

Water Classroom 1-4 (version 2)

Virtual Water

Teaching plan for learning on water for middle school students

Under a project initiated by the Living Waters Museum, Centre for Water Research, IISER Pune and
Research and supported by Transforming Education for Sustainable Futures, IIHS, Bangalore

1-4-1 Proposed plan

Lesson Plan number	WC-1-4
Topic	Virtual Water
Discipline	Social studies, Environment studies
Time	~60 minutes (Can be divided into multiple sessions)
Prior learning	WC-1-3-Direct water footprint
Learning objectives	<ul style="list-style-type: none">• Students can <i>define</i> virtual water• Students can <i>contrast</i> the green, blue and grey water footprint of different consumables and food groups• Students can <i>prescribe</i> and <i>justify</i> some changes in our daily diets and lifestyle for lowering the virtual water footprint.
Learning Outcomes	<ol style="list-style-type: none">1. Student can <i>give at least two examples</i> of how they use virtual water in their daily life.2. Student <i>points out</i> differences between the green water and blue water footprint (virtual water) of different food groups
Resources/Materials	Worksheets, projector or alternate way of showing visuals, cards for virtual water activity

Use of teaching time	<p>2-3 mins</p> <p>Facilitator/educator introduce the learning outcomes.</p> <p>They will explain to the students that we are doing this lesson not to make you feel guilty about your virtual water footprint but rather to feel a sense of hope for the future by becoming aware and informed. We also want you to get some ideas about what each one of us can do to make a positive difference in the world.</p> <p>5-7 mins</p> <p>Facilitator shares an infographic comparing rural and urban areas, reiterating that the urban daily domestic consumption is 135 lpcd.</p> <p>They discuss that a rural water supply standard is 55 lpcd. What important need does this not include for a rural household? (This allowance does not take into account water needs for livestock - cattle bathing and drinking needs. This can result in lack of hygiene and spread of disease.)</p> <p><i>Refer to – Background content for facilitator/educator- section 1-4-2a.</i></p> <p>Agriculture is out of the household's needs so it may have a different quota. But if a rural household has a kitchen garden then it will be part of the household needs.</p> <p><i>Refer to – Background content for facilitator/educator- section 1-4-2a.</i></p> <p>Facilitator/ Educator may pose the question – does the water used in agriculture contribute to our water footprint? And continue this into</p>
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	<p>a discussion on virtual water</p> <p>2-3 mins</p> <p>Facilitator/educator shows an infographic briefly explaining the concept of virtual water and the different processes that require water to produce different consumables and food products – eg. a cup of coffee (or some other example of choice).</p> <p><i>Refer to – Background content for facilitator/educator- section 1-4-2b.</i></p> <p>10-15 mins</p> <p>Conduct activity WC-1-4-Activity-I</p> <p>Students work in groups of 4-5 to try to match cards showing quantities of virtual water with cards showing products.</p> <p>Each group of students shares one answer from their matching exercise.</p> <p>Facilitator/educator shares an infographic that shows correct pairs of virtual water for foods and products used in the game, followed by discussion as appropriate.</p> <p><i>Refer to – WC-1-4-Activity-I</i></p> <p>5-10 mins</p> <p>Facilitator may display the bar graph showing virtual water (<i>refer to – Background content for facilitator/educator- section 1-4-2b</i>) required by different food products and pose the following questions for discussion:</p>
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1. What does this bar graph show us?

2. In this bar graph, the numbers represent what unit?
_____ of _____ to produce _____ of food

3. Which food has the highest water footprint?

4. Which food has the lowest water footprint?

5. Which kind of meat has the lowest water footprint?

Facilitator/educator may pose the question - why does production of a mobile phone require more than 10,000 litres of water?

5-7 mins

Facilitator/educator discusses the different types of virtual water - green, blue, grey.

Refer to – Background content for facilitator/educator- section 1-4-2c.

5-8 mins

Conduct activity - WC-1-4- Activity- II

Each group discusses and shares at least 1 point for each question:

1. what lifestyle changes can they make to reduce their virtual water footprint?
2. what dietary changes can they make to reduce their virtual water footprint?

