CO-DEVELOPMENT OF A LINKED-UP MONITORING AND REPORTING FRAMEWORK FOR THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT AND THE PARIS AGREEMENT: A CASE STUDY OF THE WATER SECTOR

FINAL REPORT

Report to the

WATER RESEARCH COMMISSION

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WRC Report No. 3015/1/22
ISBN 978-0-6392-0438-3

May 2022

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This is the final report of WRC project no. C2019/20-00112

Printed in the Republic of South Africa

EXECUTIVE SUMMARY

BACKGROUND

South Africa has committed to contributing to the global goals of promoting sustainable development and combating climate change under the United Nations Sustainable Development Goals (SDGs) and the United Nations Framework Convention on Climate Change (UNFCCC), respectively. The adoption of the UNFCCC Paris Climate Change Agreement (often referred to as the Paris Agreement) which South Africa signed in April 2016 further cemented the country's pledge to promote adaptation, in addition to pursuing the long-standing goal of mitigation.

Despite being negotiated under distinct global processes, using different negotiation approaches, having different follow-up and review mechanisms, and having different reporting structures and frequencies, there are still many similarities between the architecture of SDGs and the Paris Agreement. The common characteristics include global coverage; explicit synergies between climate change and development; the same time frame (up to 2030); the flexibility to use nationally determined targets; and the requirement for national level reporting. Importantly, under both agendas there is an obligation to report progress at regular intervals.

Both the SDGs and the Paris Agreement demand holistic planning and coordination across ministries in order to improve policy coherence for integrated implementation, monitoring and reporting at country level. The central question then becomes, how to optimise the reporting processes for both climate change adaptation and sustainable development, with a view to increasing synergies in information flows, information management and optimise available resources (human, institutional and technical) while avoiding reporting burden and duplication.

This project aimed to address this question of promoting coherence while trying to meet the country's reporting obligations to the United Nations on both climate change and sustainable development, specifically in relation to water issues. In other words, it sought to find ways to improve alignment in the processes that are in place for the compilation of mandatory reports to the UN under these two treaties.

According to international best practice, it is recommended that a holistic approach to adapting to climate change should be an iterative process consisting of: (i) assessing impacts, vulnerability and risks; (ii) planning for adaptation; (iii) implementing adaptation measures; and (iv) monitoring, reporting and evaluating adaptation (UNFCCC Adaptation Committee, 2013). We restricted the scope of this work to the fourth element, and specifically focussed on monitoring and reporting done at the national level of government, because that is where reporting to the UNFCCC takes place.

Similarly, reporting to the HLPF on progress on the SDGs happens at the national level of government, and this is the level at which this study focussed. Attention is expressly drawn to the fact that this work did not attempt to assess planning and implementation of either the SDGs or climate change adaptation interventions. As such, what is presented in this report does not include an assessment of planning, policy and implementation processes, but strictly the reporting done to fulfil obligations under the SDGs and the Paris Agreement.

While recognizing the indivisible nature of the SDGs, and specifically the high level of interconnectedness

of SDG 6 with all the other SDGs (Libala *et al*., 2021), as well as the cross-cutting impact of climate change on all SDGs (not just the environmental cluster of SDGs), we deliberately limited the focus of this work to SDGs 6 (*Ensuring availability and sustainable management of water and sanitation for all*) and 13 (*Taking urgent action to combat climate change and its impacts*), in accordance with the stated overall aim of the project.

APPROACH

The project aim was broken down into the following objectives:

(i) To get an understanding of the synergies and trade-offs in the treatment of water issues in South Africa's reports to the United Nations; and

(ii) To design a framework to optimize the coherence of monitoring and reporting of South Africa's water issues for both the SDGs and the Paris Agreement.

The research approach adopted in the project was a combination of documentary analysis and stakeholder engagement. The main sources of information used were the SDG Indicator Baseline Report (2017); the SDG Voluntary National Review (2019); the SDG country report (2019); South Africa's first Nationally Determined Contributions (NDCs, 2015); updated NDC (2021); South Africa's first (2000), second (2011) and third (2018) National Communications (NCs) to the UNFCCC and the the National Climate Change Adaptation Strategy (NCCAS). Although the NCCAS is not one of the reporting vehicles under the Paris Agreement, we included it in the analysis since it is the key guiding document for climate adaptation action in the country. As such, it was logical to look in this document for any potential interlinkages between SDG 6 and adaptation action as envisioned under SDG 13 and the Paris Agreement.

To assess the degree of alignment between the content of the SDGs and the climate change adaptation documents of focus herein, a hybrid of qualitative and quantitative methods was followed. In the first instance, textual content analysis was used, where each of the SDG 6 targets was read and then a list of keywords compiled that were deemed to be reflective of the general ambitions of the respective target. These keywords were then used to systematically search each of the NCs to try and assess the degree to which they report on the issues SDG 6 aims to address.

For the assessment of potential synergies, trade-offs and constraints between SDG 13 targets and the NDC goals, a textual content analysis was conducted, where the actual wording of both the NDC goals and the SDG 13 targets were evaluated to assess how climate actions that are listed in the NDC goals can contribute to the SDG targets and indicators and vice versa. Pairwise assessments were done, where each NDC goal was evaluated in relation to each SDG target to determine whether its achievement would enhance, restrict or have no effect on the achievement of that particular target.

To assess synergies and trade-offs between SDG 6 and the Paris Agreement, and in recognition of the lack of detail of South Africa's approach to water resources management in the NDC, the analysis was expanded to the NCCAS, specifically looking at how the listed strategic interventions can potentially impact SDG 6 targets. A similar data analysis approach to that followed for SDG 13 and NDC interlinkages was done. That is, the text of each of the actions proposed for the strategic interventions listed in the NCCAS was read and evaluated against each of the eight SDG 6 targets to determine whether a proposed NCCAS action would enhance, restrict or have no effect on the target.

To facilitate the co-design of a practical monitoring and reporting framework, we followed the Participatory Action Research approach. We used the focus group method to capture in-depth information from the experiences of decision-makers and stakeholders involved in the monitoring and reporting of SDG 6, SDG 13 and the Paris Agreement in South Africa. Focus group discussions help in overcoming biases of individual opinions and create a more robust view of factors contributing to or hindering effectiveness in monitoring and reporting

by allowing for discourse between key departments and stakeholders. Respondents were recruited using a snowball sampling approach that built on contacts within the project team and already known individuals across the relevant entities. Participants in the focus group were recruited specifically for their diverse expertise and/or experience with water and climate change adaptation. The focus group sessions were held virtually on Microsoft Teams and the proceedings were recorded, with the permission of all participants. The first session took the form of a workshop whilst the second entailed presentations and discussions. The recordings and notes from both sessions were analysed using qualitative content analysis and the constant comparison method for thematic analysis. In addition to the focus group sessions, there was a working session with the project reference group.

The process of developing the framework was anchored in SDG 6, because there is already an established and well-functioning institutional mechanism for tracking progress on SDG 6. A ranking exercise of synergies between SDG 6 and SDG 13 targets, as well as synergies between SDG 6 and NCCAS strategic interventions was performed, resulting in a list that should be used to inform the priority that must be given to the various SDG targets in terms of planning, implementation, monitoring and reporting so as to realise the biggest cross-cutting returns.

FINDINGS AND RECOMMENDATIONS

Lessons Learned from Previous Reporting Cycles, and Gaps and/or Opportunities Identified for Improved Reporting

Work regarding SDGs seems to be done only sporadically and reactively in certain departments. This leaves little room for gap analyses and adaptive management to adjust for the trajectory towards meeting the targets. We emphasize the importance of an adaptive approach that entails iteration between implementation and reporting, underpinned by continuous monitoring and evaluation.

Data quality and verifiability issues, as well as the importance of bringing data custodians into the fold and engaging with them continuously were the most important matter raised by the stakeholders, especially as data required to report against SDG 6, 13 and the Paris Agreement lie with multiple custodians. The responsibilities of collating and analysing the data should be clearly mapped and outlined. A good understanding of the stakeholders involved in the data stream of each indicator would ensure that such stakeholders are properly engaged, to promote an understanding of data quality requirements.

Analysis of the degree of alignment between South Africa's reporting towards the SDGs and the Paris Agreement focused on the approach (i.e. processes, institutional arrangements and information flows) to reporting, and the content of reports. Areas of potential synergies were found in the respective approaches, especially in relation to the stakeholders involved, as well as information sources used to compile the reports. Of particular importance in terms of the potential to promote alignment between the reporting processes is the Intergovernmental Project Steering Committee, which oversees the compilation of the NCs. This committee has representatives from similar departments to those involved in the various SDG Sectoral Working Groups. Streamlining information flows between these structures could promote efficient reporting.

An important finding of this study was the fact that institutional ownership of the SDGs is crucial for effective implementation, monitoring and reporting. To this end, the strides made by the Department of Water and Sanitation (DWS) in entrenching SDG 6 within the department are commendable. A functional SDG 6 structure has been developed within the Department, comprising a dedicated technical team for each SDG 6 target, plus three cross-cutting technical teams for Research and Innovation; Sectoral Support and Coordination; and Water and Sanitation Sector Leadership Group. These teams work in concert to ensure continuous

progress towards the achievement of SDG. Task Teams ensure that findings from the annual SDG 6 gap reports get translated into ground-level action. In this way the system allows for self-correction and is self-adapting. The National Water and Sanitation Master Plan is the vehicle for corrective action within the DWS's SDG 6 programme.

The approach of this department provides a useful template that other government departments may adopt and adapt accordingly. In particular, the Department of Forestry Fisheries and the Environment (DFFE) is encouraged to explore the possibility of institutional ownership of SDG 13 by linking it with the established UNFCCC structure within the department. Importantly, we propose that the monitoring and reporting framework for SDG 13 and the adaptation component of the Paris Agreement be explicitly linked to the NCCAS, whereby the various strategic interventions and actions can meaningfully contribute to the achievement of specific targets. In this way, the NCCAS would be the equivalent vehicle for corrective action within SDG 13 and the Paris Agreement within DFFE. Anchoring the work of DFFE on climate change adaptation to the NCCAS, putting the required structures and supporting these with the necessary processes (such as regular gap analyses) could improve performance towards SDG 13 and the Paris Agreement. The adoption of an adaptive management approach would strengthen the interlinkages between implementation, monitoring, reporting and evaluation.

The experience gained and learning achieved by the DWS through their implementation of a Monitoring, Evaluation and Reporting (MER) framework for SDG 6 could be transferred to other departments through appropriate learning events as well as longer-term guidance in the establishment of their own MER systems. The National Coordinating Mechanism could play a key role in facilitating this cross-learning. Additionally, the Department of Planning Monitoring and Evaluation (DPME) could promote the institutionalization of SDGs by increasing their prominence in the Medium-Term Strategic Framework, which is the guiding document for departmental work programmes. This, in turn, would translate into the explicit mention of the SDGs in departmental five-year strategic plans and performance plans, subsequently resulting in the implementation of the SDGs being viewed as an integral component of departmental mandates.

How Water Issues are Addressed in Climate Change Adaptation Reports

Recognizing that NDCs are the primary vehicle through which countries can establish their commitment, emphasis on water issues in South Africa's first and updated NDCs is limited, representing high level goals to which different spheres of government and sectors must respond. This is not to say there is no commitment to address water issues in the country's response to climate change. On the contrary, water issues are fully articulated in other relevant policies and documents such as the NCCAS and the NCs. In fact, each of the three NCs includes a section on water resources in the chapter addressing vulnerabilities and adaptation strategies, thus laying the foundation for improvement of information that is reported over time and which is one of the core principles of reporting under the UNFCCC.

The emphasis in the NCs is on understanding the impact of projected future climate change on water resources, without necessarily compellingly relating this to issues of access to water, as envisioned under SDG 6. The water-related information that is contained in the NCs in the context of SDG 6 is mainly around water supply; demand; quality and management. This is probably due to the heavy reliance of the NCs on climatic modelling databases as a source of information that tend to focus on how climate change will impact precipitation, and by implication, the supply and demand of water. It is imperative therefore, to view these prominent themes in the context of "*water supply by water-related ecosystems*" (Target 6.6), rather than in the context of Target 6.1, which speaks specifically to the issue of "*equitable access to safe and affordable drinking water*". This interpretation is further reinforced by the observation of an almost absence of

statements around water allocation; affordability and pricing in the NCs.

Of concern is the superficial reference to sanitation and hygiene in the NCs in the context of the climate change response. Although the word "sanitation" does appear in the three NCs, it is mostly a repeat of statements around how municipalities struggle to deliver adequate sanitation services, especially in rural and/or informal settlements. Linked to these statements are examples of specific instances of outbreaks of water-borne diseases. What is lacking is a meaningful description of how the situation has changed (worsened or improved) since the first NC was published and how/whether there is any link with country's climate change response. This represents an area of major misalignment and raises the question whether in communicating the country's approach and progress to climate change adaptation, the NCs adequately incorporate headline sustainable development indicators or show if the country's commitment to promote climate change adaptation is having a demonstrable and meaningful impact on key water and sanitation-related priorities. Even more concerning is the almost lack of sanitation-related information in the NCCAS, with the term "sanitation" only appearing once in the relevant context. If adaptation actions are meant to build resilience, it is important that prioritised adaptation actions should also include sanitation and hygiene considerations, especially in key documents such as the NCCAS. Moreover, it is proposed that alignment between the SDGs and the NDCs be tightened by specifying adaptation targets and indicators that relate strongly to relevant SDG targets in future iterations of the NDCs.

Towards a Linked-up Monitoring and Reporting Framework for SDG6, SDG 13 and the Paris Agreement.

A key guiding question for the development of the framework was whether there is scope to mould the existing SDG 6 indicators to contribute to the climate change response, specifically adaptation. In other words, what indicators can maximize the progress on SDG 6, SDG 13 and the adaptation goal of the Paris Agreement?

Strong synergies exist between SDG 6 and SDG 13 (Libala *et al*., 2021). Similarly, some synergies exist between SDG 6 and the NCCAS strategic interventions, albeit not as many. It was thus logical to anchor the framework in SDG 6. The ranking exercise, which was done at target level, showed target 6.4 (water use efficiency and freshwater stress) as the one with the highest potential to demonstrate progress in adaptation. This is because an improvement in water-use efficiency and/or a reduction in water stress (indicators 6.4.1 and 6.4.2 respectively) would translate into reduced vulnerability to water scarcity. The remaining targets were ranked second to eight as follows: 6.5 (integrated water resources management); 6.1 (access to safe drinking water); 6.3 (water quality); 6.b (local engagement); 6.6 (water-related ecosystems); 6.a (water and sanitation support); 6.2 (sanitation and hygiene). The low ranking of the sanitation and hygiene target reflects the lack of prominence of these issues in the NCCAS and further emphasizes the urgent need to promote their importance. As the principal policy instrument guiding adaptation action in the country, it will be crucial for the revised NCCAS to elevate the importance of adequate sanitation services in the climate change response.

