

SP-DS01-IN01

## REVEGETATION. MEASURING THE IMPACT OF SHADING PROJECTED BY TREES

Secondary and High school

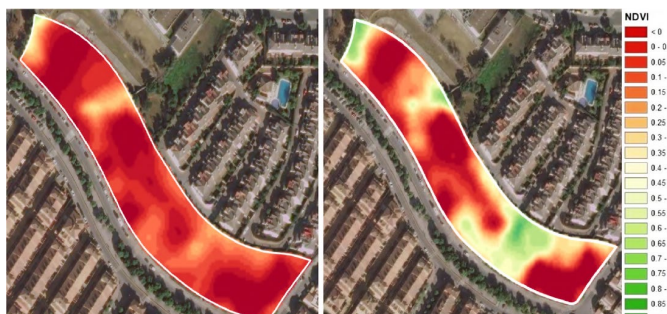


### Resources

Human	
Time	
Costs	

Although initially design for measuring the impact of shading projected by trees, the intervention progress to a more general revegetation and green area topic.

The intervention included measuring the impact of the shade cast by trees on a school facade that can be an important aspect, especially in locations with a warm climate. To priorities sustainability and energy efficiency, understanding the impact of surrounding vegetation on the building's energy demand is a crucial aspect of responsible resource management. At the same time it presents an opportunity for revegetation on the schoolyard. This increase of shade can reduce the need for cooling, saving economic resources and reducing the school's carbon footprint.



As a result of this intervention, the research team responsible for supporting its implementation was able to publish a research article, showing the process followed and the effects of the intervention, measuring parameters such as the normalised difference vegetation index. <https://digibug.ugr.es/handle/10481/101964>

### Relevant difficulties

- ◆ The possibility of finding areas where the planted trees do not grow properly, due to a lack of care during the first year, or possible bad practices of the company during the replanting of the species.
- ◆ Difficulties in finding a company ready to carry out the planting process by conducting a training session with the students.
- ◆ Find a moment during the school year to pause your usual activities for a day and carry out this revegetation session. This session can be held in the afternoon so as not to interfere with classes, but it requires extra organisation, parental authorisation to return to school in the afternoon, which can be a logistical problem for many families.

Individual Competences	Collective Competences	Technical-material Competences
<ul style="list-style-type: none"> <li>✓ To understand the influence of good shade management on reducing school cooling demand.</li> <li>✓ Identify the most effective trees in generating shade and their strategic location.</li> <li>✓ Develops students' skills in environmental impact measurement, data analysis, and understanding the role of trees in reducing heat and energy demand.</li> <li>✓ Development of knowledge about tree selection factors, combining environmental, technical and economic aspects.</li> </ul>	<ul style="list-style-type: none"> <li>✓ The intervention exceeded expectations by not only enhancing students' understanding of the importance of urban trees but also by encouraging their active participation in creating and maintaining green spaces. This has fostered a stronger environmental awareness and sense of school ownership.</li> <li>✓ Create a regular reporting system for sustainable shade management on campus.</li> <li>✓ Establish guidelines for tree maintenance and pruning based on their impact on shade.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Technically, the project requires access to tools for monitoring (such as temperature sensors) and scientific information about tree species best suited to local climate conditions.</li> <li>✓ If possible, support from experts in bioclimatic architecture and urban design is an asset to integrating these elements into the built environment, maximising shading and cooling benefits.</li> <li>✓ Quantify the potential energy savings by minimising the need for cooling.</li> <li>✓ To improve thermal comfort on campus, contributing to a more sustainable and pleasant learning environment.</li> </ul>

## Sustainability competences in place in the intervention



### Engagement

- People's engagement has been driven by the hands-on student-led nature of the project, which connects learning to real-world environmental challenges. The potential to reduce energy costs and greenhouse gas emissions, along with collaboration with experts, has further sparked interest within the school community.
  - Help students grasp the long-term benefits of tree shade and its impact on reducing indoor temperatures. Ensuring consistent involvement and balancing the project with other school activities has also been a challenge.
  - Organise research groups in advanced secondary school courses. Allowing students to make proposals about tree species and their location is a factor that helps to engage students, as they appreciate that their proposals are listened to and implemented by the school.
  - Repeat annually the measurement of shadings projected by trees to present to the educational community the importance of green spaces.
  - Teachers are expected to be fully committed and needs environmental consultancy company predisposition and organisation. This type of activity is common in schools in the region, so at the planning level, the organisation of the visit is relatively simple.
- Through active student engagement in planting and caring for trees, leading to increased awareness of their benefits. As students measure the effects of shade on temperature, they will develop a deeper understanding of environmental issues. This knowledge can inspire advocacy for more green initiatives within the school and community, fostering a culture of sustainability that extends beyond the project.



### Connections

- Relevant issues include local climate change impacts and community attitudes toward green spaces. Key actors not controlled by our organisation are local government agencies, environmental organisations, and the school community. Activities like citywide tree planting initiatives and public awareness campaigns also influence our intervention.
  - The development of this intervention requires cooperation with external stakeholders, the school administration (to support and coordinate the revegetation project).
  - Regarding students and the educational community, it is important to select a group of students to participate in the planting process, and to develop proper dissemination campaigns to communicate results and to transmit how to care for and protect these new spaces.
  - Cooperation with external stakeholders aims to align goals and share resources through participating in collaborative workshops.
- Integrate the research project into the regular curriculum, emphasising the immediate effects of tree shade on comfort and energy savings. Hands-on workshops with experts and the use of interactive tools, like temperature sensors, have also helped students engage and understand the project's impact. The participation in the Young With Research program improves students' engagement by following up on proposals throughout the course.



### Change

- The realisation of a revegetation project not only requires the process of planting the trees. This intervention emphasises the importance of all the previous work related to analysing the available spaces, proximity to the school facade, and possible effects on the envelope. This previous work is the key to developing competencies in students to envision future scenarios about impact, the resources needed to execute them, and the possible issues during execution.
  - To find a solution that maximises CO<sub>2</sub> sequestration impact, is not too expensive, in keeping with the other green spaces on the premises, and that is made up of tree species compatible with the climate and conditions of the area, are relevant aspects to design and formalise a proposal.
- Engaging students in discussions about the benefits of increased shade has helped us envision the expected impact. Collaborative workshops with researchers have provided insights into long-term effects, while sharing success stories from similar projects has inspired our vision and motivated support for sustainable practices in our school environment.



### Action

- The sessions ultimately took place both at the Architecture School in Seville and at the school where planting was conducted, achieving even better outcomes than expected. This dual-location approach enhanced engagement, with students and teachers showing greater involvement and enthusiasm despite initial challenges with schedules and resources.
- Several factors have helped us achieve our goals, including strong collaboration with the school administration and support from researchers who provided expertise. Good relationships with the school community have fostered enthusiasm and participation, while remote sensing tools have facilitated simulation and decision-making. Engaging students through hands-on activities has promoted ownership of the project, and effective communication of its benefits has generated broader support.
- Regarding the planting, it is necessary to find a time when students do not have exams nearby so that students can focus on the development of the session. This could be either at the beginning of the course or after the term of their exams.