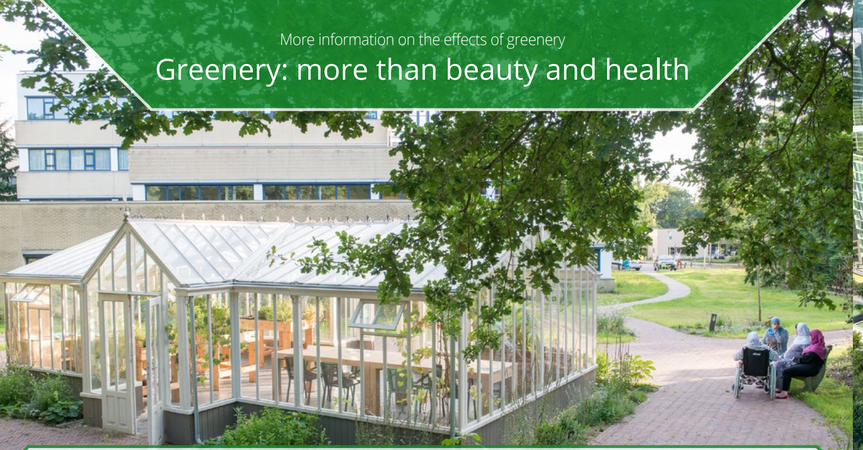
More information on the effects of greenery

Greenery: more than beauty and health



PROPERTY VALUE

Plants create appeal, and play a role in attracting mid-to-high income earners in urban areas.

HOW GREENERY WORKS

- Greenery increases the value of real estate; waterfront views increase the value by 15%, open spaces by 10%, parks by 6% and local gardens by 5%. [1]
- Greenery beautifies the local environment, decorates buildings and raises the appeal of an area, making it more attractive to residents and businesses alike. Pleasant green areas make for good living environments, which is an important factor for expats and major international companies in deciding where to settle. [2]
- Crime in green neighbourhoods is lower, and residents feel safer than in areas without local greenery. [3]

RECOMMENDATIONS

- Some investments in local greenery pay for themselves through increased property values, or – in the case of public-sector investments – through higher tax revenue (Valuation of Immovable Property Act, notional rental value).
- An attractive living and working environment is a key factor for large international businesses in deciding where to open a new branch. Greenery adds to the attractiveness of these environments.

Sources:

1. *Bervaes, J.C.A.M., Vreke, J., 2004. De invloed van groen en water op de transactieprijzen van woningen [The effect of greenery on water and residential selling prices]. Alterra report 959. WUR-Alterra, Wageningen.*
2. *Jókövi E.M. & Luttik J., 2003. Rood en groen - Het combineren van verstedelijking en natuur in de praktijk [Red and Green: Mixing Urbanisation and Nature in Practice]; Wageningen, 2003.*
3. *Wolfe, M.K., Mennis, J., 2012. Does vegetation encourage or suppress urban crime? Evidence from Philadelphia, PA. Landscape and Urban Planning 108(2-4):112–122.*

Compilation: Wageningen University & Research: J.A. Hiemstra, S. de Vries and J.H. Spijker.

Giving greenery its due

Greenery: more than beauty and health

FURTHER INFORMATION

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A summary of the benefits of greenery on health, productivity, performance and well-being

Greenery: more than beauty and health

Greenery in our living environment is beneficial for more than just our health and well-being. It facilitates water management and stimulates biodiversity in built-up areas, and it can also reduce the effects of noise pollution. Greenery also has a positive impact on the property value of homes and offices. This document provides general information on the benefits of greenery, supplementary to the detailed fact sheets on how greenery can improve health and well-being in Residential, Professional, Educational and Healthcare contexts.

WHAT DOES GREENERY DO?

- A (small) amount of rain is retained by vegetation (this is called 'interception'), after which it evaporates from the surface of the plants, reducing the quantity of water to be processed by drainage systems.
- Some rain is absorbed by the greenery bed (called 'infiltration') and never enters the drains. This reduces the load on sewage and plumbing systems, and helps retain the quality of surface water (less overflow) and prevents residential flooding.
- The judicious planting of green areas (roofs, recessed parks and gardens, grassed swales) offers even more protective capacity.
- Greenery situated close to homes increases their property value.
- Effectively landscaped greenery is extremely important for biodiversity in urban areas.
- Greenery can contribute to reducing the amount of noise pollution experienced by residents.