The interactions between adaptation goals as indicated in South Africa's NDCs and the targets of SDG 13 were found to be either synergistic or neutral. This was not surprising and emphasized the point that both tools seek to achieve an effective climate change response. Indeed, SDG 13 is unique among all the SDGs in that it is the only one with an asterisk, which is in acknowledgement of the fact that the UNFCCC is the primary intergovernmental forum for negotiating the global response to climate change. It is conceivable, that the observed absence of a dedicated SDG 13 institutional arrangement, could be attributable to this high degree of alignment between SDG 13 and the UNFCCC. However, we would like to caution against an apparent neglect of an explicit focus on SDG 13. The fact that South Africa could only report on one SDG 13 indicator (out of

eight), in contrast to a 100% report against SDG 6 indicators calls for more visible ownership of and performance on SDG 13.

Reporting should not be a mere box-ticking exercise, but should rather communicate in a demonstrable manner how effectively the country is moving towards achieving stated goals, through implementing necessary interventions. We emphasize the unbreakable link between implementation, monitoring, evaluation and reporting. We believe that the framework developed through this work is practical and can be a useful tool to help with meaningful reporting on adaptation progress. We urge the key departments/entities responsible for the compilation of SDG reports and the National Communications to spearhead the uptake and use of this framework.

We note that the goal of developing this framework was not to replace or duplicate existing monitoring and data collection tools, but rather to design a tool that is optimised for reporting specifically on water and sanitation issues in the context of climate change adaptation. To this end, the existence of the National Climate Change Information System is acknowledged, which is a key tool developed under the NCCAS and call for its sustained maintenance to support evidence-based reporting well into the future. Similarly, the StatsSA Integrated Indicator Framework is also acknowledged, which is currently under development, and propose an exploration of how these systems/tools could be seamlessly integrated.

ACKNOWLEDGEMENTS

This work was funded by the Water Research Commission under project C2019/2020-00112. The research team is deeply appreciative of the support given by the research manager, the research coordinator and the reference group through the duration of the project. Our sincere thanks also go to the various stakeholders who participated in the workshops held in May and August 2021. These stakeholders represented various institutions, as listed in Appendices 6A and 6B. Various other individuals availed themselves outside of these two formal engagements to answer questions and share resources with the project team. We are grateful to these people.

We also acknowledge the contributions made by Dr Anicia Maoela, Dr Tsepang Makholela and Mr Sithethelele Bekwa when they were still members of the project team.

CONTENTS

CHAPTER 1. ASSESSING ALIGNMENT BETWEEN THE SDGS AND THE PARIS AGREEMENT REPORTING THROUGH A WATER LENS _____ 1

1.1 INTRODUCTION _____ 1
1.1.1 Background 1
1.1.1.1 The sustainable development discourse 1
1.1.1.2 The climate change crisis 2
1.1.1.3 Global governance of climate change and Sustainable Development Goals 2
1.1.1.4 South Africa's reporting obligations under the Sustainable Development Goals and the Paris Agreement 3
1.1.2 Motivation 3
1.1.3 Contextualization 4
1.1.4 Delineation of the Study 4

1.2 METHODOLOGY _____ 5
1.2.1 Information acquisition 5
1.2.1.1 SDG reporting 5
1.2.1.2 Climate change adaptation reporting 5
1.2.2 Data extraction and analysis 6

1.3 RESULTS AND DISCUSSION _____ 8
1.3.1 The approach followed by South Africa in the compilation of reports for SDG 6 and 13 and the Paris Agreement 8
1.3.1.1 Institutional arrangements 8
1.3.1.2 Reporting processes 9
1.3.2 How are water issues addressed in climate change adaptation reports? 13
1.3.3 On the linkages between SDG targets and the adaptation imperatives of the Paris agreement 14

1.4 CONCLUSIONS _____ 18

CHAPTER 2. LESSONS LEARNT IN THE COMPILATION OF SOUTH AFRICA'S REPORTS TO THE UN ON SDG 6, SDG 13 AND THE PARIS AGREEMENT _____ 19

2.1 INTRODUCTION _____ 19

2.2 APPROACH _____ 20
2.2.1 Stakeholder mapping 20
2.2.2 Stakeholder engagement 21

2.3 RESULTS AND DISCUSSION _____ 22
2.3.1 Who are the stakeholders in the monitoring and reporting of water issues in the SDGs and the Paris Agreement? 22

2.3.2 What are the information needs, governance requirements and institutional arrangements needed for optimal reporting? 24
2.3.3 What lessons have been learned from previous reporting cycles, and what gaps and/or opportunities have been identified for improved reporting? 27

2.4 CONCLUSIONS 29

CHAPTER 3. TOWARDS A LINKED-UP MONITORING AND REPORTING FRAMEWORK FOR SDG 6, SDG 13 AND THE PARIS AGREEMENT 30

3.1 INTRODUCTION 30
3.1.1 Context 30
3.1.2 Background 30
3.1.2.1 Differences between the SDGs and the Paris Agreement: 30
3.1.2.2 Similarities between SDGs and the Paris Agreement: 31
3.1.2.3 Benefits of a joined-up monitoring and reporting framework for the SDGs and the Paris Agreement 31

3.2 APPROACH 32

3.3 PROPOSED FRAMEWORK 41

3.4 LIMITATIONS 44

CHAPTER 4. REFLECTIONS AND RECOMMENDATIONS FOR FUTURE WORK 45

4.1 REFLECTIONS ON THE JOURNEY 45

4.2 RECOMMENDATIONS FOR FURTHER RESEARCH 47

REFERENCES 49

APPENDICES 51

Appendix 1: SDG 6 Targets and Indicators 51
Appendix 2: SDG 13 Targets and Indicators 53
Appendix 3: NDC Goals 55
Appendix 4: Water resources related information contained in the three National Communications 56
Appendix 5: NCCAS objectives, interventions and outcomes 57
Appendix 6A: List of institutions represented at the Stakeholder Engagement Session held on 20 May 2021 59
Appendix 6B: List of institutions represented at the Stakeholder Engagement Session held on 17 August 2021 59
Appendix 7: List of questions used to guide the discussion during the Stakeholder Engagement Session held on 20 May 2021 60

FIGURES

Figure 1-1: Overview of the UN Sustainable Development Goals. (United Nations, 2020) 1

Figure 1-2: Three-phased Country Report writing process (adapted from: Statistics South Africa, 2019a). 9

Figure 1-3: The process of compiling and submitting SDG Country Reports. Green arrows denote iterative steps in the process. 10

Figure 1-4: The process of compiling and submitting National Communications. 11

Figure 1-5: Sources of information used in the compilation of (a) SDG reports and (b) National Communications. Dark-shaded shapes denote primary sources; lighter-shaded shapes represent secondary sources; and the clear shape represents a tertiary source of information. 12

Figure 1-6: Frequency of occurrence of keywords related to SDG 6 targets in the first, second and third National Communications (a, b and c respectively). The size of the words signifies prominence or frequency. 14

Figure 2-1: Graphical representation of the phases of the SDGs and the Paris Agreement processes. Green-shaded boxes denote the scales at which each phase takes place, while orange-shaded boxes indicate the stakeholders involved. 19

Figure 2-2: Conceptual framework for monitoring, evaluation and reporting to support evidence-based decision-making. Evidence-based decision-making is based on a circular approach allowing for corrective action through continuous monitoring and evaluation. 20

Figure 2-3: An illustration of the indicator-centred approach to stakeholder mapping, using SDG indicator 6.6.1. (i.e. Change in the extent of water-related ecosystems over time). 22

Figure 2-4: An illustration of the indicator-centred approach to stakeholder mapping, using SDG indicator 13.1.1. (i.e. Number of deaths, missing persons and persons affected by disaster per 100,000 people). 24

Figure 2-5: DPME's National Coordination Mechanism. (Image adapted from the Voluntary National Review Report (The Presidency, 2019)). 25

Figure 2-6: Institutional structure for the achievement of SDG 6. TT = Task Team (Image courtesy of DWS:2021). 26

Figure 2-7: SDG 6 coordination mechanism. (Image courtesy of DWS:2021). 28

Figure 2-8: A simple illustration of the adaptive management cycle used for SDG 6. 29

TABLES

Table 1-1: List of reporting vehicles under the Paris Agreement and their characteristics with regards to the inclusion of adaptation information for the water sector. 6

Table 1-2: List and short descriptions of SDGs and NDC goals included in the study. (See appendices 1 to 3 for full descriptions). 7

Table 1-3: Interactions between SDG 13 targets and NDC goals. Green blocks denote synergies and blue blocks denote a neutral effect. SDG target 13b is denoted as N/A (not applicable) as it refers only to least developed countries. 15

Table 1-4: Potential interactions between NCCAS strategic interventions and SDG 6 targets. Green blocks denote a positive impact, while blue blocks denote no discernible impact. The yellow box shows a mixed impact (i.e. a combination of positive and negative effects 17

Table 3-1: List of key benefits of establishing joined-up monitoring and reporting systems for SDGs and the Paris Agreement for countries. 32

Table 3-2: A high-level assessment of how SDG 6 targets are reflected in the NDC and U-NDC. 33

Table 3-3: Rationale for the relation between SDG 13 and SDG 6 targets and indicators. 34

Table 3-4: Synergies between SDG 6 and SDG 13 targets (adapted from Libala *et al*., 2021). Green shaded cells denote the number of synergies between the relevant targets. 36

Table 3-5: An expanded version of Table 1.4 showing potential interactions between NCCAS strategic interventions and SDG 6 targets. Green blocks denote a positive impact, while clear blocks denote no discernible impact. The yellow box shows a mixed impact (i.e. a combination of positive and negative effects). 38

Table 3-6: Ranking of SDG 6 targets according to their potential to contribute to tracking the climate change response. 41

Table 3-7: Proposed linked-up framework for the monitoring and reporting of South Africa's progress towards climate change adaptation, anchored in SDG 6. 42

ABBREVIATIONS

CSIR	Council for Scientific and Industrial Research
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DPME	Department of Planning, Monitoring and Evaluation
DWS	Department of Water and Sanitation
HLPF	High Level Political Forum
MDGs	Millennium Development Goals
MER	Monitoring, Evaluation and Reporting
NCs	National Communications
NCCAS	National Climate Change Adaptation Strategy
NDCs	Nationally Determined Contributions
NWSMP	National Water and Sanitation Master Plan
NWSRS	National Water and Sanitation Resources Strategy
SDGs	Sustainable Development Goals
StatsSA	Statistics South Africa
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WRC	Water Research Commission

CHAPTER 1. ASSESSING ALIGNMENT BETWEEN THE SDGS AND THE PARIS AGREEMENT REPORTING THROUGH A WATER LENS

1.1 INTRODUCTION

1.1.1 Background

1.1.1.1 The sustainable development discourse

It has been over 30 years since the concept of sustainable development became a buzz word, after the release of the Brundtland Report in 1987. Then, it was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). The term gained prominence, becoming the basis for important international agreements such as the Millennium Development Goals (MDGs), which were implemented from 2000 to 2015 and were succeeded by the current United Nations' 2030 Agenda for Sustainable Development (popularly known as the Sustainable Development Goals or SDGs). The SDGs are a bold commitment by 193 United Nations member states to end poverty, protect the planet and ensure peace and prosperity for all humankind by 2030. They came into effect in January 2016 and build on to the progress made during, and address shortcomings of, the MDG process, which centred around eight goals. The SDGs are a set of 17 global goals, with 167 associated targets and 245 indicators (Figure 1-1). The SDGs are reviewed and refined continuously, and the numbers of targets and indicators shown in Figure 1-1 reflect the global indicator framework adopted in 2020 (United Nations, 2020). The goals cover social, economic, environmental and governance thematic areas.

Figure 1-1: Overview of the UN Sustainable Development Goals. (United Nations, 2020)

1.1.1.2 The climate change crisis

The realisation that climate change poses a major threat to human wellbeing globally came about in the 1980s. This rise in prominence was signalled by a shift in the debate on climate change from being merely a scientific interest to being adopted by governments and intergovernmental bodies as a governance and policy issue. This phase culminated in the founding of the Intergovernmental Panel on Climate Change (IPCC) in 1988 (Houghton *et al*., 1990; IPCC, 2019). The 1990s were signified by a focus on mitigation and the need to avoid significant human interference with the climate system. The adoption of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, with the express purpose to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system", was the highlight of this decade (UNFCCC, 1992). The adoption of the UNFCCC was followed by the adoption of the Kyoto Protocol in 1997 (UNFCCC, 1998), which reinforced the perception of mitigation as the primary response to the climate change challenge. The publication of the 3rd IPCC assessment report in 2001 came with the realisation that mitigation alone was not an adequate response, and that there was a need for the inclusion of adaptation as a response strategy, alongside mitigation. This was a pivotal point in the dialogue, essentially shifting the main question from whether we need to adapt, to how we can adapt. In recent times, a momentous occasion was the conclusion of the UNFCCC Paris Climate Change Agreement (often referred to as the Paris Agreement) in 2015 (UNFCCC, 2015). The Paris Agreement is a universal, legally binding climate change deal that focuses on how countries should reduce their emissions, adapt to climate change impacts and finance the low-carbon economy over the coming decades. Of significance is how the Paris Agreement finally raised the profile of adaptation to the same level as mitigation.

1.1.1.3 Global governance of climate change and Sustainable Development Goals

2015 was a seminal year in that it brought about major progress in the sustainable development and climate change discourses, with the adoption of the Sustainable Development Goals (SDGs) and the Paris Agreement. Despite being negotiated under distinct global processes, being developed using different negotiation approaches, having different follow-up and review mechanisms, and having different reporting structures and different reporting frequencies, there are still many similarities between the architecture of SDGs and the Paris Agreement. The common characteristics are global coverage; explicit synergies between climate change and development; the same time frame (up to 2030); the flexibility to use nationally determined targets; and the requirement for national level reporting. Furthermore, both agendas demand policy coherence and mainstreaming.

In addition to the structural similarities between these two treaties, the interlinkages between sustainable development and climate change are undeniable. Article 2 of the Paris Agreement sets out the aim as “to strengthen the global response to the threat of climate change, in the context of sustainable development and poverty reduction.” This explicit reference to sustainable development underscores the interconnected nature of the climate change and sustainable development concepts, with water as one of the irrefutable linking factors. This is due to the critical role that water plays in each of the three dimensions of sustainable development – the social, economic and environmental aspects. In turn, climate change impacts water security directly, thus presenting a constraint to sustainable development.

1.1.1.4 South Africa's reporting obligations under the Sustainable Development Goals and the Paris Agreement

South Africa was signatory to the MDGs and is signatory to the SDGs. Consequently, the country is obliged to undertake SDG reporting, which is a valuable tool to help governments achieve their goals by enabling policymakers to understand where their country stands in relation to the SDG targets, and how far they still need to go (Centre for Open Data Enterprise, 2018). To date, this has been done by means of an SDG Indicator Baseline Report (Statistics South Africa, 2017) and an SDG Country Report (Statistics South Africa, 2019b). A Voluntary National Review was also published and presented to the High-level Political Forum on Sustainable Development (HLPF) in 2019 (The Presidency, 2019). SDG reporting is led by national government and has to comply with established fundamental UN principles. This places a reporting burden on government, thus emphasizing the need for increased efficiency, which can be achieved through coordination, integration and improved policy coherence.

