

# CLOUD IN THE BOTTLE

## KEY OBJECTIVES

1. Participants will be able to see a practical simulation on how clouds are formed in our environment.
2. Participants will be able to tell what causes unwanted cloud formations in our climate.
3. Participants will be able to tell the bad effects of unwanted cloud formation due to pollution.
4. Participants will be able to differentiate between normal cloud formation and cloud formation due to pollution.
5. Participants will be able to tell how pollution is changing our climate and will be able to describe what we can do in this scenario.
6. Participants will be able to demonstrate the cloud formation due to pollution through their activity.
7. Participants will be able to explore more on how the water cycle works and the effects of pollution on their own with the help of the experiments demonstrated in the activity.

## INTRODUCTION

Climate change and pollution are the current reality that we deal with in our everyday life these days. These two can have a very negative impact on our environment and hence it is necessary to spread awareness among everyone about this happening. Due to pollution a lot of pollutants gets mixed in our environment and may enter our water cycle. Due to the addition of certain pollutants in the air, clouds are formed in places and at times that have changed from their pre-industrial pattern. As more pollutants gets mixed in the air, the more clouds are formed. Same happens for water particles. The more water that's released in the air forms more clouds naturally. Due to our uncontrolled use of resources and for releasing more elements in the air from industries and other places unwanted cloud formation has increased and is causing climate change in different parts of the world. This information and the science behind it will be shared in the activity and the students will then get to practically experience how clouds are formed when more water or other elements gets mixed in the environment with the help of a bottle, some water and a few other elements. They will also get a demonstration to see how the water cycle works, how it generates clean water and how pollutants can hamper the process. By the end of the activity they will be able to ask questions and come up with ideas about what their action can be in order to improve the current reality. They will also have a better idea on how important the SDGs are to create a better environment around all of us and will get actively involved in the journey.

## GUIDING QUESTIONS

1. What are clouds made of?
2. Where do they come from and where do they go?
3. How are clouds formed?
4. Where can you identify Air Pollution in our environment?
5. What can be the impact of Air Pollution?
6. Can you think of any linkage between pollution and cloud formation?
7. How can unwanted cloud formation result into climate change?
8. What will happen if the water cycle is changed?
9. How can climate change hamper our lives in the long run?
10. What can we do to prevent climate change?

## CONNECTION TO SDGS



## TOPICS

The activity is directly linked with the curriculum as Climate Change is now a part of most of the curriculums taught in different countries. It is a part of the Science Curriculum in the schools and also in many places a part of the topic of Global Studies. The activity will improve student learning in the field of Climate Change, Cloud formation, Water cycle and related topics which are usually covered in the Science Books. It is also linked with the topic of pollution and its effects. In the activity students will learn about the topics and will be able to see a practical demonstration of one of the effects of pollution and how it plays a part in changing the climate through unwanted cloud formation.

## CROSS LINKS

While the activity is focused on the SDG 13: Climate Action, it has relations with other SDGs indirectly as well. The activity will give the participants a clear idea on how pollution can cause climate change by unwanted cloud formation that can change the weather and climate in different parts of the world and can hamper the water cycle. The hands-on activity will help the participants to know more about climate change and will help them become more aware about the problem. They will also be able to understand how to deal with this situation better and about what they can do to contribute for the betterment of our climate.

As it is about pollution, that causes a lot of harmful effects in our nature and lives it hampers our wellbeing greatly. And hence it is linked with SDG 3: Good Health and wellbeing. The activity shows us how pollutants can toxify our environment and affect our wellbeing. So, taking proper measures for ensuring Good Health and Wellbeing is promoted through this activity. Moreover, this also encourages us not to grow harmful habits like smoking as it creates pollutants and harm our wellbeing.

It is also cross connected with SDG-6: Clean Water and Sanitation. Pollution and climate change can drastically change the cycle of raining. It can cause flood and drought that can lessen the free flow of clean water. Acid rain is also caused because of pollution and that pollutes the water too. These are all interrelated with the cloud formation due to pollution.

SDG-12: Responsible consumption and production aims to ensure sustainable consumption and production patterns. The break in the natural cloud formation due to pollution can hamper that greatly. And hence the activity will also raise awareness for this particular goal alongside other learnings.

Besides, rain and cloud formation ensure the natural flow of how water cycle works. It has a significant impact on the lives that live on land and on ocean. The activity is also related indirectly to SDG 14: Life Below Water and SDG 15: Life on Land in this manner.

