# GUIDELINES ON THE INTEGRATION OF BIODIVERSITY AND CLIMATE CHANGE INTO THE ENVIRONEMTNAL IMPACT ASSESSMENT PROCESS

The Eswatini Environment Authority

## Assisting EA Practitioners integrate climate change impacts and biodiversity impacts in Environmental Assessments

Date: February 2023

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## Acronyms

| | |
|---|---|
| 3NR | Third National Communication to the UNFCCC |
| 6NR | Sixth National Report to the United Nations Convention on Biological Diversity |
| CMP | Comprehensive Mitigation Plan |
| COP | Conference of Parties |
| EA | Environmental Assessment |
| EA Practitioner | Environmental Assessment Practitioner |
| EAAR Regulations | Environmental Audit Assessment and Review Regulations |
| EEA | Eswatini Environment Authority |
| EIAs | Environmental Impact Assessment |
| EMA | Environmental Management Act, 2000 |
| EMP | Environmental Management Plan |
| ENTC | Eswatini National Trust Commission |
| GBF | Global Biodiversity Framework |
| GHG | Greenhouse Gas |
| IAIA | International Association for Impact Assessment |
| IEE | Initial Environmental Evaluation |
| IPBES | Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services |
| IPCC | Intergovernmental Panel on Climate Change |
| MOA | Ministry of Agriculture |
| NBSAP | National Biodiversity Strategy and Action Plan |
| NCCP | National Climate Change Policy |
| NCCSAP | National Climate Change Strategy and Action Plan |
| NDC | Nationally Determined Contribution to Climate Change |
| OECM | Other Effective Conservation Measures |
| UNCBD | United Nations Convention of Biological Diversity |
| UNFCCC | United Nations Framework convention on Climate Change |

# THE INTEGRATION OF BIODIVERSITY AND CLIMATE CHANGE ISSUES IN THE EIA PROCESS AND TRAINING OF PRACTITIONERS AND REVIEWERS

## 1 Introduction

The role of environmental impact assessments (EIA) in identifying and managing impacts on our environmental and social resources is of critical importance to ensure a safe, functional and low impact development. For too long now, the assessment of impacts arising from climate change and impacts arising from the loss of biodiversity have not received sufficient focus despite climate change and biodiversity loss being the two major concerns of the modern day and as a party to several multinational environmental agreements the country has lagged behind in mainstreaming climate and biodiversity in its EIA processes.

Eswatini is Party to all the Rio Conventions (United Nations Framework convention on Climate Change (UNFCCC) and the United Nations Convention of Biological Diversity (UNCBD), the Paris Agreement and associated protocols) that form the international governance for climate change and biodiversity. As such, the country is politically committed to mainstreaming these multilateral environmental agreements through promulgation of domestic legislation, regulations and processes in order to appropriately respond to the challenges of climate change and biodiversity loss that are affecting the wellbeing and welfare of its citizens and the economy.

Since the Eswatini Environment Authority (EEA) was established in 1992, there has been an increasing threat to Eswatini's biodiversity, water and land resources to make way for development projects and economic expansion. At the same time the effects of climate changes have been gradually strengthening and are having an increasingly damaging impact affecting the entire population and economy of Eswatini. This is evidenced by periodic droughts, increasing heat, dry spells, extreme weather events that damage costly physical and public infrastructure (like roads, bridges, educational and health facilities) as well as flooding of commercial and residential properties affecting lives and livelihoods.

The continuous loss of biodiversity and in recent decades, the ever increasing impacts arising from climate change on the country's development have been documented in all State of Environment Reports[1][2][3] as one of the country's main environmental challenges.

It is widely recognised that climate change is having enormous global economic consequences from extreme weather events to loss of crops to damage to infrastructure. The evidence gathered in the Stern Review on the Economics of Climate Change[4] (2006) shows that '*ignoring climate change will eventually damage economic growth*'. The Stern Review also pointed out that '*the benefits of strong and early action far outweigh the economic costs of not acting*'.

The Eswatini's 3rd National Communication (3NC) to the UNFCCC[5] confirms the overwhelming evidence that climate change is having an adverse impact on the country's development objectives and is reaching a critical stage that is threatening all the positive development gains achieved by the country since independence.

The loss of biodiversity combined with the emerging realities of how climate change is adversely affecting biodiversity has become one of the country's main environmental challenges. Its impact on the delivery of ecosystem services, society and the economy as a whole is increasingly recognised. To address this challenge, parties to the UNCBD have committed themselves to halting the loss of biodiversity and ecosystems and to restoring them in so far as feasible. Such an approach for the protection and restoration of biodiversity requires a more rigorous assessment of potential impacts and vulnerabilities affecting any given project subject to the Environmental Audit Assessment and Review (EAAR) Regulations.

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[1] *The Third State of the Environment Report, 2021 (https://www.undp.org/sites/g/files/zskgke326/files/migration/sz/UNDP-SZ-SOER-Report-2021.pdf)*

[2] *The First State of Environment Report, 2001 (https://wedocs.unep.org/bitstream/handle/20.500.11822/9073/-State%20of%20the%20Environment%20Report%20-%202001%20-%20Swaziland-2001State%20of%20the%20Environment%20Report-2001-Swaziland.pdf?sequence=3&amp%3BisAllowed=_*

[3] *The Second State of Environment Report: Consequences of Inaction, 2012 (http://eea.org.sz/wp-content/uploads/2020/09/SOER-2014.pdf)*

[4] *https://webarchive.nationalarchives.gov.uk/ukgwa/20100407172811/https:/www.hm-treasury.gov.uk/stern_review_report.htm*

[5] *https://unfccc.int/sites/default/files/resource/swznc3.pdf*

To address these emerging impacts and vulnerabilities of the environment (built and natural), the UNFCCC in Article 4(f) of the UNFCCC convention states '*All Contracting Parties have responsibilities to take climate change into account...., to minimize adverse effects on the economy, public health, and quality of environment, in projects or measures undertaken to mitigate or adapt to climate change'*.

Additionally, the country's Nationally Determined Contributions (NDC)[6] report (a deliverable under the UNFCCC Paris Agreement[7]) has proposed a number of ambitious targets that serve as Eswatini's commitments to reducing greenhouse gas emissions and introducing adaptation interventions to the impacts of climate change and biodiversity loss.

Similarly, the National Biodiversity Strategy and Action Plan (NBSAP)[8] outlines several targets that are designed towards halting and reversing biodiversity loss and enhancing the conservation of the country's biological resources and the complex systems that sustain them.

# 2 Background

The 2002 Environmental Management Act (EMA) that established the Eswatini Environment Authority has a variety of functions, three of which are applicable to achieving a greater appreciation of and impacts of climate change and biodiversity loss:

(a) to liaise with bodies concerned with matters relating to the protection, conservation and enhancement of the environment and the sustainable management of natural resources;
(b) to review environmental impact assessment reports and strategic environmental assessments reports;
(c) to monitor the implementation of the EMA and assess its effectiveness in improving the level of protection, conservation and enhancement of the environment and the sustainable management of natural resources, and to advise the Minister on ways of giving effect to the purpose of the Act more effectively.

These important functions are intrinsically linked to the investigation of possible environmental impacts arising from a described activity that has the potential to create or cause a variety of direct and indirect impacts on the natural environment and or citizens.

The approach and methodologies employed to identify the impacts and risks differs not only by project but also through the methodologies used by environmental consultants contracted with carrying out and reporting on these impacts.

The requirement for environmental impact assessments (EIA) stem from the EAAR Regulations and the format by which the assessment is to be presented is captured under the third schedule of the Regulations which sets out an indicative reporting format and information to be presented. A structured reporting format helps guide the Environmental Assessment (EA) Practitioner[9] and the reviewers of completed environmental reports to ensure specific analysis is performed to describe the range of issues arising from the project being assessed.

The 2022 EAAR Regulations do not specifically call for a dedicated assessment of either the biodiversity impacts or the climate change impacts (other gaps would include water impacts and energy impacts), however, the Regulations do expect a "*Description of the Environment: An overall evaluation of the type and quality of the environment (bio-physical and social components and processes) within the study area with specific information presented only when relevant to the prediction and evaluation of impacts. Description of any expected changes to the "baseline" environmental situation before implementation of the project subject to an EIA (the "no project" alternative)"* so what is now being called for by the EEA is a more detailed assessment of the climate and biodiversity impacts and how such impacts will be mitigated for during project implementation.

With the ever-increasing severity and importance of biodiversity and climate impacts affecting all types of human activities, both nationally and globally, the Eswatini Environment Authority (EEA) will be requiring a stronger

[6] https://unfccc.int/sites/default/files/NDC/2022-06/Eswatini%27s%20Revised%20NDC%2012%20Oct%202021.docx

[7] https://unfccc.int/sites/default/files/english_paris_agreement.pdf

[8] https://www.cbd.int/doc/world/sz/sz-nbsap-v2-en.pdf

[9] *An "Environmental Assessment Practitioner" means a person qualified and accredited to undertake environmental assessment in accordance with regulations 8 and 9 of the EAAR Regulations of 2022*

analysis and assessment of the biodiversity and climate change impacts related to a project that is subject to the EAAR Regulations as they relate to each project.

In a review of 125 environmental assessment (EA) reports deposited with the EEA carried out by Emmanuel Nkosinathi Cele (PhD)[10] he concluded that "*the quality of EISs in Eswatini is generally poor, despite slight variations in quality within different sections of the EISs*". The review did not focus on any particular weakness of assessment but rather an analysis of the overall adequacy of the report to meet international regional and professional norms.

The analysis also highlighted the wide variations in the experience of the EAPs carrying out the assessment with lower experienced EA Practitioners submitting lower quality reports.

The analysis indicates that below satisfactory research into the core and often critical environmental issues arising from a project weakened the overall assessment recommendations and thus exposed the environment and people to unnecessary risks and or impacts.

Specifically, the literature from the region has identified that risks to and from biodiversity are not adequately addressed in EIAs to ensure the continued integrity of habitats and ecosystems upon which life on earth depends.

Eswatini has undertaken numerous studies of it biodiversity resources (Annex 2) that are best summarised in the National Biodiversity Strategy and Action Plan together with regular reporting to the UNCBD in the form of a National Report to the UNCBD. These periodic reports identify the country's actions taken or needed to protect and manage remaining biological diversity and is a core resource when assessing project impacts. Related policies, strategies and action plans are available from various institutions and websites on land degradation, wetlands, protected areas (including protection-worthy areas and Other Effective Conservation Measures (OECM)), red data lists for flora and fauna, tree diversity and mapping and range and type of invasive species.

The same conclusion is also drawn from the climate change space wherein no EAs assessed by Cele addressed climate change as a risk to or from the project under assessment.

Eswatini has some stellar policy ambition on addressing climate change impacts through its 2016 National Climate Change Policy[11] (NCCP) as well as its National Climate Change Strategy and Action Plan (NCCSAP) (2016-2020) and its Nationally Determined Contribution to Climate Change[12] (NDC), 2021. In addition, regular reporting to the UNFCCC in the form of National Communications Reports and regular greenhouse gas inventories has been undertaken and those reports unpack a wide range of issues and impacts that an EA Practitioner should be recognising and integrating into the mitigation plans and or project design.

A review of some random examples of EIAs submitted to the EEA revealed that climate change was very seldom mentioned yet climate change has the potential to cause a project to fail or be more vulnerable to climate change impacts particularly on longer timeframes that EIAs do not often look at but should.

As a result of national commitments to the protection and management of biodiversity (as described in the NBSAP) as well as national ambition to reduce greenhouse gas emissions and integrate climate adaptation across all major economic sectors of the country (as described in the revised 2021 NDC, the EEA have developed this guideline and toolbox to assist all EA Practitioners integrate a more comprehensive assessment of biodiversity risks and impacts and stronger supportive climate change adaptation and mitigation elements within and across all EAs prepared under the Environmental Audit, Assessment and Review Regulations of 2022.

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[10] *QUALITY OF ENVIRONMENTAL IMPACT STATEMENTS (EISs) IN ESWATINI: A RETROSPECTIVE ANALYSIS OF 1996 – 2020 SUBMISSIONS AND RECOMMENDATIONS FOR IMPROVEMENT, Emmanuel Nkosinathi Cele (PhD) ORCID ID https://orcid.org/0000-0002-1700-1582*

[11] https://climate-laws.org/rails/active_storage/blobs/eyJfcmFpbHMiOnsibWVzc2FnZSI6IkJBaHBBamdHIiwiZXhwIjpudWxsLCJwdXIiOiJibG9iX2lkIn19--04bf094fa533385929e1f7b420af770cf3576d76/f

[12] https://unfccc.int/sites/default/files/NDC/2022-06/Eswatini%27s%20Revised%20NDC%2012%20Oct%202021.docx

# 3 National Context of Climate Change and Biodiversity

## 3.1 Climate Change in Eswatini

According to Eswatini's Third National Communication (3NR) (2016) to the UNFCCC, climate trend analysis since the 1960s on daily maximum and minimum temperatures show temperature patterns to have warmed up over most of the country in the past decade (Figure 6).

Minimum temperatures have increased more rapidly than maximum temperatures. The past two decades (1990s and 2000s) were warmer than the 1970s and 1980s. In the 1970s, temperatures in the Lowveld, which is the hottest region in the country, rarely exceeded 34°C; current recordings show increasing frequency of very hot days, exceeding 34°C. This shows that recent decades have experienced upward trends in annual mean, maximum and minimum temperature, with the most significant warming occurring between 2000 and 2015/16.

The 3NR reports that some of the climate change impacts and challenges being experienced in Eswatini include significant variations in precipitation patterns, higher temperatures, and increases in frequency and intensity of severe weather events such as high winds, heatwaves, droughts, floods and cyclones. The intensity and frequency of these climate extreme weather events is expected to increase with climate change. Climate change will also further increase the vulnerability of communities even regarding existing levels of hazards, through ecosystem degradation, impacts on water supply and food security and changes to livelihoods.

To guide responses to climate change, Eswatini have, over the past decade, published some important documents that EA Practitioners and their sectoral experts should be aware of and familiar with the core strategies and policy direction and integrate those policy or strategies into the EIA assessments and CMPs.

These are:

- **National Climate Change Policy (NCCP)**[13] 2016 and the **National Climate Change Strategy and Action Plan (2015—2020)**[14] (NCCSAP).

Supporting those national policy documents are a wide range of technical reports and studies including:

- the **Third National Communication to the UNFCCC**[15] (3NR) 2016,
- the **Eswatini National Greenhouse Gas Inventory Report 1990 – 2018**[16],
- the **Third Nationally Determined Contributions Report**[17] (NDC) 2021 report,
- the **NDC Implementation Plan**[18] 2022,
- the **Green Climate Fund Country Programme**[19] 2020,
- the **National Development Plan 2023/24 – 2027/28**[20],
- the **Eswatini Climate Risk Profile**[21] 2021 and
- the **Eswatini Climate Change Risk Mapping**[22] report 2021.

At the global level, the Intergovernmental Panel on Climate Change (IPCC) has published various assessment reports on climate change, its causes, its impacts and the responses needed. The IPCC prepares comprehensive Assessment Reports about the state of scientific, technical and socio-economic knowledge on climate change,

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[13] https://info.undp.org/docs/pdc/Documents/SWZ/Swaziland%20Climate%20Change%20Policy%202016%20Final.pdf

[14] *Request copy from the Climate Change Unit, Dept of Meteorology*

[15] https://unfccc.int/sites/default/files/resource/swznc3.pdf

[16] https://www.ccacoalition.org/sites/default/files/resources/Eswatini%20GHG%20Mitigation%20Assessment%20Final%20040621.pdf

[17] https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Eswatini%20First/Eswatini%27s%20Revised%20NDC%2012%20Oct%202021.docx

[18] *Request copy from the Climate Change Unit, Dept of Meteorology*

[19] *Request copy from the Climate Change Unit, Dept of Meteorology*

[20] *Request copy from the Climate Change Unit, Dept of Meteorology*

[21] https://climateknowledgeportal.worldbank.org/sites/default/files/2021-08/15929-WB_eSwatini%20Country%20Profile-WEB.pdf

[22] *Request copy from the Climate Change Unit, Dept of Meteorology*

its impacts and future risks, and options for reducing the rate at which climate change is taking place. It also produces Special Reports (Global Warming of 1.5°C, Climate Change and Land, and Ocean and the Cryosphere in a Changing Climate), as well as Methodology Reports that provide guidelines for the preparation of greenhouse gas inventories.

The IPCC Sixth Assessment Report consists of three Working Group contributions and a Synthesis Report. The Working Group I contribution was finalized in August 2021 (Climate Change 2021: The Physical Science Basis), the Working Group II contribution in February 2022 (Climate Change 2022: Impacts, Adaptation and Vulnerability) and the Working Group III contribution in April 2022 (Climate Change 2022: Mitigation of Climate Change). The Synthesis Report will be the last of the AR6 products and is scheduled to be released in March 2023.

## 3.2 Biodiversity Protection in Eswatini

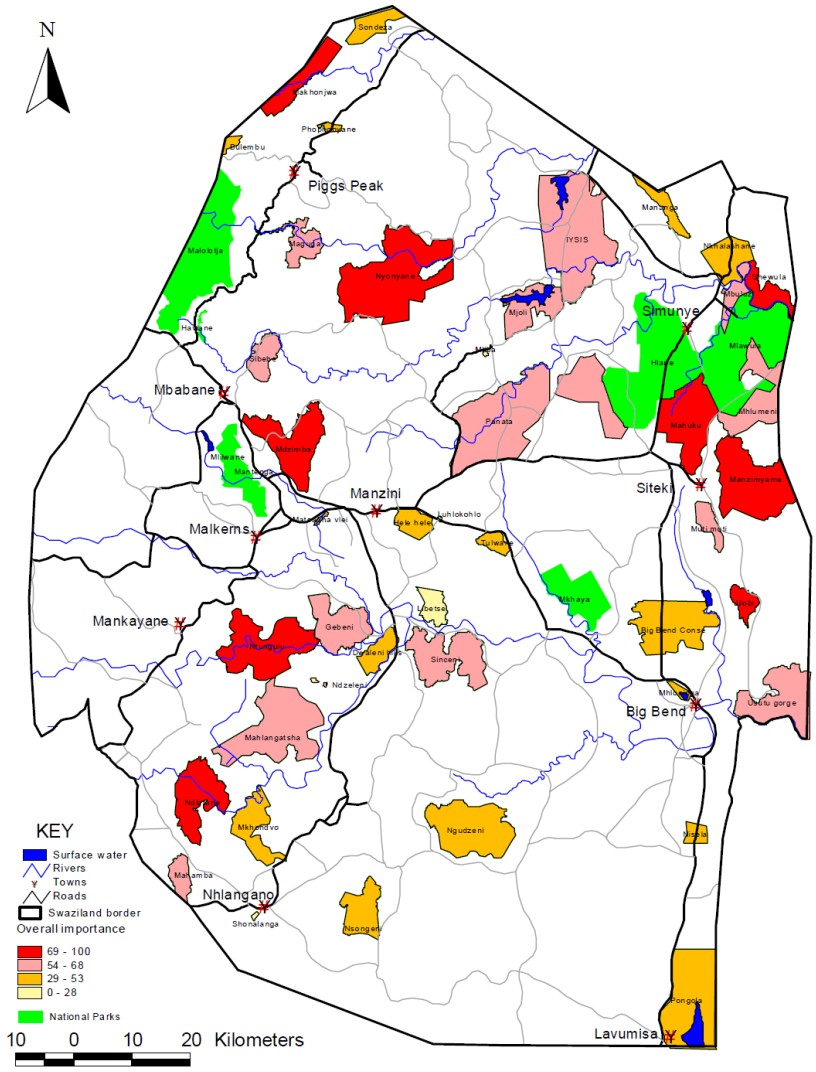
According to Eswatini's Sixth National Report (6NR)[23] to the United Nations Convention on Biological Diversity (UNCBD), only 4.26% (64,100 ha) of the country is formally protected and a combination of both formal and informal PA has an area above 8% of conservation area managed by private landowners and communal land users (Figure 2).

***Figure 1 - Size and Status of Swaziland's National PAs***

| NAME | Management | Perimeter (km) | Total Area (Ha) | Gazetted Area (Ha) |
|---|---|---|---|---|
| Hlane Royal National Park | BGP | 91.4 | 21,735.8 | 13,525.8 |
| Mkhaya Game Reserve | BGP | 50.2 | 10,050.2 | 5,815.5 |
| Mlilwane Wildlife Sanctuary | BGP | 58.6 | 4,582.8 | 3,862.0 |
| Malalotja National Park | SNTC | 75.6 | 16,292.4 | 11,255.0 |
| Mlawula Nature Reserve | SNTC | 83.6 | 16,152.3 | 14,943.4 |
| Mantenga Nature Reserve | SNTC | 11.9 | 716.7 | 716.7 |
| **Total** | | | **69,530.3** | **50,118.4** |

[23] https://www.cbd.int/doc/nr/nr-06/sz-nr-06-en.pdf

***Figure 2 - Protected and Protection-worthy Areas of Eswatini***




Swaziland's biodiversity is contending with a number of pressures, which are a consequence of a growing population with the resultant increased resource utilization, changes in land use and emissions[24]. Habitats available to flora and fauna have subsequently been entirely lost or been reduced in extent and quality. Causes of biodiversity loss and threats to biodiversity can be summed up as conversion of natural habitats to other land uses; invasion of habitats by alien species (with the country's protected areas not spared); rapid expansion of settlements and urbanization, including into biodiversity-rich areas; wild fires destroying ecosystems and altering habitats; climate change impacts; overgrazing and the unsustainable use of natural resources and illegal and uncontrolled hunting has resulted in widespread biodiversity loss. In addition to the ever-increasing poverty, particularly in the rural areas, population growth has resulted in increased pressure on available natural resources thus leading to the sustained and rapid degradation of Eswatini's biodiversity in a vicious cycle of declining availability.

According to Eswatini's second State of Environment Report (2012)[25], there has been a decline of and extinction of some wild animal species, similarly to the populations of indigenous plant species. Approximately 25% of each of the terrestrial ecosystems has been lost to some form of another land use. Land use change has been significantly driven by the forest and sugarcane growth which has cumulatively occupied 644,924 ha of biodiversity rich ecosystems in the year 2015. Aquatic water systems are under threat from agricultural development and invasive fish species since wetlands are drained for the development or are negatively affected

[24] *EEA, 2013. State of Environment Report 2012/13: The Consequences of Inaction.*

[25] https://www.undp.org/eswatini/publications/third-state-environment-report-kingdom-eswatini

by changes within their catchment. Also, overexploitation of plant genetic resources from wetlands and terrestrial habitat poses a challenge to natural plant regeneration. These factors have resulted in the diminishing of resources and the reduction in the resilience of ecosystems.