	<p>5 mins</p> <p>Facilitator wraps up by explaining that we must not feel guilty about our direct water footprint but rather feel a sense of hope for the future. We are now aware, and in a position to take informed decisions about what changes each one of us can easily make to our consumption patterns (consumer products, diet, etc.) to lower our virtual water footprint, and become part of a global movement to make our world a better place to live.</p> <p>Facilitator can point out some differences between the water footprint of packaged food and traditional cuisine.</p>
Differentiation	Level of scaffolding for calculations of water footprints, and interpreting bar graphs using a step- by step questioning method.
Additional activities	This teaching plan is designed assuming that students do not know how to interpret bar graphs. However, if students understand how to read bar graphs already, bar graph and related questions can be given as an individual activity.
Anticipated challenges and solutions	<p>Understanding of green, blue and gray water may remain obscure. Students of this age group have not had adequate exposure to interpretation of bar graphs and may find this confusing.</p> <p>Students should be told that this exercise should help inform their choices. Change in habits take time and they need to be patient and sympathetic towards themselves as well as others.</p>
Keywords	<p>virtual water footprint</p> <p>green water</p>

	blue water grey water
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1-4-2 Background content for facilitator/educator

1-4-2a What is the LPCD and water footprint for India and in rural and urban contexts?

Actual water in day-to-day life

The following norms are adopted by the Government for the rural and urban water supply schemes

55lpcd Rural ¹¹	70lpcd Towns without sewerage ¹²	135lpcd Cities with sewers/proposed ¹²	150lpcd Mega cities with sewers/proposed ¹²
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A rural fact



In rural areas, the government standard to supply 55 litres per capita per day does not take into account that a large number of rural households own livestock and need water for their drinking and washing needs. Moreover, in the absence of household level piped water supply and metering, it is difficult to monitor the quantity of water received by each household. This in turn, makes it challenging to estimate the per capita needs of rural households.

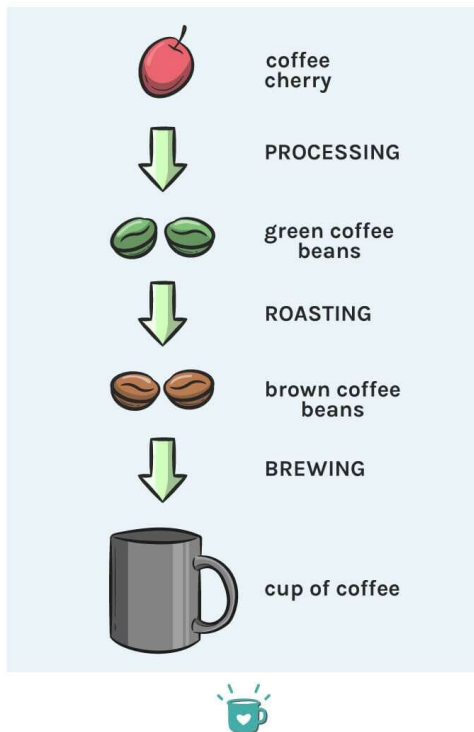
As droughts become frequent, they not only create severe problems for a rural population dependent on surface water for daily and agriculture use, but availability of water for livestock is severely affected as well. In 2016, around 3,000 animals¹³ died in Mahoba district of Uttar Pradesh, the largest producer of wheat in India and the second-largest producer of rice after West Bengal¹⁴, when it faced a drought.

Source: <https://www.wateraid.org/in/sites/g/files/jkxooof336/files/india-water-fact-sheet-2019.pdf>

1-4-2b What is virtual water?

