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SIXTY EIGHT

Creativity, Culture and Collaboration to Combat Climate Change – C6

Water Resource Management

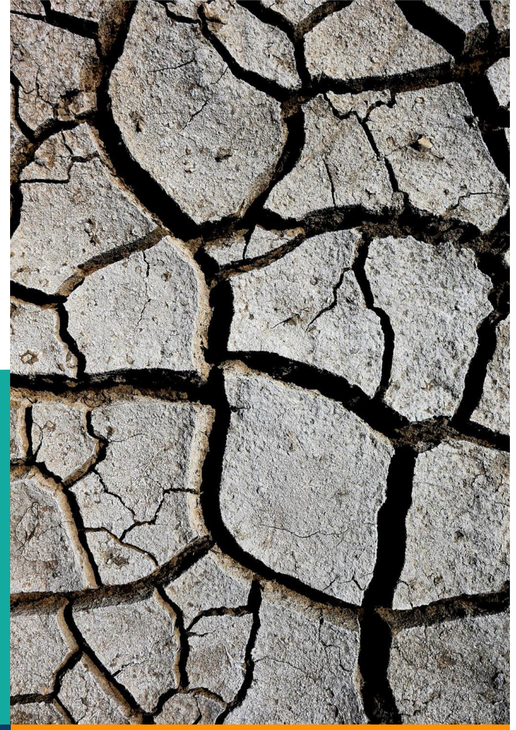
Co-funded by the Erasmus+ Programme of the European Union

Water: Oceans and Rivers

The availability of water will become one of the most crucial issues as the world continues to get warmer.

On the one hand, ocean levels will rise in large parts of the world as the climate heats up and glaciers melt, endangering ecosystems and human habitation in coastal areas and along tidal estuaries.

On the other, rivers will be subject to increasing drought in the summer due to changes in rainfall patterns and glacier dynamics, which will adversely effect agricultural production.



Risk of flooding may also increase, for example due to heavy rainfall caused by higher temperatures, endangering low-lying human habitation along river courses.

Overall, as the Earth’s highly complex weather systems are disrupted, unseasonal dry or wet weather will affect river basins and water availability more generally.

More frequent droughts and warmer water temperatures may cause a decrease in water quality, for example by encouraging growth and bacteria and algae. Increases in cloudburst events may also affect water quality by storm water washing impurities into surface water.

Water Resource Management in River Basins

This module will focus on the management of available water resources in rivers and river basins.

A great many human settlements have historically been built along rivers or in coastal areas for reasons of access, transportation, defence, and availability of water for cooking and drinking. Around 1/3 of Europe’s population lives within 50 km of the coast.

Rising sea levels may reduce the availability of fresh water, as seawater pushes into the water table and bodies of fresh water, affecting agricultural production and availability of drinking water.

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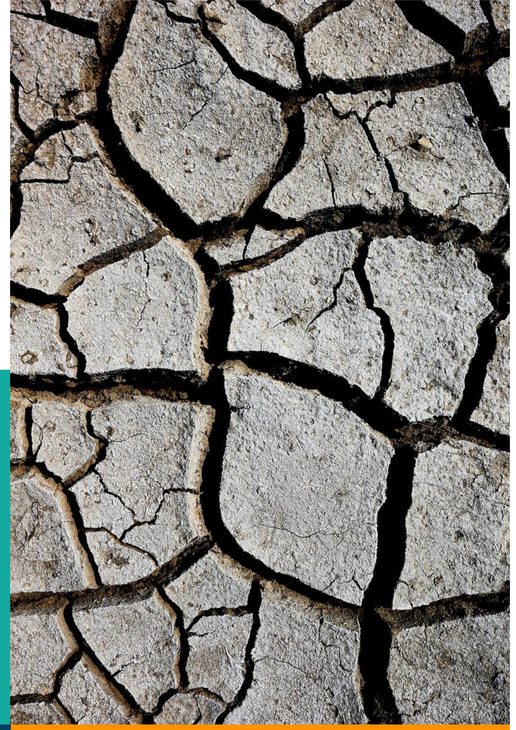

As climate change causes weather patterns to change, and temperatures and sea levels to rise, we need to think more carefully about how we manage the water we have.

