Science for Saving Species

Research findings factsheet Project 5.1 Better offsets for threatened species



National Environmental Science Programme

Strategic assessments for biodiversity in Northern Australia

In brief

In 2014 the Australian Government announced an initiative for the economic development of northern Australia over a 20-year period.

Soils across 17 million hectares are considered suitable for agriculture, but water resources could irrigate about one tenth of that area.

The locations with soils best suited to agriculture are often areas with the highest biodiversity values, leading to potential conflicts.

Ad-hoc development of areas on the best soils, closest to transport and existing settlements is likely to have a significant impact on other values such as biodiversity, carbon storage and tourism.

Based on existing data, if all suitable soils were converted to agriculture, 3 threatened species would be lost in all their known locations, and 40 species and vegetation communities could lose more than 50% of their current distributions.

Strategic assessments are important to identify trade-offs and synergies between potential land-uses and to identify potential development foot prints that minimise impacts to other values, such as biodiversity.

An initial land use zoning study has been undertaken, it has identified 5.6 million hectares of land which could be used for agricultural developments with a relatively low impact on biodiversity values and carbon farming.

Other important values such as Indigenous cultural values and other economic development opportunities such as nature based tourism and shale gas were not included in the initial assessment but should be included in future analysis.

Considering additional values will further constrain the area of land available for agriculture, but will increase other values across the North.











Strategic assessment

Strategic approaches and threat mitigation can be used to balance agricultural opportunities with biodiversity conservation. To be effective it is essential that strategic assessments for biodiversity be integrated into development planning from the earliest stages to:

- Identify trade-offs and synergies between potential development scenarios and biodiversity at landscape scales.
- Minimise regulatory risk for business by ensuring that developers know from the outset which areas can be developed at minimal known risk to biodiversity.
- Help identify planning footprints that minimize biodiversity losses without compromising development goals.
- Avoid 'death by a thousand cuts', when the cumulative impacts of many small developments are not adequately anticipated when assessing them individually.
- Consider landscape scale impacts and interactions of multiple species over long time frames, instead of only single species within single sites.
- Avoid unexpected surprises, like the late discovery of an EPBC listed species which requires substantial reworking of a development plan.

Tools available to support strategic assessments include spatial prioritization. This can improve decision-making by explicitly considering cumulative impacts of multiple proposed developments on multiple species over large spatial scales and under multiple potential land-use scenarios. Such assessments can identify minor alterations to development plans that substantially improve biodiversity outcomes.



tourism adds around \$200 million to North West Australia's economy anually. Photo: Jaana Dielenberg

Developing the North

In 2014 the Australian Government announced an initiative for the economic development of northern Australia over a 20-year period. Stretching from northern Queensland to northern Western Australia, the region covers approximately 960,000 km², which is about the size of France and Germany combined.

The region is predominantly tropical savannas and much of the region is currently used for rangeland grazing. Protected areas cover approximately 18% of the area. Approximately 20% of the region has been deemed suitable for agriculture according to a CSIRO soil capability study.

The economic opportunities are obvious, and the threats to biodiversity in northern Australia could be profound if not carefully managed. The greatest threat to biodiversity conservation globally is land use change leading to habitat loss and degradation. The region has four threatened ecological communities and 199 threatened species listed under the EPBC Act.

The policy document Our North, Our Future: White Paper on Developing Northern Australia (Australian Government, 2015) outlines a major shift in land use for northern Australia from relatively low-impact rangeland grazing to relatively high-impact irrigated intensive agriculture. The white paper does identify nor guide how to manage potential impacts to biodiversity or associated industries such as tourism or carbon storage.

Carefully balancing trade-offs between biodiversity outcomes, agricultural intensification and carbon storage will be necessary to minimise harm and conflict.

Our analysis shows substantial overlap between land of agricultural potential and biodiversity value, for example areas with better soils are more attractive for agricultural development but often also have unique biodiversity values not found in surrounding nutrient poor areas.



