Executive Summary: Designing an ecological network for biodiversity and ecotourism in Maputaland

Funded by the UK Government through the Darwin Initiative

DARWIN INITIATIVE

Introduction

- We are in the middle of a global environmental crisis, with recent reports highlighting the dramatic loss of biodiversity, and the interdependency of healthy ecosystems, climate change mitigation, poverty alleviation and human wellbeing.
- In response, the world's governments are developing new conservation targets, with the Convention on Biological Diversity's draft Global Biodiversity Framework calling for 30% of the land and sea to be conserved by 2030.
- This draft target calls for these areas to be equitably managed, ecologically representative, and well-connected. It also stresses that the new areas can be protected areas (PAs), or OECMs (other effective area-based conservation measures).
- Designing conservation networks that achieve ecological, socio-economic and equity objectives is complicated. The systematic conservation planning approach was designed to be an efficient, repeatable, and transparent process for informing these conservation decisions.
- This is why systematic conservation planning is used to inform decision-making in the Maputaland Centre of Endemism (Smith et al. 2008), an area of 19,180 km^2 within Eswatini, Mozambique and South Africa (Figure 1).

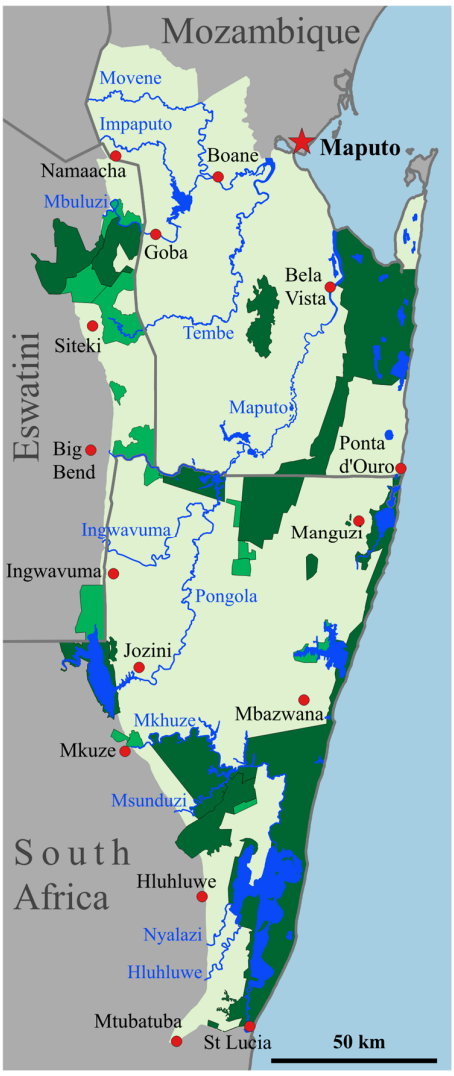

Figure 1: City, Towns, rivers, protected areas and conservation areas in Maputaland.

- Maputaland is a global biodiversity hotspot, prime ecotourism destination and home to some of southern Africa's poorest communities. It is the focus of the Lubombo Transfrontier Conservation Area (TFCA), a tri-government initiative launched in 2000. This aims to tackle poverty and biodiversity loss by improving infrastructure, training local people and expanding the PA and conservation area (CA) network.
- The Lubombo TFCA has made significant progress, but more is needed to develop conservation landscapes that protect threatened species and ecosystems, whilst also creating new job opportunities. This report describes the results of an analysis funded by the UK Government's Darwin Initiative to inform where best to create new OECMs, based on meeting conservation targets and establishing new community-based ecotourism initiatives.

Maputaland Conservation Planning System

- The Maputaland Conservation Planning System was developed by the Eswatini National Trust Commission, Administração Nacional das Áreas de Conservação, Ezemvelo KwaZulu-Natal Wildlife, the University of Eswatini, Universidade Eduardo Mondlane and DICE at the University of Kent. All Out Africa, Izele CIC and KUWUKA JDA also played a key role, together with technical experts from a number of different organisations.
- The Maputaland Conservation Planning System is based on the CLUZ plugin for QGIS (Smith 2019) and the Marxan with Zones spatial prioritisation software (Watts et al. 2009). Both software packages are open source and freely available, as is all the data used in the project. The analysis identified the best places for meeting conservation targets, whilst maintaining ecological connectivity and reducing negative impacts on people.
- Our spatial prioritisation analysis identified priority areas for new OECMs to meet conservation targets by complementing the existing PAs and CAs. We looked at two types of potential OECM: (1) High Management Intensity OECMs that would need additional resources to effectively conserve species at risk of over-harvesting and direct persecution, and (2) Low Management Intensity OECMs, where additional resources for conserving these species would not be needed.

