Circular Economy Lab & Observatory

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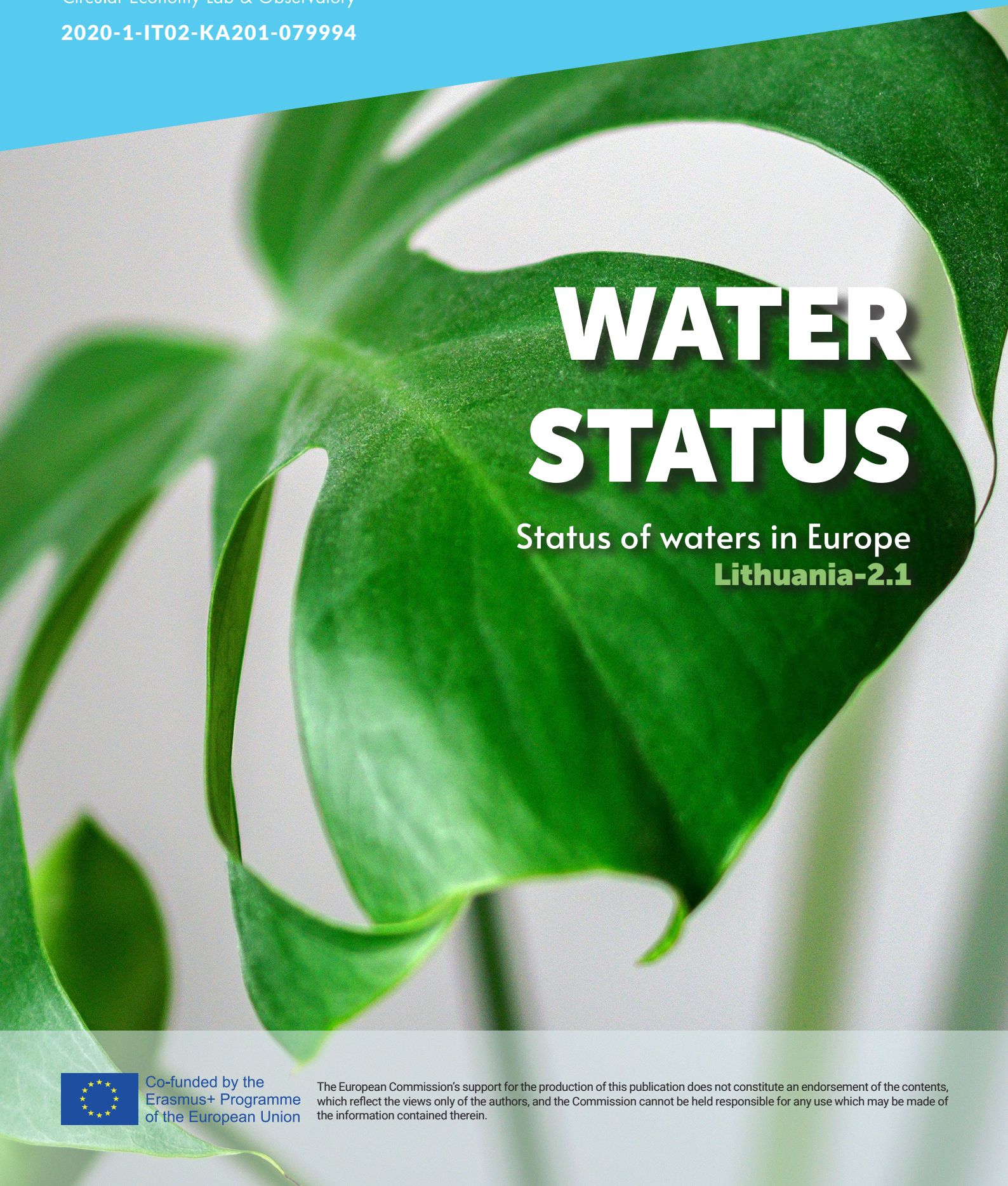

WATER STATUS

Status of waters in Europe

Lithuania-2.1

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WATER STATUS

Status of waters in Europe

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"Water is the most common compound on Earth." [1] Water quality is an important indicator of the state of the environment. The better the water quality of a lake or river, the more stable the ecosystem.

In addition, pollution has a significant impact on the swamping of lakes. Thus, efforts are being made to continuously monitor water quality.

In addition, if an alarming situation is recorded, sources of pollution are searched for and efforts are made to eliminate the pollution It is everywhere: in oceans, seas, rivers, wells, lakes, atmosphere and soil. Water is important in the formation of climate and weather, in the physiological and biological sphere of life, in the history of geology, and most importantly in the human body.