South Africa is also a Party to the Paris Agreement and has reporting obligations against this Agreement. The Paris Agreement introduced several mechanisms for communicating national adaptation efforts to the UNFCCC, such as the Nationally Determined Contributions (NDCs); Biennial Transparency Reports (BTRs) and Adaptation Communications (ACs). All of these are reporting vehicles that Parties to the UNFCCC submit periodically. By their nature, NDCs are forward-looking and specifically seek to communicate a country's commitments. BTRs were introduced as part of the recently-established Enhanced Transparency Framework (ETF), which tracks progress on how countries are implementing their mitigation and adaptation commitments under the Paris Agreement. Their submission to the UNFCCC is a requirement, as per article 13 of the Paris Agreement. ACs, on the other hand, are a flexible and voluntary mechanism that countries can use to communicate their efforts and can be submitted together with any of the mandatory reports. These three vehicles for communicating adaptation information were introduced in addition to pre-existing mechanisms such as National Communications (NCs) and National Adaptation Plans (NAPs), which are required under article 12 of the UNFCCC (UNFCCC, 1992) and the Cancun Adaptation Framework (UNFCCC, 2010), respectively. From the above, it is apparent that the reporting burden on the relevant authority can be onerous.

1.1.2 Motivation

Both the SDGs and the Paris Agreement demand holistic planning and coordination across ministries in order to improve policy coherence for integrated implementation, monitoring and reporting at country level. Over the past two decades, South Africa's climate change policy and sustainable development policy landscapes have evolved considerably. From a monitoring and reporting perspective, the climate change adaptation policies, strategies and plans provide a strong basis for informing and framing the content of South Africa's reports and communications to the UNFCCC. Similarly, the sustainable development policies, plans and strategies provide a strong basis for framing the content of South Africa's reports and communications to the HLPF. The central question then becomes, how to optimise the reporting processes for both climate change and sustainable development with the view to increase synergies in information flows, information management and optimise available resources (human, institutional and technical), while avoiding duplication, reporting burden and communicating conflicting messages to the international audience.

This work looks at ways to avoid duplication of effort when attempting to meet the country's reporting obligations to the United Nations on both climate change and sustainable development, specifically in relation to water issues. In other words, it seeks to find ways to improve alignment in the processes that are in place for the compilation of mandatory reports to the UN under these two treaties. The challenge to

achieve this alignment stems from the reality that both processes require multi-layered decision-making, multi-level coordination and cooperation, and a multitude of stakeholders participating in the process of compiling such reports. It is the inherent multi-faceted nature of both sustainable development and climate change adaptation that makes integration across different levels of governance and across sectors a central issue of critical importance. We thus seek to explore ways towards an integrated and coordinated approach, with specific reference to South Africa's reporting commitments under the UNFCCC as well as the SDGs. Because in both international treaties water features prominently, and there is an expectation to monitor and report on progress at a country level, we use water as an entry point to this work.

1.1.3 Contextualization

The United Nations has identified climate change as *the* single biggest threat to development, with its widespread and unprecedented impacts disproportionately burdening the poorest and most vulnerable (UNDP, 2015). Like many other developing countries, South Africa is particularly vulnerable to the negative impacts of climate change, especially with reference to water and food security, thus making climate change a serious threat to the country's developmental aspirations. It is therefore crucial that sustainable development and climate change policy development takes place in an integrated manner, and specifically take cognisance of water resources management.

This report is the final product of a two-year WRC-funded project entitled "Co-development of a linked-up monitoring and reporting framework for the 2030 Agenda for Sustainable Development and the Paris Agreement: A case study of the water sector." The project aims were two-fold, viz; (i) To get an understanding of the synergies and trade-offs in the treatment of water issues in South Africa's reports to the United Nations; and
(ii) To explore approaches to optimize the coherence of monitoring and reporting of South Africa's water issues for both the SDGs and the Paris Agreement.

This chapter is linked to the first project aim and sought to examine the linkages between South Africa's sustainable development agenda and the climate change adaptation agenda through a water resources management lens. Accordingly, we were specifically looking at the reporting aspect as it pertains to the water and climate change SDGs (*i.e.* SDG 6 and 13) as well as the Paris Agreement. The work was split into the following tasks:

a) Describing the approach (governance, institutional arrangements and information flows/processes) followed in compiling SDG reports in South Africa, with a specific focus on SDG 6 and SDG 13.
b) Describing the approach followed in the compilation of climate change reports to the UNFCCC, specifically focusing on National Communications.
c) Describing the scope of information regarding water that is contained in South Africa's climate change reports, with a specific focus on National Communications.
d) Identifying overlaps and differences in approaches and scope of information when compiling SDG 6 and SDG 13 reports as well as National Communications.
e) Making recommendations on options to optimise the approach to compile information for both SDG reporting and climate change adaptation reporting.

1.1.4 Delineation of the Study

It is recommended that a holistic approach to adapting to climate change should be an iterative process consisting of: (i) assessing impacts, vulnerability and risks; (ii) planning for adaptation; (iii) implementing

adaptation measures; and (iv) monitoring, reporting and evaluating adaptation (UNFCCC Adaptation Committee, 2013). We restricted the scope of this work to the fourth element, and specifically focussed on monitoring and reporting done at the national level of government, because that is where reporting to the UNFCCC takes place. Similarly, reporting to the HLPF on progress on the SDGs happens at the national level of government, and this is the level at which this study focussed. Attention is expressly drawn to the fact that this work does not attempt to assess planning and implementation of either the SDGs or climate change adaptation interventions. As such, what will be presented below does not include an assessment of planning, policy and implementation processes, but strictly the reporting done to fulfil obligations under the SDGs and the Paris Agreement.

Furthermore, while recognizing the indivisible nature of the SDGs, and specifically the high level of interconnectedness of SDG 6 with all the other SDGs (Libala *et al*., 2021), as well as the cross-cutting impact of climate change on all SDGs (not just the environmental cluster of SDGs), we deliberately limited the focus of this work to SDGs 6 and 13, in accordance with the stated overall aim of the project.

1.2 METHODOLOGY

1.2.1 Information acquisition

1.2.1.1 SDG reporting

Official reporting on the SDGs happens at the national level of government and this function is coordinated by Statistics South Africa (StatsSA). We therefore used the two official reports that have been published to date by StatsSA on the country's progress in implementing the SDGs. These are the SDG Indicator Baseline Report (Statistics South Africa, 2017) and the SDG Country Report (Statistics South Africa, 2019b). We accessed these through an online search. Additionally, we consulted the SDG Tracker portal for up-to-date information on SDGs (https://www.goaltracker.org/countries/south-africa/).

1.2.1.2 Climate change adaptation reporting

There are several mechanisms available for reporting climate change response actions under the Paris Agreement. Some of them make it mandatory to have a section on adaptation in addition to mitigation, while others do not (see Table 1-1). Furthermore, the water sector can be included explicitly or not in the submitted documents. Among the reports that *have* to be submitted to the UNFCCC, only the National Communications (NCs) *have* to include adaptation information. However, South Africa's Biennial Update Reports do include reporting on adaptation, albeit to a limited extent. Furthermore, and of importance for this current work, the NCs also explicitly include information on the vulnerability and adaptation assessment for the water sector. For these reasons, our analysis focused primarily on the NCs. We did, however, include the NDC document to some extent, because it is one of the primary tools that is forward-looking and explicitly spells out South Africa's adaptation commitments and has a direct link to the Paris Agreement.

Table 1-1: List of reporting vehicles under the Paris Agreement and their characteristics with regards to the inclusion of adaptation information for the water sector.

Document	Submission to UNFCCC	Inclusion of adaptation information	Inclusion of the water sector in submitted documents?
Biennial Update Reports	Mandatory	Optional	Yes
Nationally Determined Contributions	Mandatory	Optional	No
National Communications	Mandatory	Mandatory	Yes
Adaptation Communications	Voluntary	Mandatory	Not explicit

Thus far, three NCs have been published for South Africa, beginning with the first NC in 2000, a second NC in 2011 and the latest and third NC released in 2018. Because our focus is on assessing reporting under the Paris Agreement, which South Africa ratified in 2016, the third NC is the most appropriate to determine whether there is alignment between what has been pledged, as per the Nationally Determined Contribution (NDC, DEA, 2015), and what is being reported. It is worth noting, however, that in addition to the reports submitted to the UNFCCC, national climate change reports do also provide details on progress towards climate resilience. But, for the purposes of this work, national reports are not included in the analysis as they are not a mandatory reporting mechanism under the Paris Agreement. It must also be noted that during the course of this work DFFE published an update to the first NDC, which was approved by Cabinet in September 2021 (DFFE, 2021). Considering the date of publication, which was after the formulation of the first two chapters, the updated NDC was only considered in the formulation of the last two chapters.

1.2.2 Data extraction and analysis

To describe the approach followed in, as well as the institutional arrangements in support of, the compilation of the SDG Country Report and the National Communications, we extracted this information from the documents themselves, where available. The primary and secondary sources of information used to compile the reports were also recorded from various sections where they were mentioned. Additionally, we used the respective reference lists to deduce information sources.

To assess the degree of alignment between the content of the SDGs and the climate change adaptation documents of focus herein, we followed a hybrid of qualitative and quantitative methods. In the first instance, textual content analysis was used, where we read each of the SDG 6 targets and then compiled a list of keywords that were deemed to be reflective of the general ambitions of the respective target (see Table 1-2). These keywords were then used to systematically search each of the three NCs, to try and assess the degree to which the NCs report on the issues SDG 6 aims to address. Additionally, we conducted the same word search in the NCCAS to determine try and determine whether this fundamental document reflects the imperatives of SDG 6. Different derivatives of the keywords were used during the keyword search. For example, to find all mentions of water contamination we would search for “contaminate/d”, “contamination”, “contaminant/s”. Words would only be included in the tally if they were used in the right context. That is, the term “quality” would not be included in the word tally unless it was used in the context of “water quality” as used in S6.1 and S6.3 (see Table 1-2 for target codes/symbols). For example, the word would not count if it referred to data quality. Similarly, “availability” would not be included in the tally if, for

example, the authors were talking about data availability. The lists of compiled words from the keyword searches were then used to design word clouds using the free software WordItOut (https://worditout.com).

Table 1-2: List and short descriptions of SDGs and NDC goals included in the study. (See appendices 1 to 3 for full descriptions).

	Symbol	Short description	Keywords[1]
SDG 6: Ensure availability and sustainable management of water and sanitation for all.	S6.1	Safe and accessible drinking water	Access, availability, affordability, pricing, quantity, demand, supply, safety, pollution, contamination, quality.
	S6.2	Sanitation and hygiene	Sanitation, sewerage, hygiene, wash, defecation, toilet.
	S6.3	Wastewater and water quality	Waste-water, quality, pollution, contamination, dumping, effluent, hazardous.
	S6.4	Water-use efficiency	Efficiency, abstraction, allocation, conservation, scarcity.
	S6.5	Water resources management	Management[2], transboundary, cooperation.
	S6.6	Protection and restoration of water-related ecosystems.	Restoration, protection, ecosystem/s, catchment.
	S6.A	International cooperation	Finance, support, capacity.
	S6.B	Community participation	Community, participation, engagement, CMA.
SDG 13: Take urgent action to combat climate change and its impacts.	S13.1	Resilience and adaptive capacity	
	S13.2	CC integration into national policies, strategies and planning.	
	S13.3	Education, awareness and capacity	
	S13.a	Financial support for developing countries	
	S13.b	Capacity development for least developed countries and small island developing States.	
NDCs	NDC1	National Adaptation Plan development	
	NDC2	Climate change integration into national, subnational and sectoral policy frameworks	
	NDC3	Institutional capacity development	
	NDC4	Early warning, vulnerability and adaptation monitoring system	
	NDC5	Vulnerability assessment and adaptation needs framework	
	NDC6	Communication of financial flows	

[1] Keywords are only applicable to SDG 6 targets.
[2] In the context of water resources management.

For the assessment of potential synergies, trade-offs and constraints between SDG 13 targets and the NDC goals, we again followed a textual content analysis approach, where we evaluated the actual wording of both the NDC goals and the SDG 13 targets to assess how climate actions that are listed in the NDC goals can contribute to the SDG targets and indicators and vice versa. Pairwise assessments were done, where each NDC goal was evaluated in relation to each SDG target to determine whether its achievement would enhance (given a weight of 1), restrict (-1) or have no effect on (0) the achievement of that particular target.

To assess synergies and trade-offs between SDG 6 and the Paris Agreement, and in recognition of the lack of detail of South Africa's approach to water resources management in the NDC, we expanded our analysis to the National Climate Change Adaptation Strategy (NCCAS, DEA, 2019) specifically looking at how the nine strategic interventions listed therein (see Appendix 5) can potentially impact SDG 6 targets. Our inclusion of the NCCAS in the analysis was informed by the fact that the NCCAS is the key guiding document for climate adaptation action in the country and serves to fulfil South Africa's commitment to its international obligations under the Paris Agreement. As such, it was logical to look in this document for any potential interlinkages between SDG 6 and adaptation action. We followed a similar data analysis approach to that followed for SDG 13 and NDC interlinkages. That is, we read the text of each of the actions proposed for the nine strategic interventions listed in the NCCAS. We then evaluated each action against each of the eight SDG 6 targets to determine whether a proposed NCCAS action would enhance, restrict or have no effect on the target.

1.3 RESULTS AND DISCUSSION

1.3.1 The approach followed by South Africa in the compilation of reports for SDG 6 and 13 and the Paris Agreement

1.3.1.1 Institutional arrangements

The focal point for the SDGs in South Africa is StatsSA and is responsible to the UN for coordinating South Africa's contribution to achieving all the 17 SDGs as well as reporting on progress. Different government departments are responsible for the implementation of the different SDGs, and with regards to the focus of this work, the Department of Water and Sanitation (DWS) is responsible for the implementation of SDG 6 while the Department of Forestry, Fisheries and the Environment, (DFFE) is the logical custodian of SDG 13. DWS has a dedicated SDG 6 programme and a clear structure that has been developed to facilitate integrated planning, implementation, monitoring and evaluation, and reporting on SDG 6. The structure consists of a sectoral working group that includes task teams focusing on each of the eight targets. The task teams are responsible for identifying gaps within their respective targets and delivering reports to the UN through StatsSA. The DWS has regional offices in the provinces, which are responsible for advocating all the outputs of the task teams per target to ensure that the provinces are aware, mobilised, and can translate gaps into actions. Thus, on an annual basis, each task team is required to contribute to an annual SDG 6 Gap Report compiled by the DWS and a biennial progress report. Gaps identified would then be translated into policies, plans and projects, through vehicles such as the National Water and Sanitation Master Plan (NWSMP), the National Water and Sanitation Resources Strategy (NWSRS), and operational plans generated by Water Services Development Planning. The web page of the department's SDG programme makes the bold claim that the department is "ahead of the curve compared to others and is using DWS's structures and processes to help other departments climb on board". This could very well be true, as evidenced by the fact that in the 2019 Country Report only SDG 6 reported on all the indicators, with the closest runner-up being SDG 4 reporting on 89% of its indicators.

With regards to the institutional arrangements for SDG 13, our assessment to date is that there is currently no formal structure. However, the Knowledge and Information Management Unit of DFFE serves as an entry point for all the SDGs. This unit then liaises and engages with relevant branches within the department to provide inputs for the SDGs. There is a need and scope to improve the level of ownership of SDG 13 by DFFE. For example, there is a need to update the information on SDGs that is contained on the departmental website. Our engagement with the department showed that the department is aware of the need to increase their activity and responsiveness to SDG 13.

