

Project Day 3

# School Playground (Re)Design

## Model-building of a climate-resilient school site

Hands-on lesson

Lower secondary level, all school types

Lower secondary

Biology, Geography, Physics, Technology

Project day, 4-5 teaching hours

Classroom

This pupil project day, designed for the middle school, explores the topic of the thermal benefits of green facades and demonstrates how findings from subject-specific and pedagogical research can be successfully transferred into the school setting to teach Education for Sustainable Development (ESD) as a cross-curricular theme.

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# (Re)Designing the School Playground

## Teacher's Guide

## Content

As potential cooling oases, urban school grounds can also contribute to active climate protection whilst providing a nature-based learning environment for pupils. The third day of the project marks the transition from the theoretical and planning phase to the final design implementation and public presentation of the results. Having developed a basic understanding of climate-resilient cities and multi-perspective planning concepts over the preceding days, the focus now shifts to the construction of physical models of a climate-resilient school grounds.

Model-making is based on the **Dillinger Model method**, a participatory and action-oriented approach to the planning and design of school grounds that are close to nature. Through hands-on work on the model, spatial concepts, needs and design ideas are given concrete form and made visible. The starting point for the model design is the question of what experiences and uses the space should facilitate, and what spatial design elements are required to achieve this. In addition, the pupils consider which design elements can help adapt the school grounds to the consequences of climate change. In doing so, they draw on the knowledge acquired during previous project days regarding heat, heavy rainfall and biodiversity loss, as well as possible solutions. These include, in particular, elements of the 'sponge city' concept and rainwater management, such as green roofs and green façades, as well as design elements that promote biodiversity.

## Materials

- Work produced by each small group during Project Day 2
- 'Current situation' poster
- Floor plan + mapping slides (areas at risk from heavy rainfall and green roof potential)
- Expert role tables
- 'Planning_ReDesign of School Grounds' poster
- Materials for model-making (detailed list of materials with tips to be developed during the lesson)

## Prerequisites

This teaching and learning unit is the second part of the '(Re)Design School Playground' module and builds on the first planning part of the module (Project Day 2).

## Notes

The learning module is designed as a project day and is scheduled to last approximately 4-5 hours. To boost the pupils' sense of self-efficacy, their results can be showcased beyond their own class and the project day itself, serving as inspiration for the whole school.

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## Learning objectives

The aim of the third day of the project is to put the climate-resilient design concepts developed previously into practice. The focus is on creative model-making, through which the pupils translate their visions of a liveable, climate-resilient and biodiversity-promoting school grounds into a three-dimensional, functional model. Based on the Dillinger model, model-making serves as a participatory and hands-on planning method through which the pupils give concrete form to their spatial concepts and design ideas and bring them together in a joint design. In doing so, they apply the knowledge they have previously acquired about the impacts of climate change and climate-adapted solutions to the design of the school grounds. They explore how different qualities of use and experience can be spatially and functionally linked with measures for climate change adaptation, rainwater management and the promotion of biodiversity. In doing so, the pupils give concrete form to their planning outcomes and, finally, reflect on the effectiveness and feasibility of their designs in light of the challenges posed by urban climate change.

## Areas of competence

**Application of specialist knowledge**

***The pupils can...***

- **draw on** their **knowledge** of various greening options and soil-sealing mitigation measures from the previous units **and apply it** creatively in model-making.
- **explain, using technical terminology**, the specific ecological functions of the elements depicted in the model (e.g. water storage through the removal of impervious surfaces, shade provided by trees).
- Select relevant content from the planning tables (Day 2) and translate it into a structural form.

**Communication**

***The pupils can...***

- **discuss** planning ideas, design elements, solution strategies, as well as desired experiences and potential uses within their small group; **negotiate** differing ideas; and **reach agreement** on the joint design and organisational implementation in the physical model.
- **present** the architectural implementation of their plans to the whole class and to other school classes in a way that is appropriate for the audience, **explain** the chosen design elements and approaches, and **provide** technical **justifications for** their design decisions.
- **summarise** the key points from other groups' presentations and **identify** similarities and differences.
- During a feedback session, offer **constructive criticism** of their classmates' models and **respond appropriately** to questions about their own project.

