of noise pollution when there is excessive exposure of the listener to sounds. The World Health Organization (WHO) has determined that noise pollution begins when a threshold of 65 decibels (dB) is exceeded, however, as little as 30 dB impairs sleep and contributes to hearing complications. Recent studies show that noise exposure is now a serious problem, as the WHO alerts that more than 5 percent of population - about 430 million people - worldwide require rehabilitation to correct hearing loss, and by 2050. This number will increase to 700 million people.

The problem of excessive noise also exists in the water space. Thanks to the development of science, we know that sound travels a greater distance underwater than in the air, which means that signaling information underwater is possible over much greater distances. This benefits many marine mammals that use sound communication. Now, with the advent of the industrial age, aquatic animals are no longer only more exposed to natural ambient noise such as wind, rain and cracking ice, but also to anthropogenic sources of sound, that is, man-made.

Sources of underwater noise are primarily shipping, offshore construction, sonar or equipment exploration. The problem has escalated significantly in recent decades. Since 1950. Noise levels in the ocean have increased by more than 20 decibels, or a 100-fold increase in noise intensity, which has been fueled by, for example, oil exploration and the expansion of construction work at depth.

Sound intensity and cetacean communication

Toothfish, including orcas and dolphins, use short clicks and high-frequency whistles for echolocation and communication with other individuals. Fishbowls and sperm whales, however, unlike the rest of the aquatic mammals, communicate through what is known as cetacean singing. Their acoustic communication is more like singing, similar to human or bird song. Vocalization varies depending on the species involved. Blue fins, for example, are famous for their songs, dwarf fins make a distinctive "buzzing" sound, and belugas, studies have shown, are able to imitate the melody of the human voice. However, the general way cetaceans communicate is still unexplored fully by humans.

Cetacean melodies were first recorded about 50 years ago, and research on whale singing has been carried out ever since. They showed that these chants play a key role in social communication and determine the reproductivity of these mammals. This is why anthropogenic noise sources can be so dangerous to their existence. This is evidenced by frequent cases of stranded cetaceans due to seismic sounds or stress reactions of whalebones to noise.

Boston's New England Aquarium has studied the feces of Biscayan whales to monitor their stress hormone output. A study by a team of specialists showed that during a two-day suspension of ship traffic in the analyzed sea area, underwater noise levels decreased by 6 decibels. This significant decrease in noise had a direct effect on reducing the levels of stress hormones in these animals.

https://wodnesprawy.pl/halas-podwodny-statki-beda-musialy-go-ograniczyc-ha/

Latest research - impact of noise on whale migrations

One of the more complex areas of research is the migrations of these marine mammals. Fin whales, included in this group, make large-scale migrations every year, traveling long distances between feeding areas and breeding sites. Individuals have been observed to travel as far as 20,000. km per year. Cetacean singing also plays a role in this process. Through acoustic communication, the whalebone amplifies information about migration routes. In doing so, they take advantage of mass communication, as the transmitted sounds over hundreds of kilometers help isolated individuals navigate and take the correct course.

In recent years, research teams at the University of Melbourne have been examining how noise pollution affects whale migrations. To this end, mathematical models have been developed to study the relationship between signal detection, noise pollution and navigation behavior. Studies have shown that noise from human activities affects cetacean migration through three mechanisms. First, it reduces traffic space, thus increasing the travel time of whaleboaters due to the lower efficiency of mass navigation. Second, animals respond by avoiding noise when noise is above a tolerable threshold, which can block the migration routes in question. Third, it causes confusion among cetaceans, whose ability to identify their surroundings is effectively reduced, leading them to stray off course.

Unfortunately, forecasts are not optimistic, as he expects further growth in shipping activity and larger-scale resource extraction in the future, which will increase noise. Scientists stress the importance of regulating excessive anthropogenic sound sources, not only for the sake of cetaceans, but also for other animal species that feel the presence of noise pollution. To improve the situation, researchers are still trying to learn about the hearing senses of marine animals and set a new direction for technology applied to water. On an optimistic note, this year's International Maritime Organization (IMO) has announced that it has developed a final version of an action plan to significantly reduce underwater noise generated by ships, as we have already written about in Water Matters.

HOME TREATMENT PLANT PROGRAM - CALL FOR APPLICATIONS HAS BEEN SUSPENDED

Posted on 12 April 2024 by Karol Kucharski

A large number of households, especially in scattered areas, still do not have access to a sewage system, despite its continued expansion. In such a case, domestic treatment plants, which are cheaper to operate, become an alternative to the traditional septic tank. The great interest in the construction of domestic treatment plants is evidenced by the number of applicants in the Domestic Treatment Plant program, which was announced by the Provincial Fund for Environmental Protection and Water Management in Katowice. The call for applications began on April 2, 2024, and after only five days from that date it was announced that due to the huge interest and exceeding of the planned budget, it is being stopped.

Categories: Issue 8/2024, News, Onet
Tags: sewage treatment plant, subsidy, treatment plant, water law application

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Domestic wastewater treatment plant

A domestic wastewater treatment plant is a set of equipment used to neutralize wastewater generated in a single house or a small grouping of houses.

A domestic treatment plant consists of a septic (primary) tank and a treatment system. Depending on the type of the latter, treatment plants are distinguished from:

- Drainage of infiltration;
- sand filter;
- plant bed (soil-plant filters, hydroponic beds);
- Biological bed (containerized treatment plant);
- Activated sludge (containerized treatment plant).

Depending on the filtration method, there are several different types of domestic wastewater treatment plants, including:

- Drainage (with an infiltration drain or sand filter);
- Biological (with activated sludge or biological filter);
- Vegetables.

According to information provided by the Central Statistical Office, the number of domestic sewage disposal systems in Poland at the end of 2020 was nearly 2.5 million units, of which 87.8 percent (2.1 million units) were for non-drainage tanks, and 12.2 percent (295,000 units) for domestic sewage treatment plants. The amount of liquid wastewater (domestic sewage) collected from non-drainage tanks during the entire year of 2020 was 40.9 dam^3 of which in cities - 8.9 ^{dam3} (21.7 percent of the total amount), and in rural areas - 32 ^{dam3} (78.3 percent).

Home Treatment Plant Program

The purpose of the *Domestic Treatment Plant* program is to support activities that enable the management of social and domestic wastewater

in areas where the construction of a collective sanitary sewer system is not currently in operation and is not expected within the next 5 years. Financial assistance is directed to individuals for the implementation of tasks involving the purchase and installation of domestic wastewater treatment plants with a capacity of no more than 7.5$^{m3/d}$.

The program runs from 2023-2025, with a budget of PLN 4 million. The intensity and form of subsidy is a grant of up to 50 percent. Eligible costs of the task, but no more than 8 thousand. PLN.

Eligible costs for the construction and commissioning of a domestic treatment plant are considered to be costs associated with the implementation of the task, aimed at achieving the material and environmental effect, intended for:

- Purchase of materials and equipment necessary for the implementation of domestic wastewater treatment plants;
- execution of construction and installation works of a domestic sewage treatment plant with the cost of restoring the land to its original state, but without plantings.

Ineligible costs are considered to be:

- The cost of developing project documentation for the construction of domestic wastewater treatment plants;
- Costs of supervision and surveys, surveying and administrative fees, etc. related to the construction of a domestic wastewater treatment plant.

https://wodnesprawy.pl/mala-retencja-w-twoim-ogrodzie-jeszcze-tylko-do-kon/

Domestic sewage treatment plant vs. water law notification

According to Polish law, the construction of a domestic wastewater treatment plant does not require a construction permit if its capacity does not exceed 7.5$^{m3/d}$. However, it is necessary to declare the desire to establish such an installation. How to do it step by step we suggest in one of our previous issues.

Domestic wastewater treatment plant - key legislation

The legal act that regulates the conditions necessary to be met when discharging wastewater and rainwater and snowmelt into water or land is Decree of the Minister of Maritime Affairs and Inland Navigation dated July 12, 2019. on substances particularly harmful to the aquatic environment and the conditions to be met when discharging wastewater into waters or into the ground, as well as when discharging rainwater or snowmelt into waters or into water facilities.

The location of a domestic wastewater treatment plant requires minimum distance conditions from other field facilities. They are defined by the Regulation of the Minister of Infrastructure of April 12, 2002 on the technical conditions to be met by buildings and their location.

The location of the domestic sewage treatment plant on the plot is determined by Order of the Minister of Development and Technology dated April 15, 2022. On the announcement of the unified text of the Regulation of the Minister of Infrastructure on the technical conditions to be

met by buildings and their location.

SPRING WEATHER EXTREMES. ON HOW TO UNDERSTAND ATMOSPHERIC PHENOMENA

Posted on 11 April 2024 by Katarzyna Stefaniuk

The beginning of April, wrapped in a halo of Saharan dust, gifted Poland with an aura worthy of full summer. Temperatures reached 30°C, the sun sent heat from the sky, and afternoons brought intense thunderstorms - weather extremes unusual for a calendar spring. The scenery was complemented by lilacs already in bloom, heralding not so much the arrival of May, but testifying to the acceleration of the vegetation cycle by a full month. Scientists' alarming claims of a record warm year in 2023 and a series of record-breaking temperatures in the first months of this year herald an alarming change.

Categories: Issue 8/2024, Issue topic, Onet
Tags: atmospheric phenomena, weather, weather phenomena

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In contrast, Russia is struggling with flooding of unprecedented proportions, and the Alps are astounding with snowfall that is unprecedented for this time of year. We are faced with questions that are impossible to ignore: Is this a new norm to which we must adapt, or merely a temporary deviation from the rule? What are the causes of these unusual atmospheric phenomena? Is El Niño, which hasn't been coming off the lips of meteorologists lately, responsible for everything, or is it already a direct effect of climate change?

Warmer, warmer, hotter - temperature weather anomalies or already an everyday occurrence?

A new report from the World Meteorological Organization(WMO) shows that in 2023. global records have once again been broken for greenhouse gas levels, air and ocean surface temperatures, glacier retreat and the reduction of the Antarctic ice sheet, and the resulting rise in sea level. According to the WMO report *State of the Global Climate 2023* heat waves, floods, droughts, fires and rapidly intensifying tropical cyclones have contributed to a necessary change in the way of life of millions of people and are causing multi-billion dollar losses to the economies of many countries.

The report indicated that the global temperature at the earth's surface in the previous year was 1.45 degrees Celsius above that of the pre-industrial era, considered the baseline. It was pointed out that we are one step away from crossing the 1.5°C barrier, which will bring catastrophic changes for the Earth. Unfortunately, climate change is much more than just temperature. It's also the aforementioned intense hurricanes, heat waves that threaten ecosystems, loss of sea ice or frequent extreme weather events.

To make matters worse, according to Copernicus Climate Change Service, after an unusually warm January, February 2024. turned out to be the warmest ever measured. In addition, the average global ocean surface temperature has been rising for more than ten months and in February was the highest ever measured, breaking the record set in August 2023. The end of the previous year and the beginning of this year also brought record high global precipitation. However, their distribution on Earth was very uneven. In North America, Asia and Australia it has brought catastrophic floods and snowstorms, while Africa and South America are facing massive droughts and fires. Tropical cyclones of the highest categories were developing in the Indian Ocean. As we can see from the intense year of 2023, the beginning of the next one brings more extreme weather events around the world.

In Poland, February was also extremely warm. The anomaly of the average air temperature was 5.8°C, with new records being broken at numerous measuring stations. It was also the wettest February since the 1950s. In the 1970s. Rainfall totals were more than double the multi-year average. There are many indications that this past month will be another consecutive month with record high temperatures and the warmest March on record for measurements. Such a weather anomaly contributed to record high temperatures and droughts in southern Europe, and in the last days of March in Poland as well.

https://wodnesprawy.pl/najcieplejszy-luty-w-historii-drugi-miesiac-2024-r/

Global weather extremes - when the Pacific is ruled by *a boy*

In addition to global warming, a particularly intense El Niño phenomenon is now responsible for some of these changes. After a three-year reign of La Niña and a neutral period in the Pacific, since last summer the ENSO Southern Oscillation has entered a warmer phase - El Niño. It occurs on average every 2 to 7 years and usually lasts 9 to 12 months. This is a naturally-occurring climate pattern associated with warming ocean surfaces in the central and eastern tropical Pacific. Unfortunately, it usually brings with it hot weather, droughts or unusually heavy rainfall in various parts of the world.

On the one hand, we can expect improved moisture conditions in the eastern part of Africa, on the other hand, we must expect an increase in the intensity of extreme weather events and climatic anomalies in other areas of the world. Also of concern is the fact that despite the frequent occurrence of a cooler La Niña phase in recent times, the last eight years worldwide have been the warmest ever measured. With the current El Niño dominating the Pacific until at least the end of April, experts predict that the current year could be even warmer and with more weather anomalies, with extremes such as heat waves, droughts, fires, torrential rains and floods being intensified.

Weather anomalies in Europe with negative NAO index

Although the influence of the ENSO Southern Oscillation on the occurrence of weather anomalies in Europe has not yet been conclusively confirmed, the occurrence of unusual atmospheric phenomena is certainly related to the NAO North Atlantic Oscillation. With a positive oscillation, when there are large pressure differences between the Azores High and the Icelandic Low, the classic west-to-east flow of air masses for our climate prevails over Europe. During the spring period, relatively moist and cool air masses from over the Atlantic arrive over Poland, bringing moderately warm and rainy weather. Weather conditions reflect multi-year averages.

When there is a negative North Atlantic Oscillation, which is what we are currently in, the pressure differences between the Azores High and the Icelandic Low are smaller than the multi-year average, so the latitudinal inflow is weaker. Humid air masses are headed to the Mediterranean region. Over Europe, however, the meridional influx is stronger. It may contribute to the weather anomalies currently observed in the Old Continent and Poland. Such a circulation, depending on the location of local barric systems, results in the influx of frigid Arctic air masses or humid and hot tropical air. Many times it contributes to intense frost or heat waves in Poland, snowfall in the Alps or flooding in the south of our country.

Hot weather in Poland, and snowstorms in the Alps

In the first half of April, Central and Eastern Europe is experiencing a weather anomaly related to, among other things. With a negative NAO oscillation. As a result of the development of a low-pressure system in the Adriatic region and the expansion of a high-pressure wedge from Spain to Germany, humid air masses from the south arrived over the Alps and came into contact with cool ones from the north. At their junction, there was heavy snowfall, unusual this late, even in this region. The onslaught of winter brought snowfall of 50-80 cm. As long-term models show, this is unlikely to be the last winter touch in the region.

