Harbour

Sustainable Harbor Design

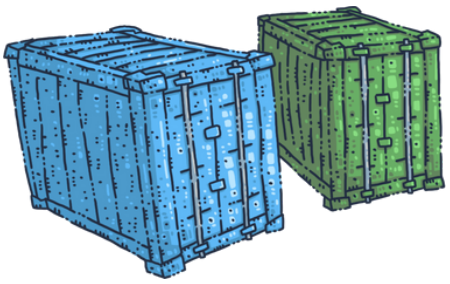
Keywords:

sustainability, harbor, marine ecosystem, pollution, renewable energy, transportation, infrastructure

Target group:

primary school pupils (ages 6-11)

Objectives:



This activity introduces pupils to the concept of sustainable harbour management by exploring the connection between human infrastructure and marine ecosystems. Pupils will learn how harbours support transportation and trade, while also identifying the environmental challenges they can pose.
Through group work and model design, they will explore solutions such as pollution prevention, habitat protection, and the use of renewable energy.

General Guideline on Time Allocation:

The duration needed to carry out this activity may vary depending on the specific group of children. Teachers are encouraged to adapt the implementation according to the needs, interests, and dynamics of the group.

In the preparatory phase, teachers may use a variety of activities to introduce and contextualize the chosen topic. These can include discussions, videos, drawings, storytelling, or even a field trip, depending on the age and background knowledge of the children.

The main construction phase, during which children plan and build their urban element using LEGO bricks, should typically not exceed 45 to 60 minutes. However, this phase often stimulates further curiosity and questions among the children, potentially leading to extended engagement or follow-up activities. For more detailed instructions and pedagogical support on how to implement activities of INNO–kids project, please download the Teacher's Methodological Guide.

Materials and Resources Needed:

- Large cardboard box or foam board (as the base for the harbour model)
- Blue and white construction paper (to represent water and land)
- Small toy boats or cardboard cut-outs (to populate the harbour)
- Markers, crayons, glue, scissors, and tape, recycled materials such as plastic bottles, egg cartons, and bottle caps (for building docks, piers, and harbour infrastructure)
- LEGO bricks or other building blocks
- Small toys or figures (to represent passengers, workers, animals, or cargo)
- Pictures of harbours, and marine animals

Note: Encourage pupils to repurpose materials creatively and adapt their designs based on available resources. If LEGO bricks are not available, pupils can fully realise their concepts using drawings, crafts, and simple construction materials.

Introduction:

Begin the activity by asking pupils what they know about harbours. What do harbours look like? What happens there? Guide the discussion toward the idea that harbours are important hubs for transportation, trade, and connection between communities. Show pictures of real harbours and describe their various functions. Then introduce the concept of sustainability — how harbours can be designed to support economic and community needs while protecting marine ecosystems.

Procedure:

Preparation:

Divide pupils into small groups of three to four. Begin with a class discussion about marine ecosystems and the role of harbours in transportation and trade. Ask guiding questions: What might harm marine animals near a harbour? How can we protect them while still using the harbour? Present examples of sustainable solutions, such as oil spill barriers, quiet zones for wildlife, solar-powered lighting, and waste separation stations.

Construction:

Distribute base materials and let each group plan the layout of their harbour on paper or directly on their model. Encourage them to include:

- Docking areas for passenger and cargo boats
- Eco-friendly infrastructure like solar panels, wind turbines, or clean fuel stations
- Habitat-friendly zones, such as floating gardens, coral-friendly structures, or noise barriers
- Community features like walking paths, green roofs, or observation areas
- Pollution prevention systems, including recycling points or clean water outlets

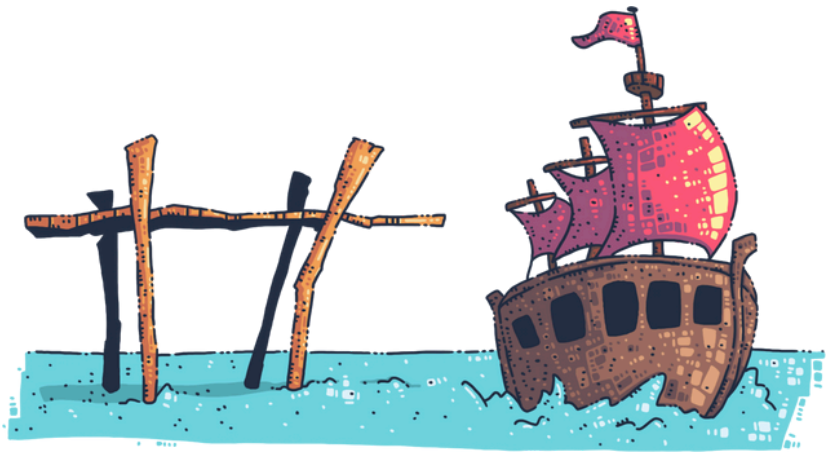
Details:
As the harbour models take shape, support pupils in thinking through details. Ask: How is your harbour different from a traditional one? How do you prevent harm to marine animals? How can people learn about nature while visiting the harbour? Invite them to label parts of their model and create signs or symbols for sustainable features. Encourage them to reflect on how their harbour can adapt to environmental challenges — like storms, oil spills, or rising sea levels — while staying useful to the community.

Stories:
Invite pupils to imagine life in and around their sustainable harbour. Encourage them to write or tell a short story featuring characters such as a harbour worker, a sea animal, a ship captain, or a child visiting with their family. Pupils might include how marine life is protected, how clean energy powers the port, or how people work together to keep the harbour safe and clean.

Presentation:
Invite each group to present their sustainable harbour model. Pupils should describe the key features of their harbour, explaining how it supports trade and transportation while protecting marine life and using sustainable technologies. After each presentation, allow time for classmates to ask questions or give positive feedback.

Tips:

- Encourage pupils to explore real-life harbours through images, videos, or local examples to make their designs more realistic and relatable.
- Emphasize teamwork and shared decision-making.
- Use open-ended questions to help pupils think critically about environmental issues and possible solutions.



Additional Considerations:

Differentiation:
Provide additional support or simplified instructions for pupils who may require extra assistance. For advanced pupils, offer extension tasks such as researching further sustainable practices or designing more complex models.
Assessment:
Assess pupils based on their participation and engagement during discussions and hands-on activities. Evaluate the creativity, effort, collaboration, depth of understanding demonstrated in their models, critical thinking, ability to provide constructive feedback and presentation skills.
Extended learning:
Invite pupils to research local harbours or ports and find out how they manage waste, protect marine life, or use renewable energy. Organise a class project to create posters or awareness campaigns about marine pollution and harbour sustainability. Arrange a virtual or in-person meeting with a marine biologist or port planner. If feasible, plan a visit to a nearby harbour, aquarium, or environmental centre to see how the concepts apply in the real world.

Curriculum Connections:

This activity integrates:
Science *(marine ecosystems, pollution, environmental impact)*
Social Studies *(geography, transportation, trade, community planning)*
Language *(oral communication, storytelling, and listening skills)*
Art *(design, drawing creativity, spatial reasoning skills)*

SDG Connections:

- **SDG 12:** Responsible Consumption and Production – Pupils learn how resource use and waste management affect harbour sustainability.
- **SDG 13:** Climate Action – The activity encourages pupils to think about climate impacts and design resilient harbour infrastructure.
- **SDG 14:** Life Below Water – Pupils explore how harbours can protect marine ecosystems and reduce negative impacts on biodiversity.

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