

Natural bank erosion processes for habitat diversity in multifunctional rivers

Gonzalo Duró, Alessandra Crosato, Maarten G. Kleinhans, Wim S. J. Uijttewaal

Challenge

A balanced combination of economic and ecological functions of a river system is a challenge due to often conflicting requirements. Current legislation promotes restoration of trained banks to improve the habitats of plants and animals, and the water quality. This research helps to understand the controlling factors of dynamic banks in navigable rivers, to optimize restoration practices and achieve local and regional targets.

Innovative components

- Application of drones to quickly measure, and with high precision, the evolution of restored banks.
- Systematic 3D topographic surveys of riverbanks in a navigable river.
- Characterization of bank erosion processes in a waterway based on systematic observations and measurements.

For whom and where?

Managers, engineers and ecologists dealing with restoration projects of riverbanks. Researchers interested in erosion processes, especially involving ship waves.

Application development and findings

Sediment deposition during past river migration created highly heterogeneous banks, whose different soil characteristics currently control erosion rates. Beacon trees locally delay erosion but their mid-term fate is subject to their substrate.

The bank terrace is a natural area for wave dissipation during low flows. Rooted vegetation at the bank toe protects the bank from erosion even during floods, but this situation depends on the terrace erodibility and status.

Status for day-to-day practice

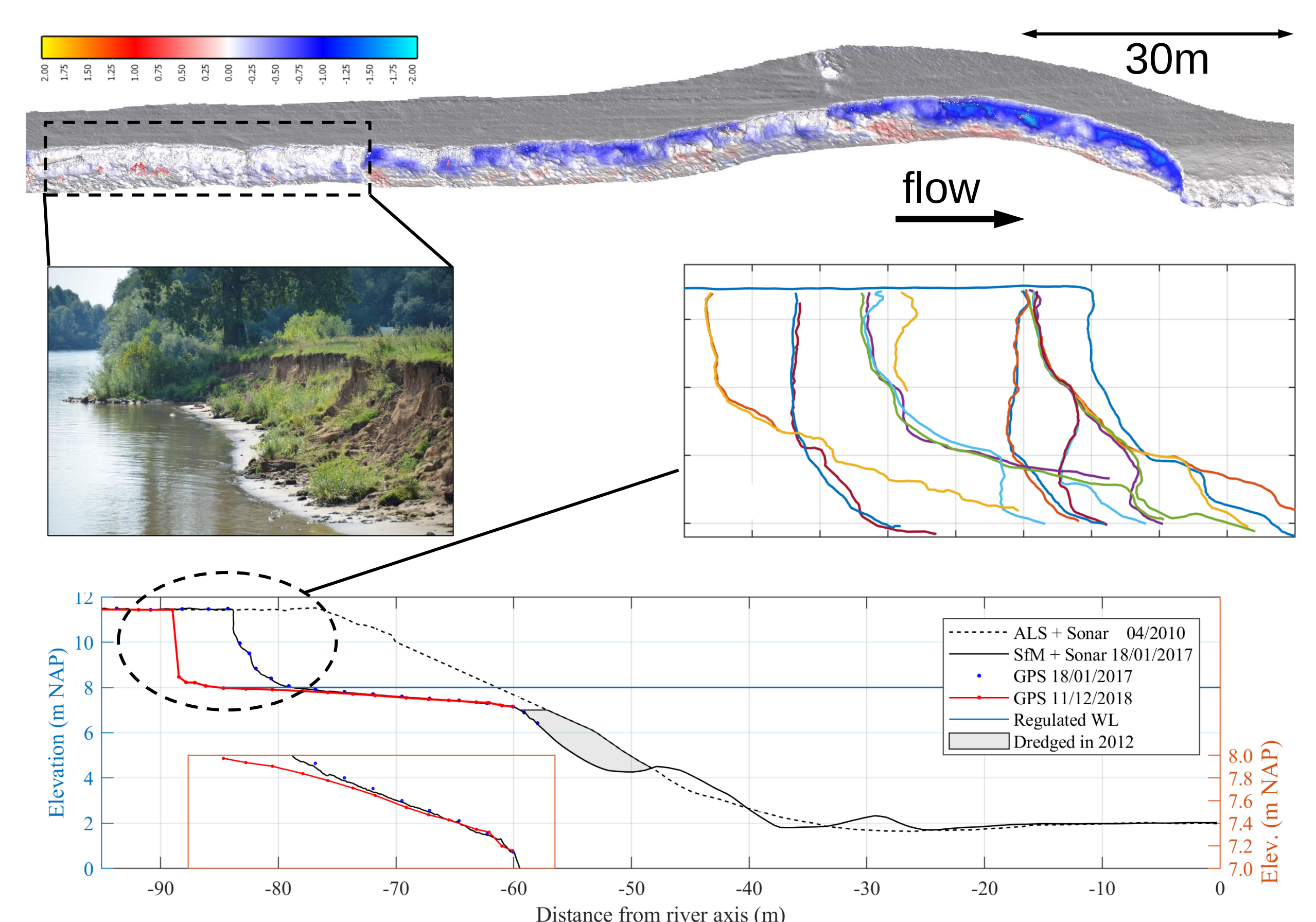
Analyze the substrate near regulated stages to estimate future bank development. Set specific targets for each site according to local conditions (location, material, water level range), considering a combination of soft and hard approaches.

