

Teaching Material on Biodiversity Conservation (TMBC)

Title: The small water cycle - in the tropical rainforest

Author: Sandra Stuhr

Quality Assessment: Prof. Carsten Hobohm (UF)

Level: secondary school

Type of material: Experiments related to the small water cycle followed by an informative text and tasks for the pupils

Aim: to understand the function, importance and vulnerability of the small water cycle

Materials: see annexe

Method (example):

Pupils are divided into six equal groups and carry out some experiments on the small water cycle. Two groups perform the same experiment at various stations. The groups rotate after a specified time, so that at the end each group has carried out all the experiments. Observations and suspected explanations are then noted on the worksheet. Afterwards the pupils carry out three tasks about the tropical diurnal climate.

Information for the teacher (references):

AMAZON CENTER FOR ENVIRONMENTAL EDUCATION AND RESEARCH (2008): The water cycle. (http://www.wcupa.edu/aceer/amigos/cd/water_cycle.htm, 21.01.14).

UNIVERSITY OF MICHIGAN (2008): The tropical Rainforest (<http://www.globalchange.umich.edu/globalchange1/current/lectures/kling/rainforest/rainforest.html>, 21.01.14).

Evaporation

You need:

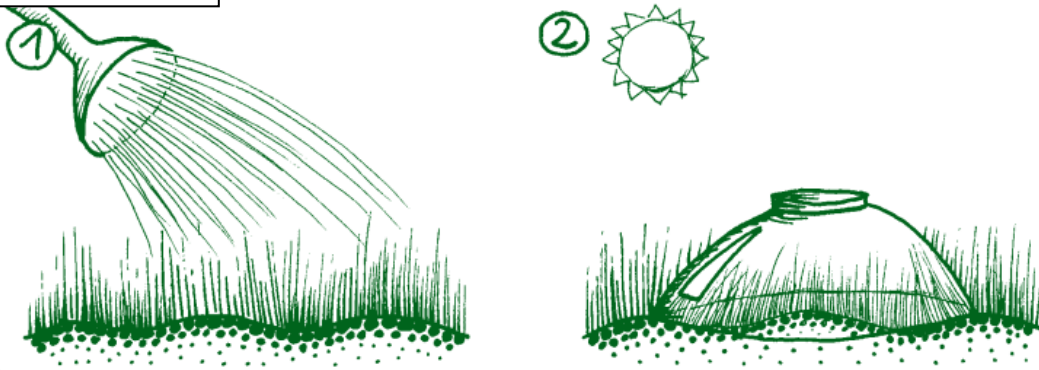
1 glass bowl

1 piece of turf from a meadow or lawn

1 watering can with water

How it works: Sets the glass bowl upside down on a piece of wet turf from a meadow or lawn. What happens when the sun has been shining for a while on the glass?

Hint: If the meadow is not wet enough, you can mimic a tropical rain shower with a watering can.



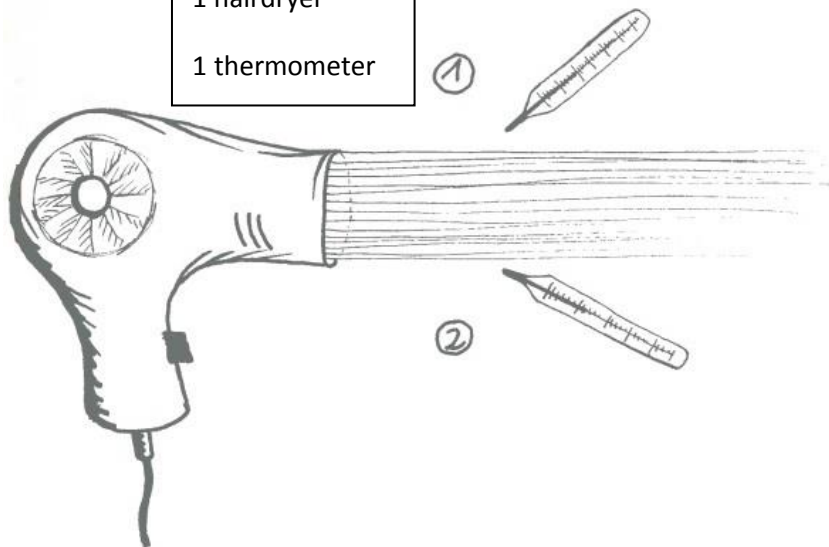
(authorized by OroVerde)

Thermal airflow

You need:

1 hairdryer

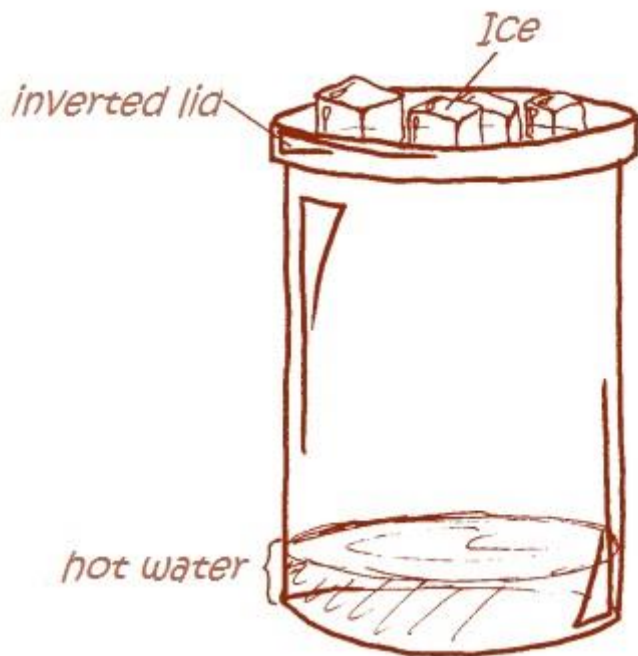
1 thermometer



How it works: Turn on the hairdryer. Make sure that it blows warm air. Hold the hairdryer straight, so that a horizontal airflow can arise. Measure the temperature of the air twice with the thermometer: once above the airflow, once under the airflow.

(authorized by OroVerde)

Condensation



You need:

1 jar (1 liter) with a lid,
hot water and a few ice
cubes

How it works: Fill the jar with hot
water (three fingers high). Place the lid
upside down on the opening of the
glass and cover it with a few ice cubes.
What happens in the jar?

(authorized by OroVerde)

Evaporation

Observations: _____

Explanation: _____

Thermal airflow

Observations: _____

Explanation: _____

Condensation

Observations: _____

Explanation: _____

The tropical diurnal climate

1.
 - a) Read the report by Maria Ramirez carefully.
 - b) Underline all of the text passages that relate to your observations of the experiments on the small water cycle!
 - c) Connect the different phases of the tropical diurnal climate with the times given below.

Maria Ramirez, Biologist, Pará, Brazil

Every morning I am woken up at 6 clock by the rising sun. Shortly before, it was still pitch dark and now the sun is shining bright and warm through my window. While I am having breakfast the dew on the leaves of the plants dries. As the sun gets warmer and warmer the patches of mist hanging between the trees are dispelled and evaporate. This morning we take care of the seedlings in the nursery. Around noon it becomes too hot for such tasks and I prefer to look for a shady spot. It is getting more humid and the air is blowing through the leaves of the trees. After work I sit under a big mango tree on the bank of the river. This is my favourite place, because it is much cooler here than in the surrounding areas.

In the meantime, huge towering clouds have built up over the treetops. I quickly run to my house, because I know that there will soon be a huge thunderstorm. It rains every day at approximately the same time. In the tropics, it rains so heavily that often all the streets and squares are flooded. After the rain, the air is clear and the hot sun comes out again for a short time. At 6 clock in the evening, it gets dark again....

In the tropics, you can observe the progress of the small water cycle every day. There is no seasonal climate, but a _____.