In the following we have provided information about water resource management with regard to rivers, including background information, who it involves, who it affects, what factors must be taken into account, and how the issue is already being approached.

This is followed by an activity, where you can discuss and innovate your own solutions.

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“Water-related hazards account for **90% of all natural disasters**, and their frequency intensity is generally rising.”

UNITED NATIONS

Why is water resource management important?

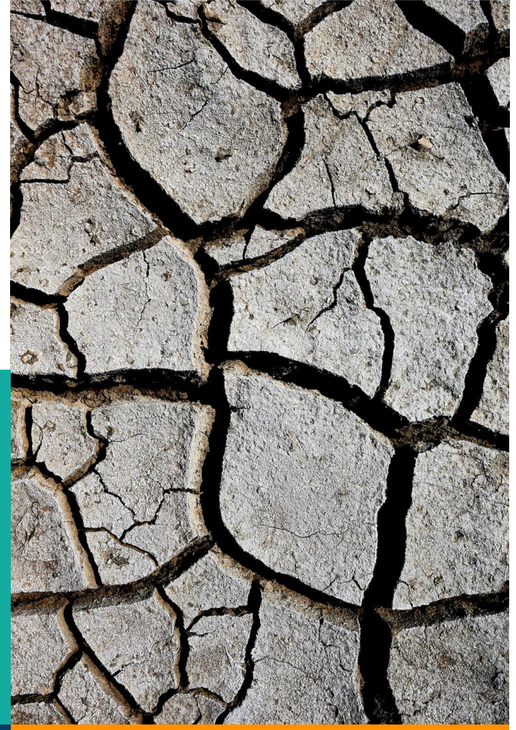
According to the predictions of the IPCC (Intergovernmental Panel on Climate Change) global warming , if it continues to increase at the current rate, is likely to reach a 1.5°C increase in temperatures between 2030 and 2052.

In this scenario, water resource management is increasingly important if we are all to have sufficient access to water, including clean drinking water. Efficient and fair management of the remaining water resources we have is ¨therefore essential.

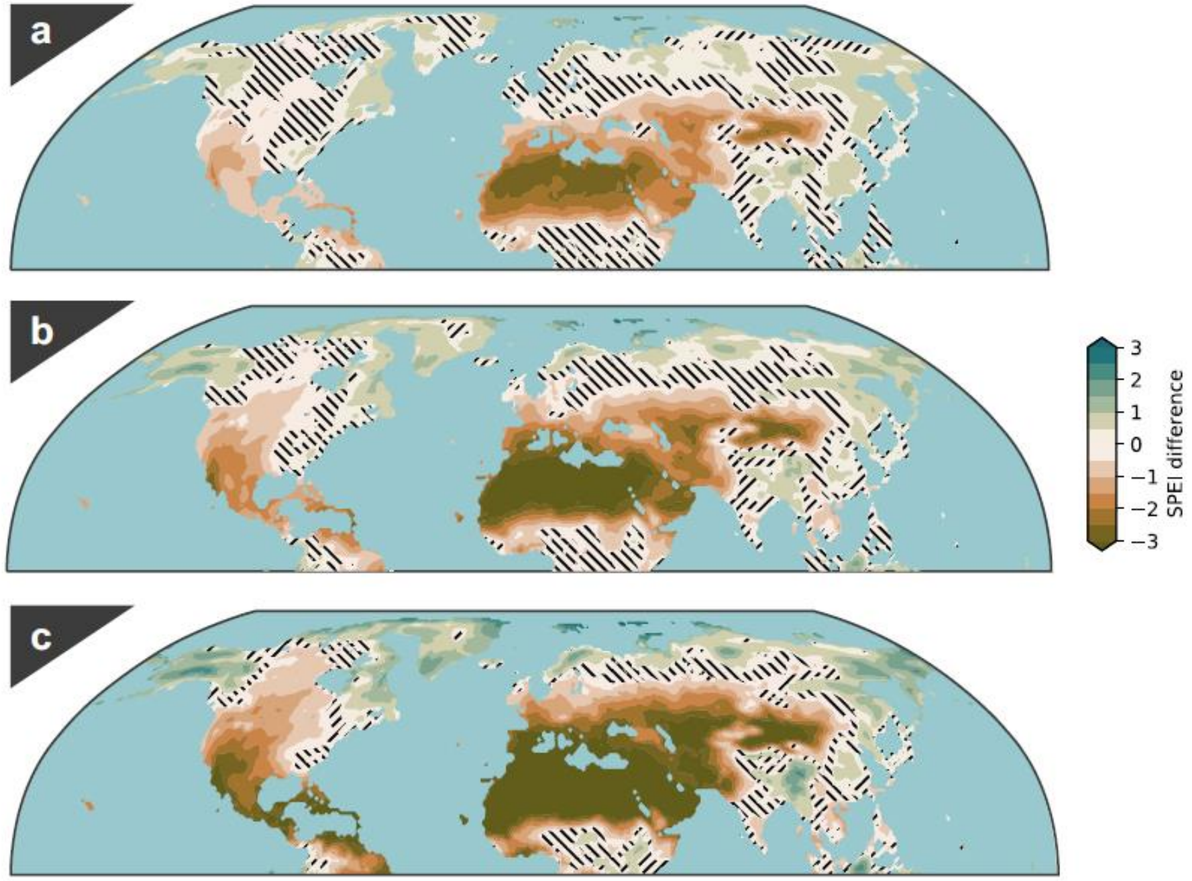
Climate models created using this information and data project large differences in regional climate characteristics as a result of increasing temperatures.

