Research highlights

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COOLSCHOOLS vision

Nature-based climate action from schools to cities

Nature-based solutions (**NBS**) are defined as actions supported by nature that simultaneously provide environmental and socio-economic benefits in sustainable and resilient ways, and can play an important role towards systemic transitions **leading to climate resilient cities**.

When incorporated in **school environments** (both within school settings and their surroundings), NBS interventions seem a **promising path** for boosting **climate change adaptation and multiple co-benefits** ranging from overcoming residential disparities in access to urban nature to enhanced well-being, health and learning opportunities for children and other vulnerable groups.

What are the challenges at stake?

Access to green space

Three-quarters of children want more time in nature, says National Trust

Charity publishes survey findings as it calls for youngsters to be no more than a 15-minute walk from green spaces

Jamie Grierson

Mon 1 Apr 2024 01.01 CEST

Extreme heat

Schools close and crops wither as 'historic' heatwave hits south-east Asia

Governments across region grappling for response as temperatures soar to unseasonable highs

Rebecca Ratcliffe *South-east Asia correspondent*

Thu 4 Apr 2024 06.02 EDT

Source of the media news: The Guardian online

Main goal

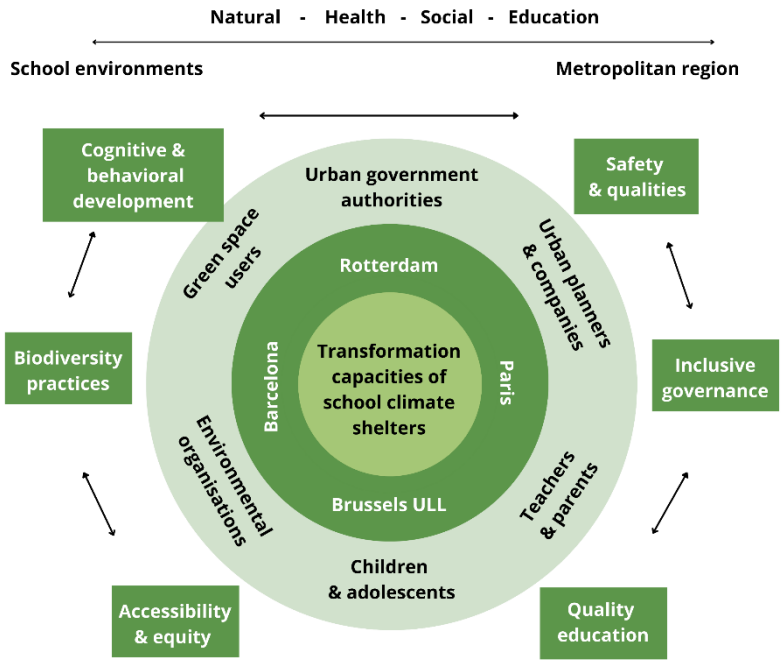
We examine the transformative potential of **NBS for climate adaptation** in school environments towards urban climate resilience, wellbeing, social justice and quality education in school settings and beyond.

Before

Our team

The **cross-sectoral composition** of our consortium (e.g., universities and research centers, city governments, international agencies, local organizations) and the creation of an Urban Living Lab (in Brussels), promotes the active involvement of different key stakeholders and final users.

Framework and case studies



Conceptual approach

Our project aims to support the creation of **nature-based climate school shelters in cities.**

Nature-based climate school shelters are innovative strategies relying on **nature-based solutions** that are implemented within school settings and their surroundings for responding to climate change.

Our approach goes beyond the idea of climate shelters as locally confined safe havens in terms of heat stress (the case of cooling centers primarily associated with air-conditioned public buildings that we identify as short-term maladaptive solution).

Conceptual approach

Nature-based climate school shelters are innovative strategies **relying on nature-based solutions** that are implemented within school settings and their surroundings for responding to climate change.

Differently, we argue that nature-based climate school shelters can offer a more sustainable and resilient strategy in the long term as we conceive them as:

co-created nature-based, enabling environments for responding to climate change that ensure wellbeing, social equity, learning and inclusivity regards schoolchildren, other school community members and the wider neighborhood community of actors around school centers.