6 am: _____

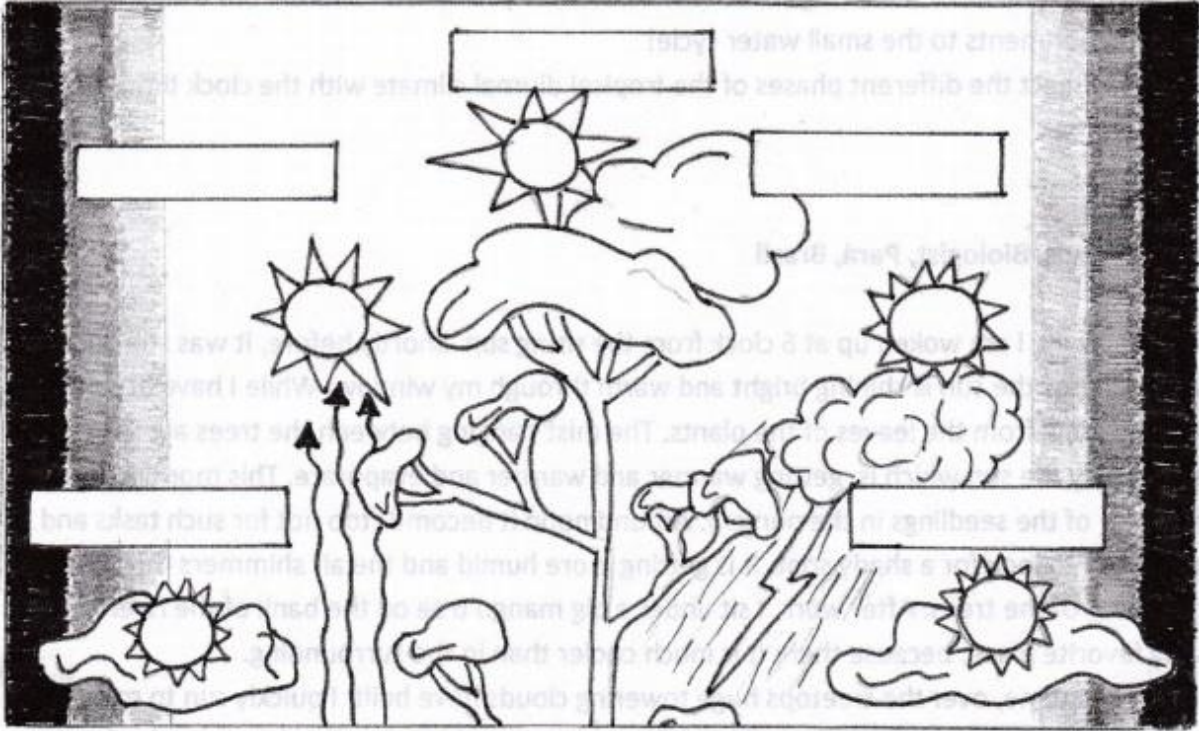
9 am: _____

12 o'clock: _____

3 pm: _____

6 pm: _____

2. Put the right elements of the tropical diurnal climate in the appropriate place in the picture.



cloud formation

sun is rising
mist/dew

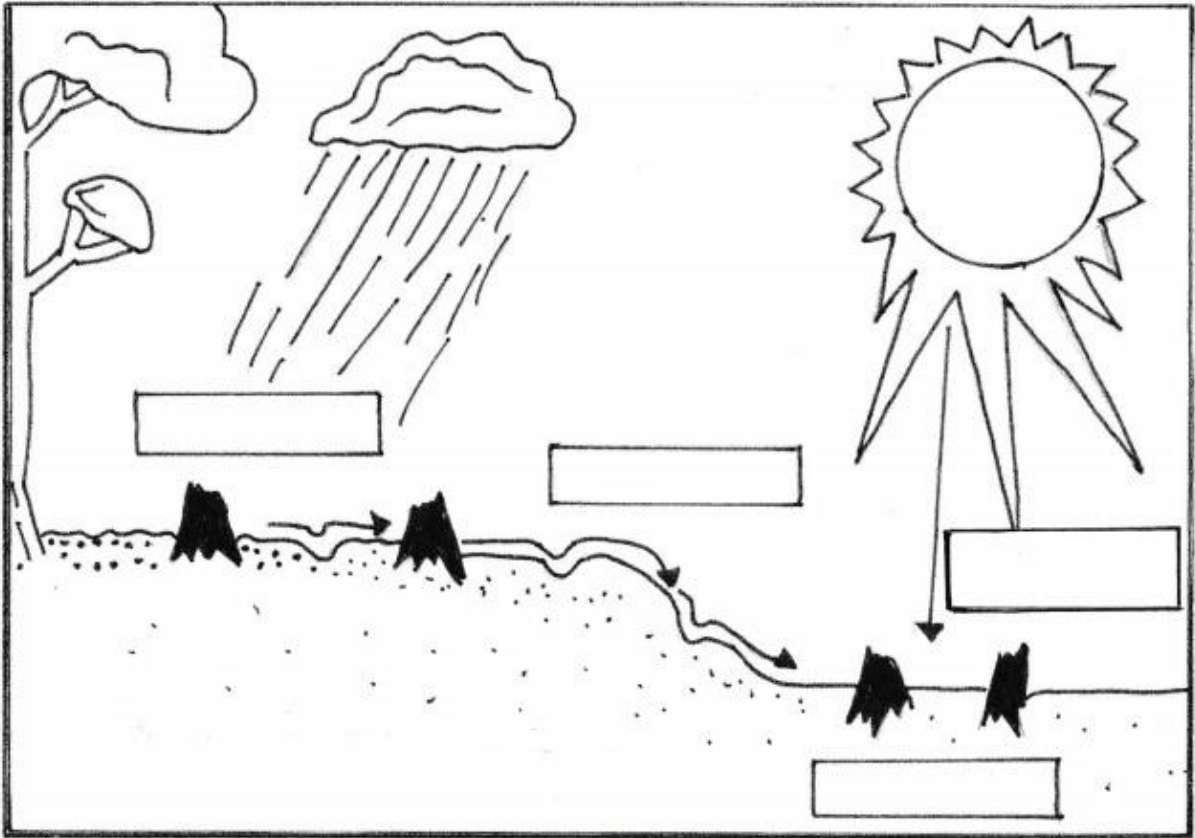
it's getting hot:
evaporation

thunderstorm: Rain is
soaked up by the forest and
goes into the groundwater.

sun is going
down: mist/dew

The solution: Why does the rainforest not dry out?

3. Look at the picture. What is interrupting the small water cycle? What are the consequences?
Fill in the elements in the right places in the picture.



The rain falls directly
on the ground

the soil is washed away

The soil dries out

The sun shines down on
the ground