Agricultural and Ecotourism suitability

- Our spatial prioritisation analysis was designed to identify where best to locate new OECMs to meet the conservation targets, but also to minimise negative impacts and increase positive impacts on people. For the High Management Intensity OECMs, we specified that areas of high agricultural suitability should be avoided where possible; for the Low Management Intensity OECMs, we specified that areas of high ecotourism potential should be preferentially selected, so that local communities could develop ecotourism-based livelihoods.
- The agricultural suitability map was developed by identifying the factors that best explained the spread of agriculture between 2006 and 2020. The analysis showed that the newly farmed areas were generally low-lying, close to existing agriculture and with high quality soils. We then converted these results into a map showing which patches of remaining natural vegetation are most at risk because of their agricultural suitability (Figure 2a).
- We produced the ecotourism suitability map by working with experts to identify, weight and combine nine important criteria based on landscape characteristics, biodiversity, accessibility, and social-cultural characteristics (Figure 2b).

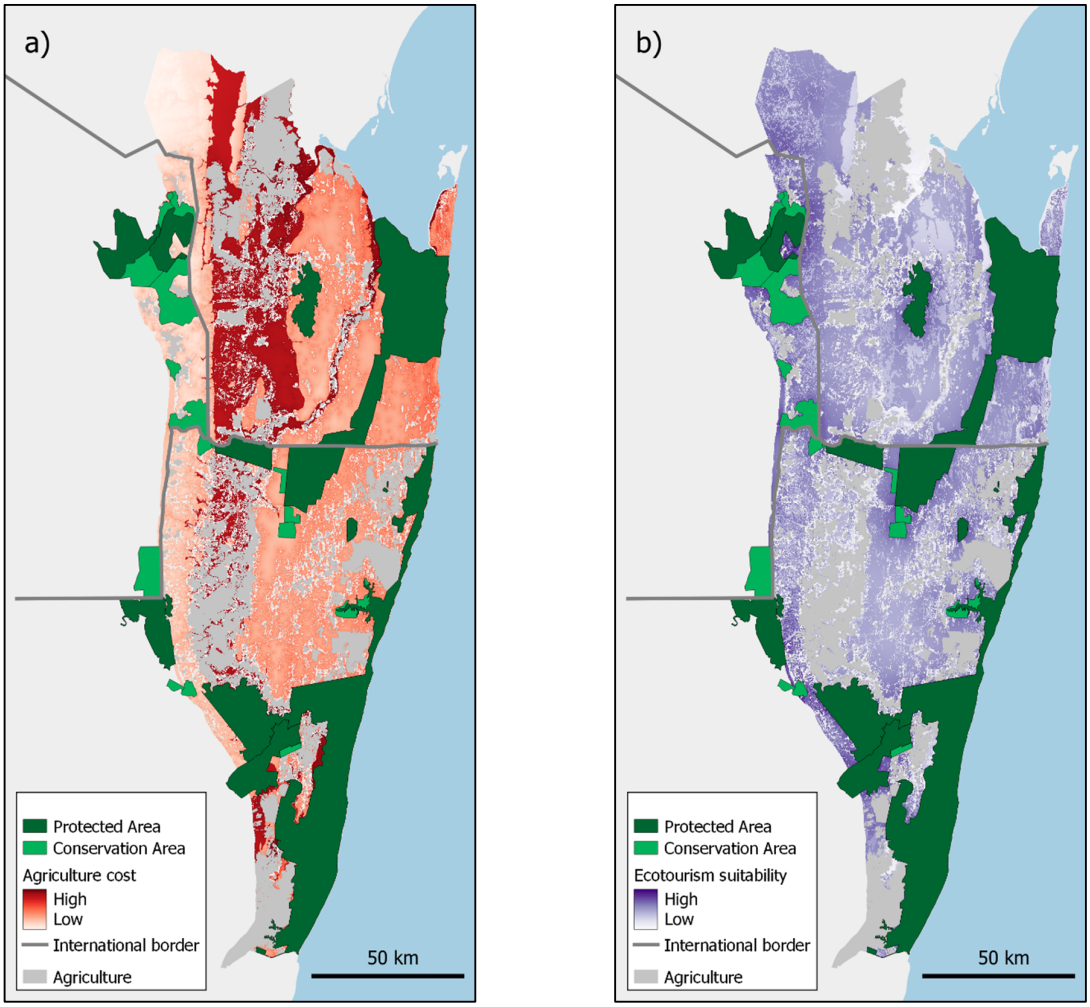

Figure 2: Maps showing (a) agricultural suitability and (b) ecotourism suitability that were used in the spatial prioritisation analysis to minimise the negative impacts of potential OECMs in Maputaland.

