Circular Economy Lab & Observatory

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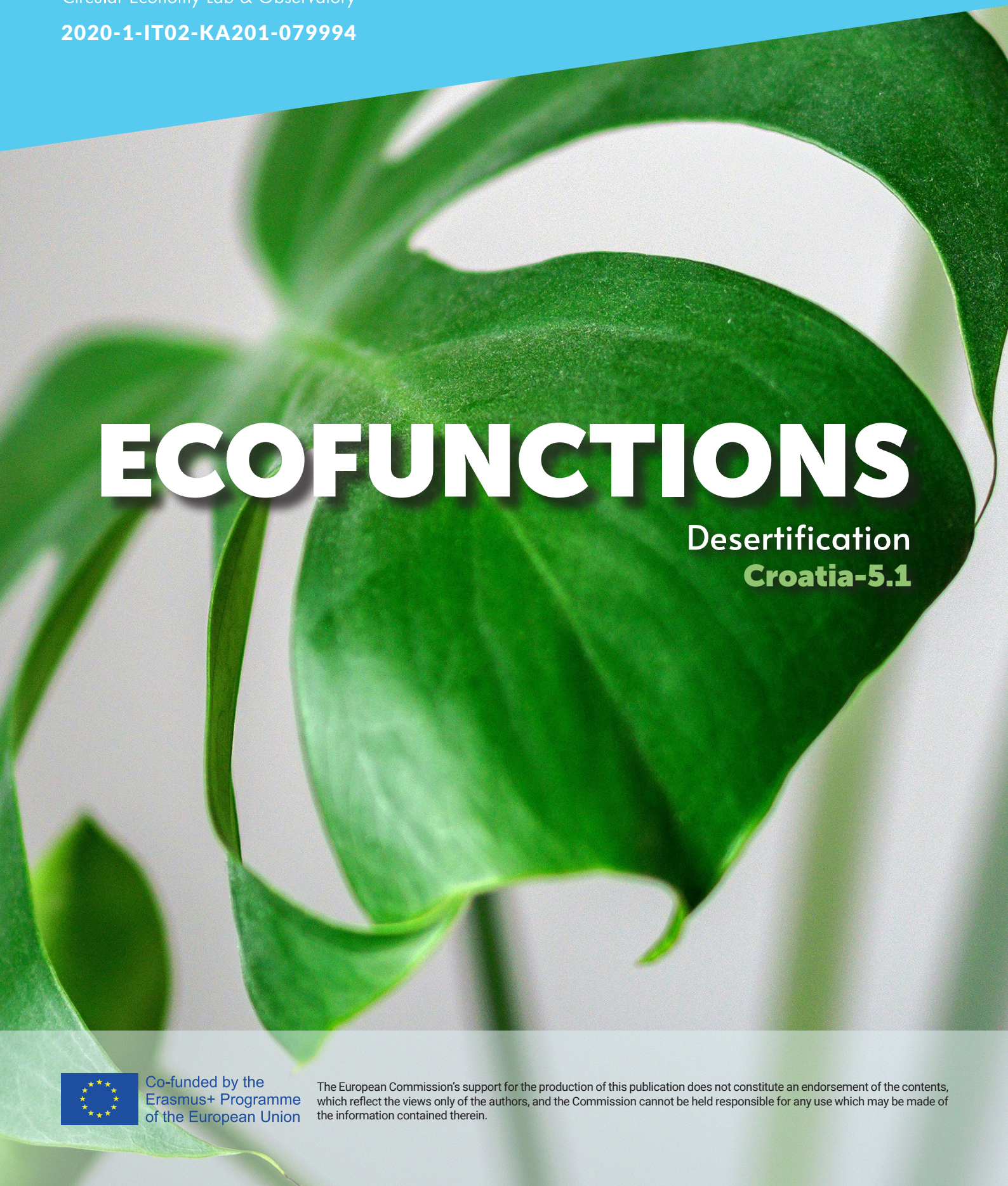

ECOFUNCTIONS

Desertification

Croatia-5.1

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Desertification

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INTRODUCTION

You will learn about the issues with desertification and how to address them throughout this essay. Desertification is a form of dryland land degradation in which biological productivity is lost as a result of natural processes or as a result of human-induced activities, causing productive areas to become more and more arid.

Effects of desertification on soil. (Photo by: https://www.iied.org/building-research-capacity-for-sustainable-water-food-security-drylands-sub-saharan-africa-breccia)

It is the expansion of dry regions brought on by a number of variables, including climate change and excessive soil exploitation as a result of human activities. Deserts have naturally formed throughout the course of geological time. Numerous scientific studies have recently focused on the potential effects of human activities, poor land management, deforestation, and climate change on desertification. Over 2 billion people live in drylands, which make up between 40 and 41 percent of the surface on Earth.

According to estimates, 10–20% of drylands have already suffered degradation [0]. The Gobi Desert, the desert that is expanding the quickest in the world, situated largely in Mongolia, and South America are among the well-known regions that are being affected by desertification. Global warming is a major issue in this because human activity is primarily what causes desertification. The amount of loose sand and dust that the wind may pick up has also grown due to desertification, which can lead to sand or dust storms.