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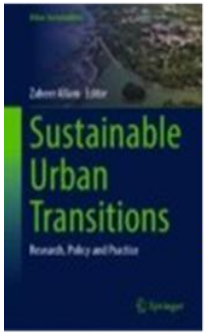


Ruiz-Mallén, I. *et al.* (2023). Nature-Based Solutions for Climate Adaptation in School Environments: An Interdisciplinary Assessment Framework. In: Allam, Z. (eds) Sustainable Urban Transitions. Urban Sustainability. Springer, Singapore. https://doi.org/10.1007/978-981-99-2695-4_6

Ruiz-Mallén, I. *et al.* (2023). Refugios climáticos escolares basados en la naturaleza: evaluación desde una perspectiva interdisciplinaria. In: (p. 61-77) Satorras, M. et al. (Coords.). Revista Papers 65: Ciutats enfront l'Emergència Climàtica: Claus per una transició justa. Barcelona: Institut Metròpoli. ISBN: 978-84-92940-54-7

ACCESSIBILITY & EQUITY (WP1)

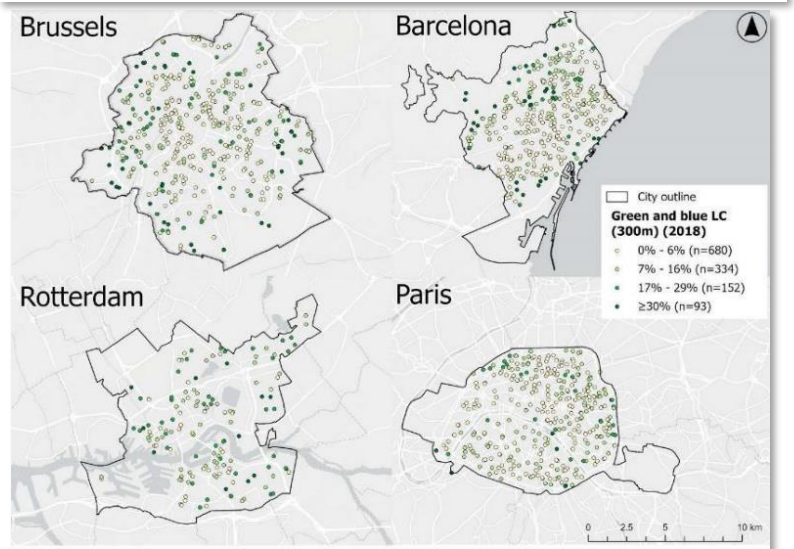
- 93% of primary schools have less than 30% GBI cover within a 300m buffer
- 48% of primary schools across the four cities are considered “grey and socio-economically deprived”

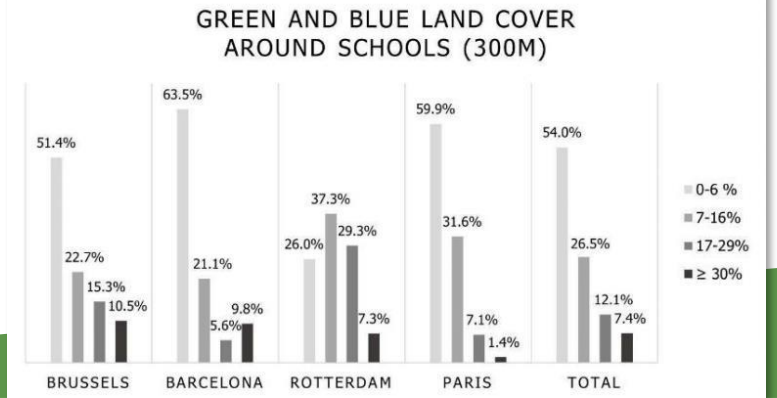
- In Brussels and Rotterdam, school-related GBI mostly favours affluent children
- In Paris and Barcelona (to a lesser extent), school-related GBI mostly favours underprivileged children
- No substantial changes (gains or losses) in school-related GBI in the assessed period (2006-2018)

Ecological Indicators

Nature-based school environments for all children? Comparing exposure to school-related green and blue infrastructure in four European cities

