

Metrics of effective conservation action: Evaluating the implementation of conservation plans

ABSTRACT

Evaluation frameworks measuring the implementation of conservation plans, are mainly absent from the literature and where they do exist, they have yet to culminate in a ready-to-use comprehensive framework that accounts for the range of elements, which incorporates the journey from inception, to action, and beyond. This paper critically engages current available metrics for measuring the implementation of conservation plans with a view to establishing an evaluation framework. The framework devised was tested and refined using the case study of the Core Flora Sites, a conservation plan that was undertaken in the late 1990s in Cape Town, South Africa. The framework identified five themes, with 26 metrics. In order to ensure both robustness and replicability, the framework is holistic, easy to use, flexible and provides ratings so that success can be quantified and monitored over time. The testing of the case study revealed that conservation implementation must be viewed as a continuous endeavour, and takes many years to show results. Innovation, opportunism, calculated risk and dedicated champions are central to conservation success. As are an enabling environment with stable institutional arrangements and good governance, supportive policies and legislation, socio economic benefits, and stakeholder involvement.¹

Keywords: Conservation Planning, Implementation, Evaluation Framework, Effective Conservation Action, Biodiversity and Social Outcomes.

1. INTRODUCTION

With increasing pressure to stem biodiversity loss, conservation planning, especially in megadiverse developing regions, is critical (Botts et al., 2019, Venter et al., 2016). In matching and meeting this demand conservation planning has become more sophisticated, using a range of approaches, robust data sets, and incorporating an ever-growing diversity of considerations including, for example, climate change refugia (Pence, 2011, Adams et al., 2018, Holmes et al., 2019, Saunders and Forstenhäusler, 2023). Conservation plans are now well advanced in many countries, incorporated into national and sub-national government policy and practice, and

¹ Abbreviations: CAPE - Cape Action for People and Environment, CapeNature – Western Cape Nature Conservation Board (Provincial), CBD - Convention of Biological Diversity, CCT - City of Cape Town, CFS - Core Flora Sites, FTE – Full Time Equivalent (job creation), GBF - Global Biodiversity Framework, GIS - Geographic Information System, METT - Management Effectiveness Tracking Tool, PAME - Protected Area Management Effectiveness, ULO - Unlawful Land Invasion.

implicit in the Kunming-Montreal Global Biodiversity Framework (GBF) (CBD, 2022, Geldmann, 2023, Obura, 2023, Watson et al., 2023).

While conservation planning has grown in rigour, implementation is not always successful (Konstant et al., 2020, Gallo et al., 2023) and there is a lack of evidence as to whether conservation plans guide management and lead to effective conservation action (McIntosh et al., 2017, Adams et al., 2018, Gallo et al., 2023). The “implementation crisis” is a well-recognised phenomenon, as highlighted by the ineffectiveness of the Aichi 2020 targets and the adoption of the GBF (Knight et al., 2006b, 2008, 2011, Sarkar et al., 2006, Reyers et al., 2010, Adams et al., 2018, Phang et al., 2020, Wessels et al., 2021b, Xu et al., 2021, Obura, 2023,).

Non-implementation of conservation plans can stem from a disconnect between planning and implementation stages, including differing actors, institutional arrangements and financial resources across time (Knight et al., 2011, Bottrill and Pressey, 2012, Game et al., 2013, Pressey et al., 2013, Xu et al., 2021, Gallo et al., 2023). Because implementation can take decades (Kapos et al., 2008, Bottrill and Pressey, 2012, Botts et al., 2019), ecological systems, financial resources and focuses can shift, as can institutional and management capacity (Midgley et al., 2003, Araújo et al., 2011, Liang et al., 2014, Holmes et al., 2019, Gibbons et al., 2021, Mandić, 2023), and it is almost certain that individuals, champions and stakeholders will change.

The literature highlights that successful implementation therefore relies on an appreciation of relevant social and institutional contexts, stakeholder engagement and identifying champions, a clear legal and policy context, explicit actions with associated targets set against timelines, and budgets matched with adequate resources – as well as how these change across time (Bottrill and Pressey, 2012, Adams et al., 2018, Gallo et al., 2023). Entrenching conservation plans into wider spatial planning and decision-making processes can help ensure continuity in agency and political support at the local government level (Pierce et al., 2005, Botts et al., 2019, Allred et al., 2021). Most important, however, is the presence of an implementation strategy and a monitoring and evaluation framework (Bottrill and Pressey, 2012, Adams et al., 2018).

Despite a literature on implementation and non-implementation, there is little published on conservation planning outcomes (Bottrill and Pressey, 2012, McIntosh et al., 2018, Wessels et al., 2021b), and the metrics and assessment approaches reported

do not yet offer a comprehensive, replicable and ready-to-use framework that effectively takes into account a holistic range of elements, as well as change over time. This paper seeks to develop such a framework by interrogating current approaches and augmenting existing frameworks. To refine and test the framework, we drew on the widely accepted method of case study analysis to develop and reflect on usefulness of devised evaluation tools or frameworks (Stake, 1978, Yin, 1997, 2013, Gerring, 2004, Harrison et al., 2017), in this case of a conservation plan from the Western Cape in South Africa.

Between 1997 and 2002, the Botanical Society of South Africa (Botsoc, a non-governmental organisation (NGO)) identified, by using rudimentary conservation planning methods, 38 critical Conservation Areas within the City of Cape Town, termed the Core Flora Sites (CFS) (Mckenzie and Rebelo, 1997, Maze and Rebelo, 1999). Cape Town is a rapidly growing city in the Global South, with an area of 2 456 km² and a population of over 4.68M (CCT, 2022), and faces the significant development issues of a high unemployment rate and considerable informality in both form and economy (Goodness and Anderson, 2013). It is located in the south-western corner of the mega-diverse and unique Cape Floristic Region (CFR), the smallest of only six floral kingdoms in the world and a recognised global biodiversity hotspot (Rebelo et al., 2011). The recommendations for the CFS at the time were that they receive conservation status, are appropriately managed, are actively promoted and utilised for their educational value, that local communities are acknowledged as important custodians, and that the threat status of the Red Data List of species decreases as their habitats are conserved (Maze and Rebelo, 1999). This case study presents a long-standing conservation plan allowing for over 20 years of material for effective testing and reflection of the framework.

2. METHODS

2.1 Devising an Evaluation Framework Tool

Metrics for the evaluation framework were drawn from literature. Some of these are established while others more novel, emerging out of recent debate in the field (Knight et al., 2006b, Kapos et al., 2009, Bottrill and Pressey, 2012, Kohsaka et al., 2013, Pressey et al., 2013, Liang et al., 2014, Coad et al., 2015, McIntosh et al., 2016, Guerrero and Wilson, 2017, Adams et al., 2018, Kareksela et al., 2018, Botts et al., 2019, Holmes et al., 2019, Stolton et al., 2019, Wood et al., 2019, Gibbons et al., 2021, Wessels et al., 2021b, Gallo et al., 2023, Mandić, 2023). The metrics were synthesised into themes using definitions and suggestions from the literature. The metrics were then analysed against the GBF (CBD, 2022) to identify any gaps.

2.2 Core Flora Sites plan – our case study

In order to assess the CFS plan through time, the changes in the area of the sites were digitally captured. Advances in Geographic Information System (GIS) technology highlighted some inaccuracies in the original data.

To interrogate the CFS plan and use it to refine and test the evaluation framework, the following information pertaining to the plan was collated (Supplementary information Appendix A):

- 1) hectares transformed (natural vegetation already transformed at the time the CFS plan was being undertaken), lost (natural vegetation transformed after the completion of the study and were lost during the implementation), not conserved (natural vegetation with no conservation status), in process (natural vegetation secured/reserved for conservation and in process of formal proclamation), and conserved (natural vegetation formally conserved in perpetuity) were established over the time period in intervals of 4 years,
- 2) vegetation type and specific incidences of species demise or recovery,
- 3) data from the Management Effectiveness Tracking Tool (METT) which assesses the management effectiveness for protected areas was obtained for each individual CFS, and
- 4) context, community involvement, stakeholder engagement, environmental education effort, institutional arrangements, political buy-in and support, uptake into policy, developer avoidance, and funding information.