Measuring the network effectiveness

- To measure the effectiveness of the existing PA and CA network, we first produced distribution maps for 45 landcover types and 212 species. 42 of these species are threatened by over-harvesting or direct persecution, so we assumed they can only be conserved in PAs or new High Management Intensity OECMs. We then set numerical targets for each landcover type (Jewitt 2018) and species (Pfab et al. 2011), based on how much of their habitat should be included in the current PA and CA network, plus any new OECMs.
- Maputaland contains 11 PAs and 19 CAs covering 5,238 km^2, or 27.3% of the region. The PAs meet targets for 19 of the 45 landcover types and 141 of the 212 species. Adding the CAs to the PAs meets an additional 2 landcover type targets and 9 species targets. In general, the existing PA and CA network is better at meeting targets for species than landcover types, with birds and mammals particularly well represented (Figure 3).

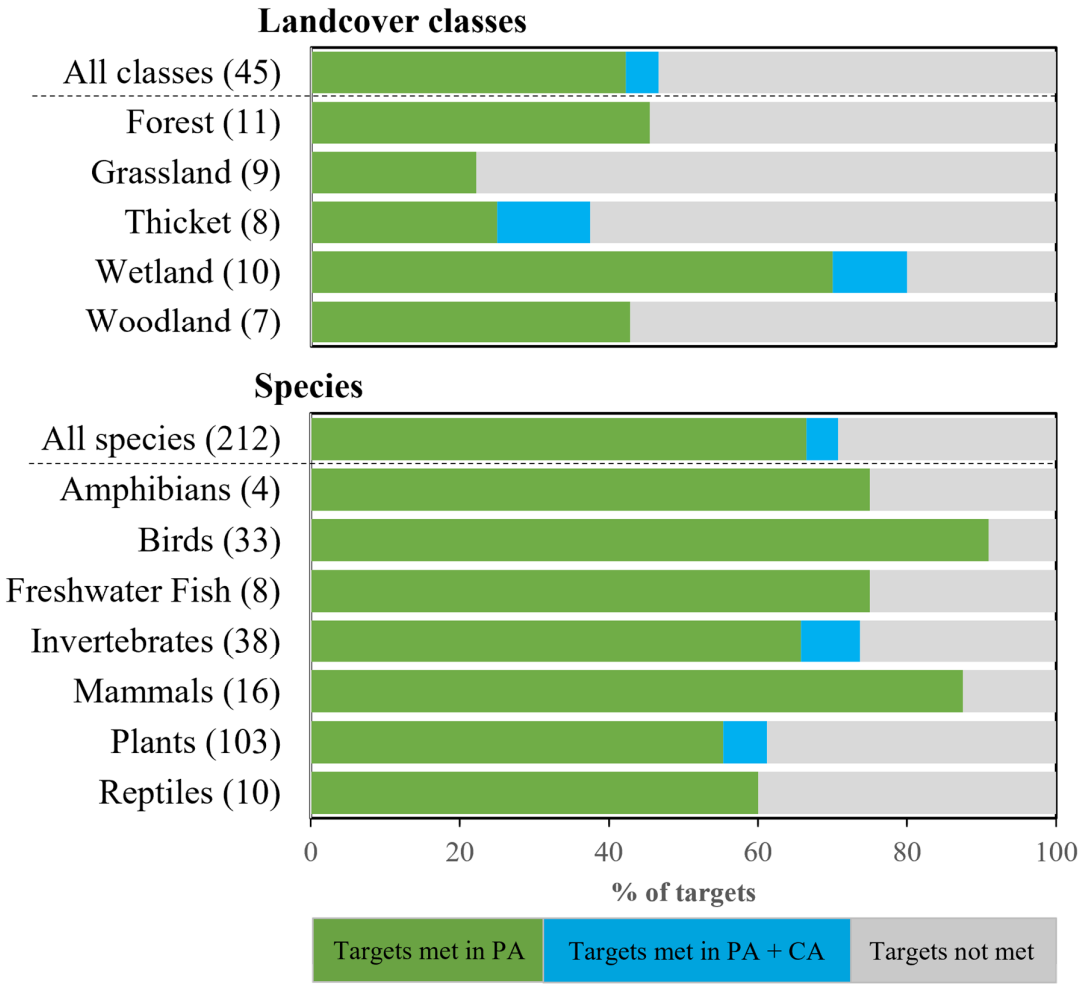

Figure 3: Proportion of conservation targets met by the existing protected areas (PAs) and existing protected areas and conservation areas (CAs) for different groupings of the landcover types and species. For example, PAs meet targets for 6 of the 8, or 75%, of the freshwater fish species.

