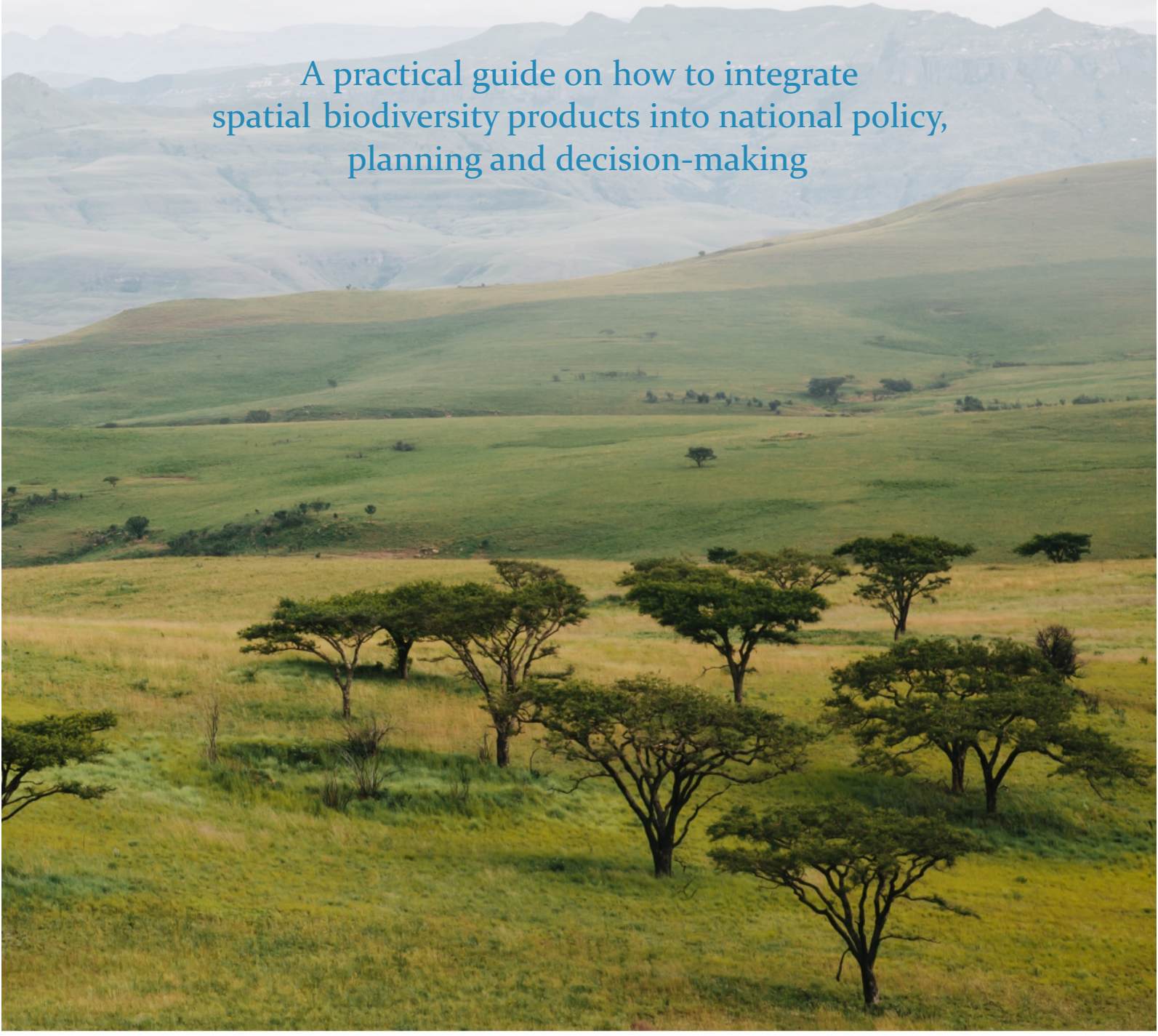
Mainstreaming Biodiversity Priorities:

A practical guide on how to integrate spatial biodiversity products into national policy, planning and decision-making



SANBI
Biodiversity for Life
South African National Biodiversity Institute

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Convention on Biological Diversity

Japan Biodiversity Fund
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Acknowledgements

The South African biodiversity planning community is acknowledged for their expertise and experience, on which this document draws extensively.

The production of this guidance was supported by the project "Mapping Biodiversity Priorities in Botswana, Ethiopia and Malawi, Phase Two", funded by the Japan Biodiversity Fund through the Secretariat of the Convention on Biological Diversity, and implemented by UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC).

Citation

UNEP-WCMC & SANBI. 2022. Mainstreaming biodiversity priorities: A practical guide on how to integrate spatial biodiversity products into national policy, planning and decision-making. South African National Biodiversity Institute, Pretoria, South Africa.

ISBN: 978-1-928224-57-0

Layout and design

SANBI Graphics and Editing

Cover photograph

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Endpaper photograph

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Executive summary

The previous guidance, **Mapping Biodiversity Priorities**[1], explains how to conduct Spatial Biodiversity Assessment and Prioritisation by combining a few basic datasets to produce useful headline indicators and maps of the state of biodiversity across a country. The basic input maps include a map of ecosystem types, a map of ecological condition and a map of protected areas. These are then combined in the assessment to produce two indicators: ecosystem threat status and ecosystem protection level.

The results are a set of spatial biodiversity products that are suitable for a wide range of applications. The purpose of this follow-up guidance is to give practical advice to those who have completed Spatial Biodiversity Assessment and Prioritisation on how to go about using the spatial products.

Mainstreaming biodiversity is about working with other sectors to make sure that biodiversity is considered whenever a decision is made that may impact biodiversity. Mainstreaming biodiversity benefits people, since we rely on natural ecosystems for human well-being and socio-economic development. Spatial Biodiversity Assessment and Prioritisation is particularly suited to mainstreaming biodiversity because it is a spatial, ecosystem-based approach that is conducted at national scale. It helps to show where ecosystems are most threatened and least protected, thus identifying priorities in the broader landscape where development impacts should be mitigated and biodiversity protection expanded.

Mainstreaming biodiversity involves taking the best available biodiversity science and applying it in a way that is relevant for policy and practical application. It involves adapting biodiversity information to meet the needs of a specific audience, and packaging the findings in a way that is user-friendly. There is no standardised method to go about mainstreaming. The approach taken and the tools used for mainstreaming depend on the context. However, it will often require communicating with people, developing information products and engaging with policy processes. To mainstream biodiversity, it is necessary to be explicit about how biodiversity can contribute to sustainable development and other national targets.

Integrating the results of Spatial Biodiversity Assessment and Prioritisation into broader policies and processes will often require additional effort towards developing supporting materials and making the resources known to users. With effort towards easy accessibility and clear presentation, Spatial Biodiversity Assessment and Prioritisation can become a recognised resource that users regularly go to for authoritative information on biodiversity. A summary of the findings, with well-articulated key messages and summarised statistics, can highlight the most important information that can be used across various reports and strategies.

There are many entry points for the products of Spatial Biodiversity Assessment and Prioritisation, but these generally fall within three main themes: to increase protection of biodiversity, to avoid loss of biodiversity, or to restore biodiversity that has been degraded. Among other uses, the products of Spatial Biodiversity Assessment and Prioritisation can be integrated into proactive spatial planning,

[1]SANBI & UNEP-WCMC. 2016. *Mapping biodiversity priorities: A practical, science-based approach to national biodiversity assessment and prioritisation to inform strategy and action planning.* United Nations Environment Programme – World Conservation Monitoring Centre, Cambridge.

reactive environmental authorisation, protected area expansion plans and restoration projects. Mainstreaming biodiversity into these processes generally involves interpreting how the map categories are relevant for the context. The map categories can be linked to specific sensitivity levels, management objectives or appropriate land-uses depending on the purpose of the policy. For example, a simple combination of the largest remaining natural sites of under-protected and highly threatened ecosystem types can provide a rapid basis for guiding protected area expansion.

Mainstreaming biodiversity is a long-term process that moves forward by building on previous efforts and taking advantage of opportunities as they arise. For this reason, measuring mainstreaming success can involve acknowledging small, incremental steps. Spatial Biodiversity Assessment and Prioritisation should not be seen as a static project output that is only done once. Mainstreaming will require that the assessment is kept up-to-date. Long-term mainstreaming of Spatial Biodiversity Assessment and Prioritisation calls for established systems by which feedback is received, data layers are reviewed, data gaps are addressed, the assessment is updated and mainstreaming is ongoing. In this way, mainstreaming the results of a Spatial Biodiversity Assessment and Prioritisation can eventually lead to improvements in biodiversity, ecosystem services and human well-being.

Andres Schieber via Flickr

Purpose and structure of this guidance

This guidebook builds on the previous guidance in **Mapping Biodiversity Priorities**[2], which set out a practical, science-based approach to Spatial Biodiversity Assessment and Prioritisation to inform strategy and action planning. The Mapping Biodiversity Priorities approach results in a set of spatial biodiversity products that are suitable for a wide range of applications.

This follow-up guidance expands on how the products from Spatial Biodiversity Assessment and Prioritisation can be used. The process of integrating biodiversity considerations into policy, strategies, planning and reporting is known as mainstreaming biodiversity. It involves interpreting the products for a specific target audience, presenting them clearly, and making them easily accessible. It may also involve giving advice on how the products apply in a particular policy context, establishing collaborative partnerships and working within policy processes and institutional systems. The purpose of this guidance is to give practical advice to those who have completed Spatial Biodiversity Assessment and Prioritisation on how to go about using the spatial products.

As with the previous guidance, the advice presented here draws on South Africa's extensive experience in mainstreaming spatial biodiversity products. The National Biodiversity Assessment has become a mainstay in South Africa, providing comprehensive information about the state of biodiversity. It is widely used in national policy, reporting and decision-making. Threatened ecosystems have been formalised into a legally published list, and incorporated into a range of law and policy. Biodiversity priority areas have been identified for all of the provinces as well as the marine and freshwater realms, and these priorities are now recognised in a range of policies that aim to avoid loss to competing land-uses, promote protection through expansion of protected areas and identify priority areas requiring restoration.

Mainstreaming biodiversity is possible across all realms

Much of this guidance is directed towards the terrestrial realm because that is where mainstreaming biodiversity has been implemented the longest. However, all the information is equally applicable for the marine, estuarine and freshwater realms.

[2]SANBI & UNEP-WCMC. 2016. *Mapping biodiversity priorities: A practical, science-based approach to national biodiversity assessment and prioritisation to inform strategy and action planning.* United Nations Environment Programme – World Conservation Monitoring Centre, Cambridge.

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Section 1: Background to mainstreaming biodiversity provides a definition of mainstreaming biodiversity, discusses why mainstreaming is important and how the products of Spatial Biodiversity Assessment and Prioritisation can be particularly useful for mainstreaming biodiversity.

Section 2: Mainstreaming approaches and tools gives a brief introduction to some of the useful conceptual frameworks and approaches for mainstreaming biodiversity. Links to additional resources on mainstreaming biodiversity are given throughout this section.

Section 3: Presenting the results contains information about how the results of Spatial Biodiversity Assessment and Prioritisation can be presented in a way that makes them suitable for mainstreaming. It gives details about how to summarise, standardise and make the products accessible so that they can be integrated into policies or strategies.

Section 4: Entry points to mainstream spatial biodiversity products explores the many policies, strategies and plans in which the results of Spatial Biodiversity Assessment and Prioritisation can be taken up and used.

Section 5: How to mainstream the spatial biodiversity products? goes into detail about how to use the spatial products for different purposes, including environmental authorisation, spatial planning and protected area expansion.

Section 6: How to measure mainstreaming success? discusses the long-term nature of mainstreaming biodiversity and the types of indicators that can be used to measure incremental progress.

Finally, **Section 7: Updating the Spatial Biodiversity Assessment and Prioritisation** provides information about how to set up a regular schedule so that the products remain up-to-date and relevant.

Deon Oosthuizen

Examples from South Africa

South Africa has substantial experience in the practical aspects of mainstreaming the products of Spatial Biodiversity Assessment and Prioritisation. The South African National Biodiversity Institute (SANBI) is a recognised authority on mainstreaming biodiversity[3]. Over the last two decades, it has gained valuable lessons in the approaches, mechanisms and tactics to successfully mainstream biodiversity[4].

Case studies from across Africa

A selection of case studies are included that show how other countries that have conducted Spatial Biodiversity Assessment and Prioritisation went on to mainstream the products into specific policy entry points. These countries were part of the Mapping Biodiversity Priorities project, through which the *Mapping Biodiversity Priorities* approach was applied in different contexts across Africa.

[3]Smith, J., Bass, S. & Roe, D. 2020. *Biodiversity mainstreaming: A review of current theory and practice.* International Institute for Environment and Development, London.

[4]Marsh, A., Botts, E.A., Driver, A., Mukhadi, F., Meiring, K. & Theart, M. 2021. Mainstreaming biodiversity and ecological infrastructure: an assessment. Water Research Commission, Pretoria.

Morgan Trimble

Section 1

Background to mainstreaming biodiversity

What is mainstreaming biodiversity?

The concept of mainstreaming biodiversity arose from the first Rio Earth Summit in 1992 that launched the Convention on Biological Diversity (CBD). The Convention calls on parties to integrate conservation and sustainable use into plans, programmes and policies across sectors. Since then, mainstreaming biodiversity has grown into an established practice, with a wide variety of approaches, mechanisms, entry points and spatial scales.

The Global Environmental Facility (GEF) is one of the largest funders of mainstreaming biodiversity worldwide. The GEF defines mainstreaming as:

> *"The process of embedding biodiversity considerations into policies, strategies and practices of key public and private actors that impact or rely on biodiversity, so that it is conserved and sustainably used both locally and globally."*

The goal of mainstreaming is for biodiversity to be considered whenever a decision is made that may impact biodiversity. Part of mainstreaming is to take biodiversity information and work with a range of sectors to include it in their decision-making processes. Successful mainstreaming contributes to sustainable development by making sure that all sectors take account of the natural systems on which economic activity and human well-being ultimately depend.

African leadership in mainstreaming biodiversity. Africa has emerged as a centre of knowledge for mainstreaming biodiversity. A large number of mainstreaming publications come from the continent and there are many practical case studies of successful mainstreaming across African nations. *The African Leadership Group in Biodiversity Mainstreaming* has developed a range of mainstreaming resources that capture practical experience.

For more information

GEF. 2019. *Evaluation of GEF Support to mainstreaming biodiversity.* Evaluation Report No. 134, Independent Evaluation Office, Global Environment Facility, Washington.

IIED & UNEP-WCMC. 2017. *Mainstreaming biodiversity and development: guidance from African experience*. 2012-17. International Institute for Environment and Development, London.

Mijatović, D., Sakalian, M. & Hodgkin, T. 2018. *Mainstreaming biodiversity in production landscapes.* United Nations Environment Programme, Nairobi.

OECD. 2018. Mainstreaming biodiversity for sustainable development. *Éditions OECD*, Paris.

Smith, J., Bass, S. & Roe, D. 2020. *Biodiversity mainstreaming: A review of current theory and practice.* International Institute for Environment and Development, London.

Why mainstream biodiversity?

The CBD states that:

> *"The objective of mainstreaming biodiversity is to help reduce the negative impacts that productive sectors, development investments and other human activities exert on biodiversity, by highlighting the contribution of biodiversity to socio-economic development and human well-being."*

Mainstreaming has benefits for human well-being and socio-economic development. Mainstreaming biodiversity does not benefit just plants, animals and ecosystems. People rely on natural ecosystems for a whole host of services and benefits, like food and water, raw materials, health and culture. If natural ecosystems are well managed, they can continue to provide these benefits for current and future generations. Conversely, if ecosystems become degraded, their contributions to people and the economy will be compromised. Therefore, using biodiversity sustainably also makes sense from a human and economic perspective. Spatial Biodiversity Assessment and Prioritisation seeks to identify the most important areas for biodiversity in a spatially efficient way, recognising that other land uses also require space. Ensuring that the ecosystems in priority areas remain healthy and functional will sustain the benefits that people receive from them.

Mainstreaming helps to sustain biodiversity both within and beyond protected areas. Securing biodiversity in protected areas is often the strongest form of conservation. Mainstreaming biodiversity can help to show why protected areas are necessary and should be expanded. However, biodiversity is also found beyond the boundaries of protected areas, in the production landscapes or seascapes where much human activity occurs. Spatial Biodiversity Assessment and Prioritisation helps to evaluate the current protected area network and show how it could be improved. It also identifies priority areas in the broader landscape where production and development sectors should try to mitigate biodiversity impacts.

Mainstreaming helps to address global biodiversity loss. It is now widely known that humans have caused a crisis of biodiversity loss that has global consequences. The causes of biodiversity loss are unsustainable use of natural resources and degradation of natural ecosystems. Mainstreaming biodiversity is necessary because it seeks to address these causes directly. By working with those industries and sectors that are negatively impacting on biodiversity, mainstreaming aims to help people make better decisions about how they use the natural environment. Spatial Biodiversity Assessment and Prioritisation helps to show where ecosystems are most threatened and least protected, as well as identifying spatial priorities for actions that will address the main pressures impacting on biodiversity.

Benefits of spatial biodiversity products for mainstreaming

Mapping Biodiversity Priorities explains how to conduct Spatial Biodiversity Assessment and Prioritisation by combining a few basic datasets to produce useful headline indicators of the state of biodiversity, and maps that help to guide planning and action.

The basic approach. Spatial Biodiversity Assessment and Prioritisation uses four key datasets: a *map of ecosystem types*, a *map of protected areas*, a *map of ecological condition*, and a set of biodiversity targets (**Figure 1**). It is possible even for data-poor or resource constrained countries to assemble these basic datasets and achieve useful initial products. It is then desirable to iteratively improve the analysis over time, or bring in additional data such as distribution data for species of conservation concern or Key Biodiversity Areas. See **Section 7: Updating the Spatial Biodiversity Assessment and Prioritisation**. The key datasets are easily combined to conduct a simple assessment that results in two headline indicators: *ecosystem threat status* and *ecosystem protection level*. The datasets and indicators reveal what biodiversity a country has, where it is and what state it is in. Spatial Biodiversity Prioritisation can then help to identify where the country should act first to manage and conserve its biodiversity.