To guide responses to biodiversity, Eswatini researchers and agencies have published some important documents that EA Practitioners and their sectoral experts should be aware of and familiar with the core strategies and policy statements and ambition and clearly integrate those policy statements or strategies into the EIA and CMPs[26].

Notable information sources include:

- the **National Biodiversity Strategic and Action Plan**[27] (2016) (which supports the improvement of the country's biodiversity by monitoring the reduction of threats and pressures, safeguarding ecosystems, encouraging sustainable utilization, and mainstreaming and integrating biodiversity into national plans and strategies to contribute to national development objectives),
- the Eswatini's **Fauna Red Lists**[28],
- the **Information on Eswatini's flora**[29],
- the **Customizing Other Effective Area-based Conservation Measures (OECM) Methodology to Eswatini Context** report of 2020[30] seeks to fulfil the CBD Aichi Target 11 to conserve 17% of terrestrial areas and 10% of marine areas through well-connected systems of protected areas and other effective area-based conservation measures. OECMs represent a significant step forward in the formal recognition of conservation beyond protected areas.
- the **Eswatini National Land Degradation Neutrality (LDN) Targets**[31] 2018 (which takes stock of anticipated losses through land degradation in Eswatini and aims to achieve a balance between ongoing land degradation and future efforts to improve degraded land by 2030. It aims at reaching, at least, a neutral status (no net loss of healthy and productive land) by balancing potential gains and losses in terms of ecosystem services and functions that are provided by land resources),
- the **Lubombo Integrated Landscape Management Plan (LILMP)**[32] for ecosystems conservation at the landscape for sustainable management and utilization of natural resources
- the **Ngwempisi Integrated Landscape Management Plan (NILMP)**[33] for ecosystems conservation at the landscape for sustainable management and utilization of natural resources
- the **Malolotja Integrated Landscape Management Plan (MILMP)**[34] for ecosystems conservation at the landscape for sustainable management and utilization of natural resources
- the **Flora Protection Act, 2000**[35],
- the **National Wetlands Policy**[36] (2020) (promotes the conservation and sustainable and wise use of wetlands. It provides a framework for actions to improve legal, institutional, and organizational arrangements),

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[26] *For example, the text should demonstrate how the NBSAP Target 15 (By 2022, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced in Swaziland, through conservation and restoration, including restoration of at least 15% of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification) has been recognised in the contribution to biodiversity by project activities.*

[27] *https://www.cbd.int/doc/world/sz/sz-nbsap-v2-en.pdf*

[28] *http://eswatininaturereserves.com/biodiversity/faunardb.asp*

[29] *http://eswatininaturereserves.com/biodiversity/sdflora.asp*

[30] *Customizing Other Effective Area-based Conservation Measures Methodology to Eswatini Context. Request copy from the ENTC*

[31] *https://www.unccd.int/sites/default/files/ldn_targets/2018-12/Eswatini.pdf*

[32] *Request copy from the ENTC*

[33] *Request copy from the ENTC*

[34] *Request copy from the ENTC*

[35] *http://eswatininaturereserves.com/documents/FloraProtectionAct2002.pdf*

[36] *Request copy from the ENTC*

- the [37] (2021) (ensures that wetland resources are managed and used sustainably; that their functions are valued, conserved, and restored to sustain biodiversity; and that they provide ecosystem services for present and future generations of Eswatini),
- the **Fresh Water Fisheries and Aquaculture Policy**[38] (2021) (to stimulate the development of fisheries and aquaculture to improve food security) and
- the **Fisheries and Aquaculture Act**[39] (2019) to achieve optimum utilization and ecologically sustainable development of fish stocks and aquaculture; protect and conserve fish stocks for both present and future generations and the need to utilize fisheries and aquaculture to achieve economic growth, human resource development, employment creation and a sound ecological balance.

Additional sources are presented in Annex 2.

As many projects subject to the EAAR Regulations are infrastructure projects, these key references assists the EA Practitioner to better understand the links between climate and biodiversity and how such links can be future-proofed to ensure that more resilient infrastructure are constructed (Future-proofing Infrastructure to Address the Climate, Biodiversity and Pollution Crises[40]).

# 4 The Challenges Ahead

## 4.1 Climate Change Realities

For all nations on this planet, the rapidly evolving climate and biodiversity loss crisis is creating major damage to livelihoods, economies and the biophysical environment.

The climate crisis, brought about from the continuous burning of fossil fuels since the industrial revolution from the 1850s, has increased the concentration of a range of gases in our atmosphere that has steadily increased the global average temperatures around the world (Figure 3).

Under the UNFCCC Paris Agreement, a legally binding international treaty on climate change wherein countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate neutral world by 2050, parties to the Convention agreed to limit warming to 1.5oC to avoid triggering tipping points in the planets delicate balance that will lead to catastrophic impacts. The world has made major efforts to reduce emissions of GHG but it has been totally inadequate and many scientists and research now believe we will reach 3oC of warming change by end of the century.

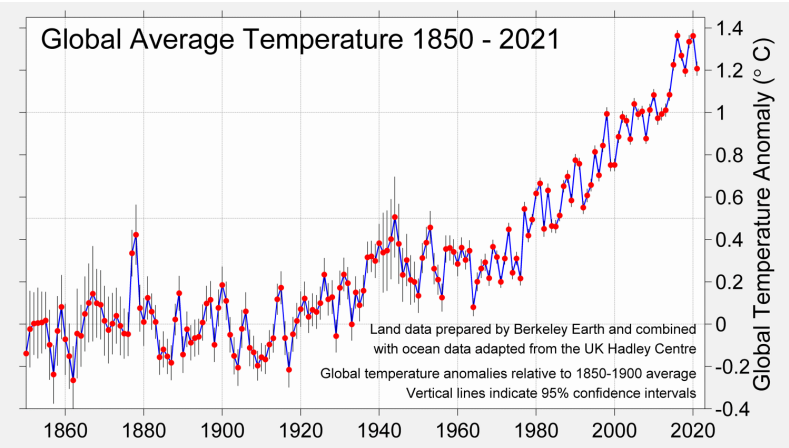



***Figure 3 - Global Average Temperature 1850-2021***

Because increased levels of CO2 and other long-lived greenhouse gases, i.e. methane (CH4), nitrous oxide (N2O) and some synthetic gases such as the chlorofluorocarbons (CFCs), persist in the atmosphere for decades to centuries, further warming is assured.

[37] *Request copy from the ENTC*

[38] *Request copy from the Fisheries Dept MOA*

[39] *Request copy from the Fisheries Dept MOA*

[40] https://wedocs.unep.org/bitstream/handle/20.500.11822/37563/GFB5.pdf

Scientists, researchers, and affected peoples around the world report changes beyond the natural variation of temperatures on land and in the ocean, as well as abnormal trends in the timing of seasons, in rainfall patterns, and in many other systems. The science on climate change is clear. There is no question that these abnormal changes result from global warming due to an increased greenhouse effect caused by the vast amounts of greenhouse gases added to the atmosphere by human activities.

In response to this, an international climate regime has developed. Governments, intergovernmental organisations, non-governmental organisations, businesses, research bodies, civil society and more are working together to build the science and knowledge that allow us to tackle the causes and threats of climate change.

***Figure 4 - The increasing rise of Atmospheric of CO2***

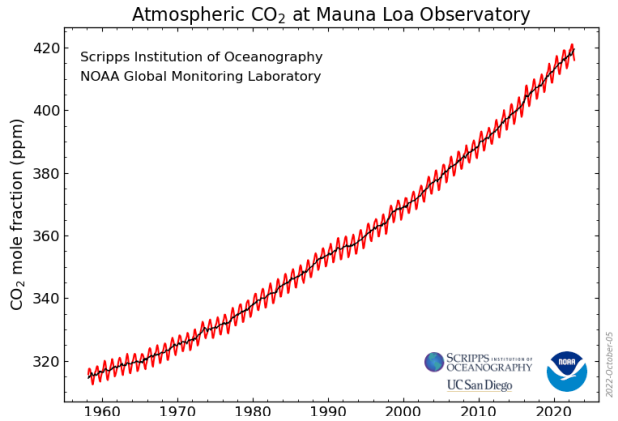
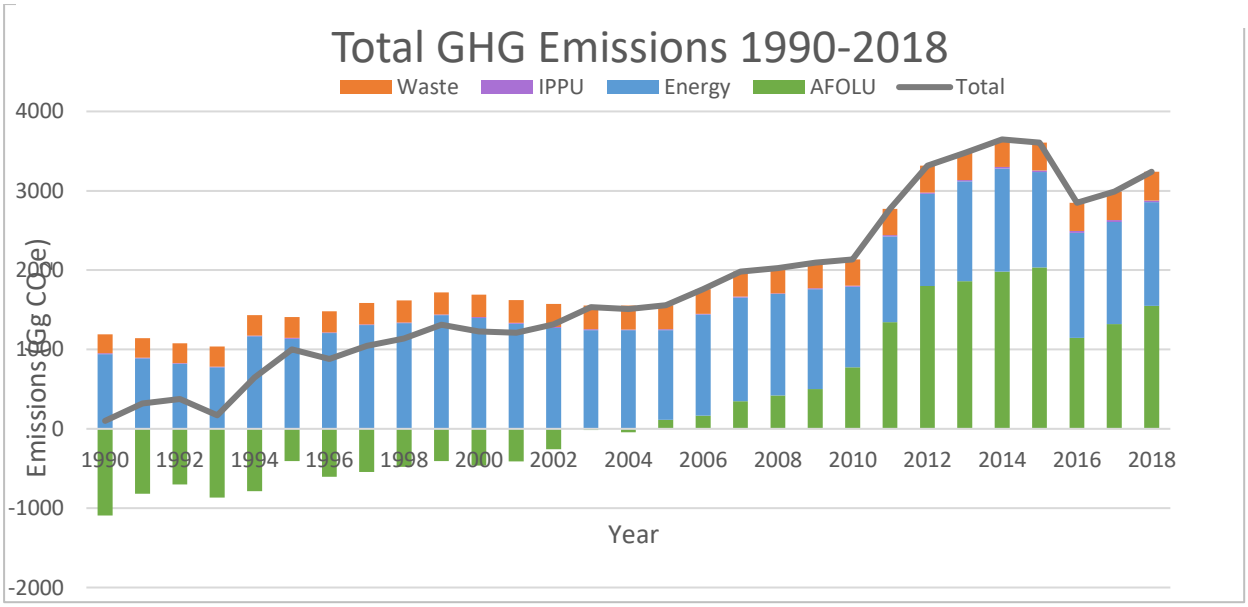
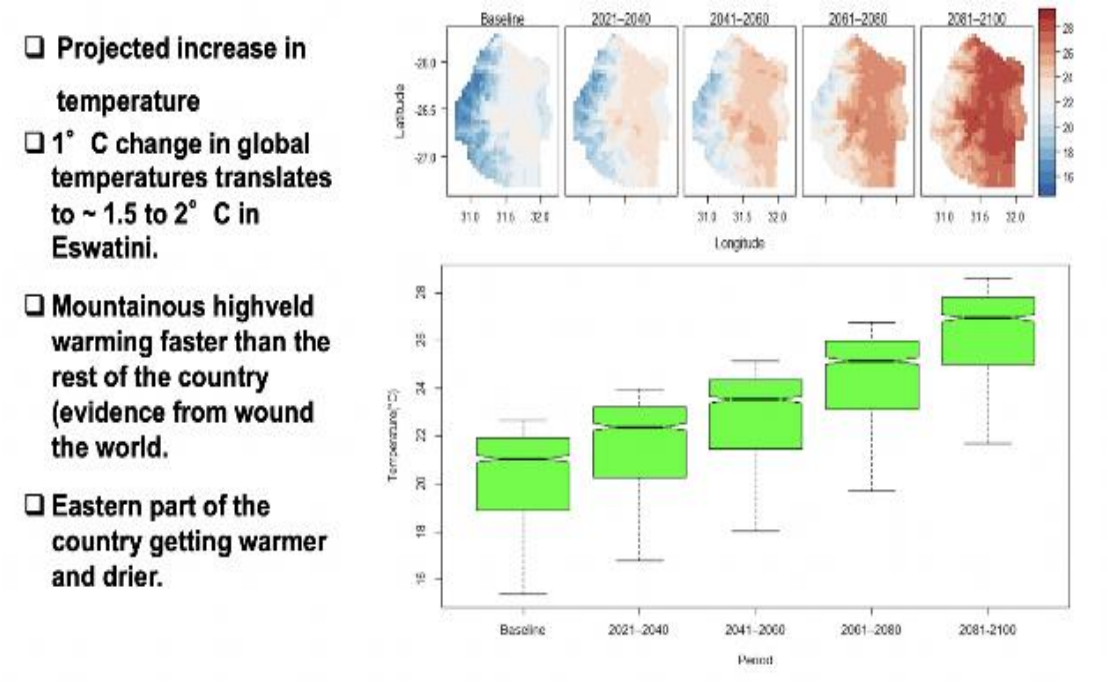



***Figure 5 - Eswatini's GHG Emissions totals from 1990 - 2018***




*Source: Eswatini National Inventory Report 1990 - 2018*

*Figure 6 - Projected increase in temperature average in Eswatini*




*Source: Eswatini Climate Change Risk Mapping, 2021*

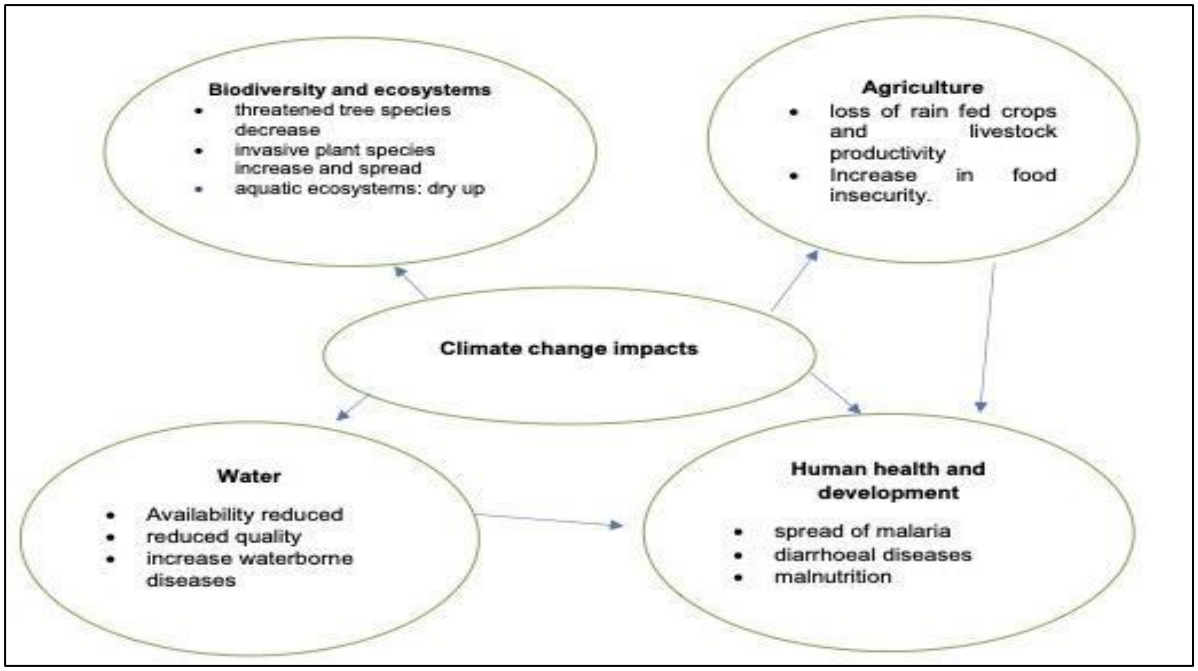
Climate change impacts may be defined as cross-cutting as they will be felt across all sectors of industry and society.

Agriculture, for example, the backbone of Eswatini's formal and informal economies, is highly susceptible to climate change through seasonal rainfall disruptions, floods and prolonged droughts or heatwaves.

***Table 1 - Climate hazards and their impacts in Eswatini***

| Most frequent | Most costly | Affects the most people | Causes the most fatalities | Causes the most injuries |
|---|---|---|---|---|
|  Fires |  Drought |  Drought |  Storms |  Storms |
|  Drought |  Storms |  Invasive animal and plant species |  Floods |  Fires |
|  Diseases/ epidemics |  Storms | |  Diseases/ epidemics |  Floods |

***Figure 7 - Cross-cutting climate change impacts in Eswatini***




*Source: The Third State of Environment Report for the Kingdom of Eswatini*

Human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Scientists are also observing changes across the whole of Earth's climate system - in the atmosphere, in the oceans, on ice sheets, and on land.

Many of these changes are unprecedented, and some of the shifts are in motion now, while some - such as continued sea level rise – are already 'irreversible' for centuries or even millennia, ahead.

But there is still time to limit climate change the IPCC experts say. Strong and sustained reductions in emissions of carbon dioxide (CO2) and other greenhouse gases could quickly make air quality better, reduce the thermal heating of the atmosphere and in 20 to 30 years global temperatures could stabilize.

The UN Secretary-General António Guterres said the IPCC Working Group 1 report on the physical science basis of the sixth assessment[41] was nothing less than "*.. a code red for humanity. The alarm bells are deafening, and the evidence is irrefutable: greenhouse-gas emissions from fossil-fuel burning and deforestation are choking our planet and putting billions of people at immediate risk. Global heating is affecting every region on Earth, with many of the changes becoming irreversible*".

He noted that the internationally-agreed threshold of 1.5°C above pre-industrial levels of global heating was "*perilously close*". We are at imminent risk of hitting 1.5°C in the near term. The only way to prevent exceeding this threshold, is by urgently stepping up our efforts, and pursuing the most ambitious path.

The UN Secretary-General in a detailed reaction to the report on the physical science basis of the sixth assessment, said that solutions were clear. "*Inclusive and green economies, prosperity, cleaner air and better health are possible for all, if we respond to this crisis with solidarity and courage*".

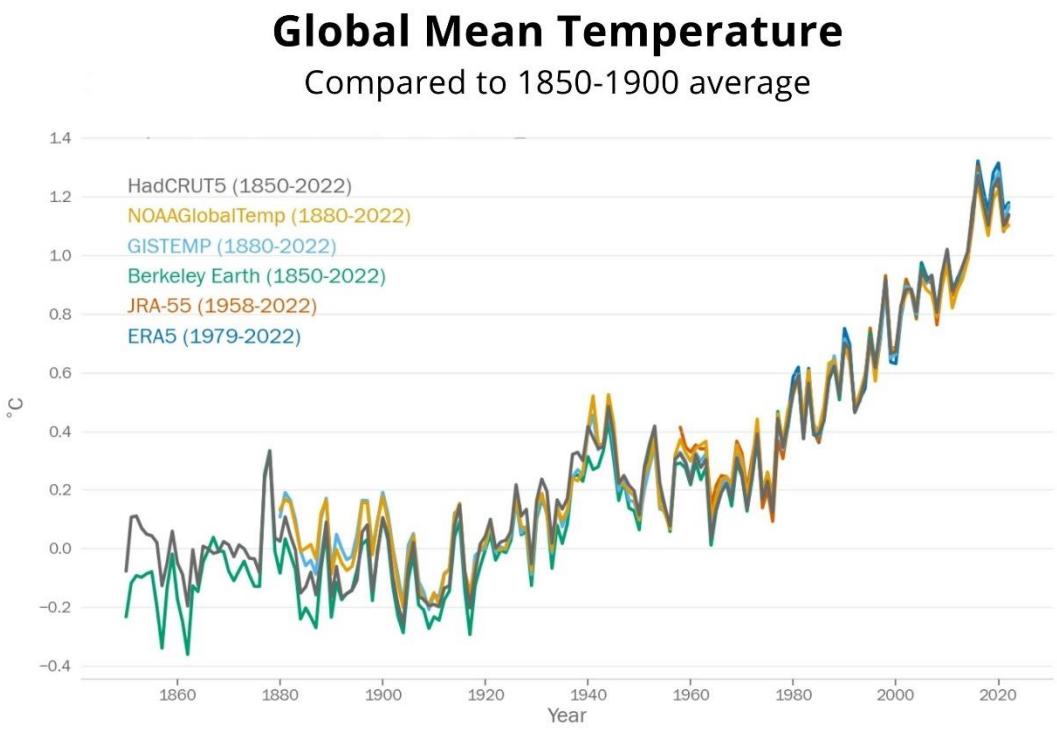
He added that all nations - especially the advanced G20 economies - needed to join the net zero emissions coalition, and reinforce their promises on slowing down and reversing global heating, *"with credible, concrete, and enhanced Nationally Determined Contributions (NDCs)*" that lay out detailed steps.

The report on the Physical Science Basis of the Sixth Assessment [42], prepared by 234 scientists from 66 countries, highlights that human influence has warmed the climate at a rate that is unprecedented in at least the last 2,000 years.