**Knowledge acquisition**

***Pupils will be able to...***

- use previously created maps and planning posters as a binding working basis to **carry out** model-making **in a targeted manner**.
- **use** various materials (e.g. natural materials such as moss and branches, as well as craft materials such as modelling clay) **appropriately** to represent real structures to scale.
- check whether your visual concept meets all the relevant criteria for sustainable urban ecology and climate adaptation.

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## Areas of expertise

**Assessment**

***Pupils can...***

- **critically assess** the problem-solving capabilities of their models with regard to coping with extreme weather events (heat/heavy rain) and promoting biodiversity.
- **consider** which of the planned transformation measures could realistically be implemented at their own school site.
- **argue** to what extent a sustainable redesign of schools can serve as a model for future urban planning.

## Factual analysis

**Model-building as a method of visualising knowledge and gai**

In order to visualise complex designs and derive valuable insights for their final realisation, model-making is regularly employed as a method in science, art and architecture (Lutz-Sterzenbach, 2022). In a school context, this action-oriented method enables pupils to translate their abstract climate-resilient planning concepts into a three-dimensional, tangible form. Through this hands-on engagement, subject knowledge becomes more deeply ingrained, as spatial thinking is linked to real-world ecological functions (Probst, 2021).

**Technical parameters of climate-resilient redesign and biodiversity promotion in the model**

Model-making illustrates the scientific principles of the 'Sponge City' concept and the promotion of biodiversity. Model components such as retention basins, green roofs and green façades, or permeable surfacing are used to visually demonstrate the storage capacity for rainwater (DStGB & Difu, 2015). Another focus is on microclimatology, where the reduction of heat islands is demonstrated through the placement of shade-providing elements and areas of vegetation (Endlicher, 2012). To promote biodiversity, the creation of habitats (e.g. deadwood, water bodies) and the interconnection of green infrastructure are key (Wittig, 2012), which are represented in the models by specific natural materials.

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## References


German Association of Towns and Municipalities (DStGB) and German Institute for Urban Studies (Difu). (2015). Heavy Rainfall and Heatwaves: Climate Change in Urban Areas Poses Challenges for Municipal Water Management. Topics, Projects and Solutions from the BMBF-funded INIS programme. (Brochure No. 133; DStGB Documentation, p. 19). Federal Ministry of Education and Research.

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Lutz-Sterzenbach, B. (2022). Model Making. In Art 5 to 10 (Vol. 67). Friedrich Verlag.

Probst, W. (2021). A City Goes Green. In: Biology Lessons. Friedrich Verlag.

Wittig, R. (2012). Geobotany. Haupt Verlag.

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## Schedule for the project day

### Introduction



The teacher begins the day in a whole-class session with a review of the outcomes from Project Day 2. The focus is on reflecting on the multi-perspective planning outcomes from the expert role-play. The pupils recall the visions they developed for a climate-resilient school site and prepare to translate these into models.

### Problem statement



The key challenge of this day lies in putting theory into practice: how can the abstract planning outcomes from Project Day 2 on the 'sponge city' and biodiversity be translated into a three-dimensional, functional model? In doing so, scale, choice of materials and the representation of ecological functions (e.g. infiltration, shading) must be taken into account.

### Development



During the implementation phase, the pupils work in their established small groups to build the 'school grounds of the future'. The outputs from Project Day 2 – expert role tables, maps and posters – serve as the mandatory basis for their work. The groups operate with a high degree of freedom and use a wide variety of materials to give tangible form to their creative and solution-oriented concepts.

