

Education for climate resilience of the Mura-Drava-Danube Biosphere Reserve

RESOURCES FOR TEACHERS

OKO MDD

Principles to remember

Below are some of the key principles about climate change education that should be taken into consideration for your curriculum.

- Climate change is a scientific subject connected to environmental education, but it's also a highly interdisciplinary subject with links to social, economic, and political topics. Climate literacy education should go beyond natural sciences to connect the cause-and-effect relationships contributing to climate change with the decision-making and critical thinking skills needed to understand it.

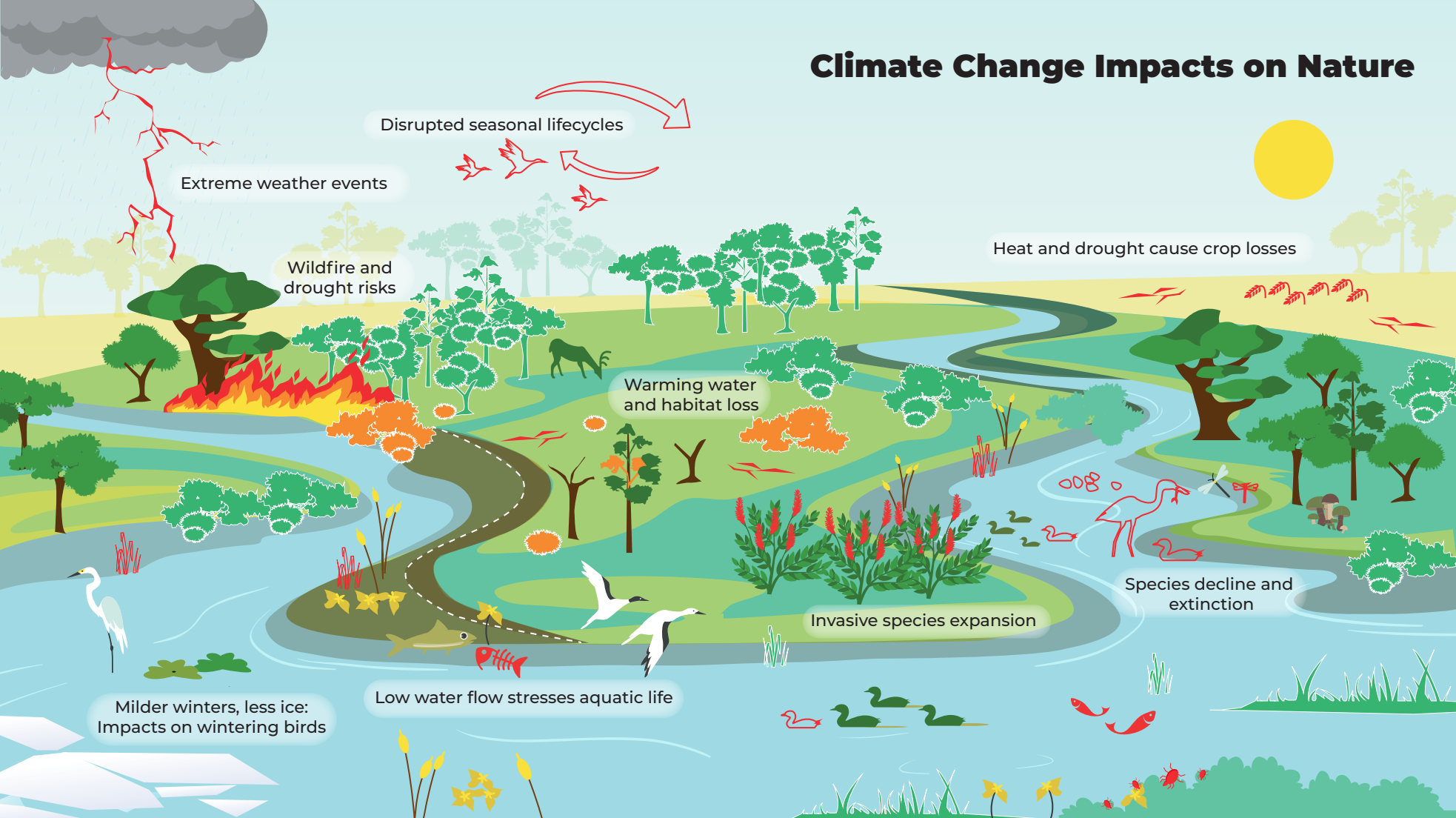
- The relationship between environment, sustainability, and climate change issues should be integrated throughout curriculum on climate change, as climate change exists within a broad context.