--Manuscript Draft--





ACCESSIBILITY & EQUITY (WP1)

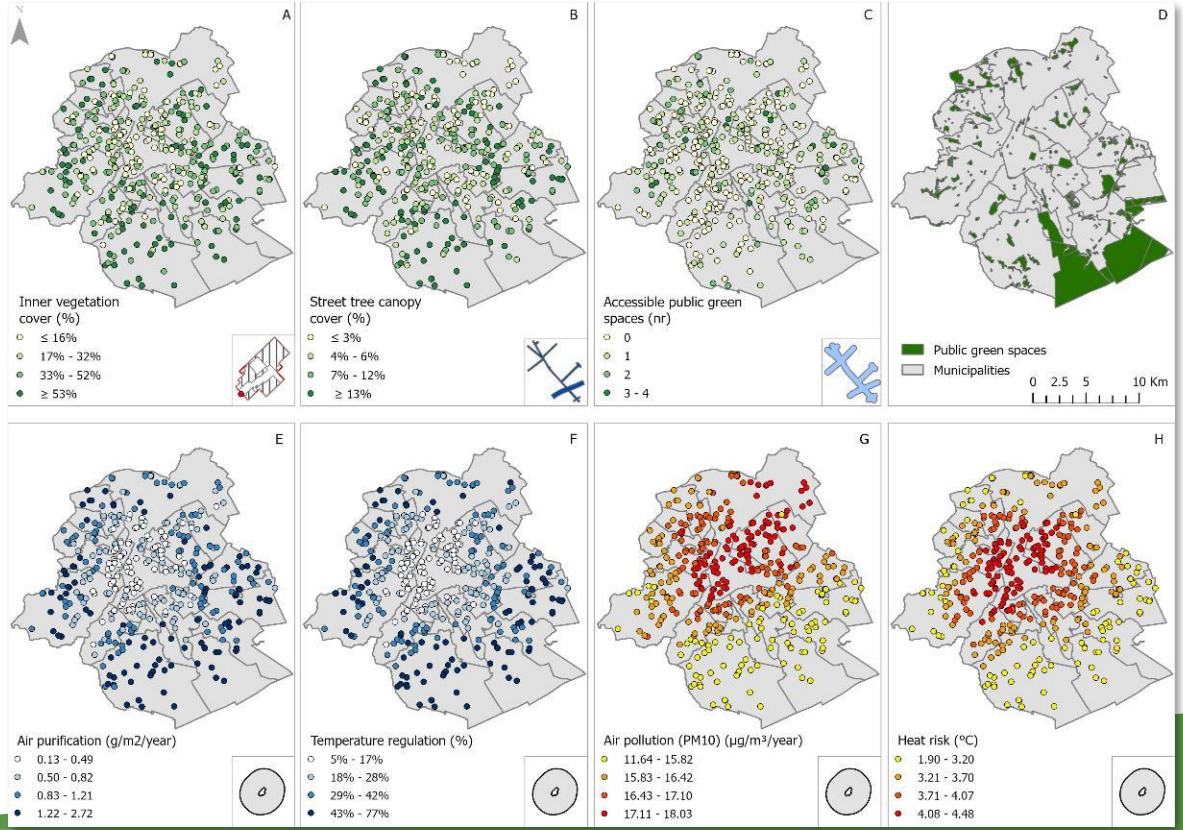
- 47% of the primary schools in Brussels have a deficit of vegetation cover in the schoolyard (less than 30%)
- 51% lack access to a nearby public green space (300 metres radius).
- 44% of primary schools have less than 30% vegetation cover in 300 metres radius
- Children from wealthier families benefit from greener and healthier school environments

Ecosystem Services

Wealthier children attend greener schools: A multi-indicator distributional analysis of school-related green infrastructure benefits in Brussels

--Manuscript Draft--

Special Issue Equity and Justice



VRIJE UNIVERSITEIT BRUSSEL

BIODIVERSITY PRACTICES (WP2)

Do green schoolyards provide habitats for wildlife?

Results

Yes ! Schoolyards are home to as much abundant and diverse wildlife as the nearby green spaces…
… Except for the herbaceous stratum (more in green spaces).