Materials: Outputs per small group from Project Day 2 -> 'Current State' poster, floor plan + mapping sheets (heavy rainfall risk areas and green roof potential), expert role tables, 'Planning_ReDesign School Grounds' poster

Model-building materials:
There are no limits to the imagination! At the end of Project Day 2, encourage the pupils to collect and bring in everything they associate with model-making for the following day (from home, the garden, on their way to school…

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## Preparation



**Pizza boxes have proved to be excellent as a base for the models!**

Particularly popular:

- **MOSS!!!** -> best collected in advance of the project day
- Wooden kebab skewers
- Hot glue (you'll need LOTS of glue sticks) -> use cardboard as a base
- Craft knives -> decide within your own study group whether it's okay to use craft knives!

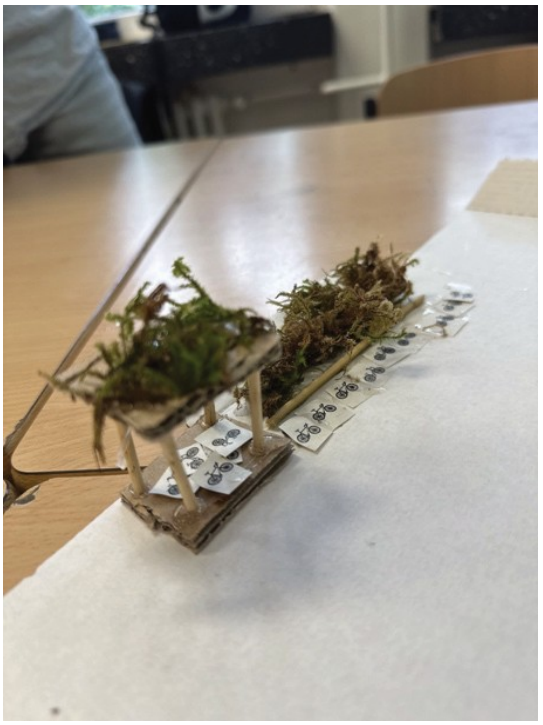
Suggested list of useful materials for model-making (can be expanded as required):

- Cardboard in various shapes and sizes (ask at the supermarket!)
- Fabric
- Acrylic paints
- Paintbrushes
- Cups
- Felt-tip pens and coloured pencils
- Toothpicks
- Modelling clay
- Liquid glue (preferably hot glue)
- Adhesive tape
- (Gaffa) fabric tape
- String
- Wire
- Ruler
- Scissors
- Natural materials (e.g. branches, stones, coarse sand, leaves, grasses, pine cones, etc.)
- Cut-out templates featuring model-making props (e.g. people, bicycles, vehicles, building façades)

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Development









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**Finalisation**

The results are finalised through a presentation of the models to the whole group. To minimise the risk of damage during transport, the presentation takes place at the group tables ('museum walk'). Each small group explains its design decisions using technical terminology and justifies the chosen problem-solving strategy with regard to heat protection and heavy rain preparedness. To do this, they also use the 'as-is' posters and planning posters from Project Day 2 to explain how the planning elements were derived.

Materials: Completed models, 'as-is' posters and planning posters from the small groups



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### Development





### Transfer

In a concluding reflection session, the class assesses the models in terms of their feasibility and effectiveness for climate adaptation. Through a democratic vote, a 'class model' is selected which best meets the requirements for sustainability and the needs of the school community. This highlights to the pupils their role as active shapers of their living environment.

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**Additional**

To further explore the topic and facilitate knowledge transfer, workshops can be organised in which pupils create explanatory videos, design posters or prepare their designs for digital presentation, with a view to raising awareness of the topic throughout the school.

**Notes & Tips**

Materials management: Prepare the craft and natural materials in advance, ensuring there is a sufficient quantity and that they are sorted, to enable work to get off to a smooth start. Pupils can also collect natural materials themselves in the school playground.
If the model-making activity is announced the day before, pupils can be encouraged to bring their own materials that they think would be suitable for the project.

Stability: Pizza boxes are ideal as a base; folding up the edges creates a sturdy frame for the model.

Teacher's role: Provide support to the groups whilst they are building and facilitate the final feedback session to ensure a constructive and professional discussion.

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