MED EDUC - European Network for Marine Environmental Education in the Mediterranean

PEDAGOGICAL GUIDE FOR EDUCATORS

The educational activities were written by the following actors:

Association U Marinu – France
CDE Petra Patrimonia – France
Hellenic Centre for Marine Research – Greece
Consell Insular de Mallorca – Spain
Istituto Giuseppe Garibaldi – Italy
MEDORO – Italy
Osnovna škola Pučišća – Croatia

Pedagogical Guide

Introduction, Scope & Contents

The Pedagogical Guide has been prepared to teach, implement, inform, sensitize and enable educators, teachers and secondary school level students from the Mediterranean Europe Basin to learn more about the Mediterranean Sea addressing it from an environmental, societal, cultural and economic point of view.

It is a joint product of the MED EDUC- European Network for Marine Environmental Education in the Mediterranean partnership and within the project duration (2018-2021) it is expected to be translated and applied in the 7 countries of the consortium.

It contains **44 learning activities** and it has been designed to primarily serve youth aged from **11 to 18 years old**, but can be used also by educators outside the formal schooling system.

Formal and non-formal educators are invited to use this material as a tool to develop observation, curiosity, imagination, creativity and action skills to young learners, on various topics relevant to the sustainable use of Mediterranean Sea and not only: in line with the principles of Education for Sustainable Development (ESD), the material views Mediterranean Sea as a piece of the wider picture of today's environment and sustainability challenges.

The protection of the Mediterranean Sea has high impact to a clean, healthy and safe system since it is strongly related with human needs (food, space for recreation etc). Furthermore, overfishing reduces fish populations threatening the supply of nutritious food, plastic pollution changes the ecosystem functioning and thus the marine life. The proposed activities of MED EDUC provide an opportunity to introduce students to the diversity of life in the marine environment of the Mediterranean Sea, to make them understand the key marine processes, to discuss with them about ocean health and safety applying adequate monitoring tools, and in general to excite and inspire students about marine science.

Furthermore, MED EDUC provides to the educators through the proposed activities ideas and educational resources to bring the ocean to life for the students in the classroom and outside the classroom. Several teacher-tested materials of marine science are selected for the classroom. These resources along with the related material of the Pedagogical Reference for educators document will support educators to inspire the next generation of ocean stewards.

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The MED EDUC project has been developed with the support of ERASMUS+ from the European Commission.

The project has been led by an educational center specializing in the environment: the CPIE Bastia – Golo Méditerrannée U Marinu (France). The project also brings together two colleges and high schools in Mediterranean Europe (Giuseppe Garibaldi Institute in Italy and Osnovna škola Pučšiča in Croatia), two cooperative companies, one engaged in local development and heritage enhancement (MEDORO in Italy), the other in economic development linked to maritime and coastal activities (CDE Petra Patrimonia in France), a public research center in the field of the sea (HCMR in Greece) and finally a local authority developing missions to support activities environmental education in schools (Consell Insular de Mallorca in Spain).

The Pedagogical Guide, will facilitate the teaching so that students will be able to establish a connection with their environment and will be able to:

Understand the coexistence needed between the society and the marine environment throughout history and in the present;

Understand the knowledge needed to sustain the marine management;

Learn about the marine environment and the need to coexist with it;

Learn and understand the phenomena in the environment that result from the degradation of marine resources (natural and economic);

Learn and understand the consequences of the degradation of the marine environment;

Understand the need to change the humans' habits and behavior to protect the sea and its coast.

The pedagogical material produced through this project is intended for teachers and non formal educators who are open to innovative teaching models based on experiential and holistic learning.

The purpose of teaching / learning activities is to:

- Connect the students to the environment;
- Strengthen students' motivation for learning and better understanding of teaching content;
- Link educational activities to real life;
- Provide students a specific knowledge about the marine environment that is otherwise not sufficiently represented in the school curricula of the Mediterranean countries;
- Encourage the development of student competences;
- Prepare students for responsible citizenship and coexistence with the sea.

After reading the educational guide and implementing some of the activities we hope that you and your students will have a better understanding of the challenges that Mediterranean Sea faces as well as a greater interest in its need for protection and sustainable management. Our lifestyle and our engagement in a sustainable use of marine resources affect the visibility and recognition of the Mediterranean customs, skills and products that need to be understood and preserved.

Special thanks to Yiannis Kapakos (Biologist at HCMR) for providing the excellent photos used in most of the activities.

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Index by Subject / Type of activity / Minimum Age

Based on the 5 countries of the project

		Min Age	Type of activity	Mother & Foreign language / Literature	History	Geography	Mathematics	Biology / Geology	Chemistry / Physics	Social Science / Economy / Law	Arts / Music	Technology / Computer science
1. Waste and pollution	1.1. Searching for microplastics in sand samples	12	Publication, exhibition, experimental activities	X		X	X	X	X			
	1.2. Plastic pollution in the Mediterranean Sea	12	Environmental observation, teamwork, information research, oral presentation	X	X	X		X				X
	1.3. Research report: Are cruises really a problem?	14	Information research, oral presentation	X				X				X
	1.4. Traces on the beach	11	Field research, experimental activity					X				X
2. Sea Water Quality	2.1. How can a Satellite tell a sea story?	13	Information research, publication, experimental activities, project	X		X		X	X			X
	2.2. Mobility of pollution in aquatic media	13	Experimental activity	X		X		X	X			
	2.3. Create a part of the water cycle in a plastic bag	11	Experimental activity, project	X		X		X	X			
	2.4. How can we collect water samples and measure temperature and pH?	15	Information research, experimental activities	X		X	X	X	X			X

Index by Subject / Type of activity / Minimum Age

Based on the 5 countries of the project

		Min Age	Type of activity	Mother & Foreign language / Literature	History	Geography	Mathematics	Biology / Geology	Chemistry / Physics	Social Science / Economy / Law	Arts / Music	Technology / Computer science
3. Artificialization of the coastline	3.1. Studying the mobility of the shoreline	12	Information research, data analysis	X		X		X				
	3.2. Panorama on coastline artificialization	12	Game, debate	X		X		X	X			
	3.3. Which goods and services are provided by coastal ecosystems?	12	Information research, debate	X		X		X				
	3.4. On site or virtual tour of a coastal tourist site?	12	Information research, field research, debate	X		X		X				
4. Energy: Production and resources	4.1. Route of your jeans	12	Experimental activity	X		X			X	X		
	4.2. How can potatoes enlighten us?	11	Experimental activity						X			X
	4.3. Create a communication tool on renewable energy	11	Publication, exhibition, Information research						X			X
	4.4. Make your solar energy dragster	12	Experimental activity						X			X

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Index by Subject / Type of activity / Minimum Age

Based on the 5 countries of the project

		Min Age	Type of activity	Mother & Foreign language / Literature	History	Geography	Mathematics	Biology / Geology	Chemistry / Physics	Social Science / Economy / Law	Arts / Music	Technology / Computer science
5. Maritime Economy	5.1. Sea or Maritime Museum Visit	14	Guided Tour	X	X							
	5.2. Search and rescue simulation	16	Experimental activity	X						X		
	5.3. From Alfa to Zulu	11	Game, Experimental activity	X								
	5.4. Discovering ports and related human activities	11	Experimental activity		X	X		X				
	5.5. Discovery of the fishing resources of professional fishing and marketing	11	Experimental activity			X		X				
6. Politics and governance	6.1. Politics and Government in our daily life	13	Game, debate, discussion, project	X	X	X				X		
	6.2. You said "migration"	14	Information research, experimental activities, exhibition	X	X	X						
	6.3. Let's talk about the PELAGOS Sanctuary	13	Information research, exhibition	X	X	X				X		

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Based on the 5 countries of the project

		Min Age	Type of activity	Mother & Foreign language / Literature	History	Geography	Mathematics	Biology / Geology	Chemistry / Physics	Social Science / Economy / Law	Arts / Music	Technology / Computer science
7. Cultural Heritage	7.1. Deterioration of heritage due to air pollution	17	Individual task, text commentary on Art History (text or picture), gathering information	X	X						X	
	7.2. Traditional shipbuilders and wooden boats	11	Observation, teamwork, information research, oral presentation	X	X			X		X		X
	7.3. Mediterranean literature as a vehicle for a new humanism	14	Debate, Information research, Publication	X	X	X						
	7.4. Me and my grandma Cook	11	Debate, natural exploration	X	X			X		X	X	
	7.5. What people do in my homeland	11	Information research, publication, exhibition			X	X					X
	7.6. Building with our elderly ones	11	Information research, field research, publication, project		X	X	X	X			X	
8. Natural Hazards	8.1. I make my survival bag	12	Game	X		X		X				
	8.2. Natural Hazards in my town	13	Information research, project	X	X	X		X				
	8.3. Make your own volcano	12	Information research, experimental activities, exhibition	X		X		X	X		X	
	8.4. Learn about tsunamis!	12	Information research, publication, exhibition	X	X	X		X	X		X	

Index by Subject / Type of activity / Minimum Age

Based on the 5 countries of the project

		Min Age	Type of activity	Mother & Foreign language / Literature	History	Geography	Mathematics	Biology / Geology	Chemistry / Physics	Social Science / Economy / Law	Arts / Music	Technology / Computer science
9. Biodiversity	9.1. Exploring a Mediterranean marine ecosystem. Abiotic and biotic factors in a marine ecosystem	12	Information research, publication, project, exhibition	X		X		X	X			X
	9.2. Explore a Marine Protected Area!	12	Information research, publication, project, exhibition	X		X		X	X			X
	9.3. Exploring the benthic fauna of a rocky shore	12	Field research, experimental activities, presentation, project	X		X		X	X		X	
	9.4. Exploring marine food webs in Mediterranean	13	Information research, publication, exhibition, project	X		X		X	X			X
	9.5. One day cetologist	11	Field research			X		X				X
10. Climate Change	10.1. Drawing the coastline in 2100	11	Field research			X	X	X	X			
	10.2. Be an eco-responsible consumer	11	Information research			X	X	X	X	X		
	10.3. Marine currents	12	Experimental activity			X	X	X	X			
	10.4. What is the ocean acidification?	14	Experimental activity	X				X	X			
	10.5. Melting ice and rising sea level	11	Experimental activity			X		X	X			

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SEARCHING FOR MICROPLASTICS IN SAND SAMPLES

Geography | Geology| Biology | Chemistry | Mother Language | Mathematics

WASTE AND POLLUTION

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PEDAGOGIC CONTENT :

- Marine pollution
- Waste
- Micro plastics
- Plastic microbeads
- Environmental sustainability

PRE-REQUISITES:

- Knowledge of notions relevant to marine pollution issues

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Investigate this type of pollution in sea shores
- Be familiar with scientific procedures
- Be familiar with the use of scientific equipment
- Behave like a scientist
- Help raise awareness and thus encourage behavioral change that reduces practices which cause microplastics input into the marine environment.

SEARCHING FOR MICROPLASTICS IN SAND SAMPLES

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DESCRIPTION:

PREPARATION

#1: (In the classroom). Educator discuss with the students about the marine litter issues. What we mean when we refer to marine litter, how marine litter enters the sea, how marine litter items impact the marine ecosystems, what kind of plastics we observe etc. He / She asks the students to search for microplastics in the internet.

#2: (in the beach). The students go to different areas of the same beach or they go to different beaches and collect some sand samples.

IMPLEMENTATION

#1: (In the lab, or classroom). Students are divided into pairs or groups and each group takes a sample of sand and examines it for plastic items and micro plastics. They complete the worksheet below with information for the plastics they found in their sample. They use magnifying lenses for their observations, and tongs or tweezers, for removing the plastic items. They also take photos of the plastic items.
It is possible that students could weigh the sand so they can calculate the number of microplastic items present per kg of sand.

#2: (In the lab or classroom). Students remove from their sample all the plastic items (micro plastic, bigger plastics, or micro beads) and they put them in another plate.

#3: (In the lab) Students observe the different sizes of micro plastics with the use of magnifying lenses or stereoscopes and they note this information.

#4: (In the lab or classroom). Students calculate how many plastic items they have found in their samples.

#5: Students create a microplastics photo guide (e.g. filaments, films, foam, fragments, pellets etc.)

#6: Students make a poster with their results and discuss about them with the educator and the rest of the class.

#7: Educator makes reference to the relevant legislation (local provisions, national laws, European laws for marine pollution)

#8: Students make an exhibition with all the posters (results, comments, photos, etc.) to inform the rest of the school community about the major environmental problem from micro plastics.

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Type of activity	Publication, exhibition, experimental activities
Target audience	From 12 years old
Place	Classroom, laboratory
Material needed	Magnifying lenses Stereoscopes, sand samples, plates, tongs, worksheets, pencils, cameras, glass petri dishes, teasing needles
Duration of activity	Preparation :1-2 hours Implementation : 2-3 hours
Authorship	HCMR (Education Unit) No authorization required
Links	https://oceanservice.noaa.gov/facts/microplastics.html
Notes by the author	Background information relevant to the microplastics and the chemistry behind them.

SEARCHING FOR MICROPLASTICS IN SAND SAMPLES

Worksheet

How many items of plastic did you find in your sample?	**How many of these items are micro plastics ?**
Photo	*photo*

What kind of color have the plastics you found **Red** **Blue** **Green** **Black** **Other**	**Did you find another material except plastic in your sample (e.g. glass, iron, etc.) ?**
Photo	photo

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PLASTIC POLLUTION IN THE MEDITERRANEAN SEA

Biology| Geography | History | Mother Language | Foreign Language |
|Computer Science |

WASTE AND POLLUTION

PEDAGOGIC CONTENT:

- Marine pollution by plastics.
- Origin and types of plastics in the Mediterranean Sea.
- Environmental impact of plastics on marine organisms and humans.
- Solutions to the environmental problem of plastics.
- Environmental sustainability.

PRE-REQUISITES:

- Basic computer skills (PowerPoint, Genially, Prezi, Canva, Glogster, etc.).

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Observe and investigate marine pollution by plastics in the Mediterranean.
- Identify the different types of plastics and their origin.
- Learn how plastic pollution affects marine species, environment and humans.
- Find information about this problem on the internet, sort it, relate it and draw conclusions.
- Use IT to draft presentations and design a poster.
- Perform an oral presentation.

PLASTIC POLLUTION
IN THE
MEDITERRANEAN SEA

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DESCRIPTION:

PREPARATION

#1: Previous to the implementation of this activity, the teacher will identify a beach close to the educational center and will gather information related to plastic pollution in the Mediterranean Sea. It will be necessary to buy gloves and garbage bags.
#2: Requesting parental authorization to go for a study visit to the beach.

IMPLEMENTATION

#1: The students will go for a study visit to a beach near the educational center to observe its state. Once there, they will observe the dirt and the presence of plastics. The teacher will distribute gloves and garbage bags.
The teacher will choose four areas of the beach where the students will make groups and collect plastics from the area assigned. They will take pictures, classify the plastics and register both the amount and type.
#2: Once in the classroom, the groups will be assigned the following tasks:
- Group number one will look for information on the types of plastic that pollute the Mediterranean.
- Group number two will look for information on the impact of plastics pollution on marine organisms.
- Group number three will look for information on the impact of plastics pollution on humans.
- Group number four will look for solutions to prevent plastics from reaching the coast.

#3: Each group will make an oral presentation on the researched topic using digital formats as PowerPoint, Prezi, Genially, Canva, etc. After the presentations, a debate on the problem of plastics in the Mediterranean will take place to make students aware of how this problem affects the marine ecosystem, marine life and human beings.
#4: Finally, using the information displayed in the presentations, the students will design a common poster using specific software like Glogster, which will show problems and solutions for plastics in the Mediterranean.

Type of activity	Environmental observation, teamwork, information research, oral presentation.
Target audience	From 12 years old.
Place	Beach, classroom.
Material needed	Camera or mobile phone, gloves, garbage bags, internet access, tablet or computer, screen, projector or electronic board.
Duration of activity	Preparation: To buy materials (gloves and garbage bags). Implementation: - Study visit to the beach: 4 hours. - Searching for Information and drafting a presentation: 3 hours. - Oral presentation and debate: 2 hours. - Design of poster: 2 hours. Total: 11 hours. Total including preparation and implementation: 11 hours.
Authorship	Technical staff in Environmental Education at Sustainability and Environment Department of Consell de Mallorca. Registration or authorization of use is not required.
Links	https://www.greenpeace.org/international/story/11871/the-ocean-plastic-crisis/ https://www.greenpeace.to/greenpeace/wp-content/uploads/2016/07/plastics-in-seafood-technical-review.pdf

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Notes by author

To take advantage of the activity, students must be aware of the serious problem caused by plastics pollution in the Mediterranean Sea; as for what it means in terms of degradation of the environment, as well as for the impact and consequences that it generates in marine organisms which also affects human beings.

The methodology of the observation in the field will make the students aware of the problem that plastics generate. Teamworks will improve the cooperation, investigate the problem, be aware of the consequences caused by plastic pollution and be able to find solutions.

The presentation by each group on each one of the topics will permit the students to develop communication skills.

The poster will reflect all the work of observation, research and look for solutions to the environmental problems of plastics in the Mediterranean.

RESEARCH REPORT: ARE CRUISES REALLY A PROBLEM?

Biology| Geology | Mother Language | Foreign Language | Computer Science

WASTE AND POLLUTION

PEDAGOGIC CONTENT:

- Marine pollution.
- Environmental impact of cruises in the Mediterranean.
- Solutions to the environmental problems generated by cruises.
- Environmental sustainability.

PRE-REQUISITES:

- Good skills on computer tools.

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Research on marine pollution caused by cruises in the Mediterranean: greenhouse gas emissions, waste pollution, greywater, acoustic pollution, etc. Lack of regulation of cruises activities.
- Find information about this issue on the Internet, books, journals, etc. and classify, order and relate it.
- Work in teams and draft conclusions on the information obtained.
- Prepare a final report in groups (reporting and submission of the data collected).
- Use computer resources properly, such as educational applications and the Internet to complete the task.
- Express themselves clearly.
- Learn from themselves and their classmates, by working in groups and overcoming the difficulties that may arise.

RESEARCH REPORT: ARE CRUISES REALLY A PROBLEM?

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DESCRIPTION:

For this activity, the students will become research reporters. It is about doing a newscast or a recorded research report using any video editing application, of a duration up to 5 minutes where students will address the finding obtained during their research on the subject.
All videos will be uploaded on YouTube. A private YouTube channel should be created to avoid the problems that can arise from posting students' videos on social media.

PREPARATION

#1: The teacher should create a YouTube channel.
https://www.youtube.com/watch?v=6o7qODwjEz8
#2: The teacher should dedicate a class session to teach students how to use the video editing application.
#3: The class will be divided into groups of 4 or 5 students each.

IMPLEMENTATION

#1: Each group will research the proposed topic.
They will have to take into account some of the following issues:
- Greenhouse gases emissions.
- Pollution of the sea, ports and acoustic pollution.
- Tourism massification vs economic development of the regions.

#2: They will draft a script which will include:
a) A cover page with the title of the report and names of the teamwork.
b) An index.
c) An introduction summarizing the work done and reasons to support it and a brief explanation of what they have learned.
d) Documents and material consulted: Collection of all the material they have used in their research such as films, books, encyclopedias, journals, websites, etc. (It must have a title, date and a brief comment or description).
e) Self-evaluation and achievement of the objectives: a reflection of the whole process to see if they have achieved the task objectives.

#3: Each group has to submit the work to the teacher.

DESCRIPTION:

#4: Once the teacher approves the proposal, they can start recording the newscast.

#5: Once assigned roles within the teamwork members (presenter, screenwriter, filmmaker, cameras...) they start recording.

The students will be free to use their creativity in the elaboration of the newscast. They can include images, websites, live Twitter news, videos, write titles and text, etc.

#6: Recorded videos will be uploaded to the dedicated YouTube channel (Tutorial: https://www.youtube.com/watch?v=VtF2AgFSLAw) and displayed to the students. From the newscasts done by the students, it will open a discussion to reflect on the problem of cruises.

Type of activity: Information research, oral presentation.

Target audience: From 14 years old.

Place: Classroom.

Material needed: Mobile phone, tablet or computer, internet access.

Duration of activity: Preparation:
1 hour to explain to the students the use of video editing application.
Implementation:
- 1-2 sessions for research of information and materials to create the newscast.
- One session to draft the script.
- One session to record videos.
- One session to present the recorded newscasts and open a discussion.
Total: 4-5 hours.

Authorship: Technical staff in Environmental Education at Sustainability and Environment Department of Consell de Mallorca.
Registration or authorization of use is not required.

Links:
https://www.elespanol.com/mundo/20190609/no-podemos-esperar-venecia-cruceros-masificacion-turistica/404460746_0.html
(Inf. from a newspaper about the tourist overcrowding caused by cruise ships in Venice)
https://www.youtube.com/watch?v=q-4Yz4tYA6A
(Video on the production of cruise ship waste)
https://www.lavozdeldespertar.com/?p=7622
(News about the destruction of corals caused by cruise ships)
https://oceana.org/sites/default/files/reports/cruise_ships_pollution_Jun2004_ENG.pdf
(Oceana Report on cruise ship pollution)

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BASTIA GOLO MEDITERRANEE

PETRA patrimonia

hcmr EAKEΘE

Departament de Sostenibilitat i Medi Ambient Consell de Mallorca

ISTITUTO TECNICO NAUTICO DOMENICO MILLELIRE

GIUSEPPE GARIBALDI LA MADDALENA

Liceo GIUSEPPE GARIBALDI

MedLORO

OSNOVNA ŠKOLA PUČIŠĆA

Notes by author

In order for the activity to meet the objectives set and the key competences consolidated, it is important that students become aware of the environmental, social and economic issues of the topic to be addressed.