Abundance and diversity of arthropods depend on the vegetation surface **IN** and **AROUND** the school.

70% of species are different between schools and green spaces

Livrables

Biodiversity report sent to each school
Scientific paper (Autumn 2024)

Does connectivity influence urban biodiversity?

Results

Yes ! Connectivity has a positive influence on species diversity, especially in environments with little vegetation.

and **No !** Connectivity does not influence the abundance of individuals

The **proportion of vegetation** in 150m has a strong influence on abundance and diversity.

Livrables

Louis-Lucas, Bortolamiol, Clavel, Blanc, … , Clauzel. *Where should we green our cities? Exploring Landscape Connectivity's Impact on Urban Biodiversity,* Journal of applied ecology (in revision)

Do green schoolyards contribute to urban connectivity?

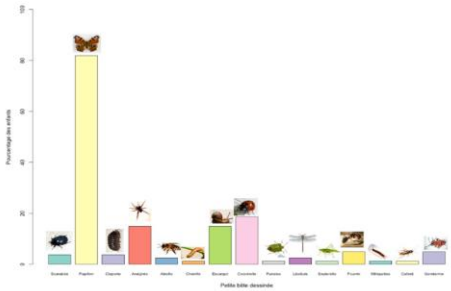
Methods

- Spatial modeling of urban connectivity
- Analysis of the distribution of connectivity values for schools
- Prioritization of schools to be greened to improve connectivity and restore corridors

LADYSS Laboratoire Dynamiques Sociales et Recomposition des Espaces
cnrs
Centre des Politiques de la Terre

BIODIVERSITY PRACTICES (WP2)

Perceptions of biodiversity



>>Work in progress in 2024

Biodiversity governance and management

Results
4 issues: cross-cutting, design, implementation, maintenance
e.g. Maintenance: anticipating and managing the maintenance phase, promoting the educational and recreational dimension, finding intermediaries, identifying defects and malfunctions, maintenance agreement, raising pupils' awareness of nature, supporting teachers,

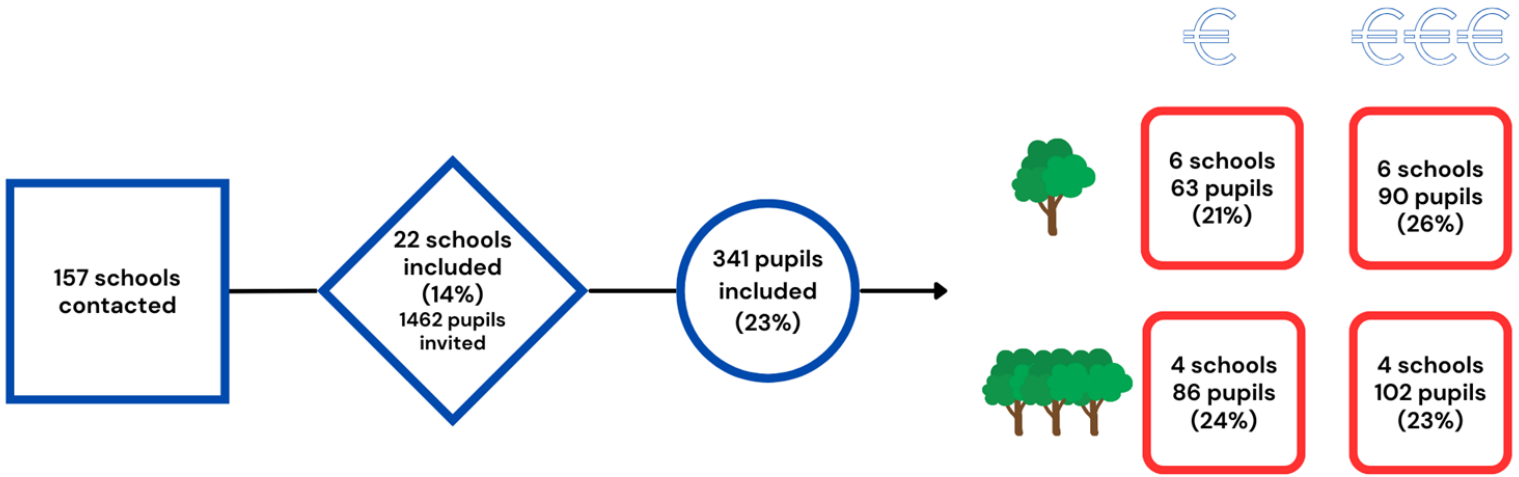
Teaching practices

- Understand teachers' level of education in biodiversity
- Assess the levers that need to be activated in order to implement this Determine the type of teaching tools available and to be produced in order to improve the level of knowledge in schoolyards
- Encourage staff involvement in this area, as well as that of parents' and neighbourhood associations