Water is not only the main source of life and industrial development, it also absorbs and transports all domestic, agricultural and industrial waste pollution. Deterioration of water quality due to pollution limits the use of water, threatens our health and the functioning of aquatic ecosystems, and reduces the amount of usable water resources.

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The term new environmental pollutants according to European Union legal directives is defined as pollutants that are not included in the regular EU monitoring, but may pose a significant threat to the environment.

The pharmaceutical industry and the increasing focus on difficult-to-biodegrade compounds have led to these impacts. The importance of advanced oxidation research is huge. Most scientific practices are laboratory based scale research, so technological development is very important to transfer processes to industry. The hypothesis of this project: the advanced oxidation process is based on combined ozonation and photocatalytic processes are effective in cleaning new environmental pollutants from water method and can be applied in pilot-scale installations.

The hypothesis was tested in advance planned experiments analyzing ozonation, photo-ozonation and photocatalytic ozonation in order to assess which of these processes achieves the greatest new environmental pollutants and a degree of purification.

A stationary Nano particulate titanium dioxide was produced for the initiation of catalysis coated glass catalyst. Characterization of the catalytic surface by X-rays by the diffraction analysis method, it was found that the predominant crystalline modification of TiO2 is anatase.

Scanning electron microscopic analysis showed that the titanium dioxide layer is porous a surface film with a large surface area and an ideal structure for heterogeneous energies for conversion processes such as the photocatalytic process.

When studying the process of advanced oxidation, it was observed that the efficiency of pollutant decomposition depends on the nature of the pollutant, the source of oxygen supplied for ozone generation, and the system pressure when the ozone a venture injector is used for dissolution.

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For ozone generation using pure oxygen through 5 times higher ozone concentration can be achieved in a shorter time than using air. In the case where the air flow rate is 2 times that of oxygen. In addition, it worked during the experiment and reached a maximum pressure of 2.8 bar.

Compared to less powerful 1 and 2 bar systems, it is possible to achieve up to 4 times more effective ozone dissolution. It is an inevitable companion of civilization, but a civilized society must be able to preserve the established balance in nature, and when it is disturbed, to restore it.

Environmental pollution is considered an unfavorable change in our environment, caused in whole or in part by human activity through energy flows, radioactivity level, chemical or physical composition and abundance of organisms can change or effect. These changes can affect a person directly or through water, agricultural products, other biological objects, his physical objects and possessions, or through his opportunities to rest and perceive nature.

Pollutants can be by-products of the metabolism of biological organisms, by-products of human activity products, various production wastes, materials released during technological processes, remains of things made, used and thrown away by man. Various synthetic chemical compounds, directly or indirectly spread by humans in the environment, become pollutants.

Radiation, acoustic pollution, thermal water pollution, and finally pollution of human consciousness are becoming more and more relevant and dangerous. The problem of environmental pollution occurs when energy and metabolism between the biotic and abiotic environment is disrupted, when the level of dispersion of harmful substances exceeds the capacity of the environment to absorb, use and render them harmless.

In the case of small pollution of air, water or soil, in most cases, nature itself is able to deal with it by dispersing, mineralizing, etc.

Only in a natural ecosystem is biological production closed, waste-free. Materials participate in the biogeochemical cycles that make up the overall metabolic cycle of the ecosphere.

The leakage of materials that have passed through this cycle is 1-2%.

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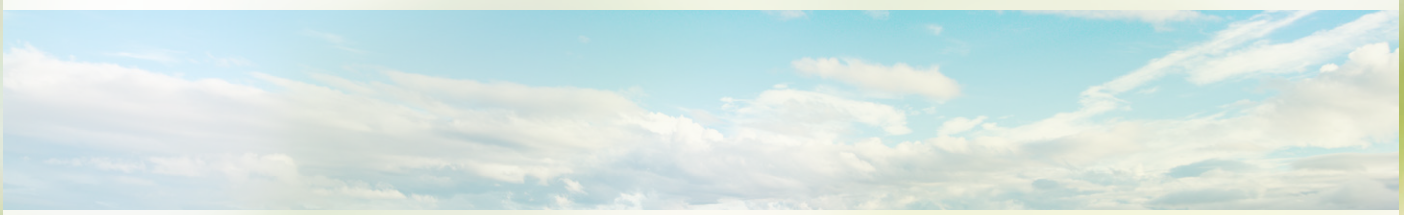
Environmental impact of new environmental pollutants
The environmental risk assessment of medicines must take into account the doses used, physical and chemical properties and ecotoxicity.

It is important to mention that even low concentrations can cause chronic and negative impact on both microorganism cultures and flora and fauna. Part of the pollutants in the laboratory conditions may not show any bad results, but when they enter the sewage, they mix with others composition, to form much more toxic and dangerous compounds [2].

