Unveiling Australia's blue forest future: abatement opportunities

Blue carbon ecosystems (BCE) such as mangroves, seagrasses, and tidal marshes are particularly efficient at sequestering carbon. Protecting and restoring BCE can contribute to greenhouse gas emissions reduction, while also offering additional benefits like supporting wild fisheries and reducing the effects of extreme weather events at the coast.

To support the application of the Australian Carbon Credit Unit Scheme's tidal restoration method, CSIRO, working with universities and other partners, have completed a project to map and estimate the potential abatement of the method around Australia.

Mechanisms for protection and restoration

Protection and restoration of BCE can prevent greenhouse gas (GHG) emissions and increase rates of carbon sequestration. A variety of financial mechanisms have been developed to direct funds towards protection and restoration activities. These include voluntary carbon markets, for which several blue carbon methods exist. These methods describe the activities that can be undertaken for crediting and calculating the abatement.

In Australia, tides have been restricted along substantial areas of the coast to allow farming practices by using various types of barriers such as bunds, embankments, dykes, dams, levees or weirs that restrict tidal flow along channels or over the ground. The Tidal Restoration of Blue Carbon Ecosystems method under the Australian Carbon Credit Unit (ACCU) scheme offers the opportunity to receive carbon credits from the removal these barriers to re-introduce the tide. Landholders can gain Australian Carbon Credit Units (ACCUs) for the additional carbon stored and the emissions that are avoided, as the land is re-wetted and blue carbon ecosystems return.

How the research addresses the problem

We set out to estimate the quantity of abatement expected for tidal restoration in Australia, following the Tidal Restoration of Blue Carbon Ecosystems method. This method provides instructions and a calculator (BlueCAM) to establish how much abatement to credit for an activity.

Our approach used a model that predicted whether land would be inundated by water levels up to the highest astronomical tide (HAT) and compared this to the current land use.

Highest Astronomical Tide (HAT)

Is the highest high tide that can be predicted under average meterological conditions

Learn more about HAT here

If our predictions indicate that the HAT would reach an area currently used for agriculture, we inferred that a tidal barrier such as a bund wall might be present. Noting this assumption was used in the absence of explicit national mapping of tide barriers, and so is susceptible to mapping errors or by locations that are naturally isolated from the ocean.

Assuming removal of the barrier, the model predicted the coastal habitats that could be restored under the ACCU method and estimated the potential abatement.

To maximise the consistency and accuracy of two key inputs, elevation and tide level, the project created two new national datasets: a digital elevation model focussing on the coast and tidal plane surfaces for mean sea level and highest astronomical tide.

Results

The results suggest that ~276,168 ha of land might be appropriate for tidal restoration (Figure 1). The jurisdictions with the largest potential of areas for inundation are Queensland (133,470 ha), Western Australia (63,022 ha), Northern Territory (52,700 ha) and New South Wales (13,863 ha).

Grazing and flooded agriculture were the land uses that had the highest potential to be restored using the ACCU method. Areas covered by sugarcane and cropping were smaller.

In the Northern Territory, the biggest reduction in emissions came from flooded agriculture, mainly due to the avoided methane emissions.