Multiple applications. There is a whole range of possible ways that the products of Spatial Biodiversity Assessment and Prioritisation can be used (**Figure 1**). They can provide the biodiversity information that is necessary to report on national or international goals, and develop national strategies. They can be integrated into national policies that guide development planning or regulate land use. If the criteria of the IUCN Red List of Ecosystems are used, the results are suitable for submission for listing. The basic input maps can also be used in Natural Capital Accounting. Spatial prioritisation can help to identify biodiversity priority areas that should be prioritised for conservation or restoration action. There may be many further applications at sub-national level, in specific production sectors, by investment agencies, for specific projects, or by

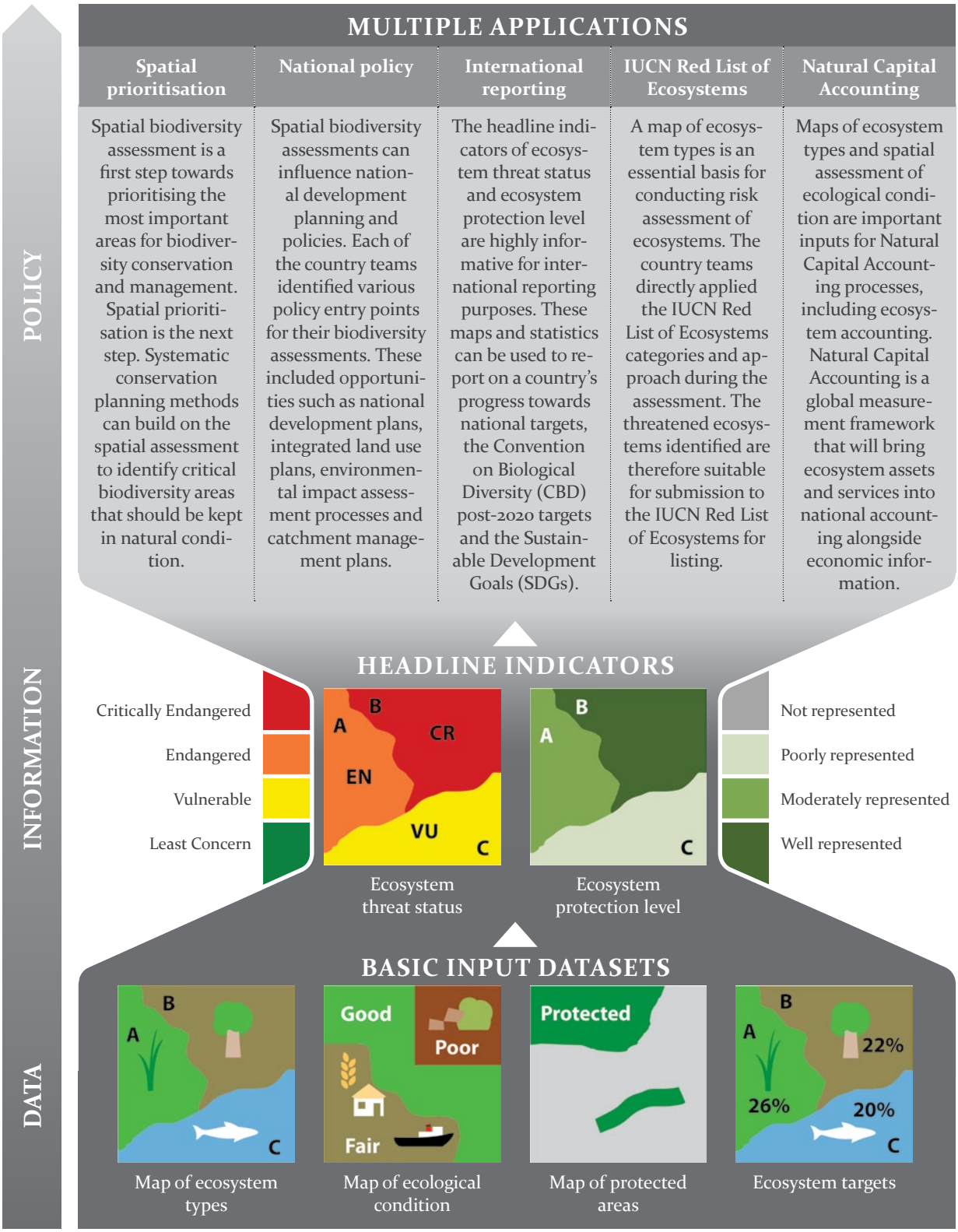

Figure 1: Spatial Biodiversity Assessment and Prioritisation uses four key datasets to assess biodiversity using two headline indicators. This information can be useful in multiple applications. Source: SANBI (2020).[5]

[5]SANBI. 2020. Mapping Biodiversity Priorities in Africa and beyond: Using spatial biodiversity assessment to inform national policies for better biodiversity management. *SANBI factsheet series.* South African National Biodiversity Institute, Pretoria.

the private sector. See **Examples of mainstreaming entry points**.

There are two characteristics of Spatial Biodiversity Assessment and Prioritisation that make it particularly useful for mainstreaming biodiversity:

Benefits of using maps for mainstreaming. Spatial Biodiversity Assessment and Prioritisation results in spatial products, such as maps of ecosystem types, maps of ecosystem threat status and protection level, and maps of biodiversity priority areas. These maps reveal where different ecosystem types occur, where across the country the ecological condition is good or poor, where the most threatened or under-protected ecosystems are found, and where to act most urgently to conserve biodiversity. A spatial approach is useful for mainstreaming because:

- The spatial priority areas that are identified can be linked to explicit actions, targeted at specific geographic locations.
- A spatial approach results in map products, which can impart a great deal of information in a visually engaging way. Maps are often an excellent way to start a conversation about mainstreaming biodiversity. They help people from different sectors to engage around something that is tangible. See **Section 3: Presenting the results**.
- The same set of maps from a spatial biodiversity assessment or spatial biodiversity prioritisation can be used across a variety of different purposes. This helps to make sure that the messaging from the biodiversity sector is consistent.
- Spatial biodiversity products can be directly integrated into broader land, catchment or marine planning processes that are also spatial.
- A spatial approach is often able to integrate different interventions across different sectors.
- Spatial assessments that are repeated at regular intervals are useful for monitoring and revealing trends occurring at specific locations. See **Section 6: How to measure mainstreaming success?**
- The results of a spatial assessment can be aggregated across a whole country, or for a range of sub-national regions, providing information at a range of different scales.

Benefits of working at the ecosystem level for mainstreaming. Spatial Biodiversity Assessment

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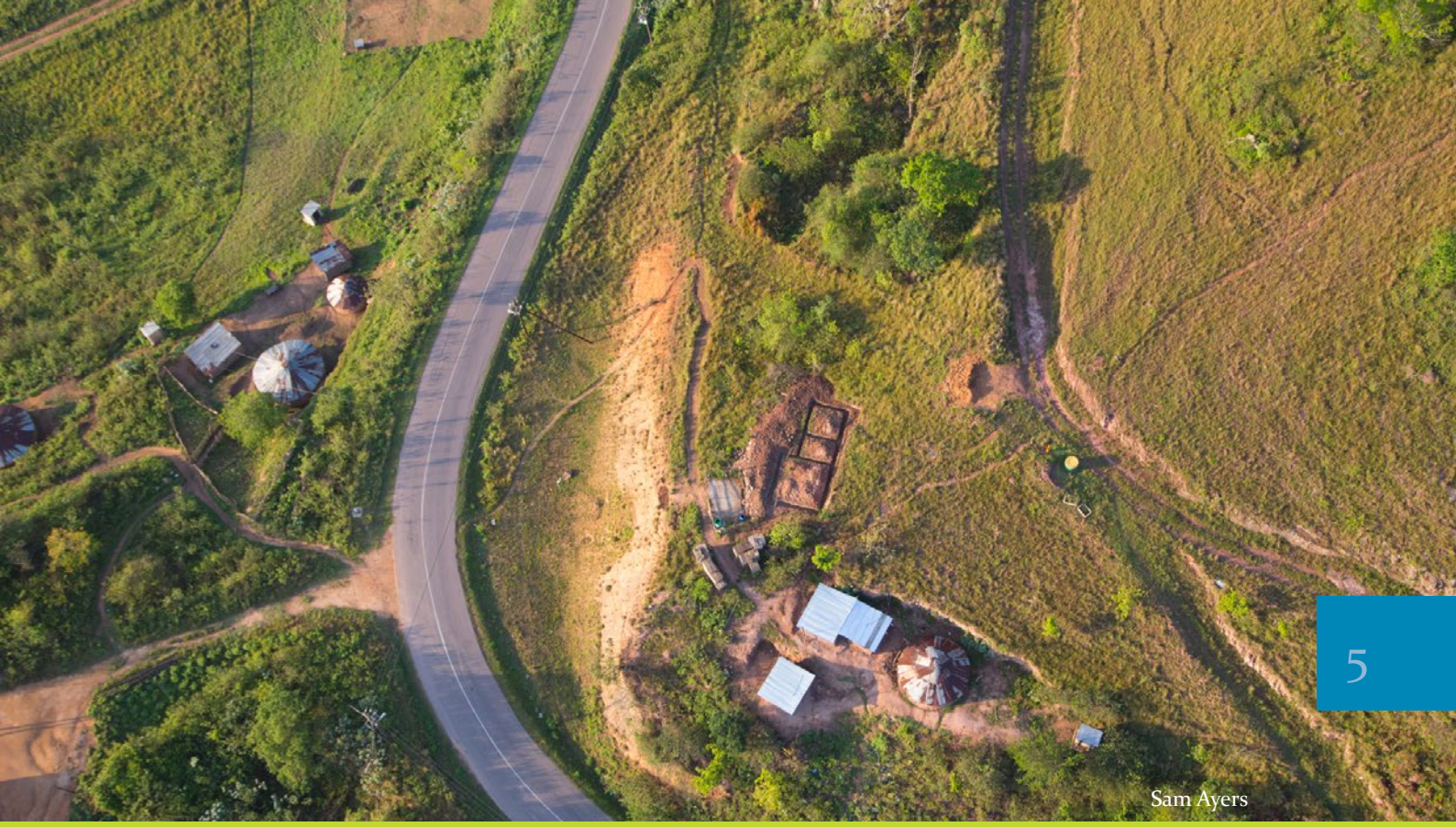

Sam Ayers

and Prioritisation is conducted at the level of ecosystem types. An assessment conducted at the level of ecosystems is useful for mainstreaming biodiversity (**Figure 1**) because:

- Ecosystem types can be mapped across the full wall-to-wall extent of a country's landscape or seascape. A national assessment at the level of ecosystems gives a complete view of the state of biodiversity for a whole country, which is useful for national policies and reporting.
- Working at ecosystem level intrinsically includes a broad range of ecological processes, habitat structure, and ecosystem services that provide benefits to people.
- Where there are limited species data available, ecosystem types can be used as a surrogate for biodiversity pattern.
- The IUCN has developed the Red List of Ecosystems methodology that uses an ecosystem-based risk assessment to complement the existing IUCN Red List of Species. Spatial Biodiversity Assessment can directly support the development of a national Red List of Ecosystems.
- Loss of natural habitats is one of the biggest causes of biodiversity loss, so conservation action should also be focussed on securing remaining intact areas of ecosystems.
- The CBD recommends an ecosystem approach for the implementation of its conservation actions. The CBD states that "the ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way".

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Section 2

Mainstreaming approaches and tools

Policy relevant science

Mainstreaming biodiversity involves taking the best available biodiversity science and applying it in a way that is relevant for policy and practical application. This requires that scientific information is structured so that it can be easily taken up into policy. There are three overall characteristics that help to take science into action:

Credibility is the foundation for policy relevant science. It means that the scientific information can be trusted and will stand up under enquiry. This is achieved by making sure the science is supported by suitable evidence and makes use of acceptable methods. Proper documentation of the methods and the findings will help to improve credibility. In the case of Spatial Biodiversity Assessment and Prioritisation, credibility comes from:

- Using robust methodology for Spatial Biodiversity Assessment and Prioritisation, including the internationally recognised IUCN Red List of Ecosystems methodology.
- Making use of adequate input datasets and acknowledging their strengths and weaknesses.
- Providing a technical report that details the input datasets and the steps followed.
- Making the technical report and spatial datasets easily accessible.
- Ensuring that scientific information is updated regularly and remains up-to-date.

Salience means that the scientific information is presented in a way that is relevant to policy. The scientific information must be fit for the purpose that it is going to be used for. This may involve developing targeted materials that interpret the science in simple terms. Making the information easily accessible, using non-technical language and explicitly making links to policy helps to improve salience. Enhancing the salience of Spatial Biodiversity Assessment and Prioritisation involves:

- Sharing the results with policy audiences.
- Presenting maps and findings in a consistent, visually appealing format.
- Producing a summary report for a wide audience that includes the most relevant information.
- Making links to the development priorities of the country.
- Limiting jargon in products intended for a non-scientific audience.
- Identifying key messages that summarise the findings.
- Providing an implementation manual that describes how the information should be used in a specific context.

Legitimacy means that the scientific information also takes into account the values of all stakeholders. It shows that the process is fair and representative. Legitimacy can be improved by making sure that there is strong communication with all relevant stakeholders. For Spatial Biodiversity Assessment and Prioritisation, legitimacy is created by:

- Establishing a **Community of practice** for Spatial Biodiversity Assessment and Prioritisation.
- Identifying a mandated organisation that can be responsible for co-ordinating Spatial Biodiversity Assessment and Prioritisation.
- Making sure that relevant stakeholders have been consulted.
- Working closely with those responsible for the selected policy entry point.
- Identifying knowledge gaps and recommendations.
- Setting up a schedule for future updates.

The scientific approach gives Spatial Biodiversity Assessment and Prioritisation its credibility. Mainstreaming the products of Spatial Biodiversity

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Assessment and Prioritisation is about improving the salience and legitimacy of the products. Managing trade-offs between credibility, salience and legitimacy is part of the work of mainstreaming biodiversity.

For more information

Cash, D.W., Clark, W.C., Alcock, F., Dickson, N.M., Eckley, N., Guston, D., Jäger, J. & Mitchell, R.B. 2003. Knowledge systems for sustainable development. *Proceedings of the National Academy of Sciences* 100: 8086–8091.

Game, E.T., Schwartz, M.W. & Knight, A.T. 2015. Policy relevant conservation science. *Conservation Letters* 8(5): 309–311.

Sitas, N., Nel, J. & Reyers, B. 2020. Lessons from mainstreaming ecosystem services into policy and practice in South Africa. In *Mainstreaming natural capital and ecosystem services into development policy* (pp. 40-59). Routledge.

Target audience for mainstreaming biodiversity

Mainstreaming biodiversity involves adapting biodiversity information to meet the needs of a specific audience. This does not mean changing the scientific basis, but rather packaging the findings in a way that is targeted and user-friendly. See **Section 3: Presenting the results**.

The way that the scientific information is presented and communicated depends on the target audience. There are many potential target audiences for the products of Spatial Biodiversity Assessment and Prioritisation, from non-government organisations, the private sector, government, or multinational organisations. Audiences often differ in the amount of technical information they require (**Table 1**).

For more information

IIED & UNEP-WCMC. 2017. *Mainstreaming biodiversity and development: guidance from African experience*. 2012-17. International Institute for Environment and Development, London.

Table 1: The approach and products used to reach three main target audiences of Spatial Biodiversity Assessment and Prioritisation.

	Target audience	Approach	Spatial Biodiversity Assessment and Prioritisation products
← Technical language and jargon →	Public audience	A general audience may be interested in what Spatial Biodiversity Assessment and Prioritisation has to say about the state of biodiversity in a country. This audience is unlikely to read a full technical report, preferring a very high-level summary of the findings. Key overall statistics, like the percentage of Critically Endangered ecosystems, can be impactful. It is essential to use non-technical language to reach this audience. Visual appeal will also help to attract a general audience, with simple map products, infographics or photos.	Summary report Map products Infographics Media articles
	Policy and implementation audience	The products of Spatial Biodiversity Assessment and Prioritisation will only be used in policy if they are easily understood by implementers. They may require access to technical information to check for credibility, but much more important is that the information is clearly interpreted for a specific purpose. For example, by explaining what the map categories mean for a particular policy. The language needs to be non-technical, or technical terms carefully defined. Policymakers can engage more easily with a well-designed map product than with raw spatial data. Face-to-face stakeholder engagement may be required to explain the approach and results. Once the products of Spatial Biodiversity Assessment and Prioritisation are accepted into a policy, training may be required for those decision-makers who are putting it into practice. If categories are referenced in the policy, open access to a standardised final version of the spatial data may be needed.	Summary report Implementation manual Map products Spatial data
	Scientific audience	The results of Spatial Biodiversity Assessment and Prioritisation can be useful to scientific researchers who are interested in the state of biodiversity or the specific datasets that have been generated. They often need to know the details of the methodology or statistical results. Access to the spatial data is important so they can include the data in their own research. Scientific language is acceptable. Researchers need an accepted source of information to cite.	Technical report Spatial data Peer reviewed publications

People, products, process approach

Mainstreaming biodiversity can be complex, and there is no standardised method. The approach taken and the tools used for mainstreaming depend on the context and need to be adapted to fit the purpose. Mainstreaming may make use of information resources, decision-support tools, information repositories, online tools, communications campaigns, administrative processes, communities of practice, and much more. However, there are three main aspects that are common in any mainstreaming effort, and these are, the people engaged, the products developed and the processes involved (**Figure 2**).

People. Mainstreaming biodiversity is a social endeavour that requires a deep understanding of the needs of other sectors and their ways of working.

Figure 2: The people, products, process approach to mainstreaming biodiversity. Adapted from Cadman et al. (2010).

It therefore involves ongoing communication with a wide variety of stakeholders. As it takes place at the interface between different sectors, new contacts with non-traditional partners need to be established. The social skills required to undertake mainstreaming include, amongst others, active listening, strategic thinking, a willingness to learn and an openness to different perspectives. Establishing a community of practice is a good way to keep people connected and maintain communication. See **Community of practice**. Targeted capacity building or formal training may be required to introduce biodiversity considerations to a new audience. Social processes can be time consuming because developing relationships and building trust take time. However, investing the time and effort in social processes can be critical for successful mainstreaming.

Products. Products are often the most practical aspect of mainstreaming biodiversity. They take the form of information or data resources, like guidelines, factsheets, maps, or decision-support tools. Products are the main way that biodiversity information is introduced into new arenas. The type of product should be adapted to fit the target audience and the purpose. See **Target audience for mainstreaming biodiversity**. Co-producing products with partners can be an essential part of mainstreaming that helps to build consensus. An initial draft is a concrete starting point for constructive debate and compromise. Since products are tangible outcomes, they are one of the ways to measure progress in mainstreaming. See **Section 6: How to measure mainstreaming success?**

Process. Products alone will not be taken up unless there is a focus on integrating them into institutional processes and systems. Mainstreaming often involves feeding information into existing legal or administrative processes, where the critical approach is about making the information applicable and easily useable. One of the main objectives of mainstreaming is to get biodiversity information used more regularly in the established operating procedures of other sectors. This may involve embedding biodiversity considerations into the way that institutions do their work on an everyday basis. The choice of what processes to target may be opportunistic, based on present government imperatives or upcoming policy revisions. Importantly, processes such as financial management can have an impact on the flow of resources towards biodiversity considerations.

For more information

Cadman, M., Petersen, C., Driver, A., Sekhran, N., Maze, K. & Munzhedzi, S. 2010. *Biodiversity for Development: South Africa's landscape approach to conserving biodiversity and promoting ecosystem resilience.* South African National Biodiversity Institute, Pretoria.

Manuel, J., Maze, K., Driver, M., Stephens, A., Botts, E.A., Parker, A., Tau, M., Dini, J., Holness, S. & Nel, J. 2016. People, products, process: The key ingredients, challenges and lessons from biodiversity mainstreaming in South Africa. *OECD Environment Working Papers* 107, OECD Publishing, Paris.

Marsh, A., Botts, E.A., Driver, A., Mukhadi, F., Meiring, K. & Theart, M. 2021. Mainstreaming biodiversity and ecological infrastructure: an assessment. Water Research Commission, Pretoria.

Nel, J.L., Roux, D.J., Driver, A., Hill, L., Maherry, A., Snaddon, K., Petersen, C., Smith-Adao, L.B., Van Deventer, H. & Reyers, B. 2016. Knowledge co-production and boundary work to promote implementation of conservation plans. *Conservation Biology* 30: 176–188.

Community of practice

Establishing a community of practice for Spatial Biodiversity Assessment and Prioritisation can be a good foundation for mainstreaming the spatial products. A community of practice is a group of people who interact regularly about a common concern so that they can share lessons and learn from each other. It is maintained by holding regular events for people to interact, and by establishing channels for communication. A community of practice is beneficial for mainstreaming for many reasons, including:

A community of practice supports peer learning. Learning from others is one of the most beneficial aspects of a community of practice. However, it should not extend to just the scientific methodology for Spatial Biodiversity Assessment and Prioritisation. The peer community can be an excellent resource to learn about mainstreaming the products. Since mainstreaming involves such varied mechanisms and approaches, learning from others about their success and failures can help to make progress in mainstreaming.

A community of practice increases capacity. For Spatial Biodiversity Assessment and Prioritisation to become an accepted way for a country to assess its biodiversity, it needs to be understood by a broad base of people rather than just the small handful of people who perform the assessment. A community of practice is a way to bring in new capacity and make them aware of the approach and its uses. The community of practice can also provide structures for formal training.

A community of practice can span boundaries. Since mainstreaming is often multidisciplinary, and involves both scientists and practitioners, a community of practice is a good way to keep a wide range of people involved. Participants may include researchers, government officials, consultants, and non-government organisations. It is useful if a mandated organisation can co-ordinate the community of practice, as it is then able to bring together those from both scientific and policy arenas and help to interpret information between the two. There is a range of literature about 'bridging agents' and 'boundary' work that can provide more information on this role.