On the other hand, such a pressure system favored the influx of tropical air over Poland and the persistence of high temperatures. Along with the hot air, dust from over the Sahara has arrived over our country. It was visible on satellite images, contributed to reduced visibility and deposited on cars and streets. After an active storm front, unprecedented for this time of year, passed through Poland, the tropical masses receded. The front brought short-lived but very intense rainfall, and also thunderstorms in Pomerania.

Will weather anomalies become an everyday occurrence?

According to the National Oceanic and Atmospheric Administration (NOAA), there is a high probability that 2024. will be the next warmest year on record. July is expected to be particularly hot. Although El Nino has begun to wane, its warming effects will persist for months to come, leading to weather anomalies in the form of prolonged droughts in some areas and intense rainfall and flooding in others. Unusually high ocean temperatures are associated with the development and intensification of hurricanes and storms around the world.

As the national long-term precipitation and temperature forecasting models in Poland show, expect a hot and dry summer. In May, temperature and precipitation should reflect the 1991-2020 multi-year average, but June, July and August will bring temperatures above the multi-year norm. Precipitation will remain at average levels, but its nature may be more localized and episodic. In between periods with heavy rain, prolonged droughts are likely to occur. Rising temperatures could intensify storm events with strong wind gusts and heavy rainfall.

As you can see, changes in the global circulation, combined with factors related to a warming climate, rising ocean temperatures or shrinking ice caps, will contribute to the intensification of atmospheric phenomena. The climate system is a whole, one for the whole world, and no region will escape the consequences of its change. As scientists show, despite attempts by many countries to reduce greenhouse gas emissions, it seems that we must prepare for weather anomalies to become our daily reality.

GHG EMISSIONS IN THE EUROPEAN UNION ARE FALLING. WHAT DOES THE ECONOMY HAVE TO SAY ABOUT IT?

Posted on 11 April 2024 by Agata Pavlinec

Eurostat has published data for the third quarter of 2023. They show that GHG (greenhouse gas) emissions in the EU have decreased by as much as 7.1 percent. compared to the same quarter in the previous year. Contrary to the predictions of ecosceptics, this reduction was not associated with a significant slowdown in economic growth. EU GDP remained stable, registering a minimal decline of 0.2 percent. relative to 2022. Poland turned out to be one of eleven member countries that managed to combine emissions reductions with GDP growth.

Categories: From the European Commission, Issue 8/2024, Onet
Tags: climate change, emissions, EU, GHG

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Leaders in ranking the fight against climate change

In the third quarter of 2023. EU countries produced a total of 787 million tons of carbon dioxide equivalent - down 60 million tons from the same quarter in 2022. This sum includes all greenhouse gases emitted by industry and households, namely carbon dioxide, nitrogen oxide, methane and fluorinated gases (HFCs, PFCs, SF6, NF3).

The absolute record-holder was Estonia, where GHG emissions declined by as much as 30.7 percent on a quarterly basis. The catalyst for the green transformation in this small Baltic republic was paradoxically the war in Ukraine, which prompted the authorities to actively develop renewable energy sources. The decrease of18.4 percent. was recorded by Bulgaria, and third in the ranking was Germany with a 12.2 percent reduction in greenhouse activity.

However, there are still marauders in the Union. GHG emissions rose by as much as 7.7 percent in Malta, where the main problem is the economy's high dependence on gas and oil, with RES accounting for just 4.1 percent of total energy supply. Three other countries that have failed to reduce emissions are Cyprus, Latvia and Slovakia.

https://wodnesprawy.pl/przemyslowe-zarzadzanie-emisjami-komisja-europejska/

Does reducing GHG emissions slow economic growth?

Since the Industrial Revolution, the growth of the economy has clearly translated into greater consumption of fossil fuels. According to representatives of the International Energy Agency, however, this dependence is gradually beginning to weaken. The latest Eurostat data seem to confirm this thesis.

As many as eleven EU member states have managed to reduce GHG emissions while increasing the value of GDP. This group included Poland, where the reduction in produced greenhouse gases on a quarterly basis exceeded 9 percent. By more than 5 percent. emissions in Belgium and Spain fell, coupled with a noticeable increase in gross domestic product. In Estonia, Germany, the Czech Republic and Finland, on the other hand, economic development has slowed down, but it is difficult to relate this fact directly to decarbonization efforts - there are many more important economic factors determining the health of the economy.

GHG emissions fall thanks to gas and energy suppliers

The analysis of changes in the structure of emissions in the European Union brings very interesting conclusions. The sector that made the most significant contribution to lowering the production of climate-damaging gases was electricity supply, gas supply and refrigeration. Comparing the third quarters of 2022 and 2023, GHG emissions fell by as much as 23.7 percent. This is by no means a phenomenon, as a similar analysis of the second quarter showed emissions falling by more than 1 percent, and the first quarter by almost 13 percent from the previous year.

The reduction in carbon footprint was also noticeable in the EU household sector, which reduced GHG emissions by 6.5 percent. relative to 2022. On the positive side, emissions in the industrial sector also decreased by 4.9 percent. However, this does not change the fact that industry remains the dominant source of carbon dioxide and other harmful gases - its share of the entire European emission structure is 21.6 percent. Energy and gas supply ranked second, followed by agriculture in third place. The latter issued in the third quarter of 2023. more gases than a year ago, as did the water and wastewater treatment industry.

According to Eurostat experts, the above data can be the basis for formulating further strategies that reconcile the economic growth of EU member states with sustainable development. In particular, it is important to update the final deadlines for reducing GHG emissions in Europe in line with the Green Deal action plan. Measuring emissions makes it possible to estimate whether current production and consumption are compatible with accepted economic, social and environmental goals.

DEVELOPMENT OF BIOTECHNOLOGY AND BIOPRODUCTION IN THE EU

Posted on 11 April 2024 by Karol Kucharski

The European Commission, faced with observed climate change and a desire to reduce dependence on fossil energy resources, is betting on the development of biotechnology and bioproduction. A recent communication entitled Building the future from nature: supporting biotechnology and bioproduction in the EU outlines a number of steps in this direction. Current developments in life sciences, supported by digitization and artificial intelligence, make biotechnology and bioproduction among the most promising technological areas of the current century. They can help the EU, among others. in the modernization of the agriculture, forestry, energy, food, feed and industrial sectors.

Categories: From the European Commission, Issue 8/2024, Onet
Tags: bioproduction, biotechnology, climate change, EU, KE

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Development of biotechnology and bioproduction - importance for the industry

Biotechnology and bioproduction are affecting various industries, such as chemicals and food. For example, biorefineries - plants used to convert biomass into a range of bio-based materials - can also convert wood into innovative products with high value additives: biochemicals, insulation foams, biocomposites, engineering foams, etc. Another example is the textile sector, where biotechnology is an environmentally sustainable alternative, particularly in dyeing, printing and finishing processes.

Enzymatic processing reduces water and energy consumption, helping to reduce environmental impact. In the agri-food sector, biotechnology increases yields and resistance to pests and diseases, instead reducing environmental impact and improving food quality and nutritional value. The development of biotechnology and bioproduction is also important in water and wastewater management, as we wrote about in a previous article
Biotechnology in water and wastewater management and its impact on wastewater treatment
.

https://wodnesprawy.pl/oczyszczanie-sciekow-biotechnologia-w-gospodarce-wo/

Development of biotechnology and bioproduction - EC proposals

The biotechnology and bioproduction sector faces challenges related to research and technology transfer to the market, regulatory complexity, access to financing, skills, value chain obstacles, intellectual property, public acceptance and economic security. Accordingly, the EC has proposed the following ways to support the development of biotechnology and bioproduction in the EU:

- Harnessing research and spurring innovation: to help identify factors that spur innovation and foster technology adoption, the European Commission has launched a study that will show the EU's position relative to other world leaders in biotechnology production and the transition to a bioproduction industry. It will also look for ways to accelerate the development and use of the biotechnology industry's innovation infrastructure and synthetic biology gas pedal (EU IBISBA);

- Increase in market demand: in order to succeed in the market, bioproducts must have a lower environmental impact compared to petrochemicals, for example. The European Commission will review evaluations of fossil-fuel and bio-based products to ensure equivalent treatment and to include a method for storing carbon in building materials. It will also conduct an in-depth impact assessment of the feasibility of bio-based ingredient content requirements in specific product categories and public procurement;

- Streamlining regulatory pathways: The European Commission will assess how EU legislation and its implementation can be simplified to reduce any fragmentation, uncover potential simplifications and reduce the time it takes to bring innovations to market. By the end of 2024. will also push for the establishment of an EU Biotechnology Center, an operational tool to help companies discern

the regulatory framework and find support to expand their operations;

- Promoting public and private investment: The EU has a wide range of financial instruments with which it can support biotechnology and bioproduction, such as the *Horizon Europe*, including the Joint Undertaking for a Closed Circuit Biotechnology Europe (CBE JU) and the Joint Undertaking for the Health Innovation Initiative (IHI JU); the EU Health Program (EU4Health); the Innovation Fund, and most recently, the Strategic Technology Platform for Europe (STEP);

- Expanding biotechnology-related skills: large-scale skills partnerships and regional skills partnerships can play an important role in upgrading and re-skilling biotechnology and bioproduction;

- Development and updating of standards: The European Commission will encourage the development and updating of European standards for biotechnology and bioproduction to facilitate market access and innovation;

- Promoting cooperation and synergies: The European Commission will encourage the deployment of technologies related to biotechnology processes and bioproduction through regional innovation valleys;

- Promoting international engagement and cooperation: The European Commission will explore the possibility of establishing international biotechnology and bioproduction partnerships with key international partners such as the United States, India, Japan and South Korea to collaborate on research and technology transfer, as well as on regulatory and market access issues. The European Commission, as part of the Global Gateway strategy and in line with the Global Health Strategy, will strengthen existing partnerships with Africa, Latin America and the Caribbean region in the manufacture of health products to diversify global supply chains, overcome shortages of critical health products and reduce the burden of disease;

- Use of artificial intelligence and generative AI: The European Commission will promote structured exchanges with stakeholders to accelerate the deployment of AI solutions, particularly generative AI in biotechnology and bioproduction. In 2024. will also work to raise awareness of EuroHPC's facilitated access to supercomputers for AI start-ups and the scientific community and knowledge and innovation community;

- Bioeconomy strategy review: by the end of 2025. The European Commission will review the EU's bioeconomy strategy, which will address current social, demographic and environmental challenges, strengthen the industrial dimension of the bioeconomy and its links to biotechnology and bioproduction to help strengthen the EU economy.

HORIZON EUROPE STRATEGIC PLAN 2025-2027

Posted on 11 April 2024 by Karol Kucharski

To support the move toward a green, digital and secure future in Europe, the European Commission on March 20, 2024. adopted the second strategic plan for Horizon Europe. It identifies three key directions for EU research and innovation funding for the final years of the program (2025-2027). This allows the European Commission to target investments, supporting cutting-edge research and breakthrough innovations. They will help address key challenges, such as climate change, biodiversity loss, digital transformation and an aging population.

Categories: From the European Commission, Issue 8/2024, Onet

Tags: climate change, ecology, EU, Strategic Plan

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Horizon Europe strategic plan

The program's strategic plan is based on an in-depth analysis by the European Commission's services, including the detection of missing topics and potential gaps in the areas of intervention provided for in the program's legal basis. The strategic plan was co-authored by the European Commission services and developed jointly with the European Parliament, member states and associated countries, as well as with more than 2,000 stakeholders and citizens who provided input at various stages of the strategic planning process, such as the largest-ever public consultation on the European research and innovation framework programs.

Horizon Europe strategic directions for 2025-2027

The *Horizon Europe* Strategic Plan 2025-2027 directs research and innovation funding, addressing key global challenges such as climate change, biodiversity loss, digital transformation and population aging. We wrote about the program's activities in a previous *Water Matters* article: *Horizon Europe* - the EU's mission to adapt to climate change.

https://wodnesprawy.pl/program-horyzont-europa-misja-ue-w-zakresie-przysto/

The adopted strategic plan identifies three main directions for investment in research and innovation under *Horizon Europe* for 2025-2027:

- ecological transformation;
- digital transformation;
- A more resilient, competitive, inclusive and democratic Europe.

The adopted strategic plan increases *Horizon Europe* 's ambitions for biodiversity conservation and commits to allocating 10 percent of the of the initiative's total budget for biodiversity topics. This new commitment complements existing targets for climate spending (35 percent over the life of the program) and core digital activities (€13 billion over the same period).

European partnerships in *Horizon Europe*

European partnerships bring together the European Commission and private and public partners to address some of the most pressing challenges through joint research and innovation initiatives. They are a key tool for implementing the program and contribute significantly to EU policy priorities.

The *Horizon Europe* Strategic Plan 2025-2027 identifies nine new areas: brain health, forestry for a sustainable future, innovative materials, raw materials for ecological and digital transformation, cultural heritage, social transformation, photovoltaics, textiles of the future and virtual worlds. To date, more than 65 billion euros have been allocated to European partnerships: 24.8 billion from *Horizon Europe* and 35.6

billion from non-EU partners. More than 65 percent. of the total amount was provided by private sector partners.

EU missions in *Horizon Europe*

The EU's climate change adaptation mission focuses on supporting EU regions, cities and local authorities in their efforts to build resilience to its effects. The *Horizon Europe* Strategic Plan 2025-2027 also reviews the implementation of the EU's mission and introduces the New European Bauhaus (NEB) instrument. This is a pioneering movement that brings together citizens, municipalities, experts, businesses, universities and institutions to ensure sustainable and inclusive living in Europe and beyond.

Given the cross-cutting nature of the new European Bauhaus and its research and innovation content, it will be implemented as a cross-cutting issue in *Horizon Europe* 's 2025-2027 work programs. This research and innovation component will be complemented by an implementation component, which will be implemented through synergies with other EU programs. Collectively, they will be referred to as the NB instrument.