- Given this background, climate change education should be approached differently from other environmental issues. There are ethical implications as well as experiences that may deeply resonate with cultural values and identities or strongly held beliefs. The role of cultural ideology must be acknowledged as it will impact how information is processed, and their perception of the topic.

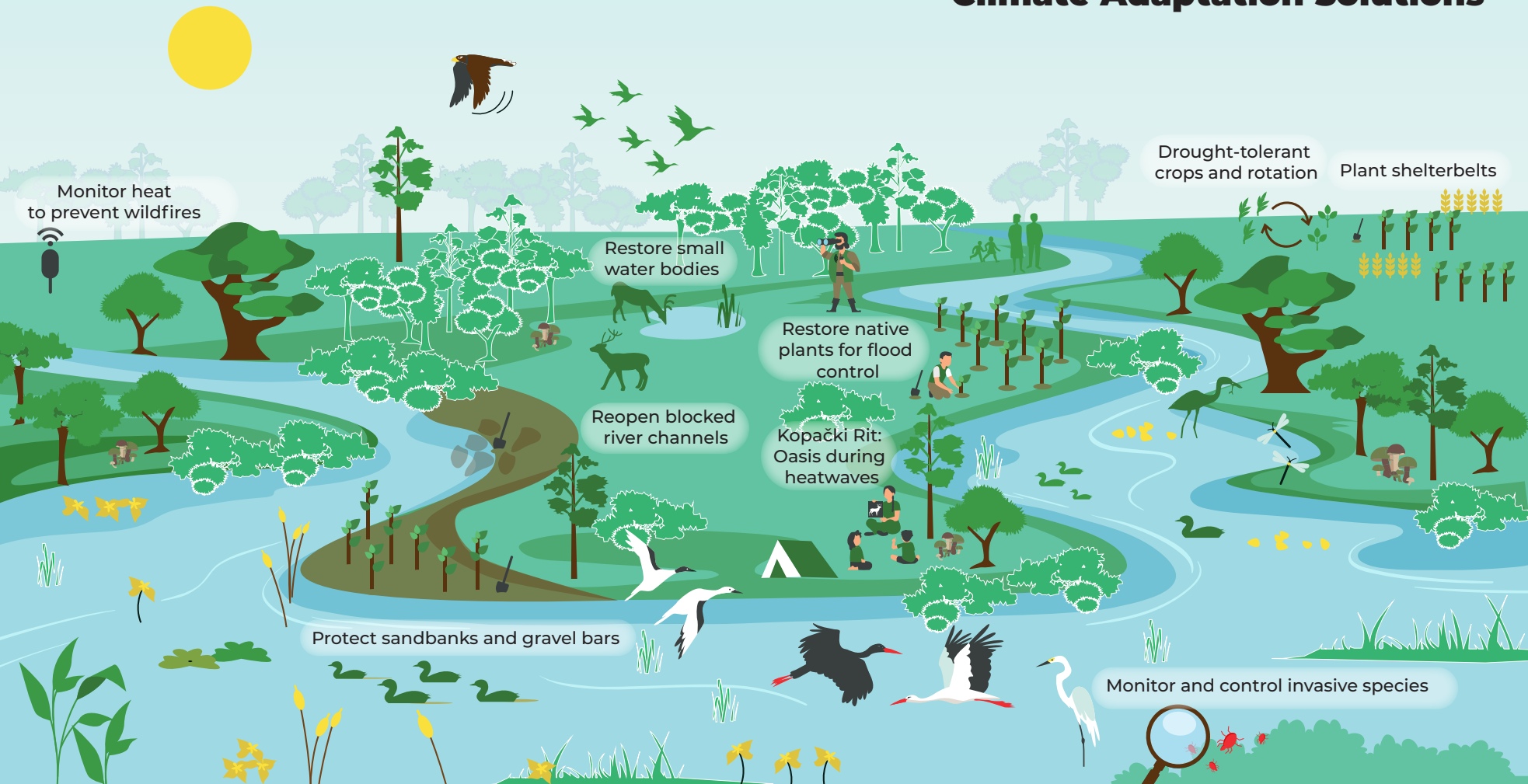
- Different age groups and exposure to climate change topics may be able to benefit from different curricula.
    - Secondary education should examine the scientific principles behind climate change, including greenhouse gases, the carbon cycle, and human impacts on the environment. Case studies may relate to pollution, deforestation, and climate change impacts on ecosystems.
    - Upper secondary students can also be exposed to ethical questions and the real-world application of climate knowledge. This may involve looking at and developing climate action plans, participating in citizen science projects, or engaging in debates about climate policies. This creates the link between current events and societal challenges, giving them a chance to use their scientific knowledge while discussing local and global climate change implications.

- Remember that climate change can also be an emotionally charged topic for some students. When confronted with information about climate impacts, it can lead to something called "eco-anxiety", the phenomenon of distress where people because anxious about their future given the environmental issues facing them. This can also sometimes lead to climate denial, as it is easier to avoid negative feelings. In order to cope, it's important to allow students to acknowledge their feelings, and help them stay connected through activities and civic engagement. This may look like providing space for students to reflect on their feelings and actively discussing solutions to climate change impacts and how they can get involved.

Climate Change Impacts on Nature



Climate Adaptation Solutions



Climate Solutions: From City to Home



Key Competencies of Climate Change Education

As you take your students through the newly developed curriculum, there are some key topics that should be covered to ensure their understanding. These are summarized below:

- Understanding causes, effects, consequences and responses
  - Climate vs. weather
  - Greenhouse effect
  - Human causes of climate change
  - Consequences of climate change

- Applying evidence-based and systems reasoning to climate challenges to evaluation information
  - How is climate change data is collected and analyzed?
  - Understanding how scientific knowledge is generated and communicated (through models, datasets, managing uncertainty, examining long timeframes)

- Evaluating arguments and perspectives
  - Teach students critical thinking such as, what is a trusted source?
  - How can you distinguish evidence-based claims from misinformation? Students need awareness of the reasons that can lead to distorted knowledge (stakeholder interest, lack of education, lack of critical thinking) and why data may be misinterpreted

- Caring for ourselves, each other and the planet
  - Recognizing our emotions when learning about climate change
  - Trying to support others affected by climate change
  - Respecting nature and our planet

- Responding together with informed action
  - Identifying problems and solutions
  - Working together for positive change

Further information about these topics can be found at Cambridge International and OECD websites.

Making climate change education effective

There are some techniques that have been shown to make climate change teaching more effective for students, especially given its interdisciplinary and uncertain nature.

1. **The curriculum should be focused on making climate change information personally relevant and meaningful for learners**
   Having a personal connection to climate change impacts affects how students absorb the information. Classic examples of climate change may be easy to demonstrate impacts (rising sea levels, melting polar ice caps) but should also be coupled with locally relevant examples. This could look like water quality impacts, ecosystem degradation, climate risk strategies for businesses, energy conservation in school, or a carbon calculator.

2. **The activities should be designed in an engaging way**
   Climate change science can sometimes be complex, but there are other social science aspects that can help keep activities engaging. Experiments, debates, small-group discussions, hands-on labs, field trips, documentaries, role-plays, online investigations, or flipped classroom can all be ways to keep your students engaged.

Dealing with controversial topics

Some parts of climate change education can be controversial, especially depending on political background or exposure to different news sources which may have already led students to form their own opinions. There are a few techniques that can help mitigate this and keep the students on track.

- **Deliberative discussion.** The aim is to help learners understand their own and others' viewpoints and knowledge. Students should compare perceptions, understand different opinions, and reflect on their knowledge. Exercises could include sharing different stakeholder organizations with different interests in climate change. Students then used climate science to help them understand and assess the different positions, which helped them combine their personal reflections, group discussion, and clarification of the scientific context.

- **Interact with scientists and use the scientific process.** Lessons that show where scientific information comes from helps them understand the process better. Students could take trainings in GIS, look at online databases, or conduct their own projects and experiments.

- **Uncover misconceptions.** There are some commonly held misconceptions about climate change that should be addressed throughout the teachings. These could include thinking that climate change and the ozone layer are the same thing, climate change should only cause global warming, or that the earth is supposed to be heating up now as in the past. Teachers should familiarize themselves with these concepts and be prepared to discuss them with students.