For more information

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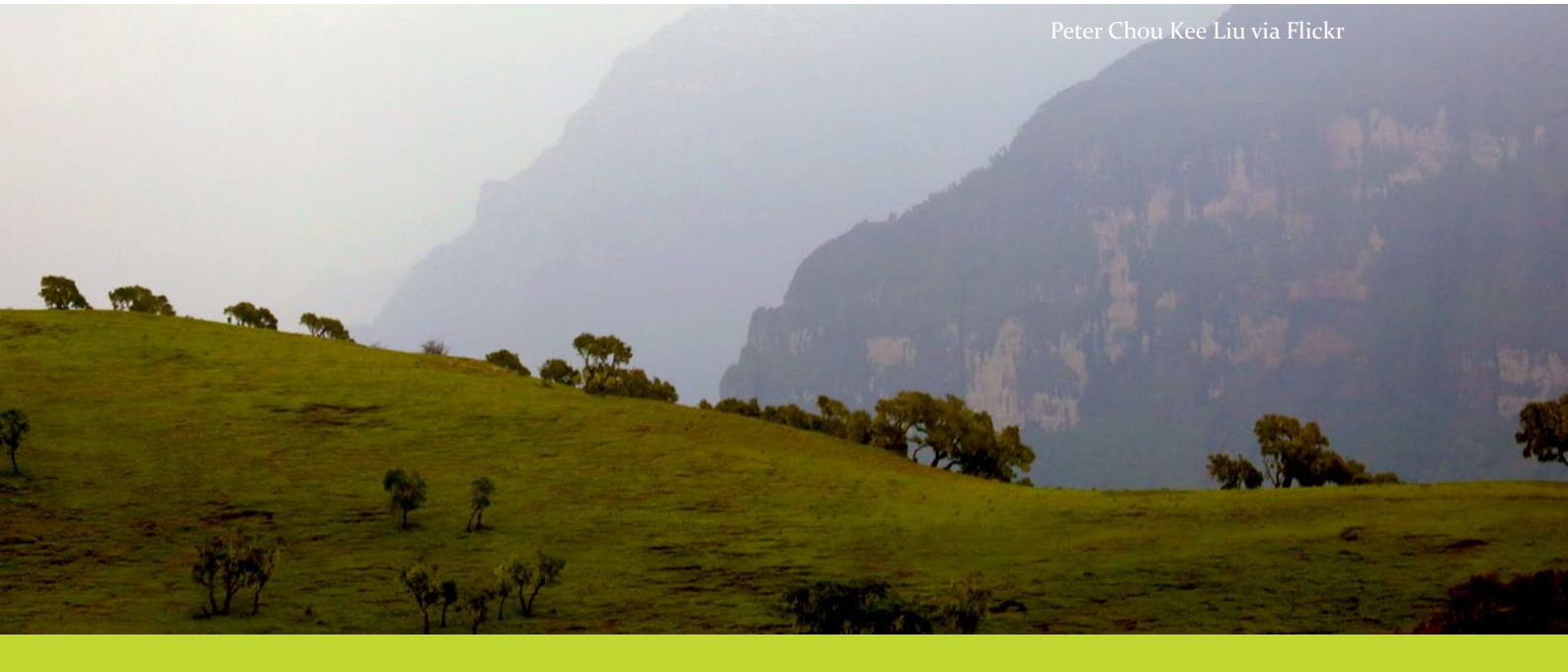

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BOX 1:
Example from South Africa: The Biodiversity Planning Forum

The Biodiversity Planning Forum is a conference that has been held annually in South Africa for more than 15 years. It is the basis for a community of practice that brings together people involved in all aspects of Spatial Biodiversity Assessment and Prioritisation. Beginning in 2004 with less than 50 people, it has grown into a diverse community that annually attracts 200 participants, from different levels and agencies of government, non-government organisations, consultants and academia. More than 1 000 different people have been involved over the years.

From an early stage, the Biodiversity Planning Forum chose to emphasise 'planning for implementation', requiring that its content show how spatial biodiversity products are appropriate for implementation by end-users. A further Biodiversity Planning Technical Working Group is drawn from among the Forum's participants, particularly those involved in the development of spatial biodiversity plans at provincial level. This group meets to discuss details of the scientific methodology as well as specifics about policy integration. The community of practice has been essential in co-producing a number of resources about spatial biodiversity planning and mainstreaming biodiversity in South Africa.

Figure 3: The 16th meeting of South Africa's annual Biodiversity Planning Forum was held in 2019. Participants come from different levels and agencies of government, non-government organisations, consultants and academia. Photograph: SANBI.

Messaging for mainstreaming biodiversity

A big aspect of mainstreaming biodiversity is communication. Gaining the attention of a policy audience can depend on the way that messages are communicated. Experience has shown that negative messaging that focuses on threat or "fear-of-loss" results in apathy. It does not inspire people to take action. Instead, the tone of mainstreaming messages should be positive, showing how people can have "hope of gain" by considering the benefits that arise from biodiversity.

Messaging strategy to make the case for biodiversity. A market research exercise conducted in South Africa developed a three-point messaging strategy for biodiversity communications (**Table 2**). To reach a policy audience, the most convincing message was one of biodiversity as a national asset. This message speaks of biodiversity as natural capital that has economic value to the country, and points out the value of ecosystem services to other economic sectors and job creation. This message can also be backed up by a sustainability argument – using natural resources sustainably means that they will continue to provide benefits in the future. Finally, all messaging should include a practical element, telling the specific audience what they can do about the issue.

Table 2: The main messaging elements of the Making the Case for Biodiversity communications strategy. Adapted from Maze et al. (2016).[6]

	Messaging element	Description
	**Economic value** "Have to"	Rational arguments about how biodiversity contributes to national development goals such as job creation, poverty alleviation and rural development.
	**Emotional value** "Want to"	Emotional messages that should inspire feeling and empathy, emphasising that biodiversity is important for the future of our children and country.
	**Practical value** "How to"	Practical messages that should give people concrete actions that they can take to effect change. They should be implementable to avoid the sense of being overwhelmed by the task.

Biodiversity and development. An important lesson in communications is that biodiversity must not be perceived as opposing development. Especially in developing countries, economic and social development is essential to address poverty and inequality. However, there are many ways that development can benefit from biodiversity. Functioning ecosystems are essential for food and water security, health, and protection from disasters. Rural communities, in particular, rely directly on nature to gather food, water, fuel and materials. The agriculture sector is heavily dependent on biodiversity for ecosystem services like pest control, pollination, grazing and preserving soils. Many jobs across the economy are dependent on biodiversity. It is important to look for "win-win" situations and make the links between biodiversity and development as explicitly as possible. See **Making links to development priorities**.

Importantly, clarity around decision-making is also very beneficial for development. Removing uncertainty about how biodiversity is considered during decisions reduces business risk that may come from unexpected adverse decisions, legal challenges or requirements for expensive mitigation measures. Multinational companies increasingly need to demonstrate to their consumers and shareholders that they are operating responsibly towards the environment. In many ways, mainstreaming biodiversity is about shifting decision-making to higher levels of the mitigation hierarchy. See **Environmental authorisation**.

[6]Maze, K., Barnett, M., Botts, E.A., Stephens, A., Freedman, M. & Guenther, L. 2016. Making the case for biodiversity in South Africa: Re-framing biodiversity communications. *Bothalia – African Biodiversity & Conservation* 46(1): 1–8.

For more information

Cadman, M., Petersen, C., Driver, A., Sekhran, N., Maze, K. & Munzhedzi, S. 2010. *Biodiversity for Development: South Africa's landscape approach to conserving biodiversity and promoting ecosystem resilience.* South African National Biodiversity Institute, Pretoria.

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Making links to development priorities

Governments are often already working towards delivering development outcomes, based on development plans or strategies, like the international Sustainable Development Goals (SDGs) or a National Development Plan. To mainstream biodiversity, it is necessary to be explicit about how biodiversity can contribute to development priorities and national targets. This involves investigating development strategies to identify aspects where biodiversity may be relevant. Then, it is possible to respond by providing suitable information with a clear message, so that policymakers are able to understand how biodiversity meets their needs. Many global and national development plans recognise that biodiversity is essential to achieving sustainable development. Spatial Biodiversity Assessment and Prioritisation provides a range of information that may help to both deliver and report on development targets. See **Integrating the results into reports and strategies**.

2030 Agenda for Sustainable Development: The SDGs are the main planning and implementation framework for national governments, multilateral organisations and donor agencies until 2030. The biosphere – life on land, in the oceans, the climate and water cycles – can be viewed as the foundation for all of the societal and economic goals of the SDGs (**Figure 4**, **Table 3**). Functioning ecosystems provide people with healthy living spaces, food, water and livelihoods. For this reason, there are many ways that mainstreaming biodiversity can contribute to the SDGs, far beyond just the two main goals that directly refer to nature (Goal 14: Life below water and Goal 15: Life on land).

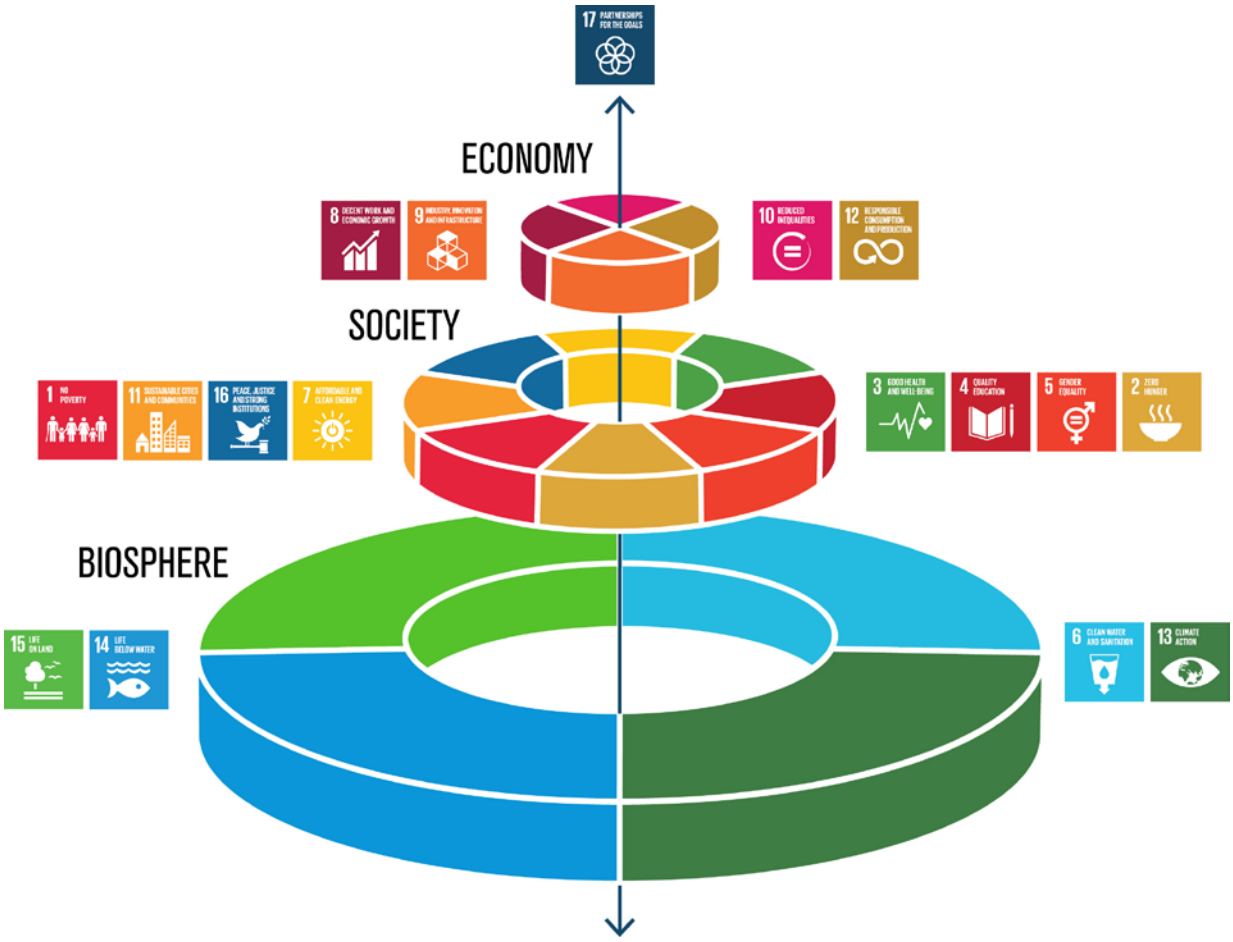
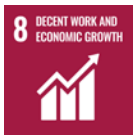


Figure 4: Biodiversity is the basis for all the Sustainable Development Goals. Credit: Azote Images for Stockholm Resilience Centre, Stockholm University.

Table 3: Biodiversity can contribute to meeting each of the Sustainable Development Goals. Summarised from CBD (2016).[7]

	Biodiversity provides resources and income, particularly for the rural poor, the majority of whom directly depend on biodiversity and ecosystems for their subsistence. Biodiversity also underpins millions of jobs.
	Biodiversity is a key element of food security and a means of improving nutrition. Biodiversity also underpins ecosystem functions, such as pollination and the maintenance of soil fertility, and water quality, which are central to agricultural productivity.
	Nearly 1 in 4 deaths globally is attributed to environmental risk factors. Healthy ecosystems help to mitigate the spread and impact of pollution by both sequestering and eliminating certain types of air, water and soil pollution.
	Increasing awareness and knowledge of biodiversity and ecosystems is a key element for sustainable development and sustainable lifestyles.
	Women play a vital role in agriculture, nutrition and the well-being of families and communities. Recognising women's roles as key land and natural resource managers is central to sustainable development.
	Ecosystems help maintain water supply and quality, and guard against water-related hazards and disasters. Managing ecosystems to maintain these types of services is generally more cost-effective than employing built technologies.
	Bio-energy produced from renewable biomass such as forestry by-products and agricultural residues, and other forms of renewable energy generated based on ecosystems such as hydropower systems, can provide major opportunities for supplying cleaner and affordable energy.
	Marine and terrestrial ecosystems underpin many national and global economic sectors providing employment such as agriculture, forestry, fisheries, energy, tourism, transport and trade.
	Biodiversity and healthy ecosystems can provide reliable and cost-effective natural infrastructure. Such green infrastructure can offer multiple benefits and are often more effective than built infrastructure in terms of cost, longevity and effectiveness.
	Recognising rights to sustainable management of natural resources, enhancing values of biodiversity and related knowledge, and building an environment for equitable benefit-sharing has the potential to improve socioeconomic and political inequality among social groups.

[7]CBD. 2016. *Biodiversity and the 2030 Agenda for Sustainable Development: Technical Note.* Convention on Biological Diversity, COP13, Cancun, Mexico.

Table 3: Biodiversity can contribute to meeting each of the Sustainable Development Goals. Summarised from CBD (2016)[7] (continued).

	Ecosystems and biodiversity underpin the day-to-day functioning of human settlements. Biological resources provide many of the foods, building materials, energy, and medicines that are consumed in urban centres.
	Utilising cleaner and more resource-efficient approaches that minimise wastes and pollutants can bring about economic opportunities and better quality of life for consumers and producers alike, and at the same time benefit biodiversity.
	Forests, peatlands, wetlands, ocean and coastal ecosystems represent globally significant carbon stores, and their conservation and sustainable use is a critical element for avoiding dangerous changes to the Earth's atmospheric temperature and climate system.
	The conservation and sustainable use of biodiversity in marine and coastal ecosystems is a key aspect of sustainable development. Conservation and sustainable use of marine and coastal biodiversity is essential to ensure that the world's oceans, seas and marine resources remain vital for current and future generations.
	The conservation, restoration and sustainable use of terrestrial ecosystems is essential for sustainable development and for achieving other SDGs. Targets under this goal include a call to integrate ecosystem and biodiversity values into national and local development planning, poverty reduction strategies and accounts.
	Conflicts over natural resources, environmental degradation and contamination can be one of the factors leading to social insecurity and violence.
	Strengthening global partnerships on science, technology and innovation, dissemination of environmentally sound technologies, and building national capacity will be fundamental to successfully implementing a transformative agenda.

[7]CBD. 2016. *Biodiversity and the 2030 Agenda for Sustainable Development: Technical Note.* Convention on Biological Diversity, COP13, Cancun, Mexico.

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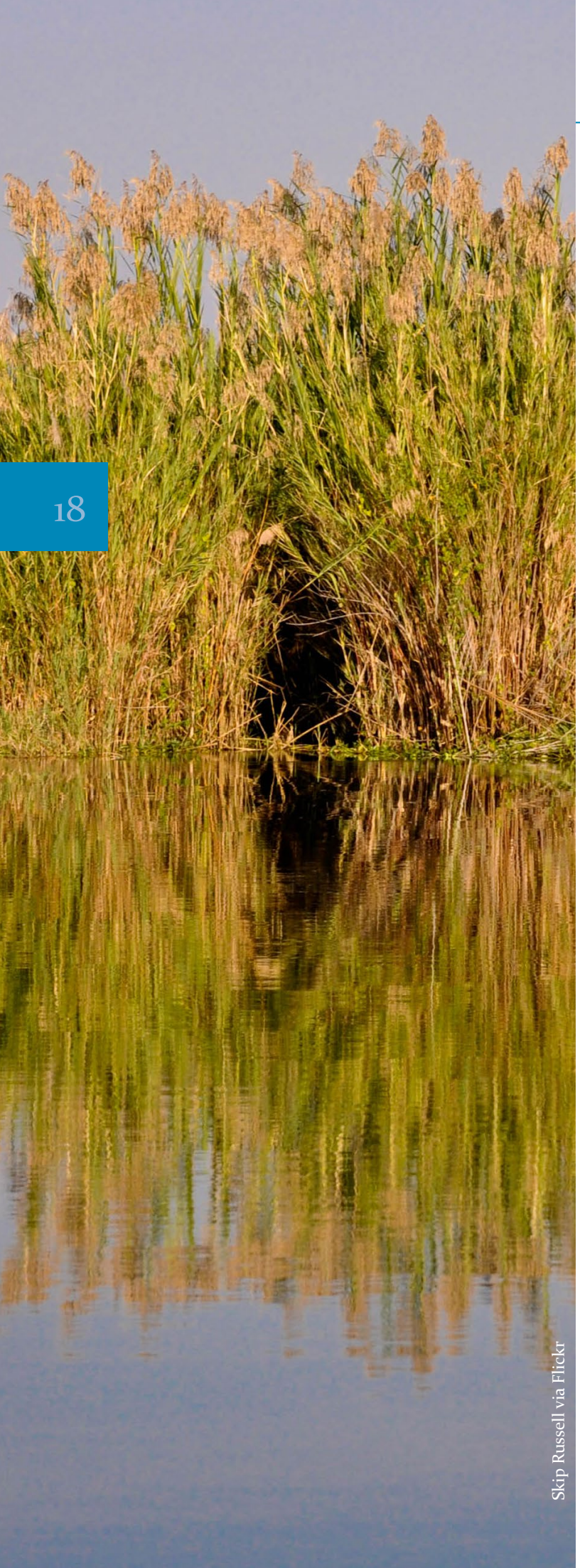
National Development Plans differ depending on the context of the country. However, many of them acknowledge biodiversity in some form using language such as "environmental priorities", "sensitive environmental features" or "sustainability". Spatial Biodiversity Assessment and Prioritisation may have relevance to a number of targets in a National Development Plan, such as those related to wildlife management, restoration, sustainable agriculture, formal protected areas, water security, land use planning, climate change resilience and more. Mainstreaming biodiversity involves identifying these links and then adapting biodiversity information with a message that explicitly relates to the language of development priorities. Furthermore, when a National Development Plan is being developed or revised, there is an opportunity for the products of Spatial Biodiversity Assessment and Prioritisation to influence the formulation of new conservation or sustainability targets.

The proposed **Global Biodiversity Framework** (First draft: CBD, 2021) will guide the implementation of the CBD until 2030. It will continue the work of the Aichi Biodiversity Targets and retains a very strong focus on mainstreaming biodiversity for the next decade. The results of Spatial Biodiversity Assessment and Prioritisation can contribute to many of the targets under the Global Biodiversity Framework. They can also help to monitor and report progress toward the targets. Targets with strong relevance to Spatial Biodiversity Assessment and Prioritisation include:

- **Target 1** seeks to achieve integrated spatial planning across all land and sea areas that is inclusive of biodiversity. This will help to ensure that biodiversity is accounted for in land and sea use change. Spatial Biodiversity Assessment and Prioritisation follows a strongly spatial approach that is applied systematically across the whole area of a country. For this reason, it can be easily incorporated into integrated spatial planning. See **Multi-sectoral spatial planning**.
- **Target 2** aims that 20% of degraded ecosystems are restored. Spatial Biodiversity Assessment and Prioritisation can help to identify and prioritise degraded ecosystems, set restoration targets and monitor restoration success. See **Restoration**.
- **Target 3** envisions that at least 30% of land, sea and freshwater area is conserved in formal protected areas or other effective area-based conservation measures. Spatial Biodiversity Assessment



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and Prioritisation can be used to identify areas that are priorities for protected area expansion. See **Protected area expansion**.

- **Target 14** calls on parties to integrate biodiversity values into policies, regulations, planning, development processes, poverty reduction strategies, accounts and assessments of environmental impact. The products of Spatial Biodiversity Assessment and Prioritisation, particularly map products, are well-suited to mainstreaming and can be a means to achieving this target. See **Environmental authorisation** and **Single-sector spatial planning**.