Horizon Europe work programs for 2025-2027

Key strategic directions are the guiding principles of *Horizon Europe*. They will be implemented through specific works that identify funding opportunities for research and innovation activities through calls for proposals and themes. *Horizon Europe* initiative's main work program for 2025. will be developed in accordance with the directions of the newly adopted strategic plan. In April this year, the European Commission will launch a feedback option on it, available to all interested parties.

A LONG-TERM VISION FOR THE EU'S RURAL AREAS: KEY ACHIEVEMENTS AND NEXT STEPS

Posted on 11 April 2024 by Monika Zabrzeńska-Chaterera

On March 27, 2024. The European Commission (EC) has adopted a report to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions focused on a vision for the EU's rural areas (COM(2024) 450 final) in the long term.

Categories: From the European Commission, Issue 8/2024, Onet

Tags: EU, EU policy, KE, rural areas

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It includes the latest data on rural areas, an overview of new indicators, information on the implementation of the vision for them in the last 30 months, possible ways to implement the European Union (EU) Action Plan and the Rural Pact. Ideas for supporting these areas were also presented. Two working papers accompany the report, supplementing it with detailed information on 30 EU initiatives for rural areas. Further discussion of the issue is expected after the planned June 2024. European elections.

A vision for the EU's rural areas by 2040.

Since the EU's rural areas cover 83 percent. its territory, and one in three people live on them, the EC presented in June 2021. A long-term vision for their development until 2040. 10 common goals and 4 areas of action for stronger, better connected, resilient and prosperous rural areas have been identified. The European Commission, in order to achieve its goals, has pledged to launch a rural pact. Its task is to mobilize public bodies and all stakeholders to respond to the identified needs and aspirations of residents. An EU Rural Action Plan has also been introduced, under which the EC is to implement 30 initiatives in a number of EU policy areas.

Achievements to date of the long-term vision for EU rural areas

The report identifies the most important achievements to date in achieving a long-term vision for the EU's rural areas. These include:

- Launching a platform for revitalizing rural areas facing demographic and economic challenges;
- Earmarking a sum of 23.5 billion euros for grants and loans for underserved areas, as well as updated state aid rules for improving rural connectivity;
- Supporting four projects aimed at more dynamic and comprehensive development of the social economy in rural areas;
- Launching 60 rural research and innovation projects;
- Supporting the implementation of the LEADER initiative and targeting some 150 communities to create smart villages;
- Improving mobility and tourism through a special European rural mobility network;
- Establishing an advisory center for the rural energy community;
- Increase the number of available datasets for rural areas and access to relevant information and analysis through the EU Rural Observatory and a new publication
  Rural Europe
  .
- Launching a toolkit for rural areas to facilitate their access to EU funding.

How EU policies contribute to rural development

The report points out that the Common Agricultural Policy (CAP) and cohesion policy are complementary to many other EU funds and policies, contributing to the goals of the long-term vision for rural areas. The EC staff working paper accompanying the report describes the Union's policies for social inclusion, gender equality, climate and environment, energy, fisheries and aquaculture, animal welfare, mobility, digitization, neighborhood and enlargement policy, education, health, culture, industry or competition.

The report's assessment includes information on the CAP Strategic Plan's contribution to the goals of the EU's long-term vision for rural areas, with a particular focus on interventions beyond agriculture. It was pointed out that the CAP's economic development activities include investments in tourism, bio-economy, social services, processing, product marketing and the establishment of agricultural and forestry businesses.

https://wodnesprawy.pl/komisja-europejska-proponuje-uproszczenia-dla-rolni/

Future plans

In the report, the European Commission indicates how the CAP and cohesion policy for 2023-2027 will contribute to the vision for rural areas. He also includes ideas and questions for consideration in the document, including. on how to strengthen EU policies and support in the future. The report's conclusions and recommendations are intended to provide useful input to the planning of future policies for rural areas and communities and to contribute to the consideration of the post-2027 MFF.

As part of the rural pact in the fall of 2024. A *policy laboratory* is planned, and in early 2025. Conference on the Rural Pact. These events will provide a space for discussion of the strategic issues in the report and provide an opportunity for feedback on future actions. In addition, the future of rural areas will be discussed at the Cohesion Forum, which is scheduled for April 11-12, 2024.

BIODIVERSITY CREDITS – SAVING THE WORLD OR ANOTHER GREENWASHING?

Posted on 11 April 2024 by Agata Pavlinec

If nothing changes, by 2050. more than a million known species of plants, fungi and animals may disappear from the face of the Earth. It has been estimated that some $700 billion is needed to curb the alarming rate at which humans are annihilating biodiversity. Where to get them from? One of the proposed tools for species conservation is to be biodiversity credits offered to private companies and organizations This solution has many supporters, but also a growing number of opponents.

Categories: Business and economics, In this issue, Issue 8/2024, Onet
Tags: biodiversity, credit, greenwashing

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Take credit for biodiversity?

At the COP15 summit in December 2022. Representatives of the governments of nearly 200 countries around the world signed the landmark Kunming-Montreal agreement. As part of it, a decision was made to mobilize at least $200 billion. annually to promote biological diversity. Biodiversity credits are to be one of the components of this financial initiative.

The World Economic Forum, which has been instrumental in developing the idea of credits, explains that the idea is to have a credible, tradable financial instrument to implement actions with a measurable, positive impact on biodiversity. In other words, private companies wishing to invest in the environment will have the opportunity to purchase units of credit from organizations actively engaged in species protection or restoration.

https://wodnesprawy.pl/kunming-montreal-ue-prezentuje-swoje-postepy-por/

Analogy to carbon credits

Biodiversity credits are compared to a tool developed in the early 21st century. In order to reduce harmful emissions. Voluntary Carbon Credits (VCMs) are designed to give companies whose operations involve the production of carbon dioxide and other greenhouse gases the opportunity to buy back the equivalent of their own in emissions in the form of subsidizing projects to reduce the amount of carbon in the atmosphere. Thus, it is a compensation for the damage done to improve the global ecological balance.

Unfortunately, voluntary carbon credits have not been as successful as expected. According to the World Economic Forum, their market has admittedly already reached a value of 2 billion The amount is expected to reach $1.5 billion and is expected to continue growing through 2030, but a number of problems have emerged during the implementation phase. Among the most important are difficulties in evaluating credited projects, the limited availability of financing options and risk transfer, as well as challenges related to accounting and avoiding double counting of environmental gains.

Criticism of the new instrument

The U.S. lobbying group Campaign for Nature released a report in early 2024, openly criticizing the assumptions and prospectivity of biodiversity credits. According to its authors, the private sector is not interested in the new initiative, which means that demand for loans will be very low. This suspicion is confirmed by earlier reports from the daily newspaper
The Wall Street Journal
, according to which giants such as Nestlé, Shell and Unilever are openly announcing that they will not use the loans as they develop their own environmental activities.

Another potential problem already identified in the carbon credit market is the threat of wasted funds due to intermediation. Indeed, the situation has been exploited by companies and individuals acting as mediators between credit buyers and organizations implementing

environmentally friendly projects. As a result, a significant portion of the funding goes into private pockets. Also controversial is the scenario where negatively impacting biodiversity companies buy credits for peace of mind and better marketing potential instead of investing in changing technological processes. In the case of carbon credits, situations have even been observed where emission reductions have been overestimated, some of which would have been achieved even without the financial commitment of the company in question.

How to measure biodiversity?

The idea of buying credits is that you can clearly identify the units of positive results achieved in the implementation of projects. In the case of carbon credits, the issue is obvious - the emissions produced and reduced are measured in tons of $_{CO_2}$ equivalent. However, biodiversity is not easily quantified, making comparability and financial estimation of privately supported initiatives difficult.

Ideas so far include calculation formulas based on, among other things. on the degree of degradation of a given ecosystem, its uniqueness, its potential for restoration and connection to other ecosystems, as well as avoided biodiversity losses in percentage terms. There have also been suggestions of converting credits into photographic evidence of the presence of specific species on a designated unit of land. However, standardization of the system on a global scale is still far from being achieved, and critics point out that it should also take into account the principles of additionality and sustainability of effects, so far quite neglected.

The role of indigenous communities

The biodiversity we are fighting for is concentrated in areas far from socio-economic centers. Up to 80 percent of all plant, animal, fungal and coral species are found in areas inhabited by traditional indigenous societies. Meanwhile, their role in environmental projects is still inadequate.

In many parts of the world, for example, land ownership is unregulated. Without them, the implementation of projects resulting from the loans could set a dangerous precedent of state authorities or private companies taking over areas to the exclusion of the interests of the people living there. In other cases, approval for project implementation is given by entities that do not represent the opinion of the entire local community.

Pollination Group, a consulting and advisory firm, in one of its first analyses of the operation of biodiversity credits, found serious violations in the social sphere. In her view, the vast majority of programs implemented so far do not involve obtaining the free, prior and informed consent of indigenous peoples, while overlooking the requirement to build local partnerships and share profits.

Do biodiversity credits have a future?

Although still in its infancy, biodiversity credits are already working - in September 2023. There were a total of 26, most of them run by private companies. The adopted goals include protection and regeneration of ecosystems, as well as management and adaptation to climate change. The Savimbo project in Colombia is presented as one of the more successful initiatives. It is based on a remarkably simple methodology for the protection of one key species, whose presence indicates the health of a given ecosystem. In the Colombian part of the Amazon, that species is the jaguar. The local community receives credits for documenting the presence of these cats in its territory.

However, there is no shortage of doubts. The aforementioned Pollination Group report emphasizes that diversity credits should in the future focus on marine and coastal ecosystems, which have been neglected so far. Promoting projects that are owned or implemented by indigenous communities and that include long-term financing without specifying an upper pool of funds are also indicated as important.

Instead, a competitive report by the International Institute for Development and Environment (IIED) postulates that a set of monitoring principles and tools must be adopted. They will enable companies buying credits to clearly demonstrate the extent to which they are minimizing their negative impact on biodiversity or actively supporting it. This will prevent a situation where species are protected in one part of the world to overshadow their destruction in another.

MARINE PARKS - WHO PROFITS FROM THEM?

Posted on 11 April 2024 by Magdalena Skrzypek

Marine national parks stretch across the globe's largest oceans. They are subject to full protection, but their value is not limited to nature. As it turns out, MPAs (marine national parks) can significantly help map fish populations by 500 percent, meaning their numbers in an area can increase through protection and proper management, and moreover, bring real financial returns.

Categories: Business and economics, Issue 8/2024, Onet

Tags: fish, fishing, GDP, national parks, tourism

Marine parks extend over areas of the seas and oceans, subject to full protection. Their value, however, is not limited to natural aspects. It turns out that marine parks, often designated as national parks, can significantly increase fish populations - by as much as 500 percent. This means that their numbers in an area can increase with effective protection and proper management, moreover, it can bring real financial returns.

Marine parks boost GDP, fisheries and tourism

Recent studies have unequivocally confirmed that marine parks located in the Americas, Europe, Africa and Oceania have a huge impact on improving the financial situation of more than 50 areas. The analyses also proved that this method of water conservation contributes to increasing fish populations and minimizing the effects of climate change.

Dr. Mark John Costello of Norway's Nord University acknowledged:

For too long, marine parks have been overlooked as generators of GDP and jobs (...) Now we can add tourism operators and fishermen to the list of beneficiaries of ocean conservation.

The study found that in 25 countries in the Atlantic, Pacific and Indian Oceans, the fishing industry is reaping huge financial profits from the protection of nature reserves. Ras Mohammed National Park on the Red Sea in Egypt was put under the microscope, as well as areas of the UK, Spain and Sweden.

Inadequate protection of the oceans

The researchers focused their study on 51 marine parks where advanced ecosystems allow, limit or prohibit human interference with coral reefs, seaweed forests, mangroves, salt marshes or mud flats. Enric Sala, founder of National Geographic Pristine Seas and author of the famous *The Nature of Nature*, admits that despite this, the oceans are not safe. According to him, marine national parks could significantly change this situation. Moreover, the expansion of marine parks would have a positive impact on the financial situation of many countries. Enric Sala said:

Outdated misconceptions about the economic impact of marine protected areas are blocking progress on the urgent global environmental goal (...). This study shows that marine national parks benefit both fisheries and tourism, which is the final blow to the argument that conservation is expensive.

https://wodnesprawy.pl/najwieksza-rafa-koralowa-na-swiecie-najwieksza-rafa/

Protection of marine parks is a gain for the economy

Examples of the economic benefits of tourism have been demonstrated in 24 countries, including. France, Spain, Italy and New Zealand. Financial gains for fisheries adjacent to protected areas were found in 46 (or 90 percent) marine parks, including increased catches for as many as 76 percent. of them. As it turns out, the parks with the most developed system of protection, i.e., the most developed parks, had the greatest impact on improving the economy. prohibiting human interference with nature.

The primacy of economic benefits was led by coral reefs, mangroves and seagrass ecosystems. Some parks brought in billions of dollars in revenue each year.

Marine parks in the United Arab Emirates

The surveys conducted did not include the United Arab Emirates' marine parks, although the protected areas cover 12 percent. of the country's entire maritime surface. It is worth adding that the global average is approx. 7.5 percent. The UAE therefore significantly outperforms other countries in terms of protected marine and ocean areas. The most popular reserves are: Saadiyat Marine National Park with an area of 59 square [kilometers]. They live in it, among other things. The chinstrap sea turtles, which are threatened with total extinction.

Another area is Marawah Marine, located in Abu Dhabi. It is home to the world's second-largest population of dugongs. Anchoring, water skiing, fishing, ballast disposal, sewage disposal, in addition to shell and coral collection, are prohibited in both reserves. Permitted activities are mainly scuba diving and snorkeling. Marawah Marine also offers recreational fishing with rod and line.

Does less mean more?

Many people overlook the impact of marine parks on the economy and the fishing and tourism sectors. They condition their belief on the small size and lack of optimal location of marine national parks. Moreover, restricting or banning fishing seems like a real loss to fisheries. However, the whole issue must be looked at holistically. Reduced catches mean an increase in the fish population in an area with the expansion to other areas. It is worth mentioning that the strict restrictions on fishermen do not only apply to marine parks. In some areas, fishery controls are practiced, such as limiting quotas and fishing gear.

Marine park biodiversity is a value to the whole world

Studies conducted have proven that marine reserves are beneficial to the functioning of humanity as a whole. It has been shown that biologically diverse populations and mega-fauna can generate huge profits from tourism, while contributing to stimulating GDP. However, there is a great need to change the management of the fisheries sector from a commercial one to one that includes broader socioeconomic benefits for coastal communities.