1.3.1.2 Reporting processes

Compilation of the SDG Country Report is a well-defined process, clearly articulated in the report itself (Statistics South Africa, 2019a) and as shown in Figure 1-2 and Figure 1-3 below.

Figure 1-2: Three-phased Country Report writing process (adapted from: Statistics South Africa, 2019a).

StatsSA coordinates the process, from appointing the writing team, through to submitting and presenting the cabinet approved final report to the UN General Assembly. The process is iterative and highly consultative, to ensure the validity of the final product (Figure 1-3). The overall process consists of three phases (Figure 1-2), which commence with the appointment of teams of experts to draft the individual reports for each of the 17 SDGs (Figure 1-3). The individual Goal Reports are reviewed and validated by the relevant Sectoral Working Groups (SWGs) and stakeholders, and subsequently used to compile Thematic Reports covering the four broad themes of the SDGs (i.e. social; economic; environmental and governance). The Thematic Reports undergo a similar process of review and validation and are later collated to form the Draft Country Report, which is also reviewed through a consultative process with stakeholders. The Draft Report is then presented to Cabinet for approval, prior to submission to the UN.

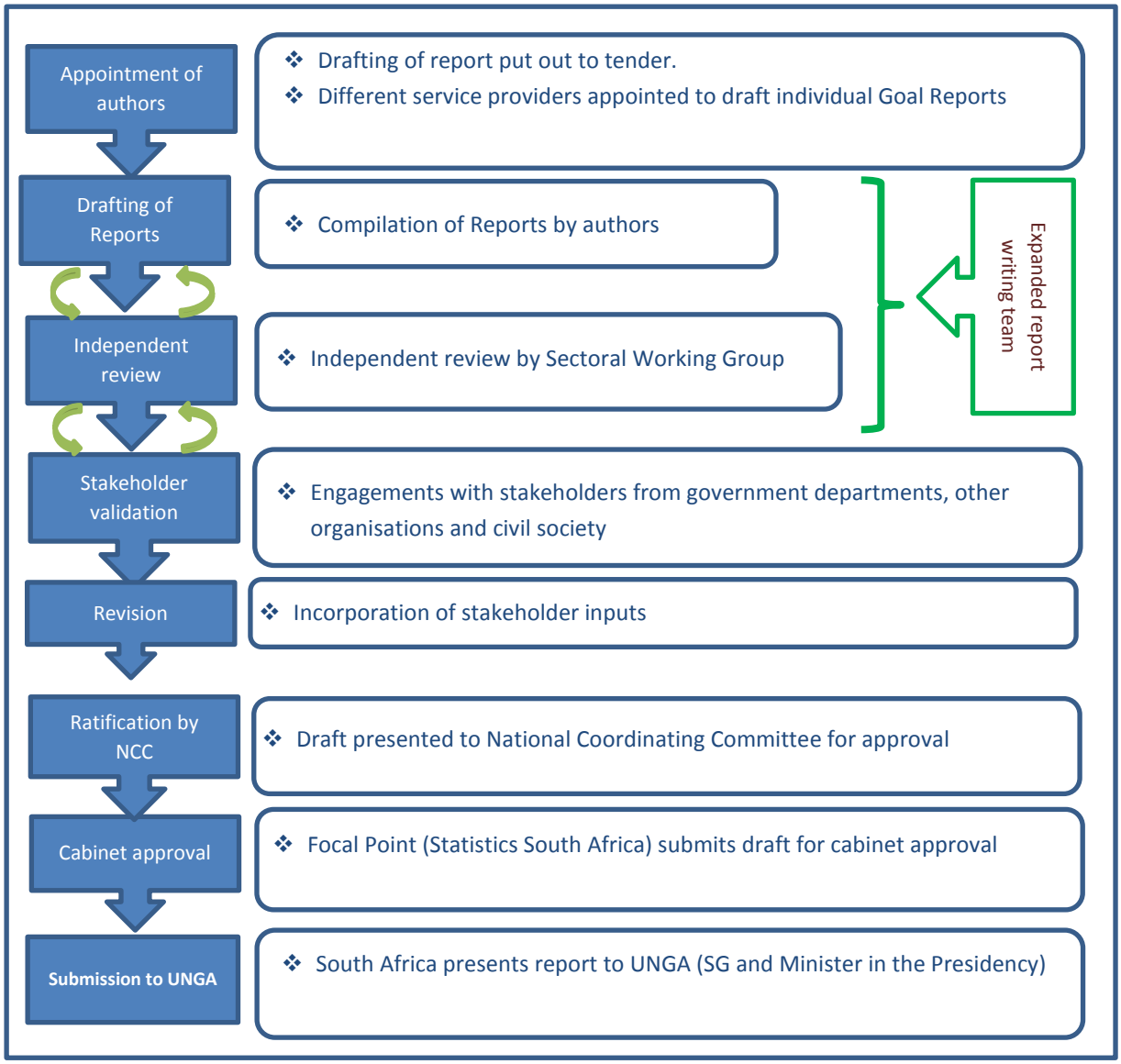

Figure 1-3: The process of compiling and submitting SDG Country Reports. Green arrows denote iterative steps in the process.

Although the first and second NCs do not provide much detail on the compilation process, we could deduce from what is written, combined with the experience of our team, what the general approach is. With regards to the sequence of steps, the compilation of NCs is not much different from that of compiling the SDG Country Reports. The NC process also commences with the appointment of a service provider(s) through a government tender process and culminates in the submission of the cabinet approved final product to the intergovernmental body, which is the UNFCCC in the case of National Communications (Figure 1-4). The main difference seems to be in the method and extent of review and validation, with the SDG Report seemingly subject to more engaged and iterative stakeholder inputs than the NCs (see the green curved arrows in Figure 1-3).

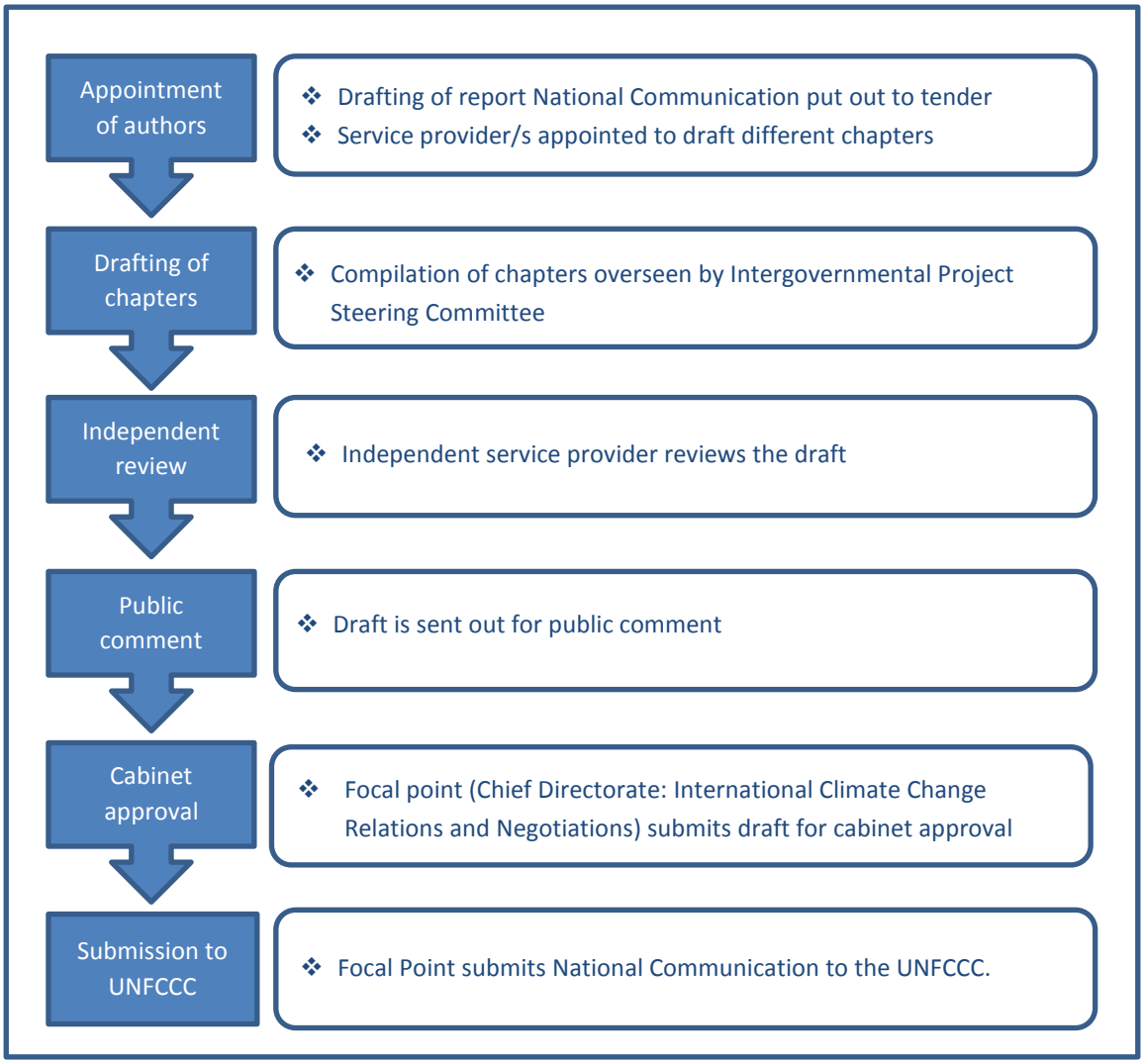

Figure 1-4: The process of compiling and submitting National Communications.

Potential areas of synergy between SDG and Paris Agreement reporting could be in the institutional arrangements that support the two processes. Although the first NC mentioned the absence of an institutional arrangement for the compilation of NCs, emphasizing that the compilation of the document was done by a team of experts external to government, this seems to have since been addressed, because the third NC portrays a detailed structure of government departments, academic institutions and research entities that were involved in putting it together (Department of Environmental Affairs, 2018). Of particular importance in terms of the potential to promote alignment between these two processes is the Intergovernmental Project Steering Committee, with representatives from similar departments to those involved in the various SDG SWGs. Streamlining information flows between these structures could promote efficient reporting. Furthermore, the focal point for the NCs is a Chief Directorate within the Climate Change and Air Quality branch of DFFE, which presents an opportunity for the ownership of SDG 13.

With regards to the sources of information used to compile the documents (Figure 1-5), there are several overlaps (e.g. peer-reviewed and grey literature; policy documents and stakeholder inputs). These similarities represent an opportunity to align the message that is communicated with regards to water resources in the context of sustainable development and climate change. The difference lies in the weight of these sources. That is, in the case of SDG reporting, the primary source of information is official statistics, and the other sources are secondary (and, in the case of stakeholder input, tertiary). In contrast, compilation of the NCs primarily relies on databases (especially predictive modelling and assessment databases); literature; and policy documents. Tacit information in the form of expert knowledge and stakeholder inputs comprises a secondary source.

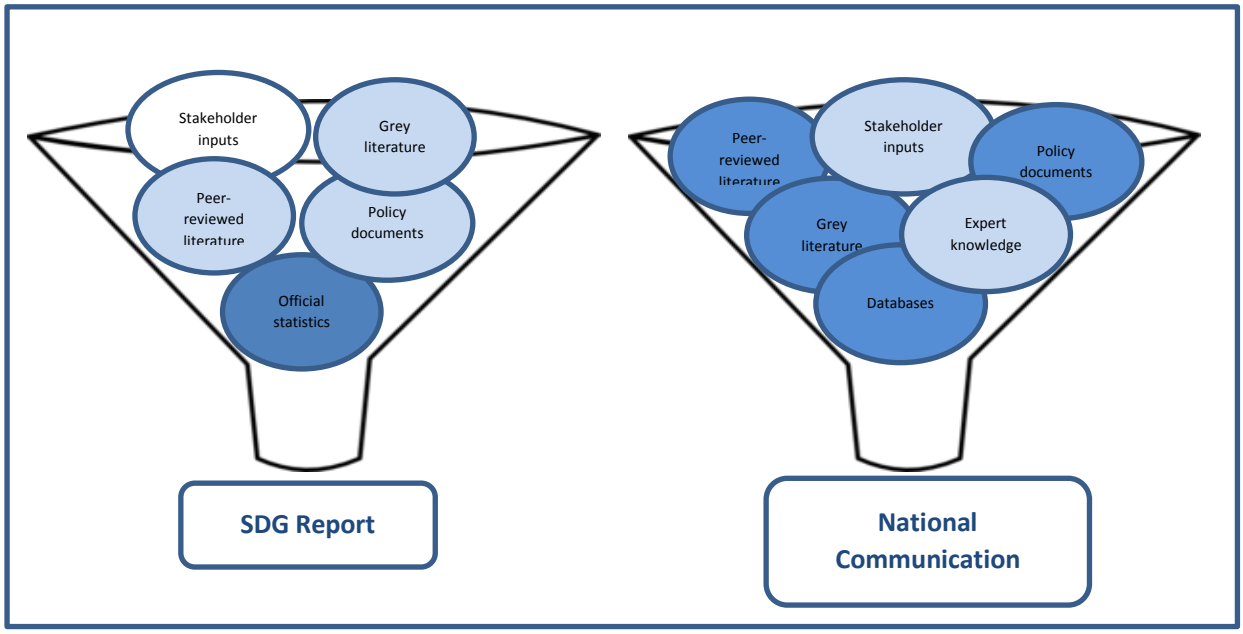

Figure 1-5: Sources of information used in the compilation of (a) SDG reports and (b) National Communications. Dark-shaded shapes denote primary sources; lighter-shaded shapes represent secondary sources; and the clear shape represents a tertiary source of information.

It is important to pay deliberate attention to the *type* of information sources used in compiling the reports, because the validity of the message they convey relies on the veracity of the source documents. If we consider that the compilation and publication of the SDG reports and NCs should not merely be box-ticking exercises, but rather important landmarks on the journey towards the achievement of the respective goals, then we should appreciate the importance of having accurate information to support an evidence-based approach to adaptive implementation of said goals. It is crucial that reports are able to demonstrate on-going progress, so that at the end of the commitment period (2030 for both treaties) we can unequivocally say whether we have achieved what we set out to do when we committed to these treaties to begin with. To this end, the information sources should ideally contain up-to-date information that is reflective of all that is being done in terms of implementation.

1.3.2 How are water issues addressed in climate change adaptation reports?

The term 'water' appears six and eight times in South Africa's first and updated NDCs, respectively. Of relevance to this work, that is, in the context of climate change adaptation, water is referred to in relation to the country's vulnerability to the impacts of climate change, and in the context of adaptation goals, as one of the sectors covered by the NDC goal of developing a vulnerability assessment and adaptation needs framework. Recognizing that NDCs are the primary vehicle through which countries can establish their commitment, the limited emphasis on water issues in South Africa's NDCs should not be misinterpreted as a lack of adequate consideration of water issues. In fact, it should be noted that the NDCs represent high level goals to which different spheres of government and sectors must respond. This, in turn, means that water issues will be fully articulated in relevant water related policies and plans, and not in the NDCs. The National Climate Change Adaptation Strategy (NCCAS) is one such instrument.

