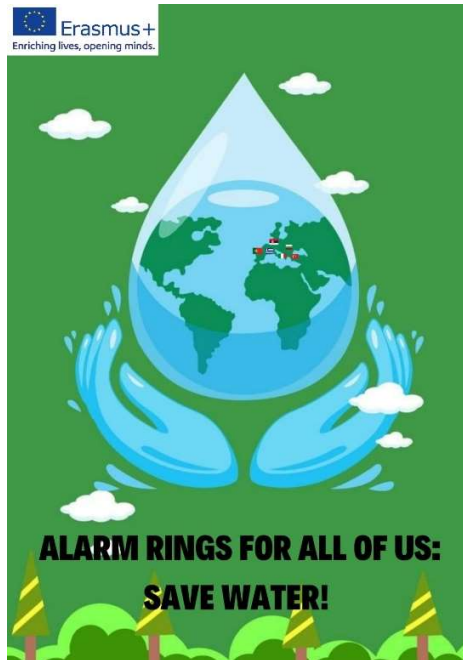


ERASMUS+ PROJECT “ALARM RINGS FOR ALL OF US: SAVE WATER!” - 2022-1-BG01-KA220-SCH-000085699



Manual For The Implementation Of The Curriculum

Water – The Key to Life: Properties, Importance, and the Environmental Impact of Water Scarcity and Pollution

Bulgaria – Turkiye – Serbia – Portugal – Italy – Greece



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Area 1: Physical and chemical characteristics of water

Topics:

- Water molecule – properties, polarity and hydrogen bonding
- Density of water and ice. Thermal and optical properties of water
- Amphoteric nature of water. Electrical properties of water.
- Cohesion and adhesion

Outcomes:

At the end of the curriculum students will be able to argumentatively discuss:

- the chemical and physical properties of water
- the importance of the hydrogen bond
- the importance of water as a solvent
- water anomalies, as well as explain the importance of water anomalies for the living world

TOPIC: Water molecule – properties, polarity and hydrogen bonding

Duration/number of classes	2
Developed by	Serbia
Objectives	Developing and expanding student's knowledge about: <ul style="list-style-type: none">• water - its physical and chemical characteristics,• water molecule, polarity and hydrogen bonding.
Preparation	Genially presentation
Outcomes	Based on the structure of water molecules, students will be able to explain polarity. They will understand what a hydrogen bond is and how it is formed. They will be able to explain states of water and the water cycle
Didactic-methodical implementation	<ul style="list-style-type: none">• Flipped classroom• Problem Based Learning
Tasks / students' activities	Students will receive the material through Google Classroom. Their task will be to read it and prepare for active participation in the class, as well as for solving problems. In class, they will actively participate in work and problem solving.

Cross-curriculum competencies of students	<ul style="list-style-type: none"> • Digital competence • Work with data and information • Problem solving • Cooperation • Communication
Assessment criteria	Student participation in class work, quality of class work and students' ability to solve assigned problems.
Materials	https://view.genial.ly/65e0d7c9874cd10013c178ad/presentation-water-molecule
Digital resources	Google Classroom Genially presentation

TOPIC: Density of water and ice. Thermal and optical properties of water

Duration/number of classes	2
Developed by	Serbia
Objectives	Developing and expanding student's knowledge about: <ul style="list-style-type: none"> • density of water and ice, water anomaly, thermal and optical properties of water
Preparation	Genially presentation
Outcomes	Students will be able to explain the anomaly of water, thermal and optical properties of water
Didactic-methodical implementation	<ul style="list-style-type: none"> • Flipped classroom • Problem Based Learning
Tasks / students' activities	Students will receive the material through Google Classroom. Their task will be to read it and prepare for active participation in the class, as well as for solving problems. In class, they will actively participate in work and problem solving.
Cross-curriculum competencies of students	<ul style="list-style-type: none"> • Digital competence • Work with data and information • Problem solving • Cooperation • Communication
Assessment criteria	Student participation in class work, quality of class work and students' ability to solve assigned problems.

Materials	https://view.genial.ly/65e6271d0d14fd00142df65a/presentation-water-anomaly-thermal-and-optical-properties-of-water
Digital resources	Google Classroom Genially presentation

TOPIC: Amphoteric nature of water. Electrical properties of water

Duration/number of classes	1
Developed by	Serbia
Objectives	Developing and expanding student's knowledge about: <ul style="list-style-type: none"> • Amphoteric nature of water, pH of water. • Electrical properties of water, electrolytes, electrolysis.
Preparation	Genially presentation Litmus paper, water samples from different sources, clean container Two graphite pencils, a plastic plate, two conductors, an electric battery, a glass of water
Outcomes	Students will be able to explain <ul style="list-style-type: none"> • Amphoteric nature of water, pH of water. • Electrical properties of water, electrolytes, electrolysis.
Didactic-methodical implementation of the topic	<ul style="list-style-type: none"> • Flipped classroom • Problem- based learning <ul style="list-style-type: none"> ○ Conducting experiments
Tasks / students' activities	Students will receive the material through Google Classroom. Their task will be to read it and prepare for active participation in the class, as well as for solving problems, and conducting experiments. In class, they will actively participate in work, problem solving and conducting experiments.
Cross-curriculum competencies of students	<ul style="list-style-type: none"> • Digital competence • Work with data and information • Problem solving • Cooperation • Communication
Assessment criteria	Student participation in class work, quality of class work and students' ability to solve assigned problems, conducting and experiments and explain the results of the experiments.

Materials	https://view.genial.ly/65e8d55007aac80014381f40/presentation-amphoteric-nature-of-water-electrical-properties-of-water
Digital resources	Google Classroom Genially presentation

TOPIC: Cohesion and adhesion

Duration/ number of classes	1
Developed by	Serbia
Objectives	Developing and expanding student's knowledge about: <ul style="list-style-type: none"> • Cohesion and adhesion, surface tension, capillary action
Preparation	Genially presentation Seven plastic cups, duct tape, shoelaces, cookie coloring extract Bowl, paper clips, tissue paper, water Soapy solution, a metal frame with a handle, metal wire (thicker) or a long metal nail
Outcomes	Students will be able to explain <ul style="list-style-type: none"> • Cohesion and adhesion, surface tension and capillary action of water
Didactic-methodical implementation of the topic	<ul style="list-style-type: none"> • Flipped classroom • Problem- based learning • Conducting experiments
Tasks / students' activities	Students will receive the material through Google Classroom. Their task will be to read it and prepare for active participation in the class, as well as for solving problems, and conducting experiments. In class, they will actively participate in work, problem solving and conducting experiments.
Cross-curriculum competencies of students	<ul style="list-style-type: none"> • Digital competence • Work with data and information • Problem solving • Cooperation • Communication
Assessment criteria	Student participation in class work, quality of class work and students' ability to solve assigned problems, conducting and experiments and explain the results of the experiments.
Materials	https://view.genial.ly/65ea1b86c4e537001595b045/presentation-cohesion-and-adhesion

Digital resources	Google Classroom Genially presentation
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TOPIC: Water properties (a gamification approach)

Duration/ number of classes	90 minutes/ 2 periods
Developed by	Greece
Objectives	<ol style="list-style-type: none"> 1. Review the physical and chemical properties of water 2. Practice active listening and note-taking 3. Apply problem-solving skills 4. Work in a group, cooperation 4. Conduct simple experiments
Preparation	<p>Venue: lockable room, preferably science lab.</p> <p>Presentation: video on water properties, projection equipment (projector or smartboard)</p> <p>Worksheets for the video presentation and pens</p> <p>Game: see section “materials”</p>
Outcomes	<ol style="list-style-type: none"> 1. Increased understanding of physical and chemical properties of water, including buoyancy, conductivity, states of water (liquid, gas, solid), aqueous solutions, light refraction in water 2. Improvement in active listening and note-taking, improved skill of finding the information needed in a video 3. Improved creativity, problem-solving skills, critical thinking 4. Improved cooperation among the students, better teamwork 5. Enhanced ability to follow the scientific method to conduct experiments. Formulating hypotheses and testing them out following the scientific protocol and safety rules 6. Fun in the classroom – the students enjoy themselves and develop a more favourable outlook towards scientific subjects
Didactic-methodical implementation	<ul style="list-style-type: none"> • Game Based Learning • Flipped Classroom
Tasks / students' activities	The students watch a video on the physical and chemical properties of water and take notes on the worksheet provided. At the end of the presentation it is announced that the room is locked and they have to use their knowledge about water to get out. The

	students search the room, gather clues and objects, open locked boxes and perform simple experiments until they obtain the key to the room and “escape”.
Cross-curriculum competencies of students	Using information to solve problems Critical and Lateral Thinking Communication Cooperation
Assesment criteria	Getting out in as little time as possible with as few hints as possible Cooperation and participation of students Practical application of theory
Materials	A lockable room (preferably science lab) and at least two keys for the door padlocks (one requiring a key, the others with 3-digit combination locks) whiteboard or poster board and marker letter and numbers of cutouts boxes, cases, cupboards to be locked with the padlocks bottles of water funnel Bunsen burner (or gas burner), lighter, saucepan safety goggles stand with 3 test tubes containing an acid solution, a basic solution and water bromothymol blue 3 small info stands/signs labeled: “acidic solution. pH=2”, “basic solution. pH=9”, “neutral solution. pH=7” coarse salt electric circuit that closes and a light bulb lights up when a trough is filled with salt water a lampshade for the light bulb that shows a 3-digit number when it is backlit jar with expanded water beads and mystery object inside (3-digit number written on the mystery object) empty bottle containing a cork to which the key to a padlock is attached lockable fridge with freezer compartment or a block of ice with the key to the lab frozen inside buzzer or bell that the students can use to ask for a hint stopwatch to time the students Human Resources: the Game Coordinator, one or two supervisors

Digital resources

YouTube videos, video-editing software, animation software, AI text-to-voice software, subtitling software (optional), digital stopwatch.

[Dropbox](#)

[Water Properties Worksheet](#)

[Escape Room Planning](#)

[Escape Room Map](#)

Area 2: Biological importance of water

Topics:

- Importance of water for maintaining hygiene
- Importance of water for the human body
- Water as a living environment
- Water as medicine

Outcomes:

At the end of the curriculum students will be able to:

- understand and explain how water is essential for maintaining personal and public hygiene, reducing the spread of diseases, and ensuring overall health and well-being.
- describe the vital role of water in human physiology, including hydration, digestion, nutrient absorption, temperature regulation, and waste elimination, and the consequences of dehydration.
- analyze the significance of water as a habitat for a diverse range of aquatic organisms, understanding how various species are adapted to live in water and how water ecosystems support biodiversity.
- explore the use of water in therapeutic and medicinal practices, such as hydrotherapy, and recognize its role in promoting physical recovery, relaxation, and overall health.

TOPIC: Importance of water for maintaining hygiene

Duration/number of classes	2
Developed by	Bulgaria
Lesson Objectives	Awareness of the need to observe and maintain hygiene Acquisition of knowledge related to the consequences of non-compliance with hygiene Cultivating a conscious sense of a hygienic lifestyle Identifying ways to maintain personal hygiene
Lesson plan	<ol style="list-style-type: none">1. Hygiene. Importance of hygiene2. Personal hygiene3. Hygiene in the home4. Food hygiene

Interdisciplinary connections	Chemistry, technology
Didactic methods	Discussion, talk, observation, problem situations
Use of materials and others means	Paper, cups, water, multimedia
Basic knowledge and skills, basic concepts	Types of nutrients Importance of food for the body
Substantive accents	Food Food products Nutrients
Digital resources on the topic	https://offnews.bg/zdrave-i-krasota/pravilno-li-miem-ratcete-si-717035.html https://www.kaldata.com/it-%D0%BD%D0%BE%D0%B2%D0%B8%D0%BD%D0%B8/%D0%BE%D0%BD%D0%BB%D0%B0%D0%B9%D0%BD-%D0%BF%D1%80%D0%B8%D0%BB%D0%BE%D0%B6%D0%B5%D0%BD%D0%B8%D0%B5-%D0%BD%D0%B8-%D0%BF%D0%BE%D0%BC%D0%B0%D0%B3%D0%B0-%D0%B4%D0%B0-%D0%BC%D0%B8%D0%B5%D0%BC-%D1%80%D1%8A-330981.html
Student activities	<p>Problem: Even though we "know" the importance, how and when we should wash our hands, we still get "dirty hand diseases". What is this due to?</p> <p>Students discuss in pairs and share their answers after a certain time.</p> <p>It is discussed what hygiene is. The responses are summarized and it is concluded that, according to the World Health Organization (WHO), "hygiene refers to conditions and practices that help maintain health and prevent the spread of disease."</p> <p>Discussion: What is the importance of hygiene, why is it important to maintain hygiene?</p> <p>After a minute, students share their ideas. Students' answers are summarized and, if necessary, further discussed.</p> <p>Attention is focused on hand washing, personal hygiene and household hygiene.</p> <p>Game: The students are divided into three groups and each group receives several cards on which situations related to the observance of hygiene are depicted. On the front of a corkboard, three columns are distinguished with the headings personal hygiene, household hygiene and environmental hygiene. The students have to distribute the cards in the correct places for a certain time.</p> <p>The result is discussed.</p> <p>Problem: A transparent glass full of water and a large open container also full of water are placed in front of the students. It is verified that the water is visibly clean. A student</p>

	<p>who thinks his hands are clean is asked to wash his hands in the open bowl of water. Another glass is filled with water from this container and the color of the water is discussed.</p> <p>Discussion: Although our hands look clean, they are not. That's why we always have to wash them. The rules and steps to follow when washing hands are discussed.</p> <p>Problem: Students are invited to share what they ate during the day at school or to discuss a family lunch or dinner. Question - what do they understand by "food hygiene".</p> <p>Discussion: It is related to the elements involved in food hygiene - where the food comes from - do we trust the producer</p> <ul style="list-style-type: none"> - how it is processed - semi-finished, vacuum-packed , fresh - how it was stored until consumption - cellar, refrigerator, outdoors - how it is prepared - the aesthetic appearance of the served food - how it is cooked – fried, boiled, baked - in what conditions a person was fed <p>Students discuss in groups.</p> <p>Problem: After cooking or eating, we wash the dishes we have used. What rules do we have to follow?</p> <p>Students work independently and a discussion follows.</p> <p>The correct sequence is recorded:</p> <ul style="list-style-type: none"> • Do not postpone washing dishes - food residues will dry on the dishes and you will have to spend much more time washing • Rinse the dishes after eating - give each item a quick rinse with water before putting it in the sink. • Clean the sink - Make sure the sink is clean before you begin. • Wash the dishes in the correct order - glasses first, then lightly soiled dishes, including cups, saucers, bowls and small plates. Then wash the larger plates and then the cutlery. Wash serving plates, trays and baking dishes last. If the water gets dirty, be sure to change it. • Rinse and dry - Rinse in clean hot water to remove detergent residue and place on a dish drying rack <p>Discussion: Do we do this at home?</p>
Evaluation criteria	Involvement in discussions, the ability to reason purposefully on a given problem are valued
Homework	<p>To determine what are the "critical" situations in which we should wash our hands.</p> <ul style="list-style-type: none"> ○ Before eating ○ Before meals

- Before preparing food
- After using the toilet
- After cleaning up child feces

TOPIC: Importance of water for the human body

Duration/number of classes	2
Developed by	Bulgaria
Lesson Objectives	To clarify the function of water in the human body To clarify the relationship between water as a chemical compound and the human body To clarify how water functions in the human body
Lesson plan	1. Chemical compounds in the cell: A) organic: B) inorganic: 2. Importance of water in the human body A) structure B) properties C) functions
Interdisciplinary connections	Chemistry and environmental protection Physics
Didactic methods	Problem-based learning, discussion, independent work, learning by doing
Use of materials and others means	<ul style="list-style-type: none"> • resources from the electronic version of the textbook • tasks from worksheets • schemes and models of monomers and polymers of organic compounds • model of a water molecule • jug of water, vessel for water
Background knowledge and skills, basic concepts	Lists groups of chemical elements based on their percentage content in the cell and illustrates with examples their importance. Recognizes (in text, image) and schematically presents inorganic compounds that make up the cell. Justifies the common and different between non-living and living nature in terms of the chemical elements and compounds that make them up. Relies on schematics, graphs and diagrams for chemical composition of living and non-living matter. Concepts: biopolymers

Substantive accents	<ol style="list-style-type: none"> 1. Water is an indispensable factor for life on Earth, which is due to the dipole structure of its molecule. 2. Water is a vital substance and building material for life 3. Water makes up approximately 2/3 of a person's body. 4. Water helps transport substances in the body and remove waste
Digital resources on the topic	<p>A Water Meditation To Relieve Stress Guided Meditation Video (yogajournal.com)</p> <p>The Water in You: Water and the Human Body US Geological Survey (usgs.gov)</p> <p>The brain science behind deciding to drink when you're thirsty is pretty complicated : NPR</p>
Student activities	<p>Water Meditation (using a digital resource) - students sit comfortably and listen to the sound of water.</p> <p>Discussion: What feelings does the sound of water evoke? How do they feel? How would they identify—as a coming river, as a raging ocean, as a flowing stream?</p> <p>Discussion: (after using a digital resource) What does it feel like when water passes through the body when we drink water? What does it feel like to be thirsty?</p> <p>Students record in notebooks the sources of their drinking water, along with the approximate amount consumed by them.</p> <p>Discussion: How much water should you drink per day? How much water is too little? What method of water intake do they prefer – favorite bottle; during meals?</p> <p>Discussion: What water do they prefer – from the tap; bottled; warm; cold?</p> <p>Discussion: Do you drink water on the go? And sitting down? How do you know you're not thirsty anymore?</p> <p>Task : Pour 3000 liters of water into a large container. Question - what do the students think this amount is? (This is approximately how much water enters a person's body every day.) An adult person also loses 3000 liters of water per day.</p> <p>Discussion: What ways are there to remove water from the body? Water is released not only through urine, but also through breathing, perspiration, and solid waste.</p> <p>Task: get students to estimate how much of the 3000ml of water we lose each day is lost through each process. Instruct groups of students to fill each of three one-liter containers with the amount of water they think is lost each day through breathing, sweating, urinating, or passing stool. Tell the students that they only have three bottles because more than 1000 ml is lost through one of the four processes listed above. They should estimate how much we lose through this last process and leave that amount in their large pot or container. Have students record the amounts they predict will be eliminated by each process.</p> <p>Demonstration: Fill each demonstration container with the amount of water indicated below. You can use food coloring to color the water if you like.</p> <ul style="list-style-type: none"> • 150 ml (eliminated by the intestines)

	<ul style="list-style-type: none"> • 1500 ml (urine loss) • 600 ml (lost by evaporation when breathing) • 750 ml (lost through sweating) <p>Discussion: The containers hold exactly the amount of water that is lost daily from the body through perspiration, urination, respiration and excrement. Pick up a container one at a time and ask - What process of water elimination can be represented by the water in this container? After students have discussed the possible answers, confirm the correct answer and pour the water into a clear tub. It explains that during a typical day we consume 1200ml of water in our foods and another 1500ml in our drinks. We get another 300 ml of water as a by-product of the chemical breakdown of food Explain that the average adult can live up to two months without food, but only about three days without water.</p> <p>Discussion: why do you think our bodies can live so much longer without food than without water?</p> <p>A healthy person shows signs of dehydration after about 3 days. With a loss of 20% of the total volume of water in the body, there is a possibility of death. On the other hand as long as there is water it is possible to survive 2 months without water.</p>
Homework	<p>Have students explore unique characteristics and strategies that help desert-dwelling organisms conserve water. Have students research the sources of water used by people living in the desert.</p> <p>Problem: If you went on a journey through the wilderness and had to survive on only what you could carry, what would you bring and in what quantities? Have students explain their answers.</p>

TOPIC: Water as a living environment

Duration/number of classes	2
Developed by	Bulgaria

Lesson Objectives	<p>Familiarizing students with the characteristics of the aquatic environment</p> <p>Identify adaptations for living in a given environment.</p> <p>Show the difference between aquatic and terrestrial environments.</p> <p>Acquiring knowledge about living conditions in freshwater and saltwater basins and their influence on plant and animal adaptations</p> <p>Formation of skills to illustrate with examples the species diversity and groups of animals;</p> <p>Cultivating a caring attitude towards the inhabitants of the aquatic environment</p>
Lesson plan	<ol style="list-style-type: none"> 1. Peculiarities of the aquatic environment 2. Adaptations of organisms for life in water 3. Comparing aquatic and terrestrial habitats 4. Ecological groups of organisms
Interdisciplinary connections	<p>Chemistry and environmental protection</p> <p>Physics</p>
Didactic methods	Problem-based learning, discussion, talk, independent work, learning by doing
Use of materials and others means	<ul style="list-style-type: none"> • resources from the electronic version of the textbook • tasks from worksheets • a computer • multimedia
Basic knowledge and skills, basic concepts	<p>Types of habitats</p> <p>Peculiarities of the studied environments</p> <p>Ecology</p> <p>Environmental factors</p> <p>Ecological groups of organisms in the studied environments of life</p>
Substantive accents	<p>Peculiarities of the aquatic environment</p> <p>Adaptations of organisms for life in water</p> <p>Comparing aquatic and terrestrial habitats</p> <p>Ecological groups of organisms</p>
Digital resources on the topic	<p>Presentation</p> <p>https://www.mozaweb.bg/bg/Microcurriculum/view?azon=dl_91</p> <p>https://www.mozaweb.bg/bg/Extra-3D_sceni-Zamrsyavane_na_vodite-146878</p> <p>https://www.mozaweb.bg/bg/Extra-Videoklilove-Voda-216856</p>
Student activities	<p>The class begins with a short discussion about the properties of water (mass, recalls that it is a good solvent). Air is also dissolved in it, which makes it a favorable living environment for many organisms.</p> <p>Task: In front of the students is the globe. Check it out!</p> <p>Discussion: The hydrosphere occupies the largest area. What is water? What is the significance of this sphere?</p> <p>Work in groups: After preliminary studies, students share their views on the following questions in a way chosen by them:</p> <ul style="list-style-type: none"> • Features of a freshwater ecosystem. Features of saltwater ecosystems • Features of terrestrial ecosystems - forests, meadows, desert, etc.

	<ul style="list-style-type: none"> • Features of a mountain ecosystem <p>Discussion: Students are asked questions in advance, the answers to which they should look for in the information presented.</p> <ul style="list-style-type: none"> • What components do the represented ecosystems have. • What influence do they have - biotic and abiotic factors. • Comparing organismal diversity. • Similarities and differences between aquatic and terrestrial ecosystem <p>Task: A presentation on the peculiarities of the aquatic environment is brought to the students' attention.</p> <p>Discussion: What adaptations do animals have for living in an aquatic environment?</p> <p>Discussion: Importance of adaptations of organisms. What relationships exist between organisms in the aquatic environment.</p>
Evaluation criteria	<ul style="list-style-type: none"> • the results of the discussions • the ability to list the living conditions that affect aquatic plants • the ability to describe adaptations of plants and animals for life in water • the skills to group plants and animals according to a certain feature.
Homework	Write and illustrate a mini-essay on 'My Journey to the Underwater World'.

TOPIC: Water as medicine

Duration/number of classes	2
Developed by	Bulgaria
Lesson Objectives	<p>Learning about the importance of water</p> <p>Awareness of the need to take the necessary amount of water</p> <p>Awareness of the connection between a healthy lifestyle and water</p>
Lesson plan	<ol style="list-style-type: none"> 1. Hydration 2. The body needs water 3. Water as medicine
Interdisciplinary connections	Chemistry, technology
Didactic methods	Talk, discussion, problem situations, work in groups
Use of materials and others means	Multimedia, presentations, worksheets, electronic resources
Basic knowledge and skills, basic concepts	<p>Water</p> <p>Water as an ecological factor</p> <p>Water as a living environment</p>

	Water as an extracellular and intracellular medium Properties of water
Substantive accents	A healthy lifestyle Properties of water The human organism
Digital resources on the topic	https://www.youtube.com/watch?v=9iMGFqMmUFs&ab_channel=TED-Ed https://www.youtube.com/watch?v=QICtbhmsXHw&ab_channel=CBSNews https://www.youtube.com/watch?v=oCfDzPs8tvA&ab_channel=CaricoVideos
Student activities	<p>Task: Students to think and write down how much water they drank during the day! When did they drink water - during meals, during training, because they were thirsty, etc.</p> <p>Discussion: Why is water so important for the body? The answers given are discussed.</p> <p>Students watch a video: https://www.youtube.com/watch?v=9iMGFqMmUFs&ab_channel=TED-Ed</p> <p>On worksheets write answers to the questions: How does the body use water? What are the effects of dehydration or low water levels on the body and brain? What are the effects of overhydration on the body and brain? https://www.youtube.com/watch?v=QICtbhmsXHw&ab_channel=CBSNews</p> <p>Discussion: On the questions asked. How much water should a person drink per day? What does it depend on?</p> <p>Attention is drawn to the fact that a person can survive for a relatively long time without food, but just two days without water leads to severe dehydration, slowed metabolism, poor health and organ dysfunction. Water is not only a source of life and a necessity for survival, it is a medicine if we know how to take advantage of its miraculous properties.</p> <p>The students were previously divided into several work teams that searched for, collected and systematized information about the importance of water as medicine. Information is shared in their preferred way - presentations, projects, announcements. Areas of study:</p> <ul style="list-style-type: none"> • Water instead of diet for weight loss • Water for joint pain and bone diseases • Water as an antitumor drug • Water for a good memory • Water as medicine for internal organs and skin • Stress dehydration <p>Discussion: Share your own research and family life situations about the importance of water.</p> <p>Sharing views of scientists on the topic: https://www.youtube.com/watch?v=oCfDzPs8tvA&ab_channel=CaricoVideos</p> <p>Meeting-conversation with a doctor who was previously invited to attend and who observed the lesson and the students' activity.</p>
Evaluation criteria	Involvement in discussions, the ability to reason purposefully on a given problem are valued
Homework	Essay on the need for hydration Create an advertising brochure about the need for hydration

Area 3: Geographical - economic importance of water

Topics:

- The Geographical and Economic Importance of Dams
- From dry landscapes to water ones
- Waterborne Diseases and Public Health
- Diseases transmitted by water and their Impact on Geography and Economics

Outcomes:

At the end of the curriculum students will be able to:

- analyze the concept of water as a public and social good, understanding its importance for equitable access, public health, and social stability, and evaluating policies that ensure fair water distribution.
- understand the geographical importance of dams in water management and regional development.
- investigate the economic and geographical significance of major dams in their country, understanding their role in water supply, agriculture, energy production, and regional development.
- explore the social-economic implications of clean water, including its role in improving quality of life, health, reducing poverty, and supporting community development, and will critically assess the challenges of ensuring water access for marginalized populations.
- development of prevention and hygiene skills

TOPIC: The Geographical and Economic Importance of Dams

Duration/ number of classes	90 minutes/ 2 periods
Developed by	Greece
Objectives	<ul style="list-style-type: none">• Understand the geographical importance of dams in water management and regional development. - To get to know the most important dams each country.• Analyze the economic benefits and challenges associated with building and maintaining dams.• Discuss case studies of major dams and their impact on local and national economies.• To practice using digital tools and artificial intelligence applications.• To develop cooperation skills.
Preparation	Presentation, video

<p>Outcomes</p>	<ul style="list-style-type: none"> • Understand the Geographical Importance of Dams: • Identify how dams play a crucial role in water management, flood control, and irrigation in various geographical regions. • Explain the relationship between dam locations and geographical features such as rivers, valleys, and reservoirs. • Analyze the Economic Benefits of Dams: • Describe the economic importance of dams in sectors like agriculture (irrigation), energy production (hydroelectric power), and water supply for human consumption and industry. • Understand the role of dams in supporting economic growth by providing a reliable water source for farming, industries, and cities. • Evaluate the Social and Environmental Impact of Dams: • Discuss both the positive and negative social and environmental impacts of dam construction (e.g., displacement of communities, changes in ecosystems, and fish migration). • Evaluate case studies of major dams (such as Hoover Dam and Three Gorges Dam) and the challenges faced in their construction and maintenance. • Develop Critical Thinking on Dam Development: • Assess the long-term sustainability and economic viability of large-scale dam projects. • Explore alternative solutions to dam-related challenges, such as ecological impacts and the displacement of local populations. • Collaborate in Problem-Solving Discussions: • Engage in discussions or group activities to critically analyze the geographical and economic reasons for constructing dams in specific areas and propose improvements or alternatives.
<p>Didactic-methodical implementation</p>	<ul style="list-style-type: none"> • Teacher-Centered (Direct Instruction, Interactive Lectures): For clear delivery of core content. • Student-Centered (Group Work, Case Studies, Discussions): To encourage active learning, collaboration, and critical thinking. • Use of Technology: Multimedia tools to engage visual learners and make complex concepts more accessible. • Formative and Summative Assessment: To gauge student understanding and provide feedback.
<p>Tasks / students' activities</p>	<p>The lesson begins with a class discussion on importance of water and water resource management. The subject of dams is introduced. It is detected if the students know what dams are and what their function is. Then the following presentation and the</p>

	<p>video are presented so that the students can get to know what dams are, which are the most important in their country and the types of dams. Then the students are divided into four groups of five and each group is given the following worksheet.</p> <p>Group 1 Search the internet for information on environmental impact of dams (ecosystem changes, fish migration, impacts on biodiversity). Create a presentation in Google Slides with the information you found.</p> <p>Group 2 Search the internet for information on the economic impacts of dams (changes to the local economy, population movements). Create a presentation in Google Slides with the information you found.</p> <p>Group 3 Search the internet for information of dams internationally and compare them with local dams in terms of their use.</p> <p>Group 4 In my maps application, pin the most important dams on the map of your country and write a little information about each one (5-6 lines).</p> <p>Feedback All groups at the end of the activity using Padlet are invited to leave their feedback (suggestions or positive remarks) on the other groups' work. A class discussion and presentation will follow upon completion of the activities.</p>
Cross-curriculum competencies of students	<ul style="list-style-type: none"> • Critical Thinking • Communication • Collaboration • Cultural Awareness
Evaluation criteria	<ul style="list-style-type: none"> - Participation in Class Discussion - Group Work/Case Study Analysis - Group Presentation of Case Study - Written Reflection/Report - Quiz (Optional) - Creativity and Problem Solving (Optional)
Materials	<ul style="list-style-type: none"> • Maps of each country(my maps) • Projector and computer for presentation • Worksheets • Internet for research
Digital resources	<p>Presentation</p> <p>Video</p>

TOPIC: From dry landscapes to water ones

Duration/ number of classes	1 class 3th year
Developed by	Italy
Objectives	<p>Developing student's knowledge and awareness about:</p> <ul style="list-style-type: none"> ● political and economic importance of water and the risks linked to the mismanagement of resources ● traditional construction wisdom ● management of water resources. ● Local policies and Wide Scale Planning for saving and enhancing regional landscapes.
Preparation	Projector, computer for videos and internet access for research
Outcomes	<p>At the end of the curriculum, the student will be able to explain:</p> <ul style="list-style-type: none"> ● the traditional construction techniques and the sustainable relationship of the ancient's architecture with nature ● What are the countries that have learned to manage water shortages and a desert climate or to manage excess water and how did they manage to resolve these issues over time. ● What were the means used to conserve water in the traditional architecture of your region and in the urban planning of cities and how does water recovery and reuse happen nowadays.
Didactic-methodical implementation of the topic	<ul style="list-style-type: none"> ● Introduction to traditional water saving architectures by <ul style="list-style-type: none"> - A teacher-architect speaking of the regional landscape Master Plan (PPTRR) guide lines - students which prepared a presentation for a "Save water" about water harvesting. ● Working groups for creating posters and presentations about dry and water landscapes ● Meeting with an architect specialised in Landscape and Urban regeneration: study case of a water park in "Sannicandro di Bari" ● Meeting with a local stakeholder: drought emergency in Puglia
Tasks / students' activities	<ul style="list-style-type: none"> - Making a newspaper insert on water agricultural emergency in Puglia - Making posters on Dutch water squares - Making posters on how Israel used innovation to beat its water crisis - Make a presentation on ongoing desertification process in Europe.

Cross-curriculum competencies of students	<ul style="list-style-type: none"> • Work with data and information • Problem solving • Cooperation • Communication in Italian and English • Select and organize information from diverse sources • Use of digital technologies to build new knowledge. • Personal and Social Responsibility towards protecting the environment.
Assessment criteria	<ul style="list-style-type: none"> • Participation in discussions and activities. • Cooperation and contribution to group work. • Final online quiz
Materials	Presentation on ancient water harvesting architectures quiz
Digital resources	https://www.youtube.com/watch?v=b_DTnOzYTR4 https://www.youtube.com/watch?v=kujf4BTL3pE https://www.youtube.com/watch?v=SQu6T3NtX3M https://www.youtube.com/watch?v=taMWUjda3fA https://www.youtube.com/watch?v=vB68xvRb2T4 https://pugliacon.regione.puglia.it/web/sit-puglia-paesaggio/struttura-del-pptr

TOPIC: Waterborne Diseases and Public Health

Duration/ number of classes	80 Minute / 2
Developed by	Türkiye
Objectives	<ul style="list-style-type: none"> • Identify common waterborne diseases • Understand transmission pathways • Analyse the impact on public health • Examine risk factors • Explore prevention and control measures • Investigate case studies • Propose solutions to improve water safety.
Preparation	Canva presentation YouTube
Outcomes	<ul style="list-style-type: none"> • Recognize waterborne diseases • Understand the ways of transmission of diseases

	<ul style="list-style-type: none"> • Will assess public health risks • Will evaluate prevention methods • Solutions to improve water security will be recommended
Didactic-methodical implementation	<ul style="list-style-type: none"> • Project and Problem Based Learning • Canva
Tasks / students' activities	<p>Group Research and Presentation: Common Waterborne Diseases</p> <p>Task: In small groups, research a specific waterborne disease (e.g., cholera, typhoid, hepatitis A) and create a 5-minute presentation. Each group should cover the following:</p> <ul style="list-style-type: none"> The cause of the disease (pathogen). Symptoms and effects on human health. How it spreads through water. The disease's impact on public health and communities. Methods of prevention and treatment. <p>Activity: Present findings to the class using visual aids (e.g., posters, slides).</p> <p>Case Study Analysis: Waterborne Disease Outbreak</p> <p>Task: Analyse a real-world case study of a waterborne disease outbreak (e.g., the cholera outbreak in Haiti or the Flint, Michigan water crisis). Each student or group will:</p> <ul style="list-style-type: none"> Identify the causes of the outbreak. Examine the response from health authorities and governments. Discuss the consequences for the local population. Propose alternative actions that could have been taken to prevent the outbreak. <p>Activity: Write a short report or engage in a class discussion about the case study.</p> <p>Water Testing Simulation</p> <p>Task: Perform a classroom simulation of water testing for contamination. Students will:</p> <ul style="list-style-type: none"> Test "samples" of water (prepared by the teacher with various substances such as soap, oil, or food colouring). Use pH strips or other indicators to detect contamination. Record and analyse results.

Activity: Students will share their results and discuss how water quality can affect public health, specifically relating to the spread of diseases.

Create a Public Health Awareness Campaign

Task: Design a public health awareness campaign to educate the community about the prevention of waterborne diseases. This can include posters, brochures, social media posts, or short video scripts.

Focus on topics like proper handwashing, water purification methods, and the importance of clean drinking water.

Activity: Share the campaign with the class or school, explaining the key messages and why they are important for public health.

Debate: Government vs. Individual Responsibility

Task: Engage in a class debate on the topic, "Who is more responsible for preventing waterborne diseases: governments or individuals?"

Divide the class into two groups, with each side preparing arguments for their position.

Consider topics like sanitation infrastructure, water treatment, public health education, and personal hygiene practices.

Activity: Conduct the debate, followed by a reflective discussion on the balance between public and personal responsibility in preventing waterborne diseases.

Field Trip or Virtual Tour: Local Water Treatment Facility

Task: Organize a field trip (or virtual tour) to a local water treatment facility to learn how water is purified and what measures are taken to prevent contamination.

Students should prepare questions in advance and take notes during the tour.

Activity: Write a reflection paper on how water treatment plays a role in preventing waterborne diseases and ensuring public health.

Create a Waterborne Disease Prevention Plan

Task: As individuals or in small groups, students will develop a prevention plan for a hypothetical community facing high rates of waterborne diseases. The plan should include:

Ways to improve water quality.

	<p>Public health education initiatives. Infrastructure improvements (e.g., sanitation and sewage). Activity: Present the plan to the class, focusing on practical, sustainable solutions.</p> <p>Interactive Map Activity: Global Waterborne Disease Hotspots</p> <p>Task: Use an interactive world map to research and identify global hotspots for waterborne diseases. Students will: Investigate why these regions are more vulnerable (e.g., climate, infrastructure, political instability). Present their findings, including possible interventions or solutions to improve water safety in these areas. Activity: Create a class map with the identified hotspots and brief summaries of the conditions in each region.</p>
Cross-curriculum competencies of students	<p>Scientific Inquiry Critical Thinking Communication Environmental Awareness Creativity and Innovation</p>
Assessment criteria	<p>Research Depth Analysis and Critical Thinking Collaboration and Participation Data Interpretation and Analysis Creativity and Innovation Overall Impact and Contribution</p>
Materials	<p>Presentation – Waterborne Diseases and Public Health</p> <p>https://www.youtube.com/watch?v=JVnxQf_xcGg</p> <p>https://www.youtube.com/watch?v=k_WzrOFj38</p>
Digital resources	<p>Google Classroom Web2 Canva WordArt (word cloud) YouTube</p>
Notes (optional)	<p>Water Safety Awareness Poster</p> <p>Task: Create a poster that raises awareness about the importance of clean water and how waterborne diseases can be prevented. Your poster should: Include facts about the dangers of contaminated water.</p>

	<p>Suggest simple ways individuals and communities can keep water safe (e.g., boiling water, using water filters, proper waste disposal).</p> <p>Use images and graphics to make your message clear and engaging.</p> <p>Materials: Design it digitally (using software like Canva) or by hand.</p>
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TOPIC: Diseases transmitted by water and their Impact on Geography and Economics

Duration/ number of classes	90 minutes / 2 periods
Developed by	Greece
Objectives	<ol style="list-style-type: none"> 1. For students to understand what water diseases are and how they are transmitted. 2. To know the main diseases caused by contaminated water. 3. To learn ways to prevent and control water diseases. 4. To develop critical thinking about the importance of clean and safe water supply. 5. Analyze the economic and geographical impact of waterborne diseases on societies, particularly in developing countries.
Preparation	<ul style="list-style-type: none"> - Presentation of slides on water diseases. - Print worksheets for students. - Search for information from the internet. -Whiteboard and markers
Outcomes	<p>Education and understanding:</p> <ol style="list-style-type: none"> 1. Understanding Diseases: Students will learn about different waterborne diseases, their modes of transmission and their symptoms. 2. Importance of Clean Water: They will understand the importance of access to clean and safe water for their health. 3. Analyze the economic consequences of waterborne diseases in individuals, communities and nations including healthcare costs, loss of productivity, and impacts on local industries (e.g., agriculture, tourism). 4. Understand the broader economic strain on governments and international organizations working to combat these diseases. <p>Development of prevention and hygiene skills:</p> <ol style="list-style-type: none"> 1. Hygiene Practices: Students will adopt good hygiene practices such as regular hand washing and drinking clean water.

	<p>2. Prevention Education: They will learn how to prevent waterborne diseases by improving sanitation at home and in the community.</p> <p>Developing critical thinking and awareness:</p> <ol style="list-style-type: none"> 1. Public Health Awareness: Students will develop an awareness of public health issues and the importance of disease prevention. 2. Critical Thinking: They will be encouraged to think critically and propose solutions to address sanitation problems in their community. <p>Strengthening social responsibility:</p> <ol style="list-style-type: none"> 1. Community and collaboration: Students will be encouraged to work together to solve public health problems in their community. 2. Responsibility: They will develop a sense of responsibility for their health and the health of those around them. <p>Long-term Public Health Benefits:</p> <p>Reducing the spread of disease: Information and education can help reduce the spread of waterborne diseases.</p>
<p>Didactic-methodical implementation</p>	<p>Teacher-Centered: Expository instruction to deliver core content.</p> <p>Student-Centered: Group work, discussions, and case studies to promote collaboration and critical thinking.</p> <p>Use of Technology: Multimedia tools and interactive resources for visual learning.</p> <p>Inquiry-Based Learning: Encouraging students to ask questions and explore solutions independently.</p> <p>Formative and Summative Assessments: Ongoing observation and final evaluations to gauge understanding.</p>
<p>Tasks / students' activities</p>	<p>- Introduction</p> <p>Begin with a brief discussion on the importance of clean water in daily life.</p> <p>Ask students what they know about diseases caused by contaminated water (e.g., cholera, typhoid, dysentery, schistosomiasis).</p> <p>Show a brief video clip or infographic illustrating the global issue of unsafe drinking water.</p> <p>-Presentation: Common Waterborne Diseases</p> <p>Introduce students to various waterborne diseases, including their symptoms, causes, and how they spread through contaminated water sources.</p> <p>Cover diseases such as:</p> <p>Cholera: Caused by the ingestion of water contaminated with the bacterium <i>Vibrio cholerae</i>.</p> <p>Typhoid Fever: Spread through water contaminated with the <i>Salmonella typhi</i> bacteria.</p> <p>Dysentery: An intestinal infection leading to severe diarrhea, often caused by contaminated drinking water.</p>

	<p>Schistosomiasis: A parasitic infection transmitted through freshwater snails. Discuss the regions most affected by these diseases, such as sub-Saharan Africa and parts of South Asia.</p> <p>-Economic and Geographical Impact Costs of healthcare and the economic burden on families. Loss of productivity due to illness, leading to decreased economic output. The impact on tourism and agriculture in regions with unsafe water. Geographical factors: How proximity to contaminated water sources or poor sanitation facilities can lead to outbreaks in certain areas. Discuss international efforts to provide clean water, including NGOs, government policies, and the role of technology in solving water crises.</p> <p>-Activity: Case Study Analysis Divide students into small groups and provide each group with a case study of a real-life outbreak of a waterborne disease (e.g., the 2010 cholera outbreak in Haiti, the schistosomiasis crisis in Egypt). Each group will discuss: The geographical reasons for the outbreak (proximity to contaminated rivers, lack of sanitation). The economic effects (e.g., cost of treatment, impact on livelihoods). Possible solutions to prevent further outbreaks.</p> <p>-Conclusion and Reflection Groups will present their case study findings briefly to the class. Summarize the lesson by highlighting how water quality affects both human health and the economy. Discuss how students can contribute to raising awareness about waterborne diseases and safe drinking water in their communities.</p> <p>-Homework Assignment: Research a waterborne disease not covered in class, and write a one-page report on its causes, symptoms, and prevention methods. Alternatively, students can create an awareness poster encouraging people to avoid contaminated water sources.</p>
Cross-curriculum competencies of students	<ul style="list-style-type: none"> • Knowledge, understanding, critical thinking, awareness, cooperation, responsibility, development of hygiene practices.
Evaluation criteria	<ul style="list-style-type: none"> - Continuous monitoring of student participation and understanding during the lesson. - Evaluation of the short work that will be assigned to the students.
Materials	<ul style="list-style-type: none"> • Computer and projector

	<ul style="list-style-type: none"> • Presentation, videos, posters • Case study handouts (e.g., cholera outbreak in Haiti, schistosomiasis in Africa) • World map to mark regions with high incidences of waterborne diseases <p>https://www.youtube.com/watch?v=pTBfP0Z3FE (video)</p> <p>https://view.genially.com/64e5e94ad3a12d00129a9539/presentation-sciencevibrant-presentation (presentation)</p> <p>https://padlet.com/vsqueo16/save-water-diseases-caused-by-polluted-waterohz8q4ks8d1nrlou (poster)</p>
Digital resources	<ul style="list-style-type: none"> - World Health Organization (WHO) for statistics and additional information. - National Public Health Organization (NPO) for local information and guidelines. - Educational videos

Area 4: Water ecology

Topics:

- Climate Change and Its Impact on Water Ecosystems
- The Water Cycle and Its Impacts on Ecology
- Water Pollution and Its Effects on Aquatic Life
- River ecology and dam impacts
- Invasive species in aquatic environments
- Microplastics and their impact on water ecosystems
- Aquatic ecosystems and food chains
- Waterborne Diseases and Public Health

Outcomes:

At the end of the curriculum students will be able to:

- understanding the importance of water in ecosystems and the vital role that water plays in sustaining life on Earth.
- analyze the natural functioning of river ecosystems and assess the ecological consequences of dam construction, including altered water flow, habitat disruption, and effects on aquatic species migration.
- identify and explain the impact of invasive species in aquatic ecosystems, understanding how they disrupt native biodiversity, alter food webs, and cause economic and environmental harm.
- evaluate the sources and effects of microplastic pollution in water bodies, discussing how microplastics affect aquatic organisms, water quality, and overall ecosystem health.
- demonstrate understanding of the structure and dynamics of aquatic food chains, analyzing the roles of producers, consumers, and decomposers in maintaining the balance of aquatic ecosystems.

TOPIC: Climate Change and Its Impact on Water Ecosystems

Duration/ number of classes	80 Minute / 2
Developed by	Türkiye
Objectives	<ul style="list-style-type: none">• Understanding Climate Change Basics• Exploring Water Ecosystems

	<ul style="list-style-type: none"> • Investigating Climate Change Impacts on Water Ecosystems • Recognizing Biodiversity and Habitat Changes • Evaluating Human and Ecosystem Interdependence • Developing Critical Thinking on Mitigation and Adaptation.
Preparation	Canva presentation
Outcomes	<ul style="list-style-type: none"> • Increased Awareness of Climate Change Students will have a thorough understanding of climate change, including its causes, effects, and the scientific mechanisms that drive global warming and environmental shifts. • Comprehensive Knowledge of Water Ecosystems Students will be able to identify and describe various water ecosystems, including their functions, importance, and the biodiversity they support. • Understanding of Climate Change's Impact on Water Ecosystems Students will recognize the specific impacts of climate change on water ecosystems, such as rising water temperatures, sea-level rise, changes in precipitation patterns, and increased frequency of extreme weather events. • Ability to Analyze Ecosystem Health Students will be capable of analyzing the health of water ecosystems by identifying indicators such as species diversity, water quality, and ecosystem services. They will also understand how climate change affects these indicators. • Insight into Biodiversity Loss and Species Adaptation Students will understand how climate change disrupts biodiversity in water ecosystems, causing species migration, extinction, or adaptation, and will be able to explain the consequences of these changes. • Understanding Human Impact and Vulnerability Students will be able to explain how climate change-related disruptions in water ecosystems impact human communities, especially in terms of water availability, food security, livelihoods (e.g., fishing, agriculture), and economic stability. • Critical Thinking on Mitigation and Adaptation Students will be able to critically evaluate and propose strategies for mitigating the impacts of climate change on water ecosystems. This includes both personal and policy-driven actions, such as reducing carbon footprints, supporting conservation, and engaging in sustainable water management. • Analysis of Real-World Case Studies Students will be able to discuss real-world examples of how climate change is affecting water ecosystems (e.g., coral bleaching, shrinking glaciers, and

	<p>droughts in wetlands), and evaluate the effectiveness of efforts to address these issues.</p> <ul style="list-style-type: none"> • Development of Advocacy and Communication Skills Students will be empowered to communicate their knowledge and concerns about climate change and water ecosystems, effectively raising awareness and advocating for action within their schools, communities, and beyond. • Hands-On Experience with Ecosystem Monitoring Through participation in hands-on activities such as water quality testing, ecosystem surveys, or restoration projects, students will have practical experience in monitoring ecosystem health and understanding the real-world implications of climate change. • Collaboration and Problem-Solving Skills Students will have improved collaboration skills through group projects that focus on finding solutions to climate change's impacts on water ecosystems, enhancing their ability to work with others to tackle complex environmental challenges. • Empowerment to Take Action Ultimately, students will feel empowered to take meaningful action to protect water ecosystems, whether through individual efforts (e.g., reducing water usage, recycling) or collective advocacy for larger-scale environmental policies and practices.
<p>Didactic-methodical implementation</p>	<ul style="list-style-type: none"> • Project and Problem Based Learning • Canva
<p>Tasks / students' activities</p>	<p>1. Research and Presentation on Water Ecosystems</p> <ul style="list-style-type: none"> • Task: Students will research different types of water ecosystems (rivers, lakes, wetlands, oceans) and present how they are affected by climate change. • Activity: In groups, students will choose a water ecosystem, research the effects of climate change on biodiversity, water quality, and habitat loss, and present their findings through multimedia presentations or posters. <p>2. Water Quality Testing (Field Activity)</p> <ul style="list-style-type: none"> • Task: Students will collect water samples from a nearby water source (e.g., river, lake) and test for indicators such as pH, temperature, turbidity, and dissolved oxygen levels.

- Activity: After testing, students will compare their results to historical data or baselines to evaluate any changes that may be related to climate change. They will discuss how these changes impact local ecosystems and biodiversity.

3. Case Study Analysis

- Task: Students will analyze a real-world case study on the impact of climate change on a specific water ecosystem (e.g., coral bleaching in the Great Barrier Reef, glacial melt affecting freshwater supply).
- Activity: Each student or group will create a report detailing the case, the causes of ecosystem disruption, and potential solutions. This can be followed by group discussions on the effectiveness of different climate adaptation strategies.

4. Debate on Climate Change Solutions

- Task: Organize a classroom debate on proposed solutions to climate change's effects on water ecosystems.
- Activity: Assign roles to students (scientists, policymakers, environmentalists, industry representatives), and have them debate the best approaches to mitigate or adapt to climate impacts, such as restoration projects, carbon emissions reduction, or technological solutions.

5. Create an Educational Campaign

- Task: Students will design an educational campaign to raise awareness about how climate change affects water ecosystems.
- Activity: Working in teams, students will create posters, infographics, social media posts, or videos aimed at educating their peers or community about the importance of protecting water ecosystems and the need for climate action.

6. Field Trip to a Local Water Ecosystem

- Task: Take students on a field trip to observe a local water ecosystem (e.g., wetland, river, lake) and assess how it may be affected by climate change.
- Activity: Students will observe physical characteristics (water levels, vegetation, wildlife), document signs of ecosystem health or stress, and discuss how climate change could impact the ecosystem over time. Afterward, they will prepare a field report with their observations and analysis.

	<p>7. Modeling Climate Change Effects on Water Ecosystems</p> <ul style="list-style-type: none"> • Task: Students will build models to illustrate how climate change impacts water ecosystems, such as rising sea levels or increased temperatures. • Activity: Using materials like sand, water, and plant life, students will simulate ecosystem changes (e.g., shoreline erosion, coral bleaching) and observe how these factors alter the habitat. They will use their models to explain the process and consequences of climate change. <p>8. Analyze Climate Data</p> <ul style="list-style-type: none"> • Task: Students will analyze climate data related to water ecosystems, such as rising temperatures, changing precipitation patterns, or ocean acidification levels. • Activity: Using online resources or historical climate data, students will create graphs and charts that show how these trends impact water ecosystems. They will present their data and discuss the long-term implications for biodiversity and human communities. <p>9. Biodiversity Mapping Project</p> <ul style="list-style-type: none"> • Task: Students will map the biodiversity of a water ecosystem and predict how climate change could alter its species composition. • Activity: Students will research the current biodiversity of a chosen water ecosystem (e.g., species of fish, plants, amphibians) and use mapping software or hand-drawn maps to illustrate their findings. They will discuss which species are most vulnerable to climate change and why. <p>10. Community Action Projects</p> <ul style="list-style-type: none"> • Task: Students will develop and execute a community-based action project focused on protecting water ecosystems from the impacts of climate change. • Activity: This could include organizing a river clean-up, planting vegetation along waterways to prevent erosion, or hosting a community event to educate others about the importance of sustainable water use and ecosystem protection.
<p>Cross-curriculum competencies of students</p>	<p>Scientific Inquiry Critical Thinking Communication Environmental Awareness Ethical Responsibility</p>

Assessment criteria	Creativity and Innovation Ethical Considerations Critical Thinking Application of Knowledge
Materials	Presentation – Climate Change and Its Impact on Water Ecosystems https://www.youtube.com/watch?v=me14ikumMZE&t=6s
Digital resources	Google Classroom Web2 Canva Youtube
Notes (optional)	How Does Climate Change Affect Water Ecosystems? What are the Human Impacts and Consequences?

TOPIC: The Water Cycle and Its Impacts on Ecology

Duration/ number of classes	80 Minute / 2
Developed by	Türkiye
Objectives	<ul style="list-style-type: none"> • They will be able to define the Components of the Water Cycle. • Analyse the Role of the Water Cycle in Ecosystems and understand and express how it supports life on Earth. • Examine the Impact of the Water Cycle on Different Ecosystems and explain how water availability shapes biodiversity in each ecosystem. • Explain the Human Effects on the Water Cycle. • Will be able to express the relationship between water availability and ecological balance.
Preparation	Canva presentation https://wordart.com/ (word cloud) Youtube
Outcomes	<ul style="list-style-type: none"> • Comprehensively understands the importance of the Water Cycle. • Gain the ability to explain the role of the Water Cycle in ecosystems. (They will be able to explain how the water cycle supports ecosystems by distributing water and nutrients, regulating climate, and sustaining plant and animal life.) • Gain insight into water cycle changes across ecosystems.

	<p>(They will understand how the water cycle functions differently in various ecosystems, such as wetlands, forests, deserts, and aquatic environments, and how these differences affect biodiversity and ecosystems.)</p> <ul style="list-style-type: none"> • Recognize human impacts on the Water Cycle. • Recognizes the effects of disruption of the Water Cycle. • Thinks critically in Water Conservation and resource management. • Evaluates the connection between water and climate. <p>(They will appreciate the role of the water cycle in global and local climate regulation, understanding how changes in the water cycle can lead to broader climate changes and affect weather patterns.)</p> <ul style="list-style-type: none"> • Awareness of the importance of water saving increases.
<p>Didactic-methodical implementation</p>	<ul style="list-style-type: none"> • Project and Problem Based Learning • Canva
<p>Tasks / students' activities</p>	<p>1- Water Cycle Diagram Task: Create a detailed diagram of the water cycle, including key processes like evaporation, condensation, precipitation, and runoff.</p> <p>Materials: Paper, colored pencils/markers, or digital tools (e.g., Canva, PowerPoint)</p> <p>2. Water Cycle Simulation Task: Conduct a simple lab experiment to simulate the water cycle using a plastic container, a cup, warm water, and plastic wrap to represent evaporation, condensation, and precipitation.</p> <p>Materials: Clear container, plastic wrap, water, heat source (optional).</p> <p>3. Role-Playing: Impact of Water Cycle on Ecosystems Task: Students role-play as different components of an ecosystem (e.g., plants, animals, rivers, soil) and discuss how they are affected by changes in the water cycle (e.g., drought, excessive rainfall).</p> <p>Materials: Role cards, group work setup.</p> <p>4. Case Study: Human Impact on the Water Cycle Task: Research and present a case study on how human activities (e.g., agriculture, industry, climate change) impact the water cycle and local ecosystems.</p>

	<p>Materials: Internet/library research, presentation tools.</p> <p>5. Field Trip/Virtual Tour Task: Participate in a field trip to a local watershed, wetland, or river ecosystem (or take a virtual tour) to observe the water cycle in action and its effects on the surrounding ecology.</p> <p>Materials: Field trip materials or virtual tour resources.</p> <p>6. Water Conservation Campaign Task: Develop a campaign to raise awareness about water conservation in your school or community, highlighting the importance of protecting the water cycle for ecological health.</p> <p>Materials: Posters, social media, presentations.</p> <p>7. Creative Writing: A Day in the Life of a Water Droplet Task: Write a creative short story from the perspective of a water droplet as it travels through different parts of the water cycle, experiencing various environments and ecosystems.</p> <p>Materials: Writing tools (pen, paper, or word processor).</p> <p>8. Climate Change and the Water Cycle Research Paper Task: Write a research paper on how climate change is affecting the water cycle and, in turn, ecosystems around the world.</p> <p>Materials: Academic journals, internet research, paper writing materials.</p>
Cross-curriculum competencies of students	<p>Scientific Inquiry Critical Thinking Communication Environmental Awareness Creativity and Innovation</p>
Assessment criteria	<p>Research Depth Analysis and Critical Thinking Collaboration and Participation Data Interpretation and Analysis</p>

	Creativity and Innovation Overall Impact and Contribution
Materials	Video – The Water Cycle and its Impacts on Ecology
Digital resources	Google Classroom Web2 Canva Wordart (word cloud) Youtube
Notes (optional)	In the upcoming lesson, we will dive deeper into the impacts of climate change on the water cycle and how it leads We will also begin exploring solutions for sustainable water management

TOPIC: Water Pollution and Its Effects on Aquatic Life

Duration/ number of classes	80 Minute / 2
Developed by	Türkiye
Objectives	<ul style="list-style-type: none"> • Define and Explain Water Pollution • Recognize the Causes of Water Pollution • Analyse the Effects of Water Pollution on Aquatic Ecosystems • Examine Case Studies on Water Pollution • Evaluate the Ecological and Economic Consequences of Water Pollution.
Preparation	Canva presentation YouTube
Outcomes	<ul style="list-style-type: none"> • Identify Different Types of Water Pollution • Students will categorize various types of water pollution (e.g., chemical, biological, and physical) and recognize their major sources, such as industrial runoff, agricultural activities, and • Understand the Causes of Water Pollution • Students will be able to explain how human activities, such as urbanization, deforestation, and industrial processes, contribute to the pollution of water bodies. • Analyze the Impact of Water Pollution on Aquatic Life • Students will explain how pollutants affect aquatic ecosystems, including specific impacts like oxygen depletion, the death of aquatic organisms, bioaccumulation in the food chain, and disruption of natural habitats. • Investigate and Discuss Case Studies

	<ul style="list-style-type: none"> • Through analysis of case studies, students will describe real-life examples of major water pollution incidents (e.g., oil spills, toxic algal blooms, and dead zones) and asses • Evaluate the Consequences of Water Pollution • Students will assess the broader implications of water pollution on biodiversity, ecosystem health, human health, and the economy (e.g., fisheries, tourism, and drinking water supply). • Suggest Practical Solutions for Reducing Water Pollution • Students will propose individual and collective solutions to minimize water pollution, such as sustainable agriculture, pollution control regulations, waste reduction, and wat • Raise Awareness of the Importance of Protecting Aquatic Ecosystems • Students will demonstrate an understanding of why protecting water resources and aquatic ecosystems is essential for maintaining biodiversity and ensuring human well-being.
Didactic-methodical implementation	<ul style="list-style-type: none"> • Project and Problem Based Learning • Canva
Tasks / students' activities	<p>1. Research Types of Water Pollution Task: Students will investigate the types and causes of water pollution. Activity: Each student will examine different types of water pollution (chemical, biological, physical) and their sources. They will meet in small groups and present their research to the class. The presentation will discuss how industrial waste, agricultural chemicals, microplastics and domestic waste mix with water.</p> <p>2. Local Water Resources Review Mission: Observe local water supplies and document signs of possible contamination. Activity: Students will visit a local river, lake or sea, observe water quality and take photographs. They will prepare reports on what dirty water looks like, its effects on living things, and sources of pollution. Alternatively, they may collect and analyze data on local water quality.</p> <p>3. Water Quality Test Task: To analyse the quality of different water samples.</p>

Activity: Students will test water samples in the laboratory. They will compare the results by measuring pH, turbidity, temperature, dissolved oxygen and nitrate levels. They will discuss the effects of water quality on fish and other aquatic life.

4. Effects of Pollution on the Food Chain

Mission: To investigate the effects of water pollution on the food chain.

Activity: Students will examine the concepts of bioaccumulation and biomagnification. For example, they will investigate how heavy metals pass from fish to humans. Each group will create a chart or poster showing the effects of a particular pollutant on aquatic life and humans.

5. Case Study

Analysing Major Water Pollution Incidents

Mission: Analyse real-world water pollution cases.

Activity: Students will choose a specific environmental disaster (for example, the Deepwater Horizon oil spill or the Great Pacific Garbage Patch) and examine the event's causes, effects on aquatic life, and long-term consequences. Afterwards, they will share this event with a presentation in the class.

6. Developing Innovative Solutions for Clean Water

Task: To develop solutions to reduce water pollution.

Activity: Working in groups, students will propose innovative solutions to reduce water pollution. Recommendations may include wastewater treatment methods, sustainable farming practices or recycling programs. Each group will present their suggestions to the class through a visual presentation or prototype.

8. Making Animation or Video

Task: To prepare a short animation or video about water pollution and its effects on aquatic life.

Activity: Students, in small groups, will prepare a digital project explaining the effects of water pollution on ecosystems. The video or animation should include the effects of pollution and solution suggestions. These projects will be monitored and discussed in class.

9. Starting Their Own Campaign to Prevent Water Pollution

Mission: To organize an awareness campaign to reduce water pollution.

	<p>Activity: Students will prepare brochures, posters or social media content to raise awareness about water pollution. Their campaigns may be aimed at saving water, reducing plastic use, or preventing industrial pollution.</p> <p>10. A Debate About Water Pollution</p> <p>Task: To organize a debate on water pollution and protection of water resources.</p> <p>Activity: Students will discuss the effects of water pollution on economic development. Two groups will be created; While one group will argue that protecting water resources is important, the other group will argue that economic development is a priority. At the end of the debate, the strengths and weaknesses of both sides will be evaluated</p>
Cross-curriculum competencies of students	<p>Scientific Inquiry</p> <p>Critical Thinking</p> <p>Communication</p> <p>Environmental Awareness</p> <p>Creativity and Innovation</p>
Assessment criteria	<p>Research Depth</p> <p>Analysis and Critical Thinking</p> <p>Collaboration and Participation</p> <p>Data Interpretation and Analysis</p> <p>Creativity and Innovation</p> <p>Overall Impact and Contribution</p>
Materials	<p>Presentation – Water pollution and its effects on aquatic life</p> <p>Water quality testing kits (optional)</p> <p>Art supplies for creative activities (optional)</p>
Digital resources	<p>Google Classroom</p> <p>Web2 Canva WordArt (word cloud)</p> <p>Youtube</p>
Notes (optional)	<p>Personal Action Plan</p> <p>Task: Develop a personal or family action plan to reduce water pollution. In a one-page outline, describe:</p> <p>Three specific actions you will take to reduce water pollution (e.g., reducing plastic use, proper disposal of chemicals, conserving water).</p> <p>Why these actions are important for protecting aquatic ecosystems.</p> <p>How you can encourage others in your community to join your efforts.</p> <p>Guidelines: Be practical and realistic in your plan. Consider actions you can take both at home and at school.</p>

TOPIC: River ecology and dam impacts

Duration/ number of classes	2
Developed by	Portugal
Objectives	<ul style="list-style-type: none"> • Understand the main concepts of river ecology. • Identify the environmental impacts caused by dams on river ecosystems. • Analyse case studies of the Tua dam and discuss possible solutions to mitigate the negative effects of dams.
Preparation	PC, projector, Internet
Outcomes	<p>Enhanced Understanding of River Ecology: Students will be able to define and describe the key components of river ecosystems, including biotic (flora and fauna) and abiotic (water, sediments, nutrients) factors.</p> <p>Critical Analysis of Dam Impacts: Students will identify and explain the various environmental impacts of dams, including alteration of water flow and sediment transport, effects on fish migration, habitat loss, changes in water quality, and ecosystem fragmentation.</p> <p>Application of Knowledge through Case Studies: Students will analyse specific case studies (e.g., Tâmega Dam) to identify real-world impacts and challenges associated with dam construction and operation.</p> <p>Development of Problem-Solving Skills: Through group activities, students will develop and present potential solutions to mitigate the negative impacts of dams on river ecosystems. Students will engage in collaborative discussions, enhancing their ability to work in teams and think critically about environmental issues.</p> <p>Improved Communication Skills: Students will articulate their understanding of river ecology and dam impacts through group discussions, presentations, and written reflections. Students will provide and receive constructive feedback during group activities and class discussions.</p> <p>Increased Engagement and Responsibility in Learning: By participating in a flipped classroom model, students will take greater responsibility for their own learning by engaging with materials at home and coming prepared for active participation in class. Students will develop self-directed learning skills and a deeper interest in environmental science topics-</p>
Didactic-methodical implementation	<p>General introduction to the topic river ecology.</p> <p>Viewing and discussion of the Video about the impact of the dam The TRUE Costs of Damming Our Rivers Earth Explained! (youtube.com)</p> <p>Visiting the Tua Dam (Foz Tua: quando a relação com o rio muda edp.com)</p>

	<p>Organization of groups for research to analyse the case study – Tua Dam, identifying the main environmental and social impacts of the dam.</p> <p>Solution Brainstorming: After the case study analysis, each group brainstorms potential solutions to mitigate the negative impacts of dams.</p> <p>Class Discussion: Groups present their solutions, followed by a class-wide discussion to evaluate the feasibility and effectiveness of the proposed solutions.</p> <p>Exploration of the PPT presentation on Solutions to mitigate the negative effects of Foz do Tua Dam.</p> <p>Evaluation of students' comprehension of the class materials through an online quiz (https://create.kahoot.it/share/river-ecology-and-dam-impacts/8003df82-63a8-4054-baa2-85e5ee8ff7f6).</p> <p>By implementing these didactic-methodical strategies, the lesson will provide a comprehensive and engaging learning experience that promotes active participation, critical thinking, and the development of essential cross-curricular competencies</p>
Tasks / students' activities	<p>Participation in discussions and activities.</p> <p>Cooperation and contribution to group work.</p>
Cross-curriculum competencies of students	<p>Critical Thinking: Students will analyse and evaluate the environmental and social impacts of dams, fostering the ability to think critically about complex ecological and societal issues.</p> <p>Collaboration and Communication: Through group discussions and activities, students will practice effective communication and teamwork. They will learn to articulate their ideas clearly, listen to others, and engage in constructive dialogue.</p> <p>Environmental Literacy: Students will gain a deeper understanding of environmental science concepts, particularly related to river ecology and the impacts of human activities on ecosystems. They will learn about sustainability and the importance of balancing development with environmental conservation.</p>
Assessment criteria	<p>Participation in discussions and activities.</p> <p>Cooperation and contribution to group work.</p> <p>Evaluation of students' comprehension of the class materials through an online quiz.</p>
Materials	<p>Computers or tablets to access online materials.</p> <p>Projector and screen for video presentations.</p>
Digital resources	<p>Links to videos dam The TRUE Costs of Damming Our Rivers Earth Explained! (youtube.com)</p> <p>Video - Foz Tua: quando a relação com o rio muda edp.com</p> <p>Online quiz (https://create.kahoot.it/share/river-ecology-and-dam-impacts/8003df82-63a8-4054-baa2-85e5ee8ff7f6).</p>

TOPIC: Invasive species in aquatic environments

Duration/ number of classes	3
Developed by	Portugal
Objectives	<ul style="list-style-type: none"> • Distinguish natural disasters from anthropogenic disasters, identifying the causes of the main anthropogenic disasters and valuing knowledge from other disciplines (e.g., Geography). • Explain how biological invasions can affect ecosystems. • Identify and characterize existing invasive species in Portugal.
Preparation	PC, projector, Internet
Outcomes	Video
Didactic-methodical implementation	<p>General introduction to the topic using the module 3 of the Project Junto à Terra.</p> <p>Exploration of the PPT presentation on water ecology - invasive species</p> <p>Viewing and discussion of a film/documentary.</p> <p>Organization of groups for research and elaboration of work/video.</p>
Tasks / students' activities	<p>Research</p> <p>Elaboration of video</p>
Cross-curriculum competencies of students	<p>- Articulate knowledge from different disciplines to deepen themes addressed in Natural Sciences.</p> <p>- Select and organize information, from diverse sources and in an increasingly autonomous way, valuing the use of digital technologies and integrating previous knowledge to build new knowledge.</p>
Assessment criteria	<p>Class participation.</p> <p>Cooperation and contribution to group work</p> <p>Quality of the final product.</p>
Materials	PPT on natural and anthropogenic catastrophes.
Digital resources	<p>Junto à Terra – e-learning: https://juntoaterra.pt/e-learning/modulo-3/</p> <p>"Espécies Exóticas Invasoras na bacia hidrográfica do Rio Vouga</p> <p>https://www.youtube.com/watch?v=bOluYfYqy3U</p>
Notes (optional)	Articulation with the Junto à Terra – Tua Project (JaT Tua). The video presented was in the competition in the JaT Tua Project.

TOPIC: Microplastics and their impact on water ecosystems

Duration/ number of classes	4
Developed by	Portugal
Objectives	Understand what microplastics are and their sources. Learn about the impacts of microplastics on water ecosystems. Discuss measures to reduce microplastic pollution.
Preparation	Projector, computer for videos and internet access for research
Outcomes	<ul style="list-style-type: none"> - Understanding of Microplastics: Students will be able to define microplastics and identify their sources, including fragmentation of larger plastics, microbeads in personal care products, synthetic fibers from clothing, and tire wear particles. - Awareness of Environmental Impact: Students will understand the various impacts of microplastics on water ecosystems, such as toxicity through chemical adsorption, bioaccumulation and biomagnification in the food chain, physical habitat alteration in sediments, and behavioral and physiological changes in aquatic organisms. - Knowledge of Mitigation Strategies: Students will be able to discuss and propose practical measures to reduce microplastic pollution, including reducing plastic waste inputs, enhancing waste management and recycling practices, developing alternative materials, and implementing regulatory policies on plastic production and use. - Critical Thinking and Problem-Solving Skills: Students will demonstrate their ability to think critically and creatively by brainstorming and presenting innovative solutions to reduce microplastic pollution in their communities, reflecting on how their actions can contribute to environmental conservation.
Didactic-methodical implementation	<p>General introduction to the topic using the materials of the Project Plastics Pirates (https://www.plastic-pirates.eu/pt-pt)</p> <p>Exploration of the PPT presentation on Microplastics and their impact on water ecosystems</p> <p>Field trip to implement the project using the PROJECT BOOKLET (Project booklet for young people – Plastic Pirates go Europe! (plastic-pirates.eu)). The students are going to collect and measure the riverbank waste.</p> <p>Upload the results of the campaign into the map at plastic-pirates.eu/en/results/map.</p> <p>Collaborative Learning - Group Activity: Solutions Brainstorm about measures to reduce microplastic pollution.</p> <p>Evaluation of students' comprehension of the class materials through an online quiz (https://create.kahoot.it/share/plastics/06a6b898-7405-41dc-8971-4210e1afc1df).</p>

Tasks / students' activities	Research Measure, collect and enter the data gathered into our map at plastic-pirates.eu/en/results/map .
Cross-curriculum competencies of students	<ul style="list-style-type: none"> - Articulate knowledge from different disciplines. - Select and organize information, from diverse sources and in an increasingly autonomous way, valuing the use of digital technologies and integrating previous knowledge to build new knowledge. - Personal and Social Responsibility: Students will reflect on their own roles in contributing to environmental sustainability and consider actions they can take in their communities. They will develop a sense of responsibility towards protecting the environment and advocating for sustainable practices.
Assessment criteria	Participation in discussions and activities. Cooperation and contribution to group work.
Materials	PPT on Microplastics and their impact on water ecosystems. Online quiz
Digital resources	Project Plastics Pirates (https://www.plastic-pirates.eu/pt-pt)
Notes (optional)	Articulation with the Project Plastics Pirates. The campaign results have been upload into the map at {{ webform_submission_value }} Plastic Pirates (plastic-pirates.eu)

TOPIC: Aquatic ecosystems and food chains

Duration/ number of classes	3
Developed by	Portugal
Objectives	<ul style="list-style-type: none"> - Systematize trophic chains of aquatic environments predominant in the region surrounding the school. - Interpret trophic chains, starting from different examples of food webs. - Critically analyze examples of impacts of human action that condition food webs, discussing measures to minimize them in ecosystems.
Preparation	PC, Internet
Didactic-methodical implementation	Flipped Classroom Contextualization of the theme with the visualization and discussion of two videos. Organization of working groups.

	Provision of the project script and analysis of the tasks presented. Monitoring of student work.
Tasks / students' activities	Viewing of the videos Food chains for kids. Episodes 1 and 2 Information research, analysis and synthesis, for the preparation of the leaflet for distribution to the educational community
Cross-curriculum competencies of students	<ul style="list-style-type: none"> - Select and organize information, from diverse sources and in an increasingly autonomous way, valuing the use of digital technologies and integrating previous knowledge to build new knowledge. - Apply the skills developed in current problems and in new contexts. - Formulate and communicate critical, scientifically grounded opinions related to CTSA. - Articulate knowledge from different disciplines to deepen themes addressed in Natural Sciences
Assessment criteria	Class participation. Cooperation and contribution to group work. Quality of the final product.
Materials	Project Guide
Digital resources	<p>FOOD CHAINS for Kid-Terrestrial and Aquatic: Episodes 1 and 2:</p> <p>https://www.bing.com/videos/riverview/relatedvideo?q=FOOD+CHAINS+for+Kids+%f0%9f%8c%b1%e2%ac%85%f0%9f%90%9d%e2%ac%85%f0%9f%90%a6%e2%ac%85%f0%9f%90%ba+Terrestrial+and+Aquatic+%f0%9f%8c%bc+Episode+1&&view=riverview&mmscn=mtsc&mid=273A759C519224AE8894273A759C519224AE8894&&aps=22&FORM=VMSOVR</p> <p>https://www.bing.com/videos/riverview/relatedvideo?q=%e2%97%8f+Aquatic+eco+systems+and+food+chains&&view=riverview&mmscn=mtsc&mid=150C5378AE130B06C8A6150C5378AE130B06C8A6&&aps=204&FORM=VMSOVR</p>
Notes	The preparation of the brochure is carried out in conjunction with the discipline of Information and Communication Technologies.

Area 5: Social and Historical importance of water

Topics:

- Water wars
- Symbolic value of water in art
- Water disasters: historical cases and contemporary policies
- From dry landscapes to water ones
- The role of water in world religions

Outcomes:

At the end of the curriculum students will be able to:

- analyze historical and contemporary conflicts over water resources, understanding the causes of these "water wars" and their impact on political relations, security, and regional stability.
- Explore the symbolic significance of water in various cultural, artistic, and religious contexts, recognizing how water has been portrayed as a symbol of purity, life, rebirth, and spiritual significance throughout history.
- examine major historical water-related disasters, such as floods and droughts, and evaluate the development of modern policies and technologies aimed at preventing and managing similar disasters in contemporary society.
- assess how human intervention, through irrigation and water management, has transformed arid and semi-arid landscapes into fertile agricultural areas, and analyze the social, environmental, and economic impacts of these transformations.

TOPIC: Water wars

Duration/ number of classes	6 lessons 1 class 5th year
Developed by	Italy
Objectives	<ul style="list-style-type: none">• Understand what water wars are and the interests that underlie them• Learn about where the water wars are settled.• Discuss measures to avoid the emergence or exacerbation of conflicts over water
Preparation	<ul style="list-style-type: none">• Preparation of a press review

	<ul style="list-style-type: none"> • Projector, computer for videos and internet access for research
Outcomes	<p>At the end of the curriculum, the student will:</p> <ul style="list-style-type: none"> • be able to make a connection between ongoing wars and water shortage • acquire political and economic awareness of the importance of water and the risks linked to the mismanagement of resources
Didactic-methodical implementation of the topic	<ul style="list-style-type: none"> • General introduction to the topic using <ul style="list-style-type: none"> - videos from Michigan State University Public Media database - a group work on a press review • Upload the results of the campaign into a Canva presentation • Brainstorm about measures to reduce water conflicts • Evaluation of students' comprehension of the class materials through an online quiz
Tasks / students' activities	<p>Research about</p> <ul style="list-style-type: none"> • How is water used in conflicts as a weapon? • Who are climate refugees? <p>Create a map of the ongoing water wars</p> <p>Make an outline for the motivations behind water wars</p>
Cross-curriculum competencies of students	<ul style="list-style-type: none"> • Work with data and information • Problem solving • Cooperation • Communication in Italian and English • Select and organize information from diverse sources • Use of digital technologies to build new knowledge. • Personal and Social Responsibility towards protecting the environment.
Assessment criteria	<ul style="list-style-type: none"> • Participation in discussions and activities. • Cooperation and contribution to group work.
Materials	<p>Press review</p> <p>Online quiz to be prepared at the end on the bases of student researches and press review and videos shared.</p>
Digital resources	<p>https://mediaspace.msu.edu/media/HM839+Blue-Gold---World-Water-Wars---697MB_512K/1_kpercw6t</p> <p>https://mediaspace.msu.edu/media/The+Nile+River+Basin+Water+Health+and+Conflict/1_f1yy5u0z</p> <p>https://mediaspace.msu.edu/media/Water+and+Health+in+North+Africa/1_w892a9gg</p>

https://mediaspace.msu.edu/media/HM839WaterasaHumanRight/1_9cdphkba
<https://www.youtube.com/watch?v=Y4DvzLGwgtw>

TOPIC: Symbolic value of water in art

Duration/ number of classes	6 lessons 1 classes 4th year
Developed by	Italy
Objectives	<ul style="list-style-type: none"> strengthen awareness of the importance of water across all cultures make students acquire a cultural background that helps them in intercultural relationships enrich students knowledge of Italian and foreign languages enrich their ability and means of expression
Preparation	<ul style="list-style-type: none"> Art lab: colored pencils, tempera, watercolors, paper, etc... Projector, computer for videos and internet access for research
Outcomes	At the end of the curriculum, the student will be able to: <ul style="list-style-type: none"> Decode verbal and visual messages identify symbols related to water in works of art acquire a cultural background that helps them in intercultural relationships
Didactic-methodical implementation of the topic	<ul style="list-style-type: none"> General introduction to the topic (water in art) showing a presentation and you tube video, group job on articles (UNESCO) Visit to the Bari National Library for a research camp Guided tour to the Acqueduct Palace in Bari
Tasks / students' activities	<ul style="list-style-type: none"> Draw up a dictionary of water symbols in art Research on art case study (The aqueduct palace in Bari) before the guided tour (water in architecture) Photo haunting in the XX cent. Bari searching for water symbols in building decorations Make drawings that reinterpretate famous artists containing water references to water and water mythes
Cross-curriculum competencies of students	<ul style="list-style-type: none"> Use the graphic-pictorial language to complete and enrich activities carried out in other disciplines. Read the images related to the topic

	<ul style="list-style-type: none"> • Decode verbal and visual messages • Compare different experiences • Articulate knowledge from different disciplines. • Work with data and information • Problem solving • Cooperation • Communication in Italian and English • Select and organize information from diverse sources • Use of digital technologies to build new knowledge. • Personal and Social Responsibility towards protecting the environment.
Assessment criteria	<ul style="list-style-type: none"> • Participation in discussions and activities. • Cooperation and contribution to group work. • Freehand drawing evaluation grid • Photo contest
Materials	Introduction presentation Freehand evaluation grid
Digital resources	https://www.youtube.com/watch?v=qv2K1yk0LCE https://www.youtube.com/watch?v=NFPs_cRRGdM&t=270s https://www.youtube.com/watch?v=dQc_QXAgmA4 https://www.youtube.com/watch?v=6jOw4YQOZPI https://www.youtube.com/watch?v=jLmu6JxWtig https://www.youtube.com/watch?v=XyLNPumMMTs https://www.unesco.org/en/articles/walk-water-art-exhibition https://whc.unesco.org/en/review/59/

TOPIC: Water disasters: historical cases and contemporary policies

Duration/ number of classes	4lessons 1 class 2th year
Developed by	Italy
Objectives	<ul style="list-style-type: none"> • Improving the understanding and encouraging the consciousness of flood risk

	<ul style="list-style-type: none"> • Developing the knowledge on past natural disasters, with insight into the changing nature of hazards and vulnerability. • Studying how different environments understand water-related risks.
Preparation	<ul style="list-style-type: none"> • Projector, computer for videos and internet access for research • Final online quiz
Outcomes	<p>At the end of the curriculum, the student will:</p> <ul style="list-style-type: none"> • acquire political and economic awareness of the importance of water and the risks linked to the mismanagement of resources • acquire awareness that ineffective political management of water leads to environmental disasters
Didactic-methodical implementation of the topic	<ul style="list-style-type: none"> • General introduction sharing web resource in working group for developing concept maps • Presentations by Majorana students who took part to another Erasmus project about environmental issues • Creation of a Padlet repository of the researches carried out to further the topics • Evaluation of students' comprehension of the class materials through an online quiz (contest among the 4 classes involved in the activities) • On site visit to Lama Balice Park in Bari – a prehistoric dry riverbed, which is strategic during floodings, and has become an outstanding environment with a rich flora and fauna.
Tasks / students' activities	<ul style="list-style-type: none"> • Concept maps: on digital resources provided. • Research water-related disasters in our region: <ul style="list-style-type: none"> - draw up a timeline - make a Canva presentation on politic answers to emergencies in our region • Photo hunting in Lama Balice Park: traces of water • Create a video about floodings with photos and videos taken from the web
Cross-curriculum competencies of students	<ul style="list-style-type: none"> • Work with data and information • Problem solving • Cooperation • Communication in Italian and English • Select and organize information from diverse sources • Use of digital technologies to build new knowledge. • Personal and Social Responsibility towards protecting the environment.
Assessment criteria	<ul style="list-style-type: none"> • Participation in discussions and activities. • Cooperation and contribution to group work.

	<ul style="list-style-type: none"> • Photo and video evaluation in a School contest
Materials	2023-24 students' presentation (PPT) and posters Online quiz
Digital resources	https://wmo.int/news/media-centre/water-related-hazards-dominate-disasters-past-50-years https://www.sciencedirect.com/science/article/pii/S2590061720300600 https://www.undrr.org/implementing-sendai-framework/sendai-framework-action/water-risks-and-resilience https://edition.cnn.com/2023/03/13/world/water-extremes-drought-floods-nasa-study-climate/index.html https://www.youtube.com/watch?v=OY_NjLzWp5s https://www.youtube.com/watch?v=kZVeGpHU-ug

TOPIC: The role of water in world religions

Duration/ number of classes	135 minutes/ 3 periods
Developed by	Greece
Objectives	<p>Research the significance of water in various world religions. Develop an understanding of cultural and religious diversity. Practice researching, comparing, contrasting, summarizing results, extracting conclusions Enhance collaboration and presentation skills. Work on visual presentations of data, use appropriate software to create a visual representation (poster) of their findings.</p>
Preparation	<p>Guidance worksheet with questions to consider Printouts of research guidelines and assessment criteria Computers/tablets with internet access Reference books on world religions (if available) appropriate software for presentations (e.g. Canva, Power Point, Google Slides) printer, poster paper /boards, art supplies</p>
Outcomes	<ol style="list-style-type: none"> 1. Improved understanding of how people perceive the importance of water through the role they assign to it in their spiritual life. 2. Honed critical thinking, knowledge of conducting comparative research

	<p>3. Improved ability to work as a member of a team, cooperate with peers, assume responsibility for one's part of the project.</p> <p>4. Enhanced understanding on how to create a poster to present the relevant results of one's research in a succinct, informative and appealing manner.</p> <p>5. Familiarity with useful tools such as software to create charts, word clouds etc.</p>
<p>Didactic-methodical implementation</p>	<ul style="list-style-type: none"> • Project based learning
<p>Tasks / students' activities</p>	<p>Research and Presentations:</p> <p>Each students group researches the significance of water in a major world religion focusing on role in creation lore, rituals, divine or sacred status. They subsequently create poster presentations to share findings with classmates, displaying both common and unique attitudes towards water.</p>
<p>Cross-curriculum competencies of students</p>	<ul style="list-style-type: none"> • Critical Thinking: Analyze and synthesize information from various sources. • Communication: Present information clearly and effectively. • Collaboration: Work effectively in groups. • Cultural Awareness: Develop an appreciation for diverse religious practices and beliefs • Research: Completeness and accuracy of the information gathered. Depth of understanding demonstrated. • Poster: Clarity and organization of the poster. Visual appeal and creativity. Inclusion of key information and religious quotes. • Presentation: Clarity and confidence in presenting the information. Ability to answer questions and engage with the audience. • Collaboration: Effective teamwork and division of tasks. Peer evaluation of group members' contributions.

Materials	Poster boards Markers, colored pencils, and other art supplies Research worksheets Project planning worksheets Reference books on world religions
Digital resources	Access to educational websites and databases (e.g., World Religion News, BBC Religion, Encyclopedia Britannica) Online articles and videos related to the role of water in different religions Digital library resources or e-books on world religions Presentation software (e.g. Canva, PowerPoint, Google Slides) for creating and displaying digital posters if applicable Digital tools for visual information presentation (to create charts, infographics, word clouds etc.)

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