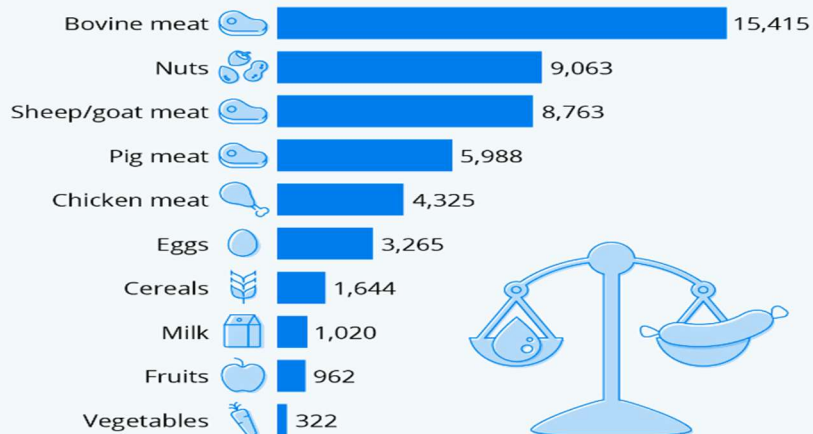
“Virtual water refers to the water included in the production of everything we eat, buy and wear. The amount of water that it takes to create a product is its water footprint. For example, take your morning cup of coffee, of about 125 ml of actual water. The water used to produce the ground coffee, from irrigating coffee plants, and processing [cleaning before and after roasting, and packaging] the beans, is way more than that. It is more than 1,000 times that amount, at 132 litres or nearly seven 20-litre buckets full.”

HOW COFFEE IS MADE



How Thirsty is Our Food?

Liters of water required to produce one kilogram of the following food products*



* Global averages

Source: Water Footprint Network



statista

1-4-2c Different forms of Virtual Water



We divide virtual water into 3 kinds to help us understand how large the indirect water footprint of a product is, and to compare it with other products. The water footprint of any item is made up of three different types of water.

‘Green water’ in this context is soil moisture. ‘

‘Blue water’ is used in irrigation, drawn from lakes, rivers and from groundwater sources below our feet.

‘Grey water’ is the amount of polluted water associated with the production of all goods and services, including the freshwater required to dilute the pollutants.

(Source: Water Aid India, India water fact sheet)

This link gives amounts of total, green, blue and gray water required for production of a few consumables and food products we use.












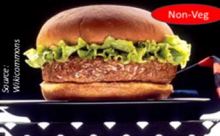

Source: <https://waterfootprint.org/en/resources/interactive-tools/product-gallery/>

Water Classroom WC-1-4-ACTIVITY- I

How much water goes in making this product?

Match the Cards –

- 7 products and 7 estimates of virtual water are printed on cards and mixed up and given to each group of 4-5 students.
- Students have to match the products to the expected water required to produce them

 <small>Source: Pixabay - OpenClipart-Vectors</small>	<p>12,760 litres water per unit = 1 to 1.5 water tanker</p>  <small>Source: Pixabay - OpenClipart-Vectors</small>	 <small>Source: Wikimedia</small>	<p>8000 litres water per unit = 40 bathtubs</p>  <small>Source: Wikimedia</small>
 <small>Source: Wikimedia (https://commons.wikimedia.org/wiki/File:Caramel_Color_in_a_Glass.jpg)</small>	<p>175 litres water per cup or glass = 12 buckets</p>  <small>Source: Wikimedia</small>	 <small>Source: Wikimedia</small>	<p>30 litres water per cup or glass = 2 buckets</p>  <small>Source: Wikimedia</small>
 <small>Source: Wikimedia</small>	<p>135 litres water per piece = 9 buckets</p>  <small>Source: Wikimedia</small>	 <small>Source: Wikimedia</small>	<p>150 litres water per unit = 10 buckets</p>  <small>Source: Wikimedia</small>
 <small>Source: Wikimedia</small>	<p>2400 litres water per unit = 12 bathtubs</p>  <small>Source: Wikimedia</small>		

This image is for teacher's reference.

Water Classroom -1-4- ACTIVITY- II

Student Name:

Class:

Date:

Discuss and share at least 1 point for:

1. What lifestyle changes can you make to reduce your virtual water footprint?

2. What dietary changes can you make to reduce your virtual water footprint?