Regarding the methodology, it is important that the student becomes the protagonist of their own learning. It is for this reason, that we propose an activity in which they are the ones who must look for the information, filter the one they believe is most suitable and agree with the rest of the group's partners to achieve success. The whole process must be done under the supervision of the teacher who will be guiding and helping them to achieve the objectives.

The realization of the different reports and all the previous work, will allow them to develop their communication skills, creativity, collaboration, entrepreneurial spirit, as well as other skills within the field of new technologies.

TRACES ON THE BEACH

| Biology | Technology |

WASTE AND POLLUTION

PEDAGOGIC CONTENT :

- Marine trophic chain
- Food safety and traceability
- Paths and actors of the seafood supply chain
- Degradation times of marine litter
- Coastal management and nature reserves.

PRE-REQUISITES:

None

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Provide examples of environmental and socio-economic activities sustainable for the seas
- Classify causes and consequences of natural and anthropogenic processes
- Recognize different typologies of marine litter
- Categorize the main groupings of the Animal and Plant Kingdom
- Find decline and erosive processes in the beach
- Construct a seafood chain, from the sea to the table
- Describe existing link among health of the sea, food safety and human health
- Disseminate how to decrease impact on marine resources.

TRACES ON THE BEACH

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DESCRIPTION:

PREPARATION

#1: Collecting of the authorization forms signed by the parents of all the students to participate in the study visit.

#2: Creation of IDs card on marine fauna and flora of the place.

#3: Explanation on how to understand when it is the right time to implement the ID cards, before or after searching activity.

IMPLEMENTATION

#1 : Learning phase.

- Briefing on the coastal-marine equilibrium. Explanation of the categories included in the seafood trophic chain and their functions.
- Observation of coastal and marine resources with considerations on their conservation.

#2: Challenge phase.

- Composition of small teams to start a collection of algae, shells, remains of bones and other parts of marine organisms, and also wastes beached as plastic bottles, bags and fishing webs that occur to them
- Use of the collected materials to construct a Food Pyramid on the beach (primary producers, consumers of 1° 2° 3°, top carnivores, decomposers).

#3 : Reasoning phase.

- Why the pyramid has not the right appearance? What are the consequences on your plates? What we can do to maintain the pyramid?
- Observation of human activities at sea and along the coast and of the pollution level of it. How they interact with marine resources and the seafood supply chain?

#4 : Guided debriefing.

- Identification of the actors of the seafood supply chain and simulation of short and long chains.
- Relationship between the health of the sea, food safety and human health.
- Restitution of the collected natural materials to the sea and disposal of the waste possibly cleaning the beach and leaving it better than they found it.

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Type of activity	Field research, experimental activities
Target audience	11 years old
Place	Outside place (preferably involving a Natural reserve including river and coastal environments with a sandy beach)
Material needed	IDs card on marine fauna and flora binoculars to better observe the environment gloves to collect natural traces and marine litter containers to collect the founded elements, garbage bags.
Duration of activity	Preparation : 1 and ½ hour Implementation: 3 hours
Authorship	MareCamp association, certified by "Friend of the Sea"
Links	www.marecamp.com
Notes by the author	No registration or authorization for use is required Program and duration of the experience may undergo variations in case of adverse weather conditions. Disposal of waste is made in collaboration with the local refuse collection service.

HOW CAN A SATELLITE TELL A SEA STORY?

Geography | Physics | Biology | Chemistry | Mother Language | Computer science

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PEDAGOGIC CONTENT:

- Use of satellite images
- Sea water conditions
- Phytoplankton
- Processes and life in the marine environment.

PRE-REQUISITES:

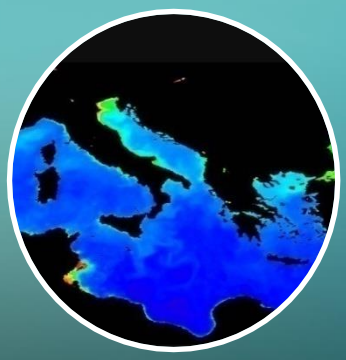
- Computer skills, knowledge about a biotic factors in marine Ecosystems.

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Improve their spatial, map-reading, and observation skills
- Practice using evidence as the basis of explanations
- Learn some important concepts related to oceans
- Introduce them to the ways where the satellites can help them to study enormous areas of ocean
- Integrate information from different areas and over long time periods

By studying the satellite images, students can learn about the large scale of ocean processes, and better understand the channels to connect humans with the oceans.



HOW CAN A SATELLITE TELL A SEA STORY?

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DESCRIPTION:

PREPARATION

#1: Educator makes an introduction about the usefulness of satellites, which can be equipped with sensors to observe wide area of the ocean, and over several days can even observe the entire surface of earth. He/she also introduces the notions of **sea surface temperature** and the **chlorophyll a** as two very useful parameters measured in the ocean based on information of the following link.
https://www.globalchange.gov/browse/indicators/ocean-chlorophyll-concentrations

IMPEMENTATION

#1: Students will be divide in pairs or **groups of 4** and will be given a satellite image of sea surface temperature or chorophyll a , to each group (images could be downloading by the links below: https://view-cmems.mercator-ocean.fr/OCEANCOLOUR_MED_CHL_L3_NRT_OBSERVATIONS_009_040, and http://podaac-tools.jpl.nasa.gov/soto/

#2: The educator asks the students to observe **for 20 minutes** the images and keep track of their observations and questions. To limit the time necessary and provide opportunities for comparisons, educator could have some students look at only temperature or only chlorophyll images, or compare the temperature and chlorophyll from only one region. Educator will explain and describe what is being measured. He /she explains the color coding used in the image, and tells what each color represents

#3: Students have to identify the geographic area, ocean, and land area in the image.

#4: Students have to describe patterns in sea surface temperature (SST) or chlorophyll based on satellite images

#5: Students have to propose and communicate an explanation for the observed patterns

#6: Students have to describe and to explain how the following factors might relate to SST or chlorophyll observations: wind and wave conditions; seasonal patterns for air temperature; regional currents; bathymetry; stratification; and upwelling events.

#7: Students have to identify phytoplankton bloom events on a satellite image.

#8: Students have to make an assignment: based on their study of the images, they will develop a story to explain what is happening in this part of the sea. The story should use evidence and any background information they have learned, and should describe what factors may have influenced the water to cause the changes they observed. The story may be written, drawn and illustrated as a poster or comic strip, or presented as a power point show.

#9: Students will present their assignment and discuss with the rest of the class about it.

#10: The best assignment will be presented in the annual exhibition for the celebration of the Sea.

MED EDUC

Erasmus+

Type of action: information research, publication, experimental activities, project

Target audience: From 13 years old

Place: Classroom, ICT laboratory

Material needed: Copies of the sea surface temperature and chlorophyll a satellite images for the Mediterranean Sea, (examples could be used referred to different areas such as Adriatic Sea , Aegean Sea for the Greek students, or Gulf of Lion for French students etc.). Bathymetry and circulation maps of Mediterranean sea for reference, Mobiles, computers, tablets.

Duration of activity: Preparation : 45 min
Implementation : 2-3 hours

Authorship: HCMR (Education Unit)
No authorization required

Links: https://earthobservatory.nasa.gov/global-maps/MY1DMM_CHLORA/MYD28M
http://www.aviso.oceanobs.com/
http://www.ssmi.com/
http://www.gebco.net/
http://meteonews.ch/en/Satellite_Image/
https://www.ospo.noaa.gov/Products/ocean/sst/contour/
https://www.globalchange.gov/browse/indicators/indicator-ocean-chlorophyll-concentrations
http://podaac-tools.jpl.nasa.gov/soto/
https://view-cmems.mercator-ocean.fr/OCEANCOLOUR_MED_CHL_L3_NRT_OBSERVATIONS_009_040

MED EDUC

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Notes by author

The oceans are vast, and for most of history, ocean research was based on data from a series of individual sampling stations but nowadays ocean observing satellites allow oceanographers / scientists to study a wide variety of factors at regional or global scales. Many types of satellite data are rendered into color-coded images that are intrinsically interesting and intuitively readable. Two very useful parameters that can be studied via satellite images are sea surface temperature (SST) and surface chlorophyll-a (chl) levels. SST allows us to follow the movements and interactions of surface water masses, infer upwelling, and observe the effects of insolation, wind, and storm events. Chlorophyll images show us the levels of phytoplankton in the upper meter of the ocean, including high concentrations during bloom events. Although it is not possible at present to identify genera or species of phytoplankton from satellite images, chl images can be used to locate and track blooms, and are enormously helpful in guiding scientists in choosing sampling sites for harmful algae blooms.

MOBILITY OF POLLUTION IN AQUATIC MEDIA

Physics | Chemistry |Geology | Geography | Biology | Mother Language

MED EDUC

Erasmus+

PEDAGOGIC CONTENT:

- Mobility of pollution in water media
- Artificial “pollution”
- Advection and diffusion of water pollutants into the ground water.

PRE-REQUISITES:

Knowledge of: hydrological cycle, ground water definition, wastewater, pollutants

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Identify the different water pollution sources and trying to understand the impact to humans.
- Learn important concepts related to advection and diffusion processes of pollutants in the water media
- Understand how water gets from the ground after its rained to the rivers and oceans.

MOBILITY OF POLLUTION IN AQUATIC MEDIA

MED EDUC

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DESCRIPTION:

IMPLEMENTATION

(In the science laboratory / classroom or field).
Students are working in pairs or small groups of 4 and they follow the instructions below :

#1: Lay down a few paper towels and put the egg carton on top.

#2: Begin pouring water into one of the cups at one end of the egg carton and watch as the water flows from cup to cup. Stop pouring once each egg cup is full. The mobility of water in the egg cases needs a slight inclination, be sure that you have provided this circumstance

#3: Pour about 1 small spoon of flax meal (flax seeds) into one of the end cups. Watch as the water carries it from cup to cup.

#4: Starting in a cup at the opposite end of the egg carton, add about 10 drops of coloring (such as egg coloring). Give the cup with the coloring a slight stir and watch as it slowly flows into the cups around it.

#5: Leave your experiment out for an hour and notice water mobility and coloring seeping out of the bottom of the egg carton and saturating the paper towels under the carton.

#6: The students should repeat the whole procedure with different “pollution” initial sources (e.g. filter coffee) and food coloring.

#7: Students discuss with their educator about what each material represents in the aquatic environment and come to conclusions about waters behavior.

#8: Educator asks the students to describe an example of water pollution that they know in their city/region/country

#9: Students are interviewing an expert (environmental scientist) about water pollution issues in their regions.

#10: Students present the results of their experiment and also the remarks of the interview as a poster in the rest of the school community

Type of activity	experimental activity
Target audience	From 13 years old
Place	Field campaign and/or science laboratory
Material needed	tray or table paper towels empty egg carton water flax seeds, filter coffee, or another powder, egg coloring material or food coloring
Duration of activity	2-3 hours
Authorship	HCMR (Educational Unit) No registration or authorization for use is required
Links	https://learning-center.homesciencetools.com/article/water-pollution-demonstration/
Notes by the author	This activity should take place in the laboratory or in an aquatic system such as pond, lake, streams or at the coastal zone. Interpretation: The students should understand that the neigboring cups represent the water media of the pollution event such as rives, lakes, streams, ponds oceans etc. The paper towels represent the aquifer (the underground water source-groundwater). In this experiment, the egg carton represents how water media (such as streams, ponds, lakes, rivers, and oceans), are connected to each another.

Notes by the author

The advection and in general the mobility of pollutants are observed after adding artifically “pollution” substances and colored powders into the first cup. The “pollutants” areadvected from the initial place (where the substance isadded), to the neighboring water media (whichcould be far away from where the initial pollution event started).

After leaving the egg carton for awhile, the water and pollution (such as the egg coloring material) started to seep out through the bottom and onto the paper towels. This is an example of how pollution that goes into a body of water can advected further into the ground and pollute areas around a stream or lake or ponds or aquifers. In the last case, when groundwater becomes polluted, it can harm plants and subsequently the humans.

This activity is an introduction for observing the mobility of pollution in water media. This experiment represents how media of water (such as streams, lakes, rivers, and oceans), are connected to each another. The advection and diffusion of such pollutants are observed by controlling the movement of artificial “pollution” from the initial cup to the neighboring cups. Similar phenomena can be observed for the advection and diffusion of water pollutants into the groundwater.

CREATE A PART OF THE WATER CYCLE IN A PLASTIC BAG

Geology| Geography | Physics | Biology | Chemistry | Mother Language |

MED EDUC

Erasmus+

PEDAGOGIC CONTENT:

- Water cycle
- Precipitation
- Evaporation

PRE-REQUISITES:

Knowledge of the precipitation, evaporation, transpiration, and water cycle

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Describe the hydrological (water) cycle
- Apply and demonstrate knowledge and understanding in activities
- Create their own water cycle in a mini-demonstration
- Participate in collaborative discussions, clearly express and argue own opinions.
- Actively listen to others' arguments and build on them

CREATE A PART OF THE WATER CYCLE IN A PLASTIC BAG

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: Educator collects all the necessary materials

IMPLEMENTATION

#1: Educator provide the students with the materials

 # 2: Educator asks the students to be divided in pairs or small groups and to draw the water cycle diagram in their plastic bag (Students should draw in the bag the sun the clouds and other elements of the water cycle, see picture below)

#3: Educator gives the **following instructions** to the students :
•Warm up the water until steam starts to rise but do not let it boil.
•Add blue food coloring into the water to represent ocean water.
•Pour the water into a ziplock bag and zip it up.
•Hang the bag upright on the window (or the door) using packing tape.

#4: Educator gives more information about the procedure. He/she asks the students to explain and write in their notebooks what happens in their bag when the water evaporates.

#5: Students take photos and videos of their water cycle, and they write some hypothesis about the water cycle.

#6: Students discuss about their hypothesis in the classroom

#7: Educator discuss with the students after the implementation of the experiment the following issues:
•How is the water cycle important to weather and climate?
•What happens to water that isn't part of the water cycle?
•What will happen if we use cold water instead of hot water?
•Give examples of the three stages of the water cycle.

#8: Students create a poster or a ppt presentation with their photos or videos and they also write a short composition about their experiment where they present all the elements which were used for the demonstration of the water cycle. They also refer which element of their experiment represents each phase and part of the water cycle.

Type of activity	experimental activity, project
Target audience	From 11 years old
Place	Classroom, Chemistry laboratory
Material needed	a zip lock plastic bag (e.g. 2 Gallon bag) color markers (e.g. Sharpie Permanent Markers or any non-erasable markers) water water heater blue food coloring (optional) packing tape notebooks, pencils, pens tablets, mobile phones, cameras
Duration of activity	Preparation phase: 30 minutes Implementation : 1 -2 hours
Authorship	HCMR (Education Unit) No authorization required
Links	https://scied.ucar.edu/learning-zone/water-cycle http://sciencenetlinks.com/lessons/the-water-cycle/ https://www.usgs.gov/special-topic/water-science-school/science/water-cycle-schools-and-kids?qt-science_center_objects=0#qt-science_center_objects
Notes by the author	None

HOW CAN WE COLLECT WATER SAMPLES AND MEASURE TEMPERATURE AND pH?

Geography | Physics | Biology | Chemistry |Computer Science | Mother Language |Mathematics |

PEDAGOGIC CONTENT:

- Physicochemical parameters,
- Temperature and pH measurements
- Pollution
- Water monitoring,
- Human health

PRE-REQUISITES:

- Physico-chemical magnitudes,
- Computer skills,
- Knowledge about pH magnitude in water solutions.

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

This activity is an introduction to the use of collecting water samples in an industrial area and how they can perform temperature and pH measurements. The results will provide key information about the seawater conditions, and will generate questions about the reasons of a potential pollution

STUDENTS WILL BE ABLE TO:

- Identify the different water pollution sources
- Understand the impact of water pollution to humans.
- Understand the need for supporting a water monitoring programme to estimate the factros that affect human health.

- Learn important concepts related to cost-effective sensing devices for monitoring the water temperature and pH, including their principle of operation

- Understand in a simplified way the key specification of such devices like sensitivi ty and accuracy.
- Develop basic data bases using software packages and save their data for further analysis.
- Get familiar with scientific procedures

HOW CAN WE COLLECT WATER SAMPLES AND MEASURE TEMPERATURE AND pH?

MED EDUC

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DESCRIPTION:

IMPLEMENTATION

First sampling should take place in controlled system (e.g. river, stream, lagoon or lake) since freshwater is not saline and the experiment is similar with seawater analysis.
Second sampling should take place in coastal zone taking into account seawater turbidity.
Students should understand the motivation of the measurements since the indicators of water quality (e.g. turbidity) will provide initial information of state of the water, that is if it is affected from industry and natural processes (e.g. climate change, natural disasters).
Students are divided in pairs/ groups and follow the protocol below:

#1: Water collection

Students should prepare with the educator a preliminary study to identify the areas of sampling. Students should also ensure that they collect the samples from exactly the same location and in the same way each time they test the water. One example is to perform sampling before and after a rainfall event in any of the proposed aquatic systems. Typical protocol indicates that the water sample should be collected from an area close to the centre of the water body. So, a two-times visit in the area is the minimum. The first visit will be in controlled system to get the relevant experience and know-how. The second will take place in the coast before and after rainfall.
Students follow the instructions below:

I. To remove potential contamination and in case you use a typical bottle for collection, rinse it out four times with the water.
II. In case of a sampling procedure in a river take your sample upstream from where you are standing but do not disturb the bottom since this may affect temperature, turbidity and salinity results.
III. In case that you collect the sample beneath water surface submerge your container and try not to collect surface water.

#2: Temperature measurement

The student who will take the measurement should place the thermometer a few centimeters into the water source in-situ or immediately into the water sample after the collection.
Then he/she should measure the temperature directly in the water. Then the student should wait one minute, until the recording becomes stable. The temperature is recorded to the nearest 0.5°C while the temperature sensor is still immersed in the water. Students repeat steps of the previous procedure at least **once**. In case that the results deviate, the students should get up to **5 measurements** and provide an average value. The students should record the results on a datasheet and will see the trends in temperature and comment unusual data (high or low) compared with literature information.

DESCRIPTION:

#3: pH measurements
pH is a difficult concept to explain to younger students.
As a general information they should know that plants and animals leave in a good quality if the pH values are between 6 and 8. pH test strips are not reusable. If the students touch the strips with salty, oily hands or they put food on their skin, pH reading will be changed. So the students should always handle the strips by the white end and don't use pH strips that have been dropped.

The following steps should be followed:
Students should pick one pH strip from the container making sure they will not touch the colored end. Then they should dip the colored part of the strip into the water to be tested and swirl for 2 minutes. The students should compare the 3 colors on the pH strip with the colors on the chart and then they should match the closest result on the data sheet

#4: (in the classroom /science laboratory)
The teacher will explain and describe what is being measured and he will explain the data for both magnitudes (temperature and pH)

#5: Students have to describe patterns in water temperature and/or pH based on in-situ observations.

#6: Students have to communicate for providing an explanation and possible interpretation for the observed patterns getting appropriate support from the teacher.

#7: Students have to discuss about the two quality indices and to compare with literature data at other sites in correlation with the contamination status.

#8: The students should repeat the whole procedure in a seasonal basis (e.g. 3-4 months).

#9: Students have to discuss data comparisons in different aquatic areas.

#10: Students should define their conclusion according to the type of the aquatic system (static for a lake, dynamic for a stream or river), to the comparison of the measured values with baseline data, and to the type of the area of study (affected or not from anthropogenic activities).

 # 11: Students present their conclusions to the rest of the class

MED EDUC

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Type of activity	information research, experimental activities
Target audience	From 15 years old
Place	Field, chemistry lab, classroom
Material needed	Temperature probe/sensors pH test strips Bottles or buckets Other general consumables, pencils, notebooks, work sheets, sun cream,
Duration of activity	Implementation : 3-4 hours
Authorship	HCMR (Education Unit)
	No authorization required
Links	https://www.watercorporation.com.au https://ecosystems.psu.edu/youth/sftrc/lesson-plans/water/6-8/quailty https://betterlesson.com/lesson/645226/water-quality-what-is-ph https://www.michiganseagrant.org/lessons/lessons/by-broad-concept/earth-science/water-quality/314-2/ https://www.otffeo.on.ca/en/resources/lesson-plans/testing-water-quality/
Notes by author	This activity should take place in an aquatic system such as pond, lake, streams or at the coastal zone. This exercise could be also implemented in collected rainwater or after rainfall.

Worksheet

How can we collect water samples and measure temperature and pH?

Collecting a water sample	
Why we test/monitor the water?	**How to collect a water sample ?**
photo	*photo*

Temperature	
What I know about temperature ?	**How to test the water temperature ?**
photo	photo

pH	
What I know about pH?	**How to test the pH of water ?**
photo	*photo*

MED EDUC

Erasmus+

STUDYING THE MOBILITY OF THE SHORELINE

Geology | Geography | Biology | Mother Language

COASTLINE ARTIFICIALIZATION

PEDAGOGIC CONTENT:

- Coastline regression
- Shoreline accretion
- Subsidence phenomenon

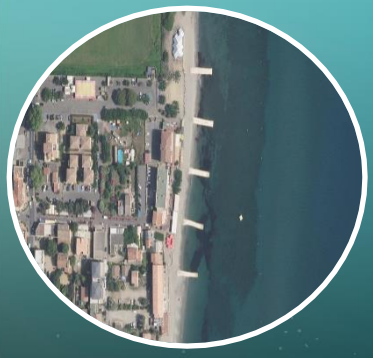
PRE-REQUISITES:

Knowledge about artificialization, urbanisation and littoralization (O1 draft).

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Analyze satellite and aerial images
- Identify different coastal human infrastructure
- Understand human impact and climate change in coastal areas
- Understand coastline mobility and the fight against the coastline regression



STUDYING THE MOBILITY OF THE SHORELINE

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: Choose one or several sites concerned by the coastline mobility, for example in France : Hyères-les-Palmiers.
#2: Find the data to ensure the activity using a public website giving access to national geographic data (actual and historical data). In France, for example, you can use the following website : https://www.geoportail.gouv.fr/.
#3: Research historical data and click on old photography (1950-1965) of your study site.
#4: Choose your scale (for example 1:2000) for your chosen site and save or capture your map image.
#5: Then, remove the old photography layer and redo the same process for today's satellite images.

IMPLEMENTATION

#1: Teacher remembers to the students natural impacts on the coast (storm surge, stream, subsidence…) and main notions about artificialization, urbanisation and littoralization helped with the O1 draft.
#2: Teacher gives to the students the necessary cards fonds. They should trace the two shorelines on a layer paper with a color to highlight it and compare it (old/new) or with computers with the help of easy software like Paint.
#3: Students work on groups of 3-4 persons and start thinking about the changes in the coastline and list which phenomenon may cause these changes according to their knowledge.
#4: Students discuss and share the reasons of the coastline mobility according to them. The teacher helps students to find out the real causes of the regression/accretion of Mediterranean beaches for each areas chosen.
#5: The teacher introduces implementation/techniques used to strife against the regression of the shoreline: hard management (cobs, sand rolls, rip-rap) and integrated/flexible coastal zone management (revegetation/maintenance of dunes).

Type of activity	Information research, data analysis
Target audience	From 12 years old
Place	Classroom
Material needed	Computer and access to internet; satellite/aerial images.
Duration of activity	Implementation : 4/5 hours (1 hour class period for each step)
Authorship	CPIE Bastia U Marinu
	No authorization required
	Satellite images of the geoportal are freely accessible in France.
Links	https://www.geoportail.gouv.fr/
Notes by author	This activity is a simple way to show/describe the mobility of the shoreline and to find out the causes of the regression/accretion of Mediterranean beaches. With shorelines highlighted in the photos, it is easier to see the impacts of human development on coastlines.

PANORAMA ON COASTLINE ARTIFICIALIZATION

Geography | Biology | Geology | Chemistry | Mother Language

MED EDUC

Erasmus+

PEDAGOGIC CONTENT:

- Littoralization risks
- Shoreline aggravating factors
- Environmental and economic issues
- Coastline management and solutions

PRE-REQUISITES:

Knowledge about artificialization, urbanisation and littoralization (O1 draft).

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Observe and understand concepts of coastline artificialization
- Identify risks, challenges and prospects of coastal artificialization
- Group, classify and assemble coastline artificialization concepts by themes creating links
- Develop information research through team work
- Develop argumentation and communication
- Listen to and respect the other students' advices

PANORAMA ON COASTLINE ARTIFICIALIZATION

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: Print the cards below in A4 format and cut them out.
#2: Have large sheets to put cards on them.
#3: Prepare the class in a way to place cards on a large table.

IMPLEMENTATION

#1: Teacher remembers some main notions about artificialization, urbanization and littoralization helped with the O1 draft.
#2:Teacher gives to the students the set of cards distributed equally and ask everyone to read his/her card(s). One after the other, they put their cards on the table grouping them according to their own criteria.
#3: Teacher lets students debate around the cards concepts in order to helps them in grouping the cards according to the following thematics: risks, aggravating factors, environmental issues, economic issues and prospects.
#4: The students debate and re-arrange the cards by themes creating links between them.
#5: The students provide a panorama on coastline artificialization being aware of the diversity of risks and the complexity of the challenges.

Type of activity	Game, debate
Target audience	From 12 years old
Place	Classroom
Material needed	Printer, markers, larger paper and the 35 card
Duration of activity	Implementation : 1/2 hours
Authorship	CPIE Bastia U Marinu No authorization required
Links	https://web.unep.org/unepmap/ http://www.cprac.org/fr/car-pl/presentation/pam
Notes by author	The list of card concepts is non-exhaustive. The teacher could let students search for definition of each card.

Coastline Artificialization

Worksheet

Panorama of Coastline Artificialization

Risks

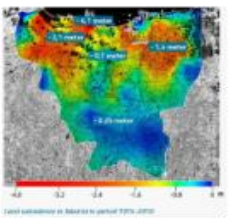
www.gridam.com

Sea level rise

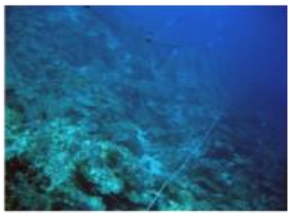
Submersions


www.midcoast.nsw.gov.au

Erosion and coastline retreat

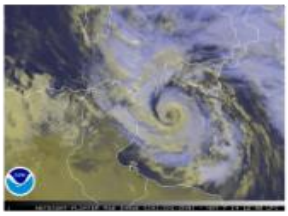


Cities subsidence



Loss of biodiversity

Floods



Storms

Aggravating factors


www.Leral.net

Illegal constructions


www.wordpress.com

Intensive extraction of ressources

Pollutions


www.gridam.com

Mass tourism and recreational activities

Amplification by development


Jean-Pierre BELZIT/MAXPPP

Climate change impacts

Coastline Artificialization

Worksheet

Panorama of Coastline Artificialization

Environnemental issues

Biodiversity

Ecosystems functionality

Habitats and protected areas

www.souvonsleau.fr

Seabeds

Conservatoire du Littoral 2B

Ecosystem services

Economical issues

Conservatoire du Littoral 2B

Agriculture

www.uboatworx.com

Underwater activities

Olivier Manslot - www.aeropeacks.com

Marine cultures

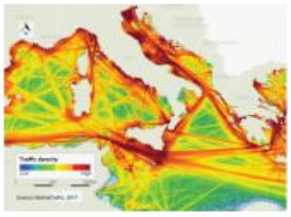
Conservatoire du Littoral 2B

Fishing

Ronan Lucas - www.aires-marines.fr

Marina and water sports

Tourism



Maritim transport

Littoral est ccng

Town planning and development

Coastline Artificialization

Worksheet

Panorama of Coastline Artificialization

Prospects

Soft protections against the sea

Hard protections against the sea

www.portdedieppe.fr

Modernisation and innovation

Waste recycling and recovery

www.lifeadapto.eu

Sustainable urbanization

Development of water treatment

Scientific support and local actors

WHICH GOODS AND SERVICES ARE PROVIDED BY COASTLINE ECOSYSTEMS ?

Geography | Biology | Geology | Mother Language

MED EDUC

Erasmus+

PEDAGOGIC CONTENT:

- Ecosystem services
- Littorization issues
- Human activities impacts
- Protected natural areas

PRE-REQUISITES:

Knowledge about ecosystem services (Definition on the FAO website, available in English, French and Spanish).

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Observe and understand the concept of coastal ecosystem services
- Identify four types of services provided by ecosystems: provisioning, regulatory, support and cultural services
- Improve their ability to do map-reading and collect spatialized data
- Understand the importance of marine and coastal resources conservation
- Develop a critical approach

WHICH GOODS AND SERVICES ARE PROVIDED BY COASTLINE ECOSYSTEM ?

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: Select one or more coastal geographical area(s) including areas of human activity (cities, ports) AND protected areas (natural reserves, protected lagoons, Natura 2000 areas, Ramsar sites, marine parks etc.).
#2: Example of geographical areas: Biguglia lagoon (Corsica, France).
#3: Print a detailed map of the selected geographical area(s) from internet or on an online map service.

IMPLEMENTATION

#1:The teacher introduces the main concepts on urbanization and the coastal artificialization helped with the O1 draft. Then, he/she presents ecosystem services using the definition on the United Nations Agriculture and Food Organization website [link 1] and provides to the students the list of ecosystem services available on the website [link 2].
#2: The teacher split the class in groups of 4 persons and gives a map to each group, asking them to identify and list human activities pressures and protected natural areas on the identified geographical area.
#3: The teacher asks to the 4-students groups to search on internet and list the ecosystem services provided by the protected natural area(s).
#4: The teacher introduces the debate asking to the students to define which of these services can be useful to fight the human activities pressures identified previously.
#5: Each group works on a presentation (paper or ppt) to expose its information research on the ecosystem services provided in the corresponding selected area.

Type of activity	Information research, Debate
Target audience	From 12 years old
Place	Classroom
Material needed	Detailed maps (on internet), computer or resources
Duration of activity	Implementation : 2 to 4 hours
Authorship	CPIE Bastia U Marinu No authorization required
Links	[link 1] http://www.fao.org/ecosystem-services-biodiversity/fr/ [link 2] http://www.fao.org/ecosystem-services-biodiversity/background/provisioningservices/fr/
Notes by author	This activity can be carried out following the activity “Discovery of a port and its human activities” in the Maritime Economy chapter.

Coastline Artificialization

Worksheet

Which goods and services are provided by coastline ecosystems ?

Supply and sampling services

- Fish resources for professional fishing
- Waterfowl and birds for hunting
- Biomass for grazing
- Shellfish (professional fishing)*
- Shellfish farming (clams, oysters)*
- Fish farming*
- Regulation of water flow
- Other materials for direct use or processing

Regulation and maintenance services

- Self-purification and water filtration
- Nursery and habitat
- Bank retention against erosion
- Regulation of the microclimate
- Fixation and decomposition of accumulated organic debris
- Regulation of floods and protection of inland lands against storms, salinity, urbanism

Cultural and social services

- Local identity
- Historical and cultural site
- Landscape value
- Aesthetic value of rare and remarkable species
- Amateur fishing and shellfish collection*
- Non-motorized water sports*
- Observations of birds
- Equestrian ride
- Support for the campsite
- Bike ride
- Walking, hiking and running
- Boat trip and excursion*
- Source of artistic inspiration
- Educational value
- Opportunities for scientific research
- Sense of well-being and tranquility

* : Potential services of a lagoon

Coastline Artificialization

Worksheet

Which goods and services are provided by coastline ecosystems ?

Categories	Ecosystem services	Definition
Supply and sampling services	Fish resources for professional fishing	Fish supply for human consumption and favourable conditions to grow them.
	Waterfowl and birds for hunting	Game supply for hunting, hunters exercise on the study area.
	Biomass for grazing	Pasture provision for sheep and cattle.
	Shellfish fishing (professional use)*	Shellfish supply for professional use (potential for lagoo
	Shellfish farming (clams, oysters)*	Rich and arable land provision.
	Fish farming*	(Potential) conditions for clams and oysters growing.
	Water flow regulation	(Potential) conditions for the professional exploitation c farmed fish.
	Other materials for direct use or processing	Regulation of the water flow by draining plain waters ar the exchanges with the sea.
	Fish resources for professional fishing	Materials supply such as driftwood or salicorne.
Categories	**Ecosystem services**	**Definition**
Services Regulation and maintenance services	Self-purification and water filtration	Natural processes of degradation of water pollutants, especially thanks to the herbarium.
	Nursery and habitat	Maintaining key habitats that act as nurseries, spawning grounds or migratory routes.
	Bank retention against erosion	Plain sediment storage and resistance to soil erosion an uprooting.
	Regulation of the microclimate	Influence of the coastal vegetation and the lagoon on th air humidity (thermoregulation role).
	Fixation and decomposition of accumulated organic debris	Natural cyclical processes of organic matter decomposition.
	Regulation of floods and protection of inland lands against storms, salinity, urbanism	Natural protection of the coastal zone against flooding, buffer effect.
Categories	**Ecosystem services**	**Definition**
Cultural et social services	Local identity	The site has its history and is linked to certain traditions such as fishing.
	Historical and cultural site	For centuries the lagoon has been coveted by people.
	Landscape value	Exaltation of senses and emotions by landscapes, habita and species.
	Aesthetic value of rare and remarkable species	Typical lagoon species, such as the salihorn, and rare species, such as the African tamarisk.
	Amateur fishing and shellfish collection*	Recreational fishing (not allowed in lagoon).
	Non-motorized water sports*	Canoe rides, for example.
	Birds observations	Wetland of major importance for the passage and parki of shorebirds: 250 identified.
	Equestrian ride	2 equestrian centres in the study area.
	Support for the campsite	3 campsites in the study area.
	Bike ride	Peripheral areas used for cycling.
	Walking, hiking and running	Possibilities all around the lagoon, especially in the Fornacina Park.
	Boat trip and excursion*	Forbidden on the reserve waters.

ON-SITE OR VIRTUAL TOUR OF A COASTAL TOURIST SITE ?

Geography | Geology | Mother Language|

MED EDUC

Erasmus+

COASTLINE ARTIFICIALIZATION

PEDAGOGIC CONTENT:

- Human activities development
- Tourism impacts
- Coastal overvisitation

PRE-REQUISITES:

Knowledge on urbanization and coastal artificialization (O1 draft).

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Identify and group human activities existing on touristic coastlines
- Improve their ability to analyze spatialized information
- Be aware of safety rules
- Develop initiative and be independent

ON-SITE OR VIRTUAL TOUR OF A COASTAL TOURIST SITE ?

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: Collect exit permission from students' parents to participate in the visit.
#2: Get the access to computers for students or groups of students for the virtual tour.
#3: Search a touristic coastal site for example the Promenade des Anglais in Nice (Méditerranée, France) and an old photograph of this site.

IMPLEMENTATION

In the classroom

#1:The teacher presents the chosen site as well as the old photograph to the students and asks them to use Google maps to find the location of the photograph. For that, students should enter the address of the old photograph and get into "street view" mode.
#2:The teacher asks students to fill out the form below according to the observations for the two periods and then to think about the observed changes because of human activities, tourism and overvisitation between the time of photography (1900) and today in terms of landscapes, buildings, facilities, attendance.
#3: In the context of a debate, the teacher organize a restitution of information with the students on the current activities and attendance of this site (observed during the virtual tour) compared to those that can be observed on the old picture.

On site

#1:The teacher starts the tour with the presentation of the chosen site and its activities (marina, tourism, leisure, shops).
#2:The teacher asks them to fill out the form below for both periods observing the old photograph and moving around the site.
#3:The teacher organizes a debate with the students on the current activities and attendance of this site compared to those that can been observed on the old photograph.

Type of activity	Information research, field research, debate
Target audience	From 12 years old
Place	In computer class or on site
Material needed	Old photograph found on computer or resources
Duration of activity	Implementation : 1 to 2 hours
Authorship	CPIE Bastia U Marinu No authorization required
Links	http://www.en-noir-et-blanc.com/la-promenade-des-anglais-p1-2688.html (Old french photograph of Nice)
Notes by author	This activity can be easily performed with even younger students (with some minor adjustments)

Coastline Artificialization

Worksheet

On-site or virtual tour of a coastal tourist site?

Site: ..... Date: .....

Coordinates: .....

.....

TYPE OF COAST

- Cliffs
- Rocky coast
- Lagoon
- Island / Peninsula
- Estuary
- Delta
- Bay
- Beach
- River
- .....
- .....

ACTIVITIES

- Agriculture
- Fishing
- Recreation
- Shops / Industries
- Tourism
- Rail networks
- Road networks
- Bicycle paths
- Industriali-port area
- Traditional-port area
- .....

SITE TRAFFIC

Circle the corresponding choices for each era (with two different colors to easily differentiate).

Very sparsely dense	Sparsely dense	Dense	Very dense	Overcrowded

ROUTE OF YOUR JEANS

Geography| Economy | Chemistry | Physics | Mother Language

ENERGY: PRODUCTION AND RESOURCES

PEDAGOGIC CONTENT:

- Globalization
- Environmental and societal impacts
- Economic challenges
- Sustainable development principles

PRE-REQUISITES:

- Notions about globalization

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Understand globalization by a concrete example
- Be aware of environmental and societal impacts of manufactured goods
- Understand economic and social issues
- Develop a critical sense on our consumption

ROUTE OF YOUR JEANS

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION:

#1: Print a world map
#2: Bring a pair of jeans with a clothing label and 10 envelopes with the HDI of each of the countries
#3: Bring samples of materials

IMPLEMENTATION:

#1: Ask the following questions:
- Where are the jeans produced?
- Where is it distributed?
The students place the corresponding thumbtacks on the map

- What materials is it made of? Plastic, cotton, metal, wool, sand etc.
Specify that everything with a strange name (acrylic, viscose, polyester, etc.) is a kind of plastic, therefore petroleum.

#2: To make the animation fun, the teacher offers samples of each material in envelopes to illustrate the countries of origin:
- Cotton: production in Benin
- Spool of thread: cotton spinning in Pakistan
- Blue powder: indigo dye in Italy
- Pieces of jeans: cutting and assembling in Tunisia
- Sand: wash in Turkey
- Elastane: polyester fiber introduced in Japan
- Zipper: produced in France
- Button: brass from Namibia

For each material, place a country pushpin on the map.
For each country, it is possible to illustrate the production conditions by photos to be projected or printed and the energy consumption by calculating the carbon footprint of the distances for example.

Using a colored thread, join the thumbtacks on the map to see the route taken by the item of clothing. It is possible at this stage to calculate the number of kilometers travelled by the clothe for each stage and to discuss the transportation mod of fashion products (boats, planes, roads) and their environmental impact.

DESCRIPTION:

#3: On each envelope note the HDI of the country.
This information is mirrored with the price of textiles. Thus, the group is gradually becoming aware of the societal and environmental impacts of the manufacture and distribution of textiles. This step also addresses the unequal distribution of wealth.

For a pair of jeans costing 35 euros:
- 15.75 euros for the trader
- 14 euros for the brand
- 1.75 euros for transport
- 3.5 euros for production cost
- 1 euro for the basic wages of workers

It is possible to introduce the notions of environmental labels (Max Havelaar, AB, FSC, etc.)

#4: - What do you do with old jeans?
List answer on the board
This allows to approach the notions of repair, reuse, recycling etc.

Type of activity: Experimental activity

Target audience: From 12 years old

Place: Classroom

Material needed:
World map: Dowload and print in A3 format
Thumbtacks (20)
1 pair of cisors
1 pair of jeans (cut the pocket (elastane), the zipper and the button)
10 envelopes
1 marker
Colored thread, a little bit of cotton, a spool of thread, blue powder (like dry paint), a few pieces of jeans and sand

Duration of activity:
Preparation: 2 hours
Implementation: 1 hour
Step 1: 5 minutes
Step 2: 20 minutes
Step 3: 20 minutes
Step 4: 15 minutes

Authorship: GRAINE Île-de-France - No commercial use

Links https://creativecommons.org/licenses/by-nc-sa/4.0/deed.fr
Activity : http://www.graine-idf.org/sites/default/files/contenus/guide_animations_BDEF.pdf
World map : https://www.mapsofworld.com/world-map-image.html
Picture on cotton production : https://boutique.rsf.org/collections/albums-photos/products/100-photos-de-yann-arthus-bertrand-pour-la-liberte-de-la-presse
HDI : http://hdr.undp.org/en/countries
Ecolabel : https://www.labelinfo.be/fr
Fashion pollution : https://www.sustainyourstyle.org/old-environmental-impacts ; http://trademachines.fr/info/sale-linge/ ; http://reseauecoleetnature.org/fiche-experience/le-vert-va-tout-le-monde-il-est-temps-de-repenser-la-fast-fashion-03-01-2019.html
(only in french)

HOW CAN POTATOS ENLIGHTEN US ?

Physics | Chemistry | Technology

ENERGY : PRODUCTION AND RESOURCES

PEDAGOGIC CONTENT:

- Sustainable development
- Biomass energy
- Energy chain

PRE-REQUISITES:

Students should know that most batteries are composed of two different metals that react with an acid to produce electricity.

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Mobilize reasoning about sources of energy
- Understand how energy transmission work

DESCRIPTION:

PREPARATION

Teacher will prepare the necessary technical equipment (to be found in the DIY shop): electric wires, copper coins, sandpaper, zinc nails, LED bulb, and potatoes.

IMPLEMENTATION

#1:Lightly sand coins and nails with sandpaper. Students must ensure that the equipment is clean so as not to interfere with electrical traffic.
#2: Then, they place a coin and a nail in each potato (in half only). Connect by means of a clamp cable the piece and the nail of two different potatoes.
#3: Connect the two ends of the cable to the bulb. Bind the potatoes to each other using electric wires, passing from the tips (zinc) to the coin (copper) When the copper parts (positive pole) and zinc nails (negative pole) are placed in the potato, a chemical reaction in the juice of the potato produces electricity.
#4: Throw the potato at the end of the experiment.
#5: Let's the teacher conclude about biomass energy.

Type of activity	Experimental activity
Target audience	From 11 years old
Place	Lab room, classroom
Material needed	Potatoes, electric wires, copper coins, sandpaper, zinc nails, LED bulb.
Duration of activity	Implementation : 1-2 hours
Authorship	PANDA-club; Fonds National de la Recherche Luxembourg www.science.lu No authorization or registration required
Links	https://youtu.be/kt1klE_advA
Notes by author	The connection of the light emitting diode to a single potato will not allow it to be started because a single potato does not have the electrical power to operate the diode. Be careful to respect polarity. This experiment is also possible with other vegetables or fruits and some sparkling drinks. An acid liquid is necessary to pass the current (from positive pole to negative pole).

CREATE A COMMUNICATION TOOL ON

RENEWABLE ENERGY

Physics | Chemistry| Computer Science

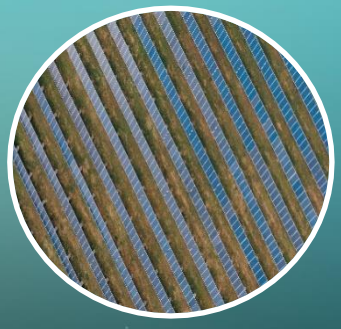
ENERGY : PRODUCTION AND RESOURCES

PEDAGOGIC CONTENT:

- Renewable energy sources
- Wind
- Sun
- Water
- Biomass
- Geothermics

PRE-REQUISITES:

Knowledge about renewable energy (O1 draft)



NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Retransmit information through a panel / poster
- Identify sources and forms of energy (energy associated with a moving object, electric and solar energy)
- Create a communication tool

CREATE A COMMUNICATION TOOL ON RENEWABLE ENERGY

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

Find books and internet sites on renewable energy in the Mediterranean. The teacher can also target his country or region as a research area.

IMPLEMENTATION

#1: The teacher introduces the activity and divides students in 3/4-scholars groups.
#2: The teacher asks student to do some research (information, photos or images) on renewable energy (general definition, sources) using the books available and internet sites.
#3: The teacher lets the students summarize the different sources of renewable energy and choose a specific topic of energy / group.
#4: Each group looks for illustrations on the specific sources of energy, such as hydroelectric power, and finds an image and a small explanation corresponding to the energy production system.
#5: After the research, each group summarize the information found on a panel or on a software (power point) or a dedicated website to create a poster.
#6: The teacher lets each group present its work and do a final synthesis and discussion about what has been learned during the activity.

Type of activity	Publication/exhibition, Information research
Target audience	From 11 years old
Place	Classroom
Material needed	Computers and access to a documentation center 1 panel/group if necessary Colored markers if necessary
Duration of activity	Implementation : 1-2 hours
Authorship	CPIE Bastia U Marinu
	No authorization or registration required
Links	Create your own panel online: - English: https://spark.adobe.com/make/social-media-graphics/ - French: https://www.canva.com/fr_fr/
Notes by author	None

MAKE YOUR SOLAR ENERGY DRAGSTER

Physics| Chemistry | Technology

ENERGY : PRODUCTION AND RESOURCES

PEDAGOGIC CONTENT:

- Sustainable development
- Renewable energy
- Solar energy
- Energy chain

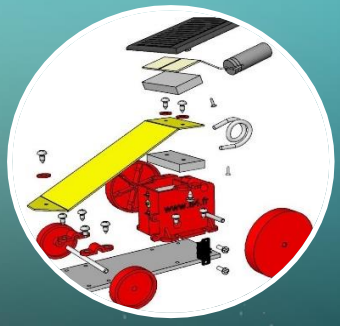
PRE-REQUISITES:

Introduce the different renewable energies using document O1 and other resources.

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Create an electric vehicle that works with renewable energy
- Understand how solar panels and energy transmission work
- Identify different sources of energy



MAKE YOUR SOLAR ENERGY DRAGSTER

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

Get the Soldrag® kit or similar material to build solar energy dragster.

IMPLEMENTATION

#1:The teacher introduces the activity presenting the electric vehicle and how it works thanks to his different elements corresponding to the different sources of energy.

#2The teacher divides students in 2-scholars groups and distribute one kit per group. The kit contains all parts of the dragster and they are grouped by type. It is important to not loose parts so avoid detaching them from the Propulso injection bunch before the use.

#3: The teacher lets students start by the first step: 'Power supply' which goal is to assemble the elements that supply the energy through the autonomous system (photovoltaic panel).

#4:Then, students carry out the second step: "Storage unit" which consist in assembling the elements that allow the storage or the accumulation of energy (capacitor).

#5:The next step is called "Distribution part" and scholars have to associate elements that allow to manage the provision of energy (switch, solenoid valve (electric tap), dimmer light…).

#6:Then, there is the "Convert part" which consists to manipulate elements that allow the transmission, sometimes adapting it, of the energy that has just been converted (gears + plate + chain + sprockets + pipe).

#7:Finally the "Transmission part" corresponds to assemble elements that allow the transmission, sometimes adapting it, of the energy that has just been converted (gears + plate+ chain+ sprockets+ pipe).

#8:The teacher concludes the activity talking about the following concepts: "sustainable development", "renewable energy", "solar energy" and "energy chain".

Type of activity	Experimental activity
Target audience	From 12 years old
Place	Technology class
Material needed	Soldrag Kit® and documentation, engineering/technology classroom
Duration of activity	Implementation : 2-4 hours
Authorship	Purchase of equipment from A4 Compagny 8 rue du Fromenteau – 91940 Gometz le Châtel www.a4.fr Phone : 01 64 46 31 19 No authorization or registration required
Links	KIT: http://www.a4.fr/base-documentaire-a4/index.php/TRANSPORTS-ET-MOBILITE/%5BK-SLD%5D-SolDrag/ Documentation (technical file, factory file, images): http://www.a4.fr/base-documentaire-a4/index.php/TRANSPORTS-ET-MOBILITE/%5BK-SLD%5D-SolDrag/
Notes by author	None

SEA OR MARITIME MUSEUM VISIT

History | Mother Language |Foreign Language | Literature

MARITIME ECONOMY

PEDAGOGIC CONTENT:

- Development of civilizations in the Mediterranean sea
- Life of the deep sea divers
- History of the Mediterranean lighthouses
- Local shipbuilding
- History of traffic and commercial boats
- History of seafaring and exploration

PRE-REQUISITES:

- No specific requisites

NEW COMPETENCIES TARGETED/LEARNING

STUDENTS WILL BE ABLE TO:

- know and valorize old civilian and military seafaring traditions that have always characterized the culture and economy of the Mediterranean Sea.

SEA OR MARITIME MUSEUM VISIT

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: The teacher choose a Sea (or Maritime) Museum near the school place which can satisfy one or more pedagogic content

#2: The teacher finds the informative material about the interesting things to see at the museum (eg. about seafaring and exploration history, relic, shipbuilding and naval architecture)

#3: The teacher organize the class trip (by foot or school transportation)

IMPLEMENTATION

#1: The class take to Guided visit to Museum

#2: At the comeback, the teacher breaks his students into work groups and assign then a content learned during the visit to develop (eg. Group 1 deep sea divers, lighthouses, etc.)

Type of activity	Guided Tour
Target audience	From 14 years old
Place	Outdoor activity
Material needed	None
Duration of activity	Preparation: 4 hours Implementation : 8 to 12 hours
Authorship	IIS Garibaldi No authorization required
Links	None
Notes by author	Sea (or Maritime) Museum near the school place which can satisfy one or more pedagogic content

SEARCH AND RESCUE SIMULATION

Mother Language | Maritime Navigation | Maritime Safety | Maritime Law

MARITIME ECONOMY

PEDAGOGIC CONTENT:

- View the correct methods to use distress signals
- Know the procedure to report your position
- Recognition of the main radar functions
- Recognition of the main navigational instruments
- Introduction to radio communication
- Know the main navigation system integration
- COLREGs knowledge
- Apply search and rescue procedures

PRE-REQUISITES:

- Geometry
- English language
- Cartography's fundamentals
- Vector calculation

NEW COMPETENCIES TARGETED/LEARNING

STUDENTS WILL BE ABLE TO:

- Know the basic procedures of SAR (search and rescue) operations
- Use radar and ARPA as systems to determine the rescue route
- Use communication techniques and procedures in English language

SEARCH AND RESCUE SIMULATION

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: The teacher choose a near Maritime College (School) with Bridge Simulation

#2: The teacher require authorization

#3: The teacher, In according with Maritime College teachers, define the simulation scenario

IMPLEMENTATION

#1: Into virtual laboratory, the teacher explains the scenario overview

#2: The students, supported by teachers, perform the required actions

#3: The teacher analyzes the data obtained and the actions taken by each student

#4: The class contributes to the final discussion which will highlight the advantages and disadvantages of the choices made, and the correspondence with international standards relating to safety of navigation

Type of activity	Experimental activity
Target audience	From 16 years old
Place	Simulation room
Material needed	None
Duration of activity	Preparation: 8 hours Implementation : 8 hours
Authorship	IIS Garibaldi Maritime College (School) with Bridge Simulation
Links	STCW 95 Amended 2010 (COLREGs) https://www.imo.org/en/About/Conventions/Pages/COLREG.aspx https://www.imo.org/en/OurWork/HumanElement/Pages/STCW-Convention.aspx
Notes by author	None

FROM ALFA TO ZULU

Mother Language

MARITIME ECONOMY

PEDAGOGIC CONTENT:

- Learn the NATO phonetic alphabet
- Make it easier to spell words during the communication

PRE-REQUISITES:

- No specific requisites

NEW COMPETENCIES TARGETED/LEARNING

STUDENTS WILL BE ABLE TO:

- Avoid miscommunications
- Learn how to use a phonetic alphabet

DESCRIPTION:

PREPARATION
The teacher prints and delivers a phonetic alphabet card for each student

IMPLEMENTATION
#1: The teacher gives an introduction about the phonetic alphabet and its history (when, why, who...) etc. Goal is to have things unambiguous and as clear as possible in the presence of radio interference or other poor audio conditions.

#2: The teacher speaks the Alphabet around the class forwards and backwards, picking letters at random. Repeat them over and over. Concentrate on the ones they find hardest, not just the ones they are sure of.

#3: The teacher speaks until they produce it automatically and instantly.

#4: The teacher spells out his/her name, and then ask students to spell out their names.

#5: The teacher selects ten random words and ask students to spell them using the phonetic alphabet.

#6: The teacher uses it as a homework or out-of-class exercise. But come back at other times for review and consolidation

Type of activity	Game, Experimental activities
Target audience	From 11 years old
Place	Classroom or outdoor activity
Material needed	NATO phonetic alphabet card
Duration of activity	Preparation: 30 minutes Implementation : 8 to 12 hours
Authorship	IIS Garibaldi No authorization required
Links	https://en.m.wikipedia.org/wiki/NATO_phonetic_alphabet https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2018_01/20180111_nato-alphabet-sign-signal.pdf https://www.offgridweb.com/wp-content/uploads/2016/01/NATO-alphabet-infographic.jpg
Notes by author	None

NATO phonetic alphabet, codes & signals

The ability to communicate and make yourself understood can make a difference in life-threatening situations – imagine for example that you are trying to alert a search and rescue helicopter of the position of a downed pilot. To ensure clear communication, NATO uses a number of well-known formats which are in general use. NATO standardization agreements enable forces from many nations to communicate in a way that is understood by all.

Some standards can be found in everyday civilian and military life. "Bravo Zulu", typically signalled with naval flags on ships at sea and meaning "well done", is also commonly used in written communication by the military, for example by replying "BZ" to an email.

Phonetic alphabet

The NATO alphabet became effective in 1956 and, a few years later, turned into the established universal phonetic alphabet for all military, civilian and amateur radio communications.

International Morse Code

Morse code transmits text through on-off tones, light-flashes or clicks. It was widely used in the 1890s for early radio communication, before it was possible to transmit voice.

Flaghoist communication

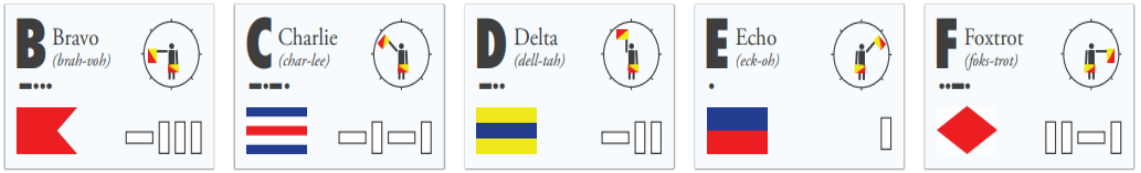
Ships use flags as signals to send out messages to each other. The use of flags, known as flaghoist communication, is a fast and accurate way to send information in daylight.

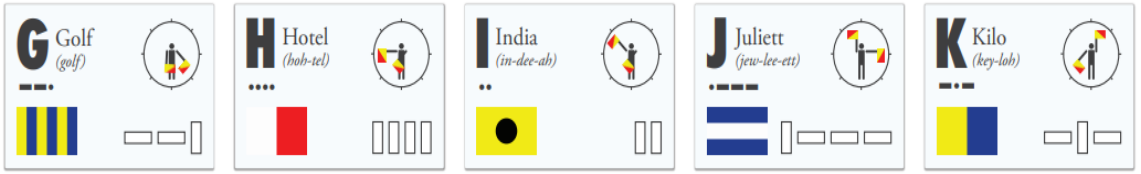
Semaphore

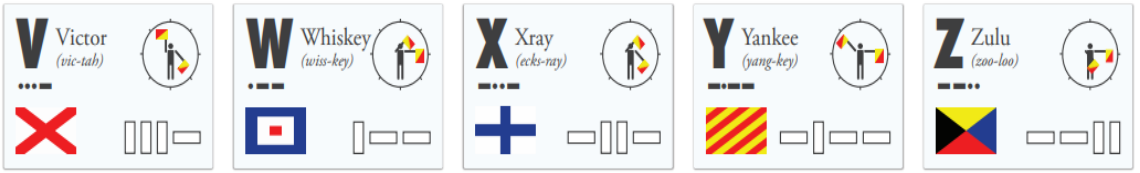
Semaphore is a system in which a person sends information at a distance using hand-held flags – depending on the position of the flags, the message will vary. The signaller holds the flag in different positions that represent letters or numbers.

Panel signalling

Panels are visual signals for sending simple messages to an aircraft. Using a limited code, ground forces can send messages to pilots, for example to request medical supplies.







Numbers

More information on NATO's codes, signals and standards can be found on the NATO Standardization Office (NSO) website: http://nso.nato.int/nso/ – More on the history of the NATO phonetic alphabet: http://www.nato.int/declassified/
This poster can be downloaded at http://www.nato.int/alphabet

Created by Communications Services, Public Diplomacy Division, NATO HQ, Brussels, Belgium – NATO 2018
Phonetic transcription is based on English pronunciation.

DISCOVERING PORTS AND RELATED HUMAN ACTIVITIES

| Geography | History | Geology |

MARITIME ECONOMY

PEDAGOGIC CONTENT:

- Blue economy
- Economic sector
- Traditional activities: fishing, aquaculture, etc.

PRE-REQUISITES:

- No specific requisites

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Know the economic activities of a port and its organization
- Find your way on the map of a place

DISCOVERING PORTS AND RELATED HUMAN ACTIVITIES

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: Collect the authorization forms signed by the parents of all students to participate to the visit.

#2: Choose a port near from the school which includes various economic activities: boating, professional fishing, tourism activities etc.

#3: Download and print a map of the port (usually available for all ports) on the Internet, or from an online mapping service (Maps type). If necessary a sketch can be made.

#4: Find from the online mapping site, the various important places in the port: harbor master's office, boats' yards (fishing, boating, trade), gas station, repair yard, nautical base etc.

#5: Take in reference the elements of the chapter on maritime economy.

#6: Organize the class excursion in the port (by foot or by school transportation).

#7: Give each student a map or sketch of the port.

IMPLEMENTATION

#1: Field visit: Start the visit with the presentation of human activities in the port (with a fisherman or a guide) then the port activities [i.e.: boating, tourism, sports and leisure, traditional and port activities etc.].

Ask students to find these places and write them down on the map.

#2: Classroom activity: Make groups of 4 students and ask them to carry out the port plan with all the human activities which they will categorize (tourism, traditional activities etc.). Other types of activities, not visited, can be added by students.

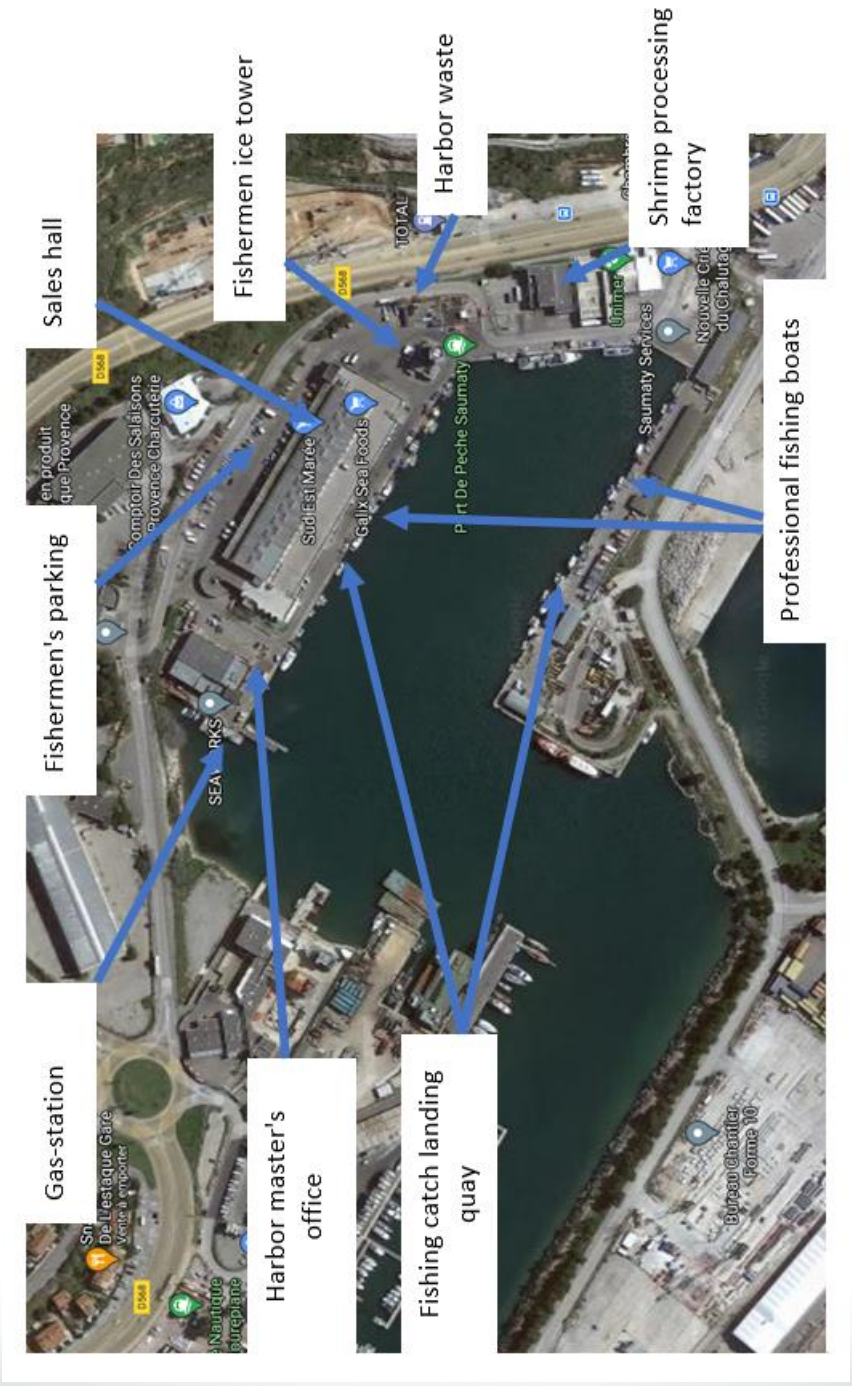
Type of activity	Experimental activity
Target audience	From 11 years old
Place	Outside and classroom
Material needed	Harbor map
Duration of activity	Implementation : 3 hours 2 hours on the field 1 hour in class
Authorship	Petra Patrimonia No authorization required
Links	www.googlemaps.com

This activity can be extended by group or class presentation work, such as making a model to be shown to parents at the end of the year.

Sometimes there are associations or guides who offer the discovery of port: inquire with tourist office.

Appendix 1

Picture of Saumaty's port



Appendix 2

Picture of Bastia's harbor

DISCOVERY OF THE FISHING RESOURCES OF PROFESSIONAL FISHING AND MARKETING

Geography | Biology

MARITIME ECONOMY

PEDAGOGIC CONTENT:

- Blue economy
- Fisheries resources
- Traditional activities: fishing, aquaculture

PRE-REQUISITES:

No specific requisites

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Improve their spatial, map-reading, and observation skills
- Recognize the varieties of fish resources
- Discover the economic sector of professional fishing
- Understand the supply channels for fish products
- Making the difference between professional fishing and marine farming

DISCOVERY OF THE FISHING RESOURCES OF PROFESSIONAL FISHING AND MARKETING

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: Get a map of Mediterranean fish on the internet (many free sources of rights available on the Internet easily downloadable) to be distributed in the class;

#2: Get a world map which will be displayed on the board,

#3: Have a map (plan) of the city that will be displayed on the board;

#4: Take in reference the elements of the chapter on the economy of the sea.

IMPLEMENTATION

#1: Teacher, animator or expert introduces the main concepts of professional fishing (artisanal fishing, industrial fishing, marine farming) and the problem of depletion of fish stocks.

#2: Bring students together in groups of 4 and ask them to answer collectively the following four questions:

- Which fish species do you know? Which one do you eat? Circle them if you find them on the map of Mediterranean fish.
- Where can we buy these fish? Supermarkets, fish/local market, fish shops etc.
- Why some fish are not on the map?
- Who fished Mediterranean fish and how are they sold?

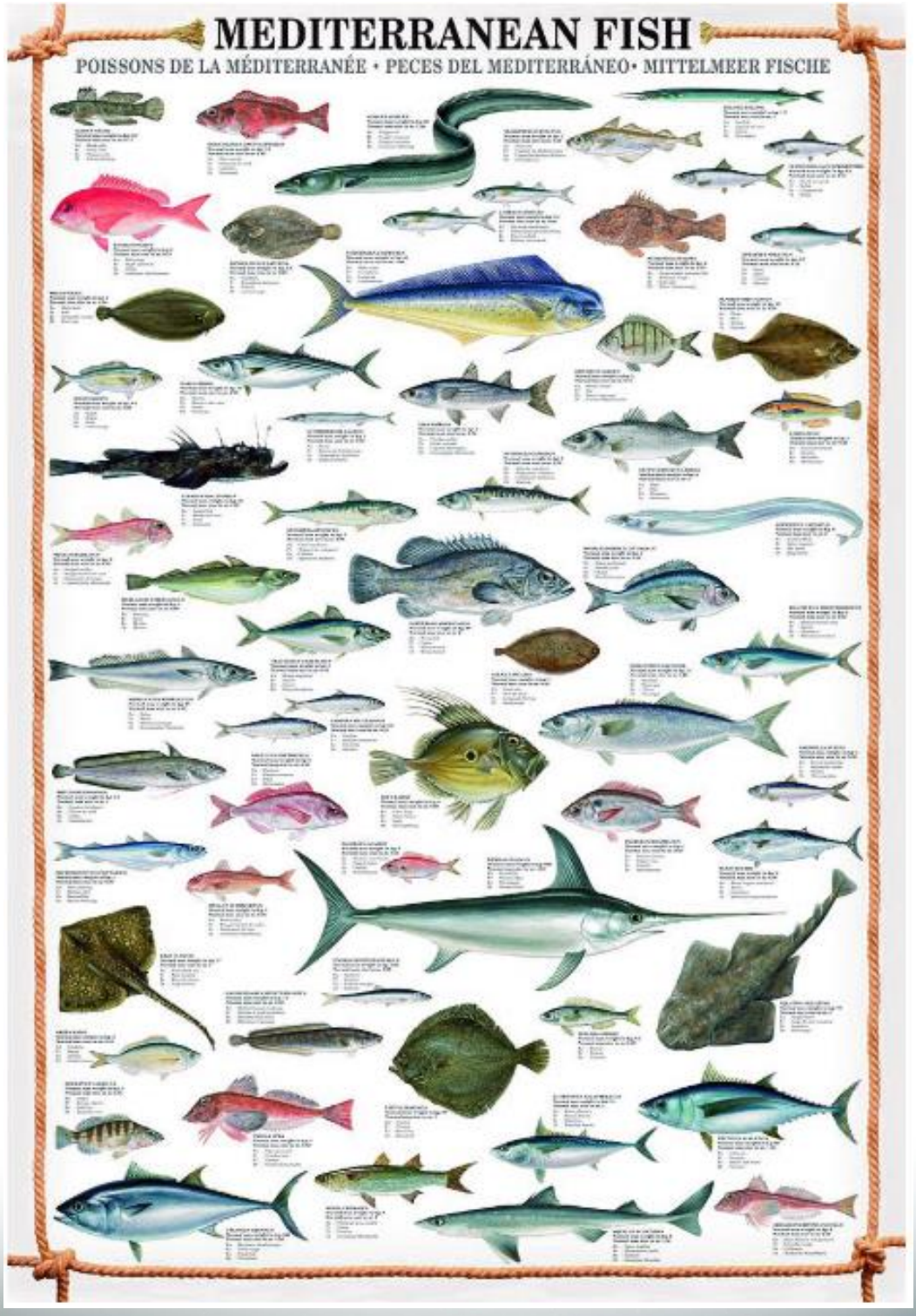
#3: A representative of one of the groups explains the results to the class.
As the student explains, the teacher places on the map the places where the fishes are caught and sold, and from where are the other fishes which not come from Mediterranean Sea (i.e.: salmon, scallop shells...).

#4: At the end of the restitution, the teacher summarizes the work of the groups which allow him/her to address issues related to the class curriculum:

- Fisheries resources management (stock depletion),
- Production methods: industrial fishing, local artisanal fishing, aquaculture (salmon, sea bream, sea bass),
- Consumption of renewable resources: industrial fish processed in factories (breaded fish squares), local fishery products and different market prices...
- Fisheries diversification measures, preservation of stocks... (quota).

Type of activity	Experimental activity
Target audience	From 11 years old
Place	Classroom, school library
Material needed	World map Map of Mediterranean fish to print for students (appendix 1) Map, city plan (in order to place the supermarket, local markets etc.) Video projector to display videos, pictures of fishing from the links provided
Duration of activity	Implementation : 2-3 hours
Authorship	Petra Patrimonia No authorization required
Links	http://www.fao.org/fishery/technology/en https://www.wwfmmi.org/?364345/WWF-urges-FAO-to-chart-a-new-course-for-fisheries-and-aquaculture http://www.fao.org/assets/infographics/FAO-infographic-SOFIA-2014-en.pdf http://www.fao.org/3/i9540fr/I9540FR.pdf http://www.fao.org/fisheries/en/ https://www.fishipedia.fr/fishinews/ https://www.greenpeace.org.uk/challenges/sustainable-fishing/

Appendix 1


MEDITERRANEAN FISH
POISSONS DE LA MÉDITERRANÉE • PECES DEL MEDITERRÁNEO • MITTELMEER FISCHE

Appendix 2

Food and Agriculture Organization of the United Nations

Fisheries and Aquaculture Department

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Fisheries and aquaculture technology

- Fish capture technology
- Aquaculture technology

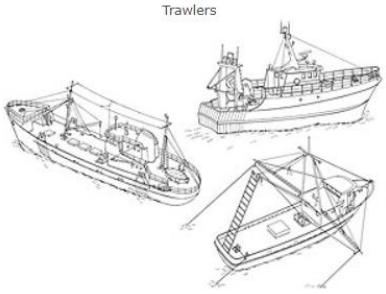
Source | Citation | XML | Print | PDF

Search vessel types

Fishing Vessel Types

Trawlers

Trawlers



See Tree Map

Food and Agriculture Organization of the United Nations

Fisheries and Aquaculture Department

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Fisheries and aquaculture technology

- Fish capture technology
- Aquaculture technology

Source | Citation | XML | Print | PDF

Search vessel types

Fishing Vessel Types

Gillnetters

Gill netter

See Tree Map

Appendix 3

How to consume Mediterranean fisheries resources in a sustainable manner?

The Mediterranean Sea is the richest marine ecosystem in the world in terms of species diversity. It represents only 0.82% of the surface of the oceans, but it is home to 8 to 9% of marine biodiversity. It is a treasure that must be preserved.

But unfortunately, fish and shellfish (known as halieutic resources) are fished too much in the Mediterranean. The Food and Agriculture Organisation (FAO), the UN's specialised agency for food and agriculture, estimates that **"75% of fish stocks are overexploited" in the Mediterranean and Black Sea.**

If we fish too much and don't give the living species time to reproduce, we risk making them disappear.

In the past, we respected the seasonality of fish. We used to buy fish in the harbours from the fishermen and not in the supermarkets. We did not fish all year round and we ate all kinds of fish.

Today, consumption is concentrated on the most noble species such as **tuna, sea bream, swordfish, red mullet, lobster or whiting,** which can be found all year round in supermarkets.

However, **fishermen are increasingly practising sustainable fishing in order to better manage fish resources.** Small-scale fishermen in the Mediterranean practice several trades. They use different fishing techniques throughout the year to catch different fish according to the season: for example, tuna in the summer and gilthead sea bream from the autumn onwards, etc.

To help preserve fish stocks, it is important **to eat a wide variety of fish and not to stick to a single species.** The diversity of species and products allows us to enjoy the flavors of fish all year round, on any occasion. It is also an opportunity to discover little-known species, for original and tasty recipes.

The main fish caught in the Mediterranean are the following:
Anchovy - Eel - Badèche - Baliste - Sea bass - Speckled bass - Yellowmouth barracuda - European barracuda - Bonito - Chinchards - Conger - Corb - Toothfish - Gilthead bream - King bream - Girelle - Pearl gurnard - Green wrasse - Pollack - Pollack - Mackerel - Marbled grouper - Grouper - Grey grouper Marbled - Brown grouper - Grey grouper - King grouper - Motelle - Oblade - Umbra - Pageot arcane - Pageot rouge - Pagre commun - Rascasse rouge - Petite rascasse rouge - Rason - Rouget rouge - Sar commun - Sar à grosses lèvres - Sar à museu pointu - Sar à tête noire - Sardine - Serran chèvre - Serran écriture - Soles - Sparaillon - Tacaud - Thon rouge.

Fish, like fruit and vegetables, have a season when it is best to eat them in order to contribute to good management of the fisheries resource. To do this, it is important **to recognise them, to learn the ways in which they are caught, to know their seasonality and the different recipes** for eating them:

January	Sea bass, periwinkle, whelk, scallop, shrimp, gilthead bream, haddock, herring, oysters, bass, mussel, whiting, cod, pollack, skate.
February	Sea bass, cod, hake, scallops, shrimps, gilthead bream, haddock, haddock, herring, oysters, dab, wolfish, monkfish, mackerel, whiting, cod, mussels, skate, salmon, sole.
March	Sea bass, anglerfish, pike, whelk, cod, carp, horse mackerel, coalfish, scallops, shrimps, gilthead bream, haddock, oysters, lobster, pollack, monkfish, wolfish, mackerel, whiting, hake, cod, mussels, perch, skate, salmon, sole, turbot.
April	Anglerfish, pike, cod, horse mackerel, hake, scallops, conger eel, shrimp, lobster, pollock, mackerel, hake, skate, salmon, cuttlefish, sole, pout, turbot.
May	Anchovy, monkfish, cod, hake, scallops, prawns, lobster, langoustine, pollack, mackerel, hake, skate, sardine, salmon, sole, albacore tuna, crab, pout, turbot.
June	Anchovy, hake, horse mackerel, conger eel, shrimp, crayfish, lobster, lobster, langoustine, pollack, mackerel, hake, skate, stingray, sardine, salmon, albacore tuna, crab, turbot.
July	Hake, conger eel, prawns, crayfish, lobster, lobster, langoustine, pollack, mackerel, skate, St. Pierre, sardine, salmon, albacore tuna, turbot.
August	Anchovies, shrimps, gilthead bream, crayfish, lobster, lobster, langoustine, mackerel, skate, sardine, salmon, albacore tuna.
September	Shrimps, gilthead bream, crayfish, lobster, lobster, langoustine, mackerel, mussels, prawn, ray, cuttlefish, sardine, albacore tuna.
October	Shrimps, sea bream, herring, lobster, lobster, mackerel, mussels, skate, sardine.
November	Sea bass, scallops, shrimps, sea bream, herring, lobster, oysters, mussels, sea urchin, skate.
December	Sea bass, sea bream, herring, mussels, skate.

POLITICS AND GOVERNMENT IN OUR DAILY LIFE

Geography| History | Civics | Mother Language

MED EDUC

Erasmus+

PEDAGOGIC CONTENT:

- Decision- making
- Political values
- European values
- Social studies

PRE-REQUISITES:

- None

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Practice in decision-making about dealing with severe environmental issues (e.g. floods, natural hazards, overpopulation etc.)
- Argue to support their suggestions
- Understand the importance of prevention (at the level of individual, neighborhood, Municipality, city, community)
- Develop an understanding of the relationship between politics and current issues
- Gain an appreciation for the role of politics in daily life

POLITICS AND GOVERNMENT IN OUR DAILY LIFE

MED EDUC

Erasmus+

DESCRIPTION:

IMPLEMENTATION

#1: Educator provides at least four 'hot topic' issues : federal, provincial, municipal and international (e.g.: waste management, migration flows, climate change, overpopulation, biodiversity loss, pollution, etc.)

#2: Students respond to the issues on the worksheet provided. (**5 minutes**)

#3: Teacher sets up 4 corners of the room for strongly agree, agree, disagree, and strongly disagree. (approx 5-8 minutes per group)

#4: Taking one issue at a time, teacher asks students to move to the corner of the room that corresponds to their answer. Once there, students record on their worksheet, how many people have a similar view to theirs.

#5: In the 'corner group', students discuss their common position on the issue, and must come up with **3 to 5** reasons to support their opinion. Students appoint one group member to report back to the class with their reasons. A student may not be the reporter more than one time and the reporter is allowed **1 minute** to state their position.

#6: Option: After moving to the corner group and hearing the reasons, students in the group may choose to 'cross the floor' to another group.

#7: After all the groups have reported their positions on the issues, the students move back to their original seats and the teacher leads a discussion on the work of government and the impact of government in daily lives, based on the premise that having a position on an issue makes each one of us 'political' at some level.

#8: Teacher provides copies of recent newspapers/articles and/or allows the students to use computers to access internet news sites. Students report back in a teacher led brainstorming session. Teacher writes issues on the board.

#9: Students choose one issue and based on their position on the issue, choose a method of response – such as:
-create a poster to highlight their position on the issue
- develop a power point presentation on the issue

#10: Students present their posters/ ppts in the rest of the school community

Type of activity	Game, debate, discussion, project
Target audience	From 13 years old
Place	Classroom, ICT laboratory
Material needed	Worksheets,Newspapers, computers, access to internet, pencils
Duration of activity	Implementation : 2-3 hours
Authorship	HCMR (Education Unit)
	No authorization required
Links	None
Notes by author	none

Worksheet

Where Do You Stand?

For each of the following statements, check the box which best reflects your opinion

S.A. : Strongly Agree

A. : Agree

D. : Disagree

S.D. : Strongly disagree

ENVIRONMENTAL ISSUES	S.A.	A.	D.	S.D.	TOTAL
Issue No 1 : overpopulation and urbanization are significant problems for our country					
Issue No 2: overpopulation contributes to the increase in illegal immigration					
Issue No 4 : further reduction of greenhouse gas emissions is important in my country					
Issue No 5: better and more efficient waste management will reduce the problem of marine pollution					
Issue No 6: we need to change our consumption habits to reduce our ecological footprint					
Issue No 7:					
Issue No 8:					

YOU SAID
“MIGRATION”

Geography| History | Mother Language

MED EDUC

Erasmus+

POLITICS AND GOVERNANCE

PEDAGOGIC CONTENT:

- Migration

PRE-REQUISITES:

- None

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Understand the concept of migration and migrant issues
- Develop some arguments on “Why do people move from their lands ?” (drivers)
- Reflect on stereotypes associated with migration
- Deconstruct prejudices and find solutions in order to act.

DESCRIPTION:

PREPARATION

#1: The teacher prints the photos from the document or presents the pdf from a computer (representing money, love, studies, war, religion, health, insecurity, work, retirement/old age, family, desire to discover another culture, obstacle to freedom of expression, sexuality or gender identity, identity / groups of belonging, hunger, water, climate): https://amnestyfr.cdn.prismic.io/amnestyfr/28593ebd-19cf-44d3-806a-f70c3efa96ff_2_pourquoi_migre-t-on.pdf

IMPLEMENTATION

#1: The teacher asks the participants what the term "migration" means to them.
Note on the board all the propositions without rephrasing

#2: The teacher can help the group by asking a few questions such as: Who is affected? Why ? How? What ?

YOU SAID ‘MIGRATION’

DESCRIPTION:

IMPLEMENTATION

#3: Indoors, the teacher displays all photos on a wall or through a screen.
Outdoors, the teacher displays the photos on the ground so that they form a circle.

#4: The teacher asks participants to mentally choose a photo that answers the question: ***What do you think makes people migrate?***

• Indoors, students do not move.

• Outdoors, they move in pairs (randomly) to watch the photos, keeping a space of five feets between them.

#5: The teacher asks from the students to prepare individually an answer to the following questions:

- How would you describe the chosen photo?
- What does it represents?
- Why did you choose it?
- Each participant explains his/her choice.

#6: Following each presentation, a discussion can take place, for example starting from the question: Does anyone wants to add a reflection about this photo?

#7: The teacher can suggest that participants rank their proposals according to whether they find them positive or negative, and then the student writes them on the board

#8: The teacher asks what do they think of this distribution

#9: Once the whole group has expressed itself, the teacher can pick up the photos that were not chosen and asks the group what they represent and the reasons why no one chose them.

#10: Discussion:

- Are there any reasons for migration that surprised you? Why ?
- When we talk about migration, do we think of all these reasons for leaving? Why?
- How could we define the term migration?
- Do you know people (family, friends – even inland moves) who migrate and why?

#11: The teacher explains the meaning of some definitions and words relevant to migration (migration, refugee, illegal etc.) from https://www.amnesty.org/en/what-we-do/refugees-asylum-seekers-and-migrants/

The conclusion of this activity could be to listen to a traditional well known immigration song or to talk about birds migration to feel that migration exists with life, from the beginning of the world.

MED EDUC

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Type of activity	Information research, experimental activities, exhibition
Target audience	From 14 years old
Place	Classroom or outside
Material needed	Board, markers or paperboard, printer, computer
Duration of activity	Implementation: 2 hours
Authorship	Amnesty International France
Links	https://www.amnesty.fr/education-droits-refugies-migrants-asile Pedagogit kit on migration : https://amnestyfr.cdn.prismic.io/amnestyfr%2F242704f9-a7c8-4fbb-b188-df25d210bccf_fiche+p%C3%A9dagogique+r%C3%A9fugi%C3%A9s+et+migrants.pdf (only in french) Other activities (refugees and medias): https://amnestyfr.cdn.prismic.io/amnestyfr%2F69bbd929-833d-4bc1-8e22-afca88b8fab5_activite-pedagogique-accueil-refugies-presse-medias.pdf
Note by author	A lot of questions can be ask during these activities; do not hesitate to read the pedagogical kit with all the definitions before hosting this activity. https://www.amnesty.org/en/what-we-do/refugees-asylum-seekers-and-migrants/global-refugee-crisis-statistics-and-facts/

LET'S TALK ABOUT THE PELAGOS SANCTUARY

Geography | History | Social Sciences/Economy | Mother Language

MED EDUC

Erasmus+

POLITICS & GOVERNANCE

PEDAGOGIC CONTENT:

- Governance
- Multilateral international cooperation
- Marine protected area

PRE-REQUISITES:

Knowledge about politics and governance (O1 draft).

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Describe the governance of the PELAGOS Sanctuary
- Understand the multilateral international cooperation
- Become familiar with literature research
- Learn to summarize and expose information
- Learn to do team work

DESCRIPTION:

PREPARATION

#1: The teacher is informed about the PELAGOS Sanctuary governance and divides the class into 3 groups.
#2: Each group represents a country of the international cooperation: France, Italy and Monaco.
#3: Each group hands out a flag.

IMPLEMENTATION

#1:The teacher introduces the PELAGOS Sanctuary and presents its purposes and aims.
#2: The teacher lets students search on internet information about the organizational chart of the PELAGOS Agreement at the international scale. (20 minutes)
#3: Teacher summarizes the information plotting on the blackboard a diagram about the organizational chart of the PELAGOS Agreement at the international scale. (10 minutes)
#4: The students search on internet some information about the organizational chart of the PELAGOS Agreement at the national scale (30 minutes).
#5: Teacher passes in each group during this session and reorient them if they are too far from the reality to define the national organizational chart of the PELAGOS Agreement.
#6: Each group plot on the blackboard a diagram about the organizational chart of the PELAGOS Agreement at the national scale. (5 minutes/group)
#7: The teacher corrects and summarizes the information. (5/10 minutes)

Type of activity		Information research, exhibition
Target audience		From 13 years old
Place		Classroom
Material needed		3 flags 1 computer/person 2/3 computers/group
Duration of activity		Implementation : 2 hours
Authorship		CPIE Bastia U Marinu No authorization required
Links		https://www.sanctuaire-pelagos.org/en/

DETERIORATION OF HERITAGE DUE TO AIR POLLUTION

Art| History | Mother Language | Foreign Language

CULTURAL HERITAGE

PEDAGOGIC CONTENT:

Air pollution.
Deterioration of monuments and historic buildings.
Solutions to the problems generated to heritage.

PRE-REQUISITES:

- Basic skills on History of Art.

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Investigate and look for examples of the effect of the increase of air pollution levels on the heritage.
- Use the obtained information properly and reflect in the text commentary or picture analysis their comprehension and considerations to the proposed problem.
- Express themselves correctly.

DETERIORATION OF HERITAGE DUE TO AIR POLLUTION

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: Looking for information on the effects of pollution on the heritage (bibliography, specialized journals etc.)
#2: Select from five up to ten images that exemplify the subject (Cathedral facades affected by car soot etc.)
#3: Select from two up to five text excerpts (newspaper articles or a specialized book on the subject) that reflect the issue of heritage affected by air pollution.

IMPLEMENTATION

#1: The teacher will explain to the students about the issue: the effect of pollution on the conservation and preservation of heritage. The polluted air of the cities, loaded with particles and gases, gradually destroy the materials of historical monuments; rain acid and soot are the main destroyers.
#2: The teacher will choose the images or texts that he will consider appropriate (about 5 pictures and about 2 or 3 excerpts) to be distributed among 20-25 students.
#3: Once the students have been assigned the task (text commentary / picture analysis) they will begin to do their individual task:
- Gathering information.
- Drafting the text commentary, taking into account the information collected.

#4: Handing in the assignment to the teacher for checking, which will include a short summary of the information consulted and how it have been used.
#5: A debate or round table among the students, moderated by the teacher, where they will present the results and conclusions of their research.

Type of activity	Individual task, text commentary on Art History (text or picture), gathering information, handing in the assignment to the teacher.
Target audience	From 17 years old.
Place	Classroom.
Material needed	Mobile phone, tablets, computer, internet access and digital whiteboard. Textbook, journals.
Duration of activity	Preparation: - Gathering information to present the subject to the students: 1 hour. - Looking for excerpts or pictures to work on the topic: 1 hour. Implementation: - 1 class session: The teacher raises the question to be treated and assign the task (1 hour). - Homework. - 1 class session: discussion or presentation of the tasks and results by the students (1 hour).
Authorship	Technical staff in Environmental education at Sustainability and Environment department of Consell de Mallorca. No registration or authorization for use is required.
Links	https://unece.org/environment/news/air-pollution-puts-cultural-heritage-risk https://www.youtube.com/watch?v=d_wDI45Zr7E (Air pollution is ruining Europe's ancient monuments)

Notes by author

In order to meet the objectives of the task and to consolidate the key competences, it is important that the students become aware of the degradation/destruction of the Mediterranean Heritage because of the high levels of air pollution, which especially affects large cities (due to the increase of the road traffic, acid rain, gases…) which entails a high cost in restoration works and protection.

Regarding methodology, the teacher will give an introduction to the students concerning the issue and will provide them with guidelines to elaborate the task and all this will be concluded with the exchanging of results and assessments on the proposed topic.

TRADITIONAL SHIPBUILDERS AND WOODEN BOATS

Social Sciences| Biology | Geology | History | Mother Language | Foreign Language | Computer Science

CULTURAL HERITAGE

PEDAGOGIC CONTENT:

- Trade
- Tools
- Building materials
- Traditional boats

PRE-REQUISITES:

- To develop the activity the students are required to have basic computer skills (PowerPoint, Genially, Prezi, Canva, etc.).

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Learn about the ancient trade of traditional shipbuilders.
- Know the tools used.
- Know the different types of wood.
- Know the main traditional wooden boats.
- Make a presentation using specific software.
- Introduce the presentation in public.

TRADITIONAL SHIPBUILDERS AND WOODEN BOATS

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: Previous to the implementation of this activity, the teacher will contact a workshop of shipbuilders in the area to prepare the study visit.
#2: Request a parental authorization to go for a study visit to shipbuilder's workshop.

IMPLEMENTATION

#1: Study visit to a traditional workshop of shipbuilders to learn about the trade, the tools, traditional wooden boats and types of wood.
#2: Back to the classroom, students will be gathered in groups. Apart from the information obtained during the study visit, they will search in Internet for more information on the trade and traditional wooden boats in other countries in the Mediterranean.
#3: In accordance with the findings obtained, each group will prepare a presentation using software like PowerPoint, Genially or Canva and will introduce it to their classmates.
#4: A debate will be opened after the presentations on the current situation of the trade, the importance of its future preservation and the conservation of traditional wooden boats.

Type of activity	Observation, teamwork, information research, oral presentation.
Target audience	From 11 years old.
Place	Workshop of shipbuilders, classroom.
Material needed	Mobile, tablet, computer, internet access and electronic board.

Duration of activity

Preparation:

- Look for information to explain the subject to students: 1 hour.

Implementation:

- Study visit to a traditional workshop of shipbuilders: 3 hours.
- Searching for information and preparation of presentations: 3 hours.
- Oral presentation: 1 hour.
- Debate: 1 hour.

Total: 8 hours.

Preparation and implementation: 9 hours.

Authorship

Technical staff in Environmental Education at Sustainability and Environment Department of Consell de Mallorca.

Registration or authorization of use is not required.

Links

https://museumaritim.conselldemallorca.cat/en/master-boatbuilders

https://museumaritim.conselldemallorca.cat/en/traditional-boats

http://mbdb.hr/en/museum-of-betina-wooden-shipbuilding/

Notes by author

The aim of this activity is that students learn about the trade, tools and materials and discover the main traditional wooden boats.

They will become aware of the importance of preserving traditional trades and the protection of maritime heritage.

They will be able to search for information, classify and present it.

MEDITERRANEAN LITERATURE AS A VEHICLE FOR A NEW HUMANISM

Geography | Literature | Mother Language | History

CULTURAL HERITAGE

PEDAGOGIC CONTENT:

- Main civilization of Mediterranean
- Latin literature nods
- Multiculturalism in Mediterranean among centuries

PRE-REQUISITES:

Computer skills

NEW COMPETENCIES TARGETED/LEARNING

STUDENTS WILL BE ABLE TO:

- Know, through literature, particularly the Latin-African one, the multiculturalism that the Mediterranean has facilitated for many centuries.
- Understand how this knowledge can lead us today to consider the Mediterranean as something that unites, and doesn't divide.

DESCRIPTION:

PREPARATION
(in the classroom)

#1: Basic notions about the use of the LIM

#2: References to Latin literature

#3: Spread map of the Latin language from the 1st to the 5th century AD

#4: Analysis of the following Latin African authors:
- Publius Terentius AferAfer II sec aC
- Lucius Apuleius Madauresis II sec. D.C
- Quintus Septimius Florens Tertullianus II-III sec a.C

IMPLEMENTATION
(in the computer room)

#1: Educator divides the students into groups and he invites students to research and deepen the themes present in Terentius, Apuleius and Tertullianus.

#2: They support this thesis (Mediterranean as "trait d'union " of people and cultures)

#3: Terentius:
- The concept of "Humanitas", understood as freedom of thought, respect for human personality, commonality of nature of all men, dedication to social duties, rationality, love for culture, balance and inner coherence: «Homo sum, humani nihil a me alienum puto» , comedy, Heautontimorumenos, v. 77
- The comedy of Terentius, Adelphoe, vv, 26-154 (a still current reflection on the relationship between fathers and sons)

#4: Apuleius:
- The novel Metamorphoseon books XI, the theme of magic and metamorphosis present in all cultures bordering the Mediterranean Sea
- The oration " Apologia" the theme of magic

#5: Tertullianus:
- Apologeticum, a passionate defense of Christianity, during the persecutions of Christians.
- Misunderstandings, persecutions, and episodes of religious intolerance are problems typical of the people bordering the Mediterranean sea

DESCRIPTION:

#1: Reflection and debate (in classroom):

- on literature as a vehicle of progress and social improvement (with references on the current theme of migration)
- European legislation on immigration, the rights and duties of immigrants, the scholastic inclusion of immigrants
- students make posters with all the information they found through their research

Type of activity	Debate -Information research- Publication
Target audience	From 14 years old
Place	Classroom, computer room
Material needed	Computers, pens, pencils, markers, tires, billboards
Duration of activity	Preparation : 3-4 hours Implementation : 3-4 hours
Authorship	IIS GARIBALDI LA No authorization required
Links	https://www.ccdc.it/documento/humanitas-origine-e-significato-di-un-concetto Link on Terentius, Apuleius and Tertullianus; https://storiacuriosa.wordpress.com/2012/12/11/magia-e-stregoneria-nellantica-roma/ http://www.aprmm.it/Magia%20Nera.pdf
Notes by author	This activity should be done in two different days, in order to give students time to do a research between the first and the second part.

ME AND MY GRANDMA COOK

Biology | Art | Social Science | Mother Language | History

CULTURAL HERITAGE

PEDAGOGIC CONTENT:

- Coastal marine organisms
- Benton fish (coastal fish)
- Traditional fishing tools
- Traditional cuisine
- Culture of living

PRE-REQUISITES:

- Knowing, in details, the habits and customs of people in their homeland

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Recognize marine organisms in the shallow sea.
- Notice in the sea, and be able to name, commonly known edible organisms.
- Explain the living conditions and culture of living of their ancestors.
- Identify traditional fishing tools and explain how to use them.
- Express in words the marks of their cultural identity (related to family values and habits).
- Adapt the traditional culture of living to contemporary conditions.
- Explain the good and bad sides of traditional living culture.

DESCRIPTION:

PREPARATION:

#1: The teacher reads to the students recipes from an old traditional cookbook, organizes a discussion about the ingredients of each meal and how it is prepared. He leads them to conclude how people lived in the recent past, where they found food, how they preserved it. It should all be connected with living conditions.

IMPLEMENTATION:

#2: Students and teacher go to the coast. Walking along the seashore with shallow sea, they are tasked with observing marine organisms at the bottom of the sea and fish swimming around, and listing them (regardless of whether they know the name of each organism).

#3: Students report which organisms they have listed, determine their names. They discuss the ways it can be used in cooking and the fishing gear needed to catch them. The teacher shows photos of different fishing tools, and students think about the most appropriate tools for particular organism.

#4: Students are tasked with talking to their families about everything they have learned and observed, to inquire how to prepare a dish from small marine organisms.

#5: Students in four groups are tasked with creating interesting and delicious dishes made of sea organisms that they had come to know. They will put together recipes; draw a dish ready to serve. Three students will be selected as the jury, to evaluate the recipes and presentation of the dishes.

#6: Conclusion:
The jury announces the winner (the group that created the most imaginative dish and presented the best one) and argues the choice.

Type of activity	debate, nature exploration
Target audience	From 11 years old
Place	Classroom, outdoor space
Material needed	Traditional cookbook, photos of fishing tools
Duration of activity	Preparation - 30’ implementation 1-2 hours
Authorship	Pučišća elementary school
Links	none
Notes by author	Meeting with the craftsmen (fisherman, cook) can also be organized in order to encourage intergenerational transfer

WHAT PEOPLE DO IN MY HOMELAND

Geography | Mathematics | Informatics

CULTURAL HERITAGE

PEDAGOGIC CONTENT:

- Traditional occupations and skills
- Contemporary occupations
- Sustainable development

PRE-REQUISITES:

- mathematical tools: value comparison, subtraction, divide, percentage, coordinate system, graphing - depending on age

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Conduct the survey according to the directions
- Process the results of the survey
- Display the results, in tables and graphs
- Explain the results of the survey and present them in public
- Get to know the occupations of people in their homeland, from past and present

DESCRIPTION:

PREPARATION:

#1: (in the classroom): the students systematize the contents that determine the map of their region (geographical location, climate, cultural and natural sights, history, living conditions, activities of people in the region...)
The discussion is initiated on what people did in the recent and old past, what they produced, what they lived from. Students with a teacher decide to research the topic. They formulate exactly what they are really interested in and together with the teacher, formulate the first research paper. They are given instructions for independent research work outside of class.
(questionnaire attached)
The purpose of the research (on a representative sample) is to gather information on what skills and occupations have enabled the three previous generations of Brač island to survive

IMPLEMENTATION:

#2: Students independently, outside of class, gather information with the help of a research paper. Each student applies a questionnaire in his own wider family (three generations)

#3: (in the classroom): Students (divided into groups), with the guidance of the teacher, process some of the information collected (about people's occupations and skills).
Before that, they list and record all occupations that appeared in the respondents' answers.
Group A:
analyzes the frequency of individual occupations in each of the 3 time periods: 1980, 2000 and 2020.
Group B:
analyzes changes in the frequency of particular occupations over the last 40 years (1980-2020)

#4: Pupils show people's occupational data in three graphs over three periods (columnar, circular, diagram...), drawing it manually or digitally

#5: Using coordinate systems, students make projections of the representation of particular activities in the future

#6: Conclusion:
Students present the research results to other students and teachers, and announce the continuation of the research in further work.

MED EDUC

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Type of activity	Information research publication/exhibition
Target audience	From 11 years old
Place	Classroom, outdoor space
Material needed	Research paper, computers
Duration of activity	preparation 2 hours implementation 3 hours
Authorship	Pučišća elementary school
Links	None
Notes by author	It is important to give to the students clear instructions for their own independent research work. (We only record the information of family members who earn regular cash income. We exclude part-time and occasional jobs that are all present in people's lives and in small towns. Responses may be overlaid when processing the information collected, because sometimes more students are researchers from the same family. For each period, the survey was conducted on a separate sample. All three samples are not equal in number (going further, more family members included). Therefore, the following is important: 1. Horizontal measurements (within the same period) are carried out showing concrete (absolute) values. 2. Vertical measurements (over multiple periods - multiple samples) are carried out showing only percentage values

Cultural heritage

Worksheet

What people do in my homeland

RESEARCH SHEET NO. 1

Research assignment:

1. Find out in what job your family members were employed in the past.

2. Enter the job type and job location information in the table.

FAMILY MEMBER	2020.		around 2000.		around 1980.	
	JOB/ OCCUPATION	WORKING PLACE	JOB/ OCCUPATION	WORKING PLACE	JOB/ OCCUPATION	WORKING PLACE
MOTHER						
FATHER						
GRANDMOTHER (by father)						
GRANDMOTHER (by mother)						
GRANDFATHER (by father)						
GRANDFATHER (by mother)						
GREAT-GRANDMOTHER (by father)						
GREAT-GRANDMOTHER (by mother)						
GREAT-GRANDFATHER (by father)						
GREAT-GRANDFATHER (by mother)						

MED EDUC

Erasmus+

BUILDING WITH OUR ELDERLY ONES

Geology| Geography| Mathematics| History | Arts

CULTURAL HERITAGE

PEDAGOGIC CONTENT:

- Traditional architecture
- Drywall
- Double drystone wall
- architectural heritage

PRE-REQUISITES:

- Knowing elements of the cultural landscape

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Explain the role of stone in the traditional architecture of the homeland.
- Connect living conditions with traditional art.
- Specify the characteristics of stone as building materials.
- Identify and name the stone buildings in the homeland.
- Describe the process of building fence walls.
- Name traditional names of different stone shapes.
- Explain the role of the stone pile in nature.

DESCRIPTION:

PREPARATION

#1 (in the classroom): students list natural materials in the homeland, they focus on the stone. They discuss about karst landscape (advantages/disadvantages).
Students name the stone buildings in the homeland, the teacher follows everything with appropriate photographs.
We recognize the oldest buildings in the homeland. We analyze them, conclude that they are all made of stone, we conclude that it is the most accessible material in the landscape and that it is very suitable for construction (durability, strength, design ability, conductivity, aesthetic value etc.)

IMPLEMENTATION

#2: (preparing for going outside the classroom)
The teacher invites students to focus their attention on the photographs of the buildings we previously discussed.
Shows photos of the island landscape, invites students to describe buildings of the same style that are not shown in the photos but know them. In the end, they conclude that most of the old stone structures were built using drywall technique. Together they make the definition of drywall.
Drywall is a construction created by stacking stones without using connective material.

#3: (Going outside, observation)
Students are divided into three groups, each group observes different types of drywall structures:
GROUP A
Exploring double drystone fence walls.
GROUP B
Exploring single drystone fence walls.
GROUP C
Exploring the stone walls of medieval houses.

DESCRIPTION:

All three groups do the research according to the following tasks:
Measure the width of the drywall.
Looking at the horizontal cross-section determine how many longitudinal rows of stones are there.
Look at the front of the built-in stone and determine if the stone embedded in the drywall is carved/sculpted.
Study the shape and size of the built-in stones.
If stones of different size are installed, study the layout, where larger stones are placed, and where smaller.
Explore and determine how hollow the dry stone walls are (if a rabbit / mouse / bird / wind can pass through them ...)
Given the predetermined characteristics of the drywall and the environment in which it is located, what was the function of the drywall.
With a picturesque expression, demonstrate your impression of the observed drywall (powerful, fluttering, playful, lacy...)

#4: The groups report on the tasks performed and the results of their research. In further discussions between students and teacher they will compare the types of drywall explored and the differences in structure and texture observed. They determine the causes of the observed differences (type of material, available amount of material, shapes and size of stones, purpose of drywall…)

#5: (classroom) – conclusions
The teacher announces a new activity: all together will participate in the construction of drywall with the help of a local master.
With the master they will exchange the necessary information:
What kind of drywall is being built? What's his purpose? What's the height you want? What is the foundation of the wall? What kind of stone can be found nearby ? What is the exposure of the future wall to wind, rainwater? What tools do they need? What are the most common difficulties and mistakes in building drywall?

Type of activity	information research, field research, publication, project
Target audience	From 11 years old
Place	Classroom, out door
Material needed	Photos of traditional buildings in the homeland, landscapes
Duration of activity	preparation – 30 min implementation 2-3 hours
Authorship	Pučišća elementary school
Notes by author	Before the final step, at the Arts class students can use drywalls as a motive for making a work of art. Students are very interested in this type of work (classroom preparation, main activity on the terrain), especially because practical work has been announced.

I MAKE MY SURVIVAL BAG!

Geography | Geology | Mother Language

MED EDUC

Erasmus+

PEDAGOGIC CONTENT:

- Natural disaster
- Prevention
- First aid
- Individual initiative
- Group interaction

PRE-REQUISITES:

- Knowledge of the types of possible natural disasters in the region

This activity could be introduced or concluded by a visit to a rescue center or a fire brigade center.

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Identify and verbalise the consequences of a natural disaster
- Learn how to prepare an emergency kit
- Act under stress
- Define priorities
- Discuss in a group under “stress”

This "fun" format, which makes the participant verbalise, allows a better acquisition of the message.

I MAKE MY SURVIVAL BAG!

DESCRIPTION:

PREPARATION

#1: Choose a large number of eclectic objects in addition to the objects that are really useful in a survival bag (see below), it is recommended to offer a large number of various objects, more or less excluding subjects, including objects strange or ridiculous (plastic frog, pool buoys, fins or masks etc.). It may be interesting to integrate objects which may be useful in appearance but turn out to be useless in 2nd analysis (for example, a can without a can opener etc.)

#2: Organise the space: the objects are hung on grids or hung on the wall - Otherwise, they are distributed on a large table.

IMPLEMENTATION

#1: Remind the context of a possible evacuation according to the most appropriate and obvious type of risk on the territory (flood, earthquake etc.) or present the natural disasters if not done in previous lessons. Students should be able to identify the possible consequences of a natural hazard on their territory, by stimulating their reactivity rather than their feelings of anxiety.

#2: Designate a group of students (8 to 12). Everyone will have to fill their bag in turn.

#3: Give the following instructions:

1. Fill your bag only with the necessary elements for an evacuation
2. The duration to fill the bag (depending on the number of objects proposed) is established between 45 seconds and 1'30 minute. The time can be reduced if it is a second pass and the pupil has already seen his/her comrade pass.
3. Once the time has elapsed, student will have to remove the objects one by one from the bag, and justify the choice.
4. The volume is limited: modest bag size, to facilitate evacuation. Everything cannot be taken!
5. Remember to replace the objects after each pass.

A variant consists in passing a group of 2/3 students and asking the others to help them to choose the objects or to make a complete bag with two bags with some lacks.

#4: Once the time has elapsed (we can count down to add “tension”) for the passage of all the designated students, launch a group discussion on the choices taken (why, what uses, what duration) and also on those that are not taken, if important elements have not been chosen. Possibly approach the notions of "survival kit".

Each "valid" object evokes prevention and rescue instructions in the face of "major risks" and the indirect effects of a disaster.

As a reminder - Composition of a basic “survival kit”: A whistle, a torch, a “SOS” fabric or panel, fluorescent vests, a survival blanket, a radio with batteries, common drugs (dressings, paracetamol, disinfectant etc.), water, energy food, a multifunction knife, photocopying of personal papers, duplicate house and car keys, cash etc.

Type of activity	Game
Target audience	From 12 years old
Place	Classroom
Material needed	• 8 m of table • 6 m of grids for hanging objects • chairs for 30 people • a timer (alarm clock, telephone, or other format) and a bell if the timer does not ring. You can choose a comic ringtone that "dramatizes" the result (a large bell, a roaring or rooster sound etc.) • Objects (see list in attachment). Some objects are important, others less. There is no standard suitcase. It is necessary to mix some "ridiculous" objects with those more necessary. The issue being the exchange during the debriefing.
Duration of activity	Preparation: 30 to 45 min Implementation: 45 minutes to 1 hour 15 to 20 minutes are essential for the realization of a "bag filling" animation with 8 to 12 students. You must add the setpoint (5') and context recall (5') times. The duration can be easily extended depending on the time allocated, by further developing the debriefing, or by having students pass several times which is generally very much appreciated.
Authorship	Authorship: IFFO-RME No authorization required
Links	http://www.risques-majeurs.info/fiche/atelier-je-fais-ma-valise (French only) https://www.wikihow.com/Make-a-Survival-Kit

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Notes by author

The purpose of this activity is to help the students to determine what are the priority objects in a natural disaster situation, and therefore to CHOOSE: in a limited time, they will not necessarily choose the objects recommended for a survival bag (cf. above), but they will have to explain their choices together and possibly reconsider them to redefine their priorities.

Example of objects that can be gathered for the activity (not exhaustive).

It is not necessary to collect ALL of the objects mentioned, but provide at least the basics of the survival kit.

- a small backpack (important, everything must fit in the bag!)
- flash light
- on-site helmet
- rain jacket (for flooding)
- simple first aid kit
- battery radio
- mobile phone with charger
- copy identity card
- copy card
- family notebook copy
- copy health book
- copy driver's license
- copy home insurance contract
- copy of auto insurance contract
- "bank card" (or game model)
- copy banknotes
- copy medical prescription

Notes by author

Example of objects that can be gathered for the activity (not exhaustive).

- car keys
- house keys
- toothbrush
- toothpaste
- towel
- small package of baby diapers
- sweater
- pair of sports shoes
- 2 or 3 coat racks
- blanket
- empty medicine boxes on the medical prescription
- empty aspirin or paracetamol box
- empty box or empty Ventoline spray (for asthmatics)
- box of peas opening with a can opener (but there will be no can opener)
- tin can of a prepared dish to be heated which can be opened without a can opener
- boxes of sardines (can be opened without a can opener) - nutritious bars
- tuna can that can only be opened with a can opener that will be absent
- rice package
- couscous package
- packet of mashed flakes
- breakfast cereal package
- 3 or 4 disposable plastic plates
- 3 or 4 disposable cups
- 3 or 4 disposable plastic cups
- small pots
- candy
- emergency glasses
- Sunglasses
- animal feed (kibble)
- windbreaker
- Lighter
- Fins

Notes by author

Example of objects that can be gathered for the activity (not exhaustive).

- 3 or 4 disposable cutlery
- big bottle of mineral water (5 liters)
- pack of 6 bottles of 1 liter
- thermos bottle
- package of paper towels
- dishwashing gloves
- big empty laundry bottle
- freezer bags
- piggy bank
- card game
- games box
- children's buoy (even with duck!)
- small plush toy
- bulky plush type big teddy bear
- PlayStation out of use
- summer hat umbrella
- binoculars
- camera
- tool kit
- extinguisher
- candlestick with candle
- box of battery matches
- 3 or 4 children's books for 7-10 year olds
- school notebook
- ballpoint pens
- pencils

This game can also be developed through an online game as with Quizziz application: https://quizizz.com/join/quiz/6022c5549f325d001b347ffb/start?studentShare=true

NATURAL HAZARDS IN MY TOWN

Geography | Geology | Mother Language | History

MED EDUC

Erasmus+

PEDAGOGIC CONTENT:

- Natural hazards / risks / disasters
- Local development

PRE-REQUISITES:

- This activity can only take place after teacher's presentation on the families of major natural hazards and their potential consequences.

- Summary of the project: After a general presentation on major natural hazards given in class, students research information on the major natural hazards to which their town is exposed in order to produce an information pack and identify preventive measures.

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Identify local major natural hazards
- Understand the concept of major natural hazards
- Find and understand the information needed to identify the major risks to which they are exposed
- Know the means implemented to limit the impacts.

NATURAL HAZARDS IN MY TOWN

MED EDUC

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DESCRIPTION:

PREPARATION

No specific preparation required. Students will have to carry out research on the internet and in their town, it may be useful to prepare some documentary resources beforehand to facilitate their work (list of websites, extracts from newspapers, list of organizations potential resources).

IMPLEMENTATION

#1: Following the work done in class on major natural hazards, get the students together in groups of 3 or 4 and ask them to carry out a research file on a major hazard, specifying in particular whether this risk is present in the town (choose among: forest fires, flood, landslide, earthquake, volcanism, storm etc.).

#2: The file must be carried out over a minimum period of 1 month during 3 class sessions (minimum) and as much homework time as desired by the students. If possible, provide them with research leads (accessible via internet, the school library, the town hall, civil security, etc.)

#3: Instructions for the composition of the file:
- Give a definition of the major risks and then of the chosen risk
- How does it manifest itself? What does it look like?
- Find a past example and detail it, preferably around your living area [or in the Mediterranean basin for example]: place, date, number of victims, course of events etc.
- Which measures (technical and also information/education) should be taken to prevent this risk?
- What are the instructions to be observed by the population in the face of this hazard?
- Is your town affected by this risk? Justify your answer.

The work must be presented with care, the text must be personal, without copying the documentary sources verbatim. Pay attention to the spelling. The file must contain:

- If possible, a local or even regional example (around the living area)
- Photos, drawings, infographics
- Extracts from press articles
- Maps, plans for easy location

#4: The teacher supervises group work during the class sessions. Establish regular progress points with students during their personal research. During their research, students can conduct interviews with firefighters, elected officials, elders, etc. If necessary, help them to create an interview framework.

#5: At the end of the work, plan restitution sessions of about 15 minutes per group of students.

Type of activity	Information research - project
Target audience	From 13 years old
Place	Classroom – School library Optionally, homeworks Optionally, outdoor work (interview for example)
Material needed	Computers with internet connection Printers if available
Duration of activity	Preparation: 1 hour Implementation: 4 to 6 hours Around 4 to 6 sessions from 1 hour each and working time outdoor and/or at home
Authorship	Authorship: IFFO-RME No authorization required
Links	http://www.risques-majeurs.info/fiche/les-risques-majeurs-sur-la-commune-de-chagny (French only) https://www.coe.int/t/dg4/majorhazards/activites/2009/Murcia_26-27oct2009/Murcia_26-27oct09_Micallef.pdf
Notes by the authors	This activity allows students to build a methodology of personal documentary research and interviews. It requires time for the students, and personalised support to help them carry out their research. A specific time can be reserved for documentary research on security plans and mitigation measures.

MAKE YOUR OWN VOLCANO

Geography | Geology | Chemistry | Mother Language | Arts

PEDAGOGIC CONTENT:

- Eruption,
- Tectonic plates
- Magma
- Lava
- Chemical reactions

PRE-REQUISITES:

- Computer skills

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Create by using simple materials a volcano eruption
- Understand volcano formation and types
- Identify key features of volcanic activity
- Create a chemical reaction
- Identify images and videos of real active volcanoes in Mediterranean Basin

MAKE YOUR OWN VOLCANO

MED EDUC

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DESCRIPTION:

IMPLEMENTATION

#1: (In the classroom). Educator activates prior knowledge by playing a video of a volcanic formation, eruption (e.g. https://youtu.be/VNGUdObDoLk)

#2: (in the classroom). Educator asks students to sketch a volcano and label it with the appropriate vocabulary words (eruption, lava, magma, mantle, tectonic plates, etc.)

 # 3: Educator divides the students in pairs and by using their sketch as a prop, they discuss each other about what causes a volcanic eruption and they keep notes in the worksheet.

#4: (In the ICT lab). Educator asks the students to work in pairs and to find information about the most popular volcanoes in their region or in Mediterranean basin generally and keep notes from their findings.

#5: (in the science lab). Students in small groups are provided by some common materials from our daily life to make an experiment. They will represent a volcanic eruption and will get an idea of what it might look like when a volcano erupts flowing lava. This experiment presents how a chemical reaction can create the appearance of a physical volcano eruption.

#6: (in the science lab). Educator gives the following instructions to the students for the experiment:

Instructions

✓ Mix the red coloring and baking soda in a small bowl until it's pink in color.
✓ Use a funnel to put this dry mixture into the bottle. To give the volcano a more pyramid/mountain shape use air dry clay to create the slopes of the mountain around the bottle.
✓When you're ready for it to erupt, add in the vinegar and watch the lava ooze out.

#7: (In the science lab). Each group demonstrates the experiment, and they keep notes about the results.

#8: (In the science lab). All the groups discuss about the type of simulation the explosion represents

#9: (in the classroom). Students make a poster with all the information they found through their research

Type of activity	information research, experimental activities, exhibition
Target audience	From 12 years old
Place	Science lab, ICT lab, classroom
Material needed	400 ml of white or red vinegar Food coloring Baking soda Air dry clay Empty 2-liter soda bottle, or any other kind of plastic bottle Gloves, funnels, spoons, pencils, worksheets, etc.
Duration of activity	Implementation : 1-3 hours
Authorship	HCMR (Education Unit) No authorization required
Links	https://geology.com/volcanoes/volcanic-hazards/ https://geology.com/teacher/volcano.shtml https://sciencebob.com/make-your-own-volcano/
Notes by author	Educator should activate prior knowledge of students

LEARN ABOUT TSUNAMIS!

Geology | Geography | Physics | Mother Language | History | Arts

MED EDUC

Erasmus+

PEDAGOGIC CONTENT:

- Volcano eruption
- Natural hazards
- Tsunami
- Earthquake
- Landslides
- Tectonic plates theory
- Geological structure

PRE-REQUISITES:

•Basic knowledge on geological structure of the Earth
•Computer skills

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Explain the terms, hazard, natural hazard, tsunami
- Extract information on the nature, causes, effects and preparedness for tsunamis
- Recognize the importance of learning about tsunamis and how this knowledge promotes in saving lives.

LEARN ABOUT TSUNAMIS!

MED EDUC

Erasmus+

DESCRIPTION:

IMPLEMENTATION

#1: (emotional warm-up phase): The educator tells the story to the students about some of the biggest tsunamis in the history and their consequences. Even better, he/she shows to the students a video on this topic (e.g. https://youtu.be/MZtC-LmG4pg). A short discussion with the students follows.

#2: Students are divided in groups with different research tasks (searching the internet & literature): group 1 will search for information on the nature of tsunamis (geographical – physical aspect); group 2 will search for information on the effects of tsunamis (socio – geographical aspect); group 3 will search for information on the frequency of their occurrence; group 4 will search for information on the ways to be prepared for tsunamis and to mitigate the consequences). Each group should get some worksheets (prepared in advance by educator) that will guide them in their research work.
Note: group tasks can also be designed differently, depending on what outcomes educator wants to achieve.

#3: (feedback phase): Students present results of their research to the rest of the class. Alternatively, a method of rotating groups can be used in this step: each member of the group is assigned a letter A, B, C, D. etc. After the research, new groups are formed: all A members in one group, all B members in another and so on. This way newly formed groups are composed of members with different research results, and they present their results to each other within the group.

#4: (creativity phase): students write an acrostic poem (T.S.U.N.A.M.I.), and present their poems to the rest of the class. After this, a poster or ppt can be made (individually or in groups), but the teacher/educator should point the students on the purpose of this tasks (informative poster / poster warning of the dangers of a tsunami / a poster to help people prepare for a tsunami etc. Posters can be exhibited on classroom/school walls.

Type of activity	information research, publication, exhibition
Target audience	From 12 years old
Place	Classroom, ICT lab
Material needed	Access to internet, tablets, computers, printer, worksheets
Duration of activity	Implementation: 1-4 hours
Authorship	HCMR (Education Unit)
	No registration or authorization for use is required
Links	https://www.ngdc.noaa.gov/hazard/tsu.shtml Videos for tsunamis https://youtu.be/sBkMLYUyUZg Animation of creation of tsunamis https://www.youtube.com/watch?v=Wx9vPv-T51I&feature=youtu.be How tsunamis work https://youtu.be/2V6ZIADfBh8 how we can create a tsunami in classroom https://youtu.be/MZtC-LmG4pg study for the consequences of tsunami to Minoan Civilization https://youtu.be/ILlyfwDwJVs creation of tsunamis by the movement of tectonic plates https://youtu.be/9xJb0oqnT4c Tsunamis in Greece and Turkey https://youtu.be/_eI3NfEJJkQ tsunamis created by earthquake in Samos island (Greece 2020) https://youtu.be/oWzdgBNfhQU Tsunamis in Japan
Notes by the authors	Background information for natural hazards

LEARN FOR TSUNAMIS!

Worksheet

Write an Acrostic Poem using the word below
T :
S :
U :
N :
A :
M :
I :

EXPLORING A MEDITERRANEAN MARINE ECOSYSTEM ABIOTIC AND BIOTIC FACTORS IN A MARINE ECOSYSTEM

Geography |Biology |Chemistry | Physics | Computer Science| Mother Language

MED EDUC

Erasmus+

BIODIVERSITY

PEDAGOGIC CONTENT:

- Ecosystem
- Biodiversity
- Biotic factors
- Organisms, bacteria
- Habitat
- Abiotic factors
- Mediterranean Sea

PRE-REQUISITES:

Knowledge of notions like: Ecosystem, biodiversity, oxygen, nutrients, temperature, salinity, solar energy, substrate, aerial exposure, depth, tides, waves, currents

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- List abiotic and biotic factors of a marine ecosystems
- Identify and describe abiotic factors and physical processes that impact marine ecosystems
- Investigate the importance of abiotic factors and physical processes within Mediterranean ecosystems
- Describe and identify two examples of Mediterranean marine ecosystems
- Discover the effects of abiotic factors on aquatic/marine ecosystems
- List ways humans interact with and impact marine ecosystems
- Provide examples of abiotic and biotic factors of different marine Mediterranean habitats
- Appropriate a computer work environment : adopt a responsible attitude, create, produce, process, use data, information research and obtain documentation, communicate.

DESCRIPTION:

PREPARATION (in classroom)

#1: The educator should introduce to the students a vocabulary that includes elements such as: ecosystems, abiotic factors, biotic factors, habitats, food chain, food web

IMPLEMENTATION (in the classroom or ICT lab)

#1: Students will divide in small groups and will search in internet or other resources (books, illustrations, guides, video galleries etc.) to provide examples of abiotic and biotic factors of different marine ecosystems in Mediterranean Sea. (Students could chose examples from different countries or from their native country and present at least **5 examples**)

#2: Students have to find an attractive way to present and share their examples /information with the rest of the classroom. They can write a play and play it in front of all, they can write a poem-haiku or they can write a story with fantastic characters or finally they can create a ppt or poster and present it in the class

#3: Students and educators discuss with an expert (e.g. marine researcher from HCMR, or from another institute-university through skype connection) about their conclusions for the effects of abiotic factors on marine ecosystems and the human's interaction and impact to marine ecosystems

#4: Students exhibit their posters/poems, or present their ppt/ or their story/fiction, or play their play to the rest of the school community and their parents and inform them about the ways that humans interact with the marine habitats in Mediterranean Basin.

Type of activity	information research, publication, project, exhibition
Target audience	From 12 years old
Place	Classroom, ICT laboratory
Material needed	Computer, access to internet, skype connection, printer, illustrations, guides
Duration of activity	Preparation : 45 minutes Implementation : 2-3 hours
Authorship	HCMR (Education Unit) No authorization required
Links	https://www.ra-spa.org/sites/default/files/doc_cop/biodiversity.pdf
Notes by author	None

EXPLORE A MARINE PROTECTED AREA !

Geography |Biology |Chemistry | Physics | Computer Science| Mother Language | Foreign Language |

MED EDUC

Erasmus+

BIODIVERSITY

PEDAGOGIC CONTENT:

- Ecosystem, Biodiversity
- Biotic factor, Abiotic factors
- Oxygen, nutrients, temperature, salinity, solar energy
- Substrate, aerial exposure, depth, foodwebs
- Environmental sustainability
- Natural Heritage and Cultural Heritage

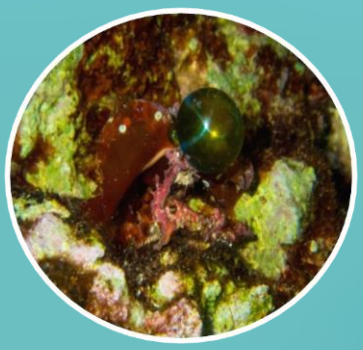
PRE-REQUISITES:

•Good skills on computer tools
•Educator should introduce a vocabulary including items like: ecosystems, abiotic factors, biotic factors, food chain, food web, MPAs, endemic species, etc. for discussion with students.

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Describe and identify 4 examples of MPAs in Mediterranean Sea
- Explore some Marine Protected Areas and perceive the importance of Marine Protected Areas
- Explain how the MPAs contribute to natural, economic, or cultural resources
- List ways that humans interact with and impact MPAs



EXPLORE A MARINE PROTECTED AREA !

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION (in the ICT lab, or classroom)

#1: Educator should introduce a vocabulary including items like: ecosystems, abiotic factors, biotic factors, food chain, food web, MPAs, endemic species, etc. for discussion with students.

IMPLEMENTATION (in the ICT lab, or class room)

#1: Students will divide in small groups and they will use Google Earth to explore **2-4** Marine Protected Areas in Mediterranean Sea.

#2: Educator should demonstrate for students how to download the Marine Protected Areas layer as a .kml file. After downloading, he /she should select the Marine Protected Areas layer, and demonstrates how to locate and explore MPAs around the world. He/ she should show students the icon they are looking for and how to examine the photos, videos, and stories that accompany each location.

#3: Students will keep information in a worksheet about their MPAs. More specific they should note the name and the location of the MPA the ecosystem type, and the purpose of the MPA.

#4: Students, will create a poster or a ppt to present their examples to the rest of the class and share with them the information.

#5: Students and educators discuss with an expert (e.g. marine researcher from HCMR, through skype) about their conclusions for the importance of MPAs and the humans interaction and impact to marine ecosystems

#6: Students write a brief article for the website of their school about a MPA in their region /country. They refer to the environmental issues the area faces, the natural and cultural resources that are in need of protection, and any stories of local environmental stewardship projects or other human actions that have helped or are currently helping the area

#7: Alternative, students exhibit their posters, or present their ppt to the rest of the school community and their parents and inform them about the importance of MPAs in Mediterranean Basin and the value provided to the society

Type of activity	information research, publication, project, exhibition
Target audience	From 12 years old
Place	Classroom, ICT laboratory
Material needed	Computer, access to internet, access to Google earth images, skype connection, printer, tablets, worksheets
Duration of activity	Implementation : 2-4 hours
Authorship	HCMR (Education Unit) No authorization required
Links	https://www.iucn.org/content/marine-protected-areas-sharing-mediterranean-experience https://medpan.org/marine-protected-areas/mediterranean-mpas/
Notes by author	None

EXPLORING THE BENTHIC FAUNA OF A ROCKY SHORE

Geography |Biology |Chemistry | Geology | Physics | Mother Language | Arts

BIODIVERSITY

PEDAGOGIC CONTENT:

- Ecosystem
- Biodiversity
- Biotic factor
- Organisms, bacteria
- Environmental sustainability

PRE-REQUISITES:

•Knowledge of notions like: Ecosystem, biodiversity, oxygen, nutrients, temperature, salinity, substrate, aerial exposure, depth, tides, waves, currents, food webs.

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

▪Measure/calculate various physicochemical parameters

▪ Identify and describe abiotic factors and benthic fauna of a sea shore.

▪Become familiar with scintific and labaratory equipment

•Be encouraged to take on the role of an environmental scientist

DESCRIPTION:

➢ **IMPLEMENTATION**

#1: (in the field). Students with educators walk along a rocky sea shore, observe the environment, and take some photos.

#2: Students will separate in different groups and will gather at least **4** quantitative and **4** qualitative data to describe the ecosystem. By providing measuring equipment students should collect some physical and chemical data (e.g. air and water temperature, pH, type of microhabitat, etc., see the worksheet below), to characterize the abiotic factors and the habitat type of each specimen (crevices, tide-pools and exposed platform).

#3: By providing recording devices such as cameras, as well as measuring equipment to allow the estimation of size and numbers, students could be guided to explore the diversity of species of the rocky shore. With the help of an expert such as a marine biologist they could collect some plant material (seaweed) from the substrate for observation. Students could also observe in mobile stereoscopes some benthic invertebrates from their samples.

#4: (In the classroom). Each group perform research on a benthic species (animal or plant) and then share their information to become 'experts' on their species.

#5: Each group creates a species identification card, focused on its morphological characteristics, habitat and modes of life. At the end, through the comparison of the similarities and differences between the different species analysed, students should develop a deep understanding about marine biodiversity and species adaptations.

#6: (In the classroom, ICT lab). Each group prepares and makes a ppt presentation or a poster with the results of the quantitative and qualitative data from the field research.

#7: Discussion. Students share their comments and conclusions with the rest of the class.

Type of activity	Field research, experimental activities, presentation, project.
Target audience	From 12 years old
Place	Outside space, class room, ICT laboratory
Material needed	Cameras, or mobile phones, work sheets, pencils, measuring equipments, computers, access to the internet. temperature probes, ph indicator paper ,field guides, cardboards glues, scissors, hats, suncreams.
Duration of activity	1 hour in the field 3 hours in the classroom/ ICT laboratory
Authorship	HCMR (Education Unit) No authorization required
Links	Brieseman, C. (2013). Oceans. An Inquiry Unit. Available at: http://seaweek.org.nz/wpcontent/uploads/sites/26/2013/10/Ocean-Unit.pdf
Notes by author	Educator should introduce students to the use of scientific equipment.

Biodiversity

Worksheet
Exploring the benthic fauna of a rocky Shore

Site: ……

Date: ……

Coordinates: ……

……

ABIOTIC PARAMETERS

1. Temperature: ……
2. Conductivity: ……
3. PH: ……
4. Dis. Oxygen: ……
5. Salinity: ……
6. Other: ……

BIOTIC ELEMENTS

1. ……
2. ……
3. ……
4. ……
5. ……
6. ……

Observed human interventions in the study area

1. ……
2. ……
3. ……
4. ……

MED EDUC

Erasmus+

EXPLORING MARINE FOOD WEBS IN MEDITERRANEAN

| Geography |Biology | Chemistry | Physics | | Mother Language | Computer Science

BIODIVERSITY

PEDAGOGIC CONTENT:

- Ecosystem
- Biodiversity
- Food webs, food chain
- Posidonia sea grass meadows
- Gorgonian gardens
- Endemic species
- Environmental sustainability
- Natural heritage

PRE-REQUISITES:

- Computer skills

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Investigate marine food webs and trophic levels
- Perform a research on a marine organism, and fit their organisms together in a class-created food web showing a balanced marine ecosystem.
- Investigate the importance of posidonia sea grass
- Learn the definition of endemic species

EXPLORING MARINE FOOD WEBS IN MEDITERRANEAN

MED EDUC

Erasmus+

DESCRIPTION:

IMPLEMENTATION

#1: (In the classroom)
Students working in groups will create their own marine food web for two representative Mediterranean marine ecosystems. The Posidonia oceanica sea grass medows and Gorgonian gardens, or deep-sea sponge fields

#2: Each group will be responsible for gathering information and photos or videos about the two different habitats and the organisms that live in them

#3: Students, in pairs, use the school computer lab and/or provided Internet resources to research their organism and complete their essay

#4: Students create posters or ppt presentations by using various multimedia to present their results

#5: All the posters /ppt are displayed for the whole school community

Type of activity	information research, publication, exhibition, project
Target audience	From 13 years old
Place	Classroom, ICT laboratory
Material needed	Pc, mobiles, tablets, photos, access to internet , posters, printer
Duration of activity	Implementation : 1-3 hours
Authorship	HCMR (Education Unit) No authorization required
Links	http://www.fao.org/3/a-i7256e.pdf https://oceana.org/sites/default/files/reports/Corals_Mediterranean_eng.pdf https://medwet.org/2017/10/mediterranean-posidonia/
Notes by author	None

ONE DAY
CETOLOGIST

| Biology | Geography | Geology | Technology

BIODIVERSITY

PEDAGOGIC CONTENT:

- Importance of top predators as marine mammals
- Conservation of protected marine species in the IUCN red list
- Elements for the equilibrium and of disturbance in gulfs and coastal areas; meaning of priority marine species and areas
- Principles of sailing; monitoring techniques applied at sea
- Code of goof conduct for observing wild fauna
- Geological origins of the monitored area
- Relationships between research, citizen science and blue tourism.