Spatial prioritisation

- Our analysis identified the best places to create new OECMs in Maputaland (Figure 4), based on meeting all the conservation targets, minimising impacts on farming and maximising opportunities for community-based ecotourism. The proposed OECMs would add 4,974 km^2 of land to the existing PA and CA network, made up of 1,362 km^2 of High Management Intensity OECMs and 3,612 km^2 of Low Management Intensity OECMs.
- The proposed OECMs form large patches in the following areas: 1) Lubombo Mountains in the west; 2) around Licuati Forest Reserve, Tembe Elephant Park and Mkhuze Game Reserve in central Maputaland; and 3) around Maputo National Park and Lake Sibayi in the east. All of the High Management Intensity OECMs were located in the west, mostly to meet targets for plant species that are threatened by over-harvesting (Figure 4).

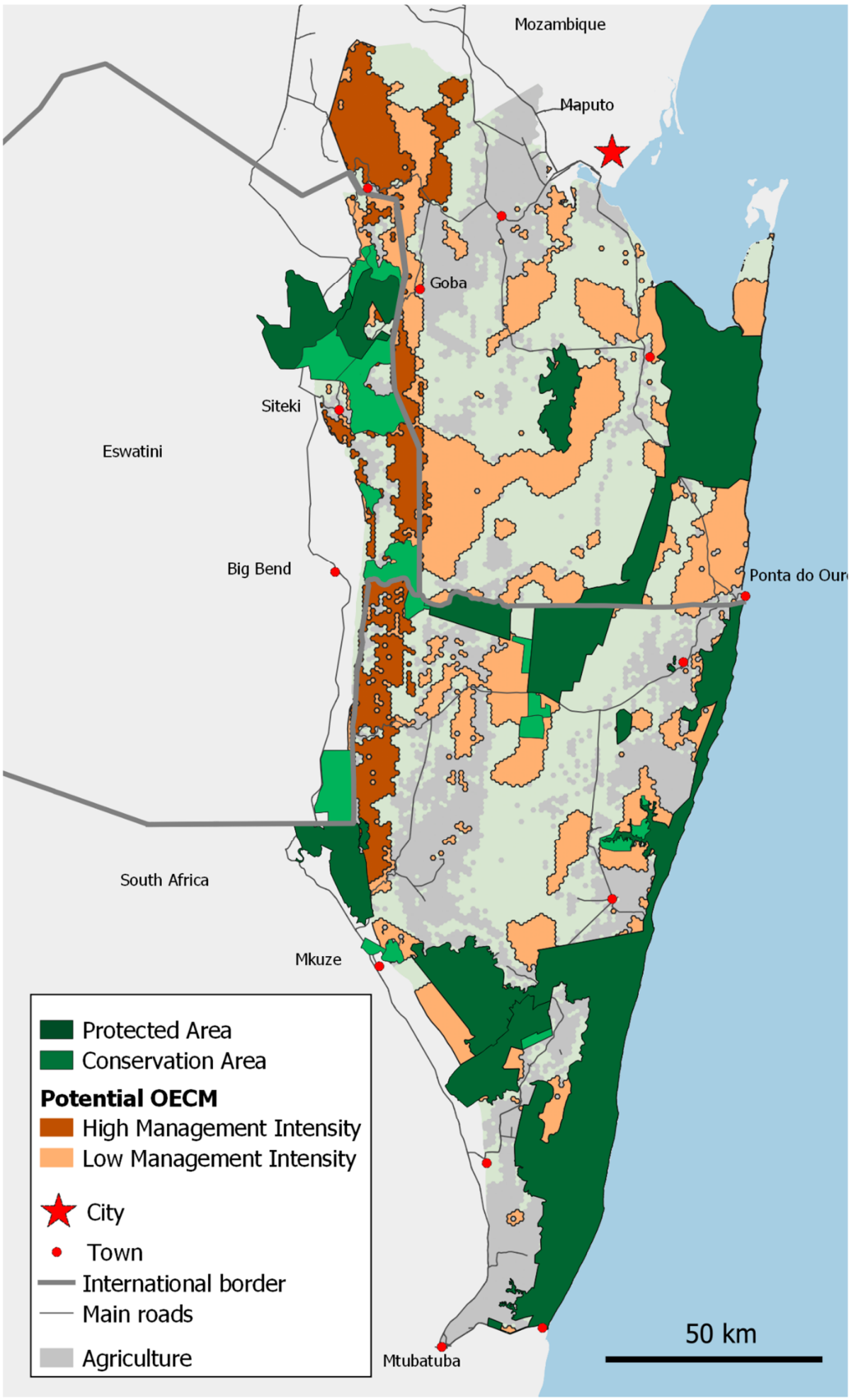

Figure 4: Marxan with Zones analysis showing the best places to locate new OECMs in Maputaland, based on meeting conservation targets, minimising impacts on farming and increasing opportunities for community-based ecotourism.