In addition to the above, an expert workshop was held with the authors of the original CFS plan. This specifically sought detail on the original concept, design, resources available and stakeholders involved at the planning and initial implementation stages.

2.3 The evaluation of the merit of different metrics

The merit of each metric in the evaluation framework was then tested using the case of the CFS plan, by determining if the metric could be easily applied, if data was available, and if it was qualitative or quantitative. Finally, in some cases the metrics were excluded if no information or data was available. Metrics and wording were refined in an iterative process in relation to the CFS plan and available data.

2.4 Providing a rating scale

A 1-5 rating scale for each metric was developed using a combination of published literature and the CFS plan as an example to illustrate the framework's application

with 1 being deemed little or no success, 3 being minimally adequate, and with 5 showing all elements of success (or exceeded) for that metric. The content of the rating scale was determined subjectively but clearly articulated with a view to allowing for modifications of the rating scale depending on the case study and/or the context in future use.

2.5 Evaluating the Core Flora Sites plan

The hectares transformed, lost, not conserved, in process and conserved, and hectares that underwent a METT assessment and scored more than 33% (at least basic management, Leverington et al., 2010) were shown graphically over the time in 4-year intervals. METT was selected alongside the hectares conserved as it looks at management effectiveness of each protected area and includes a broad range of indicators such as conservation status, planning, community involvement, education and social programmes, infrastructure and equipment, budget, staff capacity, administration processes and key biodiversity and cultural outputs.

A temporal approach was used to illustrate the usefulness of the evaluation framework over time. The CFS plan was then scored using the evaluation framework's rating scale and radar plots were generated for three time periods (1999, 2012, 2023).

3. RESULTS

The evaluation framework created draws on five themes and 29 metrics. The details, including the origin and rationale for each metric, are included in (Supplementary information Appendix B), the five themes are:

- **Planning:** original plan design and incorporation of an implementation strategy and monitoring and evaluation framework, audit, review and update – 3 metrics
- **Natural:** biodiversity persistence, reduction in threat status, and ecosystem services – 7 metrics
- **Financial:** leverage and availability of financial resources, and financial sustainability – 5 metrics
- **Social / Human:** interaction, buy-in from community, social benefits, awareness, and knowledge – 6 metrics
- **Institutional / Management:** role of institutional, management, and legal framework – 8 metrics

Three metrics in the financial theme that focused on investment transparency and the cost efficiency of plan and implementation operations were excluded due to lack of data and budgeting differences across authorities. With the exclusion of these three

metrics, the final framework included five themes and 26 metrics. Assessment of six metrics was quantitative, while 20 were qualitative.

The results from the CFS plan for the hectares transformed, lost, not conserved, in process and conserved with the corresponding number of hectares evaluated via the METT are shown in Figure 1.

The 1999, 2012 and 2023 radar plot scores (Figure 2) increased dramatically between 1999 and 2012. From 2012 to 2023, there was a relatively small increase in hectares conserved, but an improvement in institutional arrangements, community benefits and corresponding METT scores. There is a slight decrease in hectares conserved and METT scores from 2020 to 2023. Although, there was a slight decrease in conservation hectares from 2012 to 2023, there was still a consistent increase in the number of CFS that had some conservation effort. In 1999, nine of the 38 CFS were fully or partially conserved, in 2012, 19 CFS and in 2023, 23 CFS. There was also a reduction in transformed areas over the time by about 37 hectares when hard structures (derelict buildings, nursery, informal shacks) were removed from some of the CFS and other agricultural and open areas were restored.

4. DISCUSSION

4.1 Core Flora Sites plan – our case study

The results from the CFS plan illustrate the protracted nature of achieving conservation success, a challenge reported elsewhere (Watts et al., 2020). After 24 years, only slightly more than 50% of the hectares identified for formal conservation are in process of being conserved or already conserved. The quick wins achieved between 1999 and 2012 can be attributed to a corresponding increase in budget (CCT, 2018), significant efforts in proclamation processes, the development of management- and visitor-use plans (Britton and Langley, 2013), as well as momentum from the newly-formed bioregional partnership with Cape Action for People and Environment (CAPE). During this time the CFS were also incorporated in the development of the fine scale systematic conservation plan for Cape Town in the form of the Biodiversity Network or BioNet (Rebelo et al., 2011, Holmes et al., 2019).

Progress slowed through the period 2012-2023, as most of the quick and easy wins had been achieved and securing the additional areas remains challenging (CCT, 2018). While the increase in conserved hectares and number of CFS slowed, the staff component and champions as well as on-the-ground management, notably with improved invasive species clearing and restoration efforts, were all positive. When the

City became the primary implementer, there was an increase in resources and dedicated staff (Ditlefsen et al., 2016, CCT, 2018). The case of the CFS supports wider findings that highlight the importance of a strong, dedicated and capacitated staff complement with leadership as well as champions within and outside of government as critical to implementation (Dorse et al., 2019, Wessels et al., 2021b). Job creation, skills development, awareness, education, and community involvement all increased over this period too, and many of the skills development staff based on these sites are now permanently employed in the City (CCT, 2023). As a result, the CFS were supported through policy, legislative and planning engagements. This ensured the continual revision and updating of self-sustaining plans, highlighted as central to conservation success by Bottrill and Pressey (2012). The institutional and governance context continued to improve, evident in the City ensuring that BioNet was included in the Integrated Development Plan and the local spatial development plans as a base layer (CCT, 2015, 2022, Holmes et al., 2019). Despite the institutional and governance wins highlighted through this approach, as yet not conserved CFS remain vulnerable to formal development (Cliff Dorse, Head: Conservation Services, City of Cape Town, personal communication 18/01/2024, Goodness & Anderson, 2013). This shows that more work is required to mainstream conservation implementation across all sectors of governance.

In addition to the loss of the CFS to formal development, in the last few years, the greatest pressure has been illegal activities. Driftsands Nature Reserve, one of the large CFS, was deproclaimed in 2021 as a result of an unlawful land occupation during the Covid-19 pandemic (Ground Up, 2022). This deproclamation resulted in total hectares under conservation decreasing in 2023, despite additional CFS being secured and 37 hectares of transformed area being rehabilitated. Driftsands Nature Reserve had a high METT score, a high level of legal protection, management planning, community involvement, education programmes, and dedicated staff and budget (CapeNature, 2015). However, even with all these factors in place and healthy metrics to account for them this CFS was lost to conservation. It is critical that protected area status is not viewed as the end goal and that ongoing protection and adequately resourced management is emphasised. The use of the evaluation framework could provide an advanced warning if undertaken in a workshop with relevant stakeholders at least every 5 years.

Overall, the CFS shows a positive trend in implementation, despite negative dips such as the Driftsands case. The original CFS plan was undertaken on a tight budget (expert workshop 14 September 2023), but did have formal support of the local

municipality (CCT, 1999). The original CFS authors also made attempts to bridge the implementation gap, spending considerable time with the local municipality and conservation authorities, and seeking and securing funding to support and guide the plan to implementation (Maze et al., 2002).

It is critical in any conservation plan that key information is collated throughout the project (McIntosh, 2019). This includes threats, development undertaken, proclamation and other legal processes, education and stakeholder involvement, and context and institutional arrangements over the implementation period (Wessels et al., 2021a). An evaluation framework developed during the plan's initiation phase would ensure data management, which is critically important in monitoring success (McIntosh, 2019, Konstant et al., 2020,).

4.2 The Evaluation Framework

The devised evaluation framework, here proposed, builds on previous evaluation assessments and frameworks (Bottrill and Pressey, 2012, Wessels et al., 2021a) and proved extremely useful in daylighting conservation outcomes in the case of the CFS over time. The evaluation is simple and easy to use in a data- and resource-constrained environment, providing useful information at low cost (Wessels et al., 2021b) and allows for the assessment of metrics without technical training or expertise in complex analysis, software or manipulation.