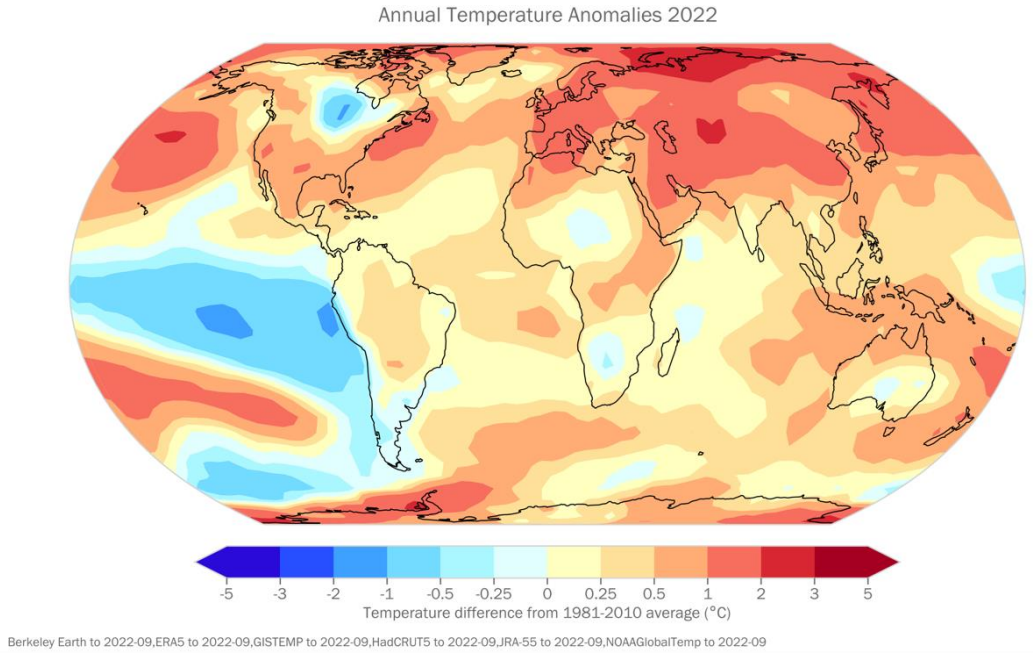
[41] https://www.ipcc.ch/report/ar6/wg1/

[42] https://www.ipcc.ch/assessment-report/ar6/

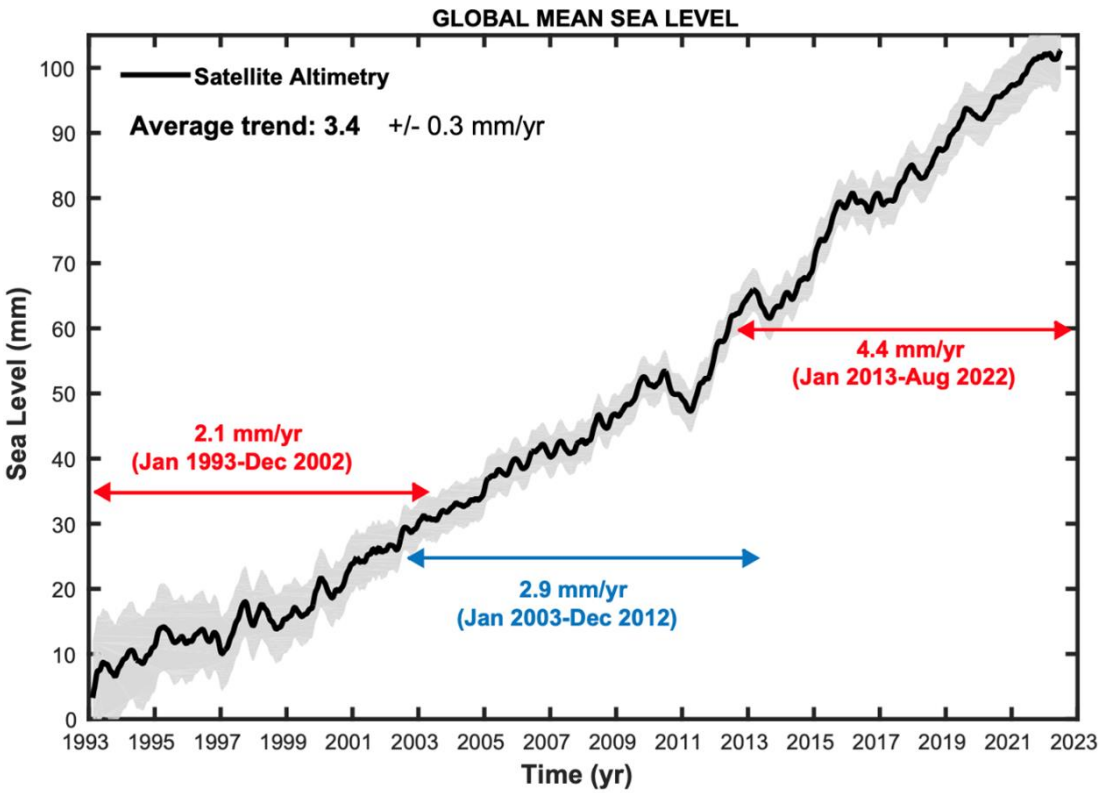
In 2022, atmospheric CO2 concentrations were higher than at any time in at least 2 million years, and concentrations of methane and nitrous oxide were higher than at any time in the last 800,000 years.




Global surface temperature has increased faster since 1970 than in any other 50-year period over a least the last 2,000 years. For example, temperatures during the most recent decade (2011–2020) exceed those of the most recent multi-century warm period, around 6,500 years ago, the report indicates.

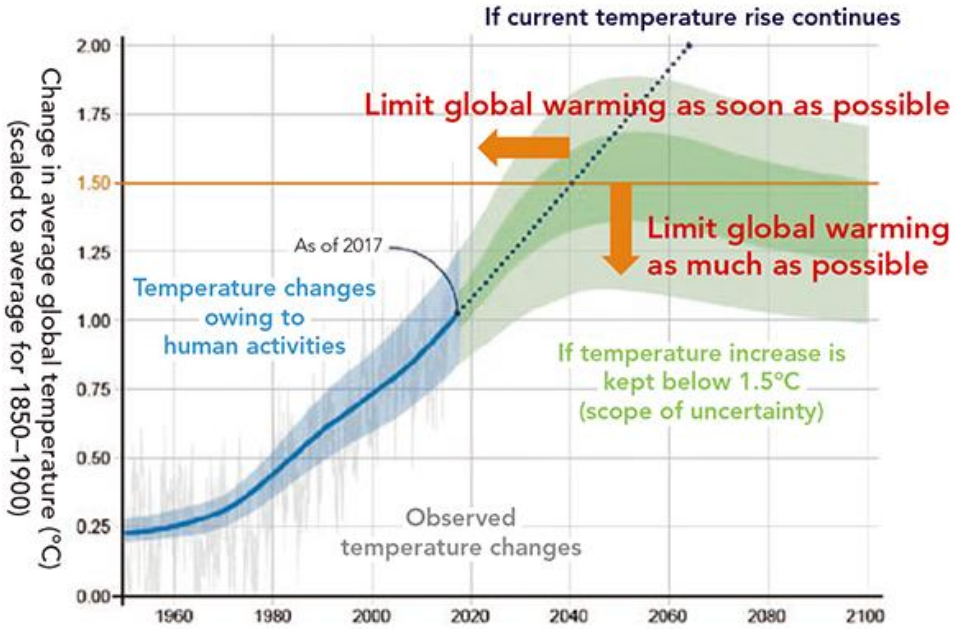



Meanwhile, global mean sea level has risen faster since 1900, than over any preceding century in at least the last 3,000 years. Global average sea level has risen 21–24 cms since 1880 and in 2021, global sea level set a new record high of 97 mm above 1993 levels.




The report on the physical science basis of the sixth assessment shows that emissions of greenhouse gases from human activities are responsible for approximately 1.1°C of warming between 1850-1900, and finds that averaged over the next 20 years, global temperature is expected to reach or exceed 1.5°C of warming.

The IPCC scientists warn that time is running out as global warming of 2°C will be exceeded during the 21st century. Unless rapid and deep reductions in CO2 and other greenhouse gas emissions occur in the coming decades, achieving the goals of the 2015 Paris Agreement "*will be beyond reach*".



Against this background and recognising the global climate change threats and biodiversity loss emergency, the EEA has called for recommendations on how it can use the existing EIA processes to strengthen the reporting on climate impacts of projects subject to the EAAR Regulations.

## 4.2 Biodiversity Realities

"*For too long, we have been waging a senseless and suicidal war on nature. The result is three interlinked environmental crises*", said the UN Secretary-General António Guterres when launching the UN Environment Programme (UNEP) report, Making Peace with Nature[43].

Human actions are rapidly transforming the planet, driving losses of nature at an unprecedented rate that negatively affects societies and economies, from accelerating climate change to increasing zoonotic pandemic risk[44]. Recognizing the accelerating severity of the environmental crisis, the global community committed to Sustainable Development Goals and the Paris Agreement on climate change in 2015. In 2022, the UN Convention on Biological Diversity (CBD) will adopt new targets for conserving, restoring and sustainably managing multiple dimensions of biodiversity, including nature's contributions to people (NCP)[45].

Collectively, these three policy frameworks will shape the sustainable development agenda for the next decade. All three depend heavily on safeguarding natural assets[46], the living components of our lands and waters. For instance, restoring and ending conversion and degradation of forests, wetlands and peatlands could sequester 9Gt $CO^2$ per year by 2050[47]. While ambitious new targets to protect species and ecosystems have been proposed, including 'half Earth' (conserving half the Earth's area for nature) and '30 by 30' (30% protected by 2030)[48], these targets have been criticized for insufficiently accounting for the needs of people, including many Indigenous and local communities[49]. It is therefore essential to demonstrate how nature conservation contributes to human wellbeing. Yet despite the urgency of safeguarding natural assets around the world, we still have limited understanding of the spatial extent of ecosystems providing essential benefits to humanity[50].

Pointing to climate disruption, biodiversity loss and pollution, which "*threaten our viability as a species*", UN Secretary-General António Guterres detailed their cause as "*unsustainable production and consumption*".

[43] https://www.unep.org/resources/making-peace-nature#:~:text=The%20first%20UNEP%20synthesis%20report,evidence%20from%20global%20environmental%20assessments

[44] *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2019).*

[45] *Diaz, S. et al. Assessing nature's contributions to people. Science 359, 270–272 (2018).*

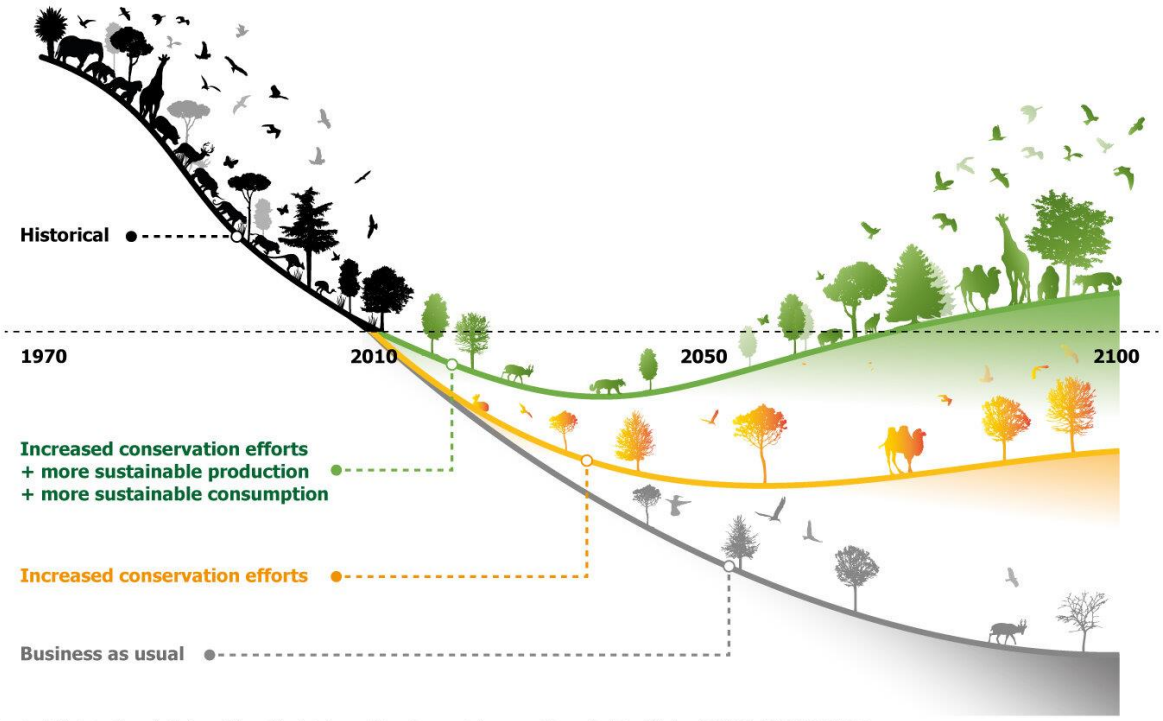
[46] *Hole, D. G. et al. Make nature's role visible to achieve the SDGs. Glob. Sustain. 5, e8 (2021).*

[47] *Roe, S. et al. Contribution of the land sector to a 1.5 °C world. Nat. Clim. Chang. 9, 817–828 (2019).*

[48] *Baillie, J. & Zhang, Y.-P. Space for nature. Science 361, 1051 (2018).*

[49] *Büscher, B. et al. Half-Earth or whole Earth? Radical ideas for conservation, and their implications. Oryx 51, 407–410 (2017).*

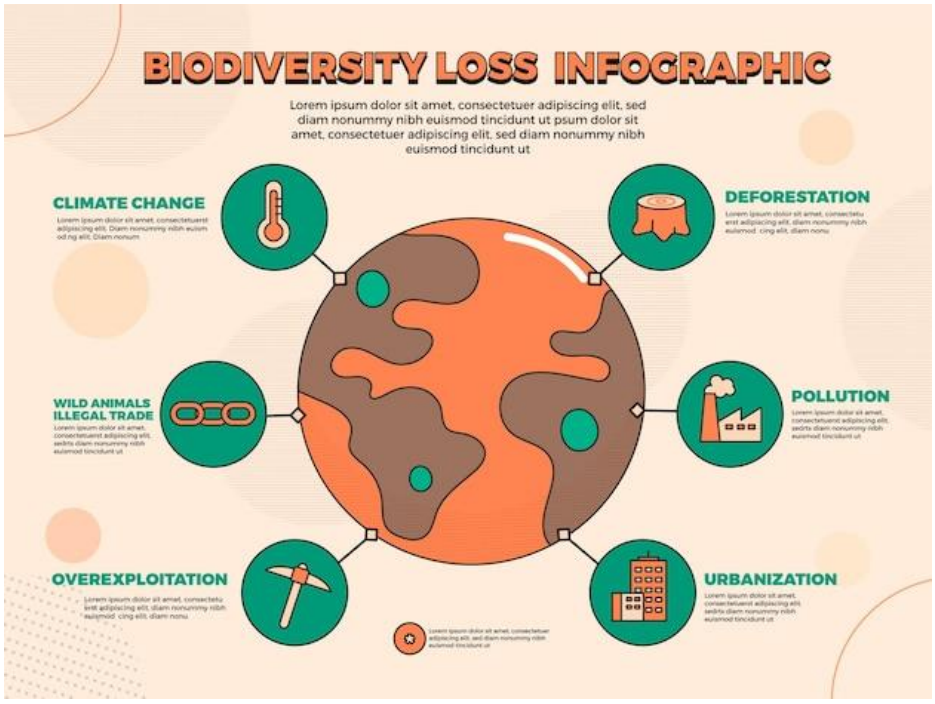
[50] *Schmidt-Traub, G. et al. Integrating climate, biodiversity, and sustainable land-use strategies: innovations from China. Natl Sci. Rev. https://doi.org/10.1093/nsr/nwaa139 (2020).*




This artwork illustrates the main findings of the article, but does not intend to accurately represent its results (https://doi.org/10.1038/s41586-020-2705-y)

It is well known that climate extremes such as droughts and heatwaves can have devastating impacts on ecosystems and, in turn, ecosystems that have a reduced capacity to protect humanity against the social and physical impacts of such events. Yet only a few such relationships have been probed in detail. Even less well known is whether biodiversity-depleted ecosystems will also have a negative effect on climate, provoking or exacerbating weather extremes.

Biodiversity loss is facing critical levels globally, with the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) reporting in 2019[51] that an average of around 25% of species in assessed animal and plant groups are threatened, suggesting that about 1 million species already face extinction, many within decades, unless action is taken to reduce the intensity of drivers of biodiversity loss.




[51] https://ipbes.net/global-assessment

According to the IPBES report, the world can tackle the climate, biodiversity and pollution crises together, but the UN chief said that these interlinked crises require "*urgent action from the whole of society*".

Noting that some two-thirds of global CO2 emissions are linked to households, he underscored that "people's choices matter".

Human economic growth is resulting in the overexploitation and degradation of the environment on land and sea. The atmosphere and the oceans have become dumping grounds for our waste and governments are still paying more to exploit nature than to protect it.

The report shows that the global economy has grown nearly fivefold in the past five decades but at massive cost to the environment.

Occurring over the same time, an increasing global population and its need to extract more and more resources and services from the environment, has led to a major loss in biodiversity across all ecosystems and all nations.

Assessments carried out by a large number of organisations including specialised United Nations agencies have concluded that the global rate of biodiversity loss is leading to a crisis in our biological resources.

The integration of more detailed analysis of the impacts of climate change and biodiversity into national EIA processes represents an important transition towards addressing critical national threats and challenges around the impact of climate and biodiversity change in the country as highlighted in the most recent State of Environment report.

Strengthening the resilience of future projects against the impacts of climate change will help ensure they remain sustainable and fit for a very uncertain future. Improving how a project interacts with the natural environment through often small changes to project design that respects the value of nature and biodiversity will help protect the remaining habitats and ecosystem functions that can have significant positive impacts for communities living within or around a project development.

In December 2022, the world gathered in Montreal for the COP15 of the UNCBD where the Post-2020 Kunming-Montreal Global Biodiversity Framework (GBF) was formally adopted. The 10-year strategy seeks to engage the entire world in the task of protecting nature and building a future of life in harmony with nature[52]. This strategy is intended to guide whole-of-society and whole-of-government work to protect and restore biodiversity in an ambitious and effective way. The overall aim of the global framework is to halt and reverse biodiversity loss by 2030.

Nature is critical to meeting the Sustainable Development Goals and limiting global warming to 1.5 degrees[53]. Adoption of a bold global biodiversity framework that addresses the key drivers of nature loss is needed to secure our own health and well-being alongside that of the planet. The vision is that by 2050, biodiversity will be valued, restored and conserved. Prospects of success look grim, however – a point emphasised in the WWF's Living Planet report 2022[54]. It highlighted some of the starkest effects humans have had on life on Earth. One million of the world's estimated 8 million species of plants and animals are threatened with extinction, and many of the ecosystem services essential for human wellbeing are eroding.

The GBF[55] proposes four goals to be achieved, by 2050, so that humanity will be "*living in harmony with nature*" - a vision adopted by CBD's 196 member Parties in 2010. The framework has 21 associated "action targets" for 2030, which help achieve the main goals: reducing threats to biodiversity, meeting people's needs through sustainable use and benefit-sharing, and tools and solutions for implementation and mainstreaming.

These 23 targets call for, among other things:

- Effective management of land- and sea-use change, loss of highly important biodiverse areas close to zero by 2030
- Effective restoration of 30% of degraded ecosystems by 2030
- Effective conservation and management of 30% of land and 30% of oceans by 2030
- Halt human-induced extinctions and maintain and restore genetic diversity

[52] https://www.cbd.int/article/cop15-cbd-press-release-final-19dec2022

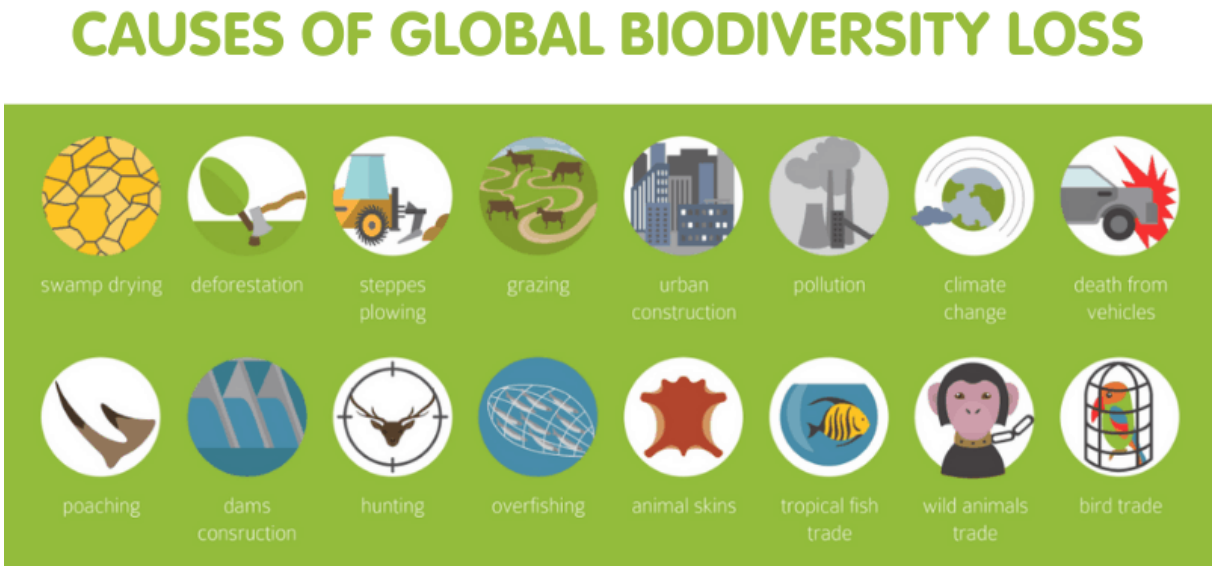
[53] https://www.unep.org/resources/making-peace-nature

[54] https://www.cbd.int/doc/c/e6d3/cd1d/daf663719a03902a9b116c34/cop-15-l-25-en.pdf

[55] https://www.cbd.int/conferences/2021-2022

- Sustainable use, harvesting and trade of wild species
- Mitigate or eliminate the impacts of invasive alien species, reduce the rates of establishment of invasive species by 50% by 2030
- Reduce pollution risks and impacts from all sources by 2030, reduce the overall risk from pesticides by half
- Minimise the impacts of climate change and ocean acidification on biodiversity
- Ensure sustainable use and management of wild species, while protecting customary use by Indigenous peoples
- Sustainable management of areas under agriculture, aquaculture, fisheries and forestry
- Restore and enhance ecosystem function through nature-based solutions and ecosystem-based approaches
- Increase the area and quality of urban green and blue spaces
- Fair and equitable sharing of the benefits arising from the use of genetic resources
- Integration of biodiversity into policies and development across all sectors
- Enable businesses to monitor, assess and disclose their impacts on biodiversity
- Encourage sustainable consumption, including by reducing food waste by half by 2030
- Strengthen capacity for biosafety measures and ensure benefits-sharing from biotechnology
- Phase out or reform harmful subsidies in a just way, reducing them by $500bn by 2030
- Substantially increase financial resources, mobilise $200bn per year by 2030 from all sources, including $30bn from developed to developing countries
- Strengthen capacity-building and technology transfer
- Integrated and participatory management, including the use of traditional knowledge
- Equitable representation and participation of Indigenous peoples and local communities
- Ensure gender equality in the implementation of the framework

Obviously Eswatini is not immune from the global biodiversity crisis and has itself begun to feel the impacts from the unsustainable utilisation, extraction and destruction of our own ecosystems to facilitate socio-economic development. To this end, Eswatini has taken its global responsibilities seriously by constantly promoting improved stewardship of our natural resources and through the implementation of the NBSAP[56] that is implemented through, for example, the application of the EAAR Regulations. The country must be more focused on avoiding many destructive impacts associated with a wide range of project activities. However, the rapid pace at which the climate is changing is resulting in intended or planned actions (described in a comprehensive mitigation plan with every EA report) being drowned out by the rapid changes taking place to our climate and ever increasing losses to our biodiversity and natural heritage.




[56] https://www.cbd.int/doc/world/sz/sz-nbsap-v2-en.pdf

Healthy biodiversity is essential to supporting all forms of life on Earth, including human life. We are dependent on healthy ecosystems for the goods and services they provide, as well as for nature-based solutions to many of the most critical environmental, economic and social challenges that we face as human society, including climate change, sustainable development, health, and water and food security.