These differences include increases in:

- mean temperature in most land and ocean regions *(high likelihood)*
- hot extremes in most inhabited regions *(high likelihood)*
- heavy precipitation in several regions *(medium likelihood)*
- the probability of drought and precipitation deficits in some regions *(medium likelihood)*



Projected Drought Risk for 2071-2100



Balting, D.F., Agha Kouchak, A., Lohmann, G. *et al.* Northern Hemisphere drought risk in a warming climate. *npj Clim Atmos Sci* **4,** 61 (2021). https://doi.org/10.1038/s41612-021-00218-2

a) Best case scenario
b) Mean case scenario
c) Worst case scenario

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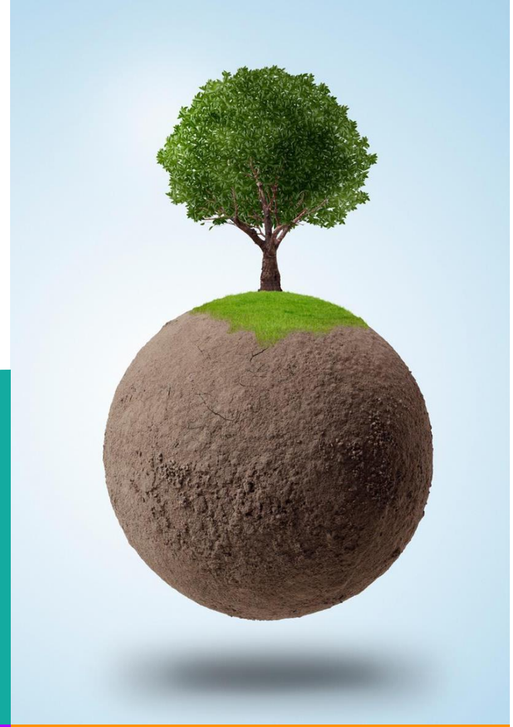

Regional Changes and Differences

Changes in global temperatures and hot extremes will not be uniform around the world. The IPCC predicts that:

The strongest warming is expected to occur at mid-latitudes in the warm season and at high latitudes in the cold season (*high likelihood*).

The strongest warming of hot extremes is projected to occur in central and eastern North America, central and southern Europe, the Mediterranean region (including southern Europe, northern Africa and the Near East), western and central Asia, and southern Africa (*medium likelihood*).

Because of the high to medium likelihood of these changes, the UN has included SDG6 in its Sustainable Development Goals :

Ensure availability and sustainable management of water and sanitation for all.

