ICAT INITIATIVE FOR Climate Action Transparency

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Initiative for Climate Action Transparency - ICAT

ICAT Sustainable Development Pilot Case Study:

An Assessment of the Sustainable Development Impact of Biodiversity Policy in South Africa through the ICAT SD Guidance

UNEP DTU PARTNERSHIP

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LIST OF ACRONYMS

BotSoc	Botanical Society of South Africa
CBD	Convention on Biological Diversity
CoGTA	Co-operative Governance and Traditional Affairs
CoM	Chamber of Mines
CSIR	Centre for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DRDLR	Department of Rural Development and Land Reform
DMR	Department of Mineral Resources
GDP	Gross Domestic Product
IAPs	Invasive alien plants
ICAT	Initiative for Climate Action Transparency
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature
LUS	Land-Use Scheme
MTSF	Medium-Term Strategic Framework
NBA	National Biodiversity Assessment
NBES	National Bio-Economy Strategy
NBF	National Biodiversity Framework
NBSAP	National Biodiversity Act Strategy and Plan
NCCRP	White Paper on the National Climate Change Response Policy
SALGA	South African Local Government Association
SAMBF	South African Mining and Biodiversity Forum

SANParks	South African National Parks
SDF	Spatial Development Framework
SDGs	Sustainable Development Goals
StatsSA	Statistics South Africa
UN	United Nations
WfW	Working for Water
WRI	World Resource Institute

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1. DEFINING THE ASSESSMENT

1.1 General information about the assessment

The scope of the assessment is to identify the ex-ante sustainable development impacts of the draft policy on the conservation and sustainable use of biodiversity in South Africa. The study has been conducted by Samantha Keen, Researcher at the Energy Research Centre at the University of Cape Town, with the support of Karen Holm Olsen (UNEP-DTU Partnership) and David Rich (WRI). The assessment described below follows a qualitative approach, and follows consultation with expert stakeholders and desktop review. The assessment period ranges from the date of the assessment and includes assessment of interventions over the short-term to medium-term, and evaluations of short-term to long-term impacts.

Table 1: General information about the assessment

General information	Assessment information
Name of the policy or action assessed	White Paper on the conservation and sustainable use of South Africa's biological diversity (draft)
Person(s)/organization(s) that did the assessment	Samantha Keen, University of Cape Town
Date of the assessment	March-April 2019
New assessment, or update of a previous assessment	New assessment
Objective(s) of the assessment	This assessment aims to understand the likely sustainable development impacts of the overarching draft policy for biodiversity in South Africa in the light of the policy's multiple objectives, its reliance on the sustainable use of natural resources for success, and shared objectives with sustainable development and climate policy. Background: The draft policy was published in 1997 for discussion, but it was not subsequently adopted as policy. Since then, according to local stakeholders, the absence of an overarching policy has arguably contributed to a lack of clarity around some key issues, for example in addressing biological invasions, and a slow pace of development of sectoral legislation like the Biodiversity Framework. The linkages between biodiversity, sustainable development and climate change are a current focus of global attention, and 2019 heralds the UN Decade on Ecosystem Restoration. This presents an opportunity to engage stakeholders about current thinking on biodiversity interventions. This assessment uses evidence that has emerged since

	the drafting of this policy to understand its likely impacts.
Intended audience(s) of the assessment	policy makers, stakeholders at research institutions
Nature of the assessment (qualitative impact assessment, quantitative impact assessment and/or tracking progress of indicators over time	Qualitative impact assessment
Opportunities for stakeholders to participate in the assessment	Stakeholder interviews, in-depth and informal in nature
Whether the assessment applies to an individual policy/action or a package of related policies/ actions	A single national policy that would be interpreted into a number of strategies and action plans, regulations and related policy.
Whether the assessment is ex-ante, ex-post, or a combination of ex-ante and ex-post	Ex-ante

1.2 Description of the policy or action

The White Paper on the conservation and sustainable use of South Africa's biological diversity (hereafter referred to as the policy or as the White Paper) aims to achieve multiple sustainable development objectives that are environmental, social and economic in nature, as expressed by the policy's six goals. Goal one is environmental, goals two to four include combinations of environmental, social and economic priorities, and the last two are enabling. Towards achieving the 6 goals, the White Paper lists 175 interventions. Approximately a third of the interventions are about controls on conservation and sustainable use of biodiversity (32% are about legislation, regulation, guidelines or incentives). A little more than a fifth target improving knowledge (22% are about creation, collation, dissemination, education). A significant portion of the interventions target relationships; 15% include processes to establish coordination and cooperation of stakeholders and to align policies and programs, and 9% are aimed at building stakeholder relationships and resolving conflict.

Interventions that are more specific and localised in terms of biodiversity conservation or rehabilitation activities, or about the use of indigenous or local user knowledge is described in 10% of the interventions. The building of skills and capacity to provide employment or promote economic opportunities is the focus of 8% of the interventions. Monitoring the attainment of the policy objectives is included (4% of the interventions), but there is no mention of monitoring of the policy. There is no process for policy evaluation.

The White Paper is intended to provide the broad context for strategies, plans, regulations and similar concerning the conservation and sustainable use of biodiversity. These include not only for the protection of biodiversity itself, and support for economic and livelihood benefits from the use of biodiversity, but also in relation to access and benefit-sharing, to traditional, sovereign and indigenous rights, to biological invasions, to genetically modified organisms, to initiatives for land restitution in rural areas, and more.

While the White Paper describes itself as sector-based, it aims to mainstream biodiversity across sectors and across spheres of government by requiring that biodiversity considerations are included in all sectoral budgets, and in national, provincial and local regulations and guidelines for spatial

planning. In this way the lead national department, the Department of Environmental Affairs (DEA) extends and devolves some responsibility to 11 other national departments, and provincial and local authorities. National statutory bodies, namely the South African National Biodiversity Institute (SANBI)) and the South African National Parks (SANParks)), play key roles in implementation, research and monitoring activities. The policy does not give an estimate of costs and in the light of the cross-sectoral and diffuse nature of the interventions, it is not possible to calculate costs of implementation.

Table 2: Description of the policy or action

Information	Assessment information
Title of the policy or action	White Paper on the conservation and sustainable use of South Africa's biological diversity
Type of policy or action	Sector-based policy for biodiversity protection and sustainable utilization in South Africa
Description of specific interventions	The policy identifies six main goals and describes 175 specific interventions to achieve each goal. The six goals are as follows. Goal 1: Conserve the diversity of landscapes, ecosystems, habitats, communities, populations, species, and genes Goal 2: Use biological resources sustainably and minimize adverse impacts on biological diversity Goal 3: Ensure that benefits derived from the use and development of South Africa's genetic resources serve national interests Goal 4: Expand the human capacity to conserve biodiversity, to manage its use, and to address factors threatening it Goal 5: Create conditions and incentives that support the conservation and sustainable use of biodiversity Goal 6: Promote the conservation and sustainable use of biodiversity at the international level The most common type of intervention (32%) is of a range of controls, including legislation, regulation, guidelines, and incentives. More than a fifth of the interventions (22%) target information and knowledge in the forms of further research, the collation and consolidation of data, and the sharing of information and popularising of biodiversity knowledge. The interventions include specific processes to establish coordination and cooperation, between stakeholders (at all levels), to align policies and programmes, and to promote comprehensive strategic planning. This accounts for approximately 15% of the interventions. 10% of the interventions direct action for conservation and rehabilitation measures or specify recognition for or use of indigenous or local user knowledge.

	Relationship building and conflict resolution is addressed by 9% of the interventions, including for access to land and resources, and compensation agreements. Of the interventions, 8% target skills and capacity building, providing employment and economic opportunities. 4% describe required monitoring. Of the seven highlighted priority interventions, all require more specific details before implementation. 1. Obtaining a political commitment … in the form of approved sectoral plans and budgets for all relevant central government departments and provincial institutions; 2. Addressing concerns relating to the present degree of fragmentation amongst nature conservation agencies, …; 3. The securing of necessary funding for implementation; 4. Strengthening and rationalizing South Africa's protected area system; 5. Establishing legislative and administrative mechanisms to control access to South Africa's genetic resources; 6. Instituting a national biodiversity education and awareness plan; and 7. Actively participating in the development of a Biosafety Protocol, and instituting appropriate measures for biosafety, including the creation of sufficient capacity to manage risks and to undertake risk assessments.
Status of the policy or action	In draft form since 1997
Date of implementation	Implementation comes into effect only once parliament agrees to support the policy and publishes it as such.
Date of completion (if applicable)	Ongoing
Implementing entity or entities	The lead national department is the Department of Environmental Affairs and Tourism (DEAT, now the Department of Environmental Affairs (DEA)). Other national departments with cross-cutting policy are the Departments of Agriculture; Water Affairs and Forestry (now the Department of Agriculture, Forestry and Fisheries (DAFF); Land Affairs (now the Department of Rural Development and Land Reform); Trade and Industry; Foreign Affairs (now the Department of Department of International Relations and Cooperation); Health; Transport; Housing (now the Department of Human Settlement); Welfare and Population Development (now the Department of Social Development); Arts, Culture, Science and Technology (now the Department of Art and Culture, and the Department of Science and Technology; Finance; as well as the South African National Defence Force. National statutory bodies include National Botanical Institute (now the South African National Biodiversity Institute (SANBI)) and the National Parks Board

	(now South African National Parks (SANParks)), especially program implementation, and for research and monitoring. Provincial environment and conservation bodies and local authorities are tasked with implementing the use of guidelines, and enforcing regulations, including for land use and pollution prevention and waste management.
Objectives and intended impacts or benefits of the policy or action	The draft White Paper responds to Party commitments under the United Nations Convention on Biological Diversity (1992) (CBD), and includes requirements to develop national strategies, plans or programs to address the provisions of the Convention. The draft policy intends to address national social and economic development priorities, including providing employment and creating opportunities for business and livelihood opportunities for poor and rural communities, through the design of measures and interventions to meet CBD commitments. At the same time, South Africa's biodiversity sector has a series of environmental, resource management and planning and regulations, introduced at different times. This has created some uncertainty as to which regulation(s) to apply in given situations. The implementation of an overarching policy would be intended to bring clarity to the guiding societal intent of the national policy.
Level of the policy or action	National, and the policy calls for budget allocation and implementation for land use and waste and pollution regulations also at provincial level and city level. Budget allocation and recognition of biodiversity objectives is also required at the sector level. Programs and projects will be used for some focus areas of intervention (for example related to agriculture practice or community engagement).
Geographic coverage	National
Sectors targeted	The biodiversity sector is the main target; also sectors in cultivation and harvesting (agriculture and forestry, fisheries, mariculture, aquaculture); industry (biotechnology, mining); governance (land-use and planning authorities); tourism and recreation.
Other related policies or actions	Overarching legislation and principles: The Constitution of South Africa (Act 108 of 1996) White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997) White Paper on Environmental Management Policy for South Africa (1998) Core environmental legislation: National Environmental Management Act (Act 107 of 1998), as amended National Environmental Management: Biodiversity Act (Act 10 of 2004) National Environmental Management: Protected Areas Act (act 57 of 2003) Related natural resource management legislation: Marine Living Resources Act (Act 18 of 1998) The Conservation of Agricultural Resources Act (Act 43 of 1983) National Forest Act (Act 84 of 1998) Integrated Coastal Management Act (Act 24 of 2008), as amended Relevant spatial planning legislation:

	Subdivision of Agricultural Land Act (Act 70 of 1970) The Draft Preservation and Development of Agricultural Land Framework Bill and Policy The Spatial Planning and Land-Use Management Act (Act 16 of 2013) Provincial biodiversity strategies, and provincial protected area expansion strategies, which have been developed by some provinces.

1.3 Additional information on policy or action

Table 3 presents additional information concerning the action assessed.

Table 3: Additional information on policy or action

Information	Assessment information
Relevant SDGs	The policy focuses on SDG 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development) and SDG 15 (Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss), for the delivery of ecosystem services to society. The benefits of the policy contribute to SDG 1 (End poverty in all forms everywhere), SDG 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture), and SDG 6 (Ensure availability and sustainable management of water and sanitation for all). Rehabilitation and management of ecosystems, and especially the protection and creation of opportunities for livelihoods and skills improvement for people who would suffer from ill effects from degraded environments provide support for SDG 8 (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all), and potentially to SDG 10 (Reduce inequality within and among countries). Ecological infrastructure can play a key role in production innovation and work with or be an alternative to built infrastructure and support SDG 9 (Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation). It plays a key role in disaster risk management, and in this way contributes toward climate adaptation and supports SDG 13 (Take urgent action to combat climate change and its impacts). Source: Adapted from *Biofin: The biodiversity finance initiative* 2017, United Nations Development Programme, viewed 12 March 2019, https://www.biodiversityfinance.net/sites/default/files/content/infographic/Screen%20Shot%202017-06-13%20at%206.43.05%20pm.png
Specific targets	Not applicable
Title of establishing legislation	UN Convention on Biological Diversity

Monitoring, reporting and verification procedures	Monitoring is referred to in the context of supporting monitoring and evaluation of relevant policies, programs and projects, and of proxies for biodiversity status and function. In terms of procedure, the policy states that government will, "Establish assessment panels or monitoring committees, comprising representatives of non-governmental organisations, community groups, industry, the scientific community, and government". Reporting and verification procedures are not mentioned.
Enforcement mechanisms	None
Reference to relevant documents	The National Biodiversity Assessment 2011 (available at http://biodiversityadvisor.sanbi.org/wp-content/uploads/2016/07/NBA-2011-Synthesis-Report-low-resolution.pdf), and forthcoming National Biodiversity Assessment 2018 The National Biodiversity Framework (NBF) (available at https://www.environment.gov.za/sites/default/files/gazetted_notices/nemba_biodiversityframework_g32474gon813.pdf) The National Biodiversity Act Strategy and Plan (NBSAP) 2015-2025 (available at https://www.cbd.int/doc/world/za/za-nbsap-v2-en.pdf) Other official sources that identify issues with a high relevance: Medium-Term Strategic Framework (MTSF), Outcome 10: Protect and enhance our environmental assets and natural resources (available at https://www.gov.za/sites/default/files/gcis_document/201409/mtsf2014-2019.pdf) *White Paper on the National Climate Change Response Policy (NCCRP) (available at* https://www.environment.gov.za/sites/default/files/legislations/national_climatechange_response_whitepaper.pdf)
The broader context or significance of the policy or action	South Africa has exceptional biodiversity and high endemism. It also faces imperatives for sustainable development, transition to less inequality, and a rapid transition to a low-carbon economy. In the context of this challenging socio-economic setting and pressures of global environmental change, the conservation, management and sustainable use of biodiversity is essential to provide ecosystem-services, for its own sake, for development benefits and for its role in climate regulation, climate change mitigation and adaptation.
Key stakeholders	Agencies and actors in conservation. Agencies and stakeholders engaged in the biodiversity economy. Interested and affected parties relating to indigenous and traditional knowledge rights, sovereignty rights. Experts in biodiversity, sustainable development, policy making or climate change who want to talk about how we understand what is important to our society.

1.4 Impact categories & indicators assessed

This section explains how the choice of the impact categories to be assessed was conducted and presents the impact categories included and excluded from the assessment. In order to choose the categories to be included in the assessment three aspects are taken into account:

- Relevance – *for*
  - *the country's three overriding priorities (that inform the policy itself)*:
    - the eradication of poverty;
    - the sustainable development of its economy; and
    - the social development of its people.
  - *the main objectives of the policy:*
    - the conservation of biological diversity;
    - the sustainable use if biological resources; and
    - the fair and equitable sharing of benefits arising from the use of genetic resources.
  - *the SDGs Framework*
- Significance – *categories significantly affected by the policy*
- Comprehensiveness – *categories should include both positive and negative effects and from all the three dimensions of sustainability*

The context for the policy is further informed by South African Government commitment to a biodiversity policy and strategy that will promote the reconstruction and development of South Africa through:

- ensuring provision of the essential ecosystem services and biological resources required to meet basic human needs;
- not restricting economic development unnecessarily;
- enhancing the provision of jobs related to the conservation of biodiversity and sustainable use of biological resources;
- redistributing income and opportunities derived from the conservation of biodiversity and sustainable use of biological resources in favour of the poor;
- enhancing the development of human resources necessary to conserve biodiversity and use biological resources sustainably; and
- increasing participation in the institutions of civil society engaged in conserving and using biodiversity.

1.4.1 Stakeholder consultations

Stakeholders' consultation was considered important given the multiple objectives of the policy and the large number of related policies and actions (listed in Table 5). The consultations were especially useful for gaining understanding of the related policy landscape, and for learning about unintended impacts, and about some changes in thinking or differences in opinion about different conservation approaches.

Stakeholders were identified in a snowballing process, starting at the Plant Conservation Unit at the University of Cape Town. Stakeholders were contacted directly and interviewed in person in Cape Town or telephonically between 8 March and 5 April 2019. According to the ICAT Stakeholder Participation guidance (Climate Community & Biodiversity Alliance & VCS, 2017), the stakeholders can be described as having high levels of interest in the policy. Because the policy is in draft form and

would be subject to public participation before it could be adopted, they are anticipated to be able to influence the policy. The interviews can further be described as in-depth and unstructured, informed largely by the expertise of the stakeholder.

The interviews were used to identify other interviewees, key literature, and relevant impact categories and specific impacts. Stakeholders were chosen from the following three group:

- Stakeholders involved in biodiversity assessment and conservation
- Stakeholders involved in research about the biodiversity economy
- Stakeholders involved in environmental policy making

Table 4 presents an overview of the stakeholders interviewed, specifying their organisation and the role which they have in relation to the assessed policy.

Table 4: Overview of stakeholders interviewed

Organisation	Stakeholder's category	Activities
South Africa National Biodiversity Institute	Expert-government consultant	Assessment of biodiversity status, trends, responses to policy. Lead author of National Biodiversity Assessment (forthcoming)
University of Cape Town	Conservation	Research in landscape and biodiversity change, associated with land management, land use change, conservation
University of Cape Town	Bioenergy and related economic opportunities	Research in industrial ecology, bio-fuels, waste management and sustainable consumption
Department of Environmental Affairs	Environmental policy, biological invasions	Strategic advisor on knowledge and information for policy making.

The status of the policy was a point of discussion among stakeholders. The draft White Paper is cited in relevant government and research documents, but in practice, stakeholders report that the policy has faded into relative obscurity. Subordinate legislation has continued to be passed, including regulations for acts by ministers (see Table 2), regulations of local authorities, and provincial proclamations and municipal by-laws.

One stakeholder suggested that the absence of an adopted white paper creates uncertainty for subordinate legislators in interpreting constitutional rights and pursuing development priorities, and that this might be cause for the slow pace of enacting subordinate national regulation, citing the example of the seven (nearly eight) year delay in publishing the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) and the alien and invasive species (AIS) lists and regulation in 2014. This view, that there is potential ambiguity in the treatment of biodiversity protection, and the understanding of the potential benefits of sustainable use, is well-argued in the literature (Cox et al., 2015). Related to this, there is a perceived wider acceptance among experts, of the value of

protecting healthy functioning novel ecosystems, in other words, previously degraded ecosystems that recover, and where the biodiversity differs from its original state, so it is distinct from a pristine undisturbed environment.

When asked about to point out which important impacts this policy would have, and which impacts it would be important to measure:

- Environmental, social and economic impacts were all considered important to measure. All the stakeholders spoke about an absence of evaluation of historic interventions.
- Economic opportunities and potential for distributional impacts were highlighted as a specific impact of interest.
- The stakeholders talked about the tensions between achieving multiple desired impacts, for example creating labour-intense employment and the objective of skills development.
- All the stakeholders were more likely to report local impacts rather than global impacts.
- Climate change was spoken about in terms of impact on biodiversity distribution and climate finance-adaptation opportunities for communities, rather than in terms of climate change mitigation co-benefits.
- Unintended negative impacts appear more commonly for interventions with socio-economic impacts. Examples of these are restrictions on sovereignty for example by tying land access to conservation arrangements, or from regulations on natural products for health or well-being, or on relating to seed banks.
- The problem of limited financial resources and expertise in historically disadvantaged groups, of competing understandings of values of and rights to natural resources, and potential environmental damage was highlighted in discussions relating to rural development impacts

1.4.2 List of selected categories

Table 5 presents the impact categories included in the assessment. “Significant” means “expected to be significant”. “U” indicates that the significance is unknown, most commonly because of uncertainty about the extent of the impacts. In the light of stakeholder reports of limited or disparate data relating to biodiversity indicators, the indicators in the table include suggested data, some of which is not currently reported.

Table 5: List of impact categories included in the assessment

Dimension	Impact category	Relevant?	Significant?	Brief description	Indicator?
Environmental	Availability of freshwater	Y	Y	The availability of freshwater is increased by managing alien plants that reduce water availability.	Reduction in area covered by high water consumption alien invasive vegetation (ha)
		Y	Y	Measures to ensure that the price of water reflects the full social, economic and environmental costs and benefits of water provision, are understood to promote more efficient water use.	Volumes of freshwater consumption per value of production (business, agriculture, industry) and per capita (residential use)
		Y	Y	River flow is affected by restoring wetlands.	Number and area of wetlands rehabilitated
	Water quality	Y	Y	The integrity of water quality is affected (through nutrient and waste assimilation) by protecting and restoring suggesting that g wetlands.	Number or area of wetlands rehabilitated or protected
		Y	Y	Water quality is improved by regulations on land-use planning and on waste and pollution.	% of constituencies that monitor and enforce land use planning and pollution and waste laws and regulations
	Flood regulation	Y	Y	Flood attenuation is impacted by protecting and conserving wetlands.	Number of clusters (of wetlands rehabilitated and or protected
	Biodiversity of freshwater and coastal ecosystems	Y	Y	Biodiversity of freshwater and coastal ecosystems is restored and replenished through a strategic network of protected areas.	% of the freshwater ecosystem that is not threatened and is protected
		Y	Y	Biodiversity of freshwater and coastal ecosystems is protected and restored by eradication of, and controls on alien invasive species.	% of ports which implement the international 2008 Ballast Water Convention
		Y	Y	Biodiversity is protected by ensuring a minimum representative area is	% representation of protected terrestrial ecosystems

Biodiversity of terrestrial ecosystems			protected by a strategic network of protected areas and is not under threat.	
	Y	Y	Biodiversity is conserved through ex situ collection and re-establishment of threatened species, in rehabilitation / remediation interventions.	% of ex situ conserved species active in restoration / reintroduction programs
	Y	Y	Biodiversity of terrestrial ecosystems is protected and restored by eradication or controls on alien invasive species.	Decrease area and prevalence of alien invasive species
Ecosystem function	Y	Y	Biodiversity and ecosystem considerations are mainstreamed by knowledge creation, collation and dissemination of threat status and ecosystem protection level.	Reported threat status and level of protection as % of each type for terrestrial, rivers, wetlands, estuaries, coastal and inshore, and offshore ecosystems
Land use	Y	Y	Land use change is influenced by land use planning regulations, and regulation against mining activities in biodiversity critical areas.	1.) % of spatial development frameworks (SDFs) with inputs from National Biodiversity Assessments. 2.) Regulations against mining (and other ecologically destructive activities) in biodiversity critical areas
	Y	Y	Land use change is impacted by integrating biodiversity considerations in land claim settlements and by incentivizing biodiversity stewardship. The land claim settlements may restrict livelihood opportunities.	Protected / conservation area expanded through the land claim process and stewardship programs (ha)
Soil quality	Y	Y	Ecological function is protected by restoring degraded landscapes.	No indicator
Terrestrial and water acidification	Y	Y	Water acidification is mitigated against by protecting priority areas against mining activities.	Number of environmentally significant areas identified and published for restriction for mining activities
	Y	N	Terrestrial acidification is reduced by encouraging sustainable agricultural practices, thereby reducing the use of ammonium-based fertilizers. This impact is not expected to be significant.	No indicator
Toxic chemicals released to air, water, and soil	Y	Y	Biodiversity in critical ecological areas if protected by restricting mining activities.	Number of environmentally significant areas identified and published for restriction for mining activities
	Y	Y	Biodiversity is protected by pollution controls on toxic chemicals in environmental legislation.	% of jurisdictions with pollution control compliance inspections

	Energy	Y	U	Processing cleared alien vegetation to provide feedstock provides access to cleaner energy.	Volumes of alien vegetation briquette production (tons / annum)
	Genetic diversity and fair use of genetic resources	Y	Y	Regulatory requirements for benefit-sharing from access to indigenous genetic resources and to local knowledge promotes the fair use of genetic resources.	Number of benefit-sharing agreements and number of patents for indigenous products.
	Access to land	Y	Y	The settlement of land claims in conservation areas promotes access to land, and sustainable use of this land.	Number of land claims settled in protected areas
	Hunger, nutrition, and food security	Y	N	Protection of species diversity impacts food security by protecting wild pollinators, water quality and availability, soil formation, against inappropriate land use change, and providing natural grazing areas for the livestock industry.	No indicator because difficult to establish attribution. Long-term and indirect impact
	Illness and death	Y	U	The policy is expected to significantly impact long term environmental health and ecosystem services e.g. fresh water, soil formation, climate regulation, and contribute to human health through its association with environmental health.	No indicator because difficult to establish attribution
Social	Quality of life and well-being	Y	Y	Access to nature for recreation, access to land, economic opportunities, rural development, recognition of indigenous and traditional knowledge is expected to significantly improve quality of life and well-being.	No indicator, might conceivably be % of bio economy revenue that benefits rural poor people, but no way to measure
	Awareness about biodiversity and sustainable use by society	Y	Y	The policy is expected to create opportunities for education and awareness building by knowledge creation and dissemination, by mainstreaming biodiversity in planning and sectoral policy, by biodiversity utilities.	% utilization of education facilities at conservation and biodiversity related facilities
	Access to clean energy	Y	N	The processing and pelleting of harvested alien vegetation is expected to provide access to clean energy, although at a scale that is not significant.	Tons of pellets created from cleared alien vegetation per year
	Indigenous rights	Y	Y	The policy is expected to significantly improve the recognition to indigenous rights by requiring that benefit-sharing arrangements take into consideration the rights of local communities, farmers, and others holding traditional knowledge to benefit from co-ownership of research data, patents, and products derived from their knowledge.	% of patents that exist for products made from local biodiversity resources or using local or indigenous knowledge, and that have benefit sharing agreements

	Gender equality and empowerment of women	Y	N	The policy is not expected to significantly impact gender equality. Women are included in targeted previously disadvantaged groups but there currently are no provisions for gender-specific support.	% of gender representative participation in forums, e.g. communities in and around protected areas and wildlife conservancies
	Resilience to climate change and extreme weather events	Y	N	Protection of ecological infrastructure and ecosystem services is expected to impact resilience to increased climate variability by protecting and providing adaptation resources e.g. by protecting species diversity, and promoting the use of ecological infrastructure, and through mitigating against erosion and flood risk.	None
	Economic productivity	Y	Y	The policy is expected to support the creation of value-adding activities in the biodiversity economy.	Increase in average annualized GDP growth rate of the SA bioprospecting and wildlife sectors
	Jobs	Y	Y	A significant number of new jobs are expected to be created by the policy, for example in conservation, bioprospecting, adding value to biodiversity resources, controls and opportunities in GMOs and alien invasive plants.	Number of bio economy jobs, by sub-sector
Economic	New business opportunities	Y	Y	New business opportunities in the bio economy are expected (e.g. bioprospecting, support for the traditional medicinal plant trade, tourism, and the clearing of alien vegetation that can be used for fuel, joint venture conservation schemes, promoting community management and co-management of protected area), some using traditional or indigenous knowledge. New business opportunities that rely on unsustainable cultivation and harvesting, through regulations and guidelines are anticipated to be reduced by the policy.	Number of new businesses in the bio economy
	Jobs	Y	Y	The policy is expected to significantly promote a growth in jobs, for example in ex-situ conservation, plant genetic resources, parataxonomy, plant-based products, etc.	Number of bio economy jobs, by sub-sector
	Growth of new sustainable industries	Y	Y	The policy is expected to create new sustainable industries for example bioenergy briquettes as a by-product of alien invasive vegetation clearing and promote value-adding industries that are inclusive of rural poor peoples.	None

	Rural economic development	Y	Y	The policy is expected to significantly bring revenues and infrastructure development to some biodiversity rich, and development poor areas.	Growth in ecotourism revenue as a share of GDP
	Balance of trade	N	N	The policy may affect these impact categories but the impact is not expected to be significant. They are not relevant to the assessment or policy objectives.	None
	Energy independence	N	N	The policy is not expected to significantly impact energy independence because energy from sustainable harvest and pelleting of alien vegetation is small in relation to total energy demand.	None

2. QUALITATIVE IMPACT ASSESSMENT

The policy under assessment is suitable for qualitative assessment only because it is an ex-ante assessment and because of an absence of reported baseline data in relation to the specific impacts identified up to this point in the assessment. The procedure through which impact categories are evaluated qualitatively through the following main steps.

1. Specific impacts are identified from the policy itself and from in-depth interviews with stakeholders, and from literature about SDG impacts. Short (up to 5 years), medium (5 to 15 years) and long-term (>15 years) impacts are considered.
2. A causal chain is developed for each of the specific impacts, and the chains include all relevant interventions to expand on the nature of the possible impacts identified and to update the table of specific impacts.
3. Online literature is used to assess each specific impact according to its likelihood and potential magnitude. This assessment is used to evaluate the significance of the impacts.
4. In the summary table, the overall impact of each impact category is summarized based on consideration of all the individual specific impacts within the impact category.

The likelihood of a specific impact can be described as its probability to happen as a result of the policy and it is evaluated based on different factors:

- The robustness of the evidence in studies that report the impact
- Whether the studies that report the impact are relevant, including to the South African context
- Uncertainty around the impacts because of a lack of information or because of plausible unintended impacts.

The likelihood is scored on a five-step scale (Very unlikely, unlikely, possible, likely, very likely). If the evidence collected is not enough or unclear, the likelihood is scored as possible.

In addition to this, specific impacts are defined as “in-jurisdiction” and “out-jurisdiction” where by jurisdiction we consider the geographical area of South Africa. Many conservation activities are located near the borders of the country and for this reason some impacts are also anticipated to occur as ‘both’ in and out of national jurisdiction.

The magnitude of a specific impact is measured on a three-step scale (minor, moderate, major) and it represents the extent of the consequences of the impact. It is scored based on:

- The maximum potential impact from policy options considered feasible
- The maximum potential impact in proportion to the national scale of the issue it addresses

For the sake of clarity, the magnitude is not comparable between categories since it does not express how "important" one impact category is compared to another one. Also, it does not indicate significance of the impact in terms of a change in the nature of impact from the status quo, for example a change in positive to negative impacts or vice versa.

2.1 Availability of freshwater, water quality, flood regulation

Impacts on the availability of freshwater, water quality and flood regulation are grouped together because all three are addressed by interventions against biological invasions, predominantly against invasive alien plants. The most well-known intervention, the Working for Water (WfW) program has been operating since 1995. It provides low skill employment, mainly to rural low income people engaged in the mechanical clearing of invasive alien plants (IAPs) in mountain catchments and riverine areas. The initiative continues to attract public and private funding and it is broadly heralded a success (Bek et al., 2017).

Stakeholders raised concerns about unintended negative impacts, specifically that the programme is a perverse incentive that encourages ineffective clear biological invasions, so as to protect future employment. Although the WfW approach is assessed to be cost-effective (van Wilgen et al., 2008; Currie, 2009), it is deemed ineffective as a biological invasion management approach, and experts suggest exploring the use of complementary biological controls (Bek et al., 2017; Morris, 2009).

The WfW initiative spawned the Working for Wetlands to restore wetland function and the positive impacts of clearing IAPs and restoring wetland functions are found to have likely positive impacts on flood regulation in modelled studies (Rebelo et al., 2015). The restoration of wetlands increases catchment ability to absorb extreme rainfall events, especially in high energy rivers. This in turn significantly reduces river channel erosion (ibid).

The Working for programs have been criticised for a failure to monitor the effectiveness of these interventions, for example whether secondary clearing was done and whether the infestation persisted (Wilgen & Wannenburgh, 2016). Perverse incentives and a lack of intervention data add to uncertainty as to the likely restoration impacts (Ntshotsho et al., 2011). This supports stakeholders' opinions that there is a pressing need for improved monitoring systems, in order to support policy and strategy evaluation.

The absence of regulation on planning and land-use applications are shown to have potentially disastrous impacts on water quality and quantity, dependent ecosystems and human activities. For example, the over-exploitation of groundwater can reduce water availability to the extent that it reduces borehole water availability for agriculture and results in saline contamination of aquifers (de Villiers & Hill, 2008).

The policy proposes a water pricing strategy that internalises all externalities in order to reduce human demand for freshwater to protect water availability. Local evidence is that this approach can be effective in reducing water demand for domestic and business use. South Africa's Western Cape province experienced a drought in 2017 and 2018, and the City of Cape Town implemented increased water tariffs in order to conserve water. Local residents and business users protested the initial draft policy to increase water prices across the board. In response to concerns about negative impacts on

poor income groups, the tariff was revised to be a series of block value increases that are more punitive for high volume users (Brisk & Visser, 2018). The City also ran awareness campaigns and instituted water use regulations, and initiated an open data project that mapped and published water consumption data by month and by erf (Van Belle & Hlabano, 2019). The City cut its daily water consumption by more than half from 2015 to 2018 and water restriction tariffs are accepted to have played a major role. (Jones, 2018).

The water availability and water quality and flood regulation impacts are assessed to be major positive as a result of IAP clearing, wetland restoration, and a water pricing strategy. The impacts are positive in the linked causal chains for employment and livelihoods, and for developing new sustainable industries from the use of sustainable harvest of IAPs for commercial use. A water pricing strategy to control for water demand is assessed to have major positive impacts. Risks of negative impacts from tying alien clearing to employment provision, and from high water prices on households and businesses require close monitoring and responsive evaluation.

2.2 Biodiversity of freshwater and coastal ecosystems, and terrestrial ecosystems

Creating **larger, better-connected, and biodiverse representative areas is shown to be effective** as a key strategy for protecting biodiversity (Minin et al., 2013; Cushman et al., 2016; Samways & Pryke, 2016). Strategic planning to ensure biodiverse representation requires rich baseline data, and also monitoring and evaluation of related interventions. In South Africa, there is a wealth of biodiversity observation data. The National Biodiversity Assessment (NBA) is produced in a five to seven year cycle and it comprises of a series of technical reports, produced by a participatory process that engages networks of experts in data collation and analyses, and produces a review and synthesis of information about the protection status and levels of threat to each of the country's type of ecosystems, and also an assessment on the status of knowledge about biodiversity in South Africa (Von der Heyden et al., 2016).

NBA 2018 (Skowno et al., forthcoming in 2019) stakeholders report that there is a lack of **capacity to institutionalise more regular data collation** arrangements. The NBA process does work to and that there is a **lack of indicators for the evaluation of policy** interventions to date. Related to this, there is growing support for the use of community-led and satellite observation data and remote sensing techniques to complement field observations, for example in inaccessible areas, or delicate marine environments that would be damaged by taking samples (Walters & Scholes, 2017). The NBA will in future link to a wide range of biodiversity-related monitoring and reporting processes in South Africa and internationally, through the establishment of the National Biodiversity Monitoring Framework, in this way intending to ensure consistent data collection for biodiversity and ecosystem indicators, and to understand and fill existing data collection gaps (Skowno & Holness, 2017).

The impact on biodiversity is a major positive. Intervention tracking and assessment will rely on establishment of indicators and systems for monitoring and evaluation. Impacts link to causal chains, most directly to ecosystem function impacts and to contribute to creating awareness about biodiversity and sustainable use by society.

2.3 Ecosystem function

From a utilitarian perspective, a functioning ecosystem delivers fresh water, soil formation and flood and climate regulation services and it supports livelihoods. In this assessment ecosystem function links to causal chains for interventions to restore wetland function and rehabilitate degraded

landscape, and to impacts of toxic chemical releases and to soil and water acidification. Ecosystem function is the base for economic productivity in the biodiversity economy and it provides for new business and sustainable industry opportunities. Key drivers of loss of ecosystem function include loss of natural habitat and biological invasions (Driver et al., 2012)

Stakeholder consultation revealed that historical perceptions relating to ecosystem function are changing, and that the value of ecosystem function is not limited to conserved pristine environments. The term 'naturally functioning' ecosystem has emerged to refer to ecosystems that can be considered novel because some of their composition and structure may be different to its original form, yet they are in a near natural or functioning condition (SANBI, 2014). This pragmatic approach gives support for protection that extends beyond pristine environments. The state of knowledge about ecosystem function in South Africa relies on the National Biodiversity Assessment (NBA) review on the protection status and level of threat for each type of ecosystem (Von der Heyden et al., 2016).

Intervention tracking and assessment relies on the establishment of indicators and systems for monitoring and evaluation (Skowno & Holness, 2017).

2.4 Land use

The inclusion of biodiversity considerations in land-use planning processes and regulations at the national, provincial and local scale is a **key mainstreaming intervention**. An example of how this is being put into practice is the development of critical biodiversity area maps by jurisdiction to support planning authority decision-making. The approach is transparent, yet still subject to practitioner bias in deciding permissions, requirement for mitigation of impacts, or biodiversity offsets (Hallatt et al., 2015). This creates **potential for negative trade-offs** where social or economic benefits are assessed to outweigh costs to biodiversity (Nortje, 2017). There is furthermore an **absence of any assessment of cumulative impacts (**ibid). Constraints on use of lands in conservation areas that are re-claimed by historically dispossessed inhabitants (see section 5.9 Access to land) may bring about negative impacts for claimants, and in some cases these can be resolved (Kepe et al., 2005).

Stakeholders raised concerns about a lack of indicators and data collection for evaluating intervention **effectiveness, for example the extent to which the biodiversity considerations inform planning applications, and whether decisions with biodiversity requirements are enforced**. Land use links most directly to causal chains for biodiversity and ecosystem function impacts, and awareness about biodiversity.

Biodiversity information can be used to streamline environmental decision making and strengthen land-use planning (Department of Environmental Affairs, 2015). Impacts are major positive impacts, especially for protecting endangered species and sensitive ecosystems.

2.5 Soil quality

A recent review of local studies of concluded that approximately 25% of South African soils are seriously degraded as a result of topsoil erosion, physical degradation or chemical degradation, largely through agriculture practices, excessive use of inorganic fertilisers, toxins, and biological degradation (Swanepoel et al. 2016). **Rehabilitation of degraded rangeland and pasture land restores ecosystem function**, although measuring improvement in soil quality is limited by a lack of baseline data as to the pristine or potential soil quality and challenged by the unique characteristics of various soil types (Bourne et al., 2017, Kotzé, 2015; Swanepoel, 2016). Methods including remote geo-sensing can be used to complement field data (Walter & Scholes, 2017). Impacts link to causal

chains for ecosystem function and access to land, especially marginal lands. Impacts are minor positive impacts because the interventions like agricultural practices are localised in nature and the impacts are long term.

2.6 Terrestrial and water acidification

Conservation farming practices effectively reduce acidification and salinization (Swanepoel et al, 2016). Acidification as a result of mining has significant effects on downstream catchments and negatively impacts scarce water resources and biodiversity (DEA et al., 2013). The publication of the joint '**Mining and biodiversity guideline: Mainstreaming biodiversity into the mining sector'** is assessed to be effective in raising awareness of biodiversity priorities (Holness et al., 2018). No readily available evidence was found on the effectiveness of applying these guidelines. Furthermore, in relation to mining, recent research suggests that **long term negative impacts of acidification from mining waste can be somewhat reduced**, and that rehabilitation of mining sites can positively impact on water quality (Westensee et al., 2018), species diversity and the provision of ecosystem services (de Klerk et al., 2016). There is reportedly a high number of abandoned mines in the country, the area that will potentially be affected is large, and the time-span of the problem is long and more than centuries (Mhlongo & Amponsah-Dacosta, 2016). Impacts from farming associated acidification are linked to causal chains for soil quality, and land use. The impacts are assessed to be moderate positive.

2.7 Toxic chemicals released to air, water, and soil

The Millennium Ecosystem Assessment identifies human exploitation and pollution is identified as one of five dominant drivers of global change (Millennium Ecosystem Assessment, 2005). Sources of toxic chemicals in South Africa include, among others, agricultural practices like over-fertilization and the use of herbicides and pesticides, industry and mining release of trace metals and hydrocarbons (van Niekerk et al., 2013), electronic waste, and a range of activities that drain into urban wastewater and stormwater disposal. Experts warn that pollution detected off the shores of the country are increasing at an alarming rate (Vikas & Dwarakish, 2015) and that despite potential ecological and human health, there is very little research on, and monitoring of, the distribution and accumulation of these compounds in South African estuaries (van Niekerk et al., 2013), riverine systems (Sibanda et al., 2015) and in other ecosystems. The assessment of safe levels of air pollution emissions and the implementation of standards is contested (Centre for Environmental Rights, 2019). Fracking for shale gas presents a further threat (Todd et al., 2016).

Toxic chemical impacts are linked through causal chains to ecosystem function, to biodiversity in freshwater and coastal ecosystems, and terrestrial ecosystems, to land use interventions, to quality of life and well-being, and indirectly to hunger, nutrition, and food security. Impacts of interventions to limit release of toxic chemicals are major positive.

2.8 Clean energy

The sustainable harvest of alien invasive plants in South Africa is estimated to provide feedstock for biofuel briquettes for a duration of approximately 20 years (Lemaitre & Forsyth, 2013. In Hugo 2015); Stafford et al., 2017). In the context of the high reliance of poor rural communities in South Africa on coal and wood, this provides a cleaner energy source and some climate change mitigation co-benefits. A stakeholder expert reports that the first project of this nature is being set up in 2019 with the support of the South African Renewable Energy Business Incubator (SAREBI) initiative, located in

the Western Cape Atlantis Special Economic Zone (an area that benefits from business stimulus incentives) (McLean, 2018).

The sustainable harvest of IAPs to create clean energy products is linked to new business opportunities and the growth of sustainable industries, to jobs, to rural development and to hydrological services impacts and biodiversity, through tackling biological invasions. For the reason of limited scope for business opportunities and clean energy supply at the national scale, the impact is assessed to be moderate positive.

2.9 Genetic diversity and fair use of genetic resources

Guidelines and regulations for access and benefit-sharing arrangements promote awareness of the benefit of retaining genetic diversity and promoting fair use of genetic resources (Crouch et al., 2008). This is linked to causal chains for indigenous rights, rural economic development from tourism and ecotourism and access to land, and quality of life and well-being. Concerns include, among others, issues of biopiracy in the forms of misappropriation and patenting of genetic resources, contestation of rights of knowledge and access where a multiple communities are involved, and unrealised expectations (Msomi & Matthews, 2015; Amusan, 2017; Chennells., 2013; Wynberg in McManis & Ong, 2017). Access and benefit-sharing is intended to especially benefit historically disadvantaged peoples, that may be disadvantaged in terms of negotiating power or because of limited financial or skills to capitalise on livelihood potential, for example for adding value or marketing their products (Wynberg, 2017). Case studies reveal that existing access and benefit-sharing arrangements would benefit from revision and streamlining, and from greater acknowledgment of indigenous rights (Crouch et al., 2008; Wynberg in McManis & Ong, 2017). Experts suggest that access and benefit-sharing best practice should be subject to ongoing consultation, deliberation and refinement.

The impacts are assessed to have potential to be moderate positive. Possible negative impacts can be mitigated and require participatory learning.

2.10 Access to land

The draft policy proposed land claim settlement in protected areas as part of broader national land reform. Conservation in South Africa is closely linked with colonialism. The intervention intends some restitution for South Africa's massive land dispossessions that stripped the majority of rural Africans of their homes and livelihoods, and it binds together land reform and conservation objectives (Kepe, 2017).

Since drafting the policy, land reform progress in rural areas has been subject to long delays and it has yielded mixed results (Cousins, 2016; Ramutsindela et al., 2016). Land reform projects in conservation areas have faced challenges of a lack of capacity and knowledge of the complexities of tourism and development (SANParks, 2012). There is not policy uncertainty in claims involving protected areas following 2008 Cabinet Resolution that imposed restrictions on the restoration of land rights in protected areas on the basis that national parks are national cultural heritage assets and that it poses a threat to tourism income, especially from large wildlife parks which cross-subsidizes much of the national parks system (Ramutsindela et al., 2016). These restrictions mean that land that has been declared a conservation area must retain that status. The implication of this is that people may not be allowed to move back to their land, and they might exercise ownership rights and lease the land, for example for conservation and ecotourism. Case studies of already settled land claims reveal issues of conflicting interests, unequal powers in joint management arrangements, contrasting

understandings of rights and benefits, and unfulfilled expectations (Kepe et al., 2005; Thondhlana et al., 2016).

The literature reveals a shared view that opportunities exist for co-benefits for conservation and land reform objectives. They encourage new framing this intervention for social and environmental justice, new process and more resources for implementation and for engaging claimants (Cousins, 2016; Cundill et al., 2017; Ramutsindela & Shabango, 2018), and renewed focus on development opportunities and undoing injustices of dispossessions (Ramutsindela et al., 2016). Impacts are moderate positive in the light of unintended negative impacts.

2.11 Hunger, nutrition, and food security

Plant and seed conservation provide the biological base for a nutrient diverse and nutrient rich diet and food security (Raimondo, 2015). South Africa has some traditional farming practice and also industrialised commercial farming. Conserving traditional landraces of crops and wild edible species is considered to be a priority in order to maintain 'within-species' diversity to ensure resilience and local adaptation potential (ibid). Food security is directly linked to retaining genetic diversity and the importance of providing access to genetic resources because it provides potential future benefits through species traits (for example pest or drought tolerance), and also a food security safety net (ibid) in the face of climate change or biological invasion. Retaining species diversity is linked to positive impacts in terms of food security as a result of increased agricultural productivity, potential to adapt to global change, and cultural identity (Vernooy et al., 2017).

There are concerns about the impact of transgenic seeds on food production systems and food security, and about effectively ensuring adequate food access for all people (DEA, 2014). South Africa has a high uptake of GM seed for yield and labour-saving benefits, for example for maize, the food staple (Adenle et al., 2013). Concerns about GM are linked to commercialisation of genetic food resources and intellectual property law and the complexity of trying to accommodate social justice and economic development and biodiversity conservation through equitable benefit sharing (Wynberg In McManis & Ong, 2017).

South Africa is seen as a leader in biotechnology in agriculture, and also as having strong local activism concerned about risks, especially for food sovereignty and of being subjected to a form of corporate colonialism (Aerni, 2005). A survey of GMO stakeholders revealed uncertainty as to process and responsibilities relating to GMOs in South Africa (van Rijssen et al., 2013). The national debates about acts and regulations relating to food sovereignty and biotechnology, indigenous rights and genetic access and benefit-sharing are lively, and non-governmental and religious organisations play key roles, as do scientists and government (ibid). The draft policy would benefit from further stakeholder participation and expert consultation, including to gain clarity about priorities relating to biodiversity and nutrition and food security and sustainability, and to facilitate refinement of regulations for process and responsibilities.

The impact of draft policy for the conservation and sustainable use can have major positive consequences for the long term. Potential for negative impacts will require monitoring and evaluation and potential re-iteration for policy makers.

2.12 Quality of life and well-being

The policy clearly links biodiversity with quality of life and well-being; it focuses on promoting the sustainable use of biodiversity to create livelihoods and to benefit people living in and near protected

areas and through access and benefit sharing agreements. This is in contrast to the historic conservation policy that was detrimental to well-being because it restricted access to protected areas and livelihoods, in these ways exacerbated poverty. There are concerns that the valuable contribution of biodiversity is not sufficiently recognized in mainstream debates, especially relating to national priorities (Crouch & Smith, 2011) and that biodiversity conservation in South Africa requires that stakeholders advocate for better understanding of the inter-relatedness of biodiversity and well-being (Chase et al., 2011; McEwan et al., 2014).

Stakeholders point out that some well-being impacts are easily achieved, for example through making conservation areas more accessible to all income groups, despite the general perception that the demographic profile of visitors to nature conservation spaces are still not representative of society. Quality of life and well-being impacts linked to livelihoods is thought to be subject to risk of negative impacts. This view is in agreement with some of the case studies referred to in this assessment for impacts relating to ecotourism and community-based resource management, access to genetic resources and benefit-sharing arrangements, and land claims in protected areas. There are some success stories (Ramutsindela, 2016; Wynberg, 2017). There are more cases that speak of contestation and these appear to be marked by asymmetries of power and differences in expectations (McEwan et al., 2014), and are considered important for what we can learn from them and for their influence on debates about sustainability and ethical approaches to opportunities for development or social justice and the protection and use of biodiversity (ibid; Wynberg, 2017).

Quality of life and well-being impacts occur in casual chains for water and soil ecosystem services, toxic chemical releases, for access to biodiversity, access to genetic resources and benefit-sharing, and livelihood and new business opportunities and jobs, rural development, and indigenous rights. It is pervasive, relates to both conservation and use, and it is possibly the least tangible to measure. For these reasons the policy is assessed to have a major positive impact.

2.13 Awareness about biodiversity and sustainable use by society

Awareness about biodiversity and its sustainable use is considered to be an important impact of the policy by stakeholders. Impacts are linked to causal chains biodiversity conservation activities, rural economic development from tourism and ecotourism, and new business opportunities, for example in organic produce. **Increasing public awareness is important for engaging public support for conservation and sustainable use of biodiversity** (van Wilgen et al., 2013), for example for managing biological invasions (Novoa et al., 2017). Impacts are major positive for their potential to impact behaviour in the short to long term.