National Biodiversity Strategies and Action Plans (NBSAPs). Under the CBD, each country is required to prepare an NBSAP that plans how it will implement actions to meet the objectives of the CBD. When developing or revising an NBSAP, Spatial Biodiversity Assessment and Prioritisation cbe very useful in providing baseline information on status and trends, while also helping to identify spatial priorities to guide target setting and focussed actions. Spatial Biodiversity Assessment and Prioritisation can then also be used to monitor and report on progress towards achieving targets, for example targets relating to protected area expansion, reducing pressures on threatened ecosystems, restoring degraded ecosystems and more.

Natural Capital Accounting (NCA) is the systematic measurement of stocks and flows of natural resources. It provides a practical tool for measuring how nature supports people and the economy. The measurement framework for NCA is the United Nation's System of Environmental-Economic Accounting (SEEA), which includes SEEA Ecosystem Accounting, recently adopted as a global standard. Ecosystem Accounting takes an explicitly spatial and ecosystem-based approach. It includes accounts for ecosystem extent, ecosystem condition and ecosystem services. These accounts are developed in biophysical terms, with the option of building on the biophysical accounts to develop accounts in monetary terms. The map of ecosystem types and map of ecological condition that are developed during Spatial Biodiversity Assessment and Prioritisation can be direct inputs into Ecosystem Accounting. Using the same datasets across both processes means that information is consistent across different types of national reporting.

Sub-national development priorities. Development priorities at local or regional levels could also be relevant. Spatial Biodiversity Assessment and Prioritisation can provide information towards these sub-national plans or strategies in the same way that it is used at national scale.

For more information

Cadman, M., Petersen, C., Driver, A., Sekhran, N., Maze, K. & Munzhedzi, S. 2010. *Biodiversity for Development: South Africa's landscape approach to conserving biodiversity and promoting ecosystem resilience.* South African National Biodiversity Institute, Pretoria.

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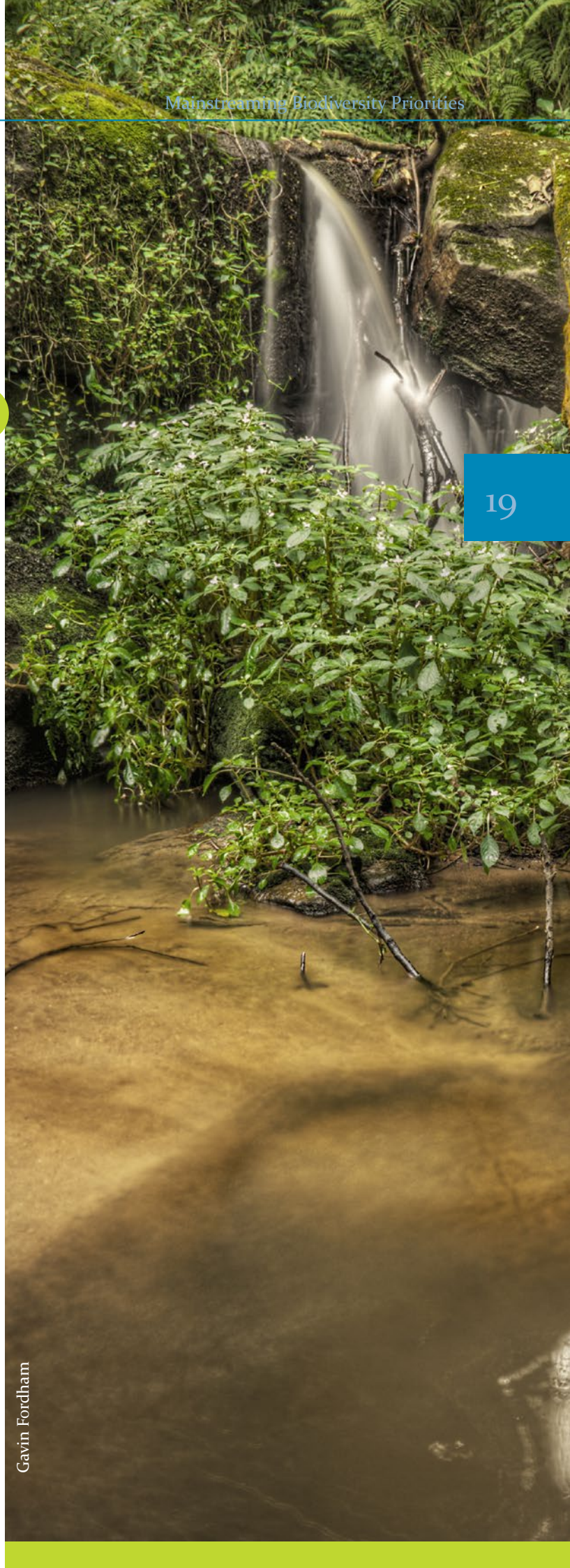

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Section 3

Presenting the results

Performing the Spatial Biodiversity Assessment and Prioritisation and creating the maps takes only a small amount of time and effort in comparison to mainstreaming the products. It is important to realise that developing supporting materials, making the resources known to users, and training stakeholders in their use, takes much longer than the initial map development.[8] Taking the time to think about how the data is interpreted, presented and made available can dramatically improve uptake of the products.

Importantly, Spatial Biodiversity Assessment and Prioritisation provides a standard set of robust information on the status of biodiversity. It can become a recognised resource that users regularly go to for authoritative information on biodiversity. While the information can be packaged in ways that are relevant to particular sectors, users appreciate that it is based on the same consistent evidence base and standard analysis methodology.

Access and sharing

Accessibility is one of the most important aspects of getting the products widely used. It is imperative to establish a stable platform from which to share GIS datasets, map products and supporting documentation. The data and information should be made available openly and for free. Some aspects to consider about access and sharing include:

Make products easily available. Any user wishing to access the products of the Spatial Biodiversity Assessment and Prioritisation should be able to find and retrieve them easily. The best way to do this is through an easily accessible online repository. However, for immediate sharing of results in the interim, a simple shared folder saved to cloud storage can be helpful. It is important to ensure that only the final results are shared and that files are well labelled and logically organised.

Establish an online repository. Over the longer term, it is useful to established a recognised online repository to share the results and any future updates. The repository should offer a basic description of the Spatial Biodiversity Assessment and Prioritisation, and allow downloads of written reports, high-resolution map images and spatial data files. Structuring the webpage with a logical organisation of information will help users navigate the products. Making the products available for free and with minimal sign-up requirements will increase the number of users. It is useful to use stable web addresses so that any links to the data remain active. Once the repository is well established, it is possible to provide additional online tools or GIS capabilities.

Access from a trusted source. All the products should be available from a known reference point so that users know where to access the final, legitimate products. Ideally, the website of a known and trusted biodiversity information provider. Distributing multiple versions from different sources can be a source of confusion, so it is important to make versioning clear and avoid distributing conflicting versions.

Provide documentation that describes the products. Ensure that adequate documentation

[8]Cadman, M., Petersen, C., Driver, A., Sekhran, N., Maze, K. & Munzhedzi, S. 2010. *Biodiversity for Development: South Africa's landscape approach to conserving biodiversity and promoting ecosystem resilience.* South African National Biodiversity Institute, Pretoria.

accompanies the products to explain their origins and intentions. The technical report that describes the input data, approach and methods used should be available for download alongside the maps and spatial data. All spatial data should be accompanied by appropriate metadata that includes a description of the data and how they should be used. It is also useful to provide a clear citation for the documents or data, so that users can reference the products correctly. See **Technical report template**.

Use logical version names for updates. It will be necessary to update the products to keep them current. Users will be unlikely to continue using the products if they become outdated. When providing updated products, it is very important to use a clear numbering system to help users recognise the latest version. Previous versions should remain available in archived format for research purposes. See **Section 7: Updating the Spatial Biodiversity Assessment and Prioritisation**.

BOX 2:
Case study: Ethiopia's biodiversity geo-portal for data sharing, communications and capacity building

The Ethiopian Biodiversity Institute has developed an online geo-portal (http://196.188.40.146/), which is a platform to exchange, publicise and communicate the products of its Spatial Biodiversity Assessment and Prioritisation (as well as other spatial biodiversity data) with stakeholders. The portal will serve as a tool for spatial processing, targeted dissemination and communications to support mainstreaming biodiversity issues into decision-making processes. It is a way to easily share biodiversity data, as well as supporting information like metadata and reports, on a recognised platform.

The geo-portal will also be a basis for building capacity of stakeholders on the spatial biodiversity products. A training manual was developed that combines explanation of the Spatial Biodiversity Assessment results with information on how to access and manipulate the data in the geo-portal including uploading, downloading and editing the spatial data as well as supporting information like metadata and reports. It will serve as the basis for training sessions aimed at government officials, parliamentarians, decision-makers, National Biodiversity Technical Team, NBSAP implementing institutions and other targeted audiences.

One of the intended mainstreaming audiences is the Ministry of Plan and Development (MoPD). They are developing Ethiopia's third Growth and Transformation Plan (GTP III) which will guide the development of the country in the coming 10 years (2020 – 2030) as well as overseeing its implementation

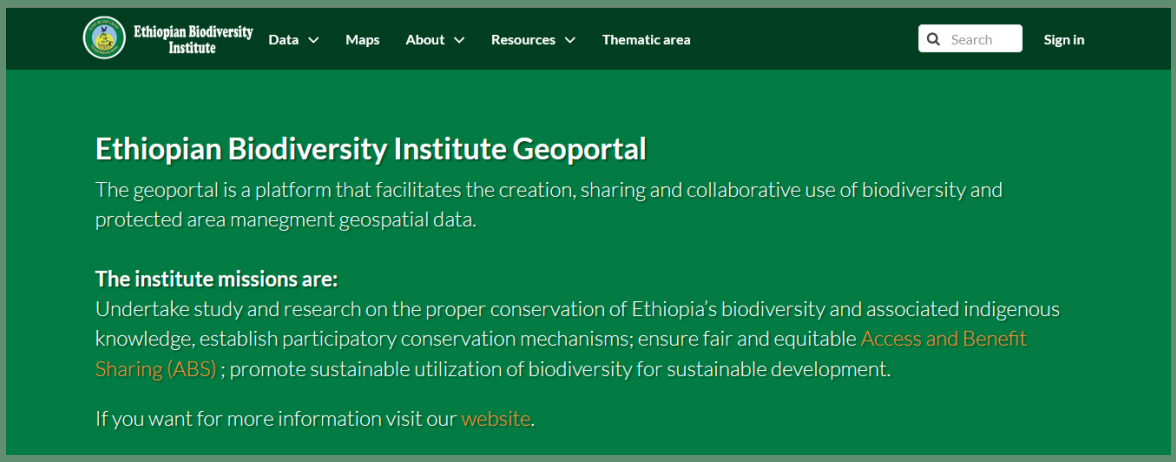

Figure 5: The Ethiopian Biodiversity Institute's geo-portal will be a means to share and communicate the products of its Spatial Biodiversity Assessment.

throughout the plan period. The plan is aimed at stimulating GDP growth, infrastructure, social development and environmental sustainability towards realising the national vision of becoming a lower-middle income country by 2025. Biodiversity is one of the thematic areas of the plan and there is a demand for relevant, up-to-date, national biodiversity information to include in the plan. The geo-portal aims to facilitate access to this data.

Ongoing communication with the staff of the MoPD is ensuring that the Ministry is aware of the spatial biodiversity products, and that the products are fit for the purpose. Sharing earlier versions of the assessment outcomes led to discussions about data shortcomings and potential improvements, which were then addressed during a re-assessment. The geo-portal, as well as the training materials, will help to disseminate the final results of the Spatial Biodiversity Assessment so that they can be taken up into the plan and its consequent implementation. Furthermore, the portal is expected to serve as a collaborative tool, linking related initiatives such as the Ethiopian Biodiversity and Protected Area Programme (BIOPAMA).

Presentation

An important step in mainstreaming the products of Spatial Biodiversity Assessment and Prioritisation is clear presentation. It is useful to take some time to think through the best ways to present and communicate the findings. Well-presented and ready prepared maps, graphs, text and graphics can be easily incorporated into a range of mainstreaming entry points (**Table 4**, **Table 5**). Well organised spatial data and spreadsheets are useful for those users who wish to use the data (**Table 6**, **Table 7**). Some aspects to consider about presentation include:

Maintain focus on a few key products. Presenting a large number of different maps, charts and statistics can be overwhelming. It is important to highlight only a few of the most important findings and communicate these clearly. The headline indicators of ecosystem threat status and ecosystem protection level should be given prominence. Try to select just one or two of the most important findings to convey from each map or chart. Make sure that the language used to convey these key results is short and simple. See **Key messages**.

Limit the use of technical jargon. The target audience for mainstreaming is often outside of scientific or biodiversity circles. Thus, the findings need to be easily understood even by non-technical users. A technical report is needed to record the methodological details, but shorter, simpler products need to be created for mainstreaming the results, like a policy brief, factsheet, summary report or implementation manual. In these products, it is useful to simplify or remove unnecessary scientific terms, or provide clear definitions.

Ensure consistency in products made available publicly. If the products are going to be accessed by a variety of different users, they need to be consistent. Only the final, well-designed map products should be made available. The language and definitions need to be kept the same across products. For example, the category labels and colours should correspond across the text, tables, graphs and maps. Naming conventions need to be decided and kept as stable as possible across products and iterations. Consistency is necessary so that users can become familiar with the concepts and products.

Pay attention to visual design. The target audience is better able to engage with information that is summarised in a visual format. A map or graph can be a good way to convey a lot of information in a concise way. But, thought needs to be given towards design that will be easily understood. Meaningful colour and styles can aid interpretation. For example, where there is an obvious order for categories, an intuitive colour gradient is useful. A consistent design style across all products helps to give the Spatial Biodiversity Assessment and Prioritisation a recognised identity.

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Table 4: Tips for presenting the reports and documentation from Spatial Biodiversity Assessment and Prioritisation.

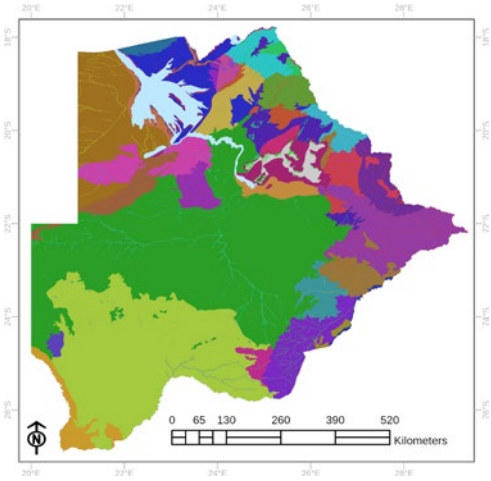
Reports
• Reports are a written reference point for users who wish to query specifics of the methods or the findings. • Reports can be structured very differently depending on their purpose and target audience. • Reports should be neatly designed, giving thought to the user's needs. • Final reports should be available for download as .pdf files from a recognised online repository. • File names and version numbers should be clear and understandable.
Technical report
• The technical report is a record of the methods used, it is necessary for scientific credibility, robustness and transparency. • The technical report should allow others to query or repeat the methods. • Sections should include: introduction, approach, input datasets, assessment methods and results, prioritisation methods and results, and a summary of the key findings and data gaps. • See the **Technical report template.**
Summary report
• A summary report gives an interpretation, in non-technical language, of what the maps and other products mean and what they can be used for. • It should be short and simple, including only the most important findings and key messages. • Using maps and diagrams will make it more visually appealing and attract wider attention. • The summary report will often be the most highly referenced report, and may be used for direct text to be copied into mainstreaming materials. • The summary report should be easily accessible for download from a recognised online repository. It is also helpful if the repository provides key graphs and maps in useable format. • See **Key messages** and **Summarising the findings**. • See the **Summary report template**.
Implementation manuals
• Depending on the mainstreaming entry point, it may be useful to provide targeted implementation manuals that describe the details of how the maps should be used in a specific context. • Implementation manuals will often include a clear description of the map categories, with guidelines of how these should be applied by the targeted sector. For example, translating the map categories into practical land-use guidelines. • Like the summary report, implementation manuals should be short and simple, but may include technical jargon of the target sector.

Table 5: Tips for presenting the map products from Spatial Biodiversity Assessment and Prioritisation.

Map products

- In addition to spatial data, a non-technical user will often prefer a map image.
- Maps should be provided as a final, high-resolution image file.
- Use a consistent layout across different map products, with standard cartographic elements, like a simple unobtrusive north arrow and scale bar.
- Maps should be kept as simple and clean as possible, for example with no unnecessary legend items.
- All maps need to show the full extent of the country, unless they are specifically for a small area.
- Maps should be available for download from a recognised online repository.

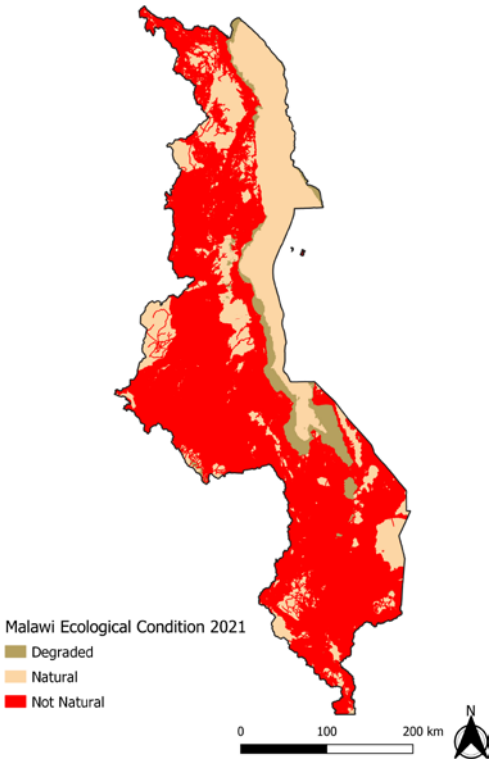
Map of ecosystem types



Map of ecosystem types in Botswana.

- The intention of the map of ecosystem types is to give a sense of the spatial scale, number and arrangement of distinct ecosystem types.
- Present the full coverage of ecosystem types across the country.
- Use a colour scheme with a visually appealing set of colours, avoiding garish, non-natural colour shades.
- Try to use colours that are as distinctive as possible to distinguish between different ecosystem types, e.g. forests vs grasslands etc.
- If the legend with all the ecosystem types is long and cumbersome, it can be left off the map or provided separately.
- Additional maps can be made available, with the ecosystem types summarised to higher levels of the hierarchical classification (e.g. biomes).

Map of ecological condition

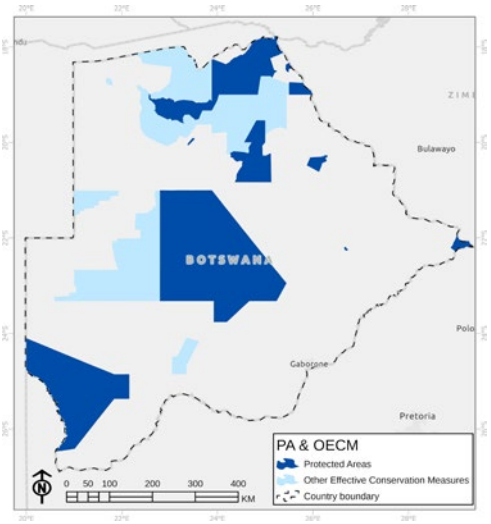


Map of ecological condition in Malawi.

- Mapping ecological condition is a way of summarising the many pressures acting on ecosystems.
- The intention of the map of ecological condition is to show the extent and location of areas of poor ecological condition, and highlight the areas that remain natural.
- Present the full coverage of ecological condition across the entire country.
- The map should be categorised according to the condition categories that you have defined, such as “good, fair, poor”.
- Use an intuitive colour gradient that shows a gradation from good to poor condition, for example using darker shades of brown or red to show increasing levels of degradation.

Table 5: Tips for presenting the map products from Spatial Biodiversity Assessment and Prioritisation (continued).

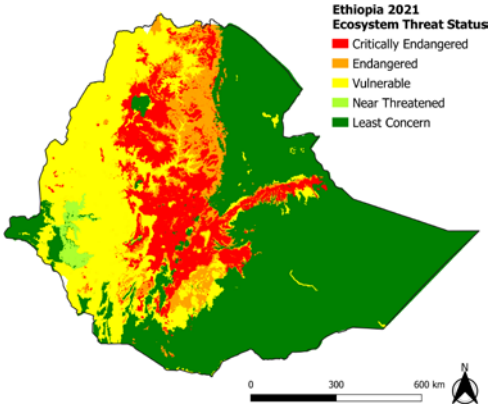
Map of protected areas



Map of protected areas in Botswana.