6 CLEAN WATER AND SANITATION

Target

6.4

By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

6 CLEAN WATER AND SANITATION

Target

6.5

By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

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What is Integrated Water Resources Management (IWRM)?

In order to ensure the best possible management of water resources, the methods of Integrated Water Resources Management have been developed to coordinate issues and approaches between various countries, national agencies and international bodies.

This is because complex natural systems such as the drainage basin of a river respect the geology and geography of the landscape, rather than the political borders which humans have imposed on the land over the course of history.

Integrated Water Resources Management (IWRM) is therefore “a process that promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems.”

In the following slide you can see the example of the River Danube’s drainage basin. Its source is in Germany and its mouth on the Romanian and Ukrainian coasts of the Black Sea. It passes through or borders Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria, Moldova, and Ukraine, and its drainage basin extends into nine more countries.

The Danube is therefore a highly complex transnational ecosystem, and managing its water as a resource requires a lot of cooperation.

https://www.eea.europa.eu/data-and-maps/figures/restoration-activities-on-the-danube

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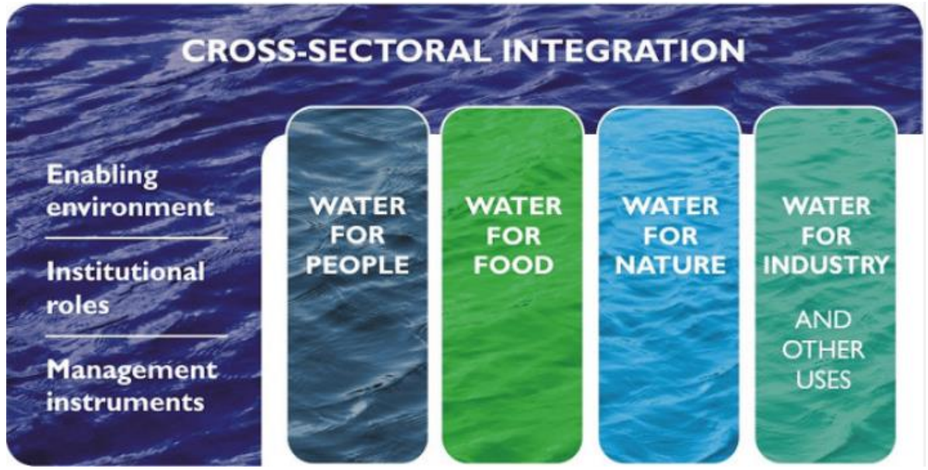
Who are the different actors and decision makers involved in managing water resources in a river basin?



https://www.gwp.org/en/learn/iwrm-toolbox/About_IWRM_ToolBox/

Several different types of water usage must be taken into account when managing water resources in a given place.

Water is needed for people (the population), food production (agriculture), industry (production of raw materials and goods), and the natural world.

Learning Activity: Role Game

The learning activity is divided into three videos.

In the first, Hydraulic Engineer Jakob Luchner presents the concept of Integrated Water Resources Management from his professional perspective.

In the second, he presents a role game using a fictional example based on a real world issue, in which representatives of two countries have to negotiate a water management solution.

In the third, you can listen to the responses and solutions of two of the groups who took part in the training workshop in Copenhagen.

We recommend that you do the activity first, and listen to the other responses afterwards.

https://sixtyeight.dk/c6ios.html#io3

Sources

Information about fresh water and flooding:
https://climate.ec.europa.eu/climate-change/consequences-climate-change_en

IPCC Special Report: Global Warming of 1.5 ºC:
https://www.ipcc.ch/sr15/

IPCC Latest Reports:
https://www.ipcc.ch/

Integrated Water Resources Management in more detail:
https://www.unep.org/explore-topics/disasters-conflicts/where-we-work/sudan/what-integrated-water-resources-management

Open Educational Resources

NOAH, Danish member of Friends of the Earth International

Information about water resources in Denmark, in Danish:
https://noah.dk/vores-arbejde/vandmiljoe

Educational resources in Danish:
https://noah.dk/materialer

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Thank you!

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