A collapse in ecosystem services, such as pollination, could result in a $2.7-trillion decline in global GDP by 2030. This collapse will affect all countries, with impacts most pronounced in developing countries, least developed countries and small island developing states.

Despite its importance, biodiversity continues to be lost at an alarming rate.

While natural ecosystems play an important role in regulating climate and can help to sequester and store carbon, the loss of forests, the draining of wetlands and other environmental degradation has contributed significantly to climate change. According to the agency, efforts to reduce deforestation and forest degradation and restore ecosystems, for example, could contribute to lowering annual greenhouse gas emissions.

The recent assessment reports by the IPCC and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) have highlighted the risks to humanity arising from the unsustainable use of natural resources. Thus far, land, freshwater, and ocean exploitation have been the chief causes of biodiversity loss.

Climate change is projected to be a rapidly increasing additional driver for biodiversity loss. Since climate change and biodiversity loss impact human societies everywhere, bold solutions are required that integrate environmental and societal objectives.

## 4.3 Biodiversity loss and the EA process

Most projects subject to the EAAR Regulations have overlooked climate change impacts on biodiversity and it is expected that EA Practitioners identify the project links between biodiversity impacts and longer term climate change impacts and seek, where possible, to strengthen mitigation measures to allow for deeper resilience building interventions that protect biodiversity and ecosystem services.

EA Practitioners need to assess, for example, what impacts arising from climate change, eg increasing heat or extreme weather events, are more likely and develop mitigations strategies to provide additional protection of biodiversity or look at ways biodiversity can be enhanced by the project subject to the EAAR Regulations eg from relocating more species, extensive (though strategic) planting of tree species that during extreme weather events provides additional protection to infrastructure or contributes to avoiding damage from excessive weather events to the project.

Eswatini's own biodiversity is at present greatly endangered, with National Red List assessments indicating that the larger mammals that once roamed the grasslands and savannas are now confined to protected areas. These larger mammals are not the only species facing threats; 89 species of vertebrates and 305 species of plants are listed in national Red Data Lists[57]. Land transformation for agriculture, urbanisation, alien plant invasion, bush encroachment, pollution, over-harvesting, livestock mismanagement and soil erosion are some of the threats faced by Swaziland's flora and fauna. The ambition of a detailed assessment of biodiversity impacts during an EA process is to counteract the threats and ameliorate their impacts and ensure proper management of the country's biodiversity, ecosystems and habitats.

# 5 The Environmental Audit, Assessment and Review (EAAR) Regulations 2022

In light of the scientific and observational evidence of local climate change impacts on the country and its ever increasing threat to future development as well as the continued loss of biodiversity, it is imperative that an assessment of the significance of climate change impacts and stronger assessments of biodiversity impacts be made more explicit for projects that are affected by the EAAR Regulations to ensure that climate impacts and biodiversity impacts are adequately assessed and mitigation measures implemented that meet national ambition as described in the NBSAP and the NDC (amongst other sectoral policies, strategies and action plans).

This will ensure that projects are better designed and conceptualised to be climate proofed and biodiversity supportive and can proceed with minimal negative environmental impacts. This will also have the added advantage of ensuring that project developers and financiers are made aware of the climate and biodiversity

[57] http://eswatininaturereserves.com/biodiversity/faunardb.asp

risks so that can adjust their resilience choices through some proactive interventions such as including energy efficiency improvements (thereby reducing GHG emissions associated with that energy) or water management (thereby reducing demand on natural systems to supply water) within their operations or by managing available biological resources on the project affected site or plant additional plants and trees that in turn provide habitat, ambient cooling and storage of carbon.

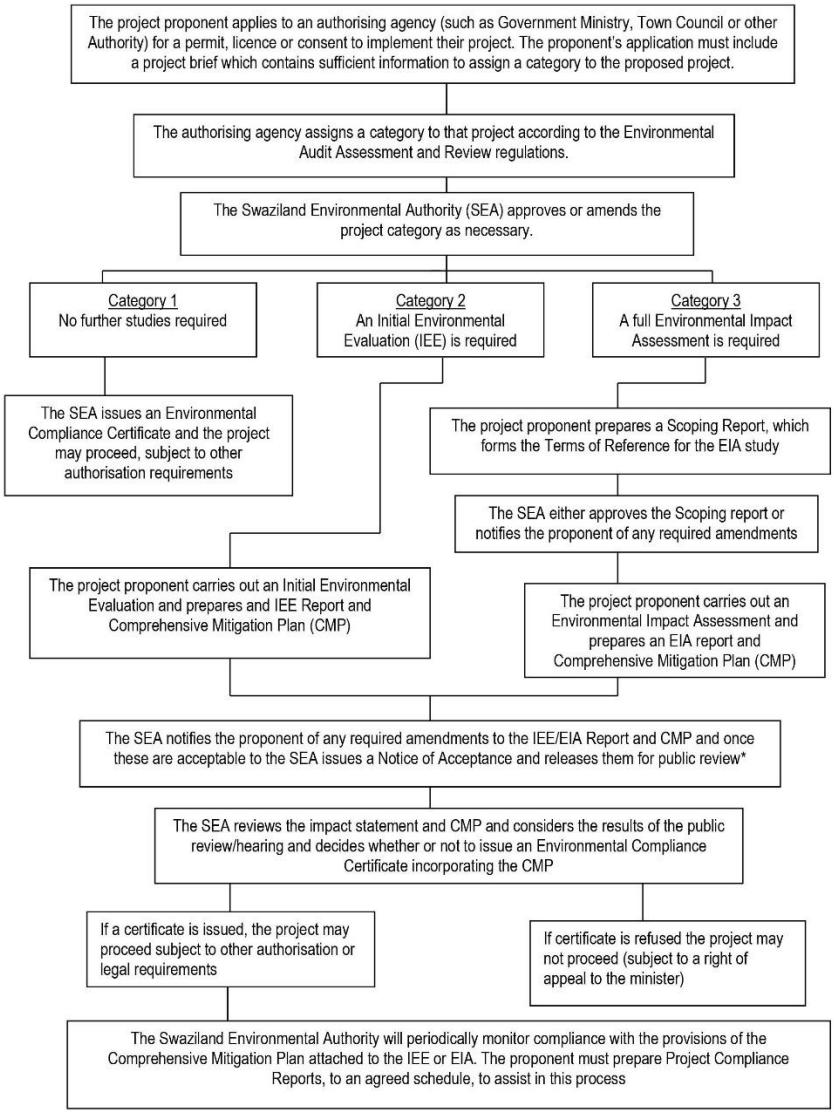
The EEA are responsible for the implementation of the EAAR Regulations whose purpose is to provide objective evidence to decision-makers during the development of a project, to ensure that the impacts of the project are understood and either mitigated or accepted as a part of wider planning and consenting process. Since first gazetting the regulations in 1996, environmental assessments have been legally required for a range of project types based on an assumed level or significance of environmental impact from such project types. These assessments were expected to assess the various natural and manmade forces on the project environment and by the project on its immediate affected environment.

Environmental impact assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse. The effective participation of relevant stakeholders, including local communities, is a precondition for a successful informed EIA. Although legislation and practice vary around the world, the fundamental components of an EIA in Eswatini involve the following stages:

a) Screening to determine which projects or developments require a full or partial impact assessment study;
b) Scoping to identify which potential impacts are relevant to assess (based on legislative requirements, international conventions, expert knowledge and public involvement), to identify alternative solutions that avoid, mitigate or compensate adverse impacts on biodiversity (including the option of not proceeding with the development, finding alternative designs or sites which avoid the impacts, incorporating safeguards in the design of the project, or providing compensation for adverse impacts), and finally to derive terms of reference for the impact assessment;
c) Assessment and evaluation of impacts and development of alternatives, to predict and identify the likely environmental impacts of a proposed project or development, including the detailed elaboration of alternatives;
d) Reporting: the EIA or Initial Environmental Evaluation (IEE) report, including a Comprehensive Mitigation Plan (CMP), and a non-technical summary for the general audience;
e) Review of the environmental impact statement, based on the terms of reference (scoping) and public (including authority) participation;
f) Decision-making on whether to approve the project or not, and under what conditions; and
g) Monitoring, compliance, enforcement and environmental auditing. Monitor whether the predicted impacts and proposed mitigation measures occur as defined in the EMP. Verify the compliance of the proponent with the EMP, to ensure that unpredicted impacts or failed mitigation measures are identified and addressed in a timely fashion.

The EIA process in Eswatini is better presented in the following figure[58].

[58] *Since this figure was produced, the country name changed to Eswatini from Swaziland and the Swaziland Environment Authority changed to the Eswatini Environment Authority*




The EAAR Regulations are under the administration of the Eswatini Environment Authority (EEA) and requires that the proponent of any project to be carried out in Eswatini undertake a systematic impact examination to determine whether or not the activity will have any adverse impacts on the environment and prepare a mitigation plan to manage the resulting identified impacts.

A study on the quality of EIAs carried out by Cele (2021)[59] concluded that the quality of EIAs and IEEs in Eswatini is generally poor, despite slight variations in quality within different sections of the environmental reports. Specifically, descriptive tasks, such as communication of results and description of development, were better than the description of alternatives and mitigation measures, and identification and evaluation of key impacts, both of which require the application of analytical approaches.

Within this national process of assessment, there is scope to strengthen the two critical aspects of modern EIAs by integrating within the EIA process stronger assessments of the biodiversity and climate change impact of a project.

Climate impact assessments of a projects' impact on increasing the greenhouse gas emissions (GHG) released into the atmosphere either directly (eg through fossil fuel burning) or indirectly by, for example, using fossil fuel derived energy that was released or used in the manufacturing of the physical components of buildings and infrastructure, ie the steel and bricks used for a building. The ever-increasing construction of buildings in urban areas is increasing the heat island effect the project could have by raising temperatures locally leading to harmful

[59] *Emmanuel Nkosinathi Cele, 2021. Quality of environmental impact statements (EISs) in Eswatini: a retrospective analysis of 1996 – 2020 submissions and recommendations for improvement*

health impacts as well as heat impacts on biodiversity. Biodiverse vegetated habitats provide essential regulating ecosystem services, such as temperature moderation and disturbance prevention, through shading, evapotranspiration, soil infiltration and carbon sequestration.

Eswatini has published national policies and strategies on biodiversity management and climate change responses that all EA Practitioners are expected to understand and integrate within their regular activities in terms of project planning and EIA execution.

Through the guidance by this toolkit, a methodology of how best, given our local context, it will be possible to address in more detail and with a broader understanding of all the interactions a project will or may have on the environment, biodiversity and climate change, is presented.

# 6 Literature Review

In preparing this Toolkit, the EEA identified and reviewed a wide range of literature that seeks to address the integration of climate change and biodiversity conservation within and across an EIA process.

Some of the key literature identified is presented below and helps frame how some countries have tackled this process to help ensure climate and biodiversity are more adequately dealt with and recognised in how projects are designed, constructed and operated.

ALL EA Practitioners are expected to become familiar with these various methodologies and using professional judgement, utilise useful aspects in their assessment approaches.

## 6.1 Addressing climate change through environmental impact assessment: international perspectives from a survey of IAIA members

A study conducted by the International Association for Impact Assessment (IAIA) in 2011[60] on addressing climate change through environmental impact assessment found that that regulations and guidelines focused on climate change were important for every phase of the EIA process and the best way for EIA to address climate change is

[60] *Vong Sok , Bryan J. Boruff & Angus Morrison-Saunders (2011) Addressing climate change through environmental impact assessment: international perspectives from a survey of IAIA members, Impact Assessment and Project Appraisal, 29:4, 317-325, DOI: 10.3152/146155111X12959673796001*

**Box 3. Key approaches for addressing climate change using regulations and guidelines specific to each phase of the EIA system**

**Screening**

- regulations prescribing screening lists to address climate change (whether environment-centred, development-centred, or a combination of both approaches)

**Scoping**

- regulation requiring that climate change is addressed in all aspects of assessed projects
- guidelines identifying climate change issues which should be considered at the scoping stage

**EIS**

- guidelines identifying specific climate change content, methods for prediction and evaluation and climate change adaptation and mitigation measures, including commitments to follow-up reporting and verification on each of these

**Public Engagement**

- guidelines identifying and directing the involvement of local and expert stakeholders
- guidelines identifying climate change issues which should be discussed with stakeholders
- regulations requiring independent climate change experts to peer-review the content of EISs prior to the approval stage
- regulations requiring monitoring and follow-up by independent third parties

**Evaluation and Approval**

- regulations specifying approval criteria and conditions
- guidelines for evaluation and approval to benefit all stakeholders (public, proponent, regulators)

**Implementation and Follow-up**

- regulations for monitoring and auditing the compliance of climate change mitigation and adaptation measures
- regulations for enforcement of climate change mitigation and adaptation measures
- guidelines or other mechanisms that will enhance monitoring and enforcement of climate change mitigation and adaptation measures

to have regulations that initially trigger EIA operations and provide a clear basis for enforcement, supported by the development of guidelines for the scoping, EIA preparation and public participation stages.

In the figure (Box 3 left) taken from the IAIA study, international EA Practitioners called for specific guidelines and regulations which could be implemented in each phase of the EIA process.

## 6.2 Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation

In a 2020 report published by the Institute of Environmental Management & Assessment entitled "**Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation**"[61], the authors argue that climate change effects are predicted to become more apparent over the coming decades therefore from the earliest stages of design the EIA should focus its attention on:

- The potential in-combination effects of both the project and future climate change on the receiving environment with a focus on locational and operational impacts;
- The resilience of design features, construction materials and planned operational processes to the predicted consequences of climate change; and
- Any specific risks related to decommissioning, where relevant.

They suggest that during scoping, climate change mitigation and adaptation issues and opportunities should be considered alongside each other to maximise integration in project design and when considering the scope of adaptation issues, consider how changes from a range of climate scenarios (e.g. National GHG Inventory) could influence the receiving environment or pose risk to the development.

Where an EIA identifies that the likely consequences of climate change pose significant risk to a project's ability to effectively function in the future, the assessment should aim to ensure the costs of not adapting are properly considered in the design process.

## 6.3 Incorporating climate change impacts and adaptation in environmental impact assessments: Opportunities and challenges

In a technical paper published in 2012 in the journal Climate and Development entitled "**Incorporating climate change impacts and adaptation in environmental impact assessments: Opportunities and challenges**"[62], the authors argue that adaptation within existing EIA modalities for project design, approval and implementation offers the most convenient route by which to integrate climate change into the EIA process. The analysis identified potential entry points for employing EIA as a vehicle for enhancing the resilience of projects to climate change impacts. It also documented progress in this direction by developed and developing countries. Several governments have signalled their intent to move in this direction; this assessment could find examples in only two countries of projects that considered climate change impacts and adaptation in EIA. A key bottleneck identified was a lack of availability of detailed historical and future climate information. While innovative approaches are tested in various jurisdictions to incorporate climate change impacts and adaptation within EIA,

[61] https://www.iema.net/download-document/237186

[62] *Shardul Agrawala , Arnoldo Matus Kramer , Guillaume Prudent-Richard, Marcus Sainsbury & Victoria Schreitter (2012) Incorporating climate change impacts and adaptation in environmental impact assessments: Opportunities and challenges, Climate and Development, 4:1, 26-39, DOI: 10.1080/17565529.2011.628791*

it is important that they retain flexibility. There is also a need to invest in the provision of climate change information, and to improve communication between the scientific community and EA Practitioners.

## 6.4 Impact assessment: Voluntary guidelines on biodiversity-inclusive impact assessment

Under the CBD, the Secretariat published voluntary guidelines on integrating biodiversity issues into EIAs in their Decision VIII/28 - Impact assessment: Voluntary guidelines on biodiversity-inclusive impact assessment[63].

The guidelines urges Parties, other Governments and relevant organizations to apply the voluntary guidelines on biodiversity-inclusive environmental impact assessment as appropriate in the context of their implementation of paragraph 1 (a) of Article 14 of the Convention and of target 5.1 of the provisional framework of goals and targets for assessing progress towards 2010 and to share their experience, inter alia, through the clearing-house mechanism and national reporting.

The guidelines focus on how to promote and facilitate a biodiversity-inclusive EIA process. They do not provide a technical manual on how to conduct a biodiversity-inclusive assessment study. Screening and scoping are considered critical stages in the EIA process and consequently receive particular attention. During scoping relevant impacts are identified resulting in the terms of reference for the actual impact study. The scoping stage is considered critical in the process as it defines the issues to be studied and it provides the reference information on which the review of the study results will be based. Scoping and review usually are linked to some form of public information, consultation or participation. During scoping promising alternatives can be identified that may significantly reduce or entirely prevent adverse impacts on biodiversity.

## 6.5 Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment

In 2013 the European Union published guidelines on how to integrate both climate change and biodiversity into EIAs process through the publication "Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment"[64]. The guidance aims to help Member States improve the way in which climate change and biodiversity are integrated in EIAs carried out across the European Union. Practical guidance on the links between climate change and specific sectors, including the identification of potential impacts and vulnerability aspects, and possible adaptation and mitigation responses to climate-related challenges including:

- Introduction and Key Concepts
- Agriculture and Rural Development
- Ecosystems and Biodiversity Management
- Education
- Energy
- Health
- Infrastructure and transport
- Solid Waste Management
- Trade & Investment
- Water and Sanitation

The guidance recommends that:

- Build them into the assessment process at an early stage (screening and scoping)
- Tailor how you incorporate biodiversity and climate change to the specific context of the project
- Bring together all the relevant stakeholders who need to be part of biodiversity/ecosystems-related and climate change-related decision-making
- Understand how both climate change and biodiversity interact with other issues to be assessed in the EIA, as well as with each other
- Consider the impact that predicted changes in climate and biodiversity will have on the proposed project, potentially over a long timescale, and the project's resilience and capacity to cope.

[63] *COP 8 Decision VIII/28. Impact assessment: Voluntary guidelines on biodiversity-inclusive impact assessment* https://www.cbd.int/doc/decisions/cop-08/cop-08-dec-28-en.pdf

[64] http://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf

- Consider long-term trends, with and without the proposed project, and avoid 'snapshot' analyses
- Consider the complex nature of climate change and biodiversity and the potential of projects to cause cumulative effects
- Consider climate change scenarios at the outset
- Analyse the evolving environmental baseline trends
- Take an integrated approach to planning and assessment, investigating relevant thresholds and limits.
- Seek to avoid biodiversity and climate change effects from the start, before considering mitigation or compensation. For biodiversity, EIA should focus on ensuring 'no-net-loss'.
- Assess alternatives that make a difference in terms of climate change and biodiversity.
- Use ecosystem-based approaches and green infrastructure as part of project design and/or mitigation measures.
- Assess climate change and biodiversity synergies and cumulative effects, which can be significant.

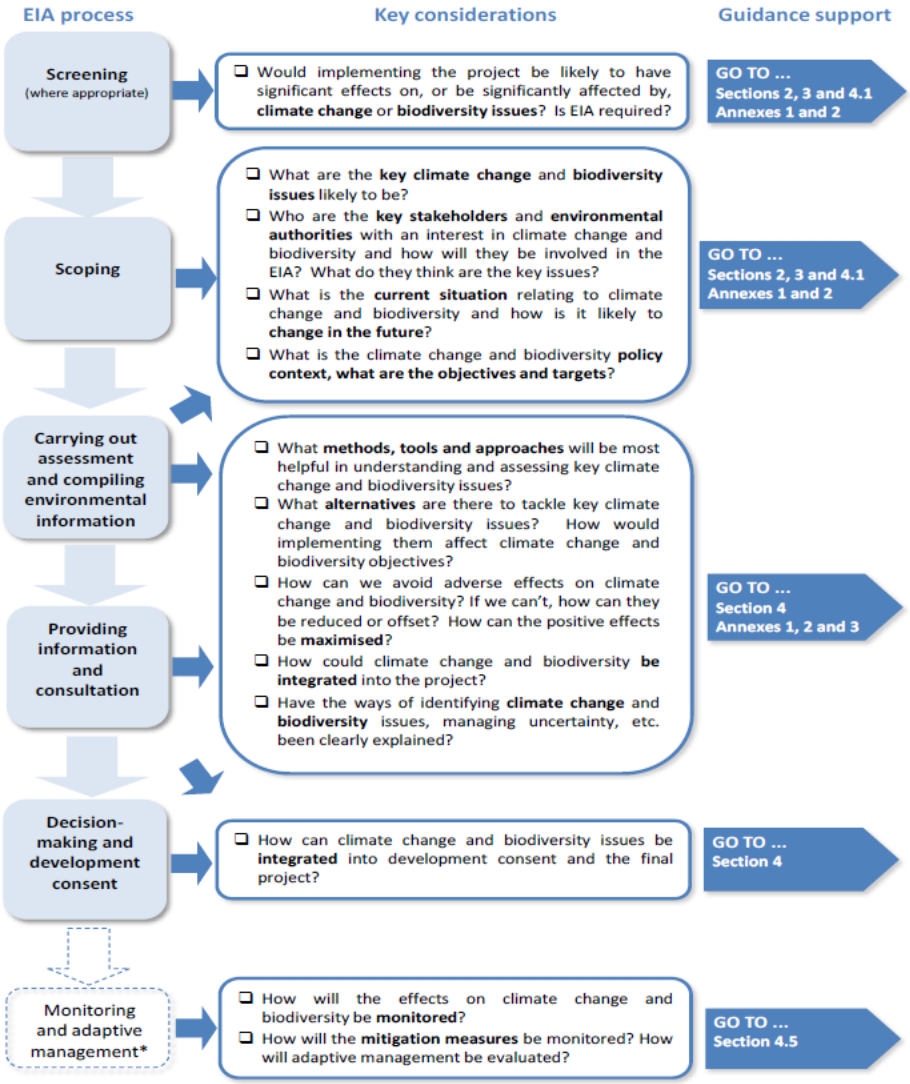



***Figure 8 - Overview of how to integrate climate change and biodiversity issues into key EIA stages***

The types of quantitative datasets relevant to climate change and biodiversity include:

- species distribution;
- trend data, e.g. loss of species/habitats;

- protection status: e.g. protection-worthy area[65], national designations[66];
- GHG emission inventories, etc.;
- climate projections: IPCC, etc.;
- future climate and socio-economic scenarios.

These datasets may already exist in different forms, spatial extent and scale required.

## 6.6 Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies

In a 1998 publication by UNEP entitled "Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies"[67] the authors introduced a wide range of methods that could be used to design an EIA study of climate change and biodiversity impacts. The handbook unpacked such methods for a range of sectors, eg Human Health, Energy, Forests, Biodiversity, Water Resources, Agriculture, and Rangeland and Livestock. Each sector chapter begins with a brief introduction that defines and describes the scope of the problem. The likely or known climate change impacts in the sectors are briefly described. Against this background an array of the various methods is presented.