As Dr. Costello said:

My research has proven that marine parks that prohibit fishing generate less costs than fisheries management regulations in a protected area.

Moreover, as many as 46 economic benefits were singled out for areas in the immediate vicinity of marine parks. These included increased fish populations, more intensive reproduction, and expansions of aquatic organisms beyond protected waters. Other studies have shown larger sizes of fish and lobsters near parks.

Need to better protect the oceans

Costello and Ballantine found that 76 percent. coastal countries did not even have a single marine reserve, and today they only occupy approx. 3 percent. world ocean. The priority is to implement a strategy that would meet the commitment to fully protect at least 30 percent of the country's population. ocean habitats by 2030. This goal is supported by the Convention on Biological Diversity, the UN Convention on the Law of the Sea and the International Union for the Conservation of Nature. To achieve the commitments, scientists must promote the use of marine reserves as a strategy to support biodiversity and fisheries management. They should also work with conservation scientists to raise awareness of the potential of marine parks in supporting economic success. Such reserves are the best tactic to reverse the decline in

biodiversity and irresponsible fishing, as existing operations are not sustainable.

The future of marine parks

Costello agrees that the research should be published worldwide so that people will see what economic and tourism benefits marine parks can bring. Popularizing knowledge would help increase the number of protected areas. As a result, not only in the UAE, but also in other countries, marine reserves would occupy at least 12 percent. The total area of adjacent waters. By 2030. 30 percent will succeed in achieving the target. oceanic protected areas? Costello and Balantine are positive and believe their research will change the trajectory of thinking about unusual underwater areas.

BY WOODEN BOAT ON THE RIVERS

Posted on 11 April 2024 by Leszek Naziemiec

Interview with Piotr Sadurski, photographer and archaeologist, honored in this year's Sony World Awards. Peter builds and uses traditional river boats. The boating season is just beginning, so you might want to think about an alternative means of transportation on inland waterways.

Categories: Feedback, Issue 8/2024, Onet
Tags: boat, rivers, wooden boat

Interview with Piotr Sadurski, photographer and archaeologist, honored in this year's Sony World Awards. Peter builds and uses traditional river boats. The boating season is just beginning, so you might want to think about an alternative means of transportation on inland waterways.

Leszek Naziemiec: I would like to buy a wooden boat for recreational river cruising. What choice do I have?

Piotr Sadurski: It should be noted right away that we are talking about traditional wooden boats. What to consider when choosing a boat? First you need to think about where you will sail, on what bodies of water. It is the water that gives shape to the boat, the boatbuilder only fulfills its will - then the best specimens are created, perfectly adapted to local nautical conditions. If we think of artificial reservoirs, such as canals, then conditions on the Elblaski or Zeran canals, or on the 18th century regulated canal. Notts are no different.

Natural reservoirs are a completely different swim. The Vistula River near Kazimierz or near Warsaw, the Oder River near Kostrzyn, the Szczecin Lagoon or the Vistula Lagoon are fundamentally different from each other, and as a result, a boat from the upper Vistula looks different from one built in Murzynow, a boat from Kazimierz does not resemble one used in the Szczecin Lagoon. If you are thinking of buying or rather building a traditional boat, look around you, because there are still built copies floating around on the rivers and lakes. This solution will be the best.

If you have an upper Vistula nearby, try to build a single lane boat, if a middle one, near Warsaw or Plock, it seems to me that a funnel would be the best choice, but farther north half-lanes or nieszawki appear. On the Vistula Lagoon, a fantastic choice would be a fisherman's jaunt. On the Oder River, on the other hand, in my opinion, one should try to build a pickerel, and on the Szczecin Lagoon or Lake Dabie the best idea would be to recreate a small fishing boat of the hojer type. This is an absolutely fantastic design. Such boats, built in the traditional way from traditional raw materials, will, I am convinced, provide an unforgettable experience of sailing on selected bodies of water.

L.N: With this answer, we sailed right into deep waters! Let's try to clarify things. What is a *one-lane road*? Suppose I want to sail on the Vistula, from Sandomierz to Gdansk. I want to take 3-4 people on board and do camping along the way. So I order a boat from a boatbuilder. How long will it take to build it? The boat probably weighs a lot. Will I be able to handle it? And the matter of the drive. There are long *push* oars, traditional - double oars, and sometimes even sails. Should I have an engine to begin with?

P.S.: A little too much detail. There will be time to deepen our knowledge when we start sailing traditional boats. Literature is plentiful. It's not readily available, but with a bit of willingness, you can find interesting information, including about single-passenger boats. There is a lot of hermetic vocabulary in folk boatbuilding, and that's where the ambiguities come from. The planks of the side planking are strips; joining successive strips with nails is sewing. My depiction of the details is a way to show the variety of designs and a suggestion to look for a boatbuilder in your immediate area. He will know best what will work in the region. Just getting to a specialist is an adventure.

My first pusher was 150 km of exploration. I checked village by village, drove along the Vistula, and asked at local museums, communities, and randomly met older residents who still remembered how to use oars, a push and nets. I've heard great stories.

In the end, I ended up outside Plock, in Murzynów. This is where boats have been built since the 1920s. In the 1970s. A wonderful continuity of tradition. In the same workshops, with old tools, constructions with an unchanging form. I managed to persuade Andrew Gurdinski to build it. What emerged was a semi-plejt - a fishing boat from the middle Vistula River, 730 cm long, 70 cm wide in the bottom, 140 cm in the sides, beautifully bent at the bow. Just right for individual use. The size of the boat is important here.

For example, 7-8 m is enough to take 2-4 people on a cruise, but 2 people are enough to take her out of the water and turn her upside down for the winter, and transport her on a small trailer if necessary. Oars, the so-called pojezda, a push oar - pojezda, a spruce mast, a sail with a characteristic rectangular shape, a strut often called a barb here, and we have almost everything. Is an engine needed? Maybe. But not a big

one: 2.5-5 hp. It will be cheaper, lighter, more economical, and the power will certainly be enough. Keep in mind that a push boat is best sailed slowly and with sail and oars.

pic. Piotr Sadurski

L.N: How do you maintain the boat? Can you use canola oil for this to make it cheaper? How often does it need to be done? How to patch leaks?

P.S.: A traditional boat is a philosophy of life, different from a laminate yacht. The new boat, built from pine brett, must be soaked. For this purpose, it is best to use linseed oil with pine tar and a small addition of turpentine. Paint the boat a couple of times until it stops absorbing the product. Then it must dry thoroughly. Let's not rush. The longer, the better. Only then can we launch.

A new boat generally leaks, so you have to sink it for a few days. The wood will soak up water, swell, the gaps between the moles will disappear and the boat will seal itself. Such a process should be repeated at least once a year, preferably in the spring, before the next season. Annual washing, painting with an anti-fungal product and oiling will certainly prolong the life of our boat. It is still worthwhile to carefully inspect the condition of the dichthong and, if necessary, fill in the gaps. Traditionally, pakulas are used, but animal hair is also great for this purpose (this is also a tradition). After the seal is struck, it is essential to pour hot tar over it.

Can other preparations be used for boat maintenance: canola or sunflower oil instead of linseed oil, beech tar instead of pine tar? You can, but the savings will not be large, and the differences in chemical composition, and therefore in the effect on the wood, will be significant. We can experiment, just why? After all, we're talking about tradition here, and that tradition gives peace of mind, limits the daily hustle and excludes innovative activities.

L.N.: I have heard that it is possible to sink a boat for the winter.

P.S.: I think that if we don't intend to sail all year round, it's a good idea to take the boat out of the water in the autumn, wash it thoroughly and put it on the maelstrom until spring. Sinking for the winter is not the best solution. Wood in water is a good place for microorganisms to grow. If you're boating, the current of the water, the friction of the bottom against the sand, and cleaning before going out reduce their occurrence. A couple of months underwater, in a standstill, can leave us with a lot more work to do in the spring.

https://wodnesprawy.pl/drewnianym-galarem-po-dzikiej-wisle-krolowa-polskic/

L.N: Once again, I would like to touch on strictly practical matters. Does a traditional wooden boat have an advantage over a laminate construction? Keep in mind that pulling it ashore and maintaining it are more difficult. It's not easy to persuade people to use old technology when there is something simpler and more convenient at hand.

P.S.: A farmer, but also a folk boat builder, Stanislaw Waszczuk from the village of Hanna Kolonia, who back in the 1980s. built and sold single-propeller boats, and considered the longboat to be the best design for fishing on the river. Tadeusz Szymanski of Kromnowo on the Vistula and Andrzej Gurdzinski of Murzynowo say the same about their boats. They emphasize the strength of wooden structures. Stepping on a rock reef or hitting a bough lying in the current does not mean damage to the planking.

Stanislaw Waszczuk also mentioned that wooden boats are quieter than modern laminate constructions, which is important with the peculiar, riverfront way of setting nets. Ecology can also be mentioned. A wooden boat is not durable. It serves 10-14 years, but never litters the river. It falls apart and disappears. Sailing on traditional boats, we are in a different cultural space, communing with something timeless. This is important for those who can appreciate it.

L.N: You recently sailed a traditional boat on the Danube River. Tell us what kind of episode it was and whether you used the engine. What surprised you?

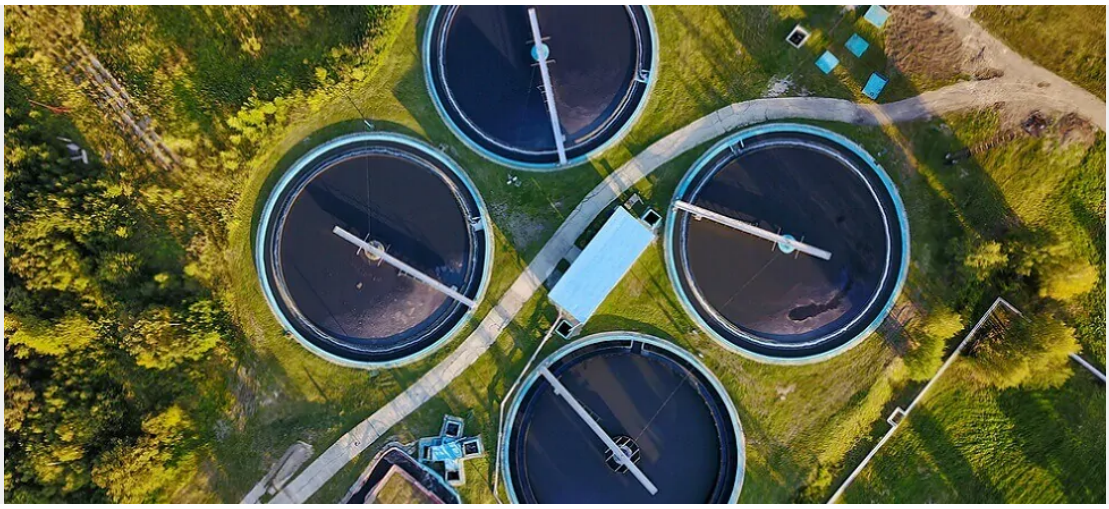
P.S.: Me and my friends managed to realize an interesting Danube cruise in 2023. We took my boat to Inglostadt and, after covering more than 800 kilometers, ended the adventure outside Budapest. The Leytak, a typical Vistula boat, has no transom. The sides and bottom of the pile connection are finished with a bar. There is no way to mount the engine there. And very well. Cruising on a big river on oars and sail is an unforgettable experience, especially since, for example, in Austria we encountered similar boat-building constructions - zillas (propelled by wrought-iron poles on the way upstream and long paddles on the way down). A very efficient way to propel a small boat. And the surprise? This is certainly a huge traffic on the water and the associated noise and ripples - felt especially at night.

Moving against the current, you can hear the barge for more than an hour, and the wave turns the boat moored at the shore and you get the impression that the water will pour into the tent. These are details that fade into oblivion. What remains is the image of the river - complex and multi-layered. History, monuments, cities, modernity, navigation, flow dynamics, space and freedom are the most important things we experienced on this trip.

L.N: Thank you for the interview and for all your advice and help in my personal adventure of using the Rowan boat.

CAN BACTERIOPHAGES IN WASTEWATER TREATMENT PLANTS DO MORE?

Posted on 11 April 2024 by Edyta Łaskawiec



Biological processes for the decomposition of pollutants are the basis of municipal wastewater treatment. For this, they use the concentrated biomass of various microorganisms (activated sludge). Wastewater treatment plants play the role of bridges between environmental bacteria, the wastewater microbiome (including the human microbiome) and opportunistic pathogens. Treatment processes are centered around the removal of sludge and suspended solids, as well as phosphorus and nitrogen compounds. However, the more than century-old technology of using activated sludge is much worse at dealing with persistent industrial contaminants, pharmaceutical compounds or antibiotic-resistant microorganisms [1, 2]. Is the solution bacteriophages?

Categories: Feedback, Issue 8/2024, Onet

Tags: bacteriophages, sewage, sewage treatment plants

Biological processes for the decomposition of pollutants are the basis of municipal wastewater treatment. For this, they use the concentrated biomass of various microorganisms (activated sludge). Wastewater treatment plants play the role of bridges between environmental bacteria, the wastewater microbiome (including the human microbiome) and opportunistic pathogens. Treatment processes are centered around the removal of sludge and suspended solids, as well as phosphorus and nitrogen compounds. However, the more than century-old technology of using activated sludge is much worse at dealing with persistent industrial contaminants, pharmaceutical compounds or antibiotic-resistant microorganisms . Is the solution bacteriophages?

Why do modern wastewater treatment processes need to be modified on a micro scale?

Because microbe-based processes for removing phosphorus and nitrogen compounds are often exposed to variable conditions, their effectiveness can be compromised. For example, the process of nitrification, the oxidation of ammonium nitrogen to nitrate by microorganisms, requires maintaining a constant level of nutrients in the wastewater flowing into the treatment plant. However, their composition can change depending on the season or even the time of day. In addition, bacterial biomass grows slowly, and losses due to leaching or heavy rainfall can cause an imbalance in the transformation processes of nitrogen compounds. As a result, the efficiency of pollutant removal is reduced, but there is also an accumulation of chemical compounds to levels that are toxic to the microorganisms themselves .