>>Work in progress in 2024

COGNITIVE FUNCTION, WELLBEING (WP3)

Objective: To investigate the associations of (urban) school yard and school surrounding green spaces with cognitive function, behavior and well-being of pupils aged 10 to 11 years.



COGNITIVE FUNCTION, WELLBEING (WP3)

- **Cognitive assessments:**
  - Attention & concentration (Continuous performance test)
  - Short-term memory & selective attention (Spanne)
  - Information processing (SDMT)
- **Anthropometrics**
- **Well-being and general health: KIDSCREEN-27 (self-completed)**
- **Behavioral screening: SDQ for youngsters (self-completed)**
- **Parental questionnaire**

Computer-assisted literature review on safety perception of NbS

- There are several **physical aspects** that influence the perceived safety of users:
  - **Maintenance**, **vegetation structure**, **landscape design**, and **presence of other users**;
- Preference for naturalness increases with **feeling of control** of the environment:
  - i.e. when people **can see their surroundings** and move freely in case of a possible threat, such as crime, violence and other users' uncivilized behavior.
- Safety perception can influence usage of NbS:
  - Catalytic relationship between safety perception, NbS use, and crime reduction.
  - → **Fostering the use of NbS can increase users' perceived safety**
  - → **Recommended to support urban transitions;**

Green schoolyard evaluation tool (GSET): case of Rotterdam's Blue-Green Schoolyards

- Greenery was present in most schools: more than half of the schools have all types of greenery checked for;
- Water was present on half of the schoolyards (17/34);
- Openness/ closeness to the public is not related to the presence of water items;
- Habitat for animals – not checked in detail, but about 60% of schools have "natural messy spaces" and "branch fences".

GOVERNANCE (WP5)

Universitat Oberta de Catalunya

Sources: Sekulova & Ruiz-Mallén (2024); Sekulova et al. (in prep.)

The understanding of nature and naturalization

- Diverse, messy, non-orchestrated, and wild spaces have been relatively hard to implement
- It is *nonetheless* elements like branches, twigs, mud, leaves, (among others) that stimulate creative play behavior and learning

Institutional flexibility and learning

The importance of learning from all implementation rounds:

- On how to continuously improve participative processes
- On how to navigate between divergent views/administrative levers
- Amongst many others

The selection of architects

- Successful greening requires architects who are fond of natural materials and understand the educational objectives of the reform; who depart form a deep understanding of ecology, creative play and outdoor education

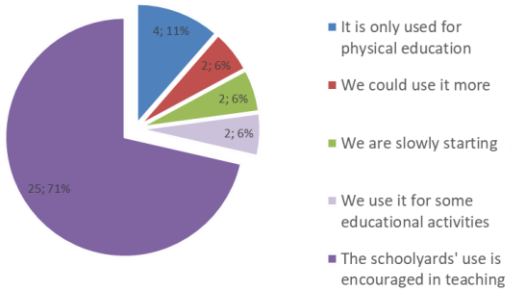
The maintenance bottleneck

GOVERNANCE (WP5)

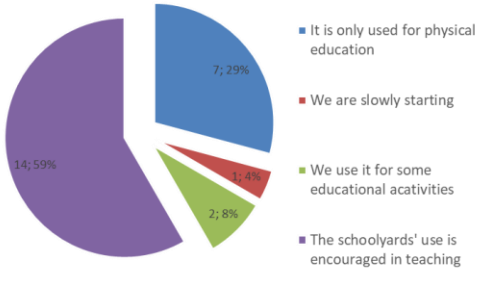
Integrating the green schoolground in the educational visions of schools

The extensive use of schoolyards as outdoor learning spaces (beyond physical education) is higher in transformed (green) grounds than in "classical" (grey) ones (in Barcelona).