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Storms of sand and dust can have a severe impact on the climate, which can worsen the problem of desertification. Airborne dust particles scatter the sun's incoming radiation. Area over the ground may briefly be covered by the dust, but the temperature of the atmosphere will rise. Less rain may fall as a result of clouds falling apart and shortened cloud life. Desertification and overpopulation pose a threat to global food security. More food must be produced as the population increases.

The amount of land that can be used for agriculture is being reduced by desertification, while demand is still rising. The supply will not meet demand in a short time.

Aquifer water extraction. (Image by ivabalk from Pixabay)

The loss of the majority of vegetation is the main contributor to desertification. Various factors, alone or in combination, such as drought, climatic changes, tillage for agriculture (the preparation of land for growing crops), overgrazing, and deforestation for fuel or building materials are responsible for this.

Studies have demonstrated that in many ecosystems, the amount of vegetation cover dramatically reduces the rate of erosion and runoff (the draining away of water). Infertile lower soil layers are left behind, which burn in the sun and turn into an unproductive hardpan (a hardened layer of soil), after exposed, dry soil surfaces are blown away by the wind or washed away by flash floods (sudden local floods usually due to heavy rain).

PROBLEM DESCRIPTION

Desertification is the process through which grasslands and shrublands in drylands, also known as arid and semiarid lands, decline and eventually vanish. The idea refers to different mechanisms that pose a threat to convert currently non-desert ecosystems into deserts, not to the actual physical growth of existing deserts.

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Water is often far from living areas in poor countries. (Photo by Gyan Shahane on Unsplash)

Desertification is accelerated by human actions, such as deforestation and excessive aquifer (sediment that holds water) extraction.

To this must be added the consequences of climate change, which is also fueled by humans, and the havoc it brings about in the form of extreme weather phenomena like fires, hurricanes, and droughts. Over 24 billion tonnes of valuable soil are lost annually, according to the UN [2].

In fact, two-thirds of the planet are currently experiencing a process of desertification, and if nothing is done, by 2050, 1.5 million km^2 of agricultural land, which is necessary for preserving biodiversity and feeding the population, will be lost [4]. This area is equal to the entire arable land of India.

The primary human actions that contribute to desertification are:

- Poor agricultural practices, such as not rotating crops, using chemical fertilizers and pesticides, or leaving the land unprotected.
- Deforestation, whose causes extend beyond tree cutting, raises the risk of fires among other things.
- Overuse of natural resources as a result of careless management of water or vegetation, for instance.

According to scientific consensus, the Sahara desert's current location is the result of natural fluctuations in exposure to the sun's rays (insolation) caused by the Earth's orbital precession (wobbling upon Earth's axis). That causes loss in vegetation and increased dust emission that amplifies the cycle of the wet and dry Sahara climate, and these fluctuations affect the strength of the West African Monsoon. There is a theory that overgrazing by the local population's livestock during the mid-Holocene contributed to the Sahara's transformation from savannah to desert.

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About half of the earth's ice-free land surface is made up of drylands, many of which are located in the world's poorest nations, which worsens the effects:
-Decrease of vegetative cover, which affects cattle and human nutrition.
-Reduction in the amount of forestland, leading to a shortage of wood resources.
-A decrease in biodiversity caused by a degradation of many species' habitats.
-Increased danger of zoonotic illnesses like COVID-19.
-A lack of food due to crop failure or low yields.
-The reduction in drinking water supplies brought on by aquifer loss.

Soil fertilization is often performed by tractors. (Photo by Etienne Girardet on Unsplash)

At least 90% of people who live in dry regions do so in underdeveloped nations, where they simultaneously struggle with deplorable economic and social conditions. Because of the decline in output, dangerous living conditions, and the difficulty of accessing resources and opportunities, this scenario is made worse by land degradation.

POSSIBLE SOLUTIONS

There are several ways to slow and reverse desertification, some more difficult or effective than others. The biggest problem in implementing countermeasures is the lack of political and economic motivation. The areas affected by desertification are often also used for agriculture, and their sustainable use is often too expensive and too burdensome for a single farmer. The most common methods to combat desertification are: reforestation, soil rehabilitation, desert reclamation and controlled grazing [1]. Reforestation addresses the root cause of desertification: By planting more plants in the affected area, we can make the soil less susceptible to erosion. The most famous example of this is the Green Wall of China project. In this project, 66 billion trees were reportedly planted. This project drastically reduced the area affected by desertification, and reduced the frequency of sandstorms.

In 2007, the African Union launched a similar thing starting a Great Green Wall of Africa project. The wall is 8000 km long and stretches across the entire continent. The project has restored 36 million hectares of land, a figure that is expected to increase [4]. This project has also created many jobs.

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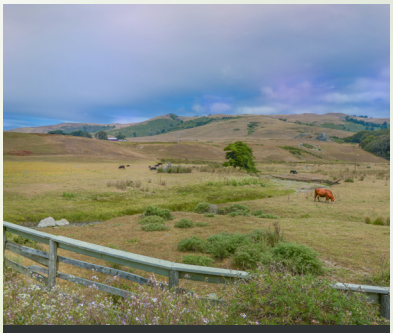
Land restoration is another commonly used technique to prevent desertification. This technique focuses on providing water and fixing and over-fertilizing the soil (in short, making it plant-friendly). This is often also achieved by planting trees (windbreaks) that slow down the wind that would otherwise blow away the top layer of fertile soil.



Keeping bushes around can reduce erosion and slow down desertification. (Photo by Cristina Anne Costello on Unsplash)

In some cases ditches are dug to keep the water in place and to prevent it from running down the hill which also slows evaporation. The main purpose of this method is to get plants to grow in dry areas.

Therefore, fertilizers are often used and trees that can survive in dry areas are planted. This method is effective but fairly expensive and time consuming. Desert rehabilitation is a method that relies on existing living tree stumps. These stumps are often grazed by livestock and cut down for timber.

In this state, they do not do much to hold the soil together and retain water. However, if allowed to grow into trees, they can contribute significantly to preventing desertification. Farmers are encouraged to plant crops around the trees and not cut down the whole tree when they need timber. The biggest advantage of this method is that it doesn't require much money to get started. Controlled grazing involves allowing livestock to roam the pasture. The results of this method have not yet been empirically confirmed. However, the basic idea is that the grass has time to recover and grow back. For this method, the farmer must have a larger area available, which is not always possible to achieve.

Money is one of the greatest problems when it comes to battling desertification. (Photo by Jason Leung on Unsplash)

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CONCLUSIONS

We acknowledged that the main cause of desertification is humanity's doings. Some problems caused by humans are overgrazing, deforestation, and tremendous climatic shifts. Possible solutions for desertification are reforestation, soil rehabilitation, desert reclamation, and controlled grazing. These solutions may sound easy, but they are not. It takes a lot of money, time, and cooperation for them to be realized; however, we at least have to try because this is a very real problem that will affect all of us.

It's important to be informed about modern-day problems in schools, V.gimnazija, 3f (Photo by Sven Matić)

All in all, we can agree that desertification is one of the most threatening global environmental problems. Desertification is an enormous problem for rural places and rural people, especially for the ones who do not have enough financial resources.

Currently, the most endangered regions are near the world's five main deserts, including the Sonoran Desert which lies in Northwest Mexico and the Southwest United States; the Atacama Desert in South America; the Kalahari Desert in Southern Africa; most of Australia; and the large desert mass made up by the Sahara, Arabian, Great Indian, Taklimakan, Gobi and the deserts of Iran and the former Soviet Union.

As time passes, these places are not the only ones that will be affected by desertification, and with the overpopulation added on, the whole world will experience a large shortage of food that will cause many deaths everywhere on Earth, but mostly in the poor rural areas.

Desertification is a topic that has to be publicly imposed and discussed more. Even though it is a significant problem for the world, a tremendous number of people don't know about it and those who do, don't really care about it and that must change.
Desertification is still stoppable.

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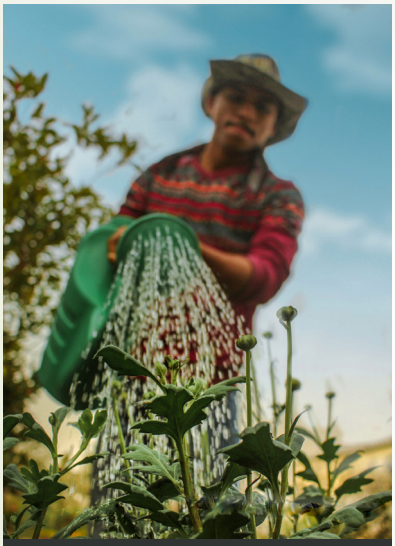
The future of areas in desertification danger and deserts themselves are in humanity's hands. There are some external factors that people can't control, such as the climate or the weather or the topography, but we can study them and maybe in the far future we will be able to prevent them and so to prevent desertification easily or live in deserts with major comfort.

Worldwide cooperation is essential to find the best solution to this problem. The fight against massive desertification has just begun and it is not too late yet. We must deal with it and solve the listed problems so this world can be a good place for future generations that are coming. And the best way to accomplish that is to educate and inform the young about this and other modern-day problems we have to face.



Protecting and nurturing plants is one of the best ways to prevent desertification. (Photo by almani on Unsplash)

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<blockquote class="wp-embedded-content" data-secret="NdIpAzzurb">Explainer: 'Desertification' and the role of climate change</blockquote><iframe class="wp-embedded-content" sandbox="allow-scripts" security="restricted" style="position: absolute; clip: rect(1px, 1px, 1px, 1px);" title=""Explainer: 'Desertification' and the role of climate change" — Carbon Brief" src="https://www.carbonbrief.org/explainer-desertification-and-the-role-of-climate-change/embed/#?secret=ejTVgLbqbH#?secret=NdIpAzzurb" data-secret="NdIpAzzurb" width="600" height="338" frameborder="0" marginwidth="0" marginheight="0" scrolling="no"></iframe>

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GROUP

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