

# Policy Brief – Water Classrooms

## Introduction

Education in the Anthropocene is faced with a unique challenge: to equip future citizens and leaders with the tools and perspective to become stewards of the environment. The generation that is currently in school needs to be able to conceptualize, understand and contribute to solutions that will build a just and sustainable future.

Achieving sustainability requires **multi-disciplinary and broad-based thinking**, skills which are also emphasized in the [National Education Policy \(NEP\) 2020](#). It also requires **transforming learning environments** and **building capacities of educators** as emphasized in the UNESCO's [priority action areas](#) in the field of education for sustainable development (ESD).

This policy brief summarizes the findings from the “**Water Classrooms**” project. This project was undertaken in collaboration with the Living Waters Museum at the Centre for Water Research, Indian Institute for Science Education and Research (IISER) Pune and the Centre for Environment Education (Pune). This project was funded by Transforming Education for Sustainable Futures (TESF) India hosted at the Indian Institute of Human Settlements (IIHS), Bangalore. This brief discusses recommendations to make progress towards UNESCO's priority action areas mentioned above as well as SDGs 4 (**Quality Education**) and 6 (**Water and Sanitation**).

## Context

The foundational role of water underlying our lives, nature and the environment, makes it an ideal focus around which to develop a learning progression that helps acquire and develop the skills needed to build a sustainable future [1]. Furthermore, water-related issues provide highly visible and relatable everyday examples to discuss the limitations of current paradigms of development and to challenge students to find creative solutions.

The **Water Classrooms** project developed educational material – a set of teaching plans and exercises – which allow middle school educators to understand student misconceptions and gaps in learning about natural and human water systems. This material also helps the educators remedy such misconceptions and provide students with the conceptual tools to understand the multi-disciplinary issues that arise when developing sustainable practices and solutions.

Sustainability is a global challenge that requires local solutions. Therefore, **Water Classrooms** were developed keeping in mind that children learn better when they are able to use the ideas they learn to interpret the world around them. Not only does such place-based education allow for more robust learning outcomes, but it also enables students to become agents of change in their localities – a critical aspect of ESD and NEP 2020.

## Findings and Recommendations

In a one year project starting November 2022, we collaborated with water experts, academics and grassroot organisations as well as school educators and undergraduate students to create more than 20 hours of teaching plans which explore water from a multi-dimensional lens. The topics covered our personal relationship to water, shared waters and social equity, water systems and the challenges to sustainability at a planetary scale such as pollution and climate change. These teaching plans were pilot tested in a classroom setting at IISER Pune on weekends over two months in the summer. These sessions were attended by 29 middle school students (ages 12-14 years) and educators from six schools in and around Pune. Based on our observations, analyses and educator feedback from these sessions, we present the following recommendations:

1. **We recommend development of regionally relevant educational material which helps students understand the widespread implications of water (mis)use in urban areas.**

During our sessions, we observed that students have a poor understanding of the pathways by which water is made available in their homes. This lack of understanding can lead to poor decision making about the management and equitable distribution of water.

Students were asked to trace the journey of water from rainwater to their homes. Majority of the students included objects visible to them in their immediate surroundings such as pipes and taps in their answers. Even though students showed familiarity with various natural water resources like rivers, aquifers and springs from their textbooks, these often did not feature in their drawings tracing the journey of water. In a 60-minute session we used movies and images to discuss the journey of water from the catchment areas in the Sahyadri hills to the rivers and underground aquifers in Pune city. After this session, students were asked to repeat the activity. We found that in the second version, students included more natural elements like hills and groundwater while tracing the pathways for water to their homes (figure 1). As pointed out by one of the educators observing the session, the number of elements or steps involved in these pathways also increased.

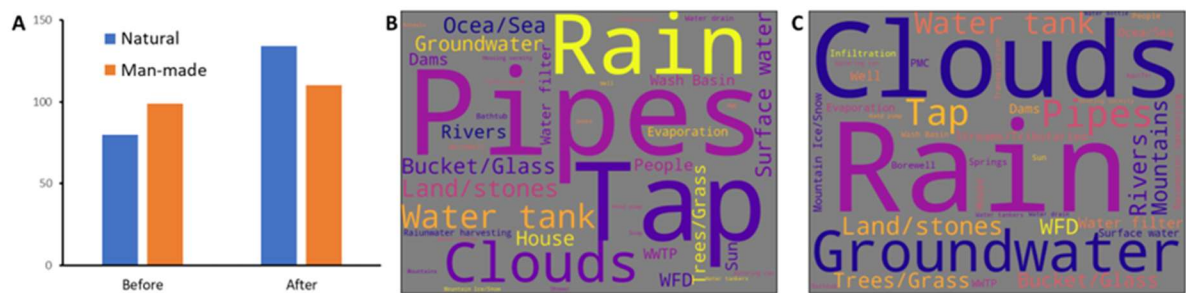


Figure 1. Quantitative (A) and qualitative comparison of vocabulary or concepts related to the natural world or man-made items before (B) and after (C) the session.