The NCCAS is a 10-year plan that was published in 2019 and serves as a common reference point for climate change adaptation efforts in South Africa, providing guidance across all sectors, including the water sector (DEA, 2019). It outlines the country's vulnerabilities, plans to reduce those vulnerabilities and leverage opportunities. It also lists a set of objectives (3), interventions (9) and outcomes (12) to enable the country to give expression to its commitment to the Paris Agreement (see Appendix 5). The NCCAS also lists a multitude of actions that need to be undertaken in order to achieve the desired outcomes.

Additionally, each of the three National Communications (NCs) includes a dedicated section on water resources in the chapter addressing adaptation strategies. It is worth noting that the content of this section has expanded since the publication of the first NC in 2000. However, some themes have remained the same across the three editions (see Appendix 4). The information on water resources that is included consistently in the three NCs is on vulnerability and adaptation. Consistent reporting on the same topics or aspects lays the foundation for improvement of information that is reported over time (Mantlana *et al*., 2021), which in turn, is one of the core principles of reporting under the UNFCCC.

When we looked at the water-related information contained in the NCs in the context of SDG 6, which is about *ensuring availability and sustainable management of water and sanitation for all*, specific themes emerged as being consistently prominent, namely water demand; management and quality (Figure 1-6). This is perhaps not surprising, considering the heavy reliance of the NCs on climatic modelling databases as a source of information. Naturally, such databases tend to focus on how climate change will impact precipitation, and by implication, the supply and demand of water. Besides, it is widely known that climate change is closely intertwined with the availability of and demand for water resources (Dzebo *et al*., 2019). It is imperative therefore, to view these prominent themes in the context of *water supply by water-related ecosystems* (Target 6.6), rather than in the context of SDG Target 6.1, which speaks specifically to the issue of "*equitable access to safe and affordable drinking water*". This interpretation is further reinforced by the observation of an almost absence of statements around water allocation; affordability and pricing in the NCs and the NCCAS.

An interesting observation was the prominence of the terms "protection" and "ecosystems", in addition to "management", in the NCCAS. This is reflective of the document's emphasis on ecosystem-based adaptation. Also worth noting is the fact that the NCCAS had much fewer keywords related to SDG 6.

Although the word "sanitation" did appear prominently in the first two NCs, it was mostly a repeat of statements around how municipalities struggle to deliver adequate sanitation services, especially in rural and/or informal settlements. Linked to these statements were examples of specific instances of outbreaks

of water-borne diseases. What was lacking was a meaningful description of how the situation has changed (worsened or improved) since the first NC was published in 2000 and how/whether there is any link with the country's climate change response.

Figure 1-6: Frequency of occurrence of keywords related to SDG 6 targets in the first, second and third National Communications (a, b and c respectively) and in the NCCAS (d). The size of the words signifies prominence or frequency.

This represents an area of major misalignment and raises the question whether in communicating the country's approach and progress to climate change adaptation under the Paris Agreement, the NCs adequately incorporate headline sustainable development indicators or show if the country's commitment to promote climate change adaptation is having a demonstrable and meaningful impact on key water and sanitation-related priorities as envisioned under the SDGs. Even more concerning is the almost lack of sanitation-related information in the NCCAS, with the term "sanitation" only appearing once in the relevant context. If adaptation actions are meant to build resilience, it is important that prioritised adaptation actions should also include sanitation and hygiene considerations, especially in key documents such as the NCCAS. Moreover, it is proposed that alignment between the SDGs and the NDCs be tightened by specifying adaptation targets and indicators that relate strongly to relevant SDG targets in future iterations of the NDCs. Similarly, future editions of the NCs should report on the progress being made in improving sanitation service delivery. These statistics should be easily accessible from the DWS, which produces annual gap reports for each SDG 6 target.

1.3.3 On the linkages between SDG targets and the adaptation imperatives of the Paris agreement

Whereas the preceding section underscores the need for clear articulation of adaptation aspirations beyond the level of goals in order to promote synergies between SDG 6 and the Paris Agreement, the same is not true for SDG 13. Relationship/ties/connections between adaptation goals as indicated in South Africa's NDC and the targets of SDG 13 are easy to deduce (Table 1-3). The fact that the interactions are either synergistic or neutral is not surprising and emphasizes the point that both tools seek to achieve an effective climate change response. Indeed, SDG 13 is unique among all the SDGs in that it is the only one with an asterisk, which is in acknowledgement of the fact that the UNFCCC is the primary intergovernmental forum for negotiating the global response to climate change.

Table 1-3: Interactions between SDG 13 targets and NDC3 goals. Green blocks denote synergies and blue blocks denote a neutral effect. SDG target 13b is denoted as N/A (not applicable) as it refers only to least developed countries.

	NDC 1 National Adaptation Plan development	NDC 2 Climate change integration into policy frameworks	NDC 3 Institutional capacity development	NDC 4 Early warning, vulnerability and adaptation monitoring system	NDC 5 Vulnerability assessment and adaptation needs framework	NDC 6 Communication of financial flows
SDG 13.1 Resilience and adaptive capacity	1	0	1	1	1	0
SDG 13.2 CC integration into national policies, strategies and planning	1	1	0	1	1	0
SDG 13.3 Education, awareness and capacity	0	0	1	1	0	1
SDG 13.a Financial support	0	0	0	0	0	1
SDG 13.b Capacity development for LDCs[4]	N/A	N/A	N/A	N/A	N/A	N/A

It is conceivable, therefore, that the observed absence of a dedicated SDG 13 institutional arrangement, as discussed further above, could be attributable to this high degree of alignment between SDG 13 and the UNFCCC. Understandably, allocating resources to two different initiatives that can be logically viewed as two sides of the same coin could be perceived as inefficient. However, we would like to caution against an apparent neglect of an explicit focus on SDG 13. The fact that South Africa could only report on one SDG 13 indicator (out of eight), in contrast to a 100% report against SDG 6 indicators (Statistics South Africa, 2019a), calls for more visible ownership of SDG 13. As previously alluded to, this is an issue that we expand on further in this report.

We commend DFFE for the progress made to date in responding to the climate crisis. In particular, we acknowledge the publication of the National Climate Change Adaptation Strategy (NCCAS), which is

[3] South Africa's NDC submitted to the UNFCCC in 2015
[4] LDCs = Least Developed Countries

intended to be the key domestic policy instrument guiding implementation of adaptation actions (DEA, 2019). Our assessment of how the NCCAS can impact the attainment of SDG 6 is summarised in Table 1-4. Overall, the actions proposed in the NCCAS either have no impact, or they have a positive impact on SDG 6. The majority of positive interactions were associated with SDG target 6.b, which deals with community participation in the management of water resources. Interestingly, NCCAS strategic intervention 1, which seeks to "reduce vulnerability and build adaptive capacity" could have a negative impact on water use efficiency through action 1.1.12, which aims to "promote the expansion of food garden programmes outside of land classified as agricultural land or farmland to reduce food insecurity and hunger". This highlights one of the documented trade-offs between SDG 2 (zero hunger) and SDG 6 (Libala *et al*., 2021). This trade-off between ensuring food security (through agricultural expansion) and water resource conservation finds balance in the NCCAS through four other actions that seek to promote water use efficiency (e.g. action 1.1.32 is about the adoption of water-wise water management practices in urban areas). This then results in NCCAS intervention 1 having a mixed impact on SDG target 6.4 (water use efficiency). The other targets that could be enhanced by the implementation of actions proposed in the NCCAS are the safe drinking water target (6.1), wastewater and water quality target (6.3), water resources management target (6.5), water-related ecosystems target (6.6) and the financial support and cooperation target (6.a).

Table 1-4: Potential interactions between NCCAS strategic interventions and SDG 6 targets. Green blocks denote a positive impact, while blue blocks denote no discernible impact. The yellow box shows a mixed impact (i.e. a combination of positive and negative effects).

	SI 1 Reduce vulnerability and build adaptive capacity	SI 2 Climate services	SI 3 Climate risk vulnerability and assessment framework	SI 4 Adaptation planning and mainstreaming	SI 5 Research	SI 6 Awareness and capacity building	SI 7 Governance and legislation	SI 8 Finance	SI 9 Monitoring and evaluation
SDG 6.1 Safe and accessible drinking water	1	1	0	0	0	0	0	0	0
SDG 6.2 Sanitation and hygiene	0	0	0	0	0	0	0	0	0
SDG 6.3 Wastewater and water quality	1	0	0	0	0	0	0	0	0
SDG 6.4 Water-use efficiency	± 1	0	0	0	0	0	0	0	0
SDG 6.5 Water resources management	0	1	0	1	0	0	0	0	0
SDG 6.6 Protection and restoration of water-related ecosystems	1	0	0	0	0	0	0	0	0
SDG 6.a International cooperation	1	0	0	0	0	0	0	1	0
SDG 6.b Community participation	0	1	0	0	1	1	1	0	0

While some interlinkages were easy to establish (e.g. between NCCAS action 1.1.27 which involves supporting farmers to use and manage water more sustainably, and SDG target 6.4 which aims for water use efficiency), others were rather tenuous. For example, action 2.1.9 is about improving/developing national early warning systems for key climate vulnerable sectors and risks. The description of this action includes "*an example of a water related early warning system that [could] focus on warning of hydrological drought so that water restrictions can be implemented in advance*". A weak link with SDG target 6.1 (universal access to safe drinking water) could be (and was) inferred, because water restrictions serve the purpose of securing water availability in the face of a drought.

Worth noting is the absence of any interactions between the proposed interventions and the sanitation target (SDG 6.2). If adaptation actions are meant to build resilience, it is important that prioritised adaptation actions should also include sanitation and hygiene considerations. The current Covid-19 global crisis has brought to the fore the critical importance of adequate sanitation services. As the principal policy instrument guiding adaptation action in the country, it will be crucial for the revised NCCAS to incorporate this aspect (The NCCAS is meant to be reviewed every five years). Once again, this emphasizes the need for better alignment between the climate response effort and sustainable development imperatives. To this end, we call for increased coordination and collaboration between parties tasked with driving these agendas.

1.4 CONCLUSIONS

South Africa has committed to contribute to the achievement of the SDGs and the Paris Agreement ambitions. The concomitant reporting requirements need to show the country's progress towards fulfilling these commitments. In other words, the reporting should not be a mere box-ticking exercise but should rather communicate in a demonstrable manner how effectively the country is moving towards achieving stated goals, through implementing necessary interventions. This then requires adequate monitoring and evaluation, using appropriate indicators. In the case of the SDGs, indicators have been agreed on globally and there are established guidelines for compiling information for reporting on these universally agreed indicators. Additionally, member states are able to develop additional indicators that reflect their unique circumstances, and these are reported as "domesticated indicators". In contrast, under the Paris Agreement countries' contributions to the global goal are in the form of Nationally Determined Contributions (NDCs), which allow Parties to the Agreement to tailor their contributions to their own national priorities, capabilities, and responsibilities. Consequently, there are no universally agreed upon indicators. However, guidelines on how to prepare NDCs, including the content thereof, do exist (World Resources Institute, 2015).

Our assessment of the degree of alignment between South Africa's reporting towards the SDGs and the Paris Agreement focused on the approach (i.e. processes, institutional arrangements and information flows) to reporting, and the content of reports. Areas of potential synergies were found in the respective approaches, especially in relation to the stakeholders involved, as well as information sources. In terms of content, however, we observed areas of misalignment with reference to SDG 6 and the adaptation component of the Paris Agreement. The key difference lay in the emphasis by the NCs on understanding the impact of projected future climate change on water resources, without necessarily compellingly relating this to issues of access to water, as envisioned under SDG 6. A superficial reference to sanitation issues was another area of major misalignment. These "gaps" point to a need to be deliberate about **meaningful and efficient** reporting.

CHAPTER 2. LESSONS LEARNT IN THE COMPILATION OF SOUTH AFRICA'S REPORTS TO THE UN ON SDG 6, SDG 13 AND THE PARIS AGREEMENT

2.1 INTRODUCTION

This chapter is linked to the second project aim (Exploration of approaches to optimize the coherence of monitoring and reporting of South Africa's water issues for both the SDGs and the Paris Agreement) and seeks to further develop our understanding of the landscape by collating lessons learned in the on-going reporting on SDG 6, SDG 13 and the Paris Agreement. The first and second chapters subsequently inform the development of an integrated framework for monitoring and reporting. The key questions guiding this component of the work programme were:

(i) Who are the stakeholders that are important in the monitoring and reporting of water issues in the SDGs and the Paris Agreement?
(ii) What are the information needs, governance requirements and institutional arrangements needed for optimal reporting?
(iii) What lessons have been learned from previous reporting cycles, and what gaps and/or opportunities have been identified for improved reporting?

Whereas this work focused on the monitoring and reporting aspects, it is important to note that the realization of the SDGs and the Paris Agreement depends on a holistic and adaptive process that includes implementation, with meaningful monitoring forming the bridge between implementation and reporting (Figure 2.1).

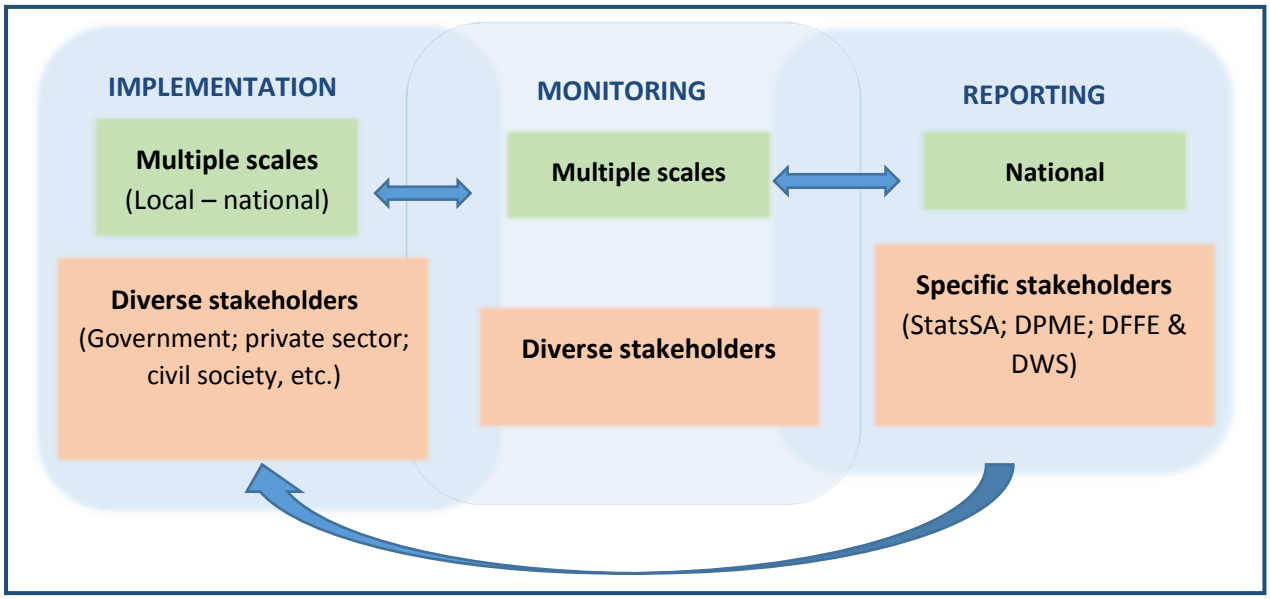

Figure 2-1: Graphical representation of the phases of the SDGs and the Paris Agreement processes. Green-shaded boxes denote the scales at which each phase takes place, while orange-shaded boxes indicate the stakeholders involved.

