



Klima Kompetenz Camps für Zukunftsberufe

Topic: Climate and
sustainability



Content

- Weather and climate
- Precipitation and the water cycle
- Sustainability
- Politics and Climate-Conferences
- Technological solutions
- Hydrogen

Weather and climate

1) Determine the difference between climate and weather: tick off X.

EXAMPLES	WEATHER	CLIMATE
1. Yesterday was very cold and windy.		
2. From December to March, bears hibernate.		
3. In the morning the sun was very hot, but at noon clouds appeared and it rained.		
4. Spring comes with warm sun and the scent of flowering trees.		
5. At the end of August, the storks gather in flocks and fly south.		
6. In summer it is sunny and warm.		

Source: [Climate and energy efficiency. Methodical materials](#). From National Trust Ecofund, edited by Gyde Pulmer, licenced as [CC BY NC](#).

2) Discuss with your partner the differences between weather and climate and write down a definition for both.



Definition of weather:

Definition of climate:



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3) Brainstorming: What comes to your mind when you think of “climate change”?

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4) Watch the following video about the GSDR, the Global Sustainable Development Report: <https://sdgs.un.org/gsd/gsdr2019> (2022) and order the terms in *Table 1* as they occur in the video.

5) Then choose at least three of the terms and write down a definition.

Table 1:

Word	number	definition
biodiversity loss		
climate change		
sustainable		
deforestation		
lasting solutions		
loosing resources		
increased harvesting		

- 6) Discuss in how far you can attest that climate change has begun to knock at our doors. Note the most impressive points.

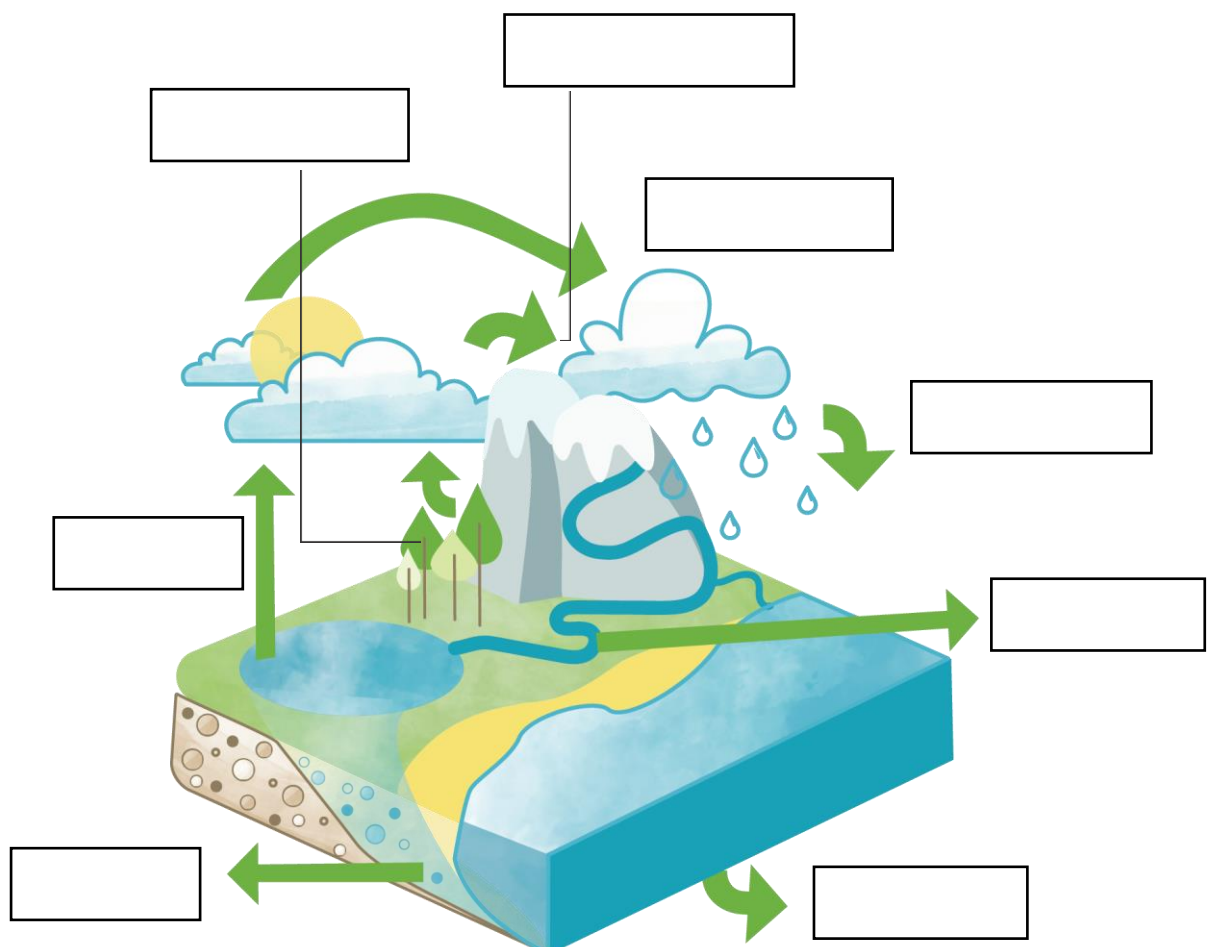
Precipitation and the water cycle

Earth's water is stored in ice and snow, lakes and rivers, in the atmosphere and the oceans.

- 1) How much do you know about how water cycles around our planet crucial role it plays in our climate?

- 2) Sort the following words to the correct place in the water cycle.

Evaporation	Condensation	Transportation	Surface flow
Accumulation	Transpiration	Precipitation	Perlocation



3) Go to the following website and answer the questions in the quiz on Precipitation and the Water Cycle:

<https://climate.nasa.gov/quizzes/water-cycle/>

The following explanation and vocabulary can help you answer the quiz questions:

word	explanation
The 3 states of water are	liquid, solid and gaseous.
surface	Oberfläche
soil	Boden
crop yield	Ernteertrag
precipitation	Niederschlag
to take place	a synonym for to occur
rain gauges	Niederschlagsmesser
The comparison (Steigerung) of warm	wet, wetter
The comparison (Steigerung) of <ul style="list-style-type: none">• warm• wet• strong	<ul style="list-style-type: none">• warmer• wetter• stronger
But: <ul style="list-style-type: none">• intense	<ul style="list-style-type: none">• more intense

How many questions did you answer correctly?

Sustainability

1) Work in pairs and discuss: What is your personal approach to “sustainability”?



Graphic „Human power is best! (Cartoon #26)“ by Alexandre Magnin, licenced under [CC BY \(4.0\)](#).

2) Read the following text about the “Brundtland Report”.

What is sustainability?

The ecological definition of sustainability originated with the Brundtland Report in 1987, which describes sustainable development as one that satisfies the needs of the present without adversely affecting the conditions for future generations.

The report highlighted the interconnectedness of economic, social, and ecological processes and was the foundation of the three-dimensional concept that was popularised at the 1992 earth Summit in Rio de Janeiro. This concept is based on the three connected dimensions of environment, society, and economy. This expresses the following:

- Economic, social, and ecological processes are interconnected. The actions of both public and private stakeholders cannot be considered as isolated, one-dimensional aspects; instead, one must consider the interrelationship between the three dimensions of environment, economy, and society.
- Sustainable development means more than just environmental protection. To satisfy our material and immaterial needs, we need economic well-being and a society based on solidarity.
- The effects of today's actions on the future must be taken into account (intergenerational aspect) so that future generations can also satisfy their needs.
- Sustainable development requires a long-term structural change in our economic and social system, with the aim of reducing environmental and resource consumption to a sustainable level while maintaining economic performance and social cohesion.

Sources: [Brundtland Report 1987](#), Federal Office for Spatial Development ARE

3) Answer the following questions about the text above.

a) What is a simple definition of sustainability?

b) What are the three principles of sustainability?

○

○

○

c) Why is sustainability so important?

d) How can we achieve sustainability?

4) Discuss the responsibility of the industrial countries in the context of climate change and sustainability. Make some notes.



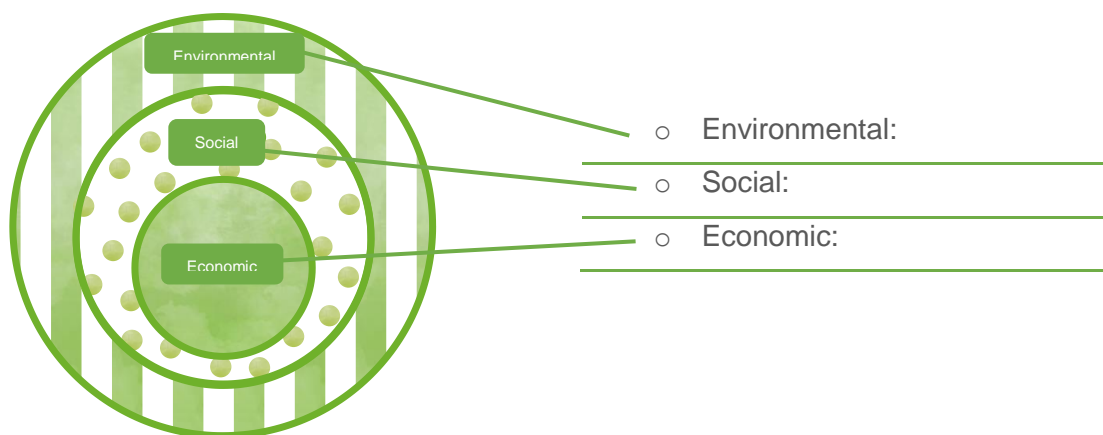
Graphic „Who made your clothes? (cartoon #17)“ by Alexandre Magnin, licenced under [CC BY \(4.0\)](#).

SUSTAINABLE DEVELOPMENT GOALS



Source: [Sustainable Development goals](https://sdgs.un.org/goals), United Nations

- 5) Look at the 17 sustainable development goals of the UN from 2015. Decide which ones refer to social, ecological or environmental, and economical changes (Add the numbers next to the appropriate aspect)



- 6) Discuss and make notes: Is it a well-balanced distribution in your opinion? Why/why not?

- 7) What is meant by the “wedding cake”? Watch this video to find out:
<https://www.youtube.com/watch?v=qfOgdj4Okdw> (2022)

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- 8) For checking the progress of each country in terms of SDGs, see
<https://dashboards.sdgindex.org/map/goals/sdg1> (2022). Describe the progress
of one country.

Country:
Progress:

Politics and Climate-Conferences

Please do some quick research (on English websites) and answer the following questions. Take notes and pass on your expert knowledge.

1) UNFCCC, UNCED

a) What does UNFCCC stand for?

b) What does UNCED stand for?

c) What is the Earth summit?

Who?

When?

Where?

Treaty?

2) COP

a) What is the COP?

b) When and where was the first COP?

c) How often do they take place?

d) What is its basic goal?

e) When and where does the current COP take place?

3) The Kyoto protocol

a) What is the “Kyoto protocol”? Who signed it?

b) When? /running for how long?

c) Which scientific consensus (2x)?

d) Which greenhouse gases listed in Annex A (7x)?

4) The Paris agreement

a) What is the “Paris agreement”?

When?

Who?

b) What is the outcome/temperature goal? _____ °C

c) What is the role of the US?

5) COP27 (see green box above)

a) Who are Participants, attendees?

b) Who are non-attendees?

c) What are topics, (ultimate) goals?

What is the COP27?

<https://www.youtube.com/watch?v=NF685s9s-jE>

What you need to know about COP27:

Since 1995 the United Nations has organized an annual conference for nearly 200 countries to talk about the climate crisis. Delegates and ministers from these countries have butted heads to find ways to cut emissions and adapt to a warming planet.

So, what is it that delegates will talk about at the beach resort town of Charmal Sheikh in Egypt this November?

Get ready for some jargon. First, loss and damage. Under the Paris agreement signed in 2015: Rich countries promise to pay for losses and damages caused in poor countries by climate change. However, until now countries have not discussed who will pay, how much they will pay, and how that money would be transferred.

With a third of Pakistan under water only a few months ago, the debate around loss and damage is expected to be a hot one at Cop27.

Second, what does Africa need? This will only be the fifth time a Cop meeting has happened in Africa as the continent that has contributed the least to climate change but it's suffering its worst impacts.

There will be a much needed focus on Africa's needs. Those needs will be met through financial grants, technology partnerships and bilateral deals. Expect lots of announcements that will be called memorandum of understanding.

Third, is private capital moving as expected. Even though COP meetings have been traditionally about government officials meeting their counterparts, private companies have been playing a bigger and bigger role. That's because moving the world to reach net zero emissions within decades will require as much as four trillion dollars of investments every year. The vast majority of that money will come from private players. At COP 26 in Glasgow last year the world's biggest financial institutions with more than 150 trillion dollars of assets under management committed to moving their Capital toward the goal of reaching net zero emissions by 2050.

At COP 27 there will be a big focus on finding out how they are progressing for all of Bloomberg's coverage of COP 27.

Technological solutions

1) Research one of the topics below.

Innovations and science-based solutions in the fight against climate change

- smart *wind power* plants of the future through innovations
 - Kite wind power:
 - Floating wind power:
 - Bladeless wind energy:
 - Vertical axis wind power:
- innovations in *solar power*
 - Solar farms
 - Floating panels
 - transmitting solar power wirelessly from space
(<https://www.youtube.com/watch?v=Uq6EgZ836iE>)
 - more efficient solar cells with higher energy conversion efficiency:
<https://www.ise.fraunhofer.de/de/presse-und-medien/presseinformationen/2022/fraunhofer-ise-entwickelt-effizienteste-solarzelle-der-welt-mit-47-komma-6-prozent-wirkungsgrad.html>
 - bio solar cells: photosynthesis converting sunlight into useable energy
<https://edepot.wur.nl/171197>
 - reshaping the solar spectrum to turn light into electricity or: use of wasted light: <https://phys.org/news/2015-07-reshaping-solar-spectrum-electricity.html> <https://www.nature.com/articles/d41586-021-01673-w>
- seaweed farms
- hydrogen
- carbon capture
- power storage
- Smart technology and artificial Intelligence

2) Prepare the researched information for your classmates in a presentation. Think about the advantages and disadvantages of the technologies as well and discuss the risks.

Hydrogen

- 1) Watch the video on hydrogen and answer the following questions in keywords.
<https://www.youtube.com/watch?v=8Mi32tnyvQs> (2022)

a) What are advantages of using hydrogen? List two.

b) Which applications are mentioned?

c) Where does hydrogen occur?

d) Which colors is hydrogen often being referred to?

e) What does the given color in general depend on? Give examples, please.

f) What are the two disadvantages of electrolysis?

○

○

g) What is a more common method of creating hydrogen gas compared to electrolysis?

2) Work on one of the following tasks. Read the text. Look up unknown words. Take notes and present your results to your partner.

a) Explain the COLOUR SPECTRUM of hydrogen in detail.

<https://www.nationalgrid.com/stories/energy-explained/hydrogen-colour-spectrum>

b) What is GOLDEN HYDROGEN?

<https://www.goldhydrogen.com.au/natural-hydrogen/>

Expected answers:

Weather and climate

1)

EXAMPLES	WEATHER	CLIMATE
7. Yesterday was very cold and windy.	X	
8. From December to March, bears hibernate.		X
9. In the morning the sun was very hot, but at noon clouds appeared and it rained.	X	
10. Spring comes with warm sun and the scent of flowering trees.		X
11. At the end of August, the storks gather in flocks and fly south.		X
12. In summer it is sunny and warm.		X

- 2) Definition weather: Weather reflects short-term conditions of the atmosphere in a certain moment at a certain location. It can change rapidly from one moment to the other.

Definition climate: Climate is the average daily weather for an extended period of time at a certain location. It is a long-term period of app. 30 years and also includes extreme values that deviate from statistics. (Paleogene climate even app. 1000 years)

- 3) climate, atmosphere, greenhouse effect, natural greenhouse effect, man-made or anthropogenic greenhouse effect, greenhouse gases, emissions, CO₂, methane, nitrogen, environment, biodiversity, energy, energy consumption, fossil fuels, resources, depletion, renewable energy sources, solar power, wind power, waterpower, biomass, agriculture, industry, economy, traffic, exhaust gases, pollution, consumption, standard of living, sustainability, nature,

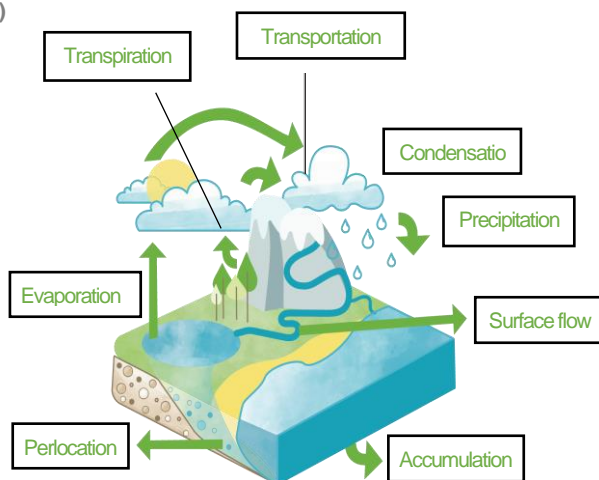
global warming, heat, heat rays, melting of glaciers, rise of sea levels, floods, storm floods, droughts, heavy winds, thunderstorm, hurricane, tornado, poverty, injustice, climate justice, climate refugee, mass migration

4)

Word	number	definition
biodiversity loss	3	
climate change	2	
sustainable	1	
deforestation	4	
lasting solutions	6	
loosing resources	7	
increased harvesting	5	

Precipitation and water cycle

2)



- 3) 1C, 2C, 3E, 4B, 5D, 6E, 7B, 8A, 9C, 10A

Sustainability

5	social: 1, 2, 3, 4, 5, 7, 11, 16	sum: 8
	ecological: 6, 13, 14, 15	sum: 4
	economical: 8, 9, 10, 12, 17	sum: 5

Politics and Climate-Conferences

1) UNFCCC, UNCED

1a) What does UNFCCC stand for?	United Nations Climate Change Conference
1b) What does UNCED stand for?	United Nations Conference on Environment and Development
1c) What is the Earth summit?	Informal name of treaty, signed by 154 states, Rio de Janeiro, 14th June 1992

2) COP

2a) What is the COP?	Conference of the Parties: the supreme governing body of an international convention (<u>treaty</u> , written agreement between actors in <u>international law</u>). It is composed of representatives of the member states of the <u>convention</u> and accredited observers. The "implementation of the Convention and any other legal instruments
2b) When and where was the first COP?	2007, Indonesia
2c) How often do they take place?	Once a year (not in 2021)
2d) What is its basic goal?	Fight climate change, reduce greenhouse gases
2e) When and where does the current COP take place?	Egypt, November 2022

3) The Kyoto protocol

3a) What is the "Kyoto protocol"? Who signed it?	signed in 1997 by 192 parties
3b) When? /running for how long?	ran from 2005 to 2020
3c) Which scientific consensus (2x)?	global warming is occurring and human-made CO ₂ emissions are driving it
3d) Which greenhouse gases listed in Annex A (7x)?	carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF ₆), nitrogen trifluoride (NF ₃)

4) The Paris agreement

4a) What is the "Paris agreement"? When? Who? an international treaty on <u>climate change</u>	
4b) Outcome/temperature goal?	Reduce emissions roughly by 50% by 2030, reach net-zero by 2050 well below 2 °C (3.6 F), preferably limit the increase to 1.5 C (2.7 °F)
4c) Role of the US?	US withdrew in 2020, came back in 2021

5) COP27

5a) Participants, attendees?	90 heads of state and representatives from more than 190 countries, among them German Chancellor O. Scholz, Biden
5b) non-attendees?	Chinese leader Xi Jinping, Russia's Vladimir Putin, Swedish climate activist Greta Thunberg
5c) topics, (ultimate) goal?	in dispute, wealthy countries will focus on ways to help developing nations phase out fossil fuels and transition to renewable energy.

Technological solutions

Listen to the presentations of the students and discuss if technological solutions can solve the problems through climate change.

Hydrogen

1a)

It can be burned for clean energy, when hydrogen reacts with oxygen to produce energy the only waste product is water. $2 \text{H}_2 + \text{O}_2 \rightarrow \text{Energy} + 2 \text{H}_2\text{O}$
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It can be used to store renewable energy to improve the flexibility of power grid. It is an energy carrier which is used to store and move energy. Hydrogen Gas = Energy Carrier (used to store and move energy)

1b) In transportation, hydrogen can be used in fuel cells in cars and other vehicles.

1c) It is the most abundant element in the universe. On earth it is not available as a pure gas but combined with other elements like carbon in methane or oxygen in water. You need to separate them from the other elements. We need energy for that like heat or electricity.

1d) Yellow, green, blue, pink, turquoise, grey, brown or black hydrogen and even gold.

1e) It depends on the method used to create it. E.g. if you use fossil fuels or coal to create energy to make hydrogen gas, this is referred to as brown or black hydrogen.

If it is produced in an environmentally-friendly way it is called green hydrogen.

Green hydrogen is created through a process called electrolysis, which passes an electric current through water to split H_2O molecules into hydrogen and oxygen. It uses renewable energy like solar or wind power for the electricity it uses. So, no greenhouse gases are emitted.

1f) It is expensive and time consuming.

1g) By taking natural gas, made up of methane and other hydrocarbons, and a process called steam reforming.



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