## 6.7 Integration of Biodiversity into National Environmental Assessment Procedures – South Africa

In a 2001 publication by the United Nations Environment Programme (UNEP) of case studies, integrating biodiversity in EIA procedures was carried out for South Africa. The "Integration of Biodiversity into National Environmental Assessment Procedures – South Africa" publication examined the threats and development pressures on biodiversity in South Africa against its national biodiversity policy and strategy framework. The case study identified entry points for examination of biodiversity impacts during screening, scoping and impact assessment phases.

EIAs include assessments of impacts on biodiversity, mainly indirectly by way of impacts on particular species or habitats, particularly when proposed activities could affect unspoiled natural areas or widely recognised sensitive areas (eg coastal zone, wetlands or freshwater systems).

A lack of understanding of biodiversity issues by EA Practitioners on the one hand, and decision-makers on the other, hampers the effectiveness of integrating biodiversity considerations in EA in South Africa. Developers often regard biodiversity as academic and esoteric, not as something real or pertinent, and there is resistance to funding related studies as part of EA.

Biodiversity considerations tend to be triggered when proposed actions could affect unspoiled natural areas, wetlands and/or watercourses, but are frequently ignored in modified agricultural and/or urban environments.

Biodiversity EAs are conducted in the absence of national and provincial biodiversity conservation plans or strategies, so it is difficult to "red flag" potential impacts.

Data on biodiversity are often insufficient to "red flag" cases consistently and reliably, and there are large differences between the availability and management of databases in the different provinces. Available biodiversity information is in many instances substandard (the Red Data Book for plants is outdated, for example, and there is little information on threatened habitats), scattered and difficult to access.

Environmental groups often express concerns that EA Practitioners and/or authorities don't adequately address issues raised by them.

Scoping often focuses on the particular development site, rather than taking a more holistic perspective in the context of a wider area.

The need to identify specific issues during scoping can result in a failure to integrate specialist studies, a prerequisite for addressing such issues as biodiversity which cross disciplinary boundaries.

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[65] *A Preliminary Field Assessment Of Protection Worthy Areas Of Swaziland, Final Report", prepared By: K.G.Roques, June 2002, and "A Field Assessment Of Priority Protection Worthy Areas Of Swaziland, Makhonjwa, Manzimnyame, Sibebe And Nyonyane" compiled by K. Roques, L. Dobson, A. Monadjem, S. Dlamini, R. Boycott, T. Mahlaba and D. Raw, July 2003*

[66] http://eswatininaturereserves.com/nature_reserves/index.php

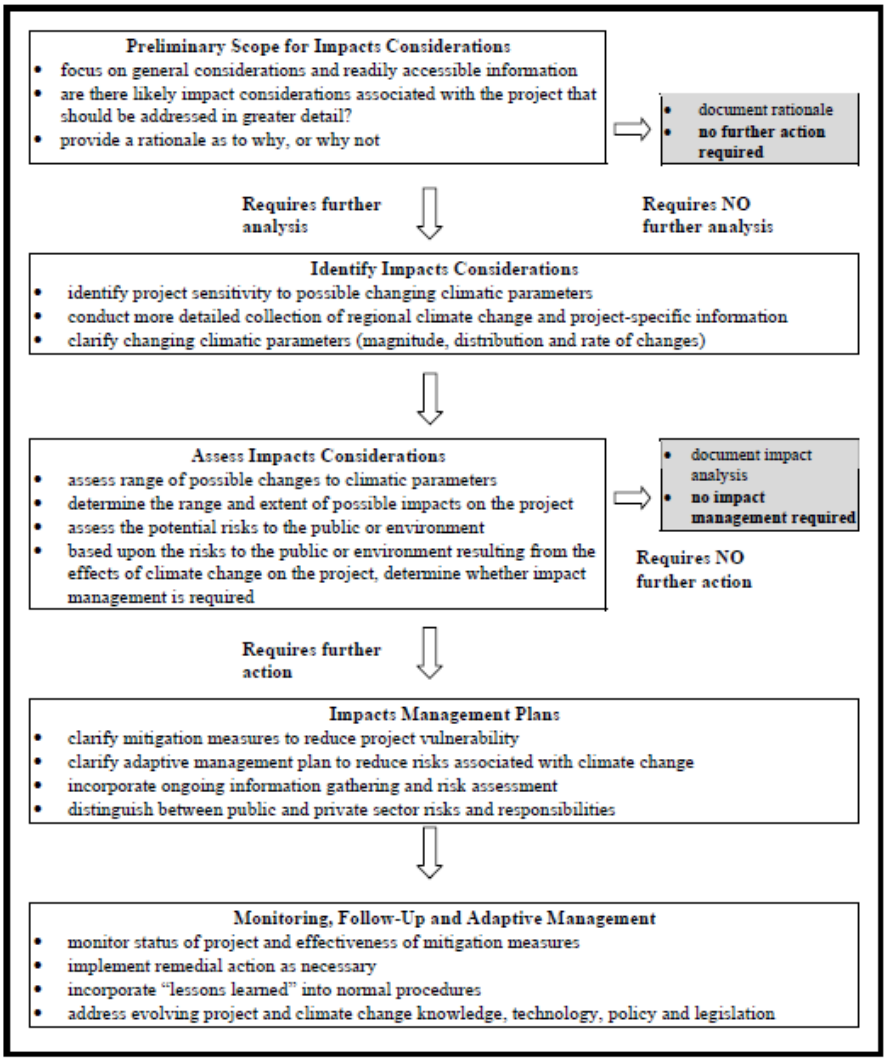
[67] https://wedocs.unep.org/handle/20.500.11822/32746

## 6.8 Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for EA Practitioners

In a 2003 publication from the Canadian Environmental Assessment Agency entitled "Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners"[68] general guidance for incorporating climate change considerations into an EIA is presented. The document was developed because:

- climate change has been recognized internationally and by the federal, provincial and territorial governments in Canada as an important environmental issue;
- EA has the potential to link project planning to the broader management of climate change issues in Canada; and
- members of the public and government agencies have raised questions and expressed interest in how climate change is, and should be considered in project reviews.

Incorporating climate change considerations in EA can help to determine whether projects are consistent with jurisdictional actions and initiatives to manage GHG emissions, such as under the Climate Change Plan for Canada. It can also assist proponents in using best practices that adapt to possible climate change impacts, such as changes in the frequency or intensity of extreme weather events, increases in mean temperatures or altered precipitation patterns and amounts.




[68] https://www.canada.ca/content/dam/iaac-acei/documents/policy-guidance/incorporating-climate-change-considerations-environmental-assessment-general-guidance-practitioners/incorporating-climate-change-considerations-environmental-assessment.pdf

***Figure 9 - Incorporating Climate Change Considerations in Environmental Assessments: Summary of Procedures***

The guidance suggests answering a range of questions to be examined during the EIA, including for GHG emissions the following:

| Review Task | Checklist of Possible Questions (where appropriate) |
|---|---|
| 1. Describe and/or quantify direct GHG emissions, or level of GHG emission intensity, if any | What are the expected GHG emissions over all phases of the project, including exploration, construction, operation, modification or decommissioning?<br><br>What are the expected GHG emissions over the operational lifetime of the project?<br><br>What will be the project's marginal contribution to total national and provincial emissions on an annual basis?<br><br>What is the intensity of GHG emissions per unit of energy produced and how does it compare with industry and technology performance? (where appropriate) |
| 2. Describe and/or quantify direct impacts on large-scale carbon sinks as a result of the project, if any | What qualitative or quantitative changes in carbon sinks can be identified as a result of the project? |
| 3. Clarify project GHG management plans and confirm, if necessary, consistency with broader jurisdiction GHG management requirements | What is the overall consistency of the project's GHG emissions or emission intensity with jurisdictional climate change policies and plans?<br><br>Are there best practices for the sector with respect to the project's GHG emissions or emission intensity? If so, is the proponent planning on applying these best practices/technologies?<br><br>Has the proponent proposed specific innovative approaches toward managing emissions over the life of the project, such as participation in voluntary industry programs?<br><br>Has the proponent proposed an emissions offsets plan for the life of the project?<br><br>Is there a need for and/or has the proponent proposed an emissions management plan for the life of the project?<br><br>Has the proponent proposed to monitor GHG emissions or emission intensity over the lifetime of the project and apply adaptive management measures as appropriate? |

To identify a projects sensitivity to environmental climate parameters, the guidance suggests ranking from nil to low to medium to high. The table (Figure 10) is meant to illustrate the types of sensitivities that a project might have, not to represent a complete or exhaustive list of all possible effects related to climate change. Proponents should also be aware of how changes in multiple components might interact and pose a risk to a project. Climate parameter-project component interfaces evaluated as being of medium or high risk should be assessed in more detail.

| Climate Parameters | Typical Project Phases/Components | | | | | | |
|---|---|---|---|---|---|---|---|
| | Construction | Large Structures | Linear Structures | Transportation and/or Energy Infrastructure | Raw Material Supply | Waste Disposal | Decommission-ing and Abandonment |
| Mean Temperature | | | | | | | |
| Frequency and/or Severity of Extreme Temperature | | | | | | | |
| Total Annual Rainfall | | | | | | | |
| Total Annual Snowfall | | | | | | | |
| Frequency and/or Severity of Precipitation Extremes (return periods) | | | | | | | |
| Sea level | | | | | | | |
| Lake Levels and Streamflows | | | | | | | |
| Soil Moisture and Ground Water | | | | | | | |
| Evaporation Rate | | | | | | | |

***Figure 10 - Ranking Project Sensitivities to Climate and Related Environmental Parameters***

## 6.9 Integrating the environment and climate change into EU international cooperation and development

In 2020 the European Union published guidelines on methods for "Integrating the environment and climate change into EU international cooperation and development"[69]. This provides a framework for strengthening the contribution of the European Union International Cooperation and Development Policy to sustainable development by integrating, or mainstreaming environmental and climate change considerations into the different phases of the EU programme and project cycle.

The guideline includes nine annexes which provide practical tools and examples, including template terms of reference and sector notes (in development) and a series of climate change sector scripts, available on Capacity4Dev, which illustrate and provide concrete examples of how the environment and climate change can be mainstreamed in specific sectors.

## 6.10 Useful International Resources for EIA impact assessments

The following resources are critical for developing a broad understanding of the key threats and drivers of biodiversity degradation and climate change with examples of mitigation that an EA Practitioner should be aware of when undertaking project EIAs.

UNFCCC Toolkit for conducting Vulnerability and Adaptation Assessments, 2021 - https://unfccc.int/sites/default/files/resource/Chapter_2_updated_2021.pdf

IPCC Guidelines for Greenhouse Gas Inventories, 2006 - https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

Good Practice Guidelines, 2000 - https://www.ipcc.ch/publication/good-practice-guidance-and-uncertainty-management-in-national-greenhouse-gas-inventories/

Impact assessment: Voluntary guidelines on biodiversity-inclusive impact assessment - https://www.cbd.int/doc/decisions/cop-08/cop-08-dec-28-en.pdf

[69] *https://europa.eu/capacity4dev/file/30041/download?token=Nce7Al1v*

Global Assessment Report on Biodiversity and Ecosystem Services - https://ipbes.net/global-assessment

Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services - https://zenodo.org/record/3553579#.Y4DJoXZBwro

Regional Assessment Report on Biodiversity and Ecosystem Services for Africa - https://ipbes.net/assessment-reports/africa

# 7 Why this Toolkit?

Climate change and biodiversity loss poses a serious challenge to socio-economic development. The nature and type of development that occurs has implications for greenhouse gas (GHG) emissions as well as the vulnerability of society to climate change impacts and the loss of biodiversity and ecosystem functions. Therefore, it has been widely recognized that there is a need to integrate consideration of climate change and its impacts and biodiversity loss into development policies and projects.

The project level is critical for the consideration of climate change and biodiversity loss risks and for incorporating suitable adaptation measures.

Infrastructure projects, which are a crucial vehicle for economic development, could be particularly sensitive owing to their often large land footprint which if often associated with the loss of project affected biodiversity as well as interference with ecosystem functions and habitats and long lifetimes during which many impacts of climate change may become progressively more and more significant. A project may also affect the vulnerability of natural ecosystems and human systems to climate change and could therefore lead to maladaptation, that is, inadvertently increase vulnerability to climate change.

For all these reasons, there has been considerable effort by development co-operation agencies and national governments to develop methodologies and tools to screen projects for climate change risks (see e.g. Klein et al., 2007[70]).

Environmental impact assessments (EIA) play a critical role in this context. EIA is a well-established tool and a legal requirement for many projects. At the same time, however, the purpose of EIA is to assess the possible impacts of a proposed project on the environment before deciding on whether or not to undertake the project, and to develop and apply measures to minimize those impacts as conditions of approval for the project.

The Eswatini Environment Authority's EAAR Regulations defines EIA as "*the process of predicting and evaluating the likely environmental impacts of a proposed project where the scale, extent and significance of the environmental impacts cannot be easily determined*". Essentially the regulations are used for identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

This toolkit provides a framework for strengthening the contribution of Eswatini's development policy to her sustainable development by integrating, or mainstreaming, environmental and climate change considerations into the different phases of project EIA assessments. The toolkit is intended for both EA Practitioners and EEA staff.

# 8 Approach for the Integration of Climate Change and Biodiversity into Environmental Impact Assessments

There has been growing concern that, in Eswatini, the issue of climate change and the never ending loss of biodiversity and ecosystem services has not been adequately addressed in the assessment of impacts arising from new projects subject to the EAAR Regulations.

At an international level, there are many examples from other countries and international organisations on approaches they have adopted to ensure a stronger more impactful assessment of climate change and biodiversity management when undertaking EIAs (see Literature Review).

This toolkit and the approach being recommend to be followed when undertaking project EIAs, is informed by international practice and/or guidance, recognising the connections between climate change and biodiversity to provide national guidance for successfully unpacking the range of issues arising from any given project subject

[70] *Klein, R., Eriksen, S., Næss, L., Hammill, A., Robledo, C., & O'Brien, K. (2007). Portfolio screening to support the mainstreaming of adaptation to climate change into development. Climatic Change, 84(1), 23 –44.*

to the EAAR Regulations and integrating a technical analysis of the climate change and biodiversity vulnerabilities and opportunities for strengthening the resilience of a given project into those EIAs.

## 8.1 Integrating climate change adaptation and biodiversity protection into EIAs

In light of climate change and biodiversity loss being the two largest environmental concerns of the 21st century, the primary goal of all EIAs should be to take on a broader mandate to conserve and protect biodiversity whilst also assessing the risks and vulnerabilities and drivers of climate change.

The connection between biodiversity and climate change is clear. As flora and fauna adapt differently and provide different services to the surrounding environment, a more robust number of species helps the environment adapt better to changes in weather. This diversity also helps to reduce the impact of natural disasters in an area by helping to increase storm water absorption, control erosion and help an area recover more quickly in the event a natural disaster does occur. Considering that climate change and biodiversity are interconnected in a cause and effect feedback loop, a negative effect in one factor creates a continual downward trend in both.

Annex 1 - Strategic Entry Points for integrating Climate Change and Biodiversity into EIA instruments presents some of the key entry points along with sources of information and data, to be used when assessing climate and biodiversity impacts in an EIAs.

## 8.2 Identify climate change and biodiversity issues early on in the EIA

Identifying climate change and biodiversity challenges during the screening and scoping phases of an EIA will help to better inform the EIA moving forward. The Fourth Schedule of the EAAR Regulations present a list of impacts and effects that need to be considered when preparing the EIA Terms of Reference. Where information is available, historical data to help identify trends to compare to the most current baseline data collected will provide a better idea of the rate of biodiversity loss as well as any extreme changes in climate that may otherwise be regarded as normal. This data may be available from technical reports from earlier EIAs or from government or scientific databases. Where quantitative data is unavailable, interviews and field observations with knowledgeable locals can help to provide a general idea of such trends.

## 8.3 Use trends instead of data at one point in time

As the nature of climate change is just that, change, using static data that provides a baseline for a single point in time leaves way for too much uncertainty in the future. Using trends will help to reduce uncertainty and provide a more informed EIA report. When indicators are chosen, thresholds or a maximum/minimum level should also be set to identify at what point a significant change in the ecosystem could occur.

## 8.4 Collection and assessment of baseline survey data as climate changes

As the climate changes, so too will the baseline survey carried out during the screening section of the EIA. This means that baseline data must be continually updated - and potential impacts reassessed - based on the new information. This will require an evolution in how EIAs are used. Traditionally, EIAs have been undertaken with the intention of obtaining a project “compliance certificate” and ensuring impact mitigation. This has meant that once the document has been finished, it is archived. While impact monitoring still occurs, it is meant to address issues if acceptable standards are surpassed indicating an impact could occur. When accounting for climate change and biodiversity, the EIA becomes a living document that is revisited on a regular basis as new baseline data is collected and weighed against the project. Collection of data should be undertaken both for climate and biodiversity in the area. While it is not explicitly the responsibility of the project to mitigate biodiversity loss if it is not directly affecting this trend, it is part of a larger responsibility to helping maintain the environmental and social integrity within the area of impact, and the plants and animals therein. After all, once species become extinct, it is impossible to reclaim them.

## 8.5 Support ecosystem services to help reduce environmental damage

By using local natural resources that provide essential services to the environment, a project can reduce costs and help maintain more resilience in the face of climate change. Ecosystem services are geographical or ecological features in an area that help people benefit from the environment around them. This may include provisioning services such as wild foods, medicines and fresh water; regulating services like wetlands and forests;

cultural services such as parks and green spaces; and supporting services that form soil, photosynthesize and cycle nutrients. All such environmental features help to maintain and keep the surrounding environment healthy.

## 8.6 Consider the adaptability and resilience of the impacted environment

All environments have limits to the amount of change they can absorb. Different factors, such as ecosystem services, biodiversity, amount of prior human development and cumulative environmental impacts from other projects all contribute to the ability of the environment to adapt to climate change. All ecosystems have limits that define their ability to cope with change without losing their primary attributes. While national and international standards are appropriate to use as benchmarks for a project, environmental limits specific to the impacted area's environment should be identified at the beginning of the EIA process, and standards made more rigid where deemed necessary. If adaptability and resilience of the environment are important factors in assessing impact severity, then the less adaptable and resilient the environment of the impact area is, the more severe the impact will be.

## 8.7 Considerations for biodiversity

Recognize the benefits of an environment with a diverse subset of flora and fauna species. Biodiverse environments are more resilient to natural disasters and changing weather patterns, and each plant and animal plays an essential role within the functioning of the ecosystem. Such diverse systems also provide many benefits to humans living within or near these natural environments, many of whom depend on the system for their livelihoods. This means that the Comprehensive Mitigation Plan (CMP) should focus on avoiding irreversible biodiversity loss, seek alternative solutions that minimize such loss, use mitigation to restore biodiversity where loss is unavoidable, compensate for unavoidable loss, optimize environmental benefits and seek to revive declining species populations. There are many factors that contribute to a loss of biodiversity. When undertaking an EIA it should be understood how biodiversity loss occurs and ensure that CMPs prioritize a strategy of "no-net-loss." Biodiversity loss can result from:

- Habitat loss and degradation
- Changes to ecosystem services
- Habitat fragmentation
- Creating change in the natural environment that unbalances the natural order of the ecosystem
- Man-made structures that may directly impact species
- The spread of invasive alien species that can disrupt natural environments
- Changes in the environmental processes (river flow or levels, erosion control etc.)
- Pollution introduced into the ecosystem be it in the air, water or soil

## 8.8 Identifying vulnerable populations

While it is a common practice to identify which populations will be adversely affected by project impacts, this process should go further to determine what the cumulative effects of both project impacts and climate change will mean for such populations. Mitigation strategies should always account for cumulative effects. Finally, always work under the assumption that, if insufficient information is available, EIA mitigation measures must err on the side of caution. Where uncertainty does exist - in that quantitative data is unavailable or unreliable to help guide the EIA - qualitative data can be collected to help supplement what information is available.

# 9 Methodology for Integrating climate change and biodiversity into EIA

This section provides guidance on integrating climate change and biodiversity throughout the EIA process. This process is defined in the EAAR Regulations. It focuses on the EIA areas where climate change and biodiversity have the most impact. It is divided into the following sub-sections:

- identifying climate change and biodiversity concerns in EIA (useful for screening and scoping).
- analyzing evolving baseline trends.
- identifying alternatives and mitigation measures;
- assessing effects (cumulative effects and uncertainty);
- monitoring and adaptive management.

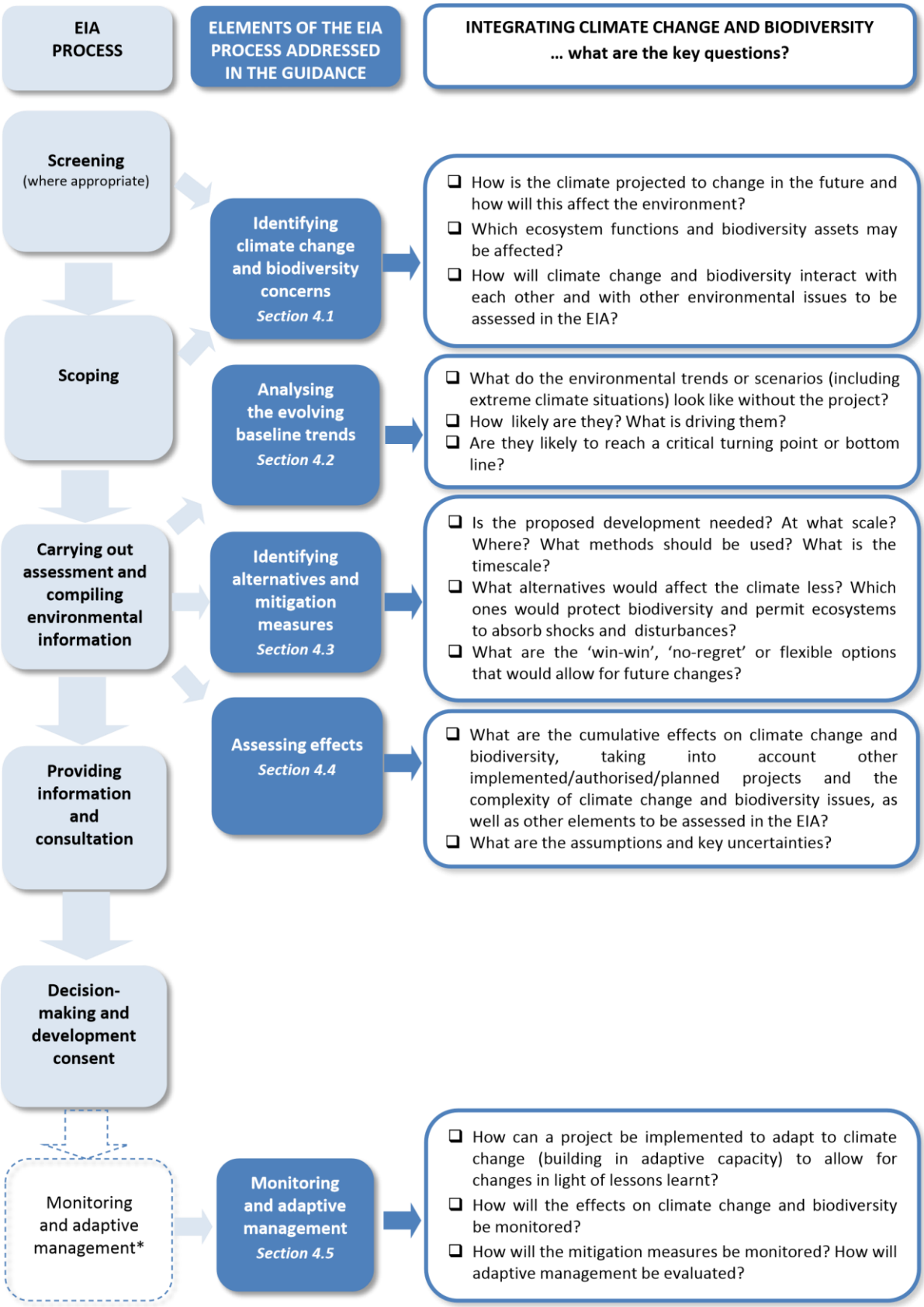
**Each sub-section looks at the EIA elements for which climate change (including disaster risks in the context of climate change adaptation) and biodiversity considerations are most relevant and gives some examples. You can use these as a starting point for more in-depth work.**

This section pays particular attention to climate change adaptation, which is a relatively new issue in the context of EIA. The advice and examples provided could serve as a basis for developing tailored approaches to a wide range of infrastructure projects (e.g., power plants, motorways/roads, pipelines, industrial plants, overhead electrical power lines, installations for storage of petroleum, ports, waste disposal facilities, urban development projects, etc.) covered by the EIA Directive. Such tailored approaches fall outside the scope of this guidance, however.