Discussion and future work

- The biodiversity and conservation value of Maputaland is widely recognised, which is why 27.3% of the region is in state-managed PAs or communally- and privately-managed CAs. However, there are important gaps, with many ecosystem types and species poorly represented.
- Our analysis identified an additional 4,974 km^2 of potential OECMs to fill these gaps by meeting conservation targets and increasing ecological connectivity, whilst minimising impacts on agriculture and increasing opportunities for ecotourism. This is 25.9% of the region, which together with the existing PAs and CAs would cover 53.5% of Maputaland.
- Our analysis was based on two types of OECM. Low Management Intensity OECMs would require similar levels of resourcing as existing community-based CAs. High Management Intensity OECMs would require higher resourcing to conserve species that are threatened by over-harvesting and direct persecution. Every OECM could support ecotourism, natural resource harvesting and agriculture, as long as they supported the ecosystems and species they were designed to conserve.
- Our analysis is designed to inform regional-scale decision making, not to determine exactly where action is needed. Future analyses should work with decision makers to develop sub-regional plans for informing action on the ground that include local-level objectives and data.
- This future work should also include field surveys to improve the distribution maps for Maputaland's many endemic and threatened species. Some of these species are poorly known and this influenced the location of some of the priority areas identified in our analysis.
- More broadly, the Maputaland Conservation Planning System should be used to inform a wide range of land-use decisions within the region, helping to ensure that future projects and actions benefit the people of Maputaland and their biodiversity.

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Citation

Matimele, H and Smith, RJ (2022). Executive Summary: designing an ecological network for biodiversity and ecotourism in Maputaland. DICE, Canterbury, UK. Unpublished report.

Data available from: https://izele.org/projects/278/

Acknowledgements

The spatial prioritisation analysis was produced by a core team of Adrian Armstrong, Orquidia Chiziane, Tânia Libanze, Hugo Mabilana, Seth Maphalala, Hermenegildo Matimele, Raimundo Matusse, Ara Monadjem, Tom Mullier, Camilo Nhancale, Cornélio Ntumi, Kim Roques and Bob Smith.

We are grateful to Nuwanthika Dharmaratne, Blaise Ebanietti, Nkosikhona Hlatshwayo and Katie McNie for producing key datasets and information used in the analysis. We are also grateful to the following people for their help in producing important datasets used in the conservation planning analysis and for developing the ecotourism suitability map: Askot Alafi, Tereza Alves, Pieter Bester, Kate Braun, John Burrows, Stuart Cable, Albert Chakona, Ines Chelene, Laura Chiluvane, Rosalina Cossa, Hugo Costa, John Craigie, Iain Darbyshire, Castigo Datizua, Camila de Sousa, Wisdom Dlamini, Meshack Dludlu, Francois du Randt, Eleuterio Duarte, Boyd Escott, Miguel Goncalves, Ross Goode, Catharine Hanekom, Alan Howland, Orlando Jalane, Kevin Jolliffe, Marinda Koekemoer, Clayton Langa, Linda Loffler, Mervyn Lotter, Nomsa Mabila, Kassia Macassa, Themba Mahlaba, Mnqobi Mamba, Elias Matsinhe, Lindani Mavimbela, Warren McCleland, Bernardo Melecuane, Cornélio Miguel, Laura Milne, Hlengiwe Mtshali, Kaveesha Naicker, Denise Nicolau, Délcio Odorico, Joanna Osborne, Suvarna Parbhoo, Michael Persson, Domitilla Raimondo, Saba Rokni, Jorge Sitoe, Pita Sitoe, Joelma Souane, Jonathan Timberlake, Wataru Tokura, Erica Tovela, Barbara Turpin, Troos van der Merwe, Sam van Zwietan, Fanie Vermaak, Hartwig von Durckheim, Delson Vutane and Phil White.

This work is in memory of our friend Camilo Nhancale and was funded by the UK Government through the Darwin Initiative (Project #25-003), the Royal Botanic Gardens, Kew, and the University of Kent.