The scales at which the three phases operate can be disjunct, thus requiring coordination. For example, implementation typically happens at the local scale, with some instances of provincial and national implementation, whereas reporting happens at the national level of government (Figure 2-1). It is thus likely that the stakeholders involved in these processes are also diverse. It was with the appreciation that an understanding of the stakeholder landscape is foundational to this work that we formulated our approach.

2.2 APPROACH

2.2.1 Stakeholder mapping

As part of this project a stakeholder map was developed in order to inform the integrated framework for monitoring and reporting on water-related issues for the Paris Agreement, SDG 6 and SDG 13. The development of the stakeholder map was based on a conceptual monitoring and reporting framework (Figure 2-2) as it relates to information flow and decision-making processes at multiple levels and scales.

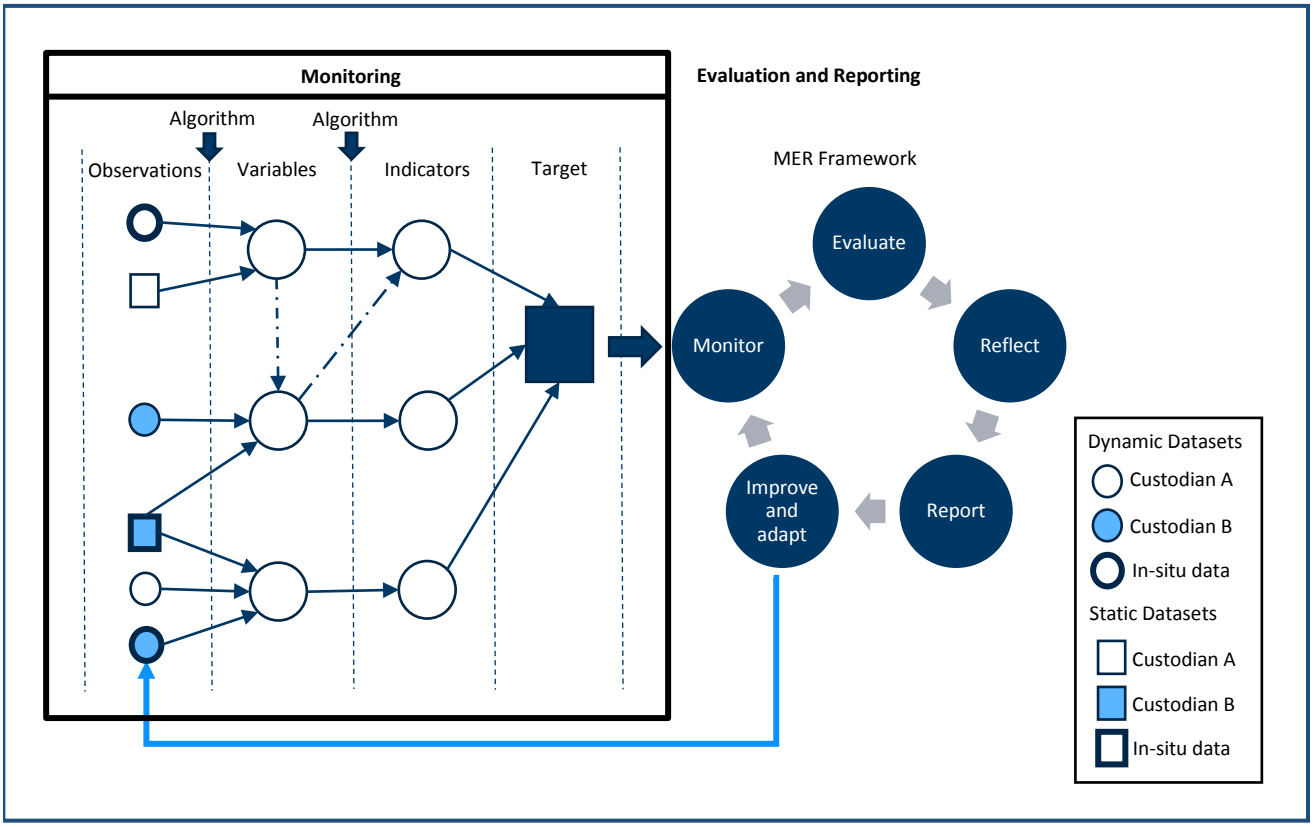

Figure 2-2: Conceptual framework for monitoring, evaluation and reporting to support evidence-based decision-making. Evidence-based decision-making is based on a circular approach allowing for corrective action through continuous monitoring and evaluation.

According to this framework, observation datasets are used to derive variables as inputs to indicators measuring trends towards particular targets. Datasets may be derived from remote sensing or in-situ observations while data collection methods could include specialist observation, drones, probes, citizen science, household surveys, sensors, etc. Some datasets used to derive variables may be dynamic with monitoring required on a regular basis (e.g. rainfall), whilst others may be fairly static (e.g. geology).

Individual datasets, needed for particular variables and indicators, are seldom held by the same data custodian. Similarly, not all indicators or targets are tracked by a single institution. This demonstrates the need to understand the flow of data and information for each target.

Using this framework, and in order to keep focus on the Monitoring, Evaluation and Reporting (MER) landscape for water, as it pertains to reporting under the SDGs and the Paris Agreement specifically, the indicators currently reported on by South Africa were used to guide the stakeholder mapping process. Our approach to stakeholder mapping was therefore indicator-centred and sought to understand the upstream and downstream role-players involved. Stakeholders were initially identified from the reports already compiled (i.e. the Indicator Baseline Report (Statistics South Africa, 2017), the SDG Country Report (Statistics South Africa, 2019b) and South Africa's Third National Communication (Department of Environmental Affairs, 2018)). Snowballing from this initial pool was then done. Since lack of reliable data can often be a hindrance to reporting, it is particularly important to pay attention to the data flows in terms of the stakeholders involved, as follows:

i. data producers;
ii. data aggregators;
iii. data custodians;
iv. data analysers/ indicator trend reporters; and
v. other potential users of these data and associated outputs.

2.2.2 Stakeholder engagement

Because the ultimate goal of this research project was to design a useable monitoring and reporting framework, it was important that the end-users of the envisaged product be part of the research process. As such, we adopted the Participatory Action Research (PAR) approach. Kidd & Kral (2005) define PAR colloquially as a research approach where "you get the people affected by a problem together, figure out what is going on as a group, and then do something about it". The study utilized the focus group approach to capture in-depth information from the experiences of decision-makers and stakeholders involved in the monitoring and reporting of SDG 6, SDG 13 and the Paris Agreement in South Africa. Focus group discussions help in overcoming biases of individual opinions and create a more robust view of factors contributing to or hindering the effectiveness in monitoring and reporting for SDG 6, SDG 13 and the Paris Agreement by allowing for discourse between key departments and stakeholders. Accordingly, we convened a virtual engagement session on the 20th of May 2021 and another one on the 17th of August 2021 with key stakeholders in the monitoring and reporting of SDG 6, SDG 13 and the Paris Agreement.

Respondents were recruited using a snowball sampling approach that built on contacts within the study team and already known individuals across the relevant entities. Participants in the focus group were recruited specifically for their diverse expertise and/or experience with water and climate change adaptation. The focus group sessions were held virtually on Microsoft Teams and the proceedings were recorded, with the permission of all participants. The first engagement session was attended by 30 people from eight institutions (excluding the research team) (see Appendix 6A) and took the form of a workshop, where the deliberations were guided by a set of questions (see Appendix 7). The purpose of the session was to distil lessons from past and ongoing monitoring and reporting efforts by interrogating factors that may impede or facilitate these processes. The second session sought to further deliberate on themes that emerged from the first session and to solicit the views of the stakeholders on whether the issues had been captured adequately. This session thus took the form of presentations and general discussion. In attendance were 18 stakeholders from 10 institutions, excluding the research team (see Appendix 6B). Attendees at both sessions included individuals with substantial responsibilities for SDG and Paris Agreement monitoring

and reporting, including people with first-hand knowledge of the processes by which monitoring and reporting of SDG 6, SDG 13 and Paris Agreement is done.

The recordings and notes from both sessions were analysed using qualitative content analysis and the constant comparison method for thematic analysis (Smulowitz, 2017).

2.3 RESULTS AND DISCUSSION

2.3.1 Who are the stakeholders in the monitoring and reporting of water issues in the SDGs and the Paris Agreement?

Use of the indicator-centred approach to stakeholder mapping is illustrated in Figure 2-3, where SDG indicator 6.6.1 was used as an example.

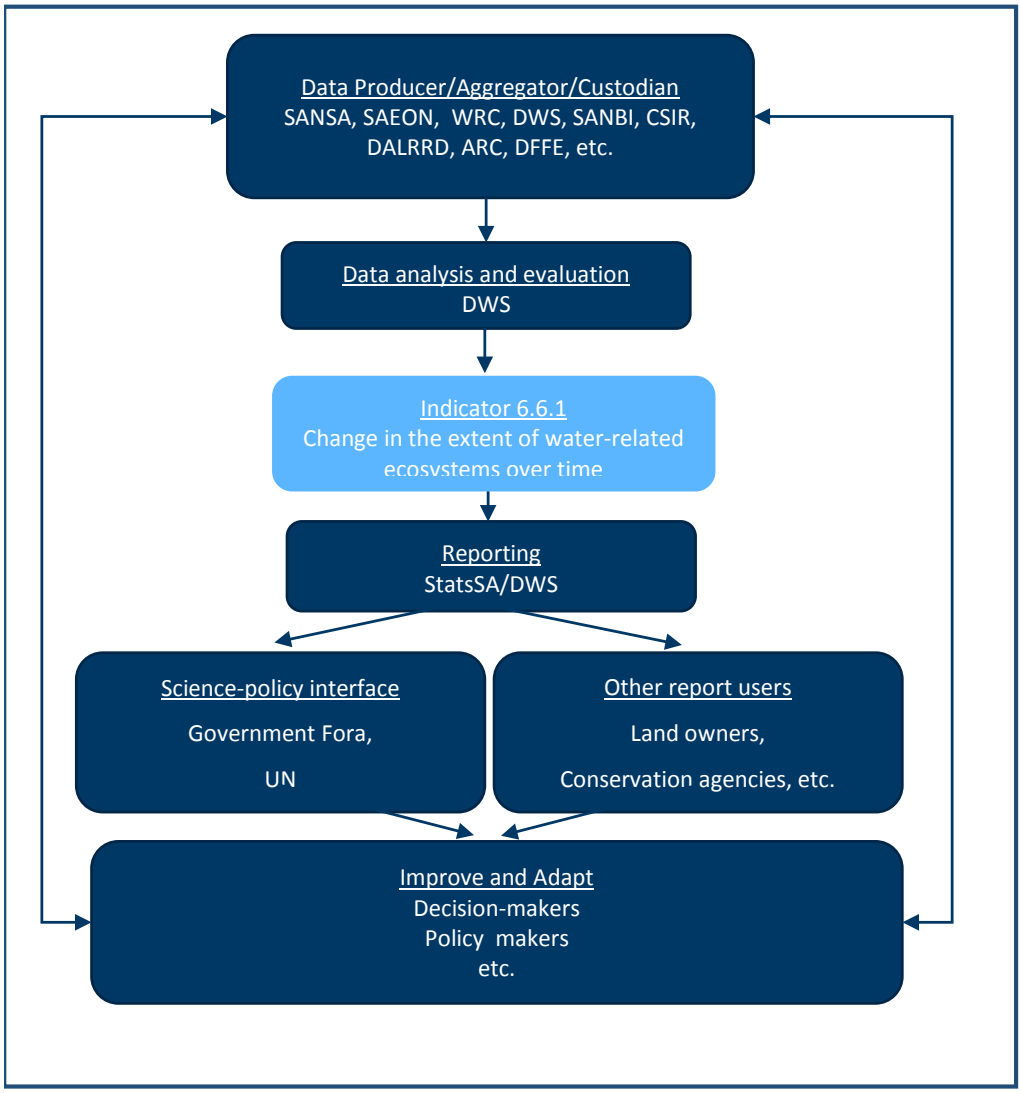

Figure 2-3: An illustration of the indicator-centred approach to stakeholder mapping, using SDG indicator 6.6.1. (i.e. Change in the extent of water-related ecosystems over time).

The indicator has upstream data input and analysis requirements, as well as downstream information users and decision-makers. There's a wide range of stakeholders that play the role of data producers, aggregators and custodians, and the ways in which they fulfil this role is equally diverse. For example, the South African National Space Agency (SANSA) and South African Earth Observation Network (SAEON) use remote sensing to monitor the extent of water-related ecosystems. The Water Research Commission (WRC), Department of Forestry, Fisheries and the Environment (DFFE) might fund projects aimed at restoring these ecosystems. Yet another role could be that played by the South African National Biodiversity Institute (SANBI), where data are aggregated for the purposes of producing the National Biodiversity Assessment (NBA). Irrespective of how or why the different institutions handle data on the extent of water-related ecosystems, what they have in common is that they are all data custodians and are important stakeholders that can contribute to the monitoring of indicator 6.6.1.

There is less diversity when it comes to data analysis and evaluation, with DWS bearing the responsibility, by virtue of being the custodian for SDG 6. Similarly, the responsibility for reporting falls on StatsSA, as the coordinator for all SDGs. Likewise, the downstream users of resulting reports are less diverse. It is worth noting the importance of including these stakeholders in the mapping exercise, as it is their needs that should inform how data production, collection and analysis must improve and adapt, to support evidence-based decision-making.

A layer of complexity emerges when one takes into consideration the different variables that contribute to the indicator itself. For instance, stakeholder maps for mangrove extent or the turbidity or eutrophication of reservoirs (which are all inputs for indicator 6.6.1), would look somewhat different. The question then becomes, should mapping be done at the sub-indicator (input) level to allow for greater resolution around data requirements and custodianship? The complexity is further compounded when one considers the number of indicators (and/or sub-indicators) for SDG 6 and SDG 13, which include both the global indicators as well as domesticated indicators to reflect the unique South African circumstances.

Another issue is that unlike the SDGs, the NDCs (which reflect the country's five year blueprint towards reducing GHG emissions and reducing vulnerability to climate change under the Paris Agreement) do not contain specific indicators, but rather reflect the country's pledge to addressing climate change adaptation, using an economy-wide approach. Furthermore, none of the NDC goals make an explicit reference to water-related aspects, which is the focus of this project. Similarly, none of the targets and indicators of SDG 13 make an explicit reference to water. This in a sense is to be expected, as SDG 6 already addresses water aspects. However, water aspects are implied in SDG target 13.1 and its indicators as the indicators make reference to hazards and disasters, which do not manifest in, but do include, water related aspects. For the purposes of this project, which aims to improve the alignment in monitoring and reporting of water-related issues between climate change adaptation and the SDGs, our focus then shifts to Target 13.1 and its indicators, and asks the question: which institutions are the core producers and custodians of data that would reflect the country's progress?

An example of stakeholder mapping for SDG indicator 13.1.1 is shown in Figure 2-4. Again, the stakeholders involved both upstream and downstream of the indicator itself are diverse, spanning different spheres of government as well as the private sector.

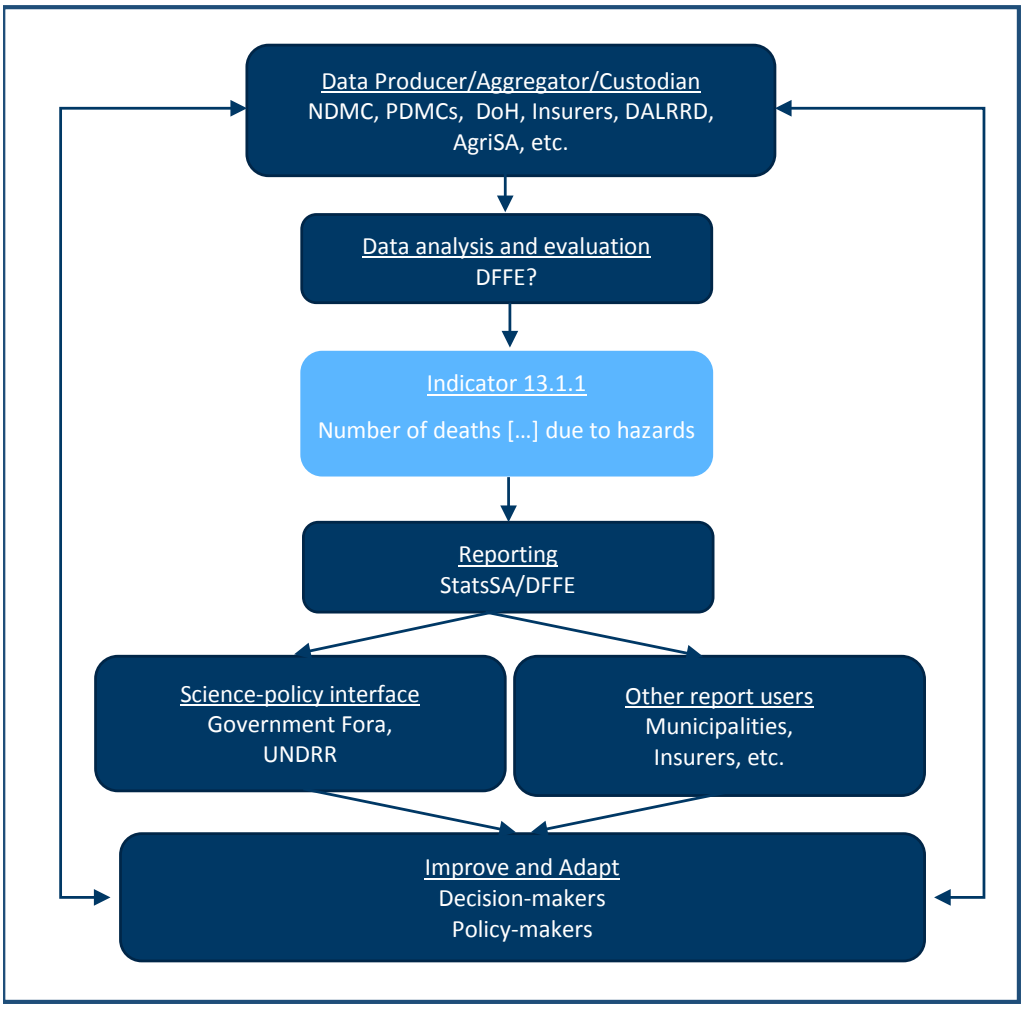

Figure 2-4: An illustration of the indicator-centred approach to stakeholder mapping, using SDG indicator 13.1.1. (i.e. Number of deaths, missing persons and persons affected by disaster per 100,000 people).

It must be noted that this stakeholder analysis exercise was only illustrative and could not carried further within the time constraints of this project. After consultation with and agreement from the project reference group, it was decided that for the further development of the monitoring and reporting framework focus be shifted to using SDG 6 as the anchor. It would be worthwhile, however, to consider doing a deep-dive into this kind of exercise in future work.

2.3.2 What are the information needs, governance requirements and institutional arrangements needed for optimal reporting?

The biggest challenge highlighted by stakeholders was knowing who the data custodians are and getting hold of data to compile the reports. By their very nature SDGs have massive data requirements, as clarified in the metadata for each goal (UNStats, 2016). The highly-specific reporting requirements for the SDGs require dedicated focus. In order to report on progress on each indicator, the prescribed method of computation for each indicator means that different data producers need to understand the data requirements so that the resulting data are of sufficient quality. During the stakeholder engagements, the

issue of lack of standardized data collection methodology came out strongly. Many stakeholders mentioned challenges ranging from poor data quality, largely qualitative data, a repetitive nature of the gathered data, and general inconsistency in data handling. It was emphasized that data and how data are handled/processed have an impact on the quality and verifiability of the data and its subsequent use for reporting purposes.

The responsibility for ensuring data quality lies with the Sectoral Working Groups (SWGs), which form an integral part of StatsSA's SDG coordination mechanism and are functional structures for gathering the data needed for reporting. They are also responsible for ensuring data is of good quality. The SWGs should ideally be continuous working structures but they unfortunately become redundant outside of the report-writing phases.

In terms of institutional arrangements, a National Coordination Mechanism (NCM) was developed by the National Planning Commission and approved by Cabinet in 2019 to ensure South Africa's effective implementation, follow-up and review of the NDP, the SDGs, and the African Union's Agenda 2063 (The Presidency, 2019). This is a high-level structure comprising mainly high-ranking representatives from government departments (Figure 2-5).

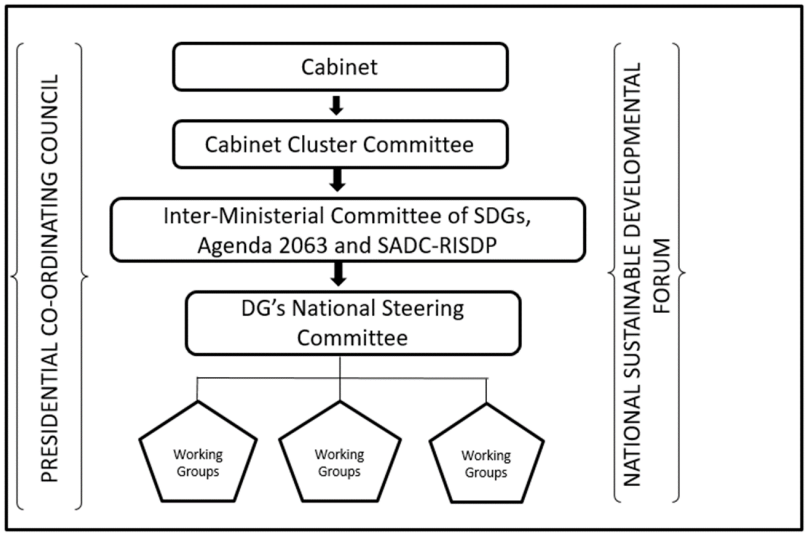

Figure 2-5: DPME's National Coordination Mechanism. (Image adapted from the Voluntary National Review Report (The Presidency, 2019)).

Despite the existence of this structure, there are inconsistencies in terms of line departments taking full ownership of the SDGs. For example, during one of the stakeholder engagement sessions it was mentioned that, "*It has been a challenge to get some departments on board. As we approach departments, they are aware they are responsible for certain goals and targets, but it is not necessarily written anywhere.*" This implies that coordination is not happening properly. While we are not familiar with the inner workings of the NCM, we propose that engagements around the implementation, monitoring and assessment of these agendas would be more effective if attended by technical experts rather than government officials somewhat removed from the data/monitoring/gaps processes. A distinction is needed between strategic oversight and practical coordination and implementation. We further propose that StatsSA's SWGs (which are only active during report-writing) could fulfil the role of providing ongoing technical oversight and be incorporated into the "Working Groups" that form part of the NCM.

At departmental level, the Department of Water and Sanitation (DWS) provides an excellent example of how institutional ownership can be operationalised (Figure 2-6).

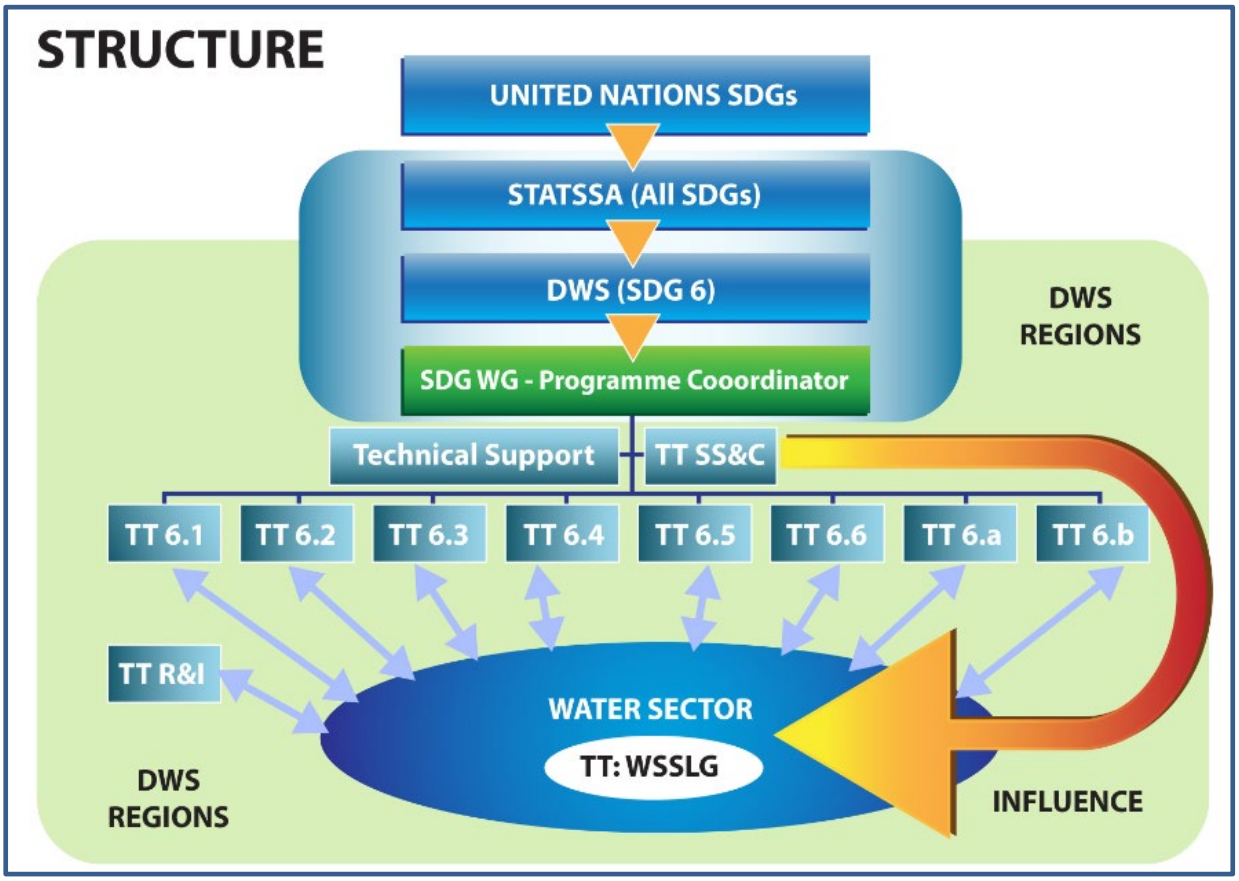

Figure 2-6: Institutional structure for the achievement of SDG 6. TT = Task Team (Image courtesy of DWS:2021).

Over the course of several years, a functional SDG 6 structure has been developed within the department. The structure comprises a dedicated task team (TT) for each SDG 6 target, plus three cross-cutting TT's for Research and Innovation; Sectoral Support and Coordination; and Water and Sanitation Sector Leadership Group, respectively. These teams work in concert to ensure continuous progress towards the achievement of SDG 6. DWS has been successful in their SDG programme because they have dedicated staff and the mandate to work towards targets at a national level; as well as the policy level implementation through the NW&SMP.

Other departments could consider establishing TTs with strong, expert leadership that would each run its own process of monitoring, evaluation and reporting for its targets. However, we are cognizant of the substantial financial investment that would be required to realise this ideal. For example, the operational costs incurred by DWS to deliver on SDG 6 were reported to be R32 million per annum (DWS, 2018). For this reason, it is imperative that the implementation of the SDGs and the Paris Agreement is closely aligned with DFFE's departmental mandates, so that it is not regarded as an additional responsibility. To this end, we commend DWS's approach of linking the reporting framework for SDG 6 to the National Water and Sanitation Master Plan (NW&SMP). DWS's NW&SMP is a guiding document that identifies key actions in the water sector and allocates roles and responsibilities to all in the water sector, from the various tiers of government, the private sector and other stakeholders for the implementation of the plan (Department of

Water and Sanitation, 2018). This means that not only can funding be funnelled towards projects where needs are identified formally, but service delivery authorities in the water and sanitation sector are held responsible for improving conditions and therefore advancing SDG progress at national scale. Similarly, anchoring the work of DFFE on climate change adaptation to the NCCAS, putting the required structures (e.g. target-specific task teams) and supporting these with the necessary processes (periodic reporting and gap analyses) could improve performance towards SDG 13 and the Paris Agreement.

Legislation could also be an enabler for better monitoring and reporting. For example, the absence of climate change legislation stands in sharp contrast to the well-developed water-related legislative framework. If data are required from partners it would need to be legislated, since voluntary data collection and reporting is sporadic and insufficient for tracking trends. The proposed Climate Change Bill (Climate Change Bill, 2018) presents an opportunity for the development of guidelines for mandatory systematic monitoring and reporting of climate change adaptation information.

2.3.3 What lessons have been learned from previous reporting cycles, and what gaps and/or opportunities have been identified for improved reporting?

Three main lessons were distilled from our engagements with stakeholders, namely data issues; institutional responsibility/ownership; and continuity.

Data quality and verifiability issues, as well as the importance of bringing data custodians into the fold and engaging with them continuously were the most important matter raised by the stakeholders. For example, data required to report against SDG 6, 13 and the Paris Agreement lie with multiple custodians. This then necessitates that the responsibilities of collating and analyzing the data are clearly mapped and outlined. This highlights the importance of the indicator-centric approach we are following. A good understanding of the stakeholders involved in the data stream of each indicator will ensure that such stakeholders are properly engaged, to promote an understanding of data quality requirements.

There is a need for well-defined institutional arrangements (e.g. functions within the department that align strongly with indicators and/or even targets). Line departments implement and report against what is contained in the Medium-Term Strategic Framework (MTSF), which is the main vehicle for achieving the ideals of the National Development Plan (NDP). High levels of alignment between the NDP and the SDGs have been reported, which presents an opportunity to align institutional mandates and plans to ensure that the government outcomes also support the SDGs (and the Paris Agreement, due to the inherent overlap between SDG 13 and the Paris Agreement adaptation imperatives). It might also be useful to align internal departmental reporting requirements with those of the SDG cycles so that relevant and timeous information can be provided for both processes. In this way, the reactivity approach towards reporting on SDGs would change to a more proactive approach. Another benefit of such an approach would be the maintenance of momentum between the reporting years. Thus, embedding the work within existing structures could be an enabler for enhanced monitoring and reporting towards the SDGs and the Paris Agreement.