## 2. We recommend highlighting and discussing the different values associated with water.

Students rarely appreciate the values implicit in water management decisions. Highlighting the different competing values – economic, social, environmental, cultural and spiritual – that can play a role in such decisions leads to a deeper understanding of water-related conflicts.

When asked to prioritize values concerning water, a diversity of priorities were observed among the twenty five students attending the session (figure 2). A follow-up discussion about the reasons for the chosen priorities resulted in spontaneous debates within the

class where students reflected on their own value systems and what they implied for sustainable development.

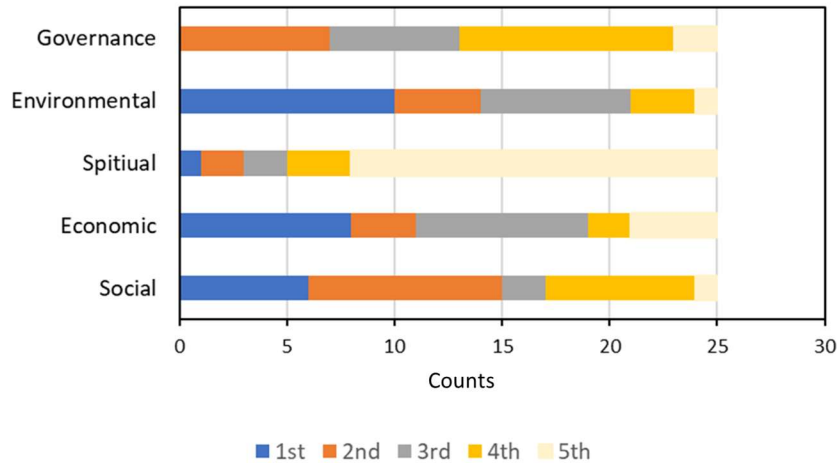


Figure 2. Stacked bar chart showing the cumulative frequency at each priority level (1-5) for different water values.

3. **We recommend including collaboration and negotiation skills as essential outcomes of the teaching-learning process. This will ensure students are equipped to deal with complex issues such as natural resource management in a positive and constructive manner.**

Decision-making in the presence of multiple and sometimes conflicting values requires skills of collaboration and negotiation. These skills are traditionally thought to develop during extra-curricular activities – NEP 2020 discusses imparting such life skills in the context of sports during Early Childhood and Care Education. These skills are rarely considered as a part of the core educational curriculum.

During Water Classrooms, we frequently used group discussions as part of the learning process. Activities based on the concept of the ‘tragedy of the commons’ or the ‘privilege game’, which are usually conducted at the graduate or postgraduate level, were conducted for middle school students during the pilot study. We found that students were able to understand and navigate the challenges that come with collaborative working and stakeholder negotiations (figure 3). These activities provided a safe space

for students to understand and discuss multiple and conflicting issues in the society related to management of natural resources.

Post-activity discussions were extremely crucial to go from problematization to problem-solving. However, these discussions had to be student-centred. These discussions may inculcate tolerance and respect in students towards lived experiences different from their own. It seemed important to leave middle school students with a sense of hope for the future through possible solutions or through discussing the efforts of people or organisations working towards such solutions.



*Figure 3. Students negotiating their stakes in a resource management exercise based on the 'tragedy of the commons'.*

4. **We recommend a three step process to design and implement a curriculum:**
  - a. Conceptual resources and application interpretations are provided by the experts.
  - b. Learning outcomes are clearly defined by experts and educators.
  - c. Educators are empowered (by providing reference material and access to experts) to develop pedagogical tools which can successfully achieve these outcomes in the classroom.

Developing a place-based pedagogy is not feasible in a hub-and-spoke model where educational material is developed centrally by experts and disseminated to teachers in

different parts of the country. On the other hand, it is desirable that all children learn tools and techniques which are applicable in a broad range of settings. Therefore, it is equally important that similar learning outcomes are achieved everywhere.