In addition, according to recent studies, wastewater treatment plants are *hot spots* from where not only antibiotic-resistant microorganisms migrate into the environment, but where transfer of antibiotic-resistance genes between microbes also occurs . Wastewater treatment processes are not designed to deal effectively with reducing the abundance of antibiotic resistance genes, and the impact of the methods used may only be indirect. The high density of various microorganisms, surfactants and disinfectants promote selection and horizontal gene transfer. In addition, microbes in treatment plants are stressed by exposure to microplastics and heavy metals. The new resistant pathogens are evolving and are different from the genotypes already circulating in the environment .

https://wodnesprawy.pl/oczyszczanie-sciekow-biotechnologia-w-gospodarce-wo/

Where will the microbiologist send the bacteriophages?

Solutions to at least some of the problems mentioned above are seen in the use of bacteriophages. Studies have shown that they can be used to optimize wastewater treatment and methane digestion processes. Treatment plants are particularly interesting microbial environments due naturally to the constant and large influx of microorganisms, including phages .

Bacteriophages are approximately 1 to 2 orders of magnitude smaller than bacterial cells, usually in the range of 20 nm to 200 nm. They have a simple structure - they consist of a protein capsid containing the phage genome, single- or double-stranded DNA or RNA, sometimes a lipid membrane in the capsid surrounding the genetic material. They make up the most numerous biological unit on Earth, outnumbering their hosts by up to 10 times. They can infect both bacteria (gram-negative, gram-positive, and even multidrug-resistant) and archaeons, usually starting the cycle by adhering to the bacterial cell wall and injecting their genome into it. Bacteriophage is simply a bacterial *eater*, which highlights its high bactericidal capacity, but also its specificity in action .

Most bacteriophages have high specificity against a particular type of bacteria and replicate at the site of infection. This means that the phage can take control of the bacterial machinery (e.g., transcription) and resources (e.g., nucleic base) for its own replication, which inhibits host growth and leads to host death (lysis) at rates as high as 1023 infections per second .

Bacteriophage-bacteria interactions can affect community composition, function and evolution of the microbiome. Thanks to these properties, they are increasingly being used in engineering, environmental and medical sciences.

The use of bacteriophages to modify the microbial community by eliminating undesirable strains may have the effect of enhancing aerobic processes in biological chambers and improving treatment efficiency . One of the technological problems associated with activated sludge is the so-called "activated sludge". swelling, which can lead to a reduction in sedimentation capacity and consequently to problems with the separation of sludge from the treated liquid. Swelling causes an increase in sediment volume and accumulation of extracellular polysaccharide substances with high viscosity. These substances increase water retention in the sludge, hindering its drainage and affecting floc stability .

Modern sequencing methods have enabled researchers to pinpoint the bacteria responsible for foaming and swelling. They account for between 1.86 and 9 percent. All microorganisms present in activated sludge. For example, *Gordonia spp.* has been identified as a species of filamentous bacteria that cause a number of problems in wastewater treatment: contaminant deposition, foaming or corrosion. Current chemical disinfection methods can lead to a number of toxic byproducts . Reduction of bacteria responsible for technological problems can be achieved by using single phage species or phage cocktails (mixtures consisting of several species) .

Most of the bacteria in biological wastewater treatment systems are not suitable for culture under laboratory conditions (an estimated 99 percent), being part of the *microbial dark matter*, including many functional microbes that determine efficiency, such as *Candidatus Accumulibacter phosphatis*, ammonia-oxidizing bacteria and *Microthrix parvicella*. Therefore, the corresponding phages are difficult to detect by classical methods, a match is only given by advanced shotgun metagenomics methods combined with bioinformatics tools .

In wastewater treatment plants, pathogenic microorganisms are found in large numbers. The most common are *E. coli*, *Salmonella spp.*, *Staphylococcus aureus* and *Campylobacter jejuni*. Although these pathogens can be adsorbed in flocs and then removed with excess sludge or ingested by protozoa, they can still pose a potential risk to the environment if biological processes are upset. Bacteriophages also increase the safety of wastewater reuse . They are particularly promising in the fight against antibiotic resistance, reducing the number of organisms exposed to them or interrupting the chains of antibiotic resistance gene transfer . In Figure 1. The basic possibilities of using bacteriophages in wastewater treatment systems are presented.

Fig. 1. Biotechnological possibilities of phages in wastewater treatment plants

What are the opportunities and obstacles?

During phage infection, bacteria can develop defense mechanisms. They can change or lose their receptors, excreting substances that prevent bacteriophage adhesion to the host, inhibiting replication and phage release. Microorganisms organized in complex biofilms continue to pose a challenge to aggressors. In addition, they can recognize phage-specific nucleic acids and destroy them, preventing infection . Resistance to infection can be reduced by using phage cocktails. It is important to improve and develop strategies for predicting bacteriophage-host and bacteriophage-environment relationships. Undoubtedly, the development of molecular biology techniques can help track bacteria and bacteriophages. Which will help alleviate concerns about this still-new tool for controlling wastewater treatment biotechnology .

The ecological role of bacteriophages is still being discovered. Phages appear to play an important role in regulating the structure of microbial communities in wastewater treatment plants . Their predation can affect the efficiency of biological removal processes of nitrogen and phosphorus compounds by controlling swelling, foaming or eliminating certain pathogens.

While all studies to date have focused on the use of bacteriophages for biological control in laboratory systems, broader studies on the potential for full-scale use of phages in wastewater treatment plants are still lacking. This is primarily due to the variability of the activated sludge microbiome and the significant contribution of *microbial dark matter*, which continues to puzzle researchers . Nonetheless, phages can provide an alternative to standard operational control (temperature, pH, oxygen concentration or retention time), becoming a valuable environmental and economic tool .

Dr.-Ing. Edyta Łaskawiec - water and wastewater technologist, assistant professor at the Department of Environmental Biotechnology, Silesian University of Technology

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In the article, I used, among others. From the works:

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UNDERWATER AMAZON: SEAWEED FORESTS KEY TO FIGHTING CLIMATE CHANGE

Posted on 11 April 2024 by Iwona Szyprowska-Głodzik

In the depths of the oceans, far beyond the reach of human vision, stretches an ecosystem as abundant and vital as the tropical rainforests, and yet often overlooked in conversations about climate change. Seaweed forests, or the underwater Amazon, are home to incredibly diverse marine life that plays a key role in global carbon cycles. Their importance to the health of our planet cannot be overstated.

Categories: From the world, Issue 8/2024, Onet
Tags: Amazon, climate change, forests of seaweed, ocean

In the depths of the oceans, far beyond the reach of human vision, stretches an ecosystem as abundant and vital as the tropical rainforests, and yet often overlooked in conversations about climate change. Seaweed forests, or the underwater Amazon, are home to incredibly diverse marine life that plays a key role in global carbon cycles. Their importance to the health of our planet cannot be overstated.

What are forests of seaweed?

The hidden ecosystem that is the seaweed forests extends over 6 to 7 million square kilometers of the ocean floor, an area larger than the Amazon jungle. These forests are mainly composed of brownies, among which kelps are the best known. These giant seaweeds are capable of rapid growth. Depending on the species, their lifespan can vary from a year to several years. At this time they reach 2 to 30 meters in height. Kelp seaweed is one of the fastest-growing plants in the world, some species can gain as much as 0.5 meters in height per day, forming dense, sprawling forests near the bottom. Their range primarily includes cool, nutrient-rich coastal waters, from the temperate to the Arctic zones.

Seaweed forests are characterized by a complex, three-dimensional structure that resembles forests found in the temperate zone, with different levels of vegetation. This specific structure is due to the structure of the brown algae, the type of seaweed, and the species richness of the algae that co-form the community. Brown algae, as key elements of the seaweed forest, are often called *ecosystem engineers*. It is through them that a biocenosis is formed - a biological community that offers shelter, food and breeding sites for a wide range of marine organisms, including fish, mammals, mollusks, crabs and many others. These ecosystems are crucial not only for marine biodiversity, but also for humans. They provide food, raw materials and are the basis for the development of local economies, especially in regions where fishing and tourism are important sources of income.

https://wodnesprawy.pl/bioluminescencja-tajemnicze-swiatlo-w-oceanie-w-g/

Importance of seaweed forests

The role of seaweed forests is multifaceted and fundamental to global conservation efforts. These underwater ecosystems perform functions that contribute to stabilizing the Earth's climate, and their potential to combat global warming is enormous.

Carbon dioxide storage

One of the most important roles of seaweed forests is their ability to store$_{CO_2}$, which directly contributes to reducing greenhouse gases in the atmosphere. This process not only reduces the concentration of carbon dioxide, intensifying the greenhouse effect. Studies indicate that seaweed forests can fix carbon in amounts comparable to or even exceeding those observed in tropical rainforests. Worldwide, seaweed is capable of absorbing nearly 200 million tons of carbon dioxide each year - as much as New York State's annual emissions. Another unique feature of these ecosystems is that some of the sequestered carbon is transported to the deep layers of the ocean, where it can be permanently stored in sediments for hundreds or even thousands of years.

Oxygen production and climate regulation

Oxygen production by seaweed forests and their role in climate regulation are equally important. Photosynthesis by seaweeds contributes significantly to oxygen production, which is crucial not only for marine ecosystems, but also for life on land. They stabilize the gaseous composition of the atmosphere, which helps keep the Earth's climate in balance. This action is particularly important in the context of

rising$_{CO_2}$ levels, which are the main driver of climate change. Seaweed forests, by absorbing carbon dioxide and producing oxygen, play a crucial role in mitigating climate change and supporting life on the planet.

Protection of coastlines

Protection of shorelines by forests of seaweed is another important aspect of their operation. With their ability to absorb the force of waves and counteract erosion, they provide a natural protective barrier for seashores. This not only reduces the impact of storms and hurricanes on coastal areas, but also ensures the protection of coastal ecosystems such as wetlands and mangroves, which are crucial for maintaining biodiversity and sequestering carbon. In the context of rising sea levels and increasing frequency of extreme weather events, seaweed forests are a valuable human ally in protecting coastal communities and infrastructure.

Biodiversity and ecosystem stability

The biodiversity and stability of marine ecosystems, supported by seaweed forests, are invaluable to the health of global ecosystems. They serve as habitats and feeding grounds for many marine species, from small zooplankton organisms to large fish and marine mammals. This biodiversity contributes to the resilience and adaptability of ecosystems, enabling them to better cope with the negative effects of environmental change. Stable and diverse ecosystems are able to sustain key ecological processes such as biomass production, nutrient cycling and carbon storage, which is essential for the planet's sustainability.

Seaweed forests are a powerful force in the fight against climate change

Carbon dioxide absorption and oxygen production by seaweed forests are a quiet but powerful force in mitigating the effects of climate change. These *blue lungs of* our planet play a key role not only in maintaining the ecological balance in the oceans, but also in protecting coastlines and improving water quality through natural filtration.

THE LARGEST SEAS IN THE WORLD

Posted on 11 April 2024 by Aneta Błędowska

The world's largest seas are natural bodies of water usually connected to the ocean or partially surrounded by land. Their waters are a vital component of marine ecosystems and biodiversity, economy and transportation, as well as culture and human history. In this article, we take a closer look at the world's largest seas, presenting them by area occupied, in order from largest to smallest.

Categories: From the world, In this issue, Issue 8/2024, Onet

Tags: ocean, sea, water, water reservoir

The world's largest seas are natural bodies of water usually connected to the ocean or partially surrounded by land. Their waters are a vital component of marine ecosystems and biodiversity, economy and transportation, as well as culture and human history. In this article, we take a closer look at the world's largest seas, presenting them by area occupied, in order from largest to smallest.

Characteristics of the world's seas

There are 71 seas indicated in the world, and they account for about 11 percent of the world's surface area. of the total ocean area, which translates into an area of about 40 million square [kilometers]. They are singled out for their specific geographic and climatic characteristics, often more diverse in terms of environmental conditions such as depth, water temperature and salinity.

Seas are divided into different types, they include:

1. Intra-continental seas - are surrounded by land on all sides, with open ocean waters connected by narrow straits. An example is the Baltic Sea, which is connected to the North Sea through the Kattegat and Skagerrak straits.

2. Intercontinental seas - are located between two or more continents. The Caribbean Sea, which lies between South and North America, is a perfect example.

3. Inter-island seas - these are seas located between groups of islands. For example, the Irish Sea is located between Britain and Ireland.

4. coastal seas - are located along the coasts of the continents. The South China Sea, stretching along Asia's southeastern shore, is an example of such a body of water.

5. Open seas - are parts of the oceans that are not surrounded by land and are not deeply cut into the continent. The North Sea, although it touches continental Europe and Britain, has a relatively wide connection to the Atlantic, which classifies it as an open sea.

https://wodnesprawy.pl/najwieksze-gatunki-zwierzat-morskich-na-swiecie-oce/

The largest seas in the world

Among the largest natural marine reservoirs in the world must be mentioned:

The Philippine Sea (area: about 5.7 million km²) - is part of the Indian Ocean, stretching between the Philippines and Southeast Asia. The Philippine Sea is also where the three major tectonic plates meet: the Philippine Plate, the Eurasian Plate and the Pacific Plate, so it is an area frequently hit by earthquakes and volcanic eruptions. It is also known for the occurrence of typhoons, which are particularly strong in September.

Coral Sea (area: about 4.8 million km²) - is located off the coast of Australia. It is here that the Great Barrier Reef, a UNESCO World Heritage Site, is found. Most of the sea is protected under the Australian Coral Sea Marine Park and the French Coral Sea Nature Park, which means that fishing there is restricted. Its natural beauty, abundance of birds and aquatic life, and warm, stable climate make it a popular tourist destination.

Arabian Sea (area: about 3.9 million km^2) - is part of the Indian Ocean, located between Saudi Arabia and North Africa. The temperature of its water in summer can reach up to 30°C. This is an area where tropical cyclones are common. The Arabian Sea boasts a rich history of commercial water transportation, dating back many centuries.

The Sargasso Sea (area: 3.5 million km^2) - connected to the Atlantic Ocean, is the place discovered by Christopher Columbus. It gets its name from the brown seaweed of the genus *Sargassum*. It is characterized by warm and calm waters, weak currents, low rainfall and high evaporation, all of which distinguish it from other parts of the Atlantic Ocean.

