

## Riverbank protection for reducing flood damage

### Climate resilience and adaptation



Floods are among the most devastating natural hazards in Australia. In addition to the toll on human lives and infrastructure, they do extensive damage to landscapes, aquatic environments, riverbanks, and soils.

When riverbanks are unprotected and surrounding vegetation has been removed, this can generate faster streamflow, erosion damage, soil loss and pollution run off, leading to extensive damage to river ecosystems, sometimes causing mass fish deaths.

They can also release sediment plumes extending kilometres offshore, which can have a devastating effect on marine environments, causing algal bloom, habitat degradation, loss of marine life, damage to fisheries and contamination of food sources.

Natural Resource Management (NRM) organisations have helped create nature-based solutions to slow streamflow, stabilise riverbanks and restore surrounding vegetation. These can dramatically reduce the impacts from floods, helping protect streambanks and aquatic ecosystems, and the industries that depend upon them.

#### How does it work?

NRM organisations use field data, remote sensing and models to understand and map the river flow and identify areas most at risk from flood damage and erosion. They work with landholders and local organisations to create streambank works using logs or rocks that slow the flow of the streams at high velocity points. Vegetation is restored behind these embankments, which provides additional protection, significantly lowers the rate of flows, and provides filtration to remove sediment from floodwaters. Modification of stream beds to introduce snags and reefs also helps to slow flows and reduce impact and erosion.

#### Richmond river restoration - North Coast Local Land Services

The Richmond River catchment is a large river system in Northern NSW.

Low water quality and flooding has created significant impacts in the past on estuarine and marine ecosystems, including the offshore fisheries.

In 2014 it was assessed by Richmond River Ecohealth scorecard as D+ for water quality, riparian vegetation, bank condition and macroinvertebrate presence, with a number of subcatchments receiving D- to F grades.

Since that time it has experienced four major floods and the impacts of run-off from the 2019-20 wildfires.

The NSW Marine Estate Management Strategy has funded North Coast LLS to improve water quality in the marine estate. The goal was to mimic natural post flood recovery processes and deliver multiple benefits, including habitat and landscape resilience, with minimal impacts on the sites restored.

North Coast LLS undertook extensive modelling to prioritise sub-catchment, which lengths of the river to restore, and specific sites, with regions ranked for risk of nutrient and sediment export loads, and recovery potential.

Emigrant Creek sub-catchment, a major tributary of the Richmond River with multiple intensive agricultural enterprises competing on its banks, was identified as a priority – heavily eroding and a huge source of sediment and pollution.

#### **What was done?**

Working with large landholders and partners including Soil Conservation Service, Big Scrub Regeneration, Ballina Shire Council, Lismore City Council and Southern Cross University, the project has introduced structural works to protect the river along 3 km of the Emigrant Creek.

Over 95 ha of Big Scrub Country has been rehabilitated across 48 km of riparian land. Projects were designed with principles to respect river diversity, work with river behaviour and changes, work with linkages between biophysical processes, and use the landforms and structure as an integrated physical template for management. Actions were tailored for each site, and included:

- improving adjacent land management by increasing and protecting existing riparian vegetation
- sealing adjacent gravel roads
- dissipating energy by increasing instream roughness and habitat
- managing accretion of sediment and channel adjustment at riverbends
- minimising boat wash impacts.

A mixture of corrugated logs, rocks, snags, and reef ball structures were used to protect streambanks and provide instream habitat augmentation.

#### **What has this achieved?**

Emigrant Creek has become an exemplar of stabilised, ecologically managed waterways, demonstrating that these can withstand significant flood events, protect, and actively recruit valuable marine habitat, and maintain viable, productive farming enterprises.

Instream work sites have withstood three major flood events (March 2021, February 2022, March 2022), and conserved 3,000 tonnes of sediment per each event that would have otherwise been lost downstream.

In one example site, the ground was hydro mulched immediately after construction but no other vegetation was added. The project has to date naturally recruited over 600,000 mangroves, of at least two different mangrove species, and up to six different species of saltmarsh.

Casuarinas and phragmites australis reeds have also begun to colonise, providing substantial habitat and ecosystem services into the future.

#### **MORE INFORMATION**

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1300 795 299

