



Designing the Future Dike: improving dike stability by increasing vegetation diversity

Studying species interactions in root development.

Level: Master internship

Start: April 2022

Duration: 6 months (36 or 42 ECTS)

Project form: Greenhouse work, data collection and data analysis

Supervision: Steven Huls and Eric Visser

Contact: steven.huls@ru.nl, eric.visser@science.ru.nl

Project description

Dike managers are facing great challenges in future dike reinforcements. Due to climate change, we are facing warmer and drier summers, which can damage the structural integrity of river dikes. Dikes that do not meet current safety standards need to be reinforced, which usually comes down to widening and raising the dikes with more sand and clay – a costly procedure. As there are over 17.000 kms of dikes in the Netherlands, they play an important role in providing safety from floodings. Currently, most dikes are covered with a species-poor grassland vegetation. Additionally, river dikes form corridors through the floodplains and thereby connect nature areas. Moreover, recent studies have reported on the current biodiversity crisis (e.g., (Hallmann et al., 2017; Harrison et al., 2018; Midolo et al., 2019). The Future Dikes project focuses on sustainable dike reinforcement by increasing the vegetation diversity to increase drought resistance and longevity as well as promoting biodiversity.

Aim

The aim of this internship is to identify key species traits to optimise seed mixture compositions for developing sustainable river dikes. In a greenhouse setting, we currently run a series of experiments focused on several important aspects of dike vegetation, such as: vegetation development speed, rooting depth, lateral root spread. You can participate in this experiment, and at the same time design pilot experiments on other aspects. Possibly, depending on the timing of the internship, we might assess combinations of different seed mixtures, sown in larger containers or outside.

Approach and outcome

You will assist with the larger experiment in the greenhouse and are responsible for the design and harvest of your own experiment(s), by collecting and analysing the data. The results of these experiments will lay the groundwork for future experiments looking into growing patterns in different soil compositions as well as experiments on small-scale dikes behind the greenhouse.

We welcome teams of students that work together, which shares the workload and facilitates sparring among each other and with the supervisors!

Literature

Hallmann, C. A., Sorg, M., Jongejans, E., Siepel, H., Hofland, N., Schwan, H., Stenmans, W., Muller, A., Sumser, H., Horren, T., Goulson, D., & de Kroon, H. (2017). More than 75 percent decline over 27 years in total flying insect biomass in protected areas. *Plos One*, 12(10).

<https://doi.org/10.1371/journal.pone.0185809>

Harrison, I., Abell, R., Darwall, W., Thieme, M. L., Tickner, D., & Timboe, I. (2018). The freshwater biodiversity crisis. *Science*, 362(6421), 1369-1369. <https://doi.org/10.1126/science.aav9242>

Midolo, G., Alkemade, R., Schipper, A. M., Benitez-Lopez, A., Perring, M. P., & De Vries, W. (2019). Impacts of nitrogen addition on plant species richness and abundance: A global meta-analysis. *Global Ecology and Biogeography*, 28(3), 398-413. <https://doi.org/10.1111/geb.12856>