The value of green roofs and green walls: GENESIS project

Maria Manso (maria.manso@tecnico.ulisboa.pt), Cristina Matos Silva (cmrsilva@civil.ist.utl.pt)

Aims

GENESIS Project: Green Roofs and walls Environmental Economic and Social Savings, is a research project aimed at developing a comprehensive and systematic model for balancing environmental, economic and social benefits of nature based solutions, specifically green roofs and green walls with the underlying extra costs, in a life cycle perspective. An integrated cost-benefit model was developed and applied to different case studies and used to understand the value of different greening spaces.

Case studies and tests

Residential buildings

Stated preferences to evaluate the willingness-to-pay of owner/tenants for green roofs/walls.
• Higher willingness-to-pay for accessible green roofs;
• Knowledge of benefits and the accessibility of green roofs have a great impact on the willingness-to-pay;
• Recreation benefit is at the forefront of individuals’ concerns, even more than aesthetics.

Transport infrastructures

Perception and willingness-to-pay of transport users for "greening" transport interfaces. Case study at Entrecampos Station, Lisbon, Portugal.

Classification of proposed greening scenarios according to the perception of benefit they will bring to the station:

---

Primary schools

Effect of introducing greener into the classroom context compared across time.

eXperiment developed in two primary schools with pupils in different socio-economic contexts, at three moments:
T1 - before introducing an artificial green wall into the classroom;
T2 - one month later;
T3 - one month after the introduction of vegetable pots.

Mean scores for each moment (T)

<table>
<thead>
<tr>
<th>Moment</th>
<th>Sustained and selective attention</th>
<th>Working memory</th>
<th>Classroom satisfaction</th>
<th>Medium socioeconomic level</th>
<th>Low socioeconomic level</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>37</td>
<td>27</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>T2</td>
<td>23</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>T3</td>
<td>10</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Hydrological performance and water quality

Ongoing tests on product optimisation:
• Adaptation of a green wall system for greywater treatment using recycled filling materials and two different plant species;
• Green roofs test beds with variation in vegetation types and substrates including recycled waste materials to determine rainfall retention capacity, vegetation development and surface temperature.

Air cleaning effect

Direct and indirect impacts of green roofs on air quality (PM₁₀, NO₂, CO₂) for Porto (Portugal) urban area.
• The effects of green roofs on air temperature vary according to the season;
• Overall increase of PM₁₀ and NO₂ annual concentrations, and a decrease of O₂ levels.

Tools

Online tool to determine the benefits and costs of applying a green roof or a green wall on a building compared to a conventional roof/wall cladding.

For further details please check the project webpage: https://www.projectgenesis-ist.com/