- The intention of the map of protected areas is to show the overall extent, location and types of protected areas and other effective area-based conservation measures across the country.
- It may be useful to provide a background spatial reference, such as a satellite image or provincial boundaries, to orientate the viewer.
- If there are different types of protected areas, these can be shown as different categories.
- The convention is to display protected areas in shades of green.

Map of ecosystem threat status



Map of ecosystem threat status in Ethiopia.

- The intention of the map of ecosystem threat status is to show the extent and location of threatened ecosystems across the country.
- Present the full coverage of ecosystem threat status across the entire country.
- Legend categories should correspond with those of the IUCN Red List of Ecosystems. The IUCN provides standardised colour codes for the categories.[9]

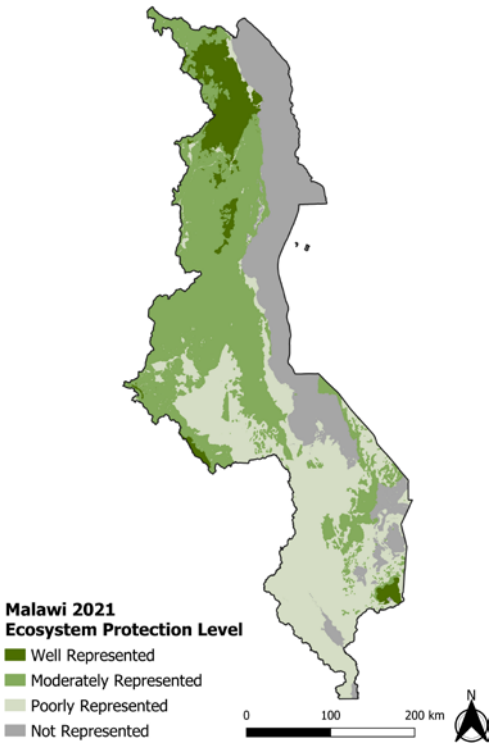
	R	G	B
Collapsed (CO)	0	0	0
Critically Endangered (CR)	255	0	0
Endangered (EN)	255	165	0
Vulnerable (VU)	255	255	0
Near Threatened (NT)	173	255	47
Least Concern (LC)	0	128	0
Data Deficient (DD)	128	128	128
Not Evaluated (NE)	255	255	255

- An additional way to present this map is displaying only the areas that remain in natural condition. Areas of fair or poor ecological condition can be shown in a neutral white shade. This can reveal how large areas of threatened ecosystems have been lost and only small areas remain. See **Figure 6**.

[9]Bland, L.M., Keith, D.A., Miller, R.M., Murray, N.J. & Rodríguez, J.P. (eds.) 2017. *Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria*, Version 1.1. IUCN, Gland, Switzerland.

Table 5: Tips for presenting the map products from Spatial Biodiversity Assessment and Prioritisation (continued).

Map of ecosystem protection level

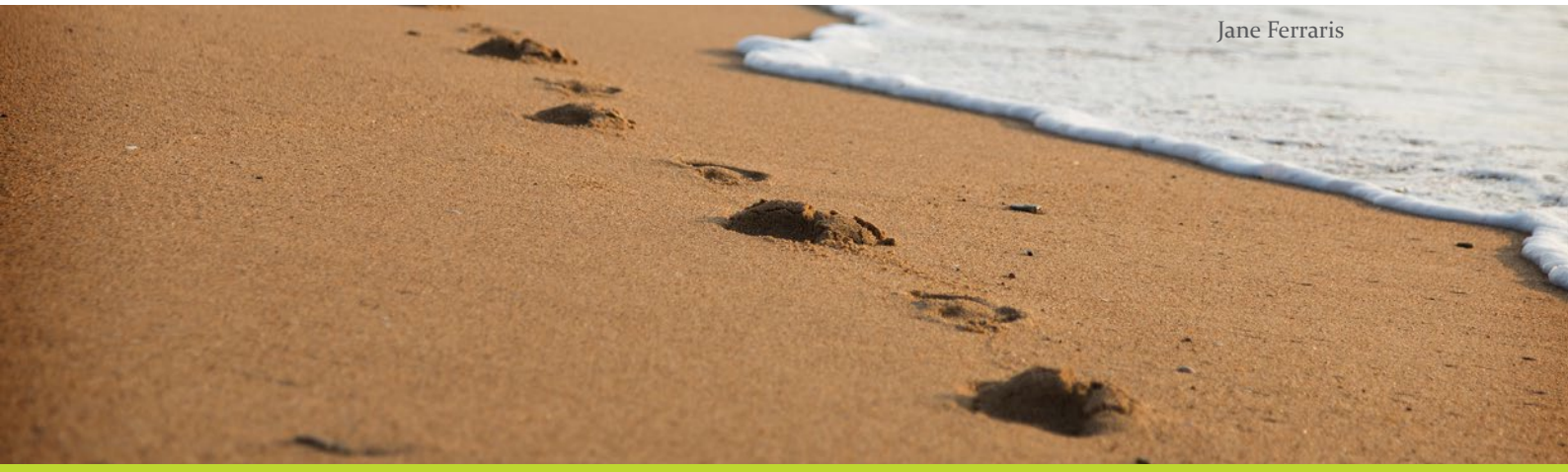


Map of ecosystem protection levels in Malawi.

- The intention of the map of protection levels is to show the extent and location of ecosystems that are either under-protected or well protected.
- Present the full coverage of ecosystem protection level across the entire country.
- Legend categories should correspond with those defined for protection levels, for example well, moderately, poorly and not represented.
- Use an intuitive colour scheme, for example darker green shades for increasing levels of protection.
- An additional way to present this map can be with only the areas that remain in natural condition.

Map of biodiversity priority areas

- The map of biodiversity priority areas shows the results of Spatial Biodiversity Prioritisation, if this has been undertaken.
- Presentation will depend on the methods of prioritisation used.
- Most spatial prioritisation exercises will result in some form of ranking of importance. Users may have difficulty in interpreting what continuous variables mean. To make these results more suitable for mainstreaming, they should be summarised into one or a few simple map categories, with a clear hierarchy that can be easily understood.
- The priority areas can be called by a name that resonates with existing national legislation, such as 'hotspots', 'sensitive features', 'environmental priorities' etc.
- Use an intuitive colour scheme to show the different degrees or categories of priority.
- For most purposes, the priority areas will only include parts of the landscape that remain in good condition.
- In some instances, it may be useful to include specific areas identified for restoration, but these should be limited and realistic, and should clearly distinguish that they are no longer in good condition.



Jane Ferraris

Remaining natural area

When mainstreaming the map products it is often necessary to only use the areas that remain in natural condition (Figure 6). Areas that have been lost are no longer suitable for conservation, except in rare instances where restoration is possible. To map the remaining area, the map of ecological condition is overlayed and only those areas in good ecological condition are kept on the map.

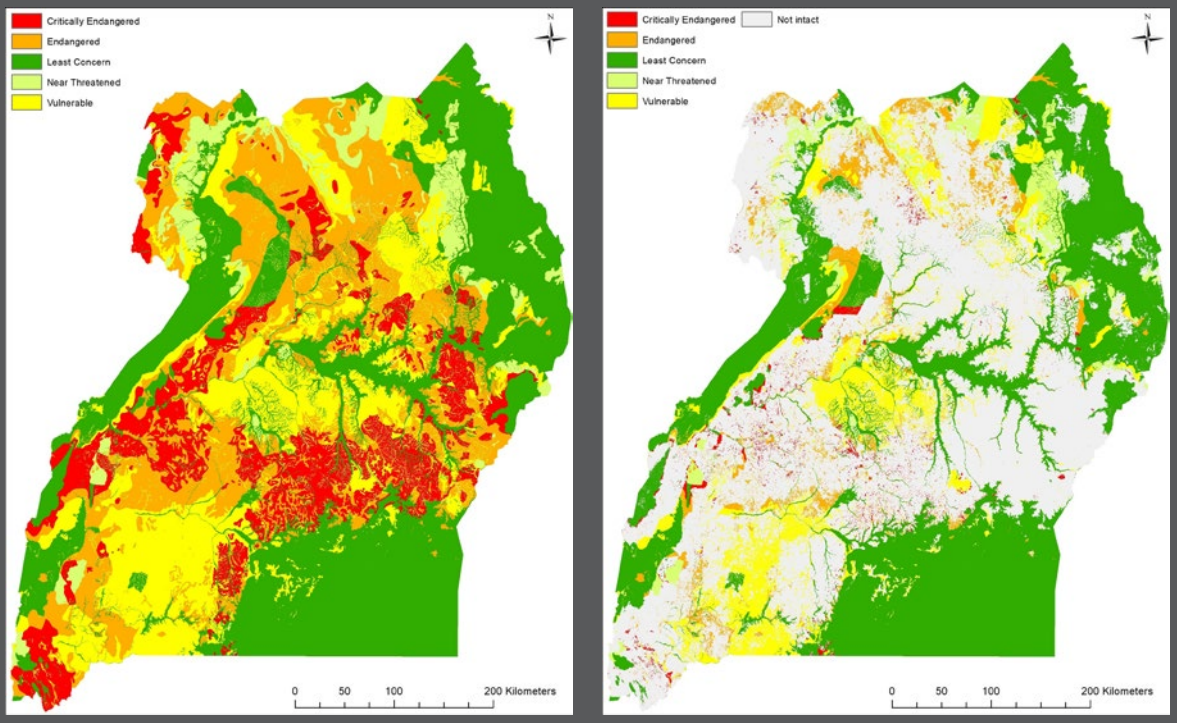


Figure 6: Compare the map of ecosystem threat status for Uganda showing the full historical extent of the ecosystem types (left) with the map showing only the remaining extent (right). Source: NEMA (2020).[10]

[10]NEMA. 2020. *Uganda Spatial Biodiversity Assessment v1*. CONNECT Project, National Environment Management Authority Kampala, Uganda.

Rod Waddington via Flickr

Table 6: Tips for presenting the spatial data from Spatial Biodiversity Assessment and Prioritisation.

Spatial datasets
• GIS layers must be clean and topologically correct. There should be no overlapping polygons within or between map categories. • GIS layers should ideally be accompanied by metadata that conform to recognised metadata standards. • In the metadata, provide contact details for someone who is available to correspond about the data. • Provide the metadata sheets as an appendix to the technical report. • Spatial data layers should be available for download from a recognised online repository. • It may be helpful to users to provide spatial datasets in a variety of formats. • It may be helpful to provide additional supporting datasets to aid consistent display. • Providing the map products (**Table 5**) with the spatial data can be useful to show what the data should look like when displayed.
Ecosystem types with threat status and protection level
• A single, simple shapefile can combine the data on ecosystem types, as well as their threat status and protection levels. • Give some thought to naming conventions for ecosystem types. Longwinded technical names may be difficult to communicate to a wider audience. • Ensure that attribute fields are easy to understand, properly labelled with units, and clearly defined in the metadata. The shapefile should contain only the necessary fields. • Preferably avoid using abbreviations for threat status and protection level categories. • Possible attributes include realm, higher classification, name of ecosystem type, original extent (ha), area lost or degraded (ha), percentage lost or degraded (%), ecosystem threat status category, protection level target (ha), percentage protection level target met (%), ecosystem protection level category.
Ecological condition
• A shapefile or raster file that maps the degree of modification of the landscape. • Attributes should include the categories of ecological condition that you have defined, for example good, fair and poor condition.
Protected areas
• A shapefile that maps the types and location of protected areas across the country. • Attributes could include the type of protected area, and could also include the name of the protected area, and any further information about protected areas that is available.
Biodiversity priority areas
• Users of a prioritisation generally prefer a shapefile that presents the results of the prioritisation. • Basic prioritisation may be the result of integrating a number of underlying layers, it is useful to stipulate an outline of the method within the metadata. • Attributes should include any categories of priority area that have been defined and may include a ranking system that was applied.

Skip Russell via Flickr

Table 7: Tips for presenting the lists from Spatial Biodiversity Assessment and Prioritisation.

Lists
• Summarised lists can be a useful quick reference for a user to look up a specific item or finding. • Lists can be presented as text, tables or spreadsheets. • Full lists are extremely helpful as appendices to the technical report.
Table of ecosystem types with threat status and protection levels
• A list of all ecosystem types, their threat status and protection levels should be made available. • The list can be presented as a table in the appendices of the technical report or a spreadsheet that is available for download. • The table is useful for those without GIS skills to look up an ecosystem type of interest and find its threat status and protection level. • The table can include columns for realm, higher classification, name of ecosystem type, original extent (ha), area lost or degraded (ha), percentage lost or degraded (%), ecosystem threat status category, protection level target (ha), percentage protection level target met (%), ecosystem protection level category.
Data gaps and research needs
• Throughout the analysis, a working list should be kept of data gaps and future research needs. • Known and clearly identified data gaps are helpful to guide data improvements for future iterations. • It can be helpful to highlight which data gaps are the most important and should be a priority for the next iteration. • The list may include scientific gaps such as data quality and availability, or mainstreaming gaps such as a better understanding of the links to development priorities. • A full list of data gaps and research needs should be presented in the technical report, and the most important data gaps highlighted in the summary report. • See **Section 7: Updating the Spatial Biodiversity Assessment and Prioritisation**.
List of national priority areas and actions
• It can be useful to summarise the national priority areas into a simple descriptive list with a clear link to the map. • The list will require interpretation of the map of biodiversity priority areas, to look for practical groupings and common causes. • The list can state the general location or group, indicate why it is a priority, and state possible future actions. For example, “wetland ecosystems in the northwest are not represented in protected areas and should be targeted for future protected area expansion”. • Where priorities have been grouped, it is important to be clear about the underlying specific features that are the priority. • The list can be presented in the technical report or in the summary report to reach a wider audience. • See **Key messages**.

Summarising the findings

Many users will not be interested in the details of the methods used or the raw results. They will not want to read the entire technical report. A summary of the findings provides an overview of the most important information and an interpretation of why the results are relevant. It can also be a useful resource from which to directly copy the key outcomes for a range of other uses. This level of information is convenient for mainstreaming the results into international and national reporting processes. See **Integrating the results into reports and strategies**. Also see the **Summary report template**.

Report the headline indicators. Spatial Biodiversity Assessment and Prioritisation provides a range of useful and interesting information about various aspects of biodiversity. But the headline indicators, ecosystem threat status and ecosystem protection level, are the essence of the approach. The headline indicators should be reported prominently in the summary. It is possible to summarise the findings from the indicators for the whole country into a summed total number of ecosystem types or set of simple percentages of ecosystem types. For example, 5% of ecosystem types are Critically Endangered.

Summarise by hierarchical classification. Establishing a hierarchical classification for ecosystem types will enable the higher levels to be used for summary statistics. The number or percentage of ecosystem types falling into different groups can be presented by either realms, biomes or another grouping. This allows for comparisons between higher levels of the hierarchy that can give powerful insights into the state of biodiversity. For example, revealing that wetland ecosystems are more threatened than terrestrial ecosystems. It is important to be clear and consistent when discussing different levels in the hierarchy, and not conflate assessment done at the ecosystem level with higher groups. For example, it is correct to state that 7 out of 14 forest ecosystem types are Endangered, but never that forests as a group are Endangered.

Use stacked bar charts for display. Stacked bar charts are a good way to condense and compare many pie charts. This makes them useful for comparing percentages of ecosystem types in different threat status or protection level categories between different hierarchical groups. A 100% stacked bar

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BOX 3:
Example from South Africa: Results of the National Biodiversity Assessment 2018

South Africa's third update of its National Biodiversity Assessment was completed in 2018[11]. The results show that almost half of all South Africa's ecosystem types are threatened, with wetlands and estuaries having the highest proportions of threatened ecosystems. Only 31% of ecosystem types are not represented in the protected area network. Wetlands and rivers are the least protected ecosystem types.

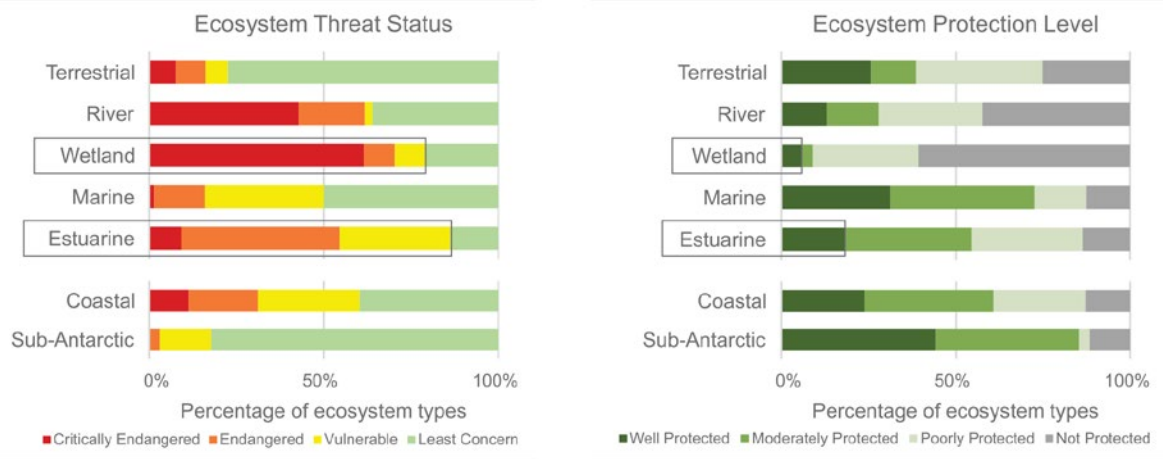

Figure 7: A summary of ecosystem threat status and ecosystem protection level from the South African National Biodiversity Assessment 2018. These stacked bar charts provide an overall visual summary of the main results.

chart is a good visual summary of the findings for each of the headline indicators. The colours for categories of the bar chart should correspond with the map colours.

Summarise information from the basic input datasets. While the headline indicators provide the most important results, summarising the basic input datasets (**see Figure 1**) can also provide useful information. These overall statistics can contribute to a biodiversity profile for the country that can be useful in many reporting applications. See **Integrating the results into reports and strategies**.

- Map of ecosystem types: The total numbers of ecosystem types and area per realm or biome. For example, Uganda has 50 wetland ecosystem types covering 15% of the country.
- Map of ecological condition: The total percentage of the country that remains natural or the area that has been lost. It may also be possible to rank the most severe pressures from this data.
- Map of protected areas: The percentage of the country that is secured within protected areas can be summarised from the map of protected areas.

Interpret the findings in the text. The text of the summary is the place to give brief explanations and interpretation of the findings. Important definitions can also be included in the text, for example a short description of the IUCN Red List of Ecosystems and its categories. Draw attention in the text to standout statistics, such as the "most"

[11]SANBI. 2019. *National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity.* Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria.

threatened or the "least" protected groups. Combinations of threatened and under-protected ecosystem types can also be informative. Use the text to draw together findings from the maps, graphs and statistics, noting patterns and trends. Use the text to create a compelling narrative about the biodiversity of the country and its status. Incorporate **Key messages** into the text of the summary.

Key messages

Key messages are the main points of information that the target audience should notice and remember. They highlight the most important findings from the Spatial Biodiversity Assessment and Prioritisation that should be communicated as widely as possible. Key messages can form a main component of the summary report, and can be used in presentations or press releases about the results.

Select only the most important messages. The target audience will be overwhelmed by many complex messages. It is important to select only those few messages that the target audience should take notice of. Identify an initial list of possible messages by noting one or two findings from each map or chart that are the most impactful. Key messages can also come from knowledge gaps or priority actions. From this initial list of messages, select a subset of key messages that are the top highlights of the Spatial Biodiversity Assessment and Prioritisation.

Make links with national priorities. A useful way to select key messages is to consider which will resonate well with current government priorities. For example, choose messages that may have links with climate change, job creation, or poverty alleviation. Try to frame the messages in a way that promotes sustainable development, and makes links to how the results could be relevant for policy. See **Making links to development priorities**.

Convey the messages clearly. Following the Making the Case for Biodiversity framework, a useful way to structure key messages is with three parts:

- a *finding* that comes from the assessment,
- a *'so-what'* statement that describes why it is important,
- a *'call to action'* that describes what can be done.

Keep the word count of key messages short and the wording simple. If you give each message a succinct heading, these can then be elevated into lists, for example in the executive summary or an infographic. It may be useful to cluster the messages into themes.

Remember to include positive messages. It is important not to shy away from severe findings about what is wrong. When discussing negative findings, state what can be done about them in a practical way to improve the issue in the future. Also acknowledge positive findings, which show progress and successes.

Consider ways to illustrate the point. A graphic element is useful to make key messages more impactful. This may be a map or graph from the Spatial Biodiversity Assessment and Prioritisation that shows an obvious trend. Alternatively, an infographic or photo that illustrates the message can be used. These can be used to give visual appeal to a summary report. Graphics should be clearly linked to the message, theme or section.

Integrating the results into reports and strategies

Information from the Spatial Biodiversity Assessment and Prioritisation provides biodiversity targets, spatial priorities and indicators that may be relevant to many reports and strategies (see **Making links to development priorities**). The fact that the assessment is systematic is a benefit for national level reporting, because it captures the whole picture in the country. There are a variety of ways that the information from Spatial Biodiversity Assessment and Prioritisation can be used in reports:

To give a high-level biodiversity profile. Wherever a high-level biodiversity profile of a country is needed, the summary statistics from Spatial Biodiversity Assessment and Prioritisation can provide some interesting facts. Information on ecosystem types, ecological condition and protected areas can be used in introductory sections to give an overview of the country. Quantitative information, like the percentage of natural area remaining or number of ecosystem types, can supplement a descriptive

Gavin Fordham

narrative. There are many reports that call for biodiversity profiles, for example the national reports to the CBD.

To show status and trends in biodiversity. Spatial Biodiversity Assessment and Prioritisation provides a systematic assessment of the state of ecosystems across a country. The headline indicators provide information about the current status of biodiversity. If they are regularly updated, they can also be used to show trends over time. Ecosystem threat status reveals how many ecosystem types are threatened and where these occur. Ecosystem protection level identifies under-protected ecosystem types, and can indicate where the current protected area network is not representative. The map of ecological condition can also provide information about the most important threats, including where they are in the landscape. Among other uses, this kind of information can be used in State of the Environment reporting.

To formulate objectives and set targets. The spatial priorities identified through Spatial Biodiversity Assessment and Prioritisation can be used during the development of strategies to set targets with a strong spatial focus. Spatial Biodiversity Assessment and Prioritisation can highlight notable gaps in conservation management, like under-protected ecosystem types, or major pressures that are causing ecosystems to become threatened. This information can guide the development of objectives and targets that will specifically address the findings of the assessment. Targets can also be taken into other processes such as protected area expansion strategies. See **Protected area expansion**. The CBD has urged countries to include spatial information in their National Biodiversity Strategies and Action Plans (NBSAPs) because it helps to give focus to the action plan.

To monitor progress and report on targets. The headline indicators can be used to monitor achievement of specific targets in both national and international reporting. They provide a structured, quantitative assessment across the whole country. Spatial Biodiversity Assessment and Prioritisation is likely to be relevant to monitoring several targets under the Global Biodiversity Framework, for example those related to spatial planning, reducing threats, expansion of protected areas, and mainstreaming biodiversity. See **Making links to development priorities**.

Submitting ecosystems to the IUCN Red List of Ecosystems

If ecosystem threat status is assessed using the categories and criteria of the IUCN Red List of Ecosystems, then the results are suitable for submission to the IUCN for listing. International listing carries strong recognition. The Red List of Ecosystems only lists ecosystems that have been assessed across their entire global distribution. Submission requires a range of supporting documentation that gives details about the ecosystem types that have been assessed, the data sources and the methods used. This information will be evaluated by independent peer review. Spatial Biodiversity Assessment and Prioritisation provides much of the necessary information for the submission of threatened ecosystems to the IUCN for listing.

For more information

Bland, L.M., Keith, D.A., Miller, R.M., Murray, N.J. & Rodríguez, J.P. (eds.) 2017. *Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria*, Version 1.1. IUCN, Gland, Switzerland.

IUCN Red List of Ecosystems. https://iucnrle.org

Box 4:
Case study: Mainstreaming biodiversity into Botswana's State of the Environment and Outlook Report

In 2019, the Government of Botswana through the Ministry of Environment, Natural Resources Conservation and Tourism in partnership with the United Nations Environment Programme (UNEP) Africa Regional Office, started the process to produce Botswana's State of the Environment and Outlook Report (SOE&OR) under the auspices of the Department of Environmental Affairs. The main aim of the SOE&OR was to report on Botswana's current state of the environment and inform development planning. Through it there will be uptake of the environmental agenda within the upcoming National Development Plan 12.

A summary of the spatial biodiversity products and headline indicators was provided to those developing the SOE&OR. Iterative engagement was needed to provide the right information, review and give feedback to show how the products could be usefully absorbed throughout the biodiversity chapter. One of the biggest challenges of mainstreaming biodiversity is managing parallel timeframes of development. In this case, the spatial biodiversity products incorporated into the SOE&OR were also in the process of being updated. Important lessons were learnt about negotiating access to data and communicating well across different government processes. Thanks to the flexibility of the developers of the SOE&OR, late-stage edits were made to the report as the newly updated assessment results became available.

Ultimately, the updated products of the Spatial Biodiversity Assessment were included in sections on ecosystem diversity, protected areas and land use change, as well as specific reporting towards the Sustainable Development Goals. Hopefully, this sets a precedent for including spatial biodiversity data regularly in the SOE&OR and similar processes, and that the recommendations are taken into the National Development Plan 12 to influence future budget allocations for biodiversity. Botswana is also investigating further mainstreaming entry points, such as a new environmental screening tool that is under discussion, and integrated development plans.

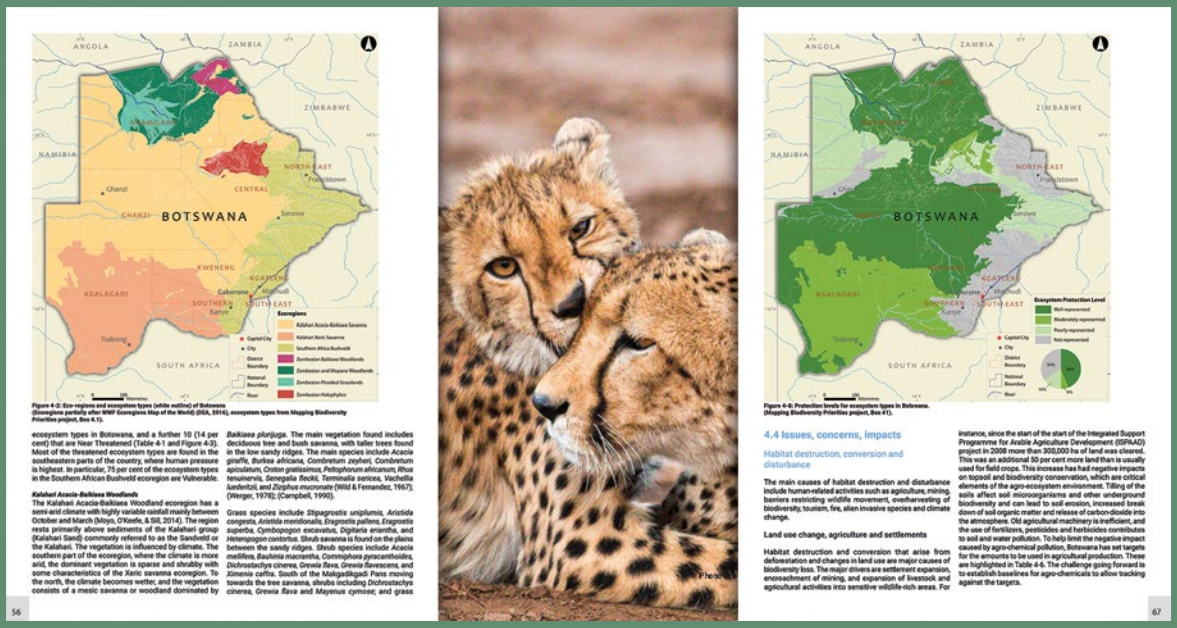

Figure 8: Maps and information from the Spatial Biodiversity Assessment have been included across multiple sections of the biodiversity chapter in Botswana's State of Environment Report.

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Section 4

Entry points to mainstream spatial biodiversity products

The three-way action plan

There are very many uses for the products of Spatial Biodiversity Assessment and Prioritisation, but these entry points generally fall within three main themes: to increase protection of biodiversity, to avoid loss of biodiversity, or to restore biodiversity that has been degraded (**Figure 9**).

Avoid loss. Much biodiversity occurs beyond the boundaries of formal protected areas, in broader working landscapes where other human activities take place. In these areas, Spatial Biodiversity Assessment and Prioritisation can provide input towards land-use planning and decision making to help avoid biodiversity loss and direct impacts away from the areas of highest biodiversity priority. The spatial products can form part of the environmental sector's contribution towards spatial planning processes. They can also be used in environmental authorisation to guide development decisions, and by responsible companies in their operational planning. See **Environmental authorisation**.

Protect. Securing biodiversity within the formal protected area network is the strongest form of

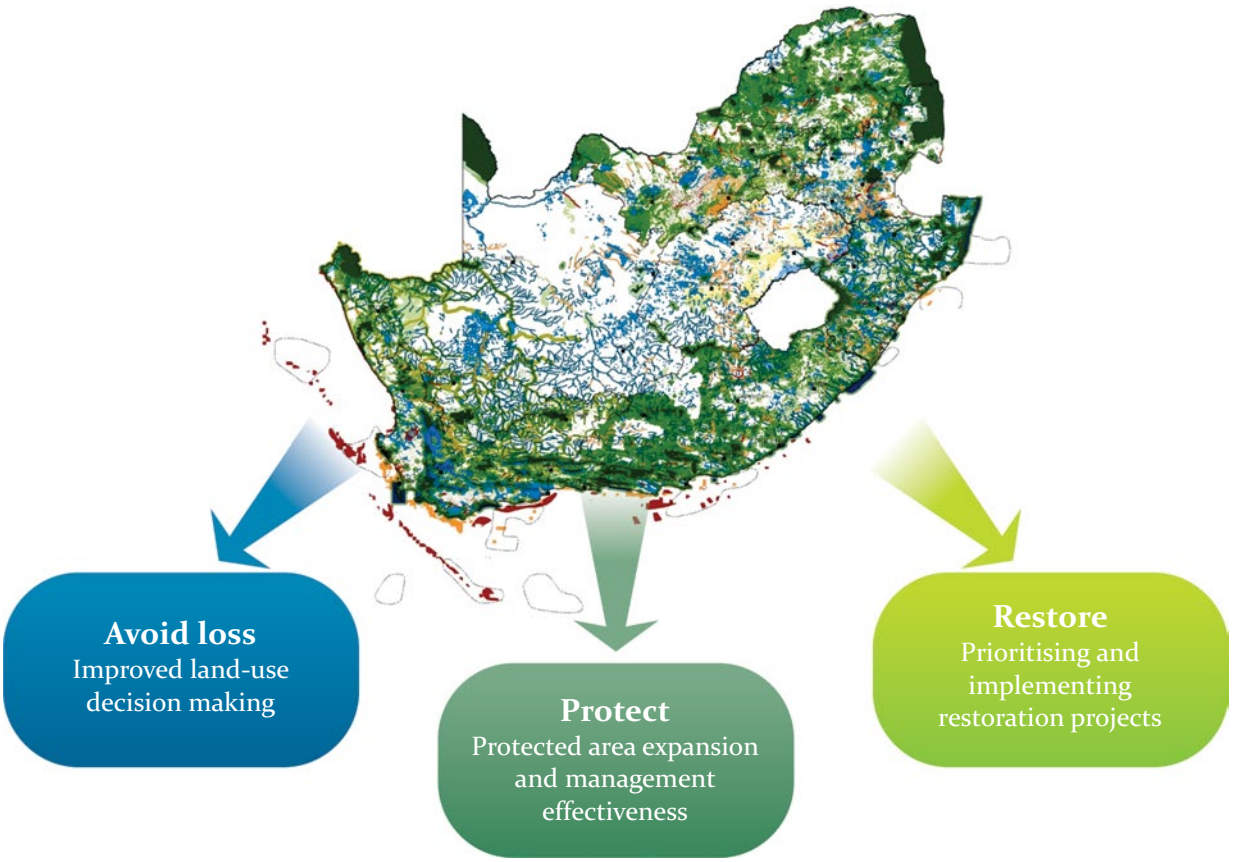

Figure 9: There are three main uses for Spatial Biodiversity Assessment and Prioritisation.

protection that can be given to the most important biodiversity priorities. Spatial Biodiversity Assessment and Prioritisation can help to identify sites for the expansion of protected areas, which will improve the effectiveness of the protected area network. It can also help to guide a range of conservation actions by stakeholders across the state and non-governmental organisations. There is an increasing focus on conserving biodiversity through other effective area-based conservation measures, which may also be a mechanism to achieve protection. See **Protected area expansion**.

Restore. Full restoration of ecosystems is complex and not always possible. However, there are a range of restorative activities that can be used to reduce degradation and improve ecosystem functioning. For example, removal of invasive alien plants to improve water flow or forest restoration for climate change mitigation. Spatial Biodiversity Assessment and Prioritisation can be used to select areas to implement different types of restoration projects. Restoration is very different from selecting areas for protection or to avoid loss, because the areas that are chosen will be those with less-than-perfect ecological condition. See **Restoration**.

For more information

Cadman, M., Petersen, C., Driver, A., Sekhran, N., Maze, K. & Munzhedzi, S. 2010. *Biodiversity for Development: South Africa's landscape approach to conserving biodiversity and promoting ecosystem resilience.* South African National Biodiversity Institute, Pretoria.

Examples of mainstreaming entry points

The products of Spatial Biodiversity Assessment and Prioritisation have a wide range of potential applications across reporting, policy and action planning:

Increasing awareness. At its most fundamental, the products of Spatial Biodiversity Assessment and Prioritisation are tools for awareness. Greater awareness is the basis for further mainstreaming of biodiversity (see **Figure 14**). The map of ecosystem threat status helps to show people where the most threatened ecosystem types are. It can also give an indication of what pressures are causing an ecosystem to become threatened. The map of ecosystem protection levels helps to create awareness about the degree of biodiversity protection in the country. The map of biodiversity priority areas identifies areas where biodiversity should be prioritised. Spatial Biodiversity Assessment and Prioritisation can help both government and non-government organisations to rally around biodiversity priorities in general, or spark an active interest in a particular ecosystem type.

Prioritising conservation actions. Spatial Biodiversity Assessment and Prioritisation can help to provide focus for conservation efforts, particularly because it is spatially specific. Threatened and under-protected ecosystem types should be a priority for conservation action that aims to avoid further loss and degradation, protect what remains and restore ecosystems where reasonable. The results of Spatial Biodiversity Assessment and Prioritisation can be used in NBSAPs (see **Integrating the results into reports and strategies**) to set targets for actions at particular locations. It can also be the basis for proactive management for specific individual ecosystem types.

Informing environmental authorisation. Spatial Biodiversity Assessment and Prioritisation should be consulted when decisions are made about development applications. The spatial products can be used to guide development in ways that will mitigate impacts to threatened ecosystems or biodiversity priority areas, while ensuring that development can go ahead sustainably in suitable parts of the landscape. The spatial products can be integrated into Environmental Impact Assessment and environmental authorisation processes, biodiversity offsetting, as well as other permitting and licensing procedures. See **Environmental authorisation**.

Informing spatial planning. Spatial planning presents the desired future vision of how land should be used. It lays out the intended future distribution of people and development. The spatial products of Spatial Biodiversity Assessment and Prioritisation can be integrated into spatial planning as a proactive way of guiding appropriate development in relation to biodiversity. Spatial

planning may include strategic plans by a specific production sector, such as Strategic Environmental Assessment (SEA). See **Single-sector spatial planning**. Or it may mean government land-use planning that generally combines priorities from several sectors. See **Multi-sectoral spatial planning**. The map products can be used in both these cases to show where development will be most appropriate to avoid loss of biodiversity.

Expanding protected areas. Spatial Biodiversity Assessment and Prioritisation is an important basis for planning future protected area expansion. Protected areas, and other effective area-based conservation measures, are the most secure way of protecting biodiversity. It is critical to have sufficient protection of all unique ecosystem types to ensure that their associated biodiversity elements persist into the future. The assessment of ecosystem protection levels provides a rapid way of highlighting ecosystem types with little or no effective protection. The remaining natural areas of under-protected and threatened ecosystem types are obvious targets for increased protection. The need to protect a specific threatened or under-protected ecosystem type can be strong motivation for declaring a new protected area. See **Protected area expansion**.

Managing protected areas. Spatial Biodiversity Assessment and Prioritisation can provide information that is useful to protected area management. Protected area managers will have a clearer understanding of what their reserve is contributing to the broader network. For example, if managers of a specific protected area are aware that their reserve is one of the few places where a certain threatened ecosystem type is protected, they can place stronger emphasis in their management plans on looking after that ecosystem type. This kind of information can also show the importance of some smaller protected areas that may not get much attention but are vital to protecting certain ecosystem types.

Use by the private sector. Beyond formal government policy, Spatial Biodiversity Assessment and Prioritisation can be used to guide planning and management in the private sector. It can help companies to plan new projects that avoid or mitigate impacts on biodiversity. It can also help businesses to manage their everyday operations in ways that are mindful of impacts to biodiversity. The spatial products can become part of environmental standards or eco-certification schemes. Private use is becoming increasingly relevant globally, and many multinational companies may be under pressure to consider biodiversity issues even when they are not required to under national regulations.

Monitoring and reporting. Spatial Biodiversity Assessment and Prioritisation provides two headline indicators that reveal the state of biodiversity in a country. Summary statistics can be a quantitative way to report on international agreements like the CBD or the SDGs. If Spatial Biodiversity Assessment and Prioritisation is repeated over time, the indicators can also be used to reveal trends over time and monitor progress. Many reporting frameworks are moving towards much more specific reporting on conservation at the level of ecosystems. See **Integrating the results into reports and strategies**.

For more information

Bland, L.M., Nicholson, E., Miller, R.M., Andrade, A., Carré, A., Etter, A., Ferrer-Paris, J.R., Herrera, B., Kontula, T., Lindgaard, A., Pliscoff, P., Skowno, A., Valderrábano, M., Zager, I. & Keith, D.A. 2019. Impacts of the IUCN Red List of Ecosystems on conservation policy and practice. *Conservation Letters*: e12666.

Botts, E.A., Skowno, A., Driver, A., Holness, S., Maze, K., Smith, T., Daniels, F., Desmet, P., Sink, K., Botha, M. & Nel, J. 2020. More than just a (red) list: Over a decade of using South Africa's threatened ecosystems in policy and practice. *Biological Conservation* 246: 108559.

IUCN. *About RLE.* International Union for Conservation of Nature. https://iucnrle.org/about-rle/rle/.

James Puttick

Section 5

How to mainstream the spatial biodiversity products?

Spatial Biodiversity Assessment and Prioritisation can help to reduce biodiversity loss by guiding appropriate land (or sea) uses. The spatial products can be integrated into proactive spatial planning, reactive environmental authorisation, protected area expansion and restoration (**Table 8**). This section provides details on how to go about mainstreaming the spatial biodiversity products across these main applications.

Environmental authorisation

Environmental authorisation refers to the decisions made in response to development applications. It usually involves an Environmental Impact Assessment (EIA). There are several stages at which Spatial Biodiversity Assessment and Prioritisation can inform the environmental authorisation process. The map categories can be used to evaluate how significant the impacts of the proposed development will be for biodiversity (**Figure 10**). Applying the mitigation hierarchy can help to ensure that impacts to biodiversity are mitigated as much as possible (**Table 9**).

The spatial biodiversity products can be used:

To screen sites at early planning stages. Consulting the spatial biodiversity products at early stages prior to EIA application can help developers identify sites that may have higher environmental sensitivity. This can help to encourage use of higher levels of the mitigation hierarchy, by allowing developers to avoid highly threatened ecosystems or high priority areas. Doing so is beneficial to developers because it may prevent an adverse decision on their application and help them avoid expensive mitigation measures. Using the maps for site screening can be made part of a formal regulatory requirement, or can be encouraged in terms of voluntary guidelines.

As a trigger for EIA. Threatened ecosystems or biodiversity priority areas can be integrated into regulatory policy as a trigger that will require developers to submit an EIA. If the proposed development will impact on an ecosystem or a biodiversity priority area in a particular map category, the developer can be required to conduct a comprehensive EIA. Developments proposed outside of such areas may then not require an EIA unless they meet other criteria.

As a required element in EIA reporting. Regulatory policy can also call on all EIAs to report on the expected impacts to threatened ecosystems or biodiversity priority areas. EIA reports can be required

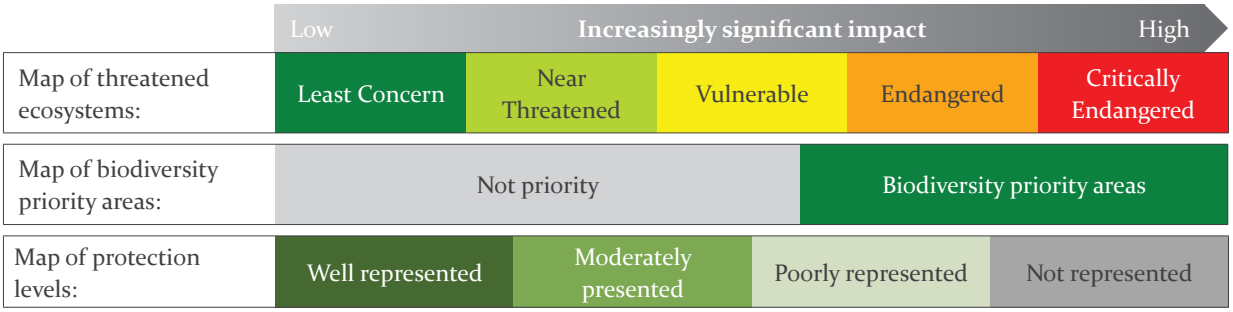

Figure 10: The map categories can be used to evaluate how significant the impacts of a development will be.

Table 8: How Spatial Biodiversity Assessment and Prioritisation can be used to guide appropriate land uses. Adapted from SANBI (2018).[12]

Environmental authorisation	Spatial planning	Protected area expansion	Restoration
Aim:			
To *avoid inappropriate land uses* in biodiversity priority areas. To ensure that the mitigation hierarchy is applied.	To *encourage appropriate land uses* in biodiversity priority areas.	To *expand the protected area network* so that an adequate sample of all ecosystem types is protected.	To *increase the area and improve functioning* of areas of ecosystems that have been lost or degraded.
Policy framework:			
Reactive decision-making in response to development applications.	Proactive spatial planning that shows the desired future uses of the land.	Declarations of new protected areas.	Restoration planning, implementation and monitoring.
Maps should inform:			
• Development applications • Environmental Impact Assessment • Mining, water or agricultural permitting	• Strategic Environmental Assessment • Land-use planning instruments, e.g. zoning	• Protected area expansion strategy	• Prioritisations for restoration
How should the maps be used:			
Developments that will modify an area from a natural state should not be authorised in intact natural areas of highly threatened ecosystems (CR, EN) or biodiversity priority areas. Developments are appropriate in areas of lower priority or those that are no longer intact. For developers, the maps can give an indication of the possible success of their application.	Intact natural areas of highly threatened ecosystems (CR, EN) and biodiversity priority areas should be assigned to land-use categories or zones that will keep the areas in a natural or semi-natural state. Other land-uses are appropriate in areas of lower priority or those that are no longer intact.	The remaining natural areas of under-protected and threatened ecosystem types should be prioritised for protection. Prioritisation can support the different types of Protected Areas.	Identifying areas where threatened ecosystems have been degraded is a basis for restoration. However, there are a range of other considerations that will determine whether restoration is advisable and feasible.

[12]SANBI. 2018. Using CBA Maps to support land-use planning and decision-making. *SANBI Factsheet Series.* South African National Biodiversity Institute, Pretoria.

Table 9: The spatial products of Spatial Biodiversity Assessment and Prioritisation can be used together with the mitigation hierarchy for Environmental Impact Assessment and environmental authorisation.

Avoid	Consider options in project location, siting, scale, layout, technology and phasing to avoid impacts on highest priority biodiversity, associated ecosystem services, and people.
Minimise	Consider alternatives in the project location, siting, scale, layout, technology and phasing that would minimise impacts on biodiversity and ecosystem services.
Rehabilitate	Consider rehabilitation of areas where impacts are unavoidable to return impacted areas to near-natural state or an agreed land use. However, rehabilitation may fall short of replicating the diversity and complexity of a natural system.
Offset	Biodiversity offsets can provide a mechanism to compensate for significant residual impacts on biodiversity, only after every effort has been made to minimise and then rehabilitate impacts.

to include sections describing the ecosystem types that are present at the site, the expected impacts and how these will be dealt with according to the mitigation hierarchy. This information will allow the person making the authorisation to make an informed decision and set appropriate conditions.

By decision-makers when assessing development applications. Once the EIA has been submitted to the relevant decision-making authority, the person tasked with assessing the proposed development can use the maps to guide their decision. Decision-makers in these positions should be provided with easy access to the map products and spatial data, as well as training on what it means for their decisions. The spatial biodiversity products can help decision-makers to understand the specific impacts at the level of individual projects. Regular use of information at this stage can improve transparency of the decision-making process and show developers that impacts to biodiversity will be taken seriously.

In policy for biodiversity offsets. Biodiversity offsets are a last resort in the mitigation hierarchy to compensate for any residual impacts which cannot be avoided, minimised or rehabilitated. The map of ecosystem threat status or the map of biodiversity priority areas can be integrated into biodiversity offset policy such that they trigger high offset ratios. In combination with the map of protection levels, they can also be used to identify suitable sites for offsets. This will help to encourage use of earlier steps in the mitigation hierarchy, and ensure that any offsets will contribute meaningfully to conserving the ecosystem type that is impacted.

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Workflow for including the maps in an EIA

The proponent of a development should consult the maps produced by Spatial Biodiversity Assessment and Prioritisation when compiling their EIA (**Table 10**). The maps help developers and decision-makers to understand what ecosystem types are present at the site and what their status is. These can then be used to apply the mitigation hierarchy in a way that reduces impacts to ecosystems.

For more information

Stewart, W.I, Bahindwa, A., Adams, A., Daniels, F., Nzimande, M.Z., Job, N. & Dabrowski, J.M. 2022. *Environmental Assessment Guideline for Ecosystems: Guidelines to support implementation of the Biodiversity Protocols for environmental impact assessments in South Africa.* Version 1, 2022. South African National Biodiversity Institute, Pretoria.

BOX 5: Case study: Mainstreaming the map of ecosystem threat status into Malawi's Environmental and Social Impact Guidelines

The map of ecosystem threat status reveals that more than half of all Malawian ecosystem types are threatened and at risk of collapse. This is especially so in the more densely populated southern parts of the country, where many of the Critically Endangered ecosystems occur.

One approach identified to avoid further loss of ecosystems is to mainstream biodiversity into the Environmental and Social Impact Assessment (ESIA) process. This will ensure that impacts on ecosystems are considered when decisions are made on new development applications. The new Environmental Management Act was enacted in 2017 and updates are underway to the ESIA guidelines

to accommodate the new laws. The purpose of the ESIA guidelines is to facilitate compliance with Malawi's environmental impact requirements by government, project developers and the general public. Importantly, clear guidelines are also beneficial to developers, helping to streamline development decisions and reduce business risk that arises from uncertainty or possible adverse decisions.

To demonstrate how the map of ecosystem threat status could be used during an actual ESIA, a current example was identified. The Shire Valley Transformation Programme is a joint initiative between the Government of Malawi and the World Bank to improve agricultural productivity across the Shire Valley in the south of Malawi. As part of the programme, an application is underway for a 60 km canal delivering water across a 40 000 ha irrigation area. The EIA workflow (**Table 10**) was applied for the proposed development as a demonstration case. It showed that much of the proposed development was in parts of the landscape that had already been transformed and would therefore have no impact. However, it also identified several remaining intact portions of Endangered and Vulnerable ecosystem types in the development footprint that should be subject to mitigation measures (**Figure 11**).

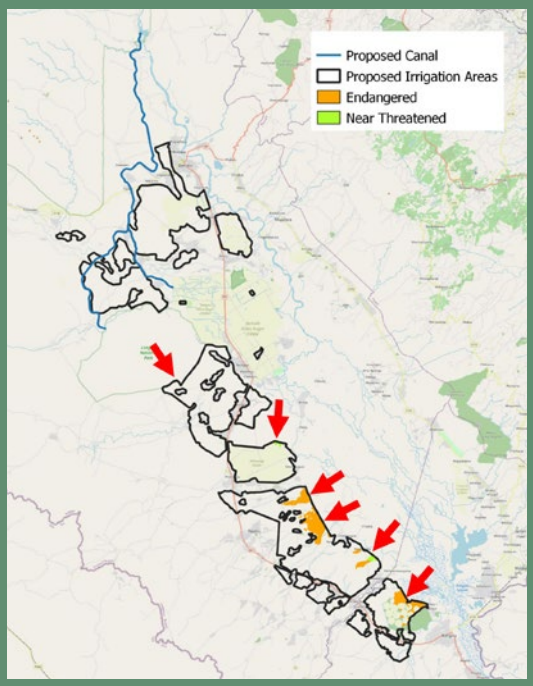

Figure 11: Intact portions of threatened ecosystem types that fall within the proposed development footprint for the Shire Valley irrigation scheme.

Drawing from the case study, specific recommendations were made for how ecosystem threat status could be incorporated within the ESIA guidelines. For example, including threatened ecosystems within certain appendices could require that the presence of threatened ecosystem types at the site is disclosed in pre-feasibility screening. The presence of intact threatened ecosystems in an area of interest could then trigger the need for an ESIA, and guide the terms of reference for specialist studies.

Single-sector spatial planning

Spatial Biodiversity Assessment and Prioritisation can provide useful inputs towards spatial planning for a single sector, like mining, electricity generation or plantation forestry. Sector-specific planning processes aim to avoid biodiversity impact, limit business risk or reduce the reputational risk to business from irresponsible actions.

Integrating spatial biodiversity products into single-sector spatial planning usually involves thinking about the sensitivity for each map category, and then recommending what land-uses are appropriate.

Sensitivity. Often used in SEA and similar sectoral planning processes, sensitivity (or alternative similar terminology) makes a determination of how easily impacted a particular biodiversity feature is by the proposed land use. Different sensitivity levels can be set for the different map categories (**Figure 12**). Broadly, the remaining areas of highly threatened ecosystem types and categories of high biodiversity priority will usually have higher levels of sensitivity, whilst lower categories of threatened ecosystems or areas that are not prioritised may have lower sensitivity. Sensitivity can be assigned a score or qualitative level, that can then be combined with other aspects within a multi-criteria analysis. Scores can also be tied to higher levels of administrative or approval process or requirements. The sensitivity of an area will help to determine which land uses are most compatible (**Table 11**).

Table 10: Workflow for including the maps of Spatial Biodiversity Assessment and Prioritisation in an EIA.

Step 1: Map the proposed development	Gather spatial data showing the boundaries of the property and proposed development.
Step 2: Identify biodiversity features and categories	Overlay the proposed development with maps from the Spatial Biodiversity Assessment and Prioritisation: • Consult the *map of ecosystem types* to identify which ecosystem types are present at the site. • Consult the *map of ecosystem threat status* to identify the categories of ecosystem threat status present at the site. • Consult the *map of ecosystem protection levels* to identify the categories of protection levels present at the site. • Consult the *map of biodiversity priority areas* to identify whether any priority areas are present at the site.
Step 3: Conduct site verification	A biodiversity or ecological specialist should verify that mapped biodiversity features are consistent with those present at the site. This can include desktop verification and a site visit. The Spatial Biodiversity Assessment and Prioritisation is done using the best available data, but there may be some mapping inaccuracies at fine scales. The site verification should: • Ensure that the identified ecosystem types are actually present at the site. • Confirm the current land cover at the site. • Confirm the location of remaining natural areas and assess their condition. • Identify any mapping discrepancies. • Investigate options to apply the mitigation hierarchy.
Step 4: Assess impact on biodiversity	The impact of the proposed development will be more significant at (see **Figure 10**): • Higher categories of ecosystem threat status, especially threatened ecosystem types (particularly Critically Endangered, then Endangered and then Vulnerable). • In identified biodiversity priority areas. • Areas that are not represented in protected areas.

Step 5: Apply the mitigation hierarchy	Identify compromises and solutions that mitigate impacts on biodiversity. Options should be considered to retain natural habitat and connectivity, implement rehabilitation, and secure biodiversity for conservation. Depending on the level of impact that is identified, different options within the mitigation hierarchy should be considered (see **Table 9**). The more significant the impact, the more important it is to consider the first step of the mitigation hierarchy i.e. avoiding loss.
	• **First avoid** significant impacts: Consider options in project location and design to avoid biodiversity impacts. Irreversible loss of habitat should be considered highly undesirable in:
	  ◦ Critically Endangered and Endangered ecosystems (especially large intact areas of these).
	  ◦ Biodiversity priority areas (or higher categories of biodiversity priority areas).
	• **Then minimise** moderate impacts: Consider how the project design can be adjusted to minimise biodiversity impacts.
	• Then consider options for **rehabilitation**, and if residual impacts remain, consider whether **offsets** are possible.
	• **No significant impacts:** Ensure that other biodiversity impacts (e.g. impacts to threatened species) are also considered.

Step 6: Include information in EIA report	The EIA report should demonstrate that the information from the Spatial Biodiversity Assessment and Prioritisation was consulted. The EIA report should include: • Verified information on the ecosystem types present at the site. • Information on the categories of ecosystem threat status, ecosystem protection level and biodiversity priority areas for these ecosystem types. • Information on biodiversity impacts identified and efforts to mitigate these impacts.

Water Land and Ecosystems via Flickr

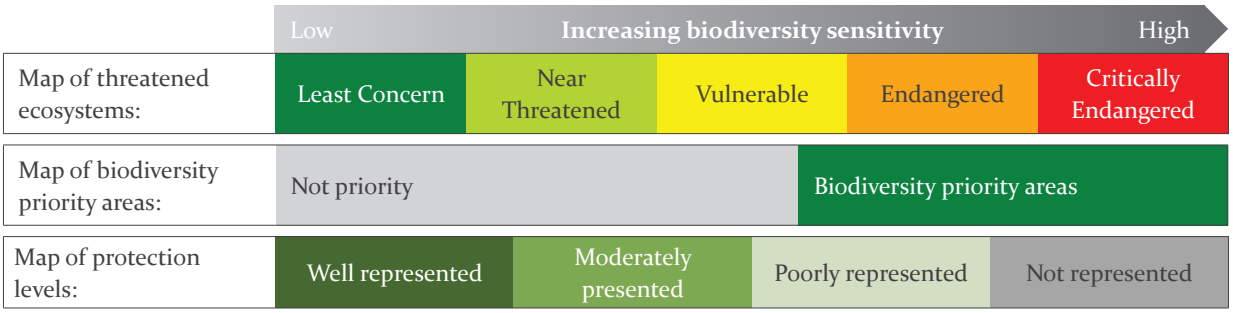

Figure 12: Map categories can be used to evaluate the biodiversity sensitivity to the proposed land-use.

Table 11: Example of how sensitivity can be specified for different map categories. Note this table is an example, it is not prescriptive and should be adapted to the context.

Biodiversity sensitivity	Compatible land-uses
High or very high	Conservation Low impact tourism Rangelands
Moderate	Tourism Sustainable agriculture Certain forms of low-density housing
Low	Urban Plantation forests Arable agriculture Other intensive land uses

BOX 6:
Example from South Africa: The Mining and Biodiversity Guideline

The *Mining and Biodiversity Guideline* "provides tools to understand how the sustainable development of South Africa's mineral resources can take place in a way that minimises the impact on the country's biodiversity and ecosystem services". The guideline was co-produced by the biodiversity and mining sectors, and received endorsement from the ministers of both national government departments. Its purpose was to mainstream biodiversity into decision-making across various stages of the mining cycle.

At the core of the Guideline is a map with four categories defined in terms of the implications for mining (Figure 13). The language used focusses on the business risk to mines from impacting biodiversity.

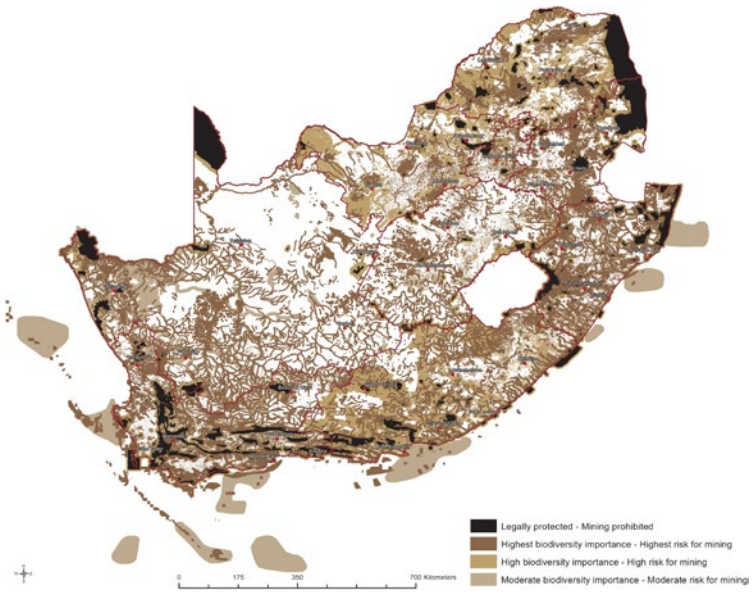

Figure 13: Categories defined in terms of implications for mining, in the South African 'Mining and Biodiversity Guideline' (DEA et al. 2013).

Category	Implications for mining	Examples of map categories
Legally protected Mining prohibited	Mining is prohibited in these areas that have legal protection, for example protected areas.	Protected areas
Highest biodiversity priority Highest risk for mining	The risk to new mining projects is high because of the significance of the biodiversity features in these areas. Environmental authorisations may not be granted.	Critically Endangered and Endangered ecosystems High biodiversity priority areas
High biodiversity priority High risk for mining	These areas are important for conserving biodiversity or supporting other priority areas. Environmental authorisations may set conditions.	Included other mapped priorities such as protected area buffers and water source areas
Moderate biodiversity importance Moderate risk for mining	These areas are of moderate biodiversity value. Environmental authorisations may set conditions.	Vulnerable ecosystems Moderate priority areas supporting ecological processes

These categories may indicate adverse authorisation decisions on new mines, potential legal challenges or heavy conditions on development. The map of threatened ecosystems, as well as the map of biodiversity priority areas, was a key input in setting these categories. For example, the category "highest risk for mining" included both Critically Endangered and Endangered ecosystems, as well as the highest biodiversity priority (Critical Biodiversity Areas).

For more information:

DEA, DMR, CoM, SAMBF & SANBI. 2013. *Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector.* Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum & South African National Biodiversity Institute, Pretoria.

Holness, S., Stephens, A., Ginsburg, A., Botts, E.A., Driver, A., Manuel, J., Maze, K., Wickens, P., Lutsch, W., Malebu, T., Mohasoa, P. & Mudau, S. 2018. Bridging the research-implementation gap: Mainstreaming biodiversity into the South African mining sector. *Bothalia: African Biodiversity and Conservation* 48(1): a2265.

Multi-sectoral spatial planning

Multi-sectoral spatial planning involves integrating the priorities of many sectors into one overall plan. It is usually conducted by government and will guide what land-uses should occur in which places. Spatial Biodiversity Assessment and Prioritisation can provide the biodiversity sector's inputs towards multi-sectoral spatial planning.

To incorporate the map products into land-use planning and decision-making processes, it is critical to set clear management objectives for each map category and provide a set of land-use guidelines that state which land uses are compatible with which map categories.

Management objectives describe the preferred condition that an area should be maintained in over the long term. The management objectives should be strongly linked to the map categories. Broadly, the intact areas in higher categories (threatened ecosystems or high biodiversity priority) should ideally be maintained in natural condition. However, in other areas the objective may be to retain ecosystem functioning, where pristine ecological condition is not necessarily required and other land uses may be appropriate. It is important to set up a clear distinction between priority areas and other areas that can be available to other land uses. The priority areas will only have value and be respected if it is recognised that other land uses also need their space in the landscape. Land uses that are compatible with the management objectives should be encouraged and land uses that will conflict with the management objectives should be discouraged.

The management objectives can be presented in a summary table, that gives a definition of each map category, its associated management objectives and translates this into recommended land uses (**Table 12**).

Skip Russell via Flickr

Sam Ayres

Table 12: Example of a template for an overview table, showing how the map categories are linked with a management objective and recommended land-use categories.

Map category	Definition	Management objectives	Recommended land uses
Protected areas		Maintain in natural ecological condition.	
Map categories listed in order of decreasing priority		Maintain in at least semi-natural condition, with no intensification of land use. Maintain ecological functioning and ecosystem processes.	
No natural remaining		No management objectives specified	

Land-use guidelines give details about which land uses and activities are appropriate in each map category. The land-use guidelines are usually shown in a table that lists all the possible land uses, and then indicates 'yes', 'no' or 'conditional' for each land use in each map category (**Table 13**).