The framework covers the full journey from plan to continuous action, and engages varied metrics to highlight the necessary complexity of evaluating conservation success, as is evident in the diversity of emerging considerations when trialling the evaluation on the CFS plan. This useful degree of flexibility acknowledges the overlapping and inter-dependences of the metrics (Wessels et al., 2021b) as critically important to implementation. For example, financial sustainability relies on institutional metrics like organisational commitment. Even more complex metrics/evaluations could be introduced to look at the broader impacts on society and highlight unintended consequences such as conflict for use of open space and formalisation of the site resulting in access issues (Baylis et al., 2016, Wessels et al., 2021b).

4.2.1 Theme: Planning

The design of conservation plans is central to implementation and should guide the foundation of any evaluation (Adams et al., 2018) – and yet this theme is under acknowledged in most evaluation frameworks (Wessels et al., 2021b).

Implementation strategies, often missing from conservation plans, are critical to on-the-ground execution and success. They need to be flexible enough to enable, re-prioritise and support actions over decades and need to embrace conservation “opportunism” and innovative approaches (Knight et al. 2006a, Knight and Cowling, 2007, Bottrill and Pressey 2012, Visconti and Joppa, 2015, Adams et al. 2018, Mascia and Mills, 2018, Holmes et al., 2019). Updates, audits and plan reviews, as well as engagement and buy-in from stakeholders and implementing agencies needs to be included in the planning phase (Gallo et al., 2023). Our framework allows space for flexibility as it evaluates the drafting of implementation strategies and involvement of stakeholders, both at inception and during the plan.

Finally, as articulated in the GBF, conservation planning is critically important even if the plan is not implemented immediately, but is embedded in a spatial development plan (Botts et al., 2019, CBD, 2022).

4.2.2 Theme: Natural

Hectares conserved is one of the most commonly used evaluation metrics (Knight et al. 2006a, Bottrill and Pressey 2012) and remains critically important, contributing to global policy targets as well as conservation success on the ground (CBD, 2022). Hectares conserved are closely linked to representation of vegetation types and forms the basis for prioritisation in conservation plans (Holmes et al., 2019).

Threatened and Red Data Listed species are implicit in most conservation plans, including the CFS plan (Maze and Rebelo, 1999, Knight and Cowling, 2007, Rebelo et al., 2011, Holmes et al., 2012, IUCN, 2016). Because threatened species are included in the determination of priority areas, it can be assumed that any implementation of the plan would decrease threat status. There are many methods and tools to measure biodiversity persistence, habitat condition, global planet health and species threat abatement, and urban nature conservation success (Butchart et al., 2007, Newbold et al., 2016, McRae et al., 2017, Akçakaya et al., 2018, Henriques et al., 2020, Mair et al., 2021,). However, in order to keep the framework simple, the details on species and their threat status was determined on a qualitative basis, as was ecosystem services which also requires in-depth study for quantitative evaluation.

4.2.3 Theme: Financial

Sustainable finance is critical to successful conservation (Waldron et al., 2013, 2017, CBD, 2021, Xu et al., 2021). The most commonly used metric in assessing

implementation is initial financial investments (McIntosh et al., 2016, Bottrill and Pressey, 2012, Adams et al., 2018, Konstant et al., 2020,). The metric “sustainability of finances” is often overlooked (Pressey et al., 2013) but has been recognised as central to effective implementation (Emerton et al., 2006, Chandra and Idrisova, 2011, Konstant et al., 2020, Chambers et al., 2022).

Budgets for protected area management are included in the management effectiveness tracking tools (Hockings et al., 2019) but many of the more detailed financial metrics suggested in the literature (Bottrill and Pressey, 2012, Armsworth, 2014), could not be included in this assessment due to limited data. Globally, inconsistent data and financial monitoring is a challenge in determining economic benefits from protected areas (Stolton et al., 2021), showing that financial reporting alone is often inadequate. Comparing finances and tracking costs of multi-year projects across organisations is difficult due to differing budgeting methods and spending cultures. The financial theme metrics would benefit from a greater level of attention so these metrics can be better assessed.

4.2.4 Theme: Social and Human

Social and transformation targets can be difficult to determine and collate and are often ignored (Knight et al., 2006a, Bottrill and Pressey, 2012). In this evaluation framework, both qualitative and quantitative metrics are suggested.

In order to provide a community benefit measure, a job creation and skills development metric was deemed important (Guerrero and Wilson, 2017). This metric is critical in the developing regions and the presence or absence of programmes as suggested in this framework is easy to record. If more detail is required, actual job opportunities, full time equivalent (FTE) or person days per year also can be included.

However, many of the qualitative metrics in this theme could be broadened to include an analysis of perspectives which could provide depth to metrics such as “trust in planning processes” and “attitudes of decision makers” (Bennett, 2016). Perceptions are critically important and contribute to a plans’ success or failure (Bennett, 2016, Wessels et al., 2021a, 2021b). This metric includes stakeholder involvement, which can be measured by forums or committees, awareness and education programmes and presence of environmental education centres. It is easy to quantify awareness and education programmes, but less so to determine behaviour change and how this has affected conservation action in a specific area.

4.2.5 Theme: Institutional

Management effectiveness can be readily quantitatively assessed using one of the globally accepted PAME Tools. In this evaluation framework, the METT is incorporated as it has been used for several years in the case study (Wood et al., 2019). The disadvantage of the METT is that, because its assessment draws heavily on plans, staff and budgets, it often ends up assessing the effectiveness of the organisation and not the success of the site and its processes (Wood et al., 2019). However, the METT is a beneficial addition to any conservation planning evaluation because of the range of indicators it engages to measure PA effectiveness, including planning, legislation, biodiversity, heritage, education, community involvement and benefits, human resources and budget (Hockings et al., 2019, Wood et al., 2019). The METT's real value is in tracking sites over time (as opposed to comparing sites) and can assist with monitoring and formative evaluations.

Other metrics in the institutional theme, mainly qualitatively assessed, include institutional commitment, conservation-planning uptake in decision making, political support, champions, and staff component (Bottrill and Pressey, 2012, Mangos et al., 2021). A metric has been included for a major risk at a national scale such as rapid economic expansion/ economic downturn/ pandemic/ government policy which causes large scale biodiversity destruction. This could alert implementers, explain rapid biodiversity loss and support adaptive management.

5. Conclusion

5.1 Evaluation difficulties and its importance

Evaluation, although fraught with difficulties, would most effectively be undertaken in a workshop with the relevant implementers and stakeholders. This would provide rich discussion, shared challenges and opportunities, and might also give an indication of pending risks, threats and issues that implementers need to be aware of and proactively plan for (Ground Up, 2022).

5.2 Framework: Value and Novelty

The implementation of conservation plans requires ongoing management and community involvement with no finite conclusion. Continued evaluation is critical, as implementation will require long-term effort usually spanning a period longer than any one individual's career, as contexts change (Gelderblom and Wood, 2018, Watts et al., 2020).

This framework will hopefully encourage more researchers and implementers to evaluate the effectiveness of conservation plans and to collate data through time and reflect on real lessons learnt. This in turn will support adaptive management with better references for implementation success and failure, and provide valuable insights into effective conservation action (Buxton et al., 2021). Our devised framework differs from previous work as it adopts a holistic approach and includes a wide range of metrics to track the journey from plan, to action, and beyond. It also provides a clear rating scale to monitor outcomes through time, and documents implementation in a structured manner that can provide feedback to ensure more effective conservation that bridges the plan-action gap. Not only is it adaptable by circumstance, but it also fosters transparency and can be updated as work in this field shifts and grows.