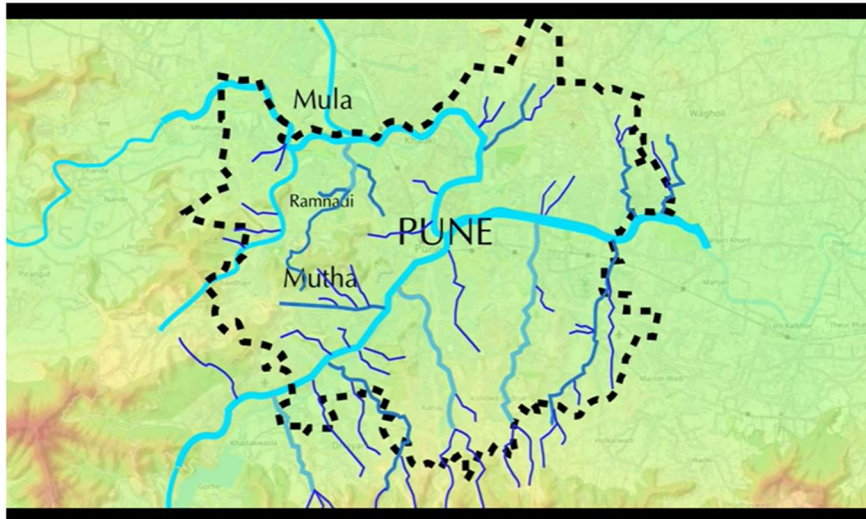
In the process of developing teaching plans for the Water Classrooms, we worked collaboratively with experts and educators. Experts provided various conceptual frameworks such as systems thinking and underlined the importance of understanding social power dynamics and gender-relations in the context of ESD. They also provided relevant reading material and resources to help illustrate how these frameworks could be used in practice. We then worked along with the educators to develop specific learning outcomes based on these frameworks that cover different levels of Bloom's taxonomy [2]. We provided educators with templates that included exercises and recommendations for the use of classroom time. The material that we developed can be easily adapted to ensure that it is place-based and student-centred.

**5. We recommend that museums create platforms to bring together diverse stakeholders to develop new place-based content that is both accurate and visually appealing for consumption by educators and students.**

Museums can provide educators with carefully curated and highly engaging material which could be used in the classroom. However, the role of museums in education is currently very limited both due to lack of accessibility of museums and lack of awareness among educators. One does not find a mention of museums as teaching-learning agencies in NEP 2020, yet many museums around the world have learning resources and activity centres for young visitors.

The Pune chapter of the Living Waters Museum (LWM) brought together academics, artists, scientists, architects and grassroots organisations to showcase the collective knowledge that existed about the waters of Pune. The academic and field research conducted by these different stakeholders and museum researchers were presented as visual stories in an online exhibition - ***Punyache Paani-Stories of Pune's Waters***. The exhibition can be accessed at - <https://punyachepaani.livingwatersmuseum.org/>. The launch of this exhibition in March 2022 was covered by several national and regional newspapers and the supporting events were attended by students, academics

and concerned citizens. Development of this exhibition put the team at LWM in a favourable and unique position of being able to use the content and access experts to develop visually engaging, interactive and place-based pedagogical tools.



Understanding the topography of Pune. (Animation by Rahul Iyer, Science Media Centre, IISER Pune)

*Figure 4. An animation developed during the exhibition *Punyache Paani* made it simpler for an educator to demonstrate how water from the rains makes its way into the rivers and aquifers before it reaches their homes.*

*<https://punyachepaani.livingwatersmuseum.org/story/pune-paradox/>*

LWM has created similar content for Mumbai and in the process of doing the same for water systems in Kolkata and Jodhpur. The exhibition on Mumbai's waters can be accessed at - <https://confluence.livingwatersmuseum.org/>.

Environmental degradation and climate change are a lived reality for the generation of children who are now in schools, and not just a futuristic possibility. Addressing such issues and finding a sustainable way forward is therefore an imperative for this generation. The need for collective action is clear, but such action has to both account for and respect the diversity that exists in India's social and ecological systems. Sustainability demands that we move past technocratic approaches and towards collaborative and democratic approaches that recognise and acknowledge different value systems.

The recommendations presented in this policy brief showcase the learnings from one such initiative – **Water Classrooms** – which tried to equip students to understand global problems and propose solutions that are sensitive to local conditions. Our recommendations are designed

to be applicable within the current schooling system to allow for wide dissemination. Furthermore, we urge that more such educational experiments be conducted across the country to test and refine these recommendations. It is only through such experiments will we be able to ensure that future generations will inherit an India that is healthier, safer and more equitable.

References:

1. Brody Michael (1995). Development of a Curriculum Framework for Water Education for Educators, Scientists, and Resource Managers. *The Journal of Environmental Education*, 26:4, 18-29, DOI: 10.1080/00958964.1995.9941448
2. [https://poorvucenter.yale.edu/sites/default/files/basic-page-supplementary-materials-files/bloom\\_and\\_learning\\_objectives\\_handout\\_.pdf](https://poorvucenter.yale.edu/sites/default/files/basic-page-supplementary-materials-files/bloom_and_learning_objectives_handout_.pdf)

Written by:

- Dr. Chhavi Mathur, Researcher/Consultant - Living Waters Museum and Transforming Education for Sustainable Futures (India)
- Dr. Joy Merwin Monteiro, Assistant Professor, Dept. of Earth and Climate Science, IISER Pune
- Aakriti Parashar, Undergraduate Student, IISER Pune
- Dr. Sara Ahmed, Founder-Director, Living Waters Museum, Centre for Water Research, IISER Pune