Do you think that the educational project of the center integrates an extensive use of the schoolyard beyond recess hours? (survey)



Schools with transformed playgrounds



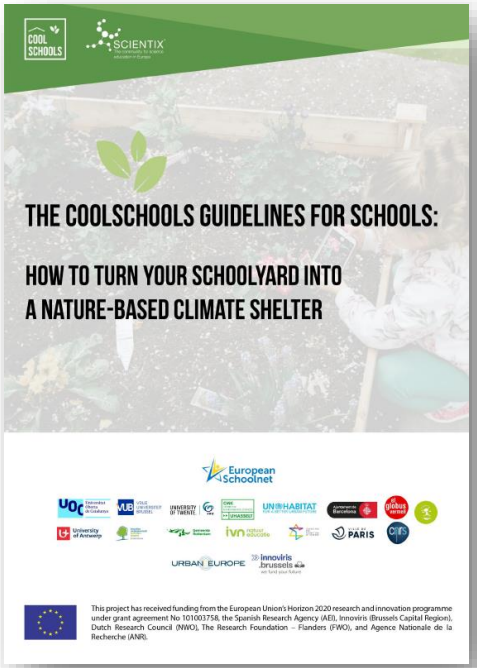
Schools with 'standard' playgrounds

Source of the figures: Sekulova et al. (in prep.)

EDUCATION (WP6)

The COOLSCHOOLS Guidelines for Schools

- ✓ Guidelines targeting school leaders, teachers and community members (e.g. parents), offering recommendations and practical advice
- ✓ Featuring COOLSCHOOLS case studies
- ✓ Alignment of nature-based climate shelters with EU climate adaptation goals and UN SDGs
- ✓ Concrete examples of transformations and green features to be used in schools
- ✓ Troubleshooting advice for the *planning*, *design*, and *maintenance* of green schoolyards



COOLSCHOOLS Objective:
To **guide European schools** to become nature-based climate shelters and promote best practice on climate resilience, inclusiveness, well-being and learning opportunities

Access the Guidelines here:

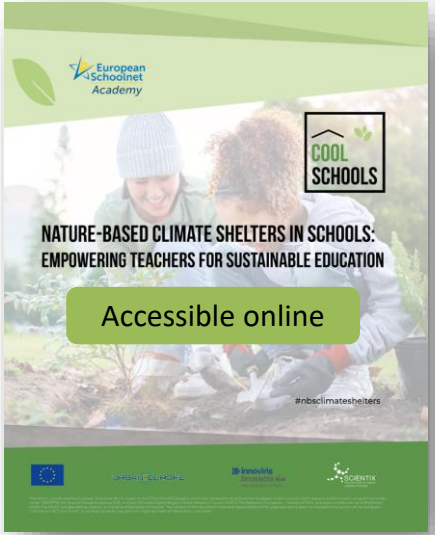
https://www.scientix.eu/resources/details?resourceId=130261

EDUCATION (WP6)

The COOLSCHOOLS MOOC

Scientix TV Episode 19 on YouTube.
Scientix® is an initiative of European Schoolnet.

- ✓ Introduces nature-based climate shelters to European teachers
- ✓ Disseminates best practice from COOLSCHOOLS case studies
- ✓ Emphasises pedagogical value of nature-based climate shelter interventions (NBCSI) for students
- ✓ Aligns NBCSI steps with the *design-thinking process*
- ✓ Peer-reviewed final activity focusing on the design of **a NBCSI *Action Plan***
- ✓ **Public webinar** to engage audiences beyond MOOC participants



COOLSCHOOLS objective:
To **promote** the health, cognitive, environmental and pedagogical value of nature-based climate shelters in schools **to teachers through capacity building activities**

Access the MOOC here:

https://www.europeanschoolnetacademy.eu/courses/course-v1:COOLSCHOOLS+GreenSchools+2024/about

Thanks for your attention!

More information: @P_Coolschools

WWW.COOLSCHOOLS.EU

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