Lastly, from our interactions with stakeholders, it appears that work regarding SDGs seems to be done only sporadically and reactively in certain departments, e.g. during reporting years. This leaves little room for gap analyses and adaptive management to adjust for the trajectory towards meeting the targets. In this way, no active change in behaviour can be affected and it will not be easy to know whether the target is met or to understand the reasons for not meeting the target. The importance of an adaptive approach to the achievement of the SDGs and the Paris Agreement cannot be over-emphasized. Such an approach requires

iteration between implementation and reporting, with continuous monitoring and evaluation as the so-called golden thread that holds the system together and gives it meaning. Figure 2-7 below demonstrates how this adaptive approach has been adopted within DWS, for the realisation of SDG 6.

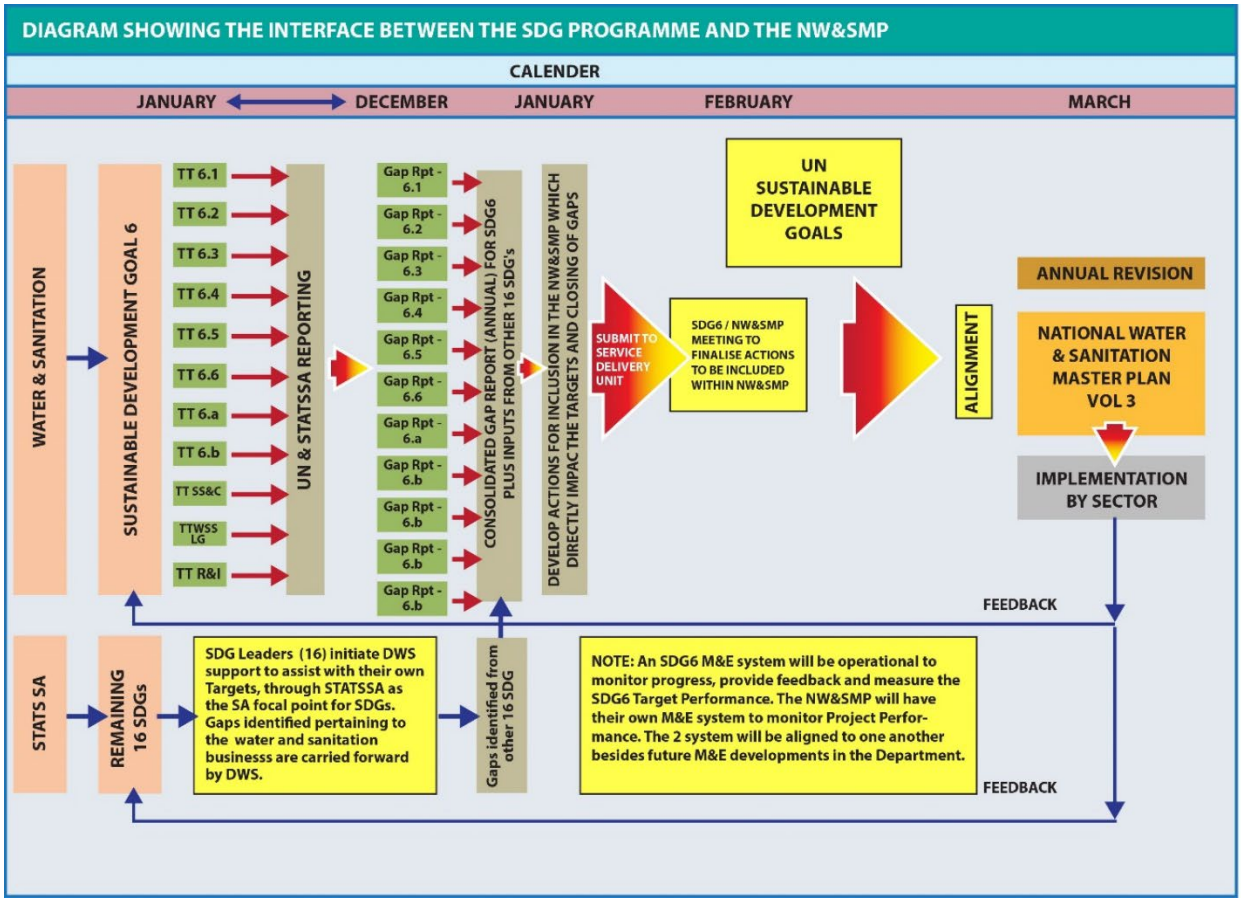

Figure 2-7: SDG 6 coordination mechanism. (Image courtesy of DWS:2021).

Ongoing engagement (e.g. annual gap analysis and continuous alignment with key sectoral plans and strategies) is the antidote to lack of continuity (e.g. SWGs only being active around the reporting periods), which inadvertently results in frantic collation of *ad hoc* data and reporting that is not reflective of all the good work that is taking place at multiple scales across the country. Long-term monitoring is critical to the observation of trends, and this requires thinking beyond "what data are available" (at the last minute), to planning for investment into observation and/or data collation systems. The TT for Research and Innovation (TT R & I) that the DWS established (see Figure 2-6) is an excellent way to ensure that research and data collection gaps get filled, and annual reviews of these are likely used to tie funding calls to specific requirements. This model could be followed by other departments. Additionally, DWS's TT for Water & Sanitation Sector Leadership (TT WSSLG), together with the TT for Sector Support and Coordination (TT SS&C) ensure that findings from the annual SDG 6 gap reports get translated into ground-level action. In this way the system allows for self-correction and is self-adapting (Figure 2-8).

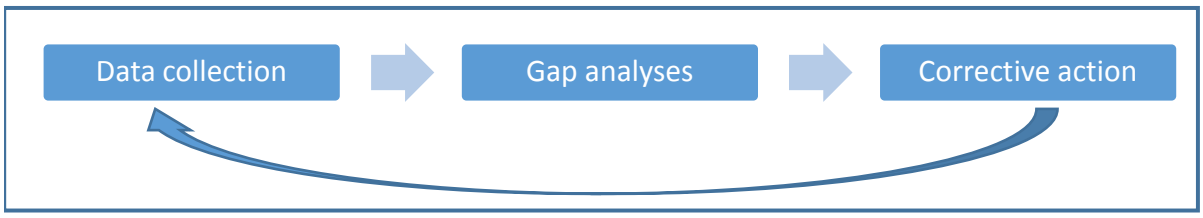

Figure 2-8: A simple illustration of the adaptive management cycle used for SDG 6.

The NW&SMP is the vehicle for corrective action within the DWS's SDG6 programme and we propose that the NCCAS could be the equivalent for SDG13 and the Paris Agreement within DFFE.

2.4 CONCLUSIONS

The importance of promoting ownership of the SDGs by aligning them with institutional mandates came up as a strong consideration. One way of doing this would be to have DPME promoting the prominence of the SDGs in the MTSF. This, in turn, would translate into the explicit mention of the SDGs in departmental five-year strategic plans and performance plans, subsequently resulting in the implementation of the SDGs being viewed as an integral component of departmental mandates.

The DWS has much to offer other departments tasked with implementing and tracking progress on the other SDGs. The experience gained and learning achieved by the DWS through their implementation of a MER framework for SDG 6 could be transferred to other departments through appropriate learning events as well as longer-term guidance in the establishment of their own MER systems. The National Coordinating Mechanism could play a key role in facilitating this cross-learning.

Multi-departmental engagements/workshops (SDG wide) to map data requirements, gaps and flows, would allow an understanding of overlaps and optimal sharing of data (and the observation systems/processes that produce them) in cases where data can contribute to multiple indicators, which they do.

Most importantly, the identification of and engagement with custodians of data is the basis for meaningful monitoring and reporting.

CHAPTER 3. TOWARDS A LINKED-UP MONITORING AND REPORTING FRAMEWORK FOR SDG 6, SDG 13 AND THE PARIS AGREEMENT

3.1 INTRODUCTION

3.1.1 Context

This chapter is the output of Task 3, whose focus was the development of a framework to link up the monitoring and reporting of SDG 6, SDG 13 and the Paris Agreement. The work presented herein was informed by and builds on the information gathered in Tasks 1 and Task 2 (and associated chapters 1 and 2).

3.1.2 Background

The year 2015 presented the world with two major achievements in the global negotiations that are likely to have a significant transformative effect on the global environmental governance for decades to come: the Sustainable Development Goals (SDGs) and the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement.

The 2030 Agenda encompasses 17 SDGs, 169 targets and a declaration text articulating the principles of integration, universality, transformation and a global partnership. The SDGs integrate the social, environmental and economic dimensions of sustainable development and aim to provide a social foundation for humanity while ensuring that human development takes place within the biophysical boundaries of Earth.

3.1.2.1 Differences between the SDGs and the Paris Agreement:

It is important to highlight the differences between the SDGs and the Paris Agreement. The two agreements were:

- Negotiated under distinct global processes,
- Developed using different negotiation approaches,
- Have different follow-up and review mechanisms,
- Have different reporting structures,
- Have different reporting frequencies, and
- NDCs were drafted at least a year before the targets underpinning the SDGs were defined.

3.1.2.2 Similarities between SDGs and the Paris Agreement:

Despite these differences, there are still many similarities between the architecture of SDGs and that of the Paris Agreement, namely:

- Both agendas have global coverage
- Both agendas have explicit synergies between climate change and development
- Both agendas have same time frame (up to 2030)
- Both agendas use nationally determined targets that have been developed in a "bottom up" manner
- Both agendas demand policy coherence and mainstreaming
- Both agendas require national level reporting
- Both recognise and attempt to guard against the risks of purely national and short-term approaches.
- Both agendas allow for monitoring and reporting environmental protection, economic and development policies.
- Both need to balance the country's need to showcasing the country's progress with making monitoring and reporting not burdensome.

3.1.2.3 Benefits of a joined-up monitoring and reporting framework for the SDGs and the Paris Agreement

Both global agendas have raised the bar for the level and intensity of monitoring and reporting of country actions. This increase in monitoring and reporting is a marked shift particularly for developing countries, like South Africa. Developing countries that first identify their constraints and act to systematically resolve those constraints, stand a better chance of deepening their effective participation in both global agendas.

We know that even if the necessary capacity development for policy and strategy formulation were addressed, without effective monitoring and reporting systems, the development of integrated national policies is unlikely to have demonstrable impact. As such, there is a growing recognition of the need for setting up national monitoring and reporting systems that will be mutually supportive in reflecting progress in the implementation of both SDGs and the Paris Agreement (Table 3-1). Cost-efficiency is also another important aspect to take into consideration when setting up such joined-up monitoring and reporting systems for the SDGs and NDCs.

Table 3-1: List of key benefits of establishing joined-up monitoring and reporting systems for SDGs and the Paris Agreement for countries.

Benefit	Activity
Development of indicators	Prioritization of the development of indicators that help track progress across the two agendas in order to minimize the information management burden.
Collaboration of the focal points	Collaboration between climate change and SDG focal points should be mandated from relevant political authorities so as to help avoid duplication and harness synergies.
Support from international development agencies	Countries need to harness focussed and greater support from international development agencies to enhance national efforts of improving consistency and integration between SDG and climate data.
Coordination of role players	Coordination of the actors involved in the two agendas, both domestic actors and international actors, such as development partners to leverage synergies not only for the implementation but also for tracking and reporting progress of the implementation.
Capacity building	Countries should provide a clear and integrated approach to capacity building for setting up, operationalising and maintaining monitoring and reporting systems for both agendas to tap into the benefits of a joined-up implementation for cost efficiency and policy coherence.
Continuous improvement	Development of joined up monitoring and reporting systems should be grounded in innovation, integration, and iteration.

3.2 APPROACH

We note that in the course of implementing the project, we received guidance from the project Reference Group to include the updated Nationally Determined Contributions (U-NDC[5]) among the documents consulted in developing the framework. NDCs are a central element of the Paris Agreement and have provided an unprecedented momentum for climate action in virtually all countries. They represent induvial country pledges to the goals of the Paris Agreement, as determined by unique domestic circumstances and capabilities. They can include national circumstances, mitigation actions, adaptation actions, economic indicators, climate vulnerabilities, fairness, ambition, support needs and opportunities for co-operation. South Africa's draft updated U-NDC was recently approved by Cabinet in September 2021. Subsequent to its adoption, the Presidential Climate Change Commission published recommendations on potential areas of improvement (The Presidential Climate Commission, 2021).

In response to the guidance of the project Reference Group, we did look at South Africa's U-NDC. However, we realised that there is not a clear reporting framework to use as a basis for reporting for the NDC. This is particularly true for the adaptation component of the NDC, which is the more directly aligned with the SDG 13 targets (see Table 1-3 further above). The reality is that unlike the SDGs, the adaptation component of

[5] U-NDC is our own notation we use to distinguish between the original 1st NDC of 2015 and the updated draft NDC of 2021.

the NDC is not designed to be tracked in a manner that is explicit and intentional. Furthermore, both the NDC and the U-NDC hardly make reference to SDG 6 targets, as reflected in Table 3-2 below.

Table 3-2: A high-level assessment of how SDG 6 targets are reflected in the NDC and U-NDC.

SDG 6 targets	What do South Africa's NDC and U-NDC say about SDG 6 targets?
6.1 Drinking water	No explicit reference
6.2 Sanitation	No explicit reference
6.2 Hygiene	No explicit reference
6.3 Wastewater treatment	No explicit reference
6.3 Water quality	No explicit reference
6.4 Water use efficiency	Implied reference
6.4 Water stress	Implied reference
6.5 Integrated water resources management	Implied reference
6.b Community participation	Implied reference

The high-level simplified reflection we conducted using everyday terms as proxies for SDG 6 targets showed that only three SDG 6 targets were implied in South Africa's 1st NDC and U-NDC. These were water stress, integrated water resources management and community participation. When this component of the work was underway, it became apparent that the NDCs were framed at a high level and therefore lacked a lot of detail that would enable them to be linked to the SDGs. Additionally, there was no formal reporting guidance for the adaptation component of the NDCs both at national and international level. As a result, we considered it impractical to attempt to design a reporting framework to link up SDG 6 targets and the NDCs[6].

As such, our focus had to change slightly from being directed at the reporting aspects, to rather first understanding the linkages between SDG 6 targets and SDG 13 indicators. The focus of this exercise was to determine the extent to which the content of SDG 6 targets and SDG 13 indicators is related, in order to establish whether there is scope for mutual technical consideration of some of these targets and their associated indicators (Table 3-3).

[6] There were new developments with regards to reporting guidelines since the writing of this section. These are further elaborated on in the final chapter which focuses on learnings and recommendations.

Table 3-3: Rationale for the relation between SDG 13 and SDG 6 targets and indicators.

SDG 13 target/indicator	SDG 6 targets	Rationale (why/how are they related)
13.1 Mortality attributed to disasters	6.1 Drinking water 6.2 Sanitation 6.2 Hygiene 6.3 Wastewater treatment 6.3 Water quality 6.4 Water stress	Climate change related disasters (e.g. floods) would have a negative impact on the listed indicators of SDