Sheet 1– A dry world

Introduction

The tranfer of water masses between the atmosphere and the ground will be particularly hit by the global warming phenomenon: All climate models forecast a quick change of the rain scenarios that,in many european regions, will cause problems connected to water availability, either because of drought (lack of rain) or because of water scarcity (when the water quantity used exceeds the one available): a situation that generates conflicts on the different water use and, being based on a reduction of the water quantity,it produces a concentration of polluting substances with a consequent crisis of potability.

A full understanding of how the water cycle works is fundamental in climate education. But if we look at text books, or on the media, the water cycle often presents two problems of its representation which distort its perception. The first one is the representation of the water cycle in

chemical/phisical terms, as an endless succession of status change.What is missing in this representation is mankind and its water use, so crucial for the availability of the resource: We don't need water only for drinking, cooking and washing but mainly to produce food, energy and industrial goods.The second problem is due to the scale: the water cycle is often represented in an abstract way and as a global process. This representation prevents from understanding the correct scale where we have to manage the water resource and how to act to preserve it: the catchment area/basin, namely the place where the human communities get the water for their use.

Class activity

THE BASIN MANAGEMENT

Material

- 1 A large water container (Hidrographic basin/catchment area);

- 3 Small water containers representing the “use” (Agriculture, Industry, Cities);
- Tape or markers of different colours;
- Sheets of paper with different scenarios (Situation Cards).

Note that: the amount of water present in the smaller containers (“use”), filled to the top, must be inferior to the amount of water present in the larger container (“hidrographic basin”)

Carrying out

This activity simulates what happens yearly in an hydrographic basin.

1. Fill the “hidrographic basin” with a specific quantity of water: That will be the amount of rain available to the human communities around the basin.

2. Introduce the three smaller containers (Agriculture,

Industry and Cities), and explain their characteristics and the reasons why they need water.

3. Fill the three containers (“Use”) of a certain quantity using the water from the main container (“hidrographic basin”). Leave some of the water in the main container. Try to calculate and simulate, in the small containers, the actual usage of water from your closet basin (for ex. 70% Agriculture, 15% Industry, 15% City).

4. Mark (with tape or a marker) the levels reached in each of the four containers. The level marked on the main container (Basin) shows the quantity of water needed to mantain the ecosystem and its functioning, while the other three levels are the ones that support the three typologies of human activities.

5. Put all the water back in the main container (basin). Then remove part of the water to simulate a drought scenario.

6. Repeat the water distribution in the three smaller containers: now, evidently, the water won't be enough to reach the levels marked previously.

7. Try to find, through an interactive debate with the students, some solutions to the problem identifying together what are the priorities: Is it better to preserve the agricolture, the industry, the city or the environement?

8. Listen to all the students ideas to see if they find any solution to lower the levels of the "Use" containers. If the solution is convincing and according to its viability, lower the level of some containers (using tape or a marker of another colour). For example, the use of recycled raining water within the cities will lower the demand of water in the container "City".
The teacher acts as an undisputable judge and can decide how much lowering the levels of water demanded by Agriculture, Industry and City. Afterwords, check if, even in this new adapted scenario, the levels required are reached.

9. Make the situation more complicated using the “situation cards”. Each time, the three bottles levels will raise or lower according to the card pulled out forcing the students to find new solutions to adapt the human activities to the resources available.

Examples of “situation cards”:

RECESSION: The Industry lowers its water demand;
GROWTH: The industry raises its water demand;
AGRICULTURAL SUBSIDY: Farming becomes more profitable, The water demand in Agriculture raises;
POPULATION GROWTH: The “City” raises its water demand;
POPULATION DECREASES: The “City lowers its water demand;
DOMESTIC RAIN WATER RECYCLE TECHNOLOGY: The “City lowers its water demand;
HEAT: The Industry raises its water demand (hydroelectric

plants) due to domestic air conditioning consume; rainfall decreases (and consequently the level of the basin).
POLLUTION: The aquifer/river basin is polluted by a spill and cannot be used. The water availability of the basin decreases.

Teachers can make up more detailed “situation cards” related to their area.

Suggestions (storytelling/gamification)

Set up different students workgroups. Each group works on a different “kit” of “Use” bottles and “hidrographic basin.
If different “situation cards” are pulled out to different groups, each of them will face different situations and crisis.The group that will manage to satisfy the most needs respecting the levels, wil get the higher score.
The game becomes more competitive and realistic if all the groups can count only on the “Use” kit and must draw the water from the same source (basin). This way the class simulates what happens in reality when different

communities/institutions/states draw up from the same basin.

Cross cutting suggestions

GEOGRAPHY: Get a map with the exact size of the basin that dispenses also your school; Highlight the natural hydrographic grid. Organize an interview with the public office that manages your hydrographic basin: are there any artificial channels? Does your hydrographic basin draw up water from any other neighbouring basin?
LITERATURE/ARTS: Get the students to find any author that, in the present or in the past, has represented life on your river, or rain in your area, through plastic or musical arts.
FILOSOPHY: search what Plato thought about the origins of rivers and crosscheck what found with the name of Pierre Perrault: Who was he? And why was he in contradiction with Plato about fountains?
FOREIGN LANGUAGE: Get the students to analyze the

capital's administration website of a country where their foreign language is spoken : Is the section dedicated to water easy to understand? Are there any responding plans to droughts or floods?

RIGHTS: The European Union has issued a Directive dedicated to water: What law your country implemented to be conformed to this Directive?

Web search

Water Directive

Link: eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=URISERV:l28002b&from=IT

WISE

The european Gateway about water

Link: water.europa.eu

EEA

All water data and maps from the European Environment

Agency.

Link: www.eea.europa.eu/data-and-maps

EDO

The European Drought Observatory shows maps, graphs, data and updates regularly the drought situations in Europe.

Link: edo.jrc.ec.europa.eu/edov2/php/index.php?id=1000

EFAS

The European Flood Awareness System (EFAS) shows the situation of EU floods through bimonthly bulletins.

Link: www.efas.eu/efas-bulletins.html

The water family (GAME)

Create a family and try to make them save water: A game plenty of informations on how to avoid water waste at home.

Link: www.thewaterfamily.co.uk

City in the sky (VIDEO)

An imaginary city that opens to the sky to receive water.

Link: vimeo.com/42452913

Saving Water

A first approach to understand what methods exist to save water.

https://en.wikipedia.org/wiki/Water_conservation