Addressing climate change and biodiversity in the EIA process brings new challenges for the EA Practitioner. There will be situations in which the EA Practitioner will have to make a judgement, preferably in consultation with stakeholders, to avoid unnecessarily extending the EIA procedure or to leave enough time to properly assess complex information. Taking a practical, common-sense approach to EIA will sometimes be best.

Figure 11 shows the scope of this guidance and includes a set of questions related to specific topics addressed in it.

*Figure 11 - Integrating climate change and biodiversity into EIA*



## 9.1 Identifying climate change and biodiversity concerns in EIA

This section looks at how climate change and biodiversity issues could be better factored into EIA. It can be useful in the screening and scoping stages of EIA. Of course, the issues and impacts relevant to a particular EIA will depend on the specific circumstances and context of each project (e.g., the sector concerned, location and scale, characteristics of the receiving environment, etc.).

The section is structured around four key recommendations:

- identifying **key issues early on**, with input from **relevant authorities, available relevant literature and stakeholders**.
- determining whether the project may significantly change GHG emissions and defining the scope of any necessary GHG assessments (**climate mitigation concerns**).
- being clear about climate change scenarios used in the EIA and identifying the key **climate change adaptation concerns** and how they interact with the other issues to be assessed in EIA.
- identifying the key **biodiversity concerns** and how they interact with the other issues to be assessed in EIA.

## 9.2 Identifying key issues early on, with input from relevant authorities and stakeholders

Identifying key climate change and biodiversity issues early on ensures that they are recognized by all involved and followed-up throughout the EIA process.

Involving relevant authorities and stakeholders at an early stage (at the latest at the scoping stage for Category I projects or prior to the issuing of a screening decision for Category II projects) will improve compliance with the EAAR Regulations. It will also make it possible to capture the most important issues and establish a consistent approach to assessing impact and looking for solutions. Making use of the knowledge and opinions of environmental authorities and stakeholders can help to:

- highlight potential areas of contention and areas of improvement in a timely and effective way.
- provide information on relevant forthcoming projects, policies and legislative or regulatory reforms, other types of assessments on 'appropriate assessment' that should be considered when analysing evolving baseline trends.
- collect suggestions for building climate change mitigation and adaptation measures and/or biodiversity enhancement schemes into the proposed project from the very beginning.

The main climate change and biodiversity concerns are listed in Table 2 below. They can help the EA Practitioner define a set of questions on climate change mitigation, adaptation and biodiversity. These could then be asked in the screening and/or scoping stages of EIA.

***Table 2 - Examples of main climate change and biodiversity concerns to consider as part of EIA***

| Climate change mitigation | Climate change adaptation | Biodiversity |
|---|---|---|
| • direct GHG emissions caused by the construction, operation, and possible decommissioning of the proposed project, including from land use, land-use change and forestry.<br>• indirect GHG emissions due to increased demand for energy; indirect GHG emissions caused by any supporting activities or infrastructure which is directly linked to the implementation of the proposed project (e.g., transport, waste management). | • heatwaves (including impact on human health, damage to crops, forest fires, etc.).<br>• droughts (including decreased water availability and quality and increased water demand).<br>• extreme rainfall, riverine flooding and flash floods.<br>• storms and high winds (including damage to infrastructure, buildings, crops and forests).<br>• landslides.<br>• freeze-thaw damage. | • degradation of ecosystem services.<br>• loss of habitats, fragmentation (including the extent or quality of the habitat, protected areas, including OECMs, habitat fragmentation or isolation, as impact on processes important for the creation and/or maintenance of ecosystems)<br>• loss of species diversity (including species protected under the Game Act or Flora Protection Act)<br>• loss of genetic diversity. |

For climate change in particular, both the impact of the project on climate and climate change (i.e., mitigation aspects) and the impact of climate change on the project and its implementation (i.e., adaptation aspects) should be considered early on in the EIA process.

Note that this list is not comprehensive and should be adapted. The issues and impacts relevant to a particular EIA should be defined by the specific context of each project and by the concerns of the authorities and stakeholders involved and the opinion of the sector expert undertaking the assessment of biodiversity or climate change impacts. Flexibility is therefore needed. This table (and other tables in this section) should be used only as a starting point for discussion and assessing the significance and relevance of impacts.

## 9.3 Understanding key climate mitigation concerns

When it comes to mitigation, the main concerns focus on GHG emissions. Implementing a project may lead to, for example:

- a direct increase in GHG emissions.
- an increase in energy demand leading to an indirect increase in GHG emissions.
- embedded GHG emissions, e.g., due to energy use in material production, transport, etc.
- loss of habitats that provide carbon sequestration, (e.g., through land-use change).

This guidance does not include any specific methodologies for calculating GHG emissions as part of the EIA procedure. There are several online carbon calculators and other methodologies that should be used for this purpose. Table 3 provides examples of basic questions that should be asked by EA Practitioners and their technical experts when identifying major climate change mitigation concerns.

*Table 3 - Examples of key questions that should be asked when identifying key climate change mitigation concerns*

| Main concerns related to: | Key questions that could be asked at the screening and/or scoping stage of the EIA |
|---|---|
| **Direct GHG emissions** | • Will the proposed project emit carbon dioxide ($CO_2$), nitrous oxide ($N_2O$) or methane ($CH_4$) or any other greenhouse gases defined as such by the UNFCCC?<br>• Does the proposed project entail any land-use change or forestry activities (e.g., deforestation) that may lead to increased emissions through for example, land clearing?<br>• Does it entail other activities (e.g., afforestation) that may act as emission/carbon sinks? |
| **Indirect GHG emissions due to an increased demand for energy** | • Will the proposed project significantly influence demand for energy?<br>• Is it possible to use renewable energy sources? |
| **Indirect GHG caused by any supporting activities or infrastructure that is directly linked to the implementation of the proposed project (e.g., transport)** | • Will the proposed project significantly increase or decrease personal travel?<br>• Will the proposed project significantly increase or decrease freight transport? |

## 9.4 Understanding key climate change adaptation concerns

Both a project's impact on climate change (i.e., mitigation aspects) and the impact of climate change on the project and its implementation (i.e., adaptation aspects) should be considered early on in the EIA process.

**How might implementing the project be affected by climate change or have an effect on climate change by increasing GHG emissions? How might the project need to adapt to a changing climate and possible extreme events?**

When addressing climate change adaptation concerns as part of EIA, you should not only consider the historical data on climate, but also clearly identify and present the climate change scenario that should be considered in the assessment process. A clear description of the climate change scenario facilitates discussion on whether the expected climatic factors should be considered in the project design and how they may affect the project's environmental context. EA Practitioners, in particular, should outline extreme climate situations to be considered as part of the environmental baseline analysis.

You should also review any existing adaptation strategies, risk management plans and other national or sub-regional studies on the effects of climate variability and climate change, as well as proposed responses and available information on expected climate-related effects relevant to the project.

Table 4 provides examples of basic questions that you could ask when identifying major climate change adaptation concerns.

*Table 4 - Examples of key questions that should be asked when identifying climate change adaptation concerns*

| Main concerns related to: | Key questions that could be asked at the screening and/or scoping stage of the EIA |
|---|---|
| **Heatwaves**<br><br>(Take into account that heatwaves are usually associated with water scarcity — see also the suggestions for droughts) | • Will the proposed project restrain air circulation or reduce open spaces?<br>• Will it absorb or generate heat?<br>• Will it emit volatile organic compounds (VOCs) and nitrogen oxides ($NO_x$) and contribute to tropospheric ozone formation during sunny and warm days?<br>• Will the project be vulnerable to heatwaves?<br>• Will the project increase energy and water demand for cooling? |

| Main concerns related to: | Key questions that could be asked at the screening and/or scoping stage of the EIA |
|---|---|
| | • Can the materials used during construction withstand higher temperatures (or will they experience, for example, material fatigue or surface degradation)?<br>• Will outdoor workers risk adverse health impacts?<br>• What protective clothing will outdoor workers require to avoid heat impacts?<br>• Do buildings have adequate natural ventilation and or ceiling insulation to reduce internal temperatures? |
| **Droughts due to long-term changes in precipitation patterns**<br>(Also consider possible synergistic effects with flood management actions that enhance water retention capacity in the watershed) | • Will the proposed project increase water demand?<br>• Will the proposed project adversely affect the surface water or aquifers?<br>• Is the proposed project vulnerable to low river flows or higher water temperatures?<br>• Will the proposed project generate poor quality waste water? Will such water worsen local and downstream water pollution — especially during periods of drought with reduced dilution rates, increased temperatures and turbidity?<br>• Will the project construct sufficient water storage to sustain operations?<br>• Will the project harvest and store rainfall for non-consumptive use?<br>• Will the proposed project change the vulnerability of landscapes or woodlands to wildfires? Is the proposed project located in an area vulnerable to wildfires?<br>• Can the materials used during construction withstand higher temperatures? |
| **Extreme rainfall, riverine flooding and flash floods** | • Will the proposed project and its infrastructure and equipment be at risk because it is located in a riverine flooding zone?<br>• Will the proposed project change the capacity of existing flood plains for natural flood management?<br>• Will the proposed project alter the water retention capacity in the watershed (eg from vegetation clearing)?<br>• Are embankments stable enough to withstand flooding? |
| **Storms and winds** | • Will the proposed project be at physical risk because of storms and strong winds (loss of roof sheeting, vehicle and equipment damage)?<br>• Will the project and its operations be affected by falling objects (e.g., trees) close to its location?<br>• Does the project have a storm water runoff management plan? Are there dedicated flow routes water can be safely channeled away6 from project infrastructure?<br>• Is the project's connectivity to energy, water, transport and ICT networks and infrastructure assured during extreme weather events? |
| **Landslides** | • Is the project located in an area that could be affected by extreme precipitation leading to landslides that could damage infrastructure? |
| **Cold spells** | • Will the proposed project be affected by short periods of unusually cold weather or frost?<br>• Can the materials used during construction withstand lower temperatures?<br>• Can ice affect the functioning/operation of the project?<br>• Is the project's connectivity to energy, water, transport and ICT networks and infrastructure assured during cold spells? |

## 9.5 Understanding key biodiversity concerns

For biodiversity, key concerns should focus on ensuring 'no-net-loss' and should outline how EIA can support this goal. Consult the actions and strategies described in the National Biodiversity Strategy and Action Plan and highlight those that the project supports or where the project may negatively impact on those relevant actions and strategies

The project may result in, for example:

- changes in the provision of local ecosystem services as a result of loss of species and habitats.
- local habitat loss and degradation, e.g., the destruction of wetlands, grasslands and forests for housing, etc.
- local habitat fragmentation — ecosystems and their species need a certain amount of interconnectivity for processes to continue; breaking a natural area into smaller pieces, means that eventually species disappear, and certain functions are lost.
- local loss of species, e.g., the plants and animals' endemic to a particular habitat will not be able to survive if that habitat is destroyed or altered by development.
- local changes in natural environmental processes, such as continued river flow, water purification, coastal sediment transport, and erosion control, which can have long-term impact on habitats and species.
- direct impacts, for example birds colliding with power lines or wind turbines.
- the spread of invasive alien species that can rapidly transform natural habitats and disrupt native species.
- effects of pollution on ecosystems and species.

Table 5 provides examples of basic questions you could ask when identifying major biodiversity concerns.

***Table 5 - Examples of key questions that should be asked when identifying biodiversity concerns***

| Main concerns related to: | Key questions that could be asked at the screening and/or scoping stage of the EIA |
|---|---|
| **Degradation of ecosystem services**<br><br>(Including impact on processes important for creating and / or maintaining ecosystems) | • Will the proposed project directly or indirectly lead to serious damage or total loss of ecosystem or land-use type, thus leading to a loss of ecosystem services? Will it affect the exploitation of ecosystems or land-use type so that the exploitation becomes destructive or unsustainable?<br>• Will the proposed project damage ecosystem processes and services, particularly those on which local communities rely?<br>• Is the project in any way dependent on ecosystem services?<br>• Can increased supply of ecosystem services contribute to the project's objective(s)?<br>• Will the proposed project result in emissions, effluents, and/or other means of chemical, radiation, thermal or noise emissions in areas providing key ecosystem services?<br><br>With regard to processes important for creating and/or maintaining ecosystems:<br>• Will the proposed project change the food chain and interactions that shape the flow of energy and the distribution of biomass within the ecosystem?<br>• Will the proposed project result in significant changes to water level, quantity or quality?<br>• Will the proposed project result in significant changes to air quantity or pollution? |
| **Loss and degradation of habitats**<br><br>(Including the national protected areas network, habitat fragmentation and isolation) | • If habitats are lost or altered, are there alternatives available to support the species populations concerned?<br>• Will the proposed project adversely affect any of the following: protected areas; threatened ecosystems outside protected areas; migration corridors identified as being important for ecological or evolutionary processes; areas known to provide important ecosystem services; or areas known to be habitats for threatened species?<br>• Will the proposed project involve creating linear infrastructure and lead to habitat fragmentation in areas providing key and other relevant ecosystem services?<br>• How seriously will this affect habitats and corridors, considering that they can also be adversely affected by climate change? |

| | |
|---|---|
| | • Are there opportunities to establish or further develop green infrastructure as a part of the project to support the project's non-environmental and environmental goals (e.g., adaptation to climate change or increasing connectivity of protected sites)? |
| **Loss of species diversity**[71]<br><br>(Including species protected under the Flora Protection Act and Game Act) | • Will the proposed project have direct or indirect negative impact on the species of interest listed in the Game Act or Flora Protection Act, in particular, priority species listed as threatened or endangered?<br>• Will the proposed project cause a direct or indirect loss of a population of a species identified as priority in National Biodiversity Strategies and Action Plan (NBSAPs) and/or other sub-national biodiversity conservation plans?<br>• Will the proposed project alter the species-richness or species-composition of habitats in the study area?<br>• Will the proposed project affect sustainable use of a population of a species?<br>• Will the proposed project surpass the maximum sustainable yield, the carrying capacity of a habitat/ecosystem or the maximum allowable disturbance level of populations, or ecosystem?<br>• Will the proposed project increase the risk of invasion by alien species? |
| **Loss of genetic diversity**[72] | • Will the proposed project result in the extinction of a population of a particularly rare species, declining species or a species identified as one of concern, in particular of priority species from the Game Act or Flora Protection Act?<br>• Will the proposed project result in the extinction of a population of a particularly rare species, declining species or those identified as priorities in the NBSAP and/or sub-national biodiversity conservation plans?<br>• Will the proposed project result in the fragmentation of an existing population leading to (genetic) isolation? |

## 9.6 Analysing the evolving biodiversity baseline trends

The evolution of the baseline - how the current state of the environment is expected to change in the future - is critical to understanding how the proposed project might impact the changing environment.

The baseline environment is a moving baseline. This is especially true for large-scale projects, which might only become fully operational after many years. During this time, the biodiversity in the project area may change and the area may be subject to different climatic conditions, such as storms, increased flooding, hotter etc. For long-term projects or those with long-lasting effects (timescales exceeding 20 years), you should ideally use climate scenarios based on climate model results. Such projects may need to be designed to withstand very different environmental conditions from current ones. For short-term projects, scenarios need to represent only 'near future' or 'present-day' climates.[27]

Environmental outlooks and scenario studies that analyses trends and their likely future directions can provide useful information. If data are unavailable, it may be useful to use proxy indicators. For example, if air quality monitoring data are not readily available for an urban area, perhaps there are data outlining trends in traffic flow/volumes over time, or trends in emissions from stationary sources.

Spatially explicit data and assessments, potentially using Geographical Information Systems (GIS), are likely to be important for analysing the evolving baseline trends and also to understand distributional effects. There are several such sources of data, including data repositories and online digital datasets, for example the Eswatini National Trust Commission biodiversity databases or and even global datasets. Annex 2 - Sources of Information to inform an Assessment provides a comprehensive overview and links to sources of information on biodiversity and climate change.

[71] Definition: The number and variety of species found in a given area in a region http://www.cbd.int/cepa/toolkit/2008/doc/CBD-ToolkitGlossaries.pdf

[72] The potential loss of natural genetic diversity (genetic erosion) is extremely difficult to determine and does not provide any practical clues for formal screening/scoping. The issue would probably only come up in dealing with highly-threatened, legally-protected species that are limited in numbers and/or have highly separated populations, or when complete ecosystems become separated and the risk of genetic erosion applies to many species (the reason for constructing so-called eco-ducts across major line infrastructure), COP 6 Decision VI/7, Annex: Guidelines for incorporating biodiversity-related issues into environmental impact assessment legislation and/or process and in strategic environmental impact assessment, http://www.cbd.int/decision/cop/?id=7181. [27] Adapted from http://climate-adapt.eea.europa.eu.

When looking at the evolving baseline, you should consider:

**Trends in key indicators over time,** for example GHG emissions, indices of vulnerability, frequency of extreme weather events, disaster risk, key species such as farmland birds and the status of habitats or protected areas. Are these trends continuing, changing, or levelling out? Are there environmental outlooks or scenario studies available that have looked at their likely future direction? If data are unavailable for certain indicators, can you use proxy indicators?

**Biodiversity considerations**

**Protected Areas**

- Are there any sites designated for nature conservation or the distribution of protected species that fall within the zone of influence?
- Does the project affect any sites likely to be designated in the foreseeable future?
- Is there any policy presumption in favour of habitat protection/creation/restoration in the area?

**General ecological considerations**

- What ecological features at or above the defined threshold level of value may occur within the zone of influence?
- What are their distribution and status elsewhere for comparison?
- What were their historical distributions, status and management compared with the present?
- What are their scales of variation, vulnerability and likely exposure to the project?
- What are the key ecological processes or species activity periods; are there seasonal variations in distribution, abundance and activity?
- Are there any species, the disappearance of which would have significant consequences for others?
- Are there any other projects planned within the same area or timeframe that may contribute to cumulative effects?

**Drivers of change** (both direct and indirect), which may cause a particular trend. Identifying drivers facilitates future projections, especially if some existing drivers are expected to change or new drivers are about to come into play and will significantly affect a given trend (e.g., already approved developments that have not been implemented yet; changes in economic incentives and market forces; changes in the regulatory or policy frameworks; etc.). Identifying drivers should not become a complex academic exercise - it is only important to recognize drivers that will significantly change the trend and take them into account when outlining the expected future state of the environment.

**Thresholds/limits,** e.g., have thresholds already been breached or are limits expected to be reached? The EIA may determine whether the given trend is already approaching an established threshold or if it is coming close to certain tipping points that can trigger significant changes in the state or stability of the local ecosystem.[28]

- **Key areas that may be particularly adversely affected by the worsening environmental trends** including, in particular, protected areas, protection worthy, OECMs or areas designated pursuant to the National Trust Commission Act, Game Act or Flora Protection Act.
- **Critical interdependencies,** for example water supply and sewage treatment systems, flood protection, energy/electricity supply, communication networks, etc.
- **Benefits and losses brought by these trends and their distribution** may determine who benefits and who doesn't. Beneficial and adverse impacts are often not proportionally distributed within society — changes in ecosystems affect some population groups and economic sectors more seriously than others.
- **Climate change vulnerability** assessment needs to be built into any effective assessment of the evolution of the baseline environment, as well as of alternatives. Major infrastructure projects, in particular, are likely to be vulnerable.

When developing the baseline against which the project is to be evaluated it is also important to acknowledge uncertainty - depending on the timescale and spatial scale some uncertainty is inevitable and will increase for largescale projects. Uncertainty can be communicated using terms such as 'strongly suspected', 'suspected', etc., used for instance by IPCC in their Fourth Assessment report (2007) or later reports.

## 9.7 Identifying alternatives and mitigation measures

In the early stages of the process, alternatives are essentially different ways in which the developer can feasibly meet the project's objectives, for example by carrying out a different type of action, choosing a different location or adopting a different technology or design for the project. The zero option should also be considered, either as a specific alternative or to define the baseline. At the more detailed level of the process, alternatives may also merge into mitigating measures, where specific changes are made to the project design or to methods of construction or operation to 'prevent, reduce and where possible offset any significant adverse effects on the environment'.[73]

Note that many alternatives and mitigation measures important from the point of view of biodiversity and climate change should be addressed at strategic level, in a Strategic Environmental Assessment (StrEA). For example, to avoid problems associated with flood risk, planners should prevent projects from being developed on flood plains or areas of flood risk or promote land management to increase water retention capacity. To avoid or minimize effects on protected areas or OECMs located near road or railway projects, it is necessary to assess the siting of the whole corridor before leaving it to the level of individual sections, as this would limit the choice of alternative locations, etc.

***Climate change vulnerability of major infrastructure projects***

Major infrastructure projects may be particularly vulnerable to:

- increased flood risk to fossil fuel and nuclear power sites and electricity substations.
- reduced availability of cooling water for inland power stations.
- reduced quality of wireless service from increased temperatures and intense rainfall.
- increased flood risk to all transport sectors.
- increased scour of bridges from intense rainfall/flooding.
- reduced security of water supply from changing rainfall patterns.
- increased flood risk to wastewater infrastructure.

When assessing vulnerability, it is important to consider critical interdependencies, as they can lead to 'cascade failure', where the failure of one aspect, such as flood defenses, can lead to other failures, e.g., flooded power stations leading to power cuts which in turn affect telecommunications networks.

## 9.8 Climate change mitigation

For **climate change mitigation,** it is important to investigate and use options to eliminate GHG emissions as a precautionary approach in the first place, rather than having to deal with mitigating their effects after they have been released. Mitigation measures identified and introduced as a result of an EIA, e.g., construction and operational activities that use energy and resources more efficiently, may contribute to climate change mitigation as well. However, this does not always mean that the project will have overall positive impacts as regards GHG emissions. Impact may be less negative in terms of quantity of emissions, but still have overall negative impact, unless the carbon used in development and transport is unequivocally equal to zero.

Bear in mind that some EIA mitigation measures that address climate change can themselves have significant environmental impact and may need to be taken into account (e.g., renewable energy generation or tree planting may have adverse impacts on biodiversity).

***Figure 12 - Examples of alternatives and mitigation measures related to climate change mitigation concerns***

| Main concerns related to: | Examples of alternatives and mitigation measures |
|---|---|

[73] Annex IV of the EIA Directive.

| | |
|---|---|
| **Direct GHG emissions** | • Consider different technologies, materials, supply modes, etc. to avoid or reduce emissions.<br>• Protect natural carbon sinks that could be endangered by the project, such as peat soils, woodlands, wetland areas, forests.<br>• Plan possible carbon off-set measures, available through existing off-set schemes or incorporated into the project (e.g., planting trees). |
| **GHG emissions related to energy** | • Use recycled/reclaimed and low-carbon construction materials.<br>• Build energy efficiency into the design of a project (e.g., include south facing windows for solar energy, passive ventilation and low-energy light bulbs).<br>• Use energy-efficient machinery.<br>• Make use of renewable energy sources. |
| **GHG emissions related to transport** | • Choose a site that is linked to a public transport system or put in place transport arrangements.<br>• Provide low-emission infrastructure for transport (e.g., electric charging bays, cycling facilities).<br>• Ensure all combustion engine equipment is maintained |

## 9.9 Climate change adaptation

In terms of **climate change adaptation**, different types of EIA alternatives and mitigation measures are available for decision-makers to use in planning the adaptation of projects to climate change.

### Types of EIA mitigation measures for climate change adaptation and risk management

- Measures that strengthen the project's capacity to adapt to increasing climate variability and climate change (e.g., building in early warning or emergency/disaster preparedness).
- Risk reduction mechanisms (e.g., insurance).
- Measures that control or manage certain identified risks (e.g., choice of project location to reduce exposure to natural disasters).
- Measures that improve the project's ability to operate under identified constraints (e.g., choice of most water efficient or energy-efficient options).
- Measures that better exploit certain opportunities offered by the natural environment.

The most appropriate mix of alternatives and/or mitigation measures will depend on the nature of the decision being made and the sensitivity of that decision to specific climate impacts and the level of tolerated risk.

Key considerations include:[74]

- `No-regret' or `low-regret` options that yield benefits under different scenarios.
- `win-win-win` options that have the desired impacts on climate change, biodiversity and ecosystem services, but also have other social, environmental or economic benefits.
- favouring reversible and flexible options that can be modified if significant impacts start to occur.
- adding 'safety margins' to new investments to ensure responses are resilient to a range of future climate impacts.
- promoting soft adaptation strategies, which could include building adaptive capacity to ensure a project is better able to cope with a range of possible impacts
- (e.g., through more effective forward planning).
- shortening project times.
- delaying projects that are risky or likely to cause significant effects.

If, based on an assessment of specific risks and constraints, alternatives and mitigation measures are considered impossible or too expensive, the project may have to be abandoned.

***Table 6 - Examples of alternatives and mitigation measures related to climate change adaptation concerns***

| Main concerns related to: | Examples of alternatives and mitigation measures |
|---|---|
| **Heatwaves** | • Ensure that the proposed project is protected from heat exhaustion.<br>• Encourage design optimal for environmental performance and reduce the need for cooling.<br>• Reduce thermal storage in a proposed project (e.g., by using different materials and coloring). |
| **Droughts** | • Ensure that the proposed project is protected from the effects of droughts (e.g., use water-efficient processes and materials that can withstand high temperatures).<br>• Install livestock watering ponds within animal-rearing systems.<br>• Introduce technologies and methods for capturing storm water.<br>• Put in place state-of-the-art wastewater treatment systems that make reusing water possible. |
| **Wildlife fires** | • Use fire-resistant construction materials.<br>• Create a fire-adapted space around the project (e.g., use fire-resistant plants). |
| **Extreme rainfall, riverine flooding and flash floods** | • Consider changes in construction design that allow for rising water levels and ground water levels (e.g., build on pillars, surround any flood-vulnerable or flood-critical infrastructure with flood barriers that use the lifting power of approaching floodwater to automatically rise, set up backwater valves in drainage-related systems to protect interiors from flooding caused by backflow of wastewater, etc.).<br>• Improve the project's drainage. |
| **Storms and winds** | • Ensure a design that can withstand increased high winds and storms. |
| **Landslides** | • Protect surfaces and control surface erosion (e.g., by quickly establishing vegetation — hydroseeding, turfing, trees).<br>• Put in place designs that control erosion (e.g., appropriate drainage channels and culverts). |
| **Cold spells and snow** | • Ensure that the project is protected from cold spells and snow (e.g., use construction materials that can withstand low temperatures and make sure the design can resist snow build-up). |
| **Freeze-thaw damage** | • Ensure that the project (e.g., key infrastructure) is able to resist winds and prevent moisture from entering the structure (e.g., by using different materials or engineering practices). |

## 9.10 Understanding key biodiversity concerns

For **biodiversity**, EIA should focus on ensuring 'no-net-loss' (see box below) and avoiding effects from the start, before considering mitigation, with compensation being used as a last resort.

EIA mitigation measures for biodiversity can also help to mitigate and adapt to climate change. For example, creating new habitats, green spaces, green corridors, green and brown roofs (enhancement) can help maintain and enhance biodiversity, aid species in adapting to long term climate change, and provide essential ecosystem services such as flood storage capacity, rainfall interception, shade and heat regulation and air quality regulation as part of adaptation to climate change.

As a last resort, biodiversity offsets can be used to compensate for significant negative impacts arising from a project, after appropriate prevention and mitigation measures have been taken. A discussion with relevant authorities like the ENTC and EEA would need to be done to see how offsets could be integrated into the project design. However, compensation will not always be possible: there are cases where a development proposal can be rejected on grounds of irreversible damage to, or irreplaceable loss of biodiversity.

The EA Practitioner should apply the precautionary principle when considering risks and adjust your proposal, rather than try to defend it against significant biodiversity effects.

*Table 7 - Examples of alternatives and mitigation measures related to biodiversity concerns*

**Key messages for promoting 'no- net-losses of biodiversity**

1. Avoid irreversible biodiversity loss, for example by improving the spatial arrangement of a project.
2. Seek alternative solutions that minimize biodiversity loss, in particular consider and prioritize maintaining habitats that are experiencing long-term decline.
3. Use mitigation to restore biodiversity resources where their loss is unavoidable.
4. Compensate for unavoidable loss by providing substitutes of at least similar biodiversity value.
5. Look for ways of optimizing environmental benefits, for example by facilitating connection of fragmented environments or creating beneficial high biodiversity habitats.

**Source:** Biodiversity Impact Assessment (IAIA, 2005)

| Main concerns | Examples of alternatives and mitigation measures |
|---|---|
| **Degradation of ecosystem services** | • Restore degraded ecosystems on the site to enhance ecosystem services. |
| **Habitats,** (including protected areas, OECMs, protection-worthy areas, habitat fragmentation and isolation) | Use an ecosystem services approach, ecosystem-based approaches and green infrastructure:<br>• Green bridges and eco-ducts (elements of green infrastructure) re-connect natural areas divided by linear developments (e.g., roads or railway lines). They reduce accidents involving wild animals and cars, allow animals to move easily and safely from one area to another, and help plant species to spread. This gives animals more space to find food and shelter, and allows populations of the same species to interact, improving the overall resilience of the species. |
| **Species diversity** | • Introduce design alternatives to avoid adverse effects on bird species (e.g., size, height, spacing, lighting and visibility of wind turbines).<br>• Consider timing of construction, maintenance and decommissioning.<br>• Deliver 'smart conservation', e.g., by promoting well-designed parks, walking paths, green roofs and walls that can contribute to species diversity and to tackling climate change related to urban infrastructure projects. |

## 9.11 Assessing the significant impacts from climate change and biodiversity

Many assessment approaches used in the EIA process have the capacity to address biodiversity and climate change. There are, however, three fundamental issues that you should consider when addressing climate change and biodiversity: the **long-term and cumulative nature of effects**, **complexity of the issues and cause-effect relationships** and **uncertainty of projections**.

### *9.11.1.1 Long-term and cumulative nature of effects*

Climate change and biodiversity are generally complex issues with long-term impacts and consequences. EIAs that aim to properly address biodiversity and climate should take this into account and assess the combined impact of any number of different effects. This requires an understanding of evolving baseline trends and an assessment of the cumulative effects of the project on the changing baseline.

There are a number of tips and approaches to be considered when assessing the cumulative effects of climate change and biodiversity in EIA:

- **Recognize cumulative effects early on in the EIA process,** in the scoping stage if possible. Talking to the right stakeholders as early as possible can give the wide overview needed to better understand how seemingly insignificant individual effects can have greater consequences when considered together.
- **Pay attention to the evolving baseline** when assessing the cumulative effects of climate change and biodiversity impacts. The current state of the environment will not necessarily be the future state of the environment, even if the proposed project does not go ahead. Moreover, both the climate and the species that make up the natural world are in a constant state of flux. A changing climate may mean that the design and operational management of a project meant for a certain climate scenario will no longer be relevant in

20 years' time. For instance, warmer summers may increase the susceptibility of materials to heat deformation or increase the risk of wildfires to a project. Considering potential impacts such as these is a unique challenge of climate change within EIA.

- **Distinguish between magnitude and significance and use significance criteria** — a large magnitude impact may not be significant if the species affected is common, widely distributed and readily able to recover, but a small magnitude impact may be very significant to a highly sensitive or rare species or habitat. Significance criteria can be developed from existing policy and guidance documents, such as: biodiversity strategies; biodiversity action plans for habitats and species; international, national and local designations: legislation; and/or using an ecosystem-based approach by identifying the valued ecosystem services and how these will be affected by drivers of change over time.
- **Where possible, use causal chains or network analysis** to understand the interactions and associated cumulative effects between specific elements of the project and aspects of the environment. The point is not to be comprehensive, but to understand which cumulative effects might be most significant. These can often be identified with stakeholders who can help work through potential pathways in causal chains.

## 9.12 Complexity of the issues and cause-effect relationships

Many of the recommendations regarding assessing a project's long-term and cumulative effects will also help address the complexity of climate change and biodiversity and understand the cause-effect relationship they have with each other, as well as with other issues assessed within an EIA.

The complexity of climate change and biodiversity should not deter you from analysing direct and indirect impacts the proposed project could have on trends in key issues. At times, this will require simplified models that give best estimates of emissions and impacts, e.g., using best-case and worst-case scenarios to illustrate different future states under various assumptions.

Judging an impact's magnitude and significance must be context specific. For an individual project, e.g., a road project, the contribution to GHGs may be insignificant on the global scale but may well be significant on the local/regional scale, in terms of its contribution to set GHG-reduction targets.

Biodiversity impacts will also depend on geographical and temporal scales of impact and the sensitivity of the habitat or species concerned. For instance, a project's implementation could have possible negative effects on a species that is relatively common at global level but is the only viable population of that species at local level. Using casual chains or network analysis should help to understand the complexity of the issues and cause-effect relationships.

**Communicating uncertainty**

Quantifying uncertainty can be very valuable in decision-making. It cannot eliminate uncertainty, but it can help to understand the levels of uncertainty we are dealing with. To do this well, uncertainty has to be well explained and communicated.

There are two types of probability, subjective and objective. Subjective or inductive probability gives an estimate based on the available information and strength of evidence. Objective or statistical probability presents information where all uncertainties are accounted for.

Irrespective of the type of probability, it is important to be consistent in how terms are used and how they relate to the probability they represent. The IPCC provides a guide, reproduced below:

**Likelihood scale**

| Term | Likelihood of the outcome |
|---|---|
| Virtually certain | 99 – 100 % probability |
| Very likely | 90 – 100 % probability |
| Likely | 66 – 100 % probability |
| About as likely as not | 33 – 66 % probability |
| Unlikely | 0 – 33 % probability |
| Very unlikely | 0 – 10 % probability |
| Exceptionally unlikely | 0 – 1 % probability |

## 9.13 Uncertainty informing Decisions

One of the tasks of describing expected impacts is to help audiences understand what is known with a high degree of confidence and what is relatively poorly understood.

Decision-makers and stakeholders are used to dealing with uncertainty all the time (e.g., economic growth, technological change) and they will be able to use such information. It will be important to reassure them that considering a range of possible uncertain futures and understanding the uncertainties is part of good EIA practice and permits better and more flexible decisions.

The key principle in communicating uncertainty is avoiding complex or obscure language. Those undertaking EIA should describe the sources of uncertainty, characterize its nature and explain the meaning of phrases used. Using everyday language to describe uncertainty can makes the concept more accessible, but there is a risk of misunderstanding, as people may have personal and differing interpretations of terms like 'high confidence'. Using the IPCC terms (see box above) may help here. The IPCC and other institutions offers some uncertainty guidance which aims to help decision-makers to understand the sources of uncertainty in climate information that are most relevant for adaptation planning. It also provides further suggestions for dealing with uncertainty in adaptation planning and for communicating uncertainty.

## 9.14 Monitoring and Adaptive Management

Monitoring, as required by the EAAR Regulations, can be identified and implemented as a mitigation measure. For example, such monitoring measures could be linked to the environmental conditions set in development consent as a result of the EIA procedure (e.g., adherence to agreed flights schedules in order to avoid increasing noise or GHG emissions levels for airports). Moreover, generating recommendations for monitoring the impact of implementing a project, in order to identify any unforeseen adverse effects and take appropriate remedial action, is good EIA practice.

This guidance emphasizes the importance of analysing long-term trends related to climate change and biodiversity, assessing direct and indirect impacts of proposed projects on these trends, acknowledging assumptions and uncertainty in the assessment process and ideally choosing a project design and implementation that allows for changes in light of lessons learnt. If project implementation does allow for changes to be made, EA Practitioners may find it useful to consider the principles of adaptive management.

A key feature of adaptive management is that decision-makers seek development strategies that can be modified once new insights are gained from experience and research. Learning, experimenting and evaluation are key elements of this approach. Adaptive management requires the flexibility to change decisions as new information becomes available. While this may not always be possible, project development designs and permits should increasingly allow for changes in project structure and operation, if changes in the environmental context make them necessary (e.g., increasing severity of flooding, droughts, heat waves, changes in habitats and migration corridors, need for changes in buffers of areas important for protection of biodiversity, etc.).

EIA may facilitate adaptive management by clearly acknowledging assumptions and uncertainty and proposing practical monitoring arrangements to verify the correctness of the predictions made and bring any new information to the attention of decision-makers. When designing such systems, EA Practitioners will need to expand project owners' and stakeholders' knowledge and awareness, ensure their commitment and propose approaches to project implementation that provide for flexibility.

## 9.15 Sources of information on climate change and biodiversity

This section outlines the different types and sources of information that are available and can be used to support the integration of climate change and biodiversity into EIA. Additional sources of information are listed in Annex I. This information will be particularly useful in the EIA screening, scoping and assessment stages, as well as for monitoring/follow-up.

### *Types of information*

Examples of the types of quantitative datasets relevant to climate change and biodiversity include:

- species distribution.
- trend data, e.g., loss of species/habitats.

- protected area status: e.g., OECMs, NTC Act, Game Act and Flora Protection Act designations.
- GHG emission inventories, etc.
- climate projections: IPCC, etc.
- future climate and socio-economic scenarios.

These datasets may already exist, depending on the location and scale required.

### *Sources of information*

The strategic documents that provide the context in which a project must be considered will serve as the starting point for sources of information on climate change and biodiversity. These may include, for example, municipal/local authority town planning schemes and policies/strategies on biodiversity protection (e.g., biodiversity action plans for species and habitats) and climate change mitigation and adaptation plans, strategies, risk assessment or risk management plans, or vulnerability assessment studies.

Other assessments may also be relevant, such as SEAs carried out for higher-level plans and programmes.

For biodiversity, specialist sources include:

- Eswatini National Trust Commission, Eswatini Environment Authority, Department of Forestry, Ministry of Agriculture (Fisheries section), and Big Game Parks.
- Environmental and rural development NGOs.
- Stakeholders dependent on or influencing biodiversity-derived ecosystem services, e.g., foresters, fisheries, water companies/authorities (such as EWSC, DWA).

For climate change, specialist sources include:

- Ministry of Tourism and Environmental Affairs (Climate Change Unit).
- Nationally Determined Contributions (NDC) document
- National GHG emission inventory
- climate projections: IPCC, UNESWA, etc.
- future climate and socio-economic scenarios.

### *Key Eswatini sources of data*

Annex 2 summarizes some of the key sources of data available at Eswatini, including data repositories and datasets, online tools and key reports and documents. The Annex is organized by different topics and types of data.

## 10 EEA Reviewing Checklist

Through a more systematic integration and assessment of climate change impacts and impacts on biodiversity as a result of a project affected by the EAAR Regulations, the EEA are expecting that each project that requires an environmental assessment delves into how that project will be affected by climate as well as how that project, through its emissions and resource use, affects the climate.

At the same time, the EEA are expecting that for each project that requires an environmental assessment delves into how that project will affect directly or indirectly affect biodiversity loss and how, through a comprehensive mitigation plan, the implementation of the project will strengthen the overall management and protection of biodiversity recognising the critical vulnerabilities the country's biodiversity is currently in and into the future.

To this end, the EEA will be looking more closely how the EA Practitioner has used the information contained in this toolkit to describe and analyse how the project will address both climate change impacts and biodiversity degradation.

One of the aims of the new approach by the EEA is to ensure that the EA Practitioner and or sectoral experts contracted to undertake specific technical assessments recognise and mainstream national policy and strategy ambitions particularly in climate change and biodiversity, but also how the project design, implementation and

operation constructively supports, strengthens and mainstreams the country's policy framework into the project.

To advance this EEA ambition, the EEA will now review each EIA against the following checklist to ensure the EA Practitioner has undertaken the requisite technical assessments and analysis, demonstrated the projects policy and legal conformance and presented such in a CMP that boldly and clearly supports the country's sustainable development vision, its climate change adaptation agenda and its commitments to strengthening the protection, management and expansion of the country's precious and often unique biodiversity, ecosystems and habitats.

| EIA Review pointers | Climate change | Biodiversity |
|---|---|---|
| **How well has the EIA described the climate and biodiversity baseline?** | Presentation and assessment of climate change data<br>Use of maps, tables and illustrations<br>Technical climate change impact assessment annex | Presentation and assessment of biodiversity data (species, habitat, ecosystem function)<br>Use of maps, tables and illustrations<br>Technical biodiversity impact assessment annex |
| **How well has the EIA identified project impacts that affect the baseline (at project, local and regional scales)?** | Impacts arising that will potentially adversely affect the operations of the project<br>Impacts arising that contribute towards strengthening climate change (eg emissions released by the project)<br>Did the climate impact assessment utilise scenarios to foresee future climate conditions that will adversely affect the project? | Project impacts arising that will potentially degrade local, regional and national biodiversity<br>Project impacts arising from a strengthening of biodiversity protection and expansion by the project |
| **How well has the EIA mainstreamed national policy ambition into the project design and mitigation plan (ie supports national policy targets)?** | A descriptive overview of the legal and policy framework of the country<br>A descriptive overview of the international agreement framework<br>An analysis of the legal and policy framework indicating how the project supports or degrades the national policy and legal ambition to address climate change at project level | A descriptive overview of the legal and policy framework of the country<br>A descriptive overview of the international agreement framework<br>An analysis of the legal and policy framework indicating how the project supports or degrades the national policy and legal ambition to address biodiversity at project level |
| **How successfully has the EIA identified the overall resilience of the project** | Judgemental assessment of how well the project has been climate proofed<br>Has the EIA adequately addressed:<br>• Reducing GHG emissions through proactive interventions such as use of renewable energies, demand side management of energy | Judgemental assessment of how well the project has strengthened the biological resources it directly or indirectly affects<br>Has the EIA adequately addressed:<br>• Habitat loss and degradation<br>• Changes to ecosystem services<br>• Habitat fragmentation |

| EIA Review pointers | Climate change | Biodiversity |
|---|---|---|
| | use, implementation of strategies that seek to reduce energy use<br>• Reducing the vulnerability of physical infrastructure from extreme weather events through described interventions<br>• Developing a heatwave response plan for workers<br>• Developing a water management plan to minimise the use or water<br>• Utilising natural cooling approaches in its building designs<br>• Included farming and husbandry strategies that contribute towards a more productive system requiring minimal inputs | • Creating change in the natural environment that unbalances the natural order of the ecosystem<br>• Man-made structures that may directly impact species<br>• The spread of invasive alien species that can disrupt natural environments<br>• Changes in the environmental processes (river flow or levels, erosion control etc.)<br>• Pollution introduced into the ecosystem be it in the air, water or soil |
| **How well has the EIA identified and described project mitigation measures?** | Do the mitigation measures proposed adapt the project to a future hostile climate?<br>Are the key climate positive measures adequately described, costed and managed?<br>Will the measures described result in the project being described as climate proofed upon completion? | Do the mitigation measures proposed strengthen or weaken biodiversity of the project site or local area?<br>Will the mitigation measures described result in a project that could be described as being biodiversity positive with "no net loss" of biodiversity?<br>Does the EIA describe any long term plans by the proponent to increase biodiversity on the project site or local area, eg tree planting in communities, establishing a small nursery, creating bird, bee and insect friendly environments? |
| **How well has the EIA identified alternatives and mitigation measures** | How well does the EIA present features or aspects of the project that have reduced the projects vulnerability to climate change impacts<br>To what degree have innovative mitigation or adaptation measures been applied to strengthen they climate resilience of the project?<br>How clearly have national climate targets, goals and ambition been | How well does the EIA present features or aspects of the project that have reduced the projects impact on biodiversity?<br>Have innovative solutions been applied to protect, expand or manage biodiversity?<br>How well has the EIA described alternatives to the original project concept described in the proponent's application for project categorisation? |

| EIA Review pointers | Climate change | Biodiversity |
|---|---|---|
| | integrated into project design, implementation and operation?<br><br>How well has the EIA described alternatives to the original project concept described in the proponent's application for project categorisation? | |
| **How well were sources of information on climate change and biodiversity used and referenced?** | Does the EIA present a wide ranging list and use of national and international literature sources? | Does the EIA present a wide ranging list and use of national and international literature sources? |
| **Does the EIA have technical annexes?** | Does the EIA have a technical annex for the climate change impact assessment?<br><br>Have the findings and recommendations of the technical annex been integrated into the main report and CMP? | Does the EIA have a technical annex for the biodiversity impact assessment?<br><br>Have the findings and recommendations of the technical annex been integrated into the main report and CMP? |

***Annex 1 - Strategic Entry Points for integrating Climate Change and Biodiversity into EIA instruments***

The following table, adapted from the 2022 report "Assessment of Policies and Strategies that are key to support the National Adaptation Planning (NAP) Process" presents some of the key entry points along with sources of information and data, to be used when assessing climate and biodiversity impacts in an EIAs.

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| Climate change | Climate change impacts are already being observed in Eswatini in the form of erratic rainfall and changing temperatures which have a direct influence on availability of water, agriculture production, energy sources and supplies and ecosystems Climate change is threatening Swaziland's quest to achieve sustainable development and therefore the livelihoods and food security of the Swazi Nation. Climate change is already evident in a number of ways. Consistent warming trends and more frequent and intense extreme weather events (such as floods and droughts) have been observed across the country in recent decades. In line with these trends, climate change scenarios consistently project temperature increases across the southern Africa region, which will require the Swazi Nation to adapt to changing conditions. High vulnerability to climate change impacts particularly on vegetation, soils, biodiversity, productivity and livelihoods. | To provide a systematic approach to address climate change impacts through efficient adaptation measures that contribute to the achievement of sustainable development and poverty eradication. | Integrate climate change adaptive measures into the various sectoral policies and national development planning and budgeting.<br><br>Promote development and implementation of adaptation actions that contribute to the achievement of sustainable development, poverty alleviation<br><br>To enhance adaptive capacity and reduce vulnerability to climate change impacts.<br><br>Provide mechanisms for mobilizing and accessing technical, technological and financial support for climate change adaptation.<br><br>Build awareness and understanding of climate change among various stakeholders through education, training and public awareness.<br><br>Strengthen the legal and institutional framework for effective coordination and | National Climate Change Strategy and Action Plan (2015-2020)<br><br>National Climate Change Policy 2016<br><br>Nationally Determined Contributions (NDC) 2021<br><br>National Adaptation Plan (NAP) (under development)<br><br>Climate Change Risk Mapping 2021 |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| | | | implementation of climate change adaptation actions, programmes and initiatives. | |
| Biodiversity and ecosystems conservation | Healthy ecosystems are vital to the implementation of adaptation strategies. The State of the Environment Report (2020) and the Third National Communications (2016) highlighted key climate stresses on ecosystems and biodiversity. Fall in precipitation and rise of temperature in the next 70 years are projected to have significant implications on the sector that will influence plant growth, vegetation community composition, associated habitat suitability and the distribution and abundance of species. Some impacts are already visible such as decline in the number of wildlife (SNAP, 2020). | To manage, protect and conserve biodiversity and ecosystems as vital and essential assets for socio-economic and environmental purposes. | Conserve genetic resources (indigenous trees and land races)<br>Restore and protect wetlands (WRP) and improve sustainable utilization of its resources<br>Prevent, control rehabilitate /restore degraded land<br>Strengthen the implementation of the national biodiversity strategies and action plans (NBSAPs) and ensure that vulnerable ecosystems are addressed in national adaptation programmes.<br>Develop land use plans for each community (divorce plan from land policy)<br>Increase protected area network (from 5.2% to 8%) and re-assess and re-evaluate climate resilience of the protected areas<br>Reduce pressures driving biodiversity loss to improve carbon sinks | Approve Draft Wetlands Policy 2020<br>Approve Draft Wetlands Strategic Plan 2020<br>Approve Draft Forest Bill 2021<br>Flora Protection Act 2002 due for review<br>Environment Management Act 2002 due for review<br>National Solid Waste Management Strategy 2000<br>Swaziland Environment Action Plan (SEAP) 1997 (due for review)<br>National Forest Policy 2002 |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| | | | Properly manage water resources quantity and quality for ecosystems and biodiversity preservation<br><br>Manage and control invasive alien species<br><br>Conduct research, innovation and knowledge sharing on bamboo, moringa, and develop valorization strategy) | Draft National Forestry Programme 2002<br><br>The Environment Assessment Audit and Review Regulations 2022<br><br>Eswatini National Trust Commission Act 1972 |
| Water Resources Planning, development, utilisation, and management | Water is a valuable natural resource, vital for social and economic development as well as for environmental benefits. Eswatini has witnessed a steady decline in water availability and quality degradation that has resulted in water stress in many regions of the country. Poor management of both surface and ground water resources results in over exploitation, reduced quality and quantity. In addition, the lack of enough storage increases vulnerability to droughts episodes. | To invest in water saving technologies<br><br>To increase water availability through integrated catchment management and construction of water storage infrastructure.<br><br>To improve surface and groundwater water quality. | Improve water use efficiency<br><br>Construct additional water storage infrastructure to store flood water<br><br>Develop and implement climate smart catchment management plans and strategies<br><br>Control alien invasive species in catchments<br><br>Enhance risk assessment, management and improve early warning<br><br>Strengthen streamflow observation for emergency preparedness | Water Act 2003<br><br>Water Point Mapping (2016)<br><br>Approve Draft Water Pricing Strategy 2021<br><br>Integrated Water Resource Master Plan 2016<br><br>National Water Policy 2018<br><br>International IncoMaputo Agreement (IIMA) 2002<br><br>Mbuluzi Agreement 1976 |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| | | | Improve water governance and compliance to enhance efficient water use and manage demand.<br>Improve groundwater management | Lavumisa Agreement 2003 |
| Agricultural planning, production and marketing and Improved Nutrition | The agriculture sector plays a dominant role in Eswatini's economy, accounting for 9% share in the total GDP. It is also a source for many raw materials for the country's thriving agro-based manufacturing industries such as food products, sugar, beverages. More importantly, 70% of the population generate income through subsistence and commercial cultivation. | To promote climate smart agriculture.<br>To minimize deterioration of nutrition.<br>To reduce dependency on food aid. | Increase irrigation water use efficiency, equity and security<br>Manage and restore degraded land to improve climate resilience<br>Promote water harvesting for irrigation<br>Strengthen resilience and adaptive capacity through integrated early warning system<br>Construction of medium scale dams to increase irrigation water availability and improve water and soil management<br>Manage alien invasive species.<br>Adopt sustainable climate smart livestock and range management practices<br>Promote integrated pest management system (IPMS)<br>Upscale value chain-based climate smart agriculture | National Irrigation Policy (2005)<br>Comprehensive Agriculture Sector Policy CASP 2005<br>Livestock Development Policy 1995<br>Rural Resettlement Policy 2003<br>Draft Land Policy 1999<br>MoA Strategic Plan (2018-2023)<br>National Agriculture Investment Plan 2015-2025<br>National Food and Nutrition Policy 2016<br>National food and nutrition strategic plan 2010 |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| | | | Promote climate smart aquaculture<br>Facilitate agricultural market information management system. | Climate Smart Agriculture Policy, 2019.<br>Eswatini National Agriculture Investment Plan 2015-2025 |
| Improved Public Health | The effect of climate change on health determinants such as safe drinking water, food security, income, etc. increases the susceptibility of climate relevant health outcomes. For instance, Eswatini's maize and cotton production decreased by 67% and 90% respectively, during El-Nino induced drought in 2015-16 (Government of Eswatini, 2020). The resultant fall in food access and availability, triggered a sharp increase in malnutrition, anaemia and mortality cases. | To enhance capacity to respond to climate change in health care systems<br>Improve Surveillance and rapid response.<br>Strengthen Infection Prevention and Control<br>Strengthen Operational support and logistics<br>Raise Risk Communication and Community Engagement. | Establish/strengthen multi-sectoral and use early warning systems for detection and the management of climate sensitive risk factors<br>Improve basic public health programmes that address vulnerability to climate change induced infections<br>Develop and conduct research on climate change and health<br>Integrate Climate Change into Health Legal frameworks, Strategies, and plans<br>Address Malnutrition for improving Health amongst the most vulnerable groups (Under-fives and >65 years population<br>Incorporate Climate change information in integrated disease | Approve Eswatini Public Health Bill<br>National Health Sector Strategic Plan (2014-2018)<br>National Sanitation and Hygiene Strategy 2019-2023<br>National Health Sector Policy 2016-2026 |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| | | | surveillance and response (IDSR) system<br>Promote waste management<br>Build Capacity of health care staff on risk informed programming and on WaSH<br>Climate-Proofing of Health Care Infrastructure | |
| Resilient Infrastructure | Eswatini's rapid urbanization is driven by migration of people from rural area in pursuit of better job opportunities. This growth results in increased pressure on existing urban infrastructure, increased demand for housing, water and sanitation, electricity, road networks, education and health. | To increase the resilience of both new and existing infrastructure to climate change. | Promote integrated waste management in all areas<br>Strengthen capacity for professionals in environmental and building sectors<br>Implement nature-based solutions for urban infrastructure<br>Develop climate change resilient infrastructure<br>Policy reviews, updates & enforcement - settlement planning, land tenure for improved adaptation and resilience<br>Implement climate smart town planning<br>Implement payment for ecosystem services i.e buy back critical ecosystems | The Human Settlements Authority Act of 1988<br>Construction Policy<br>Housing Policy<br>Physical Planning Policy<br>Draft Maintenance Policy<br>Contractor Performance Strategy<br>The Sectional Titles Act of 2022<br>The Crown Lands Disposal Regulations of 2003. |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| | | | Retrofit existing critical infrastructure built in hazard prone areas and climate proof them<br><br>Strengthen governance and institutional framework on climate resilient infrastructure (and coordination) | Vesting of Land in Kings Order (1973).<br><br>The Crown Lands Disposal Act of 1911.<br><br>National Transport Policy<br><br>Town Planning Regulations<br><br>Construction Industry Council Regulations, 2017 |
| Sustainable Potable Water, Sanitation and Hygiene access | Water and sanitation-related diseases are among some of the leading causes of death for children under five years of age in the country. Challenges faced by the country include poor levels of investment, weak sector coordination and climate variability. On the other hand, influencing national behaviour change toward good hygiene practice and ending open defecation remains a prime challenge. Eswatini has a glaring gap in the access between urban and rural communities and including the growing informal settlement around the urban centres. | To ensure sustainable and resilient safe water and sanitation services.<br><br>To promote hand washing with soap.<br><br>To ensure a coordinated WASH response. | Increase climate resilient access to drinking water in all exposed areas to build community resilience to climate change.<br><br>Promote climate smart and efficient domestic water-use and recycling technologies<br><br>Conduct a situation analysis exercise to strengthen the resilience of sanitation interventions and increase access to climate proofed sanitation facilities<br><br>Promote hygiene behaviour change in all households to | WaSH Sector Strategic Development Plan 2017-2022<br><br>Water Services Act 1992<br><br>Eswatini Public Health Bill<br><br>National Sanitation and Hygiene Policy 2019 |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| | | | integrate climate change adaptation | |
| Gender | Implications of growing climate variability and change on Eswatini's environment is severely felt by women as they are more deeply engaged in resource mobilization and utilization than men at the household level. Climate change impacts on natural resource, including water and firewood availability consequently exacerbates gender inequalities.<br><br>The Multiple Indicator Cluster Survey 2014, reflect that in 68.2% households, adult females and female child under age of 15 usually collect drinking water when the source is not on the premises. | To provide protection against abuse, violence, exploitation, and neglect such as the risk of GBV, SGBV to all vulnerable groups. women, girls, children, the elderly, sickly and those with disabilities.<br><br>To ensure that human rights are respected and enable survivors and persons at risk to access specialized care and support. | Equitable access to knowledge and skills<br><br>Equitable access to natural resources, technology and finance and credit to better prepare for climate impacts<br><br>Enhanced participation of women and girls in decision making<br><br>Develop Gender responsive policies and strategies in natural resource management | Gender National Policy (2019) |
| Energy sector | Energy is an important resource that fuels all economic activities; however, the sector has a lower share in the overall GDP of the country. The GHG emissions from the sector was 1.26 MtCO2e in 2018 with transport contributing around 57% followed by commercial/institutional, residential and agriculture at 18% and manufacturing and construction industries at 16%. | To enhance resilience of the energy sector to climate change.<br><br>To increase access to efficient energy sources.<br><br>To promote and improve the use of alternative energy sources. | Promote diversified energy sources.<br><br>Promote development and use of energy efficient technologies. | Energy Policy 2009<br><br>Energy Policy Implementing strategy 2010<br><br>Sustainable Energy for All Country Action plan 2014<br><br>Programme framework for affordable renewable Energy in Swaziland (PARES) 2018 |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| | | | | Energy efficiency and Conservation Policy<br>Energy efficiency and Conservation Strategy<br>Independent Power Producer Policy of 2016<br>Energy Masterplan 2034 |
| Resilient Tourism | The Government of Eswatini has identified tourism as one of the national priority sectors. Almost 1.2 million international tourists visited Eswatini in the year 2019. It has a good potential to stimulate economic growth through the creation of employment opportunities, poverty alleviation, and foreign income generation. Apart from international arrivals, domestic tourism has also been a crucial contributor providing a bedrock for sustained tourism growth and development. | To build resilience and adaptive capacity of the tourism industry.<br>To restore the degraded tourist attraction sites. | Tourism Product diversification<br>Promote disaster preparedness planning<br>Develop Evacuation plans<br>Promote Rainwater harvesting and recycling within the tourism sector.<br>Strengthen Early warning and communication in the sector. | Tourism Authority Act 2001<br>National Tourism Strategy<br>National Tourism Policy |
| Education and Research | Learning and related education activities often become the first casualty of most disasters either as direct or indirect consequences. In a disaster situation, often the household level food security decline or diminish implying that many children go to classes hungry and unable to concentrate. The consequences are a high dropout rates, increased absenteeism, and | To ensure continuity of teaching and learning at all levels of education even during disasters. | Awareness raising and sensitization in all educational institutions.<br>Provision of hand washing facilities in schools.<br>Facilitate emergency response teaching alternative techniques | Eswatini national curriculum framework for general education<br>The Education Sector Strategic Plan 2010-2022 |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| | compromised quality of education that result in high repetition rates. | | (radio and television learning modules).<br>Preposition water harvesting facilities in schools.<br>Capacity building for teachers on climate change and adaptation. | National Education and Training Improvement Programme (NETIP, 2014)<br>The Swaziland National Children's Policy (2009) - Long overdue for review<br>The Education Act (1981) under review<br>The National Science Technology and Innovation Policy (STI)<br>Teaching Service Act (1982)<br>Special education policy statement (1999)<br>National education and training sector policy (2018)<br>The national research council bill (2020) |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| DRR | Eswatini is experiencing recurring natural and human induced disasters such as drought, extreme weather, heatwaves, damaging winds, flash floods, high wind, cyclonic storms, hailstorm, diseases outbreak and fire. The most common and recurring disasters in the record were drought, floods, storms, fires and disease outbreak.<br><br>These hazards have caused a varying degree of impact on lives and livelihood of the population as well as the social and economic landscape of Eswatini. | To ensure a coordinated and effective system of disaster risk reduction/ management in Eswatini.<br><br>To foster a culture of adherence to humanitarian standards and principles among stakeholders and partners while providing humanitarian assistance to the affected population.<br><br>To encourage evidence-based interventions through assessments, research for sustainability of interventions and resilience.<br><br>To effectively lobby for resources mobilization for the emergency response activities. | Update and revise risk and hazard maps and collect data through research for risk reduction.<br><br>Develop a multi hazard early warning system covering all relevant sectors.<br><br>Modernise meteorological services to improve access to high quality weather data and support risk assessments<br><br>Strengthen the capacity of early warning centres, for improved emergency preparedness, disaster risks and response capacities across all sectors.<br><br>Build capacity to monitor climate and disaster risks within relevant institutions.<br><br>Capitalize and operationalize the Disaster Management Fund.<br><br>Undertake comprehensive Risk Assessment to develop Risk Knowledge.<br><br>Develop Disaster Risk Finance Strategy.<br><br>Facilitate review of Disaster Management Act and Policy. | National Disaster Management Act 2006<br><br>National Disaster Risk Management Policy 2011<br><br>Disaster Resilience Strategy 2017-2022<br><br>National Emergency Response Mitigation and Adaption Plan (2016-2022) 2016<br><br>National Multi-Hazard Contingency Plan (2019-2020) 2019 |

| THEMATIC AREA / SECTOR | CLIMATE CHANGE AND BIODIVERSITY LINKAGES | OBJECTIVE | STRATEGIC ADAPTATION OPTION | SOURCES OF ADDITIONAL INFORMATION |
|---|---|---|---|---|
| | | | Identify and harmonize the existing sectoral mechanisms for emergency management. | |

*Annex 2 - Sources of Information to inform an Assessment*

**Key:**

 Climate change

 Biodiversity

 Mitigation

 Adaptation

 Databases, data and online

 Organizations projects

 Reports and repositories and research other documents & tools

*Table 8 - Key Eswatini sources of data, including data repositories and online digital datasets*

| | Source | Description | Links (November 2022) |
|---|---|---|---|
|  | **Climate change** | | |
|  | **Nationally Determined Contributions** | This document is the primary source of information regarding the country's response to climate change and the set of activities and targets set for the same. | https://unfccc.int/sites/default/files/NDC/2022-06/Eswatini%27s%20Revised%20NDC%2012%20Oct%202021.docx |
|  | **Climate Change Knowledge Portal, CCKP (the World Bank Group)** | The portal provides online access to comprehensive country data related to climate change and development. The portal provides development practitioners with a resource that helps them explore, evaluate, synthesize, and learn about climate-related vulnerabilities and risks, in various levels of detail. | https://climateknowledgeportal.worldbank.org/country/eswatini |
|  | **Intergovernmental Panel on Climate Change (IPPC)** | The IPCC is the leading international body for the assessment of climate change. Its website includes the sixth assessment report on climate change (2022) and other global climate change science findings, split by working groups and sectors. | https://www.ipcc.ch/reports/<br>https://www.ipcc.ch/data/ |
|  | **Climate change — mitigation** | | |

| | Source | Description | Links (November 2022) |
|---|---|---|---|
|  | **Greenhouse Gas Mitigation** | The GHG mitigation assessment aims to evaluate the potential to reduce GHG emissions through the implementation of different policies and measures in Eswatini. The assessment aims to provide recommendations as to possible GHG reduction targets for Eswatini that are based on an evaluation of specific policies and measures that could achieve them. | https://www.ccacoalition.org/sites/default/files/resources/Eswatini%20GHG%20Mitigation%20Assessment%20Final%20040621.pdf |
|  | **National Greenhouse Gas Inventory** | The GHG inventory report provides details on the emissions and sinks and their sources in Eswatini. It also provides data on the sources of data and emission factors used in the estimates. | Contact the Climate Change Unit, Ministry of Tourism and Environmental Affairs. |
|  | **Climate change — adaptation** | | |
| | **Initial Adaptation Communication to the United Nations Framework Convention on Climate Change (UNFCCC)** | The document provides information on the national circumstances including institutional arrangements; climate change impacts and risks; and adaptation measures and priorities proposed and already implemented. It further elaborates on barriers and challenges to planning and implementing climate change adaptation, and the support and implementation needed by the Kingdom to deliver on its adaptation priorities. | https://unfccc.int/sites/default/files/resource/eswatini-climate-change-adaptation-plan-unfccc.pdf |
|  | **IPCC Climate Adaptation Portal** | This portal provides a list of online portals on adaptation that contain an array of information, data, and tools on vulnerability assessment and adaptation measures implemented in various parts of the world at different scales. | https://www4.unfccc.int/sites/NAPC/Pages/information-websites.aspx |
|  | **EmDAT** | International disaster database that provides information helpful for natural disaster preparation and decision-making. It can be useful for scoping vulnerability to climate change. | http://www.emdat.be/ |

| | Source | Description | Links (November 2022) |
|---|---|---|---|
| | **DesInventar Sendai** | This is an online tool for analyzing disaster trends and their impacts in a systematic manner based on the Sendai Framework. The data can also be used to characterize climate change impacts and vulnerability in various parts of the country. | www.desinventar.net/index_www.html |
| | **National Adaptation Plan (NAP)** | This is a good source of country-specific actions regarding adaptation | https://unfccc.int/sites/default/files/resource/eswatini-climate-change-adaptation-plan-unfccc.pdf |
| | **State and Trends in Adaptation 2022 Report: Africa** | The State and Trends in Adaptation 2022 Report: Africa is a useful reference to gain further understanding of climate impacts and adaptation needs for Africa. The report assesses climate adaptation across various sectors including Livestock, Innovation in Agriculture, Urban Informality, City Resilience, and Nature-based Solutions in Agroforestry | https://gca.org/reports/sta22/ |
| | **Biodiversity** | | |
| | **National Biodiversity Strategy and Action Plan** | The NBSAP is the principal instrument for implementing the United Nations Convention on Biological Diversity (CBD) at national level. | https://www.cbd.int/doc/world/sz/sz-nbsap-v2-en.pdf |
| | **Birdlife Datazone** | Updated site that provides species- and habitat-specific information for sites. | http://www.birdlife.org/d atazone/ |
| | **Biodiversity Information for Eswatini** | Database of all relevant Eswatini biodiversity data sources. It is a good source of indicators and maps for Eswatini. Hosted by the Eswatini National Trust Commission. | http://eswatininatureserves.com/biodiversity/index.asp |

| | Source | Description | Links (November 2022) |
|---|---|---|---|
|  | **Biodiversity Explorer** | An interactive database of biodiversity in Eswatini grouped into Fauna, Flora and Fungi and Lichens. Hosted by the Eswatini National Trust Commission. | http://eswatininaturereserves.com/bioexplore/index.asp |
|  | **Global Biodiversity Information Facility** | Publicly accessible biodiversity data, including species occurrence and taxonomic information. It is a very detailed species-specific data source and a good indicator of potential species presence across Eswatini for use in scoping. It is likely to require site investigation to confirm occurrences. | http://data.gbif.org/welc ome.htm |
|  | **Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES)** | The IPBES goal is to be an interface between the scientific community and policy makers and to build capacity for and strengthen the use of science in policy making. IPBES set up a mechanism to address the gaps in the science policy interface on biodiversity and ecosystem services. | http://www.ipbes.net/ |
|  | **Protection-worthy areas** | Information on the protection-worthy areas of Eswatini based on a survey conducted in 2003. | http://eswatininaturereserves.com/proposed_reserves.asp |