5.3 Final word

Conservation implementation is a tricky process that requires years of dedicated resources (Watts et al., 2020) and champions (Gelderblom and Wood, 2018, Dorse et al., 2019). The inter-linked factors outlined above interact throughout time and can produce confounding and unforeseen negative or positive outcomes (Ashwell et al., 2006, Gibbons et al., 2021, Wessels et al., 2021b, Mandić, 2023). Conservation interventions often fade or become less intense over time (Ashwell et al., 2006, Mascia and Mills, 2018, Konstant et al., 2020), making it critical that dedicated champions are able to take advantage when opportunities arise for long term gain (Holmes et al., 2012, Manuel et al., 2016) and are able to effectively respond in the context of a major risk such as the Unlawful land occupation (ULO) during the Covid-19 pandemic. Implementers need to remain proactive, innovative, and prepared to take calculated risks (Holmes et al., 2012, CCT, 2018, Dorse et al., 2019, Wood et al., 2019).

Other more detailed conservation indices that are readily available such as biodiversity health, species persistence, threat status, and reduction, would be highly effective supplements to our framework for specific questions. The value of a simple, easy to use and highly adaptable and reflective tool remains a top priority in monitoring and in turn guiding conservation success.

Figure 1: Conservation status of Core Flora Sites with the hectares subjected to a METT assessment shown over the time period as represented in 4 years intervals.


 **Dates during the implementation when the evaluation framework was applied (Figure 2).**

Figure 2: Evaluation framework shown on a radar chart conducted for roughly every 10 years (details in supplementary – Appendix C spreadsheet). P – Planning theme, N – natural theme, F – Financial theme, S – Social/Human theme, I – Institutional theme

11. REFERENCES

- Adams, V.M., Mills, M., Weeks, R., Segan, D.B., Pressey, R.L., Gurney, G.G., Groves, C., Davis, F.W., Álvarez-Romero, J.G., 2018. Implementation strategies for systematic conservation planning. *Ambio* 48, 139–152. <https://doi.org/10.1007/s13280-018-1067-2>.
- Akçakaya, H.R., Bennett, E.L., Brooks, T.M., Grace, M.K., Heath, A., Hedges, S., Hilton-Taylor, C., Hoffmann, M., Keith, D.A., Long, B., Mallon, D.P., Meijaard, E., Milner-Gulland, E.J., Rodrigues, A.S.L., Rodriguez, J.P., Stephenson, P.J., Stuart, S.N., Young, R.P., 2018. Quantifying species recovery and conservation success to develop an IUCN Green List of Species. *Conserv. Biol.* 32, 1128–1138. <https://doi.org/10.1111/cobi.13112>.
- Allred, S., Stedman, R., Heady, L., Strong, K., 2021. Incorporating biodiversity in municipal land-use planning: An assessment of technical assistance, policy capacity, and conservation outcomes in New York’s Hudson Valley. *Land use policy* 104, 264–8377. <https://doi.org/10.1016/j.landusepol.2021.105344>.
- Araújo, M.B., Alagador, D., Cabeza, M., Nogués-Bravo, D., Thuiller, W., 2011. Climate change threatens European conservation areas. *Ecol. Lett.* 14, 484–492. <https://doi.org/10.1111/J.1461-0248.2011.01610.X>.
- Armsworth, P.R., 2014. Inclusion of costs in conservation planning depends on limited datasets and hopeful assumptions. *Ann. N. Y. Acad. Sci.* 1322, 61–76. <https://doi.org/10.1111/nyas.12455>.
- Ashwell, A., Sandwith, T., Barnett, M., Parker, A., Wisani, F., 2006. Fynbos Fynmense: people making biodiversity work., SANBI Biodiversity Series 4. SANBI, Pretoria.
- Baylis, K., Jordi, H.-R., Jan, B., Esteve, C., Driss, E.-B., J, F.P., Renaud, L., Persson U, M., Alex, P., Sven, W., 2016. Mainstreaming Impact Evaluation in Nature Conservation. *Conserv. Lett.* 9, 58–64. <https://doi.org/10.1111/conl.12180>.
- Bennett, N.J., 2016. Using perceptions as evidence to improve conservation and environmental management. *Conserv. Biol.* 30, 582–592.

<https://doi.org/10.1111/cobi.12681>.

Bottrill, M.C., Pressey, R.L., 2012. The effectiveness and evaluation of conservation planning. *Conserv. Lett.* <https://doi.org/10.1111/j.1755-263X.2012.00268.x>.

Botts, E.A., Pence, G., Holness, S., Sink, K., Skowno, A., Driver, A., Harris, L.R., Desmet, P., Escott, B., Lötter, M., Nel, J., Smith, T., Daniels, F., Sinclair, S., Stewart, W., Manuel, J., 2019. Practical actions for applied systematic conservation planning. *Conserv. Biol.* 33, 1235–1246.
<https://doi.org/10.1111/cobi.13321>.

Britton, P., Langley, H., 2013. Second Application of the METT-SA (2008) to Protected Areas in the City of Cape Town. CCT, Cape Town.

Butchart, S.H.M., Akçakaya, H.R., Chanson, J., Baillie, J.E.M., Collen, B., Quader, S., Turner, W.R., Amin, R., Stuart, S.N., Hilton-Taylor, C., 2007. Improvements to the Red List Index. *PLoS One* 2. <https://doi.org/10.1371/journal.pone.0000140>

Buxton, R.T., Bennett, J.R., Reid, A.J., Shulman, C., Cooke, S.J., Francis, C.M., Nyboer, E.A., Pritchard, G., Binley, A.D., Avery-Gomm, S., Ban, N.C., Beazley, K.F., Bennett, E., Blight, L.K., Bortolotti, L.E., Camfield, A.F., Gadallah, F., Jacob, A.L., Naujokaitis-Lewis, I., Raudsepp-Hearne, C., Roche, D.G., Soulard, F., Stralberg, D., Sadler, K.D., Solarik, K.A., Ziter, C.D., Brandt, J., McKindsey, C.W., Greenwood, D.A., Boxall, P.C., Ngolah, C.F., Chan, K.M.A., Lapen, D., Poser, S., Girard, J., DiBacco, C., Hayne, S., Orihel, D., Lewis, D., Littlechild, D., Marshall, S.J., McDermott, L., Whitlow, R., Browne, D., Sunday, J., Smith, P.A., 2021. Key information needs to move from knowledge to action for biodiversity conservation in Canada. *Biol. Conserv.* 256, 108983.
<https://doi.org/10.1016/j.biocon.2021.108983>.

CapeNature, 2015. Driftsands Nature Reserve Protected Area Management Plan 201502020. Version 1.0 2015.
https://www.capenature.co.za/uploads/files/protected-area-management-plans/DRFS-PAMPS_merged-1.pdf. (accessed 24 September 2024).

CBD, 2021. Estimation of Resources needed for Implementing the Post-2020 Global

Biodiversity Framework.

<https://www.cbd.int/doc/c/b858/143f/c58220e9a61c4b5fc2dfeed3/sbi-03-05-add2-rev1-en.pdf> (accessed 24 September 2024).

CBD, 2022. Kunming-Montreal Global Biodiversity Framework.

<https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf> (accessed 24 September 2024).

CCT, 1999. Resolution of Cape Metropolitan Council Meeting December 1999.

CCT, 2015. The Cape Town Bioregional Plan. Cape Town.

https://resource.capetown.gov.za/documentcentre/Documents/Bylaws%20and%20policies/Bioregional_Plan_CCT_FINAL_2015-08-19_policy_number_44854.pdf (accessed 24 September 2024).

CCT, 2018. Biodiversity Report. Cape Town.

https://resource.capetown.gov.za/documentcentre/Documents/City%20research%20reports%20and%20review/CCT_Biodiversity_Report_2018-07-27.pdf (accessed 24 September 2024).

CCT, 2022. Integrated Development Plan, City of Cape Town. Cape Town.

https://resource.capetown.gov.za/documentcentre/Documents/City%20strategies%20c%20plans%20and%20frameworks/IDP_2022-2027.pdf (accessed 24 September 2024).

CCT, 2023. Biodiversity Management Progress Report: July 2022-June 2023. Cape Town.

https://resource.capetown.gov.za/documentcentre/Documents/City%20research%20reports%20and%20review/BiodiversityManagementProgressReport_Jul2022-Jun2023.pdf (accessed 24 September 2024).