South China Sea (area: about 3.5 million km^2) - a vast sea between the coasts of Southeast Asia and the archipelagos of Indonesia and the Philippines. There are more than 200 islands in its area. About one-third of the world's shipping trade passes through the South China Sea. The sediments at its bottom contain volcanic ash in both deep and shallow waters.

Caribbean Sea (area: approx. 2.7 million square $^{\text{kilometers}}$) - forming part of the Atlantic Ocean, is located between Mexico, the Caribbean Islands, Cuba and Central America. In its zone there are large areas of coral reefs and seagrass pastures. The Caribbean Sea is known for the Mesoamerican Barrier Reef, the second largest in the world.

The importance of the Earth's seas

Seas are a vital component of ecosystems and biodiversity. By absorbing carbon dioxide and heat, they can regulate the climate, while also being a source from which raw materials are extracted and providing a habitat for many forms of life. The seas are also important transportation routes. Their protection and sustainable use are key to maintaining the Earth's ecological balance.

World Maritime Day was established to emphasize that the seas are a common asset that requires adequate protection. Its role is to underscore the fact that the protection of the marine ecosystem should be the interest and responsibility of both governments and citizens. Also, this year's World Wildlife Day, which falls on March 3, focused on highlighting the importance of technological innovations used to protect marine wildlife and water quality in the seas.

HUNTING BAN ON FOUR MORE WATERFOWL SPECIES

Posted on 11 April 2024 by Adam Kapler

Life for hunters 60 years ago was simpler. The coots were legally hunted all year round. Likewise for gray herons in the area of closed waters, because in open waters only from July 1 to March 31. Wild geese were shot legally from August 11 to May 20, with no question of whether one was shooting at a goose or a goose. And even more so what species. Wild ducks (females) were caught from August 21 to November 30, and bucks from April 1 to May 20, then from August 21 to November 30. One could legally hunt grouse and black grouse roosters (from April 1 to May 20) and even ruffed grouse (though only from May 1 to 31) [2].

Categories: Feedback, Issue 8/2024, Onet
Tags: ban, hunting, waterfowl

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It was even easier for hunters and harder for birders before the war. Fishing at the time included. Wild swans (from May 15 to July 31), anchovies, white-tailed eagles, ospreys and kites (from February 1 to August 15). Boats were fished longer - from June 1 to July 10. For that, the period of legal duck shooting was shorter. This is because it overlapped with the time of the battalion hunt: from June 1 to July 10 . Now four waterfowl species are safe, let's take a look at which ones.

Why is bird hunting passe?

Shortly after the election, newly appointed Chief Nature Conservator Nikolai Dorozhala recognized the validity of the arguments of the *Let Them Live!* coalition against further bird hunting:

- Legal shooting of game birds does not fulfill the statutory goals of hunting, which are to *preserve the diversity and management of game populations* and to *protect and shape the natural environment for the improvement of game habit*at;
- Game species in Poland do not threaten biodiversity or the biological balance;
- Game species do not harm rational fisheries, agriculture and forestry;
- Even legal hunting of avifauna violates the Birds and Habitats Directives and the Ramsar, Bern and Bonn Conventions;
- Hunting plans did not show the abundance of 10 of the 13 game species;
- A number of strictly or partially protected species, including very rare species, are mistakenly killed in Poland, e.g.: the helmeted and bitterling instead of the loggerhead, the gyran instead of the teal;
- Sharps swallowed as gastroliths (pebbles for grinding food) poison birds. First the finer ones, and then the raptors that feed on them, with the white-tailed eagle, which is cresting for Poland, in the lead .

pic. Diliff, CC BY-SA 3.0/Wikipedia

Four more waterfowl species safe - at least on paper

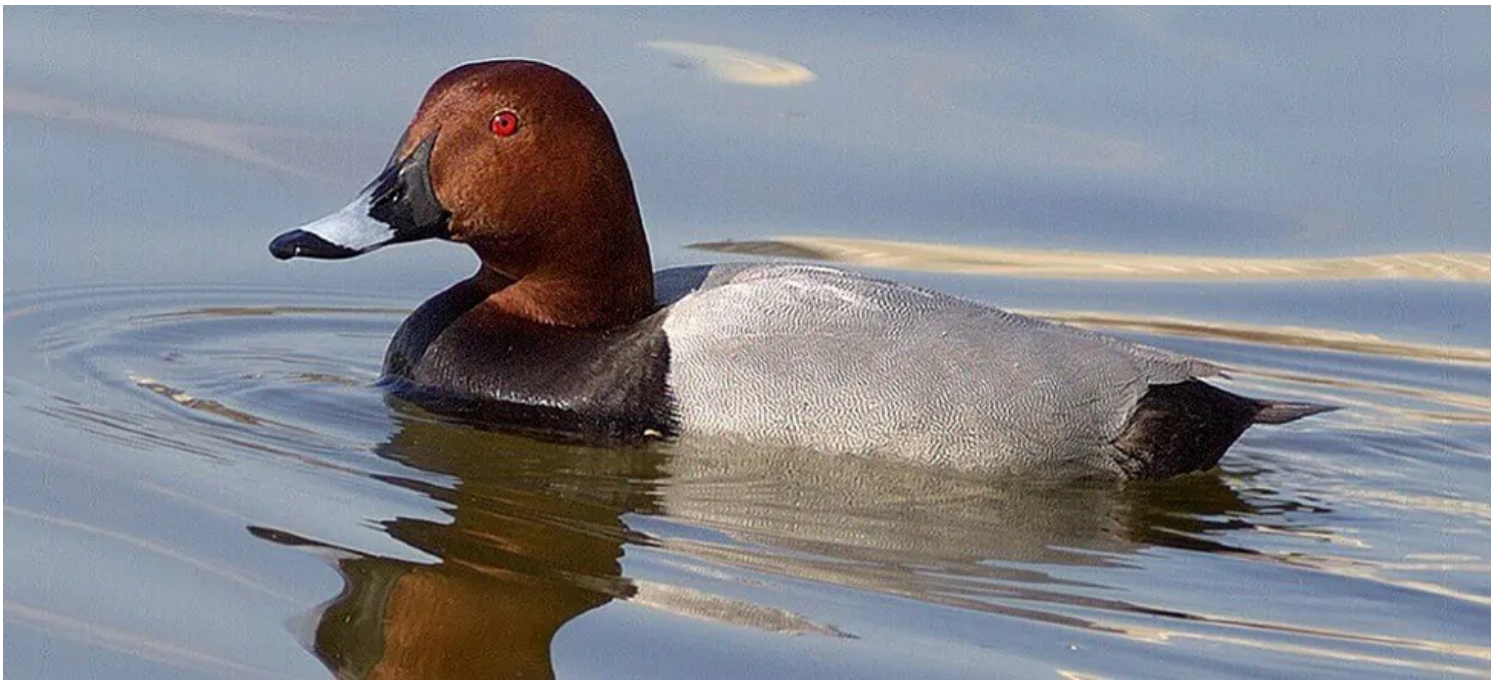
The latest moratorium by Nature Conservator-in-Chief Nikolai Dorozhala imposes a year-round ban on hunting four aquatic and marsh species: coot, gannet, loggerhead and tufted duck. *There will be a regulation to remove four species of birds from the list of game species. We will want to protect the garganey, the loggerhead, the tufted duck and the coot in a systematic way. As for the red-footed teal, we have nearly 25,000 planned for shooting, in the case of the loggerhead it is 16,000, the tufted coot - more than 15,000, and the coot - more than 20,000.* - Deputy Minister Dorozha announced. For the time being, they have been covered by a moratorium by the Minister of Economic Affairs. climate and environment .

pic. Jacek Halicki, CC BY-SA 4.0/Wikipedia

Five-year pardon

The selected four were lucky, as it is the fifth anniversary of the publication of Wylegala and Lavitsky's text, "The story of the world. *The capercaillie, the tufted duck, the little gannet, the coot - the state of the population in Poland and the impact of hunting management. Opinion for the IUCN Polish National Committee* justifies the introduction of a moratorium and then the eventual transfer from the list of game species to the list of protected species. The probability of extinction varies greatly for each species of the four just *pardoned.*

While garganeys nested in our country with only 1300-1700 pairs (in 2013-18), loggerheads with 2-6 thousand pairs, while coots at the same time nested with 30-60 thousand pairs. Coots have increased by as much as 61 percent in the scale of Poland, while cyranids have been steadily declining. The loggerhead shoal is dying out even faster, losing between 1980 and 2018 some 80, perhaps even 90 percent of our country's population .



pic. Dion Art, CC BY-SA 4.0/Wikipedia

Not just hunting

Even the biggest opponents of hunting admit that legal harvesting is just one of many nails in the coffin of the aforementioned species. All are equally threatened by habitat loss, deterioration of the food base, predator pressure, and, finally, changes in carp pond management. Both withholding management, leading to overgrowth of ponds, and increasing intensification of stocking rates, intensifying competition for feed, are detrimental.

The disappearance of colonies of their allies - black-headed gulls - is also contributing strongly to the decline of the black-headed gull colony, due to the pressure of blackflies (excess blackflies are a result of climate change and the invasion of foreign germplasm), better vaccines for foxes, increasing numbers of wizards and raccoons, and the culling of gulls as pests. Hunting ducks prefer to nest near a colony of laughing ducks because the species warn each other and defend themselves against predators, a bit like giraffes, zebras and antelopes on the savannah. The disappearance of the chinchilla paradoxically saved its cousin, but also its rival, the subadult , from extinction in Poland (at least for several decades).

Law by law and life by life

There is a public consensus on banning the hunting of endangered and rare birds. It is supported by 94 percent. Asked by Kantar Poland in a survey conducted for the *Let Them Live!* coalition. On the other hand, according to$_{1/3\ of}$ citizens, we have too many of certain species, especially the cormorant and the heron. If the British can shoot goldeneyes in the majesty of the law, and Icelanders can shoot mascons, why should we be worse? In Poland, of the protected species, the following are most often killed during legal hunting of aquatic and marsh ornithofauna: great crested grebes, mute swans, gannets, white-headed gulls and blackheads. Many real and imaginary fishing pests are also shot: from herons and bitterns, to harriers and terns, to doubloons.

Let us remind you right away that the RDEP may issue a permit for the reduction shooting of cormorants and gray herons under partial species protection, but such permits are subject to a number of conditions. Absolutely do not authorize leaving injured birds or killing white or purple herons! Gray herons are sometimes the bane not only of fishermen, but also of drivers and woodcutters, and in 2011. threatened to kill the toño penguins at the Tri-City Zoo. Even then, they deserve hounding rather than death. And if to death, then more humane than in Silesia .

pic. USFWS Mountain-Prairie, CC BY 2.0/Wikipedia

Something ends, something begins

Hunters argue that their hobby develops a number of skills that, again, will be extremely useful in our part of the world: eye-hand coordination, orientation in unfamiliar and desolate terrain (including after dark), noiseless stepping and wading in water, insensitivity to blood, cold and moisture. We have good news for them as well! There are an increasing number of non-European species, eradicated by law throughout the Community, that not only can be hunted, but should even be hunted. Among the tinfoil warblers increasingly observed in Poland are. Egyptian casefish (goosefish) and Jamaican rudderfish. The Egyptian Kazarka is known for its aggressive territorialism.

It chases away both other blackthroats and raptors (buzzards, hawks) and passerines (blackbirds, starlings, sparrows) living at an angle in the nests of larger birds. Even the white stork is sometimes helpless against this *Egyptian goose*. Goosebumps almost always give infertile hybrids with a number of gannets (mallards), kazaras (including ohar) and barnacles (whitetails). It spreads two strains of bird flu, paramyxovirus and salmonella.

The Jamaican rudderfish, on the other hand, threatens the nature of the Old Continent by:

- Interbreeding with the native common rudderfish;
- The spread of the avian influenza virus (H5N1 strain);
- competition with native species, especially grebes and eiders.

As early as 2016, the Berne Convention Standing Committee in its Recommendation 185 (2016) ordered the extermination of the Jamaican rudderfish from the entire Western Palearctic by 2020. Paradoxically, these rudders in their homeland, the Western Hemisphere, have been counted in total fewer than coots - 25-200 thousand. specimens of the subspecies/species *ferruginea*, 10 thousand. *andina* subspecies against 8-10 million of the latter .

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AQUATIC PUBLICATION REVIEW (16)

Posted on 11 April 2024 by Agnieszka Kolada

A current review of the aquatic literature brings new information on golden algae - Polish scientists have used bioassays to test how water samples taken from the Oder River during the disaster affect plankton organisms. Another team of national scientists looked at the problem of metal pollution in the waters of the Vistula Lagoon and the role of phytoplankton in their circulation in this ecosystem. The theme of the impact of climate change on aquatic organism assemblages could not be missed either. This time we present the problem of remodeling coral reef fish assemblages and their tropicalization in subtropical areas.

Categories: Issue 8/2024, Science
Tags: golden alga, literature review, Oder, review, water level

A current review of the aquatic literature brings new information on golden algae - Polish scientists have used bioassays to test how water samples taken from the Oder River during the disaster affect plankton organisms. Another team of national scientists looked at the problem of metal pollution in the waters of the Vistula Lagoon and the role of phytoplankton in their circulation in this ecosystem. The theme of the impact of climate change on aquatic organism assemblages could not be missed either. This time we present the problem of remodeling coral reef fish assemblages and their tropicalization in subtropical areas.

The researchers also asked themselves how to assess the impact of changes in groundwater levels on the health of water-dependent ecosystems. Imaging information and relevant indicators are proving helpful in mapping areas at risk of drought due to lowered groundwater. Another indicator that can effectively support rational resource management is the Urban Nature Index, which is used to assess the ecological footprint of urbanized areas. This is an interesting proposition for city managers facing the need to adapt to climate change.

1. primnesium as a threat for planktonic communities - an ecotoxicological approach for the environmental disaster in the Oder River 2022

Szklarek S., Font-Nájera A., Mazur-Marzec H. et al. 2024. *primnesium* as a threat for planktonic communities - an ecotoxicological approach for the environmental disaster in the Oder River 2022. Ecohydrology & Hydrobiology

The environmental disaster that hit the Oder River in the summer of 2022. has made the problematic
golden algae
has become firmly established in our domestic scientific literature. And very well, because we still know very little about this dangerous algae. And there is especially little research on the effects of toxic *Prymnesium parvum* blooms on organisms other than fish. Researchers from Polish centers undertook an assessment of the toxicological effects of *P. parvum* blooms by subjecting river water samples to microbiotests involving organisms from two trophic levels: producers (the green alga *Pseudokirchneriella subcapitata*) and consumers (two species of crustaceans Daphnia*magna* and *Thamnocephalus platyurus*).