2.14 Indigenous rights

The draft White Paper recognises the value of traditional knowledge and practices, and the rights of traditional knowledge holders. It encourages that this information be recorded and collated, and exploited for the benefit of local people. This links directly to access to genetic resources and fair use of genetic resources through benefit-sharing arrangements, and to restoring access to rural land. South Africa's history of migrations and racial oppression, and its mixed heritage and peoples of mixed ancestry means that the word 'indigenous' has different meanings for people. Access and benefit-sharing regulations takes an inclusive approach, saying that benefits may be due to "any community of people living or having rights or interests in a distinct geographical area within the Republic of South Africa with a leadership structure." (DEAT, 2008:9).

The protection of indigenous rights includes for the appropriation of traditional knowledge, especially for economic benefit. In this regard, and because of the country's megadiversity (Crouch et al., 2008), under the draft White Paper on Conservation and Sustainable Use of Biodiversity, bioprospecting, access and benefit-sharing legislation and regulation may have widespread and long-term impacts. There is risk of misappropriation of indigenous knowledge through the use of patents. There are cases to learn from, for example knowledge of the use of the Pelargonium plant for respiratory ailments, (Msomi & Matthews, 2015), the use of Hoodia to suppress appetite (Amusan, 2017), or simply from the appropriation of Rooibos Tea by various multinational corporations, at the expense of recognising indigenous rights through minimum observations of intellectual property rights, ethical requirements for access and benefit sharing, or true prior informed consent (Amusan, 2014) . A challenge is that the knowledge is rarely exclusive to any one community and that multiple groupings may be knowledge custodians or users (Chennells., 2013; Wynberg in McManis & Ong, 2017). In the light of high values of potential economic benefits from indigenous knowledge, even though the benefits would be localized, the impact is assessed to be potentially moderate positive.

2.15 Resilience to climate change and extreme weather events

Resilience to extreme weather events is linked to the causal chain for flood regulation, through restoring wetlands and clearing alien vegetation. Although the concept the “ecosystem-based adaptation” (EBA) approach postdates the drafting of the draft policy under assessment, it is included in this assessment for the reasons that it is an important part of the current National Biodiversity Strategy and Action Plan, which is the tool that currently enacts activities linked to international commitments under the CBD, and the policy under assessment was drafted to meet the objectives of the CBD, inter alia. The approach is also supported by South Africa's 2013 Long Term Adaptation Scenarios (LTAS) Flagship Research Programme, and the 2014 Biodiversity Sector Climate Change Response Strategy. The Strategic Framework and Overarching Implementation Plan for Ecosystem-Based Adaptation (EbA) in South Africa (2016 - 2021) is in place.

Recent research recommends that EbA be incorporated into existing programs (Aronson et al., 2019), and that the approach enhances climate change resilience and potential for new funding streams (ibid), which is essential for future work (United Nations, n.d.). Local EBA projects demonstrate that both adaptation and mitigation can be achieved together, for example by bio-infrastructure investment and enhancing ecosystem services, for example through afforestation (Roberts et al., 2012). There is uncertainty related to ecosystem resilience thresholds and associated adaptation potential and this will vary on a case by case basis. Also, the intensity and frequency of extreme weather events is unknown. The impact on resilience to climate change and extreme weather events is assessed to be positive. The magnitude of the impacts are uncertain.

2.16 Economic productivity

Economic productivity in the biodiversity economy relies on ecosystem function. Economic productivity of agricultural activities link closely to casual chains for soil quality and nutrition and food security, and quality of life and well-being, and rural economic development from tourism and ecotourism. Agricultural productivity is reliant on pollinators and is enhanced by the rehabilitation of degraded ecosystems, and by encouraging high levels of species diversity (Bourne et al., 2019; Carvalheiro et al., 2011). Economic productivity is also linked to causal chains for biodiversity, especially through interventions to address biological invasions, including by alien invasive plants (Richardson & van Wilgen, 2004), parasites in livestock, non-native weeds, pests in forests, fish in aquaculture (Shackleton et al., 2018).

Economic productivity is enhanced by adding value through recreation activities, or diversifying products like teas in a variety of flavours (Wynberg, 2017), and by utilising waste products for example using harvested IAPs to create fuel (Stafford et al., 2017). It links also to causal chains for new business opportunity impacts, for example the growth of the organic produce market, and for jobs. The impact is assessed to be moderate positive.

2.17 Jobs

Employment opportunities are a main benefit of interventions for the conservation and sustainable use of biodiversity. At 27.1% in the fourth quarter of 2018 (StatsSA, 2019) the official unemployment rate is one of the highest in the world (this number excludes discouraged work-seekers, i.e. people legally able, but not seeking work). The bio economy in South Africa is estimated to provide 406 000 jobs in 2014, of which approximately 14% were conservation oriented, 21% were non-consumptive use, and the remainder were in extractive use of biodiversity resources (Driver and Mukhadi, 2017). Most of these jobs are reported to be in rural areas and a substantial share are low-skill and labour intense (ibid). A barrier that affects 32% of the estimated jobs in 2014 is the contested status of traditional healers. Healthcare policy hinders the professionalisation of traditional healers, in part because activities are not recognised as providers by the medical aid industry (Louw & Duvenhage, 2017). The current contribution and potential for additional jobs is considered to be significant (Steyn, 2012; McLean, 2018).

Jobs impacts link to causal chains for rural economic development from tourism and ecotourism, access and benefit-sharing and less directly to indigenous rights, and quality of life and well-being. There are potential negative impacts, for example the case of ineffective alien invasive plant clearing in order to protect future employment (van Wilgen et al. 2012). The potential impact on jobs is a major positive.

2.18 New business opportunities, growth of new sustainable industries

The biodiversity economy includes all “businesses and economic activities that either directly depend on biodiversity for their core business or that contribute to conservation of biodiversity through their activities” (DEA, 2015: 6). New business opportunities and the growth of new sustainable industries impacts overlap, and for this reason the specific impact categories are discussed together here.

Opportunities for new sustainable industries include in adding value to harvested materials and by-products, to investing in benefit-sharing opportunities, in bioprospecting and bio trade, in tourism and ecotourism, wildlife and marine wildlife sectors, and more (National Biodiversity and Business Network 2018; Rogerson, 2016; Wynberg 2017; Stafford et al., 2017;Government of South Africa, 2015). Also, the production of essential oils (e.g. Buchu and Rose Geranium), flower selling, furniture creation, production of herbal teas, the manufacturing of mosquito repellent candles and adding value to harvested of invasive alien plant (Audouin et al., 2016; Mander, 2017), biodiversity stewardship (SANBI, 2017) and organic produce. Negative impacts may arise, for example in experiences of biopiracy, ineffective distribution of benefits and contestation of rights of knowledge or to resources (Wynberg, 2017), or through tourism infrastructure in sensitive ecological areas. Tourism drives emissions of greenhouse gases, and linked to this, the country’s reliance on coal-fired power plants has negative impacts for local tourism (Amusan & Olutola, 2017).

New business and growth of sustainable industries impacts link directly to ecosystem function, to access to land, quality of life and well-being, to rural economic development, economic productivity, and jobs. **The extractive use of biodiversity must be monitored and evaluated so that use can**

be managed to ensure long term persistence of biodiversity (Driver & Mukhadi, 2017). Experts stress the **need for technical and financial support for small business development** in the bio economy, including through the provision of seed funding and incubation support services (Audouin et al., 2016). Impacts have the potential to be major positive.

2.19 Rural economic development from tourism and ecotourism

Tourism and ecotourism in South Africa is recognised as a driver of development and subject to risk from climate change and related biodiversity loss, and that at the same time it can play a role in promoting environmentally and socially 'responsible tourism' (Rogerson, 2016). The ecotourism industry has shown remarkable growth in comparison to conventional tourism (Brezac, 2010), although subject to risk, linked to climate change through fossil fuel associated pollution and impacts of seasonal change on biodiversity (Amuson & Olutola, 2017). Potential negative impacts of tourism and ecotourism include transporting vectors of biological invasions and ecological damage from building associated infrastructure like roads in protected areas.

Rural economic development impacts from tourism and ecotourism link to causal chains for creating awareness of the value of biodiversity (for tourists and in visited areas), jobs, new business opportunities, the protection of biodiversity and ecosystem function, quality of life and well-being. The impact is moderate positive.

Table 6: Overview of the qualitative impact assessment (social impacts)

Impact category	**Specific impacts**			**Qualitative assessment of impacts**					
Impact categories included in the assessment	**Specific impacts identified**	**Jurisdiction**	**Type of impacts**	**Likelihood**	**Magnitude**	**Positive / Negative**	**Significant?**	**Summary of qualitative assessment results for each impact category**	**Methods / sources used**
Availability of freshwater	Increased freshwater availability by reducing high water-consuming alien invasive vegetation. However, if ineffectively eradicated, alien invasive vegetation will increase and reduce freshwater availability.	In	Indirect, intended and unintended, short to long term	Possible	Unknown	Positive and negative	Yes	Major positive impact from restoring wetlands, from clearing alien invasive vegetation and from internalizing externalities in the price of water. Risks of negative impacts from tying alien clearing to employment provision, and from high water prices on households and businesses require close monitoring and responsive evaluation.	(Bek et al., 2017); (van Wilgen et al., 2008; Currie, 2009); (Morris, 2009); (Wilgen & Wannenburgh, 2016); (Ntshotsho et al., 2011)
	Increased freshwater availability by implementing water pricing that internalizes externalities and decreases	In	Indirect, intended and unintended, short term, micro- and	Likely	Moderate	Positive and negative	Yes		(Brisk & Visser, 2018); (Van Belle & Hlabano, 2019); (Jones, 2018)

	human consumption. Potential negative social and economic impact of increasing the price of water		macro-economic						
	Increased flow of rivers fed by areas of restored wetlands.	In	Direct, intended, long term	Very likely	Moderate	Positive	Yes		(Rebelo et al., 2015)
Water quality	Improved water quality by increasing the area of protected and restored wetlands.	In	Direct, intended, short to long term	Very Likely	Moderate	Positive	Yes	Major positive impact from restoring wetlands and controls on land use and pollution.	(Rebello et al., 2015); (van Wilgen et al., 2008); (Bek et al., 2017)
	Improved water quality by regulations on planning, land-use and pollution.	In	Direct, intended, institutional	Very likely	Major	Positive	Yes		(de Villiers & Hill, 2008)
Flood regulation	Increased attenuation of flood damage by restoration of wetlands.	In	Direct, intended, long term	Likely	Unknown	Positive	Yes	Positive impact from the restoration of wetlands which increases catchment's ability to absorb extreme rainfall events, especially in high energy rivers. This in turn significantly reduces river channel erosion. The magnitude of the impact is	(Rebello et al., 2015)

								uncertain because each river may be subject to unique quantities and profile of water abstraction.	
Biodiversity of freshwater and coastal ecosystems	Decreased loss of biodiversity by increasing the extent of protected freshwater ecosystems.	Both	Indirect, intended, positive, long-term	Likely	Major	Positive	Yes	Major positive impact from protecting ecosystems. Intervention tracking and assessment will rely on establishment of indicators and systems for monitoring and evaluation	(Driver et al., 2012); (Minin et al., 2013); (Walters & Scholes, 2017); (Skowno & Holness, 2017)
	Decreased loss of biodiversity by controls that limit introduction and spread of alien species, by regulations on ballast water and ship cleaning, on aquaculture and fish farming etc.	Both	Direct, intended, positive, long-term	Likely	Unknown	Positive	Yes		
Biodiversity of terrestrial ecosystems	Decreased loss of biodiversity by increasing the area of the protected area and conservation estate.	In	Indirect, intended, positive and negative, long-term	Likely	Major	Positive and negative	Yes	Major positive impact from minimum representative protected areas and clearing invasive vegetation. Potential for negative impact of disrupting ecosystems by reintroduction of species is insignificant. Intervention tracking	(Driver et al., 2012); (Minin et al., 2013; Cushman et al., 2016; Samways & Pryke, 2016); (Walters & Scholes, 2017);

	Decreased loss of biodiversity by increasing the % of known threatened species conserved, in situ and ex situ. Risk of decreased biodiversity by potentially disrupting the balance in 'novel' ecosystems.	In	Indirect, intended, short-term and long-term	Likely	Unknown	Positive and negative	Yes	and assessment will rely on establishment of indicators and systems for monitoring and evaluation	(Skowno & Holness, 2017)
	Decreased loss of biodiversity by eradication and control of alien invasive species.	In	Indirect, intended, short to long term	Likely	Major	Positive	Yes		
Ecosystem function	Increased information about ecosystem function and awareness of the benefits of ecosystem protection.	In	Direct, Intended, short to long-term	Likely	Major	Positive	Yes	Major positive impact from assessing, improving and mainstreaming ecosystem information	(Driver et al., 2012); (SANBI, 2014); (Von der Heyden et al., 2016); (Skowno & Holness, 2017)
Land use	Increased protection for biodiversity by land use	In	Direct, intended, short to long-term	Likely	Major	Positive	Yes	Major positive impact from regulations on land use. Negative impacts from land-tied biodiversity protection arrangements, because	(Nortje, 2017); (de Villiers & Hill, 2008), (Kepe et al.,2005); (Department of

	planning regulations.							of slow pace and constraints on livelihoods.	Environmental Affairs, 2015)
	Increased area with biodiversity consideration agreements (through land claims settled or stewardship arrangements).	In	Indirect, intended, short to long-term, distributional	Likely	Unknown	Positive and negative	Yes		
Soil quality	Increased ecological function by restoring / rehabilitating / remediation of degraded landscapes.	In	Indirect, intended, long-term	Very likely	Minor	Positive	Yes	Minor positive impact on biota ecological function of soil in degraded areas. The extent of degraded area and the capacity of soil for improvement is unknown.	(Swanepoel et al. 2016); (Bourne et al., 2017, Kotzé, 2015; Swanepoel, 2016); (Walter & Scholes, 2017)
Terrestrial and water acidification	Decreased loss of biodiversity to acidification by protecting priority areas from acid mine drainage.	In	Indirect, intended, long-term, life-cycle	Very likely	Minor	Positive	Yes	Moderate positive impact from avoiding acid mine drainage. The potential uptake of sustainable agriculture practices is unknown.	(DEA et al., 2013); (Holness et al., 2018); (Westensee et al., 2018); (de Klerk et al., 2016); (Mhlongo & Amponsah-Dacosta, 2016)
	Decreased loss of biodiversity as a result of increased take up of sustainable agriculture practices (e.g.	In	Indirect, intended, long-term	Unknown	Unknown	Positive	Yes		(Swanepoel et al, 2016)

	ammonium-based fertilizers) and by limiting expansion of agriculture to biodiversity critical areas.								
Toxic chemicals released to air, water, and soil	Decrease the rate of loss of biodiversity through the release of toxic chemicals into environmentally significant areas by spatial restriction on mining activities.	In	Indirect, intended, long-term, life-cycle	Likely	Unknown	Positive	Yes	Potentially major positive impact by limiting the release of toxic chemicals to air, soil, and water, especially in biodiversity critical areas or fragile ecosystems.	(Millennium Ecosystem Assessment, 2005); (van Niekerk et al., 2013); (Vikas & Dwarakish, 2015); (van Niekerk et al., 2013); (Sibanda et al., 2015); (Centre for Environmental Rights, 2019); (Todd et al., 2016)
	Decrease biodiversity loss to the release of toxic chemicals into the aquatic environment through pollution control measures, with particular emphasis on biodiversity priority areas.	Both	Indirect, intended, long-term, life-cycle, distributional	Likely	Unknown	Positive	Yes		

Clean energy	Increased clean energy production by briquetting cleared alien vegetation.	In	Direct, intended, short to long term	Likely	Minor	Positive	No	Minor positive impact from using cleared alien vegetation as feedstock	(Lemaitre & Forsyth, 2013. In Hugo 2015); Stafford et al., 2017); (McLean, 2018).
Genetic diversity and fair use of genetic resources	Increased equitable beneficiation of genetic resources, and for local knowledge.	Both	Direct, intended, medium to long-term, distributional	Possible	Moderate	Positive and negative	No	Moderate positive impact from benefit-sharing agreements. Possible negative impacts can be mitigated and require participatory learning.	(Crouch et al., 2008); (Msomi & Matthews, 2015; Amusan, 2017; Chennells., 2013; Wynberg in McManis & Ong, 2017)
Access to land	Increase settlement of land claims in protected areas.	In	Direct, intended and unintended, medium to long-term, distributional	Possible	Minor	Positive and negative	No	Moderate positive impact from including biodiversity and conservation areas in the national land reform agenda. Negative impacts are possible from slow claim settlement and settlement-agreement tied constraints on socioeconomic opportunities for communal land holders. Experts recommend that some improvements for revision of this approach.	(Kepe, 2017); (Cousins, 2016; Ramutsindela et al., 2016); (SANParks, 2012); (Kepe et al., 2005; Thondhlana et al., 2016) (Cundill et al., 2017; Ramutsindela & Shabango, 2018)
Hunger, nutrition, and food security	Increased protection for species diversity and ecosystems function in order to protect future food security.	Both	Direct and indirect, intended, long-term, distributional	Possible	Unknown, potentially major	Positive	Yes	Potential for major positive impact from the protection of species diversity and ecosystem services for the purpose of food security. The magnitude of the impact will depend on the need to adapt to global change.	(Raimondo, 2015); (Vernooy et al., 2017); (DEA, 2014); (Adenle et al., 2013); (Wynberg In McManis & Ong, 2017); (Aerni, 2005); (van Rijssen et al., 2013)

Quality of life and well-being	Increased access to nature for recreation, access to land, economic opportunities, rural development, recognition of indigenous and traditional knowledge.	In	Direct and indirect, intended and unintended, short to long term, distributional	Very likely	Unknown, potentially major	Positive and negative	Yes	Potentially major positive impact from increased accessibility and affordability. Potential negative impact from increased built infrastructure to provide access is not considered significant. Monitoring and controls should be put in place to mitigate negative impacts.	(Crouch & Smith, 2011); (Chase et al., 2011; McEwan et al., 2014); (Ramutsindela, 2016; Wynberg, 2017); (McEwan et al., 2014); (ibid; Wynberg, 2017).
Awareness about biodiversity and sustainable use by society	Increased awareness about biodiversity and sustainable living.	In	Direct, intended, medium term	Likely	Major	Positive	No	Major positive impact from mainstreaming biodiversity and increasing societal awareness about sustainable use of biodiversity. Potential for increasing significance of impact.	(Novoa et al., 2017); (van Wilgen et al., 2013)
Indigenous rights	Increased recognition for indigenous rights by requirements for benefit-sharing arrangements, and recognition of indigenous local knowledge.	In	Direct, intended and unintended, institutional, distributional	Likely	Moderate	Positive and negative	Yes	Moderate positive impact from recognition of indigenous rights. Significant risk of negative impacts from biopiracy, from contestation about who holds indigenous rights, and of inequality as a result of ongoing limited access to resources and rights of ownership for indigenous knowledge holders.	(DEAT, 2008:9); (Crouch et al., 2008), ; (Msomi & Matthews, 2015); (Amusan, 2017);(Chennells., 2013; Wynberg in McManis & Ong, 2017); (Amusan, 2014)
Resilience to climate change	Increased ecological infrastructure	Both	Direct and indirect, intended,	Likely	Unknown	Positive and	Yes	Positive impact from increased protection of biodiversity is assessed to be significant in the	(Roberts et al., 2012); (Aronson et al., 2019); (United Nations, n.d.).

and extreme weather events	(e.g. wetlands and riverine stability) and protection of biodiversity resources (e.g. seed banks).		medium to long term			unknown		face of the potential rate of environmental change. Taking a precautionary principle approach, the extent to which the magnitude is unknown is assessed to be insignificant.	
Economic productivity	Increased value of productive activity by focusing on adding value to raw materials and waste products, and by utilizing value of biodiversity resources. Increased agricultural productivity by protecting biodiversity on and in the vicinity of farms.	In	Direct and indirect, intended, market, distributional	Possible	Moderate	Positive	Yes	Moderate positive impact from value-adding economic activities and from enhanced biodiversity in conservation agriculture.	(Bourne et al., 2019; Carvalheiro et al., 2011); (Richardson & van Wilgen, 2004) (Shackleton et al., 2018); (Wynberg, 2017); (Stafford et al., 2017)
Jobs	Increased number of jobs, including in conservation and sustainable use of biodiversity, e.g. conservation and remedial	Both	Direct, intended and unintended, distributional,	Likely		Positive and negative	Yes	Moderate positive impact from opportunities for new employment. Negative impacts from loss of jobs that relied on unsustainable use of biodiversity. Moderate positive impact from new industries. Negative impacts from	(Steyn, 2012); (McLean, 2018); (StatsSA, 2019); (Driver and Mukhadi, 2017); (Louw & Duvenhage, 2017); (van Wilgen et al. 2012)

	activities, bioprospecting, ecotourism, and more.		macro-economic					biopiracy and contestations about access to resources or ownership of knowledge or because of ineffective distributional impacts for the poorest and that may not have start-up capital are also likely and significant.	
New business opportunities	Increased new business opportunities in the bio economy, some using traditional or indigenous knowledge.	Both	Direct and indirect, intended and unintended, micro- and macro-economic, distributional	Likely	Major	Positive and negative	Yes	Major positive impact from promoting sustainable production by increase in bio economy revenue. Unknown impact on employment and short term revenue as a result of limiting unsustainable biodiversity use for business.	(United Nations, 2017); (National Biodiversity and Business Network 2018; Rogerson, 2016; Wynberg 2017; Stafford et al., 2017;Government of South Africa, 2015); (Audouin et al., 2016; Mander, 2017)
	Decreased number of business opportunities that rely on unsustainable practices, for example agriculture with high reliability on chemical inputs, plantation forestry with unsustainable water requirements.	Both	Direct and indirect, intended, short term, macro-economic	Unknown	Moderate	Positive and negative	Yes		

Growth of new sustainable industries	Increased number of sustainable industries in adding value to biodiversity materials, including for example pelleting harvested alien vegetation, health and beauty products, and in bio trade industry, which requires legislation and controls to protect against biopiracy, cruelty to animals, and other adverse consequences.	In	Direct, intended, short to medium term, distributional	Very likely	Moderate	Positive and negative	Yes	Major positive impact from new industries. Negative impacts from biopiracy and contestations about access to resources or ownership of knowledge or because of ineffective distributional impacts for the poorest and that may not have start-up capital are also likely and significant.	(National Biodiversity and Business Network, 2018); (DEA, 2015); (National Biodiversity and Business Network 2018; Rogerson, 2016; Wynberg 2017; Stafford et al., 2017;Government of South Africa, 2015); (Audouin et al., 2016; Mander, 2017); (SANBI, 2017); (Wynberg in McManis & Ong, 2017),
Rural economic development from tourism and ecotourism	Enhanced economic development, for example thorough wildlife and park management initiatives, including community-based wildlife management	Both	Direct and indirect, intended and unintended, market, distributional	Very likely	Moderate	Positive and negative	Yes	Major positive impact from revenues and community involvement in conservation area utilities. Although the areas that will benefit are a small portion of the country, the impact is significant in terms of alternative opportunities for development. Negative impacts are likely for some areas, from infrastructure for	(Brezac, 2010); (Amuson & Olutola, 2017); (Rogerson, 2016)

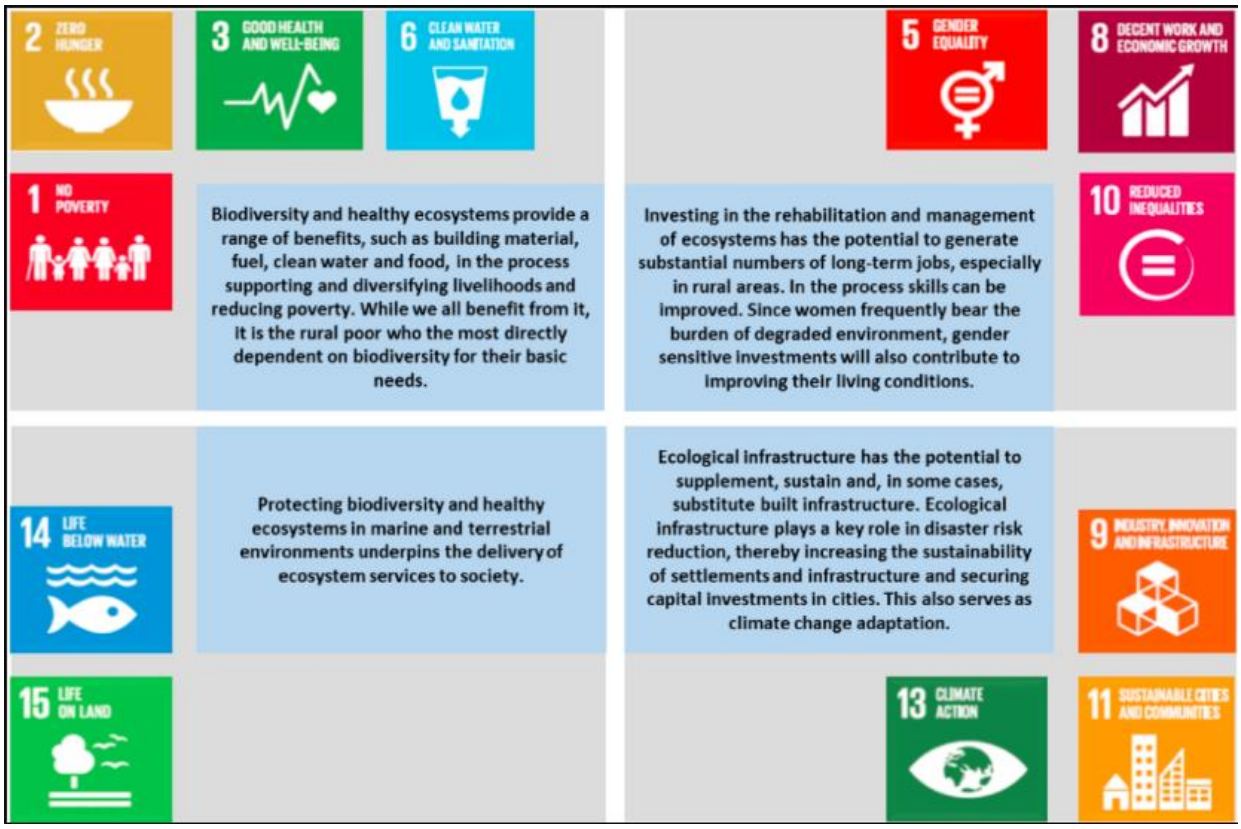
	initiatives and public-private partnerships.							tourism or lack of distributional impacts between communities.	

3. MONITORING AND REPORTING

3.1 SDGs performance

Based on the impact categories and the specific impacts outlined, the action assessed is expected to impact 12 SDGs, as displayed in and explained in Figure 1 below.

Figure 1: The conservation and sustainable use of biodiversity in South Africa is linked to 13 SDGs. (United Nations, 2017)



3.2 Monitoring of indicators

The draft policy assessed does not include a monitoring strategy. Nonetheless, the present section attempts to suggest a set of indicators to keep track of impacts. The suggestions made below are not intended to be comprehensive of all impacts, rather, a relatively short list is presented, after taking into account stakeholder input about current plans for monitoring. The intention in following this approach is to track some key indicators with a minimal additional reporting burden, taking into account existing reporting requirements under the CBD, indicators identified in the National Biodiversity Strategy and Action Plan (Department of Environmental Affairs, 2015), and noting the country's national priorities. Goal values are adopted from existing national targets.

Table 7: Proposed indicators for the monitoring of the impacts

Indicator	Source of data	Monitoring frequency	Measurement method	Responsible entity or institution	Goal value for year Y
Areas protected (ha, km, km^2)	provincial conservation authorities and South Africa's Scientific Authority	National Biodiversity Assessments are updated every 7 years	Land survey	SANBI, with support of DEA and the Centre for Scientific and Industrial Research (CSIR)	By 2028, in protected areas: 10.8m land-based hectares, 353km inshore, 210 000km2 marine offshore in SA's EEZ plus 93 300 km^2 marine offshore in Prince Edward Islands EEZ.
% of threatened species conserved ex situ	provincial conservation authorities and South Africa's Scientific Authority	Every 4 years (Monitoring processes being developed by 2020.)	Counts of Threatened species (IUCN Red List)	SANBI and Botanical Society of South Africa (BotSoc)	60% of threatened plant species by 2020
% of species with ex situ collections active in restoration programmes	SANBI	Every 4 years	Reported	DEA with support from SANBI's zoological and biological gardens	1% of plant species by 2020
Threat status of ecosystems	provincial conservation authorities, DEA, DAFF, CSIR, research institutions	National Biodiversity Assessments are updated every 7 years	Four datasets (ecosystem types, ecological conditions, protected areas, biodiversity targets), local datasets where possible, otherwise global with some ground truthing.[1]	SANBI	Minimum 60% of each ecosystem type is in good ecological condition

Protection level of ecosystems	provincial conservation authorities and South Africa's Scientific Authority	National Biodiversity Assessments are updated every 7 years	As above	SANBI	Minimum 20% of each ecosystem type is well protected
Benefit-sharing: patents that exist for products made from local biodiversity or that use local or indigenous knowledge, and that have benefit sharing agreements	International patent registry, agreements registered under South Africa's Bioprospecting, Access and Benefit-Sharing Regulatory Framework	Annual	Desktop review	DEA	By 2025, benefit-sharing agreements exist for patents that are commercialized. Benefit-sharing agreements have been reviewed.
% of Spatial Development Frameworks (SDFs) Integrated Development Plans (IDPs) and Land-Use Schemes (LUS) that include biodiversity considerations	all national, provincial and municipal departments responsible for development planning and monitoring, Department of Rural Development and Land Reform	Every 5 years	Reporting progress on the Mid Term Strategic Framework (MTSF)	Presidency with support of DRDLR, SANBI, SALGA, CoGTA	By 2020, 100% of SDFs, IDPs, LUSs include maps for critical biodiversity areas and controls development
Increase in average annualized GDP growth rate of the SA bioprospecting and wildlife sectors	StatsSA	Every year	NBES	DEA	By 2030, 10% increase compared with 2020

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