Antibiotics can affect prokaryotic cells and their mechanism of action. It is assumed that they are far more dangerous to microbes than to aquatic vertebrates such as fish. Yes it is also believed that antibiotic pollutants accelerate the mutation of bacteria and microbes, they become resistant.

Abnormal proteins and enzymes contribute to growth abnormalities in rats, fish and frogs activity. Acute toxicity due to priority pollutant cases and to daphnia [3]. The main pollutants animals and people get with drinking water. Extremely small, so the harmful effects may not be immediate.

The presence of hormonal preparations in water can cause disorders of the endocrine system, and there is also a potential impact on cancer diseases, reproductive changes, etc. Other substances may be responsible for the proteins structural changes, organ function disorders, and chronic entry into the body determines the causes the occurrence of diseases.



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Currently, nanomaterials have limited applications in the water domain, primarily serving as adsorbents, filters, disinfectants, and reagents.
However, there is increasing evidence that they can be utilized for large-scale water treatment and environmental remediation.

"One example of the potential of nanomaterials in this area is the development of nanoscale zero-valent iron." [4] This material can be used to treat groundwater and hazardous materials.

Engineered nanomaterials began to be used for environmental cleanup applications when scientists discovered that small amounts of nano-sized iron particles could help remove underground pollutants like polychlorinated biphenyls, which are toxic to both humans and the environment and can cause cancer.

Iron nanoparticles, particularly nanoscale zero-valent iron, have demonstrated efficacy in cleaning water contaminants such as pesticides, flame-retardants, antibiotics, chromium, arsenic, and heavy metals.

Nanomaterials such as zero-valent iron possess numerous properties that make them excellent adsorbents for heavy metals in polluted water:

- large relative surface area and small size;
- high reactivity;
- ability to isolate heavy metals;
- ability to act quickly;
- good ability to join metal and
- structural properties that allow the nanomaterial to be regenerated and reused.

An example is removing arsenic from water

The most dangerous impurities in household water are chemical detergents. Even cleaning equipment does not stop them. Irresponsible household chemicals, excessive use of plastic toys and improper waste disposal are the main threats to the safety of water, the natural environment and health.

The more effective a chemical cleaner, the more toxic it can be to the environment. Household antibacterial cleaners in sewage treatment plants kill bacteria that break down pollutants.

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In this case, the biggest threat is to residents who operate local treatment plants. Untreated wastewater enters the soil, surface water bodies or groundwater. It is even worse if there is a well for drinking water right here, which is used by consumers.

In this way, pollution also enters our drinking water. Mineral fertilizers and pesticides are used indiscriminately and carelessly in agriculture. Some of them are carried away by water into streams, melioration channels, lakes, and the conditions for pollution of water bodies are formed. Part of the mineral fertilizers gets into groundwater, which causes the water in the underground wells to deteriorate.

Water pollution associated with agricultural production covers large areas, polluting small rivers, on which the cleanliness of power depends. Water pollution violates the ecological balance and harms human health.

Contaminated water contains bacteria and viruses. It is a widely known fact that about 8 million people enter the ocean and seas tons of plastic waste every year.

Plastic pollution is a critical problem in everyday human activities. Many people consume micro plastics every day, often without even realizing it. Plastic particles enter our daily diet mainly through the food chain.

Plastics are made from petroleum products, various impurities and dangerous chemicals are added to them. Due to the impact of micro plastics, internal scratches appear in living organisms, and vital functions are disrupted. A person can feel, cause, reproductive system, develop cancer.

Arsenic is a semi-metal with toxic properties that have been linked to various types of cancer and health issues. Groundwater arsenic contamination is a natural occurrence documented in countries including Argentina, Bangladesh, Chile, China, India, Taiwan, Thailand, some EU countries, and the United States.
Arsenic can enter groundwater through natural deposits, mining activities, agriculture, or industrial operations.

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"The removal of arsenic and other similar contaminants from water has been of particular concern to the scientific community." [5] In recent years, the results of using nano adsorbents to remove arsenic from contaminated groundwater have been promising. Water scarcity or water quality remains an issue for three quarters of humanity.

Conserving and improving the quality of water resources for consumption is a major concern for many countries. The main sources of water pollution are industry, cities, agriculture and transport. Industry and cities discharge around one million cubic meters of polluted water per day into open waters, while only 22% is fully treated.

Therefore, certain requirements must be met in order to use or be in safe water. In the spring and fall, it is advisable to test well water for microbial contamination in the laboratory, as contamination can often occur during snow melt or rain and can be instantaneous. If you go swimming, it is advisable not to apply creams, because they are harmful to microorganisms, do not do your natural work in the water, and most importantly, do not litter.

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GROUP

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