

Can capturing rainwater increase biodiversity and reduce flood risk?

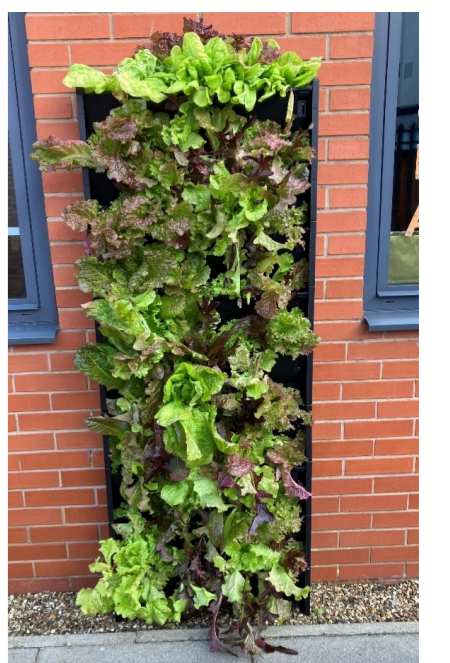
Wilberforce Sixth Form College
Yorkshire Water

Overview and background information

Biodiversity is the range of life found in one area. Its existence is required due to its huge effect on the stability of natural ecosystems, supporting human and societal needs. This includes access to food and development of medicines. Reduction in biodiversity is normal, but the current rate is a thousand times higher than usual. Therefore, changes need to be made and an active approach is required. During 2020 Hull recorded 128 deaths in relation to air pollution. Being a culture capital and an industrial area, Hull should impart a different method of air pollution prevention that's more attainable on a small scale, leading the UK towards a sustainable future. Flood alleviation is another vitally important issue in Hull and its surrounding area as, according to the Yorkshire and Humber Climate Commission, 97% of Hull's residents are currently at risk of experiencing material or physical issues associated with flooding. By implementing strategies such as the installation of water butts in our college to capture rainwater, we can play a part in reducing the impacts associated with flooding in the region.

Aims

- Implement measurable rainwater capture strategy to help with flood alleviation
- Regreen the site about the science block using the captured water as a water source
- Increase the plant community with edible plants (for staff and students to harvest) and key species of the local ecosystem to encourage insects and possibly birds and to monitor incoming 'wild' flower



Living wall of lettuce

Methodology

Staff and students have been able to install multiple vertical 'living walls' around certain buildings in the college. By greatly reducing the footprint of the planter boxes but retaining the area of soil space, we have been able to sustainably grow edible plants to be used in the College. Additionally, blackthorn (*Prunus spinosa*) and buckthorn (*Rhamnus cathartica*) plants too by providing butterflies with an 'island' of vegetation amidst the larger urban area of Hull. We have also been able to collect seeds from various plants, such as sunflowers and spinach to feed to birds that can then be spread further afield than just the college campus. These seeds are now germinated indoors for the next harvest. Six water butts (210L) have been set up around the college to capture rainwater. This alleviates flooding and the water is used to water the living walls and planters.

Results

Biodiversity

Species of **insects** observed included bumble bees, honeybees, mason bees. Large white (which decimated the broccoli crop), small white, brimstone butterflies, mullein moth, ladybirds, black fly and black ant. (On sunflowers there is a functioning ecosystem of black ants farming black flies. Ladybirds act as predators.)

Species of **wildflowers** observed included willowherb, corn speedwell, mouse ear duckweed, red shank and field forget me not.

Rainwater capture

For roof area of Science (K) block 625m² 6x210L water butts were used, which over 48 hours collected 708L of rainwater from the total of 1260L volume available.

To cover the total roof area of the college and scale up the project 20x210L water butts are needed to capture 4200L for the average annual rainfall of 693.45mm in Hull (Met Office 2024).

Conclusion

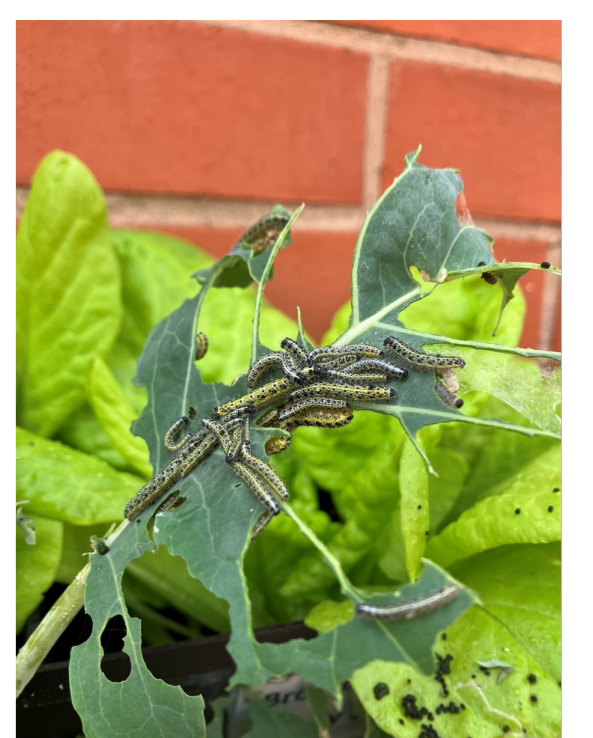
The captured rainwater successfully watered the plant crops and wildflowers via the plant boxes and planters. In July-August there was a measurable increase in species of insect and wildflower. Finally, the broccoli crop fell victim to an unexpected but very welcome explosion in large white butterfly numbers.

Next steps

Replant, rejuvenate and regreen. There is huge potential in scaling up this project.



Black ants farming aphids on the stem of *Helianthus*



Caterpillars of large white butterfly (*Pieris brassicae*) on broccoli plants



Team Wilberforce