The water samples tested came from the Oder River from the period of the disaster (August 13-16, 2022) and just after (September 24). The ecotoxicity assessment showed significant differences in the responses of the plankton organisms tested. While the green alga *P. subcapitata* and one of the crustaceans *T. platyurus* did not show increased mortality in the presence of *P. parvum* and prymnesins in the samples, the daphnia *D. magna* proved sensitive to the disaster water, with a maximum mortality rate of up to 90 percent after 24 hours of exposure.

Analysis of the 18S rRNA gene showed high levels of P. *parvum* in the samples tested during the environmental disaster (up to 9.2 percent) and their drastic decrease one month after the disaster (0.1 percent). The results of the study expand the knowledge of the impact of toxic *P. parvum* blooms on plankton communities and indicate that *D. magna* may be an effective bioindicator of the risk of *golden algal* blooms.

https://wodnesprawy.pl/kryzys-ekologiczny-na-rzece-odrze-wyniki-kontroli-d/

2. The role of planktonic filtrators in the distribution of metals in the water of semi-closed lagoon (southern Baltic)

Beldowska M., Kobos J., Nawrocka L. et al. 2024. The role of planktonic filtrators in the distribution of metals in the water of semi-closed lagoon (southern Baltic). Ecohydrology & Hydrobiology

In our waters, not only eutrophication, salinity and *P. parvum* are significant problems. Also, metals are a group of environmental pollutants

that require recognition of the processes determining their origin, migration pathways in the aquatic environment, distribution and seasonal dynamics. Polish scientists have analyzed the concentration of metals such as: beryllium (Be), thallium (Tl), mercury (Hg), cadmium (Cd), silver (Ag), lead (Pb), cobalt (Co), chromium (Cr), uranium (U), nickel (Ni), vanadium(V), molybdenum (Mo), aluminum (Al), zinc (Zn), manganese (Mn), copper (Cu), iron (Fe) and strontium (Sr), as well as other elements (among others.sodium, magnesium, calcium or potassium, among others) in samples taken between May 2017 and April 2018 at three sites within the Vistula Lagoon. In addition, they examined the taxonomic composition and biomass of phytoplankton.

Metals can be accumulated by phytoplankton. In particular, Pb, U, Co, Be, Zn, Cr, Sr, Ca, Al, Fe, Ni, Mg and Se show the ability to accumulate intensively. Thus, they are introduced into the first link of the food web. However, the amount and type of metals accumulated in the cells varied according to their size and taxon. This may be related to the specific structure of the cell or to the need for a chemical element with a specific role in the cell. The above observations indicate the specific properties of individual algal species affecting the selectivity of adsorption of elements from water.

Cyanobacteria of the order *Oscillatoriales* played the most important role in the circulation of dissolved elements in the Vistula Lagoon. The dying biomass sinks to the bottom, where it decomposes and becomes a secondary source of dissolved metals in the water, as was observed in the Lagoon after the spring phytoplankton bloom (increase in Pb, Ni and Mn concentrations). In turn, the process affecting the circulation of metals in estuaries was flocculation, which contributed to the vertical transport of Pb, Al, Fe, Mn, Cd and Be to the sediment surface. In this situation, bottom sediments are not only a sink for metals, but under certain conditions can also be a source of metals.

This is particularly important in shallow estuaries, where dissolved chemicals can be easily transported from the bottom zones into the water column and introduced into the cycle and trophic network. The article points out the role of phytoplankton in the circulation of hazardous metals in the water and sediments of the Vistula Lagoon.

3. Establishing ecological thresholds and targets for groundwater management

Rohde M.M., Stella J.C., Singer M.B. et al. 2024. Establishing ecological thresholds and targets for groundwater management. *Nat Water*

Groundwater is extremely important for the functioning of many ecosystems. However, requirements for their availability are rarely included in management and conservation plans for water-dependent ecosystems. A team of U.S. scientists has developed an approach to determine ecological thresholds, ecological targets and drought risk mapping for groundwater-dependent vegetation in California based on Landsat satellite data from 1985-2022 and the Normalized Differential Vegetation Index (NDVI).

Based on the analysis of changes in NDVI against changes in groundwater level (DTG) during the dry season, standardized using the Z index (an index indicating the number of standard deviations by which a given value differs from the mean; *Z-score*), the authors were able to assess acute threshold responses of vegetation to groundwater levels, such as a decline in participation or complete withdrawal. $_{ZDTG}$ thresholds and targets for groundwater-dependent vegetation were evaluated under different classes of conditions and at different rooting depths. The method made it possible to identify areas at risk of drought resulting from groundwater problems throughout the state. The proposed approach provides environmental conservation and restoration specialists with a simple and reliable method for assessing and supporting the water needs of water-dependent ecosystems.

4. regional reef fish assemblage maps provide baseline biogeography for tropicalization monitoring

Walker B.K., Fisco Becker D., Williams G.J. et al.2024. Regional reef fish assemblage maps provide baseline biogeography for tropicalization monitoring. Sci Rep 14, 7893

Anthropogenic increases in global temperatures are facilitating the expansion of tropical species, including coral reef fish, to now subtropical locations. This redistribution of species, known as tropicalization, has serious consequences for economic development, livelihoods, food security, human health and local culture. Measuring the tropicalization of subtropical reef fish assemblages is difficult due to the temporal and spatial variability of species' ranges and the multitude of factors determining the occurrence and density of assemblages.

This task was undertaken by Florida marine ecologists, analyzing data collected in 2012-2014 in the Kristin Jacobs Coral Reef Conservation Area (Florida Reef - the third largest coral reef in the world). They showed that communities in the southern part of the ocean were characterized by a higher frequency and density of tropical species, while subtropical species dominated in the northern part.

This study contributes to monitoring the tropicalization of southeast Florida's reef fishes, along the transition between tropical and subtropical ecotones, in order to define regional assemblages of reef fishes and develop new benthic habitat maps to spatially represent their zoogeography. Future tropicalization of reef fishes is expected to result in the homogenization of subtropical and tropical zone assemblages and the expansion of tropical species toward the pole. We also describe this phenomenon in the text on heat stress. The article is another example of an analysis of the problem of changes in the existing ranges of species and remodeling of local resources caused by climate change.

5. Urban Nature Indexes tool offers comprehensive and flexible approach to monitoring urban ecological performance

Pierce J.R., Costadone L., Mannetti L. et al. 2024. Urban Nature Indexes tool offers comprehensive and flexible approach to monitoring urban ecological performance. *npj Urban Sustain* 4, 22

Cities significantly impact ecosystem integrity and biodiversity, both within and beyond their geographic boundaries. Urban environments consume more than 75 percent of resources, generate 80 percent of greenhouse gases and are largely responsible for some of the major drivers of habitat and biodiversity loss. As rapid urbanization is expected to increase the percentage of the world's population living in urban areas from 55 percent to more than 68 percent, achieving global biodiversity conservation goals requires the development of tools to mitigate the environmental impact of cities.

Such a comprehensive tool measuring the environmental performance of cities - the Urban Nature Index (UNI) - was proposed by researchers in the pages of the *npj* journal *Urban Sustainability*. UNI covers six groups of issues that have measurable impacts on climate change, biodiversity loss, ecosystem services, pollution, consumption, water management and equity. These groups include: consumption-driven factors (e.g., greenhouse gas emissions or water withdrawals), anthropogenic pressures (mainly pollution - air, noise, light or water), habitat condition, species condition, ecosystem services and institutional responses (e.g., legislation, education, governance).

The index was developed by an interdisciplinary team of experts and assessed based on a survey analysis of practitioners from 24 cities of all sizes located around the world. The results of the survey indicate that the developed index is very useful for assessing cities' ecological footprints and adaptation needs. With institutional support, the IUCN Urban Nature Index offers cities the opportunity to assess and enhance their contribution to a more sustainable and biodiverse future.

ALTERNATIVE REPRODUCTIVE TACTICS

Posted on 11 April 2024 by Adam Kapler

Spring in our climate zone is the time of reproduction for most organisms, but it is not uniform in all of them. Some animal species, both vertebrate and invertebrate, adopt diverse reproductive tactics. Diverse within one, and the same species, we add. Tactics and strategy are terms mainly used in the art of war. But in love, as in war, that's why behavioral ecologists have adapted this military nomenclature to describe alternative reproduction tactics (ART) found in one species. This interesting phenomenon also occurs in fish!

Categories: Issue 8/2024, Onet, Science
Tags: breeding time, ecology, fish

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What are alternative reproductive tactics?

Alternative reproductive tactics take many forms. They often involve two categories of males: guardians or caretakers (*guarders/ parents*) and *sneakers, cuckolds*. The guards compete for mates, build nests, and often guard eggs and young. Sneakers, on the other hand, avoid violence, copulate secretly, sometimes posing as females, sexually immature juveniles or individuals of another species to trick their chances of reproduction.

Several types of reproductive migrations are also observed, such as in dioecious fish. After spawning, some individuals remain in freshwater or physiologically die of old age, and some steam back up rivers, dying only due to predation or accident, for example: in sturgeon. A prerequisite for the fulfillment of the definition remains the discrete (jumping, very pronounced) rather than continuous nature of differences between alternative versions of individuals of one species. This ontological divide is revealed at the level of genes as well as appearance and behavior .

You praise what you don't know

In behavioral ecology classes, alternative reproductive techniques are usually given little time, usually illustrated with examples from birds, mammals, and possibly arthropods. And yet the world of fish is just as fascinating! It is not at all necessary to look for them in the depths of the seas, among the corals of the Great Reef or in the waters of the Amazon. Alternative reproductive tactics are practiced by males of the native salmonids *Salmonidae,* Pontocaspian *gobies Gobidae* or *Rhodeus sericeus*.

In Polish textbooks of ichthyology and sozology, and even more so in albums for anglers, there is no mention of the occurrence of ART in native salmonids: sea trout *Salmo trutta* morpha *trutta* and Atlantic (noble) *salmon Salmo salar*. From the salmon chapter *GIOŚ methodological manual* we learn about two alleged subpopulations: summer and winter, and about spawning occurring in Poland from October to December (at 5-6°C heat, in sections of rivers with gravelly bottoms), but not a word about the fact that some males do not swim to the seas at all or undergo metamorphosis (smoltification). The life cycle of salmon is often presented as follows: roe> alevin> parr>smolt -> sexually mature individual (spawner).

Meanwhile, not only in Pacific *salmon Oncorhynchus* sp. div. but also in our own *S. salar*, some males pretend to stall in development. They still look like parries, still remain in freshwater, relatively close to their hatching sites, and yet become fully sexually mature. Instead of floating down rivers, feeding for years in the sea or some huge lake, and then laboriously swimming upstream and preparing their nests, they wait for the females on the spot . Some sea trout behave similarly, although they trumpet later than salmon, as from December to April .

The largest family of the smallest fish

Gobidae is the most species-rich family of marine fishes, with only a few representatives in (say) fresh waters. Among its tropical members we find several candidates for the status of the world's smallest fish and smallest vertebrate in general. In the vast majority of gobies, the eggs laid near the bottom are guarded by the male. And where there are nests, there are often alternative reproductive strategies. The

plantains that are settled with us are no exception. For example, two morphs of males have been recorded in the Lower Rhineland *gobies* (bullheads) *Neogobius melanostomus*, which pursue two reproductive tactics. Smaller males (9.85 cm and above) are stealthy, while their larger brothers are good fathers/caregivers of children .

A couple of months ago, the presence of two types of males was shown in 3 species of gobies (including again for the b. breakfasttail) in their original homeland, in the rivers of Iran. Males are either large warriors maturing in late adolescence, with dark coloring and wide *chada* jaws, making elaborate courtships and fighting with rivals, or small *cuckolded* males maturing in youth, with light coloring and narrow jaws, not adoring females or fighting with males of the first type .

Until now, the successes of gobies have been explained by their origin in the Pontocaspian region. There, they have adapted to changes in salinity, smothering, naturally high concentrations of heavy metals, foraging for crayfish and other such hindrances. Art. may give gobies an added advantage over other fish. Even if the new environment turns out to be absolutely unfriendly to one morph, alternative tactics here may have an advantage over the native fauna and cope with the climate .

A living incubator

Common pinks (hatchetfish) *Rhodeus sericeus* are the only ostracophiles, or fish that spawn into mollusk shells, in the European fauna. Little! Unlike the cichlids we're familiar with from aquariums, these adorable cyprinids lay their eggs and then their milt into the gill lobes of a live scaphopod clam, rather than into an empty shell. A mister-ink treats a scurvy or bristlefish similarly to how a mister-ink or mister-ink treats its nest. He therefore guards it from other males, while showing it off to females. And where the males guard the nests, there also appear creeps secretly flooding the eggs with their sperm. Across the board, Rosewood is no exception in this regard. In her case, too, the masters are divided into caretakers and kukolds, although their house is alive.

The Common Rose proved to be unique in another respect. Namely, it is the only species known so far in which the Coolidge effect (an increase in libido after changing partners, typical of chickens, rats and humans, among others) operates at a level other than inside the female's body, and the only example of this effect in an organism with external fertilization. Gentlemen's libido increases after the change of incubator. A live scorpionfish or rattlesnake is therefore a direct analogue of the female reproductive system of species with internal fertilization .

Three sources of thousands of tactics

The diversity of reproductive modes in bony fishes remains an evolutionary mystery. Among *Teleostea* , we will meet all types of reproduction observed in vertebrates, but also a few peculiar ones. The number is increased by alternative reproductive tactics. The reasons for the diversity are probably the duplication of the entire genome, the way the gonads differentiate, and the organization of the brain-pituitary axis . Genome duplication duplicates the pool of available genes. In turn, this increases the rate of evolution, including the evolution of reproductive behavior.

Fish gonads are formed from somatic mesoderm cells, so - regardless of the method of sex determination (environmental or genetic) - fish retain their protogenic potential. That's why there are so many hermaphrodites among them, as well as species that change sex with age or as life requires. This labile nature of the gonads also means that males of one species can mature in very different ways (at different ages, in different environments) and then pursue a range of alternative reproductive tactics.