- ✓ 'Yes' means that the land use is compatible with the map category. It is recommended that this type of land use can go ahead in areas that fall within this category.
- ✗ 'No' means that the land use is incompatible with the map category. It is recommended that this type of land use be avoided in areas that fall within this category.
- ~ 'Conditional' means that the land use may be appropriate in some circumstances. The restrictions are usually explained in the land-use guidelines.[13]

For more information

SANBI. 2017. *Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas and Ecological Support Areas using systematic biodiversity planning.* First Edition (Beta Version), June 2017. Compiled by Driver, A., Holness, S. & Daniels, F. South African National Biodiversity Institute, Pretoria.

SANBI. 2018. Using CBA Maps to support land-use planning and decision-making. *SANBI Factsheet Series.* South African National Biodiversity Institute, Pretoria.

[13]SANBI. 2018. Using CBA Maps to support land-use planning and decision-making. *SANBI Factsheet Series.* South African National Biodiversity Institute, Pretoria.

Table 13: Example of a table of land-use guidelines for different map categories. The table would be completed with an indication of "yes", "no" or "conditional" to show which types of land use are appropriate in which categories in terms of biodiversity.

Land-use	Protected areas	Map categories listed in order of decreasing priority →	No natural remaining
Conservation	✓		~
Rangelands	~		✓
Tourism	✓		✓
Crop farming	✗		✓
Forestry	✗		✓
Rural residential	✗		✓
Urban residential	✗		✓
Industry	✗		✓
Mining	✗		✓
Transport	~		✓
Etc.			

Protected area expansion

Protected area expansion is one of the most common and long-standing uses for Spatial Biodiversity Assessment and Prioritisation. Many global agreements call on countries to expand their protected area networks to achieve sustainable development, improve climate change resilience, deliver socio-economic benefits in rural areas and protect biodiversity. See **Making links to development priorities**.

The map of ecosystem protection levels can highlight where there are glaring gaps in protection – ecosystem types that have little or no formal protection. These ecosystem types are at risk because no sample is protected and their entire extent may be lost to other land uses. It can also help to show biases in protection levels. In the past, declaration of protected areas was usually ad hoc, with their locations based on factors other than biodiversity priority or within areas that are least suitable for human use. Ecosystem types may have been neglected from protection if they occur in production landscapes wanted for other uses. The first step in creating a more representative protected area network is understanding the gaps and biases in the current network.

A protected area expansion strategy can be a mainstreaming tool to guide protected area expansion. It identifies which sites need to be added to the protected area network over defined timeframes to ensure that a representative sample of all ecosystem types is protected. A simple combination of protection levels, threat status and the largest remaining unfragmented natural sites, can provide a rapid and rational basis for guiding protected area expansion. Alternatively, full systematic conservation planning can provide priorities for protected area expansion that also take into account a range of other data.

Spatial Biodiversity Assessment and Prioritisation can be used:

To set protected area targets. The threshold used for the highest category of protection level – well represented – can be considered a long-term goal of protection. In the long term it would be ideal if all ecosystem types were categorised as well protected, although in reality alternative conservation measures can be used where this is difficult or impossible. It is rational to align long-term protected area targets and the thresholds used in assessments. However, pragmatic considerations may require a country to aim to achieve only a portion of these targets in the short or medium term when implementing protected area expansion plans.

To identify priority ecosystem types for increased protection. Those ecosystem types that are least represented in the existing protected area network are priorities for future declarations. Focussing protected area expansion on ecosystem types that are not currently protected will help to improve the overall effectiveness of the protected area network in securing all components of biodiversity. This will help to ensure that important aspects of biodiversity are secured. The map of ecosystem threat status can also be used in combination with protection levels to prioritise, as ecosystem types that are both highly threatened and under-protected are prime candidates for protected area expansion. Alternatively, full systematic conservation planning can be used to prioritise areas for protected area expansion.

To identify suitable sites for expansion. The ideal sites for protected area expansion are large, intact and unfragmented areas that will meet protected area targets for priority ecosystem types. This type of prioritisation can often be done very quickly using the products of Spatial Biodiversity Assessment and Prioritisation. The map of ecosystem protection levels can help to identify such sites at a high-level, which can then be further refined prior to declaration. It can also provide an idea of how many alternative sites are available to protect a particular ecosystem type. For example, protection may be particularly urgent if only one large, unfragmented site remains for a particular ecosystem type. When motivating for new declarations, the map of ecosystem protection levels can help to provide compelling reasons for declaration at a particular site.

To identify receiving areas for biodiversity offsets. It is beneficial if the receiving areas for biodiversity offsets are strategically identified to contribute to overall biodiversity targets. Under-protected ecosystems can be prioritised as receiving areas for biodiversity offsets. In this way, biodiversity offsets can contribute to improving the representativeness of the protected area network.

Protected area management

Ecosystem types that are categorised as well protected have enough of their extent within the existing protected area network. However, these ecosystem types are only properly protected if the management of protected areas is effective. Existing protected areas should be kept in natural or near-natural condition. The primary purpose of a protected area is to protect and maintain biodiversity and ecological integrity. This purpose should guide all management decisions, including land-use activities within the protected area. A management plan should be developed that identifies allowable activities that are consistent with the purpose of the protected area. Management effectiveness should be monitored.

Restoration

The realisation that extensive areas of ecosystems have been lost or degraded has led to large scale efforts to catalyse restoration, such as the UN Decade on Ecosystem Restoration 2021-2030. Ecosystem restoration is defined as "the process of halting and reversing degradation, resulting in improved ecosystem services and recovered biodiversity".[14] Ecosystem restoration includes many different restorative actions across a continuum, from reducing impacts and repairing ecosystem functioning, to fully recovering natural ecosystems.

Critically, restoration can only contribute to biodiversity outcomes if it reflects the natural ecosystem types. For example, tree planting efforts for carbon storage may be restorative in forest ecosystem types if native species are used, but may cause further degradation if done using exotic species within grassland ecosystem types. The map of ecosystem types can provide information to help set the overall goal for restoration, and to identify what restoration actions are appropriate.

[14]UNEP. 2021. Becoming #GenerationRestoration: Ecosystem restoration for people, nature and climate. United Nations Environment Programme, Nairobi.

Spatial Biodiversity Assessment and Prioritisation can help to guide planning of ecosystem restoration initiatives. It can be used:

To identify priority ecosystem types for restoration action. Protecting and avoiding loss of existing intact natural areas of ecosystems is often a priority before restoration is considered because it is easier to prevent loss and degradation than remedy it once it has occurred. However, restoration can complement conservation efforts and be a means to improving the threat status of ecosystems. Ecosystem types that have experienced loss or degradation are the obvious focus for restoration, so restoration should be prioritised within threatened ecosystem types. Deciding on which threatened ecosystems are candidates for restoration will depend on the restoration objectives and feasibility. Other factors also need to be considered, like the influence of competing land-uses.

To identify suitable sites for restoration. Unlike efforts to avoid loss and protect biodiversity, which focus on remaining natural areas, restoration occurs in parts of ecosystems that have already been lost or degraded. For this reason, restoration often requires its own prioritisation process, resulting in a separate map of priorities and requiring different methods of mainstreaming. The map of ecological condition and the map of ecosystem threat status can be used to inform where restoration should occur. Fully restoring parts of ecosystems that have been completely lost will require significant resources with uncertain chance of success. Instead, it may be more worthwhile to address specific causes of degradation in areas where remnant parts of threatened ecosystems are in moderate to poor condition.

To set targets for restoration. The Red List of Ecosystems criteria provide several options to set targets for restoration. Ultimately, the goal may be to achieve down-listing of an ecosystem to a lower category of ecosystem threat, for example from Endangered to Vulnerable. To achieve this may require setting targets to restore a certain area of an ecosystem (hectare targets) or to improve a certain indicator of ecosystem integrity. It is important to recognise that achieving changes in ecosystem threat status through restoration may require long timeframes and large areas. The same targets can then also be used to monitor restoration success.

For more information

UNEP. 2021. Becoming #GenerationRestoration: Ecosystem restoration for people, nature and climate. United Nations Environment Programme, Nairobi.

Valderrábano, M., Nelson, C., Nicholson, E., Etter, A., Carwardine, J., Hallett, J., McBreen, J. & Botts, E. 2021. *Using ecosystem risk assessment science for ecosystem restoration: A guide to applying the Red List of Ecosystems to ecosystem restoration.* International Union for Conservation of Nature, Gland, Switzerland.

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Peter Chou Kee Liu via Flickr

Section 6

How to measure mainstreaming success?

Mainstreaming biodiversity is a long-term process. The eventual end result of mainstreaming should be improvements in biodiversity, ecosystem services and human well-being (**Figure 14**). But achieving actual biodiversity impacts may only occur after years of dedicated mainstreaming efforts. It is almost impossible to reach this point within the timeframe of a single project. It is more useful to think of mainstreaming as an incremental process, and break it down into small, achievable, stepping-stone impacts.

Mainstreaming involves collaboration. There are many ways that mainstreaming requires social engagement and collaboration. It may require communicating with a new audience, setting up committees, establishing a community of practice, training people on the use of a product, and more. However, social processes are always time consuming. It takes time to build trust and negotiate compromises. Social processes are critical steps towards mainstreaming and should be counted as successes.

Mainstreaming builds on previous work. Mainstreaming is often layered on previous successes. A first step is often new information that increases awareness about biodiversity issues. The awareness leads to the development of new knowledge products, specifically those that are joint outputs with a development or production sector. Slowly, these begin to be integrated more closely into policy and practice. Finally, improvements in biodiversity, ecosystem services and human well-being should emerge (**Figure 14**).

Mainstreaming is dynamic and opportunistic. Mainstreaming often does not proceed in a

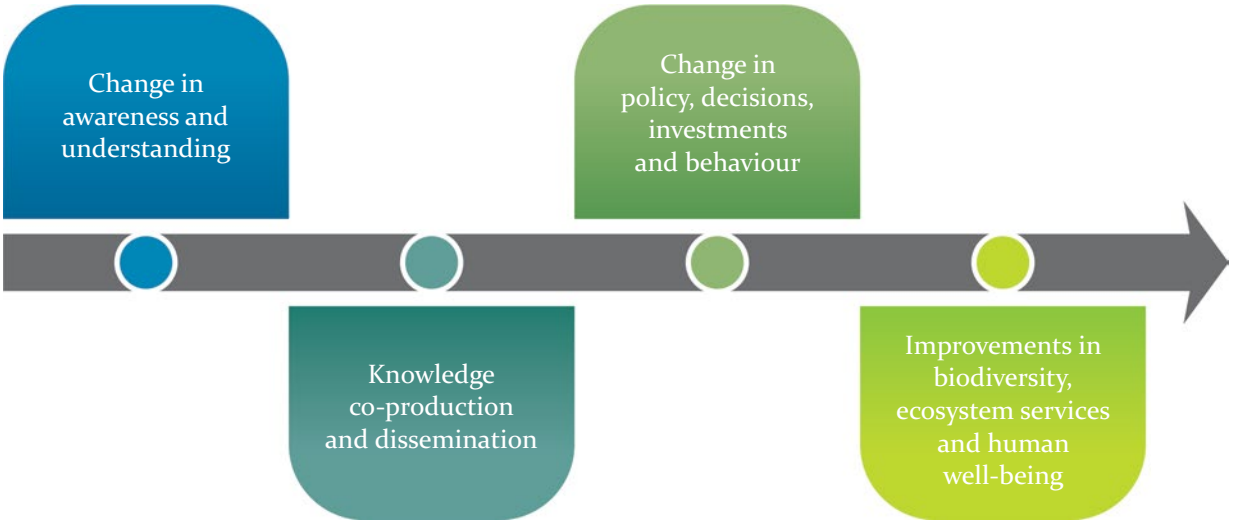

Figure 14: Stepping-stones to increasing mainstreaming impact. It may not proceed in a strictly linear way. Adapted from Sitas et al. (2020).[15]

[15]Sitas, N., Nel, J. & Reyers, B. 2020. Lessons from mainstreaming ecosystem services into policy and practice in South Africa. In *Mainstreaming natural capital and ecosystem services into development policy* (pp. 40-59). Routledge.


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standard linear way. It depends so strongly on context that each mainstreaming experience is different. Often, the biggest mainstreaming successes are achieved by taking advantage of unexpected opportunities, like the revision of a piece of legislation or a change in political focus. Because of this, it is useful to remain flexible and adapt short-term mainstreaming goals to fit the context, but within the clear strategic focus provided by the underlying Spatial Biodiversity Assessment and Prioritisation.

Indicators to measure mainstreaming progress

Mainstreaming is so varied that there are many different ways to measures success. Indicators will often be specific to a particular project or context. However, mainstreaming indicators can generally be divided into a few main types.[16]

- **Input indicators** measure the resources that go into mainstreaming, such as funding, staff or equipment. They may also measure the production of new data, research or maps that are the start of mainstreaming efforts.
- **Output indicators** measure the products that are developed while mainstreaming, such as reports or guidelines. Outputs are a very tangible way to measure mainstreaming, but they may not be put into practice without additional engagement.
- **Process indicators** measure the actual activities of mainstreaming that are done. They show that efforts have been made to move mainstreaming forward. Process indicators may include training the target audience or conducting a communications campaign.
- **Outcome indicators** measure how biodiversity is being taken up into the target sectors. Outcome indicators track things like changes to regulations, or increases in biodiversity funding.
- **Impact indicators** measure the eventual intended impacts of mainstreaming, showing how the efforts of mainstreaming have led to actual improvements in biodiversity and human well-being.

The incremental steps towards mainstreaming the products of Spatial Biodiversity Assessment and Prioritisation can be tracked using these types of indicators (**Figure 15**). None of these steps is quick or simple, and each may involve lengthy consultations and refinement of products. It may only be possible to achieve a small number of steps during the course of a single project. But, by layering on previous efforts, incremental progress can be made that builds towards successful mainstreaming.

For more information

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Awareness | **Co-production** | **Policy** | **Impact**

Four basic input datasets developed.
> SBA&P analysis completed.
> Basic spatial prioritisation done.
* Technical report written.
> Key messages identified.
* Summary report written.
> Information made accessible to users.
> Communications campaign implemented.
+ Information used in NBSAP.
+ Information used in State of the Environment Report.
+ Information used in CBD national reports.
+ Changes in understanding among stakeholders.
+ Stakeholders are familiar with the SBA approach.

> Community of practice established.
> Policy entry points identified.
> Workshops with relevant stakeholders held.
> Identify links between SBA&P and development priorities.
> Ecosystem threat status results submitted to IUCN.
> New collaborations between non-traditional partners.
> Inputs received into draft products.
* Protected Area Expansion Strategy developed.
* Guidelines for use of map products in development planning.
* Guidelines for use of map products in environmental authorisations.
> Training conducted on use of products.

> Regular updates conducted.
> Handover of SBA&P to government custodians.
+ Follow-on projects initiated.
+ Private sector uses map products for planning.
+ Map products used in eco-certifications.
+ Increased sources of funding for biodiversity.
+ Wording refined in existing policies.
+ Policies specifically mention SBA&P outputs.
+ New law or policies developed that reference map categories.
+ SBA&P contributes to Natural Capital Accounting.
+ Information used in National Development Plan.

> Activities undertaken to manage threatened ecosystems.
+ New protected areas declared.
= Trends in protection levels improving.
= Trends in ecosystem threat status stable or improving.
= Benefits of biodiversity to people maintained or improved.

Input indicators
* Output indicators
> Process indicators
+ Outcome indicators
= Impact indicators

Figure 15: Possible stepping-stone achievements in mainstreaming the products of Spatial Biodiversity Assessment and Prioritisation (SBA&P).


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Morgan Trimble

Section 7

Updating the Spatial Biodiversity Assessment and Prioritisation

Spatial Biodiversity Assessment and Prioritisation should not be seen as a static project output that is done once and considered complete. National reporting and the range of other mainstreaming entry points require that the assessment is kept up-to-date. To remain relevant, the assessment needs to take into account improvements in knowledge and data, and changes to the situation and context. Long-term mainstreaming of Spatial Biodiversity Assessment and Prioritisation calls for established systems by which feedback is received, data layers are reviewed, and the assessment is updated. See **Technical guides.**

Establish a regular update schedule. Instead of making ongoing, minor edits and changes to the data and redoing the assessment each time, it is advisable to collect all new information and update the assessment on a regular release schedule. This will keep versions clear and help users to know which is the latest version to use. Updates of the assessment can be planned for approximately every five years. During the interim period, deliberate efforts can be made to fill data gaps and refine the basic input datasets, so that when the new assessment happens it can be done easily on the most up-to-date information.

Assign responsibility for the next version. When conducting a first Spatial Biodiversity Assessment and Prioritisation in a country, it is important at the same time to make plans for future updates, including deciding which organisations and individuals should be responsible for the next version. This is especially important if the assessment is being done as part of a finite project, after which participants disperse, responsibility is lost and any gains made may lapse as the assessment becomes outdated. Ideally, updating the Spatial Biodiversity Assessment and Prioritisation should become part of the routine work of a recognised biodiversity organisation.

Set up channels for feedback. Once the first version of the Spatial Biodiversity Assessment and Prioritisation has been finalised and shared, it is useful to set up communications channels by which users can provide feedback. Contact details should be shared for a contact person who can respond to queries and receive feedback. This can help to identify further data gaps, technical issues or points that need to be clarified from a presentation and mainstreaming perspective. These can be addressed during the next update.

Work to fill identified data gaps. No Spatial Biodiversity Assessment and Prioritisation will be perfect because pragmatic decisions will need to be made to get useable answers from the data that is available. However, the next version provides an opportunity to make data improvements. It is important to identify data gaps and scientific research needs that will help to improve the assessment in the future. The gaps can then become a focus for gathering new data, and refining the input datasets. Making solid improvements to the three foundational spatial datasets – the maps of ecosystem types, ecological condition and protected areas – will be the best way to improve the assessment. Preparing data for regular updates can motivate significant progress in biodiversity data collection and analysis across a country.

Build capacity for Spatial Biodiversity Assessment and Prioritisation. To facilitate regular updates, it is necessary to have a strong core group of people who understand the assessment methods and can perform the updates in the future. A community of practice for Spatial Biodiversity Assessment and Prioritisation (see **Community of practice**) can help to familiarise new recruits with the approach and ensure that enough people are available to take the process forward. Specific training on the methodology, as well as ongoing mainstreaming of the products, can also help to build capacity.

Ongoing mainstreaming. While the Spatial Biodiversity Assessment and Prioritisation should be updated periodically, efforts to mainstream the results must be ongoing between the updates. Mainstreaming is a long-term process that progresses by making incremental steps towards its ultimate goal.

See **Section 6: How to measure mainstreaming success?** Conducting the analysis is actually a small step in comparison to the efforts required to share and mainstream the results. There are likely to be ongoing opportunities to apply the results of the assessment.

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Related resources

MAPPING BIODIVERSITY PRIORITIES: A practical, science-based approach to national biodiversity assessment and prioritisation to inform strategy and action planning. SANBI & UNEP-WCMC. 2016. UNEP-WCMC, Cambridge, UK.

MAINSTREAMING BIODIVERSITY PRIORITIES: A practical guide on how to integrate spatial biodiversity products into national policy, planning and decision-making. UNEP-WCMC & SANBI. 2022. South African National Biodiversity Institute, Pretoria, South Africa.

REPORT TEMPLATES: Blank, editable templates that show what should be included in a technical report and summary report.

- Technical report template
- Summary report template

TECHNICAL GUIDES: A set of step-by-step technical guides on how to assemble the datasets and run the assessments.

- INPUT MAP: Map of ecosystem types
- INPUT MAP: Map of ecological condition
- INPUT MAP: Map of protected areas
- ASSESSMENT: Ecosystem threat status
- ASSESSMENT: Ecosystem protection level

The previous guidance, **Mapping Biodiversity Priorities**, explains how to conduct Spatial Biodiversity Assessment and Prioritisation by combining a few basic datasets to produce useful headline indicators and maps of the state of biodiversity across a country. The results are a set of spatial biodiversity products that are useful for a wide range of applications.

Mainstreaming biodiversity is about working with a range of sectors to include biodiversity considerations in their decisions. There are many mainstreaming entry points for spatial biodiversity products. They can be integrated into spatial planning, environmental authorisation, protected area expansion plans, restoration projects, global reporting and more.

This follow-up guidance, **Mainstreaming Biodiversity Priorities**, gives practical advice on how to go about mainstreaming the spatial biodiversity products. It explains how to present the results clearly, formulate effective key messages to suit the target audience and interpret the map categories in different contexts.

In this way, mainstreaming the results of a Spatial Biodiversity Assessment and Prioritisation can eventually lead to improvements in biodiversity, ecosystem services and human well-being.

ISBN 978-1-928224-57-0