Chambers, J.M., Massarella, K., Fletcher, R., 2022. The right to fail? Problematizing failure discourse in international conservation. *World Dev.* 150, 105723.

<https://doi.org/10.1016/J.WORLDDEV.2021.105723>.

Chandra, A., Idrisova, A., 2011. Convention on Biological Diversity: A review of

national challenges and opportunities for implementation. *Biodivers. Conserv.* 20,

- Coad, L., Leverington, F., Knights, K., Geldmann, J., Eassom, A., Kapos, V., Kingston, N., Lima, M. De, Zamora, C., Cuadros, I., Nolte, C., Burgess, N.D., Hockings, M., 2015. Measuring impact of protected area management interventions: current and future use of the Global Database of Protected Area Management Effectiveness. *Philos. Trans. R. Soc. B Biol. Sci.* 370, 20140281. <https://doi.org/10.1098/RSTB.2014.0281>.
- Ditlefsen, C., Jørgensen, A.H., Møldrup, M., Thomsen, K., Pinholt, H., 2016. A strategic review of the management system. EMBA program at DTU business 2016.
- Dorse, C., Wood, J., Scott, D., Paterson, A., 2019. The Dassenberg Coastal Catchment Partnership: Promoting Ecosystem-Based Adaption and Climate-resilient Protected Areas Expansion in Cape Town, in: Scott, D., & Davies, H. & New, M. Eds. *Climate Change and Urban Development: Lessons from Cape Town*, UCT Press. Cape Town, pp. 260–282.
- Emerton, L., Bishop, J., Thomas, L., 2006. Sustainable Financing of Protected Areas A global review of challenges and options Best Practice Protected Area. Guidelines Series No. 13. IUCN, Gland, Switzerland and Cambridge, UK.
- Gallo, J.A., Lombard, A.T., Cowling, R.M., 2023. Conservation Planning for Action: End-User Engagement in the Development and Dual-Centric Weighting of a Spatial Decision Support System. *Land* 12. <https://doi.org/10.3390/land12010067>.
- Game, E.T., Kareiva, P., Possingham, H.P., 2013. Six Common Mistakes in Conservation Priority Setting. *Conserv. Biol.* 27, 480–485. <https://doi.org/10.1111/cobi.12051>.
- Gelderblom, C.M., Wood, J., 2018. The Fynbos Forum: its impacts and history. Fynbos Forum, Cape Town.
- Geldmann, J., 2023. Safeguarding biodiversity requires understanding how to manage protected areas cost effectively. *One Earth* 6, 73–76.

<https://doi.org/10.1016/j.oneear.2023.01.008>.

Gerring, J., 2004. What is a case study and what is it good for? *Am. Polit. Sci. Rev.* 98, 341–354. <https://doi.org/10.1017/S0003055404001182>.

Gibbons, D.W., Sandbrook, C., Sutherland, W.J., Akter, R., Bradbury, R., Broad, S., Clements, A., Crick, H.Q.P., Elliott, J., Gyeltshen, N., Heath, M., Hughes, J., Jenkins, R.K.B., Jones, A.H., Lopez De La Lama, R., Macfarlane, N.B.W., Maunder, M., Prasad, R., Romero-Muñoz, A., Steiner, N., Tremlett, J., Trevelyan, R., Vijaykumar, S., Wedage, I., Ockendon, N., 2021. The relative importance of COVID-19 pandemic impacts on biodiversity conservation globally. *Conserv. Biol.* 1–14. <https://doi.org/10.1111/cobi.13781>.

Goodness, J., Anderson, P.M.L., 2013. Local assessment of Cape Town: Navigating the management complexities of urbanization, biodiversity, and ecosystem services in the cape floristic region, in: *Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities: A Global Assessment*. pp. 461–484. https://doi.org/10.1007/978-94-007-7088-1_24

Ground Up, 2022. Families living in Cape Town nature reserve told to move 1–4. <https://groundup.org.za/article/families-living-in-cape-town-nature-reserve-told-to-move/> (accessed 10 November 2024).

Guerrero, A.M., Wilson, K.A., 2017. Using a social–ecological framework to inform the implementation of conservation plans. *Conserv. Biol.* 31, 290–301. <https://doi.org/10.1111/cobi.12832>

Harrison, H., Birks, M., Franklin, R., Mills, J., 2017. Case study research: Foundations and methodological orientations. *Forum Qual. Sozialforsch.* 18. <https://doi.org/10.17169/fqs-18.1.2655>

Henriques, S., Bohm, M., Collen, B., Luedtke, J., Hoffmann, M., Hilton-Taylor, C., Cardoso, P., Butchart, S.H.M., Freeman, R., 2020. Henriques et al 2019. Accelerating the monitoring of global biodiversity_ Revisiting the sampled approach to generating Red List Indices _ Enhanced Reader.pdf. *Conserv. Lett.* 13, 1–9.

- Hockings, M., Hardcastle, J., Woodley, S., Sandwith, T., Wildson, J., Bammert, M., Valenzuela, S., Chataigner, B., Lefebvre, T., Leverington, F., 2019. The IUCN Green List of Protected and Conserved Areas: Setting the standard for effective area-based conservation. *Parks* 1, 41–57.
- Holmes, P., Anderson, P., Pugnalin, A., Wood, J., Dorse, C., 2019. Conservation planning for climate change in a rapidly developing city. Examination of two case studies: The Biodiversity Network for Cape Town and the Conservation Implementation Plan for False Bay Strandveld, in: Scott, D., & Davies, H. & New, M. Eds. *Climate Change and Urban Development: Lessons from Cape Town*, UCT Press. pp. 155–177.
- Holmes, P.M., Rebelo, A.G., Dorse, C., Wood, J., 2012. Can Cape Town's unique biodiversity be saved? Balancing conservation imperatives and development needs. *Ecol. Soc.* 17. <https://doi.org/10.5751/ES-04552-170228>.
- IUCN, 2016. A Global Standard for the Identification of Key Biodiversity Areas, Version 1.0., First Edition. IUCN, Gland, Switzerland.
- Kapos, V., Balmford, a., Aveling, R., Bubbs, P., Carey, P., Entwistle, a., Hopkins, J., Mulliken, T., Safford, R., Stattersfield, A., Walpole, M., Manica, a., 2008. Calibrating conservation: new tools for measuring success. *Conserv. Lett.* <https://doi.org/10.1111/j.1755-263X.2008.00025.x>.
- Kapos, V., Balmford, A., Aveling, R., Bubbs, P., Carey, P., Entwistle, A., Hopkins, J., Mulliken, T., Safford, R., Stattersfield, A., Walpole, M., Manica, A., 2009. Outcomes, not implementation, predict conservation success. *Oryx* 43, 336–342. <https://doi.org/10.1017/S0030605309990275>.
- Kareksela, S., Moilanen, A., Ristaniemi, O., Väliavaara, R., Kotiaho, J.S., 2018. Exposing ecological and economic costs of the research-implementation gap and compromises in decision making. *Conserv. Biol.* 32, 9–17. <https://doi.org/10.1111/cobi.13054>.
- Knight, A.T., Cowling, R.M., 2007. Embracing opportunism in the selection of priority conservation areas. *Conserv. Biol.* 21, 1124–1126.

<https://doi.org/10.1111/j.1523-1739.2007.00690.x>.

Knight, A.T., Cowling, R.M., Campbell, B.M., 2006a. An operational model for implementing conservation action. *Conserv. Biol.* 20, 408–419.

<https://doi.org/10.1111/j.1523-1739.2006.00305.x>

Knight, A.T., Cowling, R.M., Rouget, M., Balmford, A., Lombard, A.T., Campbell, B.M., 2008. Knowing but not doing: Selecting priority conservation areas and the research-implementation gap. *Conserv. Biol.* <https://doi.org/10.1111/j.1523-1739.2008.00914.x>.

Knight, A.T., Driver, A., Cowling, R.M., Maze, K., Desmet, P.G., Lombard, A.T., Rouget, M., Botha, M.A., Boshoff, A.F., Castley, J.G., Goodman, P.S., Mackinnon, K., Pierce, S.M., Sims-Castley, R., Stewart, W.I., Von Hase, A., 2006b. Designing systematic conservation assessments that promote effective implementation: Best practice from South Africa. *Conserv. Biol.* 20, 739–750. <https://doi.org/10.1111/j.1523-1739.2006.00452.x>.

Knight, A.T., Sarkar, S., Smith, R.J., Strange, N., Wilson, K.A., 2011. Engage the hodgepodge: management factors are essential when prioritizing areas for restoration and conservation action. *Divers. Distrib.* 17, 1234–1238. <https://doi.org/10.1111/J.1472-4642.2011.00789.x>.

Kohsaka, R., Pereira, H.M., Elmqvist, T., Chan, L., Moreno-Peñaranda, R., Morimoto, Y., Inoue, T., Iwata, M., Nishi, M., da Luz Mathias, M., Cruz, C.S., 2013. Indicators for management of urban biodiversity and ecosystem services: City Biodiversity Index, in: Elmqvist, T., Fragkias, M., Goodness, J., Güneralp, B., Marcotullio, P.J., McDonald, R.I., Parnell, S., Schewenius, M., Sendstad, M., Seto, K.C. and Wilkinson, C. (Eds.), *Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities*. Springer, Dordrecht, pp. 699–718. <https://doi.org/10.1007/978-94-007-7088-1>.

Konstant, T., Soal, S., Ratcliffe, G., 2020. Facilitation and Documentation of a Participant-driven Summative and Formative Evaluation of the Cape Action for People and the Environment (CAPE). SANBI, Cape Town.

Leverington, F., Costa, K.L., Pavese, H., Lisle, A., Hockings, M., 2010. A global analysis of protected area management effectiveness. *Environ. Manage.* <https://doi.org/10.1007/s00267-010-9564-5>.

Liang, S., Liu, Z., Crawford-Brown, D., Wang, Y., Xu, M., 2014. Decoupling analysis and socioeconomic drivers of environmental pressure in China. *Environ. Sci. Technol.* 48, 1103–1113. https://doi.org/10.1021/ES4042429/SUPPL_FILE/ES4042429_SI_002.XLSX.

Mair, L., Bennun, L.A., Brooks, T.M., M Butchart, S.H., Bolam, F.C., Burgess, N.D., M Ekstrom, J.M., Milner-Gulland, E.J., Hoffmann, M., Ma, K., W Macfarlane, N.B., Raimondo, D.C., L Rodrigues, A.S., Shen, X., N Strassburg, B.B., Beatty, C.R., Gamp, C., Iribarrem, A., Irmadhiany, M., Lacerda, E., Mattos, B.C., Parakkasi, K., Tognelli, M.F., Bennett, E.L., Bryan, C., Carbone, G., Chaudhary, A., Eiselin, M., B Fonseca, G.A., Galt, R., Geschke, A., Glew, L., Goedicke, R., H Green, J.M., Gregory, R.D., L Hill, S.L., Hole, D.G., Hughes, J., Hutton, J., W Keijzer, M.P., Navarro, L.M., Nic Lughadha, E., Plumptre, A.J., Puydarrieux, P., Possingham, H.P., Rankovic, A., Regan, E.C., Rondinini, C., Schneck, J.D., Siikamamp, J., Sendashonga, C., Seutin, G., Sinclair, S., Skowno, A.L., Soto-Navarro, C.A., Stuart, S.N., Temple, H.J., Vallier, A., Verones, F., Viana, L.R., Watson, J., Bezeng, S., Bamp, M., Burfield, I.J., Clausnitzer, V., Clubbe, C., Cox, N.A., Freyhof, R., Gerber, L.R., Hilton-Taylor, C., Jenkins, R., Joolia, A., Joppa, L.N., Pin Koh, L., Lacher, T.E., Langhammer, P.F., Long, B., Mallon, D., Pacifici, M., Polidoro, B.A., Pollock, C.M., Rivers, M.C., Roach, N.S., Paul Rodramp, J., Smart, J., Young, B.E., Hawkins, F., K McGowan, P.J., 2021. A metric for spatially explicit contributions to science-based species targets. *Nat. Ecol. Evol.* 5, 836–844. <https://doi.org/10.1038/s41559-021-01432-0>.

Mandić, A., 2023. Protected area management effectiveness and COVID-19: The case of Plitvice Lakes National Park, Croatia. *J. Outdoor Recreat. Tour.* 41, 100397. <https://doi.org/10.1016/j.jort.2021.100397>.

Mangos, A., Rouchier, J., Meinard, Y., 2021. Analysing constraints to improve

conservation decision-making: a theoretical framework and its application to the Northern Vosges, France. *Environ. Conserv.* 48, 174–181.

<https://doi.org/10.1017/S0376892921000175>.

Manuel, J., Maze, K., Driver, M., Stephens, A., Botts, E., Parker, A., Tau, M., Dini, J., Holness, S., Nel, J., 2016. Key Ingredients, Challenges and Lessons from Biodiversity Mainstreaming in South Africa.

Mascia, M.B., Mills, M., 2018. When conservation goes viral: The diffusion of innovative biodiversity conservation policies and practices. *Conserv. Lett.* 11, 1–9. <https://doi.org/10.1111/conl.12442>.

Maze, K., Katzschner, T., Mydral, B., 2002. Conserving an embattled flora: mainstreaming biodiversity issues in urban Cape Town, in: Pierce, S.M., Cowling, R.M., and Sandwith, T. Eds. *Mainstreaming Biodiversity in Development: Case Studies from South Africa*. The World Bank, Washington, USA. pp. 89–99.

Maze, K., Rebelo, A.G., 1999. Core Flora Conservation Areas on the Cape Flats. FCC Report 99/1, Botanical Society of South Africa, Cape Town.

McIntosh, E.J., 2019. Barriers to the evaluation of systematic conservation plans: Insights from landmark Australian plans. <https://doi.org/10.1016/j.biocon.2019.06.029>.

McIntosh, E.J., Chapman, S., Kearney, S.G., Williams, B., Althor, G., Thorn, J.P.R., Pressey, R.L., McKinnon, M.C., Grenyer, R., 2018. Absence of evidence for the conservation outcomes of systematic conservation planning around the globe: A systematic map. *Environ. Evid.* 7, 1–23. <https://doi.org/10.1186/s13750-018-0134-2>.

McIntosh, E.J., McKinnon, M.C., Pressey, R.L., Grenyer, R., 2016. What is the extent and distribution of evidence on effectiveness of systematic conservation planning around the globe? A systematic map protocol. *Environ. Evid.* 5, 1–13. <https://doi.org/10.1186/S13750-016-0069-4/TABLES/4>.

McIntosh, E.J., Pressey, R.L., Lloyd, S., Smith, R.J., Grenyer, R., 2017. The Impact

- of Systematic Conservation Planning. *Annu. Rev. Environ. Resour.* 42, 677–697.
<https://doi.org/10.1146/ANNUREV-ENVIRON-102016-060902>.
- Mckenzie, B., Rebelo, A.G., 1997. Core Flora Conservation Areas on the Cape Flats. FCC Report 97/1, Botanical Society of South Africa, Cape Town.
- McRae, L., Deinet, S., Freeman, R., 2017. The diversity-weighted living planet index: Controlling for taxonomic bias in a global biodiversity indicator. *PLoS One* 12, 1–20. <https://doi.org/10.1371/journal.pone.0169156>.
- Midgley, G., Hannah, L., Millar, D., Thuiller, W., Booth, A., 2003. Developing regional and species-level assessments of climate change impacts on biodiversity in the Cape. *Developing regional and species-level assessments of climate change impacts on biodiversity in the Cape Floristic Region. Biol. Conserv.* 112, 87–97.
[https://doi.org/10.1016/S0006-3207\(02\)00414-7](https://doi.org/10.1016/S0006-3207(02)00414-7).
- Newbold, T., Hudson, L.N., Arnell, A.P., Contu, S., De Palma, A., Ferrier, S., Hill, S.L.L., Hoskins, A.J., Lysenko, I., Phillips, H.R.P., Burton, V.J., Chng, C.W.T., Emerson, S., Gao, D., Hale, G.P., Hutton, J., Jung, M., Sanchez-Ortiz, K., Simmons, B.I., Whitmee, S., Zhang, H., Scharlemann, J.P.W., Purvis, A., 2016. Has land use pushed terrestrial biodiversity beyond the planetary boundary? A global assessment. *Science* 353, 291–288.
<https://doi.org/10.1126/science.aaf2201>.
- Obura, D., 2023. The Kunming-Montreal Global Biodiversity Framework: Business as usual or a turning point? *One Earth* 6, 77–80.
<https://doi.org/10.1016/J.ONEEAR.2023.01.013>.
- Pence, G.Q.K., 2011. Incorporating Climate Change Adaptation Strategies into Updating of the City of Cape Town’s Biodiversity Network Analysis. CCT, Cape Town.
- Phang, S.C., Failler, P., Bridgewater, P., 2020. Addressing the implementation challenge of the global biodiversity framework. <https://doi.org/10.1007/s10531-020-02009-2>.
- Pierce, S.M., Cowling, R.M., Knight, A.T., Lombard, A.T., Rouget, M., Wolf, T.,

2005. Systematic conservation planning products for land-use planning: Interpretation for implementation. *Biol. Conserv.* 125, 441–458.
<https://doi.org/10.1016/j.biocon.2005.04.019>.
- Pressey, R.L., Mills, M., Weeks, R., Day, J.C., 2013. The plan of the day: Managing the dynamic transition from regional conservation designs to local conservation actions. *Biol. Conserv.* 166, 155–169.
<https://doi.org/10.1016/j.biocon.2013.06.025>.
- Rebelo, A.G., Holmes, P.M., Dorse, C., Wood, J., 2011. Impacts of urbanization in a biodiversity hotspot: Conservation challenges in Metropolitan Cape Town. *South African J. Bot.* 77, 20–35. <https://doi.org/10.1016/j.sajb.2010.04.006>.
- Reyers, B., Roux, D.J., Cowling, Richard, J., Ginsburg, A.E., Nel, J.L., O'Farrell, P.J., 2010. Conservation Planning as a Transdisciplinary Process. *Conserv. Biol.* 24, 957–965. <https://doi.org/10.1111/j.1523-1739.2010.01497.x>.
- Sarkar, S., Pressey, R.L., Faith, D.P., Margules, C.R., Fuller, T., Stoms, D.M., Moffett, A., Wilson, K.A., Williams, K.J., Williams, P.H., Andelman, S., 2006. Biodiversity Conservation Planning Tools: Present Status and Challenges for the Future. *Annu. Rev. Environ. Resour.* 31, 123–159.
<https://doi.org/10.1146/ANNUREV.ENERGY.31.042606.085844>
- Saunders, S.P., Forstenhäusler, N., 2023. Integrating climate-change refugia into 30 by 30 conservation planning in North America. <https://doi.org/10.1002/fee.2592>
- Stake, R.E., 1978. The Case Study Method in Social Inquiry. *Educ. Res.* 7(2), 5-8.
<https://doi.org/10.2307/1174340>.
- Stolton, S., Dudley, N., Belokurov, A., Deguignet, M., Burgess, N.D., Hockings, M., Leverington, F., MacKinnon, K., Young, L., 2019. Lessons learned from 18 years of implementing the management effectiveness tracking tool (METT): A perspective from the METT developers and implementers. *Parks* 25, 79–92.
- Stolton, S., Stevens, C., Timmins, H.L., Dudley, N., 2021. Short Communication: Recommendations for standardising reporting of site based economic benefits from protected and conserved areas. *Parks* 27, 63–68.

- Venter, O., Sanderson, E.W., Magrath, A., Allan, J.R., Beher, J., Jones, K.R., Possingham, H.P., Laurance, W.F., Wood, P., Fekete, B.M., Levy, M.A., Watson, J.E.M., 2016. Sixteen years of change in the global terrestrial human footprint and implications for biodiversity conservation. *Nat. Commun.* 7, 1–11. <https://doi.org/10.1038/ncomms12558>.
- Visconti, P., Joppa, L., 2015. Building robust conservation plans. *Conserv. Biol.* 29, 503–512. <https://doi.org/10.1111/cobi.12416>.
- Waldron, A., Miller, D.C., Redding, D., Mooers, A., Kuhn, T.S., Nibbelink, N., Roberts, J.T., Tobias, J.A., Gittleman, J.L., 2017. Reductions in global biodiversity loss predicted from conservation spending. *Nature* 551, 364–367. <https://doi.org/10.1038/nature24295>.
- Waldron, A., Mooers, A.O., Miller, D.C., Nibbelink, N., Redding, D., Kuhn, T.S., Roberts, J.T., Gittleman, J.L., 2013. Targeting global conservation funding to limit immediate biodiversity declines. *Proc. Natl. Acad. Sci. U. S. A.* 110, 12144–12148. <https://doi.org/10.1073/pnas.1221370110>.
- Watson, J.E.M., Venegas-Li, R., Grantham, H., Dudley, N., Stolton, S., Rao, M., Woodley, S., Hockings, M., Burkart, K., Simmonds, J.S., Sonter, L.J., Sreekar, R., Possingham, H.P., Ward, M., 2023. Priorities for protected area expansion so nations can meet their Kunming-Montreal Global Biodiversity Framework commitments. *Integr. Conserv.* 140–155. <https://doi.org/10.1002/inc3.24>.
- Watts, K., Whytock, R.C., Park, K.J., Fuentes-Montemayor, E., Macgregor, N.A., Duffield, S., McGowan, P.J.K., 2020. Ecological time-lags and the journey towards conservation success. *Nature, Ecol. Evol.* 4, 304–311.
- Wessels, N., Sitas, N., Esler, K.J., O'farrell, P., 2021a. Understanding community perceptions of a natural open space system for urban conservation and stewardship in a metropolitan city in Africa. *Environ. Conserv.* 48, 244–254. <https://doi.org/10.1017/S0376892921000345>.

implementing natural open space plans in a Global South city. *Landsc. Urban Plan.* 216. <https://doi.org/10.1016/j.landurbplan.2021.104237>.

- Wood, J., Anderson, P., Dorse, C., Holmes, P., 2019. Assessing the management effectiveness of the City of Cape Town's protected areas as a tool for climate-change resilience, in: Scott, D., & Davies, H. & New, M. Eds. *Climate Change and Urban Development: Lessons from Cape Town*, UCT Press. pp. 242–259.
- Xu, H., Cao, Y., Yu, D., Cao, M., 2021. Ensuring Effective Implementation of the post-2020 global biodiversity targets *Nature Ecology and Evolution*. *Nat. Ecol. Evol.* 5, 411–418. <https://doi.org/10.1038/s41559-020-01375-y>.
- Yin, R.K., 1997. Case study evaluations: A decade of progress? *New Dir. Eval.* 69–78. <https://doi.org/10.1002/ev.1088>.
- Yin, R.K., 2013. Validity and generalization in future case study evaluations. *Evaluation* 19, 321–332. <https://doi.org/10.1177/1356389013497081>.

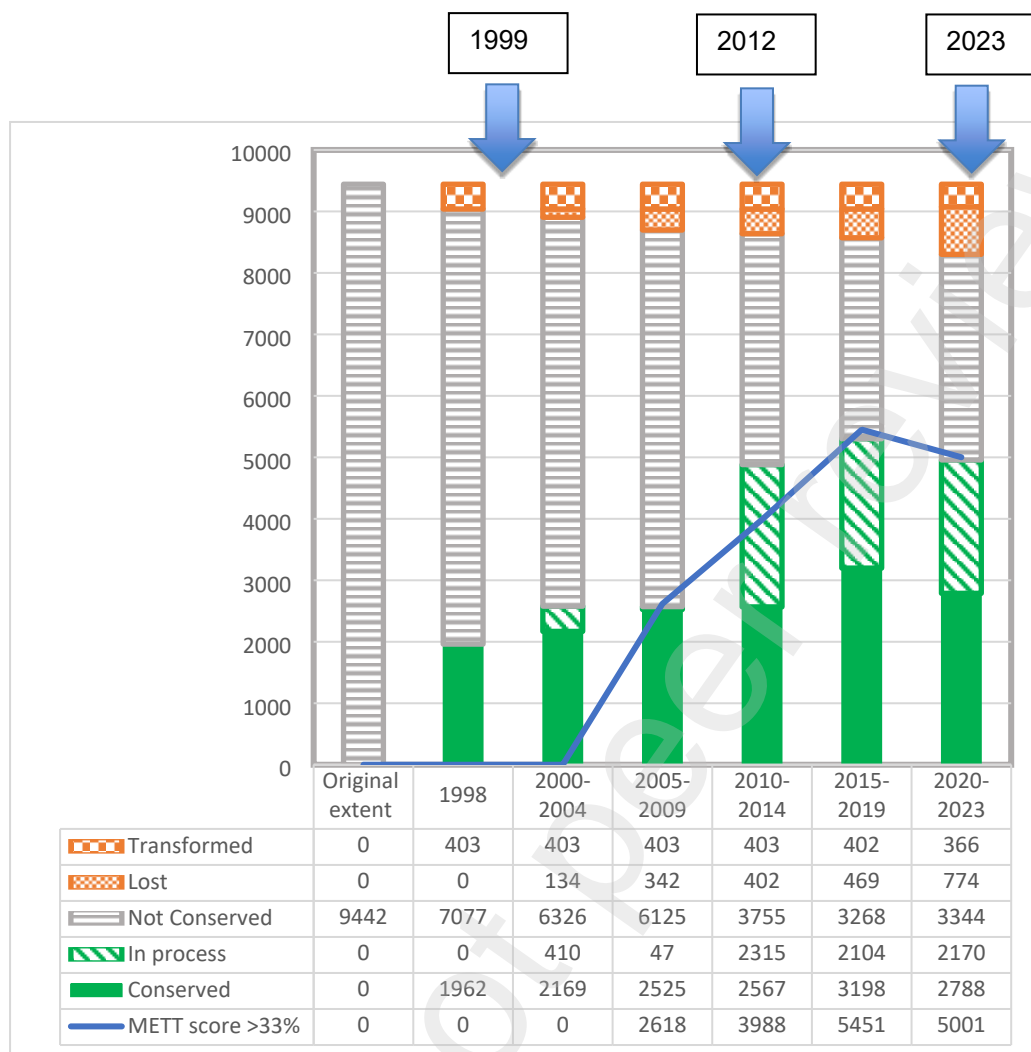
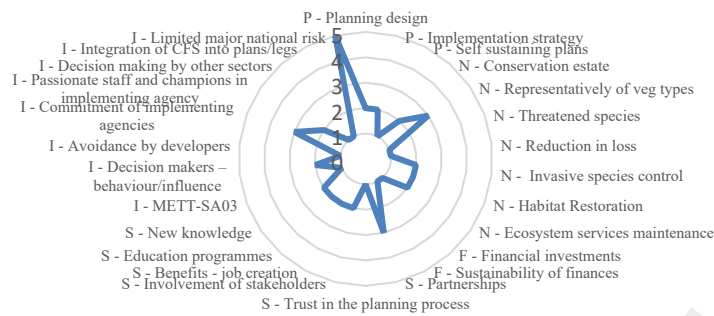


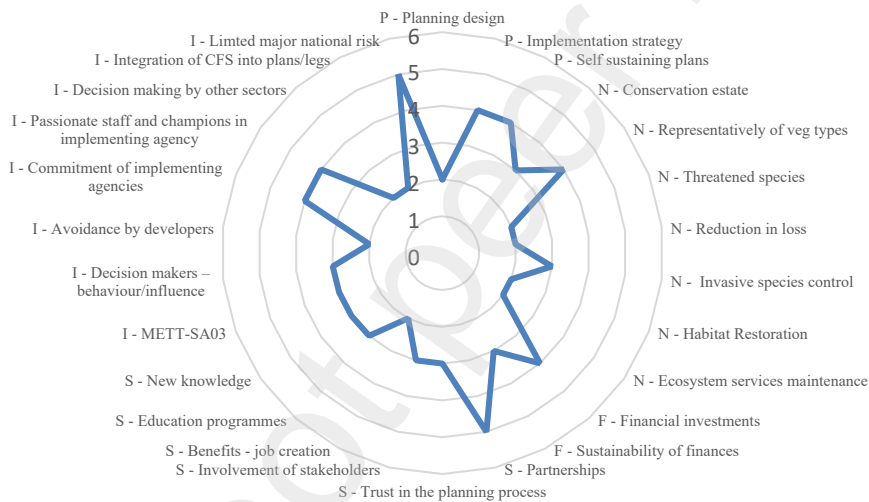
Figure 1: Conservation status of Core Flora Sites with the hectares subjected to a METT assessment shown over the time period as represented in 4 years intervals.

↓ Dates during the implementation when the evaluation framework was applied (Figure 2).

1999 Baseline Evaluation - overall score 37%



2012 Evaluation - overall score 61%



2023 Evaluation - overall score 70%

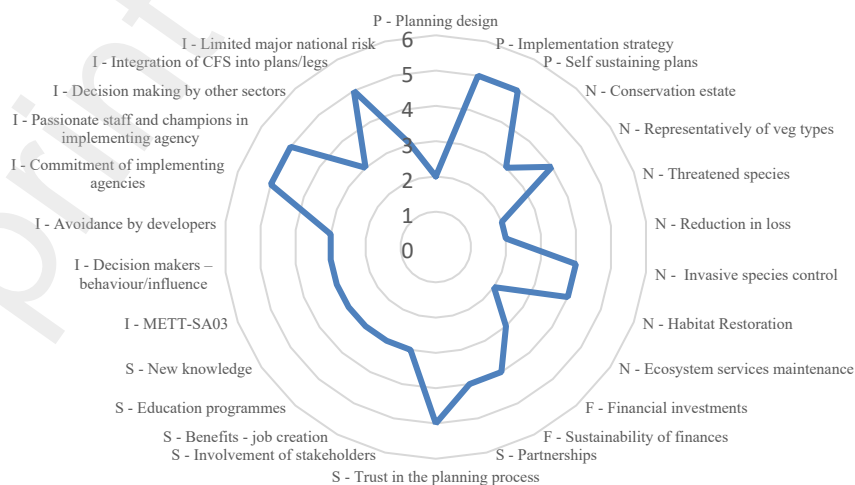


Figure 2: Evaluation framework shown on a radar chart conducted for roughly every 10 years (details in supplementary – Appendix C spreadsheet). P – Planning theme, N – natural theme, F – Financial theme, S – Social/Human theme, I – Institutional theme

Metrics of effective conservation action: Evaluating the implementation of conservation plans

Julia Wood^{a,b} and Pippin Anderson^b

^aCorresponding author: jwood@xsinet.co.za, +27 844649153

^bEnvironmental and Geographic Science, UCT Private Bag, Rondebosch, 7700

Acknowledgements

We thank Jonathon Bell and Andre Rossouw who provided the raw data from the City of Cape Town's database, which is contained in ArcView (GIS). Biodiversity Management Branch staff, CCT: Andre Rossouw, Cliff Dorse, and Jacques van der Merwe assisted with the data collation. The expert workshop of the original CFS authors provided the context and useful information for the application of the evaluation framework.

CRedit Author Contribution Statement

Julia Wood: Conceptualisation, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Visualisation, Project administration, Funding acquisition.

Pippin Anderson: Writing – review and editing, Supervision,
Data will be made available on request.

Conflict of interest

Julia Wood is employed by CCT and as such, care was taken to remain objective and ensure that the assumptions were checked with available literature and reports. Pippin Anderson has no conflict of interest.

Julia Wood received a bursary from the City of Cape Town for her studies resulting in this research.