APPLICATIONS

- Green roofs and walls.
- Courtyards and rooftop gardens.
- Indoor plants in the living environment.
- Indoor plants in offices, schools and healthcare institutions.
- Plants, shrubs and trees around buildings and in public parks and gardens.
- Use of planters.
- Grassed swales and recessed green areas in gardens and parks.
- Open flower and garden beds, insect hotels.

PROVEN SUCCESS

- The presence of greenery in the immediate vicinity of houses increases their value by 4-15%, depending on local conditions. [1]
- Reserving ten per cent of urban areas for varied greenery provides plenty of habitat for butterflies and bees. [2]

There are many more facts, figures and examples available on the benefits of vegetation. Consult the specific information on Residential, Professional, Educational and Healthcare environments, or see the references cited in this document.

Sources:

1. *Bervaes, J.C.A.M., Vreke, J., 2004. De invloed van groen en water op de transactieprijzen van woningen [The effect of greenery on water and residential selling prices]. Alterra report 959. WUR-Alterra, Wageningen.*
2. *Hoffman, M., 2010. Biodiversiteit in tuin en plantsoen [Biodiversity in gardens and parks]. PPH, Boskoop.*

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WATER MANAGEMENT

The Royal Netherlands Meteorological Institute (KNMI) has drawn up four potential climate-change scenarios for the Netherlands. All four show an increase in precipitation intensity and frequency of heavy rains, while the current climate conditions already cause plenty of flooding in streets, cellars, etc. The Dutch Association of Insurers expects increases in damage of over 140%. In addition to material damage, these types of water emergencies can also cause injuries and even death, especially in inclined areas (e.g. South Limburg) where small waterways can easily swell into a turbulent deluge.
Expanding green zones in urban areas improves water management and reduces the adverse effects of peak rainfall.

HOW GREENERY WORKS

- Vegetation reduces the amount of rainwater that needs to be processed. Some rain is 'retained' on the surfaces of foliage, stems and branches (this is called 'interception') and evaporates again once the rain has stopped. Non-sealed ground beneath vegetation aids in this regard, trapping more rain than a hard surface and allowing more water to evaporate. In forests, broad-leaved trees can intercept 5-20% of the annual precipitation in this manner, and conifers up to 50%. A further 5-34% of precipitation can evaporate from the ground. Vegetation in urban areas can also approach these figures. [1]
- In vegetated areas, water is free to infiltrate the soil, replenishing the groundwater and ultimately the underground water supply. Some of this water is absorbed later by the vegetation, and some of it will evaporate. This means that less water needs to be channelled away than from surfaced areas, and the process is also slower (reducing peak intensity). Infiltration speed depends on the soil type, and can reach speeds of over 50mm/h in areas with effective drainage (coarse sand). Greenery promotes infiltration, as vegetated areas with extensive root systems absorb water much more effectively than bare soil. [2]
- Green roofs (especially on large buildings, such as factories, hospitals and large office complexes) help reduce peak.
- intensity by retaining some of the rainfall, and delaying the flow of the remainder. Extensive green roofs.
- (i.e. with a substrate of at least 15 cm) achieve the greatest effect, and can retain 50-80% of rainfall, allowing it to evaporate later. This is effective for minor to moderate showers; for intense rain, however, the storage of rooftop gardens alone is inadequate, and additional measures are necessary. [3]
- Water quality: Plants can sometimes also be used on industrial sites for the organic filtering of waste water via helophyte filters, an application that also serves to reduce peak intensity.
- In cities, green shores and helophyte filters can be used to improve water quality. Vertical helophyte filters are effective in organically purifying household wastewater of contaminants such as nitrogen, phosphate and heavy metals. This requires 2.5-5 m^2 of helophyte filter per IE (inhabitant equivalent). Examples of this application are in use in various districts (such as Drielanden in Groningen, Aardehuizen in Olst and the Erasmus Canal in Amsterdam). [4]

RECOMMENDATIONS

- Increasing the ratio of vegetated areas to surfaced/built-up areas reduces the amount of water requiring processing. Green roofs contribute in this regard.
- Deep-rooted plants (trees and bushes) facilitate the penetration of water into deeper substrates. Variation in vegetative ground covers (trees in combination with shrubs and undergrowth) are most effective, and also serve to prevent compaction and erosion.
- Introducing plants to grassed swales improves infiltration, contributes to biodiversity, renders them suitable as ecological transition areas and improves the perceived value of a neighbourhood's green areas.
- Vegetated swale plants must be able to withstand both temporary (and sometimes extremely) high water levels and also dry periods; planting trees at the vegetated swale's edge (instead of inside it) also offers more possibilities.