Scenarios for Northern Australia

We explored trade-offs and synergies among biodiversity conservation, carbon farming and agriculture production for a range of potential land-use change scenarios in northern Australia. This preliminary analysis used the planning and analysis tool zonation to identify potential conflicts between competing land use by considering the highest priorities for: biodiversity only, carbon only, agriculture only, all three equally weighted, and biodiversity weighted more highly.

The results identify the locations with the greatest conflict between competing land uses, places to protect before impacts are felt, and planning that balances agricultural and conservation needs.

We found that prioritising land-use based only on opportunities for high-intensity irrigated agriculture or carbon storage will lead to total habitat loss for at least one species, even when only a small proportion of the landscape is converted. And, if all suitable soils were converted to agriculture, three threatened species would lose all of their suitable habitat and 40 species and vegetation communities could lose more than 50% of their current distributions.

However, the analysis also shows plenty of opportunity to develop irrigated agriculture in areas that are not high priority for biodiversity, and that high value biodiversity features could be maintained across the study area even under fairly high levels of agricultural development. In fact, we were able to identify a zoning option that could yield over 56,000 km² of agricultural development with a relatively low impact on biodiversity values and carbon farming. Achieving this would depend on also managing other factors such as habitat connectivity, species dispersal, changing climate and fire regimes, and predation by and/or competition with invasive species.



Magpie geese and other wetland birds on a floodplain in the Top End. Strategic assessments can be used to identify where agricultural intesification can occur with the least impact to biodiversity and other values. Photo: Jaana Dielenberg



Barunga Festival Photo: Roderick Eime CC BY 2.0

Foundations

Three key features are essential to the success of strategic assessments:

- 1. Rigorous, repeatable, peerreviewed methods, including the use of conservation planning tools based on irreplaceability and complementarity that are intuitive enough for immediate relevance to planners and decision-makers.
- 2. Willingness of planners and decision-makers to engage with and explore science-based approaches to planning and technical tools for it.
- 3. Engagement between researchers and planners to ensure that the scientific methods are carried through the whole planning process, especially from the earliest stages.

During the planning stages, spatial impact assessments can help planners identify development footprints that minimise cumulative effects on biodiversity and are compliant with regulations for the protection of threatened species. These analyses can then be embedded in statutory strategic environmental assessments that reconcile and balance the environmental, social and economic impacts of proposed developments.

Future work

The analysis above was undertaken to identify trade-offs and priorities for biodiversity conservation, carbon farming and agriculture production. Future analysis should also extend to other economic development opportunities, such as nature-based tourism or shale gas expansion, or for Indigenous cultural values. Indirect impacts have also not yet been examined and could potentially outweigh the direct impacts of the changes to land use that we are analysing. These may include the construction of transport networks, dams and pipelines.

The study to date has also been limited to available data, which are typically only available for a small number of well-studied species. Effectively exploring persistence for a more comprehensive set of species and ecological communities under different threat and land-use change scenarios will depend on more data being available. This could be a good next step for planners and decisionmakers seeking to understand the implications of development options in northern Australia and the conservation investments and actions needed to secure the persistence of biodiversity. Information could also be included on key breeding areas, refugia and sites of endemicity for species.

Other extensions to the current work should also consider new innovations in intensified agriculture suitable for Northern Australia that could secure more carbon and biodiversity at the site level.



Figure 1: A land-use zoning scenario in which all biodiversity features together are weighted 10-fold than agriculture and carbon storage - this approach could yield over 56,000 km² of agricultural development with a relatively low impact on biodiversity. Source: Moran-Ordonez A. et al. (2017). Analysis of Trade-Offs Between Biodiversity, Carbon Farming and Agricultural Development in Northern Australia Reveals the Benefits of Strategic Planning, Conservation Letters, January/ February 2017, 10(1), 94–10

Further Information

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