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## MATERIALS

- A plastic bottle (2 Liter Bottle of any carbonated beverage will be ideal)
- Water
- Match Sticks
- Aerosols or another mosquito repellent or sprays
- A black background
- For a second activity that will be demonstrated, participants will need.
- A transparent plastic-bag/File
- Water
- Food color
- A household object to create a division

## TASKS/PROCEDURE

1. Firstly, the facilitator will interact with the students, asking guiding questions to get them thinking and discussing ideas amongst their peers and with the facilitator. The facilitator will also explain how clouds are formed and how the water cycle works. The reality of pollution and climate change will also be briefly discussed in an engaging manner.
2. In the second part the students will do the activity on their own while the facilitator will be giving them demonstration or instructions. The safety measures will first be announced. And based on availability participants will either use matches or aerosol sprays for the experiment. If the participants are using a match stick for the experiment, parental guidance will be necessary.
3. Firstly, the water bottle will be filled up with water with an empty space on top. The bottle will then be squeezed in front of a black background and nothing will happen. Nothing unusual will be seen.
4. After that a match stick will be lit up. It will then be put out and dropped inside the bottle. Afterwards, if we squeeze the bottle and then let go quickly, a cloud will appear. As we repeat this the cloud that appears may grow thicker. The black background will make the clouds more visible. Same will happen if instead of the match we can add some spray in the bottle and then do the similar actions. When the bottle is squeezed (the pressure goes up, and so does the temperature of the air in the bottle. The warm air can carry more water vapour. When you release the pressure on the bottle, the air inside cools a little bit - but quickly, and the cool air can hold less of the water as vapour. The clear water vapour will try to condense back to water drops. If the air in the bottle is clean, the water will not have any particles to condense out onto. But once we have smoke particles or pollutants in the air, the water vapour can condense out on these, forming a cloud. Clouds can form more easily in air which contains these fine particles. This activity will help them understand how adding pollutants in the air or water can result into unwanted cloud formation.
5. To understand the water-cycle a bit better, another demonstration will be shown which will show how the water cycle works. For this a plastic file which is transparent will be used. The bag will be divided with an object and on one side water, mixed with blue food color will be placed. On a hot summer day, the water will slowly evaporate and will reappear on the other side of the barrier. This will just be a demonstration and the participants can do it afterwards in their own time. The water that will be restored will not have the blue color in it and will be clean water. This will help the participants understand more why a fresh water cycle without pollution is important for us to get clean water from our environment.

## KEYWORDS

CLOUD FORMATION POLLUTION POLLUTANTS  
CLIMATE CHANGE AIR POLLUTION WATER  
WATER CYCLE CLEAN WATER

## LEVEL

Primary and Secondary

## RESOURCE TYPE

EXPERIMENT AND DEMONSTRATION  
WITH GUIDED ACTIVITIES

## INTENDED AUDIENCE SIZE

20-30 Participants can take part in the activity if conducted in a single room or arranged online.

## MODE OF DELIVERY

The activity will be better executed if taken within small groups of 20-30 Participants. It can easily be done within a physical venue and on online sessions if the participants are aware of the learning materials needed.

## TIME FOR ACTIVITY

50-60 min.

The activity will take place in three parts. Initially the teacher will interact with the children for 15 minutes and talk about introduction and related talk on climate change and clouds. Next will be the Group Activity phase where the teacher will run the experiment and students will also do it along with the teacher. This will be the phase where students will get to do the experiment by themselves and will also be able to interact with the teacher and among themselves. This part will take 20 minutes. And the last part will include a few guided questions and an individual activity where the students will individually work on the guided questions and show their individual tasks by the end of a defined time. This will take 15 more minutes. In total the time for the full activity will be 50 minutes. Along with some time for preparations and question answers the activity can be completed within an hour.

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## FOSTERING DISCUSSION

On the third part of our activity we will be having the fostering discussions. The students will get the science behind the activity, ask questions and get relevant answers. As a part of making them understand better an individual activity will then take place. As per the discussions and activities shown so far students will get an idea on how climate change and pollution is harming the environment. Some of the causes will be discussed. But they will have to come up with other causes that they identify in their own surrounding that can result into this type of cloud formation or pollution in general. The activity will be to identify some sources around them and quickly draw a picture that demonstrates what they can do to prevent the situation. This will allow them to think more about the problem and come up with solutions that they can perform for a better future. By the end of the activity, pictures and ideas will be shared and discussed in the whole group so that everyone can know what they can do next. If there are any misconceptions in the idea, the facilitator will clear that up as well.

## SAFETY INSTRUCTIONS

If a student uses match sticks, a guardian should be there to help him or her. While using aerosol or any other sprays it must not be used on a person and should only be used on the water for the experiment. The water used in the environment must not be drank.

## POSSIBLE EXTENSIONS

The demonstration mentioned in the activity can be a possible extension for the total activity where everyone will do the experiment themselves and see what happens in the water cycle. As a part of the activity interested participant can form a club among themselves to raise awareness about climate change. As a part, they can demonstrate the activity the learnt in larger groups and among their friends while mentioning what to do to take actions for preventing climate change. The same group can ensure mindful consumption of food and energy within their surrounding and keep a track record by themselves.

## AUTHOR

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