Sources:
1. *Gerrits AMJ 2010, The role of interception in the hydrological cycle, doctoral thesis, TU-Delft.*
2. *Green WH and Ampt GA 1911 Studies on soil physics. The journal of agricultural science Volume 4, Issue 1 p. 1-24).*
3. *Getter K.L & D.B. Rowe. The role of extensive green roofs in sustainable development. HORTSCIENCE 41(5):1276-1285. 2006.*
4. *Aquarama 2011; Rietland bvba wil rietveldsysteem op een hoger plan tillen [Rietland BVBA aims to take reed field system to the next level] Aquarama issue 51, File: Water purification & recycling.*

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BIODIVERSITEIT

'Biodiversity' refers to the variety of living organisms. A wide range of different types of vegetation will ensure a high degree of biodiversity. The more varied the greenery, the more life it will attract. Large numbers of pollinating insects and various types of vegetation in turn provide a source of food for birds and other animals. Pollinators (and pollination) therefore constitute an important link in ecosystems, making them essential to biodiversity. Many city residents value the presence of nature, expressed by setting up birdhouses and bee hotels, and feeding birds in the winter time.

HOW GREENERY WORKS

- A variety of plant species is a great way to encourage biodiversity in urban areas. Planting pollen and nectar-bearing trees, shrubs and perennials is important to attract bees, butterflies and other insects. Birds and small mammals also do better in areas with plenty of diversity. [1]
- Non-native plants can be a valuable addition to urban environments: they increase biodiversity and extend the blooming season, providing more food for pollinating and other insects. [2]
- Just 10% vegetation in urban areas can provide a good habitat for butterflies and bees, provided there is enough diversity and food, and the areas are spread out through the city like a network. [3]

RECOMMENDATIONS

- Green roofs and facades can also be used to increase biodiversity, as they too provide food and a safe haven for insects and birds, count towards the 10% percentage and also act effectively as links between different green areas.
- De Rooij [2] has drawn up three eco-profiles for bumblebees, hoverflies and pioneer species, each of which sets different requirements. In order to function correctly, the various insect habitats must be connected effectively.
- Green zones must not be more than 500 metres apart, and the intervening areas must also contain insect food sources.

Sources:
1. *Hoffman, M., 2010. Biodiversiteit in tuin en plantsoen [Biodiversity in gardens and parks], PPH, Boskoop.*
2. *Salisbury, A., Armitage, J., Bostock, H., Perry, J., Tatchell, M. and Thompson, K., 2015. Journal of Applied Ecology 52, 1156–1164.*
3. *Rooij, S. van, A. Corment, W. Geertsema, M. Haag, P. Opdam, M. Reemer, R. Snep, J. Spijker, E. Steingröver, A. Stip 2016. Een Bij-zonder kleurrijk landschap in Land van Wijk en Wouden; Handreiking 2.0 voor inrichting en beheer voor bestuivende insecten [A bee-utifully coloured landscape in Land van Wijk and Wouden; Infosheet 2.0 for habitats and management of pollinating insects]. Alterra, Wageningen UR. Groene Cirkels Report no. 5.*

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NOISE

Plants and vegetation are crucial to the way noise and noise pollution from traffic and industry are perceived.

Firstly, the sound made by trees and plants is generally considered to be quite pleasant, both directly (rustling) and indirectly (birds), and it can partially mask other noises. This fact, along with the higher quality of the living environment (due to the greenery) can serve to draw attention away from sources of noise pollution, making them less bothersome. Vegetation can therefore reduce the perceived levels of noise pollution.

It usually has little to no effect on the actual volume of the noise – spaced-out plants will usually not create any audible drop in sound. Using vegetation as a sound barrier requires very dense planting, as even green noise barriers must be properly sealed.

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