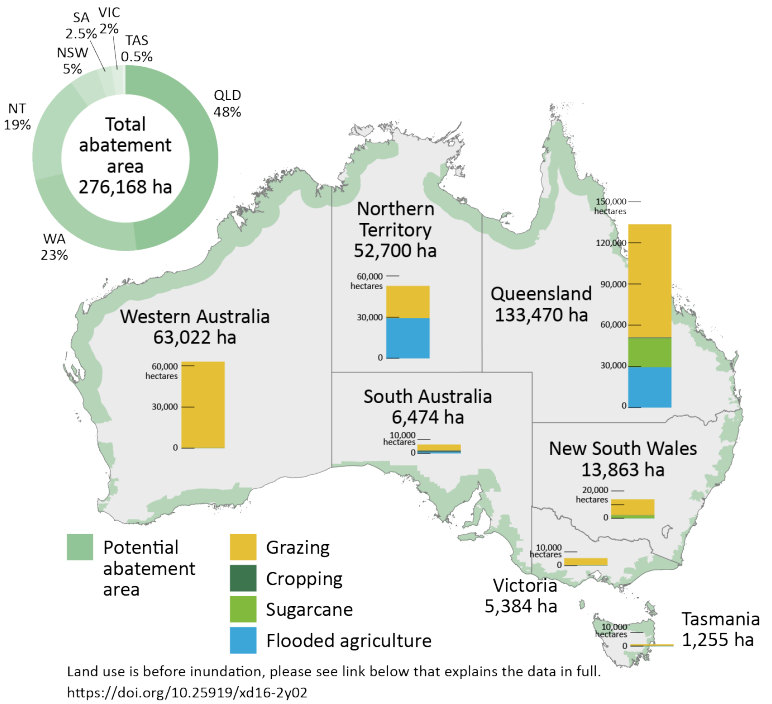
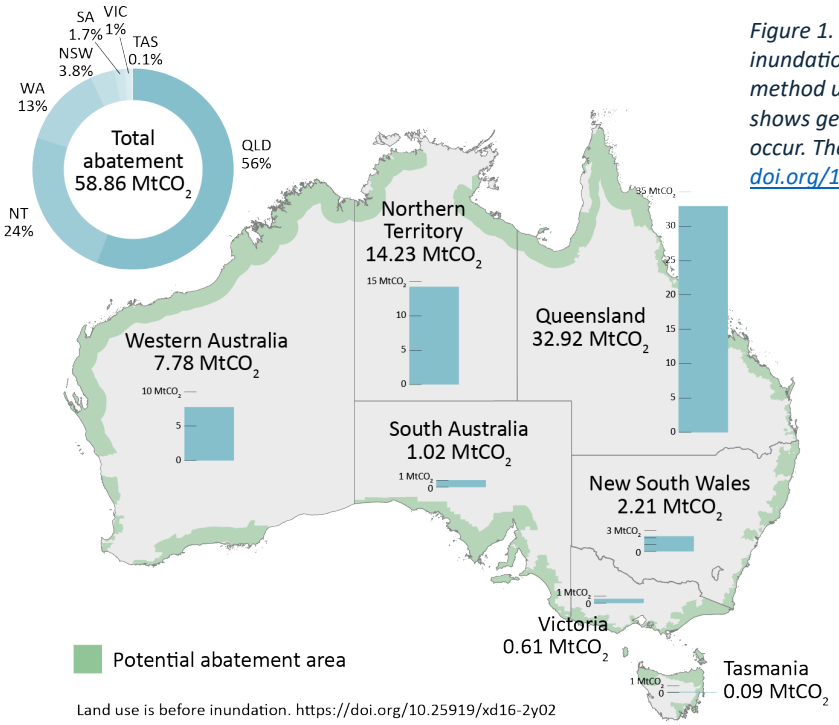


Figure 1. Potential abatement per state and the different land uses before inundation that are available for tidal inundation with the blue carbon method under the ACCU scheme. Shading for 'Potential abatement area' shows generally where along the coast locations with abatement potential occur. The actual locations are much smaller and closer to the coast. https://doi.org/10.25919/xd16-2y02



The total estimated abatement from reintroducing tides to all areas of Australia is ~58 Mt CO2-e over 25 years (Figure 2). The jurisdictions with the largest abatement potential are Queensland (32.9 Mt CO_2), Northern Territory (14.2 Mt CO_2) and Western Australia (7.7 Mt CO_2).

Economic analyses also showed that income generated by restoration of tides to grazing land was more feasible at lower carbon prices than land being used for cropping or sugarcane.

Figure 2. Abatement potential per state. https://doi.org/10.25919/xd16-2y02

The information from this project is available to be used by decision makers and assist in the adoption of the ACCU scheme tidal restoration method, ultimately assisting in the uptake of blue carbon restoration projects. Future work could include the addition of future sea level rise predictions.

For detailed descriptions of how the project was undertaken visit: https://research.csiro.au/coastal-carbon/resources/factsheets/

For the data and mapping project visit: https://research.csiro.au/coastal-carbon/resources/data/

For further information

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