Next steps

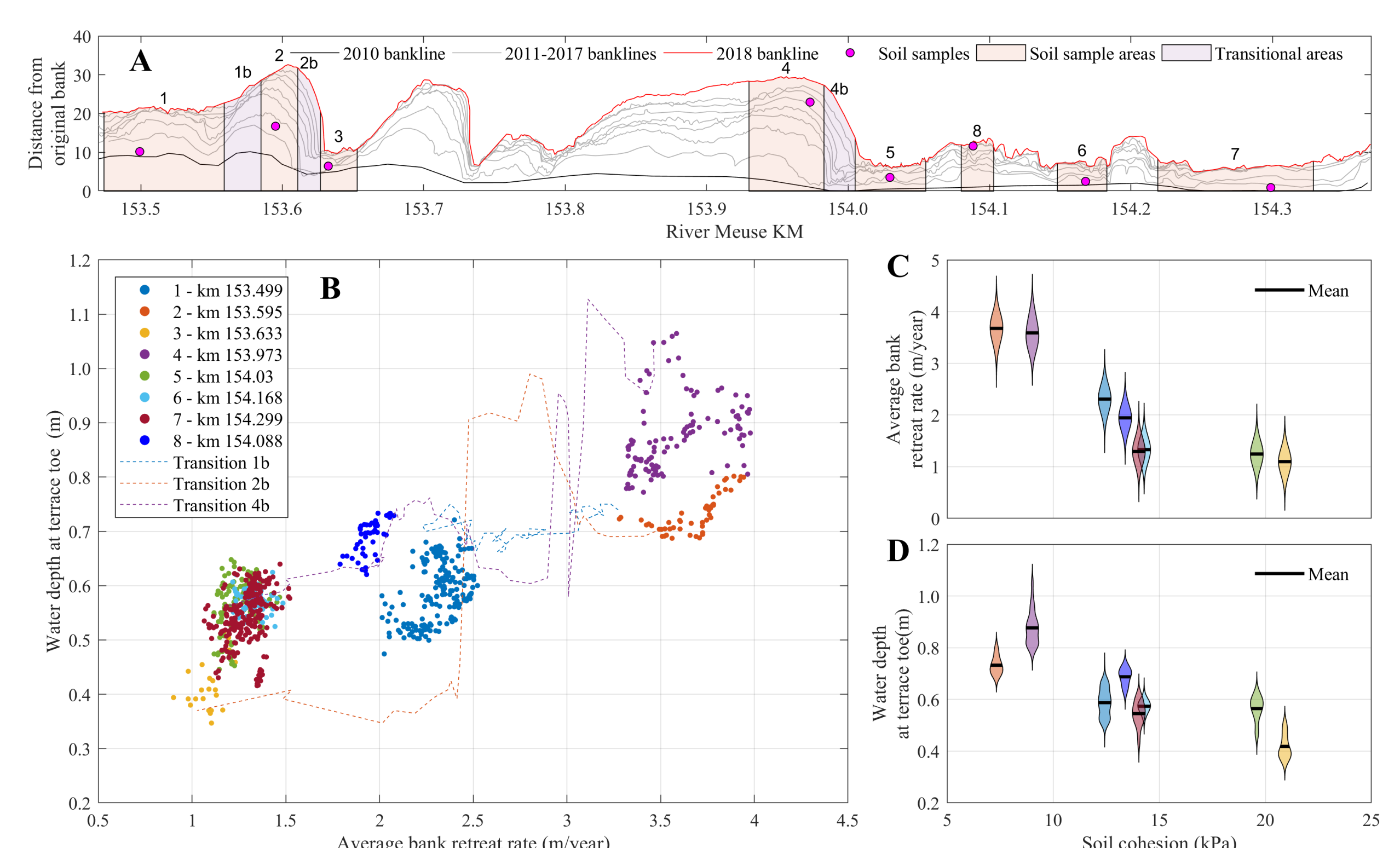
- Utilize the insights to improve current predictive models.
- The inclusion of unregulated rivers to extend the knowledge to such conditions.



Inspection of eroding banks near Neerloon, the Meuse River.



Erosion during a flood (top 3D model, in blue). Grown vegetation at toe protected the upperbank. Other areas (bottom profile) present continuous erosion both at the upperbank (drone surveys) and the terrace (dGPS).



Terrace length and depth along Oeffelt, the Meuse river. Different soil compositions caused wide-ranging erosion rates.

Interested?

Email to: g.duro@tudelft.nl
Explore further Bank Erosion Processes
at the RiverCare website:

