

# Science for Environment Policy

## 'Soft' flood defences to protect riverside biodiversity

**Riversides** that are unprotected by flood defences are home to more diverse plant communities, according to a new study. According to the researchers of the study, 'soft' approaches to flood management, which work in harmony with natural processes, could help promote biodiversity in flood-prone regions.

**Many studies** have highlighted the benefits that biodiversity provides for human populations. These are most often described in terms of ecosystem goods and services, such as food, medicine, pollination of crops and regulation of climate.

Although previous studies have attempted to understand the effect of dams on biodiversity, the effects of flood defences are less well understood. This study carried out plant surveys at 11 sites alongside rivers in Yorkshire, UK. Six sites had flood defences built between 1972 and 2006, and five sites had no flood defences.

To quantify biodiversity at these sites, the researchers used two different types of calculation: one that used survey data to produce a measure of the number of different species at each site (species richness), and one that measured the difference in biodiversity between sites with and without defences, or with old and new defences.

Using the first measure, they showed that species richness was twice as high for vegetation at sites that did not have flood defences. Species richness did not seem to change with the length of time that the flood defences had been present.

Using the second measure, they showed that there were large differences between the types of plant species at sites with and without flood defences. The same was true for the types of plants species at sites with old and new flood defences. However, it was unclear why such different communities were present at different sites as all were home to species that could tolerate drought and disturbance.

These results support a theory called 'intermediate disturbance hypothesis', which suggests that sites that are either frequently or never disturbed will be less diverse than those that are only sometimes disturbed. Sites with no defences will sometimes flood, wiping out plants and providing space for new species to invade and ultimately, according to the researchers, lead to higher biodiversity. Sites behind flood defences will rarely, if ever, be disturbed by flooding and so will have lower levels of biodiversity.

Based on their findings, the researchers suggest avoiding engineered structures that cut floodplains off from rivers and streams completely. Instead they support sustainable flood management approaches or 'soft defences' that work in harmony with natural processes to allow intermediate levels of flooding. Using subsidies, areas of agricultural land could, for instance, be designated as washlands, which are areas that are periodically flooded by rivers or streams, for environmental benefit.



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