PRE-REQUISITES:

- None

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Recognize differences between fishes and cetaceans
- Identify different species of cetaceans by morphology and surface behavior
- Compile scientific surveys for data collection
- Set a sailing route
- Distinguish different types of rocks and seabed
- Apply the international code of good conduct for the observation of whale and dolphins
- Recognize what tourist activity is responsible and eco-friendly
- Disseminate the importance of marine resources conservation

ONE DAY CETOLOGIST

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: Collecting of the authorization forms signed by the parents of all the students to participate in the study visit.

IMPLEMENTATION

#1: Briefing on the monitored area, on local cetacean species and on the code of good conduct for their observation

#2: Boarding. Sea monitoring and clean up.

#3: Observation of coastal and marine resources with considerations on their protection.

#4: Return and debriefing on the monitoring.

Type of activity	Field research
Target audience	11 years old
Place	Outside place, in correspondence of a Natural Reserve. For example, in Sicily: the meeting point could be the port of Catania, from which the boat will depart to sail in the waters of the gulf of Catania and of the Marine Protected Area of the Ciclops Islands. The ecotour permits to see natural and anthropic elements both close to the coast and offshore
Material needed	Boat with all required safety devices Binoculars, GPS, fish finder, surveys for data collection ID cards on cetaceans camera or mobile phone to take photos and video on the environment and the animals gloves and small landing nets to collect marine litter
Duration of activity	Preparation : ¼ hour Implementation: 3 hours
Authorship	Mare Camp association, certified by "Friend of the Sea"
Links	www.marecamp.com
Notes by the author	Participants suffering from sea sickness need to take health precautions before the boarding. Participants need clothing suitable for the season. Program and duration of the excursion may undergo variations in case of adverse weather and sea conditions and no refund will be due. The excursions have 75% of probability to sight cetaceans in the considered area. The experience can give the expected notions and competencies also in case of missing sighting.

MED EDUC

Erasmus+

DRAWING THE COASTLINE IN 2100

Geography | Physics | Chemistry | Mathematics | Biology

MED EDUC

Erasmus+

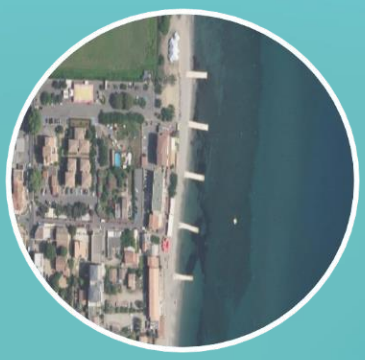
CLIMATE CHANGE

PEDAGOGIC CONTENT:

- Coastal artificialization
- Coastline mapping
- Coastline observation

PRE-REQUISITES:

Knowledge on urbanization and coastal artificialization (O1 draft).



NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Describe and map coastal spaces
- Learn to use measuring instruments/equipment
- Develop knowledge of the different areas of a coastline
- Identify the biological and geological components of the landscape

DRAWNING THE COASTLINE IN 2100

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

#1: The teacher should choose a local beach as studied site characterized by the coastline mobility (erosion or accretion, with dwellings near the sea, etc.). Then he/she could fix a date and book a bus to do the field work.

#2: The students do some initial research on the management of coastline solutions (e.g. dikes, 'fences' made from chestnut wood which hold the sand in place, sandbags).

#3: The teacher introduces some key notions about climate change and coastal artificialization with the help of the O1 document and the links below to provide to the students a simulation of the water rise in 2100.

IMPLEMENTATION

#1: The teacher introduces the purpose of the activity and forms 4/5-students groups handing out a sheet and a pencil per person.

#2: The teacher does a first tour of the chosen site to delineate the study area with a decameter, stakes and twine.

#3: The teacher lets the students observe the landscape and describe it for 10 minutes. The goal of this step is to visualize the landscape and define 3-4 landmarks.

#4: Then, the educator lets the students begin the mapping out the site not forgetting to give them the correct indications to report the North, the scale and the date on the drawing.

#5: The teacher observes the data collection of each group and analyzes what they have noticed (human activity, cleanliness, natural elements, etc.), reorienting them if they are too far from the site reality.

#6: In the context of a debate, the students have to plot the sea level projection simulated in 2100 taking into account to the effects of climate change on the landmarks present in the studied site.

Type of activity	Field research
Target audience	From 11 years old
Place	Outside
Material needed	Work sheet, decameter, stakes, twine, compasses, pencils, computers/tablets
Duration of activity	Implementation : 2 hours
Authorship	CPIE Bastia U Marinu No authorization required
Links	https://www.iucn.org/fr/content/la-mediterranee-un-environnement-marin-cotier-en-mutation-selon-les-scenarios-sur-levolution-du-climat https://portals.iucn.org/library/sites/library/files/documents/2012-070-Fr.pdf
Notes by author	Cameras could be used on the field to take pictures of specific elements (habitations, tourist buildings, dikes, 'fences"…) present on the coastline and/or visible effects of the erosion/climate change on the landscape.

BE AN ECO-RESPONSIBLE CONSUMER

Geography | Biology | Chemistry | Mathematics | Social Sciences | Economy

MED EDUC

Erasmus+

CLIMATE CHANGE

PEDAGOGIC CONTENT:

- Greenhouse gas emissions
- Carbon footprint
- Eco-consumption

PRE-REQUISITES:

Knowledge about climate change (O1 draft).

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Describe the greenhouse gas phenomenon
- Understand the origin of climate change and our responsibility
- Learn to be an eco-responsible consumer
- Do some literature research
- Summarize and expose information
- Work in team
- Define the different steps of products production and distribution

BE AN ECO-RESPONSIBLE CONSUMER

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

The teacher will choose and bring to the students the following materials: 8 –10 food products (1 product/4-students team; for example cereals, rice, pasta, fruits, vegetables…), one global map per group.

IMPLEMENTATION

#1: The teacher introduces the program and the purpose of this activity highlighting the impact of anthropogenic greenhouse gases and our contribution to climate change as consumers.
#2: The teacher hands out a food product and a map per group.
#3:The teacher lets the students for 10 min read and note the information about the production place given on the product packaging.
#4:The teacher observes each group during this session and reorients them if they are too far from the reality to define the production place of the product.
#5: Let's the students search for 15 min on internet for some information about the distribution places of their product.
#6: The teacher observes each group during this session and reorients them if they are too far from the reality to define the distribution places of the product.
#7: Students have 5 min to plot on the map the projections of train tracks and/or the sea and/or air routes between the places of production and distribution.
#8: Students have 15 min to quantify the travels in km and in terms of CO2 emissions using online carbon footprint calculators (for example the one cited below).
#9:The teacher lets each group (5 min/group) to expose the information collected on the product (what is it, production and distribution places, projections of train tracks and/or sea and/or air routes on the map, CO2 emissions estimation, etc.). (total duration : 30 min)
#10:The teacher summarizes the information collected and proposes to the students to think and discuss about alternative solutions of consumption, privileging local producers or products from ranching for example, to reduce our carbon footprint as consumers. (duration 10 minutes)

MED EDUC

Erasmus+

Type of activity	Information research
Target audience	From 11 years old
Place	Classroom , ICT laboratory
Material needed	1 food product/4-students group 1 global map/4-students group 1 computer access and/or tablets /4-students group Worksheet
Duration of activity	Implementation : 2 hours
Authorship	CPIE Bastia U Marinu No authorization required
Links	https://www.carbonfootprint.com/calculator.aspx
Notes by author	The teacher should privilege packaged products. Concerning the others, fruits or vegetables for example, the teacher should keep in mind and add a target on the product with the production place, indicated in the store shelves, and the producer name to help students to do information research on the distribution places.

Climate Change

Worksheet

Be an eco-responsible consumer

Food product ……...

Production place ……

Distribution place(s) ……

……

……

Circle the transport used between the production place and the distribution ones.

Train	Plane	Boat	Other

How many kilometers does the product travel?

……..……..

How much do you estimate the carbon emissions related to the product travel?

……..

MARINE CURRENTS

Physics | Geology | Geography | Mathematics | Chemistry

MED EDUC

Erasmus+

PEDAGOGIC CONTENT:

- Sea currents experimentation
- Melting ice simulation
- Water temperature
- Salinity

PRE-REQUISITES:

Knowledge about climate change and ocean circulation (O1 draft)

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Carry out a scientific protocol (hypothesis, experiment, observation)
- Relate the experiments carried out with the functioning of the ocean circulation
- Identify surface and deep water currents
- Understand the consequences of the melting ice on sea currents

MARINE CURRENTS

MED EDUC

Erasmus+

DESCRIPTION:

IMPLEMENTATION

#1: The teacher introduces the activity and divides students in 2/3-scholars groups.

#2: The students begin the first experimental activity following the instructions below: *"Put some water in two different beakers. Chose one of the two beaker and color the water in blue. Heat blue water on a hot plate. Use the thermometer to monitor the hot water temperature. When it reaches 60 °C, take a small amount of the blue water with a micropipette. Then, release the hot water into the second beaker with cold water."*

#3: The teacher lets the students map the stages of the first experiment and debate about what do they observe, trying to explain the observed phenomenon due to the water temperature.

#4: The students conduct the second experimental activity following the instructions below: *"Prepare a beaker of fresh water and another of salt water. Pour in 2 teaspoons of coarse salt in one of the two beakers to get salt water and stir to dissolve the salt. Color the salt water in green. Take a small amount of the green salt water using another micropipette. Then, release the salt water into the second beaker with fresh water."*

#5: The teacher lets the students map the stages of the second experiment and debate about what do they observe, trying to explain the observed phenomenon due to the water salinity.

#6: The students do the third experimental activity following the instructions below: *"Prepare a beaker of tap water and another of salt water. Pour in 2 teaspoons of coarse salt in one of the two beakers to get salt water and stir to dissolve the salt. Dip a colored ice cube in each of the two beakers."*

#7: The teacher lets the students map the stages of the third experiment and debate about what do they observe, trying to explain the observed phenomenon which consists in the modelling of a melted iceberg.

#8: Let's the students have the following read on sea currents: *"A sea current is a movement of sea water characterized by its direction, speed and flow. There are two types of currents: surface currents and depth currents. The Earth receives solar energy unevenly: it is not the same depending on whether we are at the pole (because the rays arrive in a very inclined way) or at the equator. The intertropical zone thus receives as much energy as the rest of the planet. This imbalance sets in motion the atmosphere and the oceans which will thermally rebalance the whole. It also generates winds which are the main factors of surface currents. These movements are influenced by a force due to the rotation of the Earth, called the Coriolis force. This imbalance also causes temperature differences depending on the latitude. This difference in temperature causes a difference in the salinity of the water and therefore in density, thus creating the depth currents"*

DESCRIPTION:

IMPLEMENTATION

#9: Let's the student answer to the following questions:
1 – What is a sea current?
2 – What are the 2 types of existing sea currents?
3 – What are the origins of these different marine currents?

#10: Let's the students have the following read on the importance of the Gulf stream: *"The Gulf Stream is a sea current that is part of the global thermohaline circulation, the famous conveyor belt, which carries heat from the tropics to the poles. In the North Atlantic, this current is the hot leg of the conveyor belt. It transfers its heat, accumulated in the tropics, to air masses above Europe, helping to warm the regional climate. Cooled and enriched by colder and more salty, therefore heavier, arctic waters, this current plunges to the bottom of the ocean and heads back to Antarctica. The engine of this thermohaline circulation is the difference in density, and therefore in temperature and salinity, of water masses. It has therefore been proposed that an increased melting stions of glaciers, following global warming, could slow the Gulf Stream by reducing the salinity of polar waters. "The warm, fresh waters are more light and dive less quickly than cold and salty waters," recalls Josh Willis, oceanographer of the NASA. Such a slow down would have consequences for the European climate, which would cool down."*

#11: Let's the student answer to the following questions:
1 – What is the Gulf Stream?
1 – Why does the Gulf Stream sink to the bottom of the ocean when it arrives in the Arctic and then returns to the Antarctic?

#12:The teacher asks to the students what have they learned during the activity about sea currents and concludes talking about climate change impact on the ocean circulation.

Type of activity	Experimental activity
Target audience	From 12 years old
Place	Lab room, classroom
Material needed	Green and blue water dyes / hotplate / thermometer / 2 beakers / 2 micropipette / coarse salt / 1 ice cube tray
Duration of activity	Implementation : 2 hours
Authorship	CPIE Bastia U Marinu No authorization required
Links	https://phys.org/news/2010-03-nasa-atlantic-conveyor-belt.html http://www.ecoles.cfwb.be/arvise/SECONDAIRE/pedagogie/G%C3%A9ographie/Mr%20Fallais/courants%20marins.pdf https://www.futura-sciences.com/planete/actualites/oceanographie-fonte-arctique-affecte-courants-oceaniques-plus-encore-44867/
Notes by author	None

WHAT IS THE OCEAN ACIDIFICATION ?

Biology | Mother Language | Chemistry

MED EDUC

Erasmus+

PEDAGOGIC CONTENT:

- Acidity and pH meaning
- CO2 emissions
- Ocean acidification impacts
- Marine species conditions
- Food chain modifications

PRE-REQUISITES:

Knowledge about climate change and pH concepts (O1 draft)

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Carry out a scientific protocol (hypothesis, experiment, observation)
- Relate the experiments carried out with the functioning of the ocean acidification
- Understand how CO2 emissions have an impact on the ocean and its marine species

WHAT IS THE OCEAN ACIDIFICATION ?

MED EDUC

Erasmus+

DESCRIPTION:

PREPARATION

Ensure students have protective gowns.

IMPLEMENTATION

#1:The teacher introduces the topic and asks to the students what «ocean acidification» is and which consequences on the marine environment is it responsible for.

#2: According to the answers, the teacher explains to the students the meaning of acidity (which is due to the presence of H + ions) and pH (chemical measurement used to assess the concentration of hydrogen). The teacher precise the values of acidic and basic solutions and the sea pH (8.2). The purpose of this step is to make sure that the students have all the necessary tools to understand the rest of the activity.

#3: The teacher asks to the students if they know why ocean pH is decreasing. After students debate, he/she explains them the principal cause of oceans acidification: CO2 releases into the atmosphere, which has become more important since the industrial revolution (1850). About 25-30% of the CO2 in the atmosphere is absorbed by the ocean.

#4: The teacher divides students in 2-scholars groups

#5: The students begin the first experimental activity, which goal is to highlight the CO2 absorption by water, following the instructions below:

"Put lime water into a container and then use a straw to blow into the lime water."

#6: The teacher lets the students debate about what they observe, trying to explain the observed phenomenon (a white precipitate (CaCO3) appears, highlighting the CO2 formation).

#7:The students begin the second experimental activity, which goal is to demonstrate pH reduction, and therefore the environment acidification, because of the CO2, following the instructions below:

"Put water into a container and then immerge the pH probe into it. Note the value displayed on the pH meter. Place the straw in the container and blow to introduce CO2 into the water. Observe the value displayed on the pH meter throughout the exhalation."

#8: The teacher lets the students debate about what they observe, trying to explain the observed phenomenon (the higher the CO2 concentration is, the more pH value decreases during the experiment) which shows the water acidity due to CO2 increases.

DESCRIPTION:

IMPLEMENTATION

#9: The students begin the third experimental activity, which goal is to highlight the acidity impacts on corals and shelled species development, following the instructions below: *"Take a container, put some water in and a few drops of hydrochloric acid (or vinegar). Then put a mollusk shell into the container (or another invertebrate such as mussels, oysters, snails etc.). Wait 10 minutes to observe the first results".*

#10: The teacher lets the students debate about what they observe, trying to explain the observed phenomenon: shells are considerably attacked by the acid.

#11: The teacher asks to the students the following questions :

1 – What does ocean acidification mean for you ?

2 – Do you think it has positive or negative impacts ?

3 – Which are these impacts ?

#12:The teacher debate with students about the consequences of the ocean acidification on marine species. For example, crustaceans have difficulties to shell, impacting the food chain, and corals are directly affected by this acidification.

Type of activity		Experimental activity
Target audience		From 14 years old
Place		Lab room, classroom
Material needed		*Experimental activity 1* : container, limewater, straws *Experimental activity 2* : container, water, pH meter, straws *Experimental activity 3* : container, snail or mussel or oyster shell, hydrochloric acid (or vinegar), water
Duration of activity		Implementation : 2-3 hours
Authorship		CPIE Bastia U Marinu No authorization required
Links		Acidification information: https://fr.oceancampus.eu/cours/Ajw/acidification-des-oceans; http://lemonsea.org/ Experimental activities : https://sites.google.com/site/acidificationdesoceans/les-experiences
Notes by author		None

MELTING ICE
AND RISING SEA LEVEL

Geography |Chemistry| Physics | Geology

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PEDAGOGIC CONTENT:

- Different state of water, density, ph and chemical reactions
- Global warming
- Continental glaciers / ice floes
- Melting glaciers and rising sea levels
- Immersed soil, non- immersed soil
- Fragility of coastal regions, Loss of habitat
- Migration (climate refuge)

PRE-REQUISITES:

- Notions on global warming

NEW COMPETENCIES TARGETED/LEARNING OUTCOMES:

STUDENTS WILL BE ABLE TO:

- Know the different state of water
- Be aware of human activities impacts on the environment
- Be aware of global warming and its consequences (loss of habitat, rising of sea levels, migration etc.)

DESCRIPTION:

PREPARATION

#1: It is better to carry out the experiment shortly before lunch break, as the ice takes time to melt. You can also use a hair dryer to shorten the melt wait time.

Prepare the room and group the students

MELTING ICE AND RISING SEA LEVEL

DESCRIPTION:

IMPLEMENTATION

#1: Ask the question: what impact can global warming have on oceans?

In general, pupils spontaneously think of rising sea levels. The teacher then surveys the reasons, in the children's view, for the rise in sea levels. Most pupils think it is the melting ice, without making a distinction between the melting of polar ice floe (or ice floes, as there is also an Antarctic ice floe, which is less familiar to pupils) and continental ice.

The teacher can then ask where ice is found in large quantities on Earth, and point out that there are two different possibilities: ice can be situated on land (continental glaciers, Antarctica, Greenland, etc.) or float on the ocean (Arctic and Antarctic ice floes). It can then be asked whether these two types of ice will have the same effect on rising sea levels.

#2: In order to raise the interest of students, the teacher can introduce this activity through linking it to the loss of habitat for species like polar bears.

Polar bears are the largest land carnivores in the arctic habitat and spend most of their time traveling on sea ice in search of preys such as seals. The arctic sea ice cap in a large area of frozen floating on top of the Arctic ocean.

Watch the video (link provided in the end of this sheet): Arctic polar bears "face near-extinction within decades warn scientists".

Why? Carry out this experience to answer.

#3: Split the class into 2 groups :

- Ice floes
- Continental glaciers

Put the same quantity of water in the 2 containers (the water represents the oceans).

In one of the 2 containers, put 10 ice cubes into the water (for the ice floes group).

In the other container, put stones or a heavy object that represents a continent. On this continent, place the 10 ice cubes (for the continental glaciers group).

#4: Ask the question: How will you know that the water level has risen or not?

Students can suggest different solutions: draw a line with an indelible marker, paste a paper, paste a ruler... to see the height of the water before the ice melts.

DESCRIPTION:

#5: The ice placed in water melts very fast (in a few minutes), whereas the one placed on the “continent” melts much more slowly (in a few hours). This first observation should help understand the fragility of the ice floe, which melts more quickly than the continental glaciers. The ice changed it state, it became l liquid.

#6: After leaving enough time (after lunch, for example), the pupils, by groups, should write down exactly what they have observed and draw their experiment. This is an opportunity to work on drawing of experiments: title, date, legend, use of pencil, ruler, etc.

They should write down the results of their experiment and their conclusion, which is an interpretation of the results in the light of the context of the experiment: What did we want to find out? Does the result provide the answers to the question? etc.

Each group designates a representative to explain its work to the class. The results are discussed as a group, and a common conclusion is produced.

For example: Climate change causes melting of ice. The melting of continental ice causes sea levels to rise, whereas the melting of ice floes has no immediate effect on sea levels.

The melting of the continental glaciers accounts for 65% of the rise in sea levels, half of which comes from the glaciers of Greenland and Antarctica. The other 35% is from thermal expansion of the oceans.

The various scenarios predict a rise in sea levels from 50 cm to 1 meter by the end of the 21st century.

#7:

- What will happen if the sea rises? Millions of people will be displaced: they are called "climate refugees".
- Address the concepts of emerged and submerged lands.
- Address cases of climate refugees (e.g. Tuvalu Islands).

Type of activity	Experimental activity
Target audience	From 11 years old
Place	Classroom or ICT laboratory
Material needed	Water 2 containers (with a flat bottom) 20 ice cubes Some little rocks (if not possible, a box with weight in it in order to support the ice cubes)
Duration of activity	Preparation: 10 minutes Implementation: 1 hour Step 1: 10 minutes Step 2: 5 minutes Step 3: 10 minutes Step 4: 10 minutes Step 5: 5 minutes Step 6: 10 minutes Step 7: 10 minutes
Authorship	La Main à la Pâte Foundation (French) No authorization required
Links	Activity : https://www.fondation-lamap.org/en/page/33358/ocean-session-i6-melting-ice-and-rising-sea-level Polar bear video: https://www.youtube.com/watch?v=inlSRFxWlPY Other activities (refugees and medias): https://amnestyfr.cdn.prismic.io/amnestyfr%2F69bbd929-833d-4bc1-8e22-afca88b8fab5_activite-pedagogique-accueil-refugies-presse-medias.pdf
Note by author	None

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