- **Projects.** Learners can get engaged in designing and implementing their own school-level or community projects to create a personal connection with the issue.

Further resources

Under this project, we have collected a series of resources for climate change education, including sample lesson plans, interesting reports, multimedia resources, and more.

UNDP Climate Box Toolkit
https://climate-box.com/toolkit/
This interactive resource suggests a full education program with an illustrated textbook on climate change. This can be used as supplemental reading or to help you design courses.

National Geographic lessons and resources
https://education.nationalgeographic.org/search/resources/?q=climate&page[number]=1&page[size]=25&filter[grades]=9&filter[grades]=10&filter[grades]=11&filter[grades]=12&filter[grades]=13
This resource includes a collection of videos, articles, and other tools that are interesting and engaging for students.

CC Indicators map
https://education.nationalgeographic.org/resource/mapmaker-climate-change-indicators/
This interactive map shows different climate change indicators layered to understand the impacts around the world.

Teaching Climate Change guide
https://subjecttoclimate.org/teacher-guides/teaching-climate-change-to-high-school-students
This resource includes games, videos, and some specific lesson plans such as climate change solutions and argumentation.

WWF Climate change resources
https://www.wwf.org.uk/get-involved/schools/resources/climate-change-resources
This resource includes teacher guides and ready-made presentations that can be adapted.

Climate Adaptation Game
https://www.smhi.se/en/climate/tools-and-inspiration/climate-adaption-game
An online game to make a city more resilient to climate change. It helps students understand how climate change affects society and explore solutions to deal with it.

Climate Handbook
https://probablefutures.org/climate-handbook/
The handbook explores key topics: heat, water, and land. It can be used as an extra resource for you or students to learn more on key topics. There are some visuals that may be useful for presentations.

CFR Climate Change Resources
https://www.cfr.org/education/climate-change-resources
This website includes lots of free resources, including topic background, lesson plans, discussion questions, and activities for teachers.

SEEEd Resources
https://se-ed.org.uk/a-collated-list-of-online-climate-change-learning-resources/
Scroll down to the Videos and Podcasts section for different free documentaries, videos, and podcasts.

ESA Climate Office
https://climate.esa.int/en/educate/climate-for-schools/
This site includes resource packs covering different climate-related topics. While split into different levels, the lower secondary may still be appropriate. Includes very specific lesson plan instructions, with activities

CLEAN Educator Support resources
https://cleanet.org/clean/literacy/index.html
These resources go through lesson plans and key concepts. Check out Teaching Climate Science, Teaching Energy, and Addressing Climate Change.

Climate Change and Land (OCE)
https://www.oce.global/en/resource/climate-change-and-land/
Use page 7+ for an introduction for teachers. This resource provides a Pedagogical Overview for teachers and a series of Lessons, including Project-based learning techniques

The Climate in our Hands — Climate Models (OCE)
https://www.oce.global/en/resource/the-climate-in-our-hands-climate-models/
This report covers more physical science topics, especially
- Earth's Climate system
- Climate Modelling
- Climate Models to Predict Future

As well as different teaching methods (page 10)
- Inquiry-based learning
- Project-based learning
- Interdisciplinary approach
- Positive thinking

Ocean and Cryosphere (OCE)
https://www.oce.global/en/resource/alec-oceans-and-cryosphere/
This resource is more specific but still has some interesting chapters which could cover supplemental topics, such as:
- Sequence C: What are the consequences of CC on the Ocean and Cryosphere?
- Sequence D: Why are the Ocean and Cryosphere Important to Us?
- Part II: projects examples with Do it Yourself Project Ideas section

Experiential Learning — Innovative Education Ideas for Teachers
https://www.experientiallearningdepot.com/experiential-learning-blog/a-step-by-step-guide-for-teaching-a-comprehensive-high-school-climate-change-unit
This resource shares a list of activities that can be done with high school students to demonstrate different topics.

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SWISS-CROATIAN Cooperation Programme

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This booklet was created for the OKO-MDD Education for Climate Resilience of the Mura-Drava-Danube Biosphere Reserve project, supported by the Swiss Government under the Swiss-Croatian program of cooperation. This guidebook provides key resources for teachers on climate change education that can be consulted during the design and teaching stages of the project.