

Research Report

COMMITTEE: UN Water

ISSUE: *How can we increase the resilience of vulnerable populations and ecosystems facing drought?*

CHAIRS: Raphaëlle HOLROYD & Eleonore HASLER

How can we increase the resilience of vulnerable populations and ecosystems facing drought?

INTRODUCTION

Hello! My name is Raphaëlle and I'm in première (year 12) in the Lycée international de Ferney-Voltaire. Outside of school I really enjoy swimming, I have been doing it since I was 4 years old!

FerMun 2023 will be my first conference as chair. I cannot wait to preside over this conference alongside Eléonore Halser. I believe that the issue of access to water is very important as this resource, upon which we depend, is in danger. This is why I look forward to hearing your plans to guarantee access to this resource for future generations.



KEY WORDS

Drinking water: Water that is safe to drink and that can be used for domestic or industrial consumption. It can be in the form of running water or bottled water.

Arid regions: Regions of the globe where the level of precipitation does not exceed 25 centimeters per year.

Drought: According to the United Nations, this phenomenon can be described by three criteria: meteorological, hydrological or agricultural.

-A **meteorological** drought occurs when precipitations become scarcer over a period of time. However, this period and the level of precipitation deficit have not been defined.

-A **hydrological** drought occurs when surface and groundwater supplies run out. This drought is measured by the flow of certain rivers, lakes, and groundwater tables.

-An **agricultural** drought occurs when the moisture in the soil does not meet the needs of a crop. This type of drought is particularly noticeable after a meteorological drought and before a hydrological drought.

Vulnerability: Vulnerability expresses a situation of weakness or fragility from which the integrity of a population or an environment is likely to be affected, diminished or altered. To evaluate and quantify the vulnerability of an environment or a population following an

unfamiliar situation, four factors can be taken into consideration: resilience, the degree of dependence and anticipation of an event, and the capacity to adapt.

Resilience: Resilience is the ability of a system to return to its initial state after being disturbed. To be more exact, the UNISDR (United Nations International Strategy for Disaster Reduction) defines resilience as being “The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.” Resilience aims to minimize the consequences of a risk that cannot be controlled or predicted. A population can be described as resilient if it can regenerate or recover from a disruption. An ecosystem is resilient if it recovers after an episode of water stress, for example.

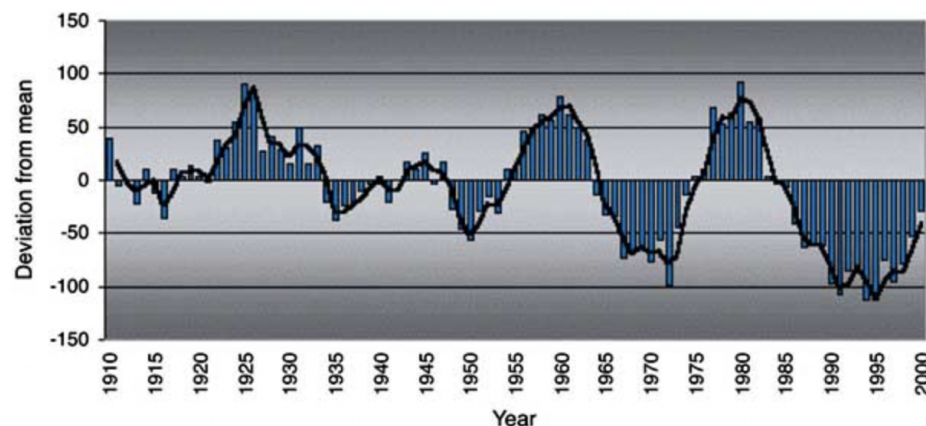
“Drought-toolbox”: Created by the United Nations Convention to Combat Desertification, this module provides information and data on drought to help vulnerable populations and ecosystems.

OVERVIEW

Since 2010, the United Nations considers access to safe drinking water as a fundamental human right. This right entitles every person to have access to clean, safe and affordable water for personal and industrial use. However, today, one in three people in the world do not have access to safe drinking water and water scarcity affects 40% of the world's population (approximately 3 billion people worldwide). Moreover, humans are not the only ones to use this water. Indeed, all the fauna and flora that surround us also depend on it.

It is estimated that by 2050, over three quarters of the world’s population will be affected by drought, which represents almost 6 billion people. This issue has been exacerbated by climate change as it affects rainfall patterns and therefore the length of meteorological droughts. Although this phenomenon affects more than 70 countries worldwide, only a small number have a comprehensive drought plan (it is important to note that this number has increased significantly thanks to the UNCCD "drought initiative"). Droughts cause multiple difficulties and unequally affect populations and ecosystems.

Fig. 1: Average rainfall in Zimbabwe from 1910 to 2000 ([source](#)).



As shown by this study of the rainfall pattern in Zimbabwe,

drought episodes are most often cyclical. However, the number and duration of droughts have increased by 29% since 2000 compared to the previous two decades.

D) Vulnerable Populations

1) Agriculture and access to food

With increasingly limited water resources and for longer periods, the arid and semi-arid regions of the globe have seen their crop yield decline year after year. However, 1.3 billion people in the world are financially dependent on agriculture as their primary source of income. Repeated droughts cause a decrease in the quality of the land. This causes the surface to solidify, which makes cultivation much more difficult. This particularly hard and compact soil is then more prone to erosion and consequently to the loss of land dedicated to agriculture.

2) Maritime transport

80% of all international trade is carried out through maritime routes. Lower water levels have led to the closure of key waterways. At certain times of the year, water levels drop meaning that it is too dangerous to travel on them. In 2012, the Great Plains drought in the United States led to the closure of the Mississippi River on three occasions. It is estimated that these closures caused \$300 million in losses.

3) Social Inequalities

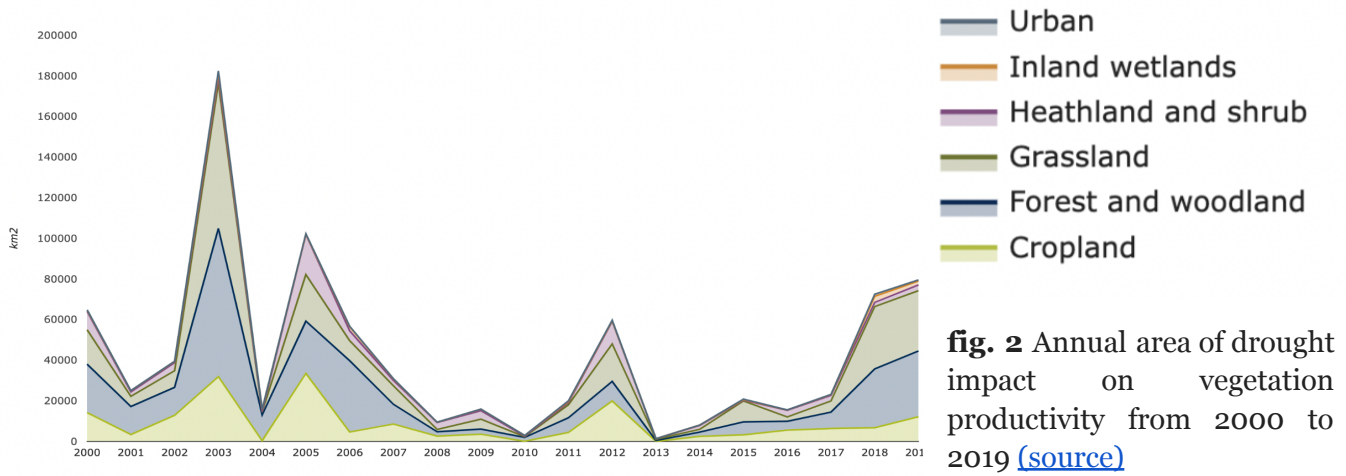
3.1) Trends

According to the United Nations, the populations most likely to be affected by drought are those in countries with a lower human development index. This is due to the high rate of employment in the agricultural sector in these countries. This report also indicates that gender inequalities are exacerbated by drought. Ensuring gender equality in these conditions is very complex as in 80% of the households that do not have running water, women are in charge of water collection. The ever growing scarcity of this resource threatens the efforts already put in place to achieve gender equality.

3.2) Case study: California

Up to now, there has been little joint effort to answer the many challenges created by droughts. This lack of international and intra-territorial cooperation has revealed discrepancies in water access management. This clearly indicates that the issue can be similar or the same for a large population, however, with different management strategies, the outcome can differ greatly. The example of California is very telling. This state has suffered from repetitive drought episodes: in 2022, the months of January, February and March were the driest on record. However, the handling of this water shortage varied from town to town. This disordered and inconsistent response gave way to many inequalities. In the town of Pico Rivera, the residents pay, on average, \$200 for their water bills yearly. The neighboring town of Lynwood, however, charges \$2500 to its residents for water every year. This very apparent gap shows how uncoordinated the response to drought is. This is one example amongst many of how drought could lead to a rise in inequalities.

II) Vulnerable ecosystems



Humans are not the only ones affected by drought, every single ecosystem that surrounds us has seen its productivity diminish due to the lack of water. And, according to the European agency, these dry spells will become more frequent and of greater intensity.

Currently, wetlands represent 10% of the entire surface of the earth. Overlooked and underestimated by many until recently, these areas are in fact complex ecosystems. They have the capacity to store water before filtering it and letting it through to the water tables beneath, therefore getting rid of harmful pollutants. These fragile ecosystems are in danger, the lack of rainwater has put a strain on the plants that inhabit these wetlands, they are therefore less capable or completely unable to perform their filtration duties for example. As a result, the water levels in the groundwater tables have significantly dropped. If the filtering process that usually takes place in the wetlands can no longer occur due to the lack of precipitation, water that does reach the ground will evaporate at much faster rates which will then cause major issues for the fauna and flora that find refuge there.

A tree is capable of converting CO₂ into oxygen thanks to the process of photosynthesis. This oxygen is required, amongst other things, for our survival. Furthermore, it is important to take into consideration that forests act as natural air conditioning as trees are able to regulate air temperature by offering shade. This feature will be all the more important in the coming years as the UN has predicted that by 2030, it is highly likely that average temperatures will be more than 1.5°C higher than in the pre-industrial era. 1.6 billion people rely today on the forest as their main source of income. But, just like wetlands, forests are not spared from drought-related problems. According to the European agency for the environment, forests are the ecosystems that are the most affected by the lack of water, each year they lose 5% of their productivity. This means that the biomass of forests increases by 5% each year. The natural ecological balance of these areas is altered by droughts. This phenomenon leads to the loss of precious habitats for native species, whilst other more invasive ones establish themselves and proliferate resulting in a significant loss in biodiversity.

RELEVANT UN TREATIES AND EVENTS

22/03/2018 - 22/03/2028: International Decade for Action on Water for Sustainable Development

The United Nations General Assembly unanimously adopted a resolution in December 2016 to urgently include water disasters, scarcity and pollution in the "International Decade for Action on Water for Sustainable Development." This resolution joins the other sixteen UN Sustainable Development Goals.

12/09/2019: The "Drought toolbox" is created

The United Nations Convention to Combat Desertification launches the "Drought toolbox" during the COP 14 in India. This toolbox provides data and devices to help populations in distress to cope with drought. This can be done in three different ways: how to prevent and monitor threats, assess the different risks as well as measures to mitigate them.

17/06/2022: World Day to Combat Desertification and Drought

During the World Day to Combat Desertification and Drought, the United Nations chose to focus on drought with the theme "Rising up from drought together". This made it possible to raise awareness of the growing risk posed by drought through [videos](#), for example.

POSSIBLE SOLUTIONS

- The enrichment of plantations and the restoration of forests, in general, can help to increase the water level because forests will once again be able to perform their functions fully. In India, for example, after a large-scale forest regeneration project, the groundwater level rose by seven meters. When forest regeneration initiatives take place, promoting more drought resistant trees (e.g. bur oak, Scots pine...) could help maintain ecosystems despite water shortages. This would also be beneficial in urban areas where trees, adapted to their climate, could guarantee tolerable temperatures.
- Initiatives such as the FAO's [ONE MILLION CISTERNS FOR THE SAHEL](#) show that rainwater harvesting could be a solution to ensure access to water even in the most remote areas. Most of it could be used for drinking water purposes and the surplus could be used for agriculture, thus ensuring access to food. If this model were replicated in other parts of the world, it would help reduce water and food insecurity drastically.

Solutions for vulnerable populations

- Expand the ["Drought Toolbox"](#) to help vulnerable populations recover after a drought. Currently, this tool focuses rather on prevention by offering data on the evolution of droughts around the world.
- The organization [Digital Earth Africa](#) allows a clear overview of the data already obtained on the African continent in several sectors such as agriculture or water resources. However, there is a lack of data in certain regions. It would be beneficial to many to launch initiatives to collect more data. The organization's model could also be replicated on other continents where drought risks are high.
- As for agriculture, there is still a lot to be done to preserve the soil while ensuring a high yield. Today, we know that overexploitation of the land makes it poorer. To resolve this issue, pasture management plans could be implemented on a large scale to try and help farmers to keep a high yield even if the weather conditions deteriorate.

Solutions for vulnerable ecosystems

- To better understand the origins of droughts in certain places (e.g. reservoirs), and therefore be able to better prepare for potential future droughts, the method of isotope hydrology could be implemented. The International Atomic Energy Agency is already using this kind of technology, as explained in this [video](#).
- During drought episodes, the use of pesticides should be limited or at least strongly monitored. Indeed, after the use of such chemicals, some particles penetrate the soil. The decomposition of these chemicals can be done in different ways, but the most common is hydrolysis. This process requires water which is, in this case, unavailable. If they are applied regularly and without being flushed away by rain water, pesticides can accumulate and consequently lead to high levels of toxicity.

Questions to consider

1. Which new technologies could be used to prevent desertification (due to the lack of water)?
2. What would be the consequences of future drought in your country if nothing further is put in place?
3. Has your country already found solutions to overcome this problem?
4. How could your delegation use the treaties and steps already in place to improve its response to the issue of water scarcity?

BIBLIOGRAPHY

General:

<https://www.unccd.int/land-and-life/drought/toolbox>

[https://www.eea.europa.eu/ims/drought-impact-on-ecosystems-in-europe#:~:text=Drought%20impacts%20on%20forests%20where,shrubs%20\(3.1%25%20decrease\).&text=Long%20lasting%20C%20severe%20and%20frequent,species%20and%20consequently%20biodiversity%20loss.](https://www.eea.europa.eu/ims/drought-impact-on-ecosystems-in-europe#:~:text=Drought%20impacts%20on%20forests%20where,shrubs%20(3.1%25%20decrease).&text=Long%20lasting%20C%20severe%20and%20frequent,species%20and%20consequently%20biodiversity%20loss.)

<https://www.unccd.int/land-and-life/drought/drought-initiative>

<https://www.srs.fs.usda.gov/compass/2019/12/10/managing-drought-in-forest-ecosystems/>

<https://www.csiro.au/en/about/challenges-missions/drought-resilience>

<https://www.drought.gov/states/california>

<https://drought.unl.edu/Education/DroughtforKids/DroughtEffects.aspx>

https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0018/1210806/Soil-management-drought-recovery.pdf

Solutions:

<https://www.digitalearthafrika.org/>

<https://drought.unl.edu/Education/DroughtforKids/Protection.aspx>

Explanatory video on isotope hydrology:

<https://www.youtube.com/watch?v=SAAn-2554TA>