In skeletons, the nervous and endocrine systems are more adaptive than in other vertebrates. Their pituitary gland works differently, more precisely, integrating the two systems so strongly that you can basically talk about one - the neuroendocrine system. As a result, they

respond to environmental and social challenges (of their own population) in a variety of ways not available to the rest of the mandibles .

Seek and you shall find. However, you must have the right tools for your search!

The example of alternative reproductive tactics shows the importance of inquisitiveness and language skills. Polish professional and popular literature lacks any mention of ART in the native and permanently established fishes of Poland. Meanwhile, the noble salmon provides a pretty good example of this tactic. It is noteworthy that being its opposite in many respects (native, size, resistance to climate change and water pollution...) gobies acutely behave very similarly in the field of reproductive tactics. And just as with salmon, the issue of ART remains overlooked in domestic science and popularization. In contrast, the roseate - with its Coolidge effect on external fertilization - has proven to be as unique in terms of ART as it is in terms of its choice of egg-laying sites.

Photo. main: By Ostjan, CC BY-SA 3.0/Wikipedia

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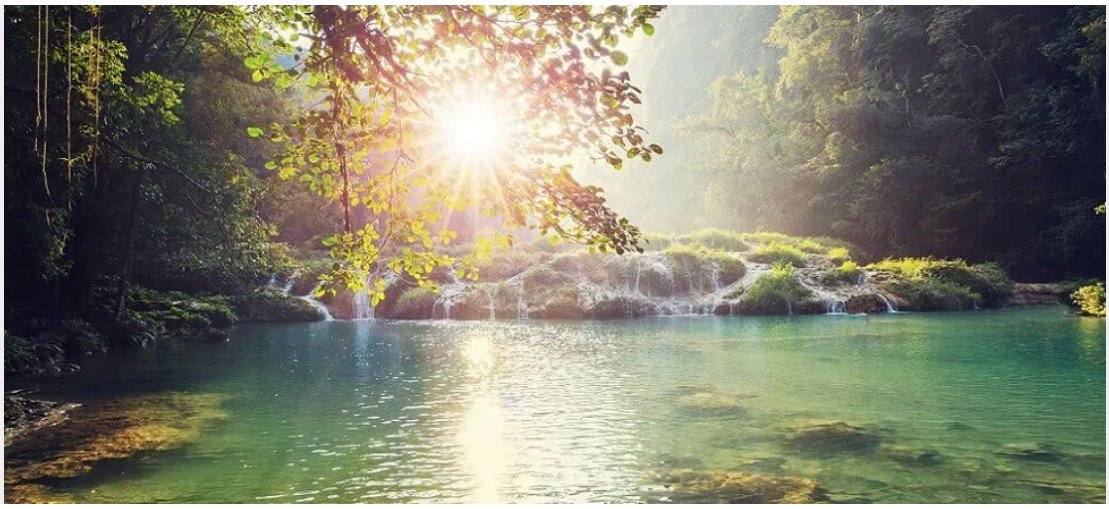
THERMAL STRESS - HOW ELEVATED WATER TEMPERATURES ARE CHANGING AQUATIC ECOSYSTEMS

Posted on 11 April 2024 by Agnieszka Kolada



This year, spring came exceptionally early, with high temperatures already setting off an explosion of vegetation in March. It has become pleasantly warm. Let him be the first to throw a stone who would prefer rains and frosts now. Let's not kid ourselves, humans in our latitude will inherently flee to places that are dry and warm. It takes knowledge and awareness to admit that warmer does not mean better.

Categories: In this issue, Issue 8/2024, Onet, Science
Tags: aquatic ecosystems, high temperatures, temperature, Thermal stress

This year, spring came exceptionally early, with high temperatures already setting off an explosion of vegetation in March. It has become pleasantly warm. Let him be the first to throw a stone who would prefer rains and frosts now. Let's not kid ourselves, humans in our latitude will inherently flee to places that are dry and warm. It takes knowledge and awareness to admit that warmer does not mean better.

The progressive rise in average air and water temperatures is confirmed by hard data and numerous scientific studies. Poland has also seen a shift in thermal seasons toward longer summers and warmer winters , which can also be seen in rivers . Climate change has meant that heat stress is beginning to affect all waters. Warming has both direct and indirect effects on aquatic organisms, and exacerbates existing problems such as eutrophication, pollution and the spread of disease. The pressure, which was often considered marginal, suddenly becomes a widespread problem.

Why rivers are getting warmer - heat stress and its many causes

The temperature of the waters is largely determined by solar radiation, so it varies depending on the time of day, season and latitude. It is correlated with air temperature, but the relationship is not linear. It also depends on the volume of water and local exposure due to channel geometry, shading and shoreline development. For example, the removal of riparian vegetation, including the cutting of natural riparian forests, reduces shading of the riverbed and contributes to warming waters. Also, the hydrology of the catchment affects the thermal regime. Warmer runoff from impermeable urban surfaces can significantly raise water temperatures, not to mention the effluent from power plants, industrial plants and treatment plants, which cause the so-called "water pollution". thermal pollution.

Rivers have been transformed by humans for centuries and around the world, significantly modifying their thermal regimes. Disruption of hydrological connectivity through the construction of dams and weirs results in reduced flow velocity and water mixing dynamics, as well as increased exposure time, leading to faster heating. Also, widening and regulating river channels for transportation purposes increases the area and time of exposure to the sun. Low flows associated with water abstraction, regulation or droughts reduce the natural thermal buffering capacity, leading to faster heating of waters.

Scientists predict that river water temperatures will rise with climate change, and this is a trend that can already be observed over large areas of Europe, North America and Asia, although the warming will vary between areas. Thermal regimes of rivers vary considerably within and between catchments, even over short distances (less than 1 km). They change with diurnal, seasonal and interannual cycles, reflecting climatic conditions (e.g., seasonality will be lower in tropical regions than in temperate ones) and local conditions (e.g., thermal buffering by groundwater recharge). The results indicate that surface water temperatures will rise by 0.03°C per year in the UK, 0.001-0.08°C in the US, and 0.03-0.05°C in China.

Although the measured and projected changes in water temperature associated with climate change appear to be very small compared to the natural diurnal, seasonal and interannual temperature variability recorded in many temperate rivers, the chronic nature of these changes could have significant ecological impacts. A comprehensive review of the issue of the impact of thermal stress on animals inhabiting rivers, which has just been published in the journal *WIREs Water* , inspired me to look into the problem.

Thermal limits of aquatic animals

Changes in water temperature have a direct impact primarily on ectothermic organisms, such as fish and aquatic invertebrates. These organisms function within certain critical temperature ranges, beyond which they are unable to carry out physiological processes. Thermal ranges of certain physiological activities have also been determined for selected freshwater animals, such as. Foraging, growth or reproduction.

For example, for Atlantic*salmon (Salmo salar*), the upper thermal limit for growth is 22.5°C, although they can feed at higher temperatures. Limiting temperatures can depend on life stage, body size and ecological interactions. Garten and Gentry showed that larval dragonflies*(Libellula auripennis* and *Macromia illinoiensis*) with longer bodies have higher thermal maxima than smaller individuals of the species. It is also known that juvenile Atlantic salmon are more heat tolerant than adults due to a different ratio of body surface area to body weight .

Although studies typically focus on the upper thermal thresholds of organisms, elevated temperatures, even well below thermal maxima, have also been shown to affect the survival and physiology of aquatic animals, including diapause, phenology and reproduction.

Critical thermal maxima are of greater importance for organisms adapted to cooler environments, such as. living near springs, at high altitudes or higher latitudes. The same is true for organisms living in regions with very stable temperatures (e.g., tropical rivers with temperatures between 22 and 34°C), which have adapted to conditions close to their maxima. Even with small changes in temperature (<1°C), but lasting for longer periods (weeks or months), their thermal limits can be significantly exceeded.

Thermal acclimatization, or changes in physiology, behavior and phenology

Animals adapt to changes in environmental conditions through adaptation. The ability to acclimatize thermally is largely dependent on the characteristics of the habitat. Animals living in rivers with long-standing and stable thermal regimes (e.g., at high altitudes and high latitudes, in tropical zones or areas with significant groundwater recharge), may be less able to acclimatize to changing conditions than animals living in more dynamic environments.

While some organisms (including, importantly, some invasive species) may benefit from warming, others will lose from it. For example, survival rates of juvenile cyprinid fish in the Yorkshire Ouse River in the UK have increased over 15 years as a result of warming waters . Numerous studies suggest that forkbeards (aquatic insects of the order Plecoptera) are particularly sensitive to increases in water temperature, and their numbers in Europe are declining with climate warming , while caddisflies (Trichoptera) are considered more tolerant animals, and temperature increases appear to be beneficial to them .

Changes in water thermals can also affect the phenology of organisms, or the timing of life events. Temperature affects all aspects of fish reproduction, including gamete development, fertilization and larval hatching. As the waters warm, fish spawning is likely to occur earlier and embryo development will be faster, according to the study. Migrations of Atlantic*salmon (Salmo salar*) from rivers to the ocean in North America since the 1960s. In the 1970s. move by an average of 2.5 days per decade . Fish eggs also develop faster in warmer water. The increase in temperature from 8°C to 12°C accelerated hatching from 63 to just 38 days after fertilization .

The phenology of aquatic insects is less well studied, but changes of only tenths of a degree Celsius can significantly affect the timing of events in their life cycle. Warmer water usually leads to earlier emergence of imago (adult form), as individuals reach maturity sooner. The consequences of altered phenology in aquatic ecosystems can be significant, as it leads to desynchronization of many processes, disruption of food base availability, predator-prey interactions and/or habitat availability. With seasonality occurring on a smaller scale in tropical regions, the consequences of thermal changes may be less noticeable than in temperate climates.

Fleeing the heat, or changes in migration range

As rivers warm, mobile animals are likely to move toward cooler areas. This phenomenon can affect single individuals (e.g., fish temporarily using local thermal refuges) or entire populations (e.g., migration toward mountain stream refuges). In the Rhône River, a 1.5°C rise in temperature over 20 years has led to the replacement of cold-water species such as dace by more tolerant chub and barbel . Such escapes are

beneficial to mobile species, but significantly disrupt interspecific competition at target sites.

Changes in geographic range depend on the ability of individuals and species to spread. While some organisms will be able to move to regions with more favorable conditions, those that already live at higher latitudes and have fewer opportunities to migrate toward the pole will have nowhere to go. Therefore, populations living near springs, in the upper reaches of rivers, and in mountainous regions are likely to be among the most vulnerable to warming. Not only will these organisms have nowhere to escape to, but they will also face additional competition from organisms migrating from lower altitudes/latitudes. We can expect that isolated or relict taxa, as well as those associated with specific habitats (e.g., the Arctic) are most likely to become extinct first.

Indirect effects of thermic changes on river ecosystems

In addition to the direct impact of warming on river ecosystems, rising water temperatures will have many indirect effects, such as exacerbating the impact of other pressures such as eutrophication, chemical pollution and disease.

As a result of rising temperatures, eutrophication, in particular, can increase significantly. In warmer rivers with reduced flow in summer, nutrient concentrations will be higher even with similar nutrient loads. This, in turn, will promote faster growth of algae, reduce photosynthesis of macrophytes and other primary producers, and lower dissolved oxygen levels (which are lower in warmer water), with further consequences for plants and animals. It may also turn out that previous remedial measures aimed at stopping trophy at the current level or lowering it, with increased water temperature, will be far from sufficient and greater reduction of nutrient loads will be necessary.

Temperature can affect the toxicity of pollutants, for example, ammonia, pesticides or polyaromatic hydrocarbons PAHs. There is also evidence that it alters the bioavailability, toxicity and bioaccumulation of toxic metals. Although studies have shown that higher temperatures generally enhance the harmful effects of pollutants, we have exceptions to this rule. For example, some pesticides degrade faster in warmer water. In general, chemical toxicity and increasing water temperature may interact, but this synergistic effect is likely to be variable and its impact at the population level difficult to predict.

Elevated water temperatures can also promote the spread of diseases, as they increase the likelihood of bacterial and viral infections becoming established and more widespread, as well as pathogens that have relatively high temperature thresholds. For example, a study by Marco-López and co-authors predicts an increase in the frequency of salmonid diseases, including yersiniosis, boils and white spot, as a result of climate change. On the other hand, for pathogens that activate at lower temperatures, the risk of some diseases may decrease (e.g., hemorrhagic septicemia below 14°C). The consequences of climate change on the spread of animal diseases are not well understood, but are an area of great concern and in need of intensive research.

Can we make rivers more resilient to future warming?

It is not particularly revealing to say that the optimal resilience to climate change is a river free of anthropogenic disturbance, with good longitudinal, lateral and vertical connectivity, minimal changes in the flow regime and hydrology of the catchment area, with a preserved floodplain and natural vegetation of the riparian zone. It is also clear that around the world such rivers are now an extremely rare phenomenon.

The most vulnerable to the effects of climate change are watercourses lacking shade, with deforested banks and high exposure to sunlight. In an attempt to improve their resilience to rising temperatures, we should therefore place emphasis on restoring the vegetation of the coastal zone. Also, groundwater inflow largely regulates the thermal regime and limits the temperature amplitudes caused by solar radiation. It is also crucial to ensure links to floodplains and restore habitat heterogeneity.

The greater the ability of rivers to buffer thermal changes, the more resilient the biological communities inhabiting them will be to progressive climate change. In situations of increased warming, organisms can survive by taking advantage of thermal refugia (such as hyporeic upwelling, deep pools, groundwater tributaries or sections of the river system located higher where temperatures are more accessible). Protecting thermal refugia is therefore crucial to increasing the resilience of biological communities to climate change.

Rivers will continue to respond to changes in climate and land use in the catchment, hydromorphological transformations, pollution and other anthropogenic pressures. Although we cannot predict all the changes that will occur in aquatic ecosystems, managing rivers in a way that builds their resilience to a variety of pressures can, at least to some extent, mitigate the effects of these undesirable impacts. While it is true that the ecological effects of pollution and habitat loss are expected to outweigh the effects of climate change over the next century, focusing efforts on protecting and restoring refugia and building resilience in the river system will be key to at least partially adapting to climate-induced water temperature change.

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