

## **Project result 2: Professional development training for scientists**

## Training materials for scientists & science communicators

## 1. General description of the module

Partner institution:	USB – University of South Bohemia		
Target group:	Scientists		
Expertise needed per	Basic understanding of the natural image of the Earth		
target group:	(geobiomes), movements of sea currents (salinity,		
	temperature, etc.), basic orientation in the effects of human		
	activity on climate change		
Overview of the module:	The module consists of four units that demonstrate and approach scientific work through various activities and experiments and through which the public, scientists, pre- service and in-service teachers can understand the issue and lead the pupils and students to enlightenment as well. The module is developed in a mixed format. In particular, the target group must explore in advance several selected resources related to the topics under investigation (based on the resources that can be found in the Toolkit (PR1) and the developed infographic (PR3)), participate in face-to-face teaching based on independent work and experiments. At the same time, the whole unit is supplemented with asynchronous teaching. The whole module aims at a deeper final discussion and reflection, while working with the active participation in the topic.		
Duration:	4 hours		
Objectives:	Learning of climate change concepts, development of		
	creative activity and teamwork, development of discussion		
	skills		
	Learn about the consequences of climate change and realize		
	the impact of human activities on the irreversible		
	transformation of the landscape		
Assessment:	Final debate and feedback forms for participants		

## 2. Description of the individual activities





Title of activity 1:	A planet from nature: the territory of scientists or a place for human life?	
Duration:	60 minutes	
Core ideas – Content:	The introductory part of the module with the aim: to realize what impact climate change has on people's lives, how the results of scientific work, approached and presented to the public, can affect these impacts	
Objectives:	Approaching the structure and procedures of scientific work – working with different sources, sorting one's own ideas, one's own practical part, and a final discussion. They will realize that climate change needs to be addressed at different levels of the organization of human society. Development of work with resources (atlas, Google Earth), reading materials. Acquire and improve acquired knowledge in the field of the natural image of the Earth. Be able to think spatially and develop creative abilities. They will become aware of the connection between the location of a given place on Earth (geobiomes) and the impact of climate change in a given area and how the results of scientific work can help to educate in this area. Acquisition of teamwork skills, application of content skills in a practical activity.	
Detailed description of the activity's implementation (word limit 300 words max)	<b>INTRODUCTORY MOTIVATION PART</b> : The activity is carried out outdoors. Participants are divided into 3 working groups. Each group is assigned one white canvas with the outline of the continents; they have at their disposal a School World Atlas and a tablet with Google Earth. The task of the groups is to first use the natural materials found in the surroundings to assemble the Earth's vegetation belts (geobiomes) and then to define and talk together about possible climate processes that affect (positively/negatively) the local landscape and life in it. Participants create the map independently in groups. There is collaboration, discussion of problems, and division of tasks in the group. The activity takes place "in situ" and "in time" and constitutes the motivational part of the module, which through experiential learning enables not only a closer acquaintance of the module participants, but also the transmission of scientific procedures to the general public, while the process of unintentional learning takes place. <b>MAIN PART:</b> Participants are divided into 3 groups, according to the previous task. Now each group will be given one of the materials from the Toolkit to study, after reading which they must incorporate their thoughts in the form of their own	





	wordclouds, which the participants.	ey will then present to the other	
	<b>FINAL PART:</b> Presentation of own maps from nature materials to other participants, including a discussion of the effect of climate change on selected geobiomes or their parts. Presentation of topics from Toolkit materials in the form of created wordclouds. Final joint discussion of the main ideas in Activity 1.		
	WorkshopWorkshop	Participants create their own practical map of geobiomes from nature. They work in groups with an atlas or world map (Google Earth)	
Type of activity <i>(select &amp; comment)</i> :	Planned reading Planned reading	Each group is given a different material from the Toolkit to read, after reading which they must select the key ideas and present them to the other participants.	
	Group discussionGroup discussion	A final joint discussion on the created maps and questions prepared by the participants as part of the analysis of the Toolkit materials in the form of a wordcloud.	
	AssignmentAssignmen t	They develop their own map of the world's geobiomes and discuss the issue of climate change in selected areas.	
Tools (select & comment):	Toolkit Toolkit	Reading the material from the Toolkit – capturing the main ideas	
	WordcloudWordcloud	Creating your own group wordclouds based on the results of reading materials from the Toolkit.	
Links of the activity sheets:		·	
Resources (links to the toolkit & infographics):	https://climatekids.nasa.gov/menu/play/ https://thewaterweeat.com/		

Title of activity 2:	Thank You for the Rain
Duration:	60 minutes



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Core ideas – Content:	Asynchronous teaching	<ul> <li>independent work</li> </ul>
Objectives:	<ul> <li>to realize the implives</li> <li>learn about the pdeveloping world</li> <li>realize that climat different levels of will understand the for agriculture ar permanent climate take a look at interclimate change</li> <li>they will realize own neighbourh</li> </ul>	pact of climate change on people's problems that farmers in the d have to face ate change needs to be addressed at of the organization of human society the importance of rain and its need and the population dependent on a fate system ternational events in the issue of that even small civic actions in their ood can bring about change
Detailed description of the activity's implementation (word limit 300 words max)	<ul> <li>INTRODUCTORY PART: Watching the documentary film Dahr. J (2017) 'Thank You for the Rain' to realize the interconnectedness of your actions on climate change.</li> <li>MAIN PART: During the film, the participants write down their main ideas and then try to pick out a locality from their immediate surroundings/place of residence/state, etc., that they have heard about in connection with climate change, or which may be negatively affected by climate change. Subsequently, they prepare their own presentation in which they discuss a case study dealing with the selected problem.</li> <li>FINAL PART: They will then present the prepared presentations to other participants in the online forum. As part of their case study, Infographics will try, also based on the materials from the Toolkit, to propose a possible solution to the problem they were interested in</li> </ul>	
Type of activity (select & comment):	Case studies Case studies	Watching a documentary film, creating a case study, presenting this study to other participants
Tools (select & comment):	Video Video	The introductory part of the activity: Watching the documentary film
	InfographicsInfographi cs <mark>Toolkit</mark> Toolkit	Use of Infographics materials, Toolkit to solve selected problems within the case study of the selected territory
	PresentationsPresenta tions	





	ForumForum	Online forum for presentation of the created case study to other participants
Links of the activity		
sheets:		
Resources (links to the toolkit & infographics):	https://thewaterweeat.com/         https://www.youtube.com/watch?v=oXOu-         dezdKo&ab_channel=TEDxTalks         Waarom smeltend zee-ijs van de Noordpool niet bijdraagt         aan de zeespiegelstijging   NU.nl         Dahr, J. (2017): Thank You for the Rain         https://www.jsns.cz/lekce/748377-dekujeme-za-dest	

Title of activity 3:	Island of plastic waste	
Duration:	60 minutes	
Core ideas – Content:	The activity aims to arouse interest in the issue of ecology and recycling. It uses discussion, critical thinking, and questioning. It is important for students to be aware of the interconnectedness of the world and its ecosystem so that they can behave and act accordingly in the future. The activity shows one of the examples of the popularization of science (see Charles Moore's video sample).	
Objectives:	The goal of the activity is to learn not only about what happens to most plastics after they cease to be useful to people but also about the laws of physics that gradually create a continent of garbage. Participants become familiar with the real form of scientific research as part of the experiments.	
Detailed description of the activity's implementation (word limit 300 words max)	INTRODUCTORY MOTIVATION PART: The activity begins by watching a video (7 min.), which is freely available from the following web address: http://www.ted.com/talks/capt charles moore on the sea s of plastic The video deals with the topic of plastic waste in the seas and oceans, accompanied by science populariser Charles Moore of the Algalita Marine Research Foundation. The video is interspersed with many statistical data and authentic visual material. It describes the garbage cycle and answers basic questions such as: How does this garbage get to these places, what does it create, and how does it move? It deals with the formation of garbage patches, what causes them to clump together, and what are the possibilities for their disposal. In	



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	conclusion, he reflects on the future and the changes that		
	human society must go through.		
	Even while watching	the video, the reflection of the	
	through the montin	is collected from the participants	
	narticinants create a co	mon wordcloud Subsequently the	
	resulting worldcloud i	s debated together using guiding	
	questions e g ·		
	Have you noticed any possible solutions to the problem of		
	plastic pollution? How c	an this pollution affect each of us? Is	
	it our problem? Think ab	out how to prevent sea pollution and	
	how to proceed in solvin	ng this problem? By what means and	
	routes does waste enter	the ocean?	
	MAIN PART:		
	Participants (as a scient	ist = role-play) carry out experiments	
	according to the exact ir	nstructions they receive (see sheet 1).	
	Physical experiments de	al with the issue of sea currents and	
	the determination o	f water salinity (during these	
	experiments, participants will have the chance to experience		
	now water naturally moves in the world's oceans).		
	Experiment 1 Flow of wa	ater in the oceans	
	<ul> <li>Experiment 2 Stratification of water in the ocean according to its various properties.</li> <li>Participants become familiar with the real form of scientific research as part of the experiments.</li> </ul>		
	research as part of the e	xperiments.	
	FINAL PART:		
	Based on watching a motivational lecture and carrying out experiments and using the available Toolkit, Infographics, etc. Participants will create their own poster/padlet/mind map or whiteboard with a thematic focus on education in the area of		
	plastic waste manageme	and Joint presentation of the resulting	
	Debate Debate	Watching a motivational video	
Type of activity (select &	Dobalo Dobalo	reflection using mentimeter	
comment):		experiments and a final debate	
	Role - play Role - play	Implementation of experiments -	
		participants have the role of	
		scientists exploring the oceans and	
		implement scientific experiments	
Tools (select & comment):	Video Video	Watching a motivational video	
	Toolkit		



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	InfographicsInfographi cs	Use of Infographics materials, Toolkit to create final posters/padlets etc.
	Whiteboard (e.g. padlet, jamboard)Whiteboard (e.g. padlet, jamboard)	Creation of own posters/padlets reflecting the given topic from the participant's point of view
Links of the activity sheets:	Sheet 1 Physical experiments deal with the issue of sea currents and the determination of water salinity	
Resources (links to the toolkit & infographics):	https://www.ted.com/talks/charles_moore_seas_of_plastic plastic-free-school.pdf (nationalgeographic.com)	

Title of activity 4:	Storytelling Will Save the Earth: feedback of activities	
Duration:	60 minutes	
Core ideas – Content:	Climate change is complicated and can often feel far removed from our lives. Sharing our personal stories about climate change can place facts into context and can help us understand how it is relevant to our lives. Final discussion and brainstorming	
Objectives:	Getting to know climate stories - personifying the problems Acquisition of oral skills, collection of ideas and feedback forms	
Detailed description of the activity's implementation (word limit 300 words max)	<ul> <li>INTRODUCTORY MOTIVATION PART:</li> <li>In three groups, participants will learn about <i>climate stories</i> selected from the Toolkit and Infographics.</li> <li>Unlike numbers or facts, stories can trigger an emotional response, harnessing the power of motivation, imagination, and personal values, which drive the most powerful and permanent forms of social change. The power of stories can be harnessed for good. We all have a story to tell, what's yours?</li> <li>MAIN PART:</li> <li>Through Storytelling combined with dramatization, narration, etc., he will present their climate stories to the other participants.</li> <li>The intention is to awaken in the participants their own responsibility for their surroundings and thus adapt their behaviour to the values of sustainable development and an ecological way of life. At the same time, emphasis is placed on critical thinking and examining issues on a global scale. In the</li> </ul>	



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	<ul> <li>course of the discussion, the participants are already working with the information they have acquired during the entire module.</li> <li>FINAL PART:</li> <li>A final discussion will follow the group presentations: students will be asked their feedback and opinions about the activities, positive and negative impressions and suggestions. This will be useful both for students, in order to collect ideas, elaborate the acquired skills. Participants fill out a feedback</li> </ul>		
	form.		
Type of activity (select &	StorytellingStorytelling	Final reflection of own work and	
comment):		feedback, joint discussion	
Tools (salast & commant);	InfographicsInfographi	Work with infographics dedicated	
	CS	to climate stories	
	Toolkit <mark>Toolki</mark> t	Use of materials from Toolkit about	
		storytelling (climate stories)	
Links of the activity			
sheets:			
Resources (links to the toolkit & infographics):	https://scied.ucar.edu/learning-zone/climate-change-impacts https://www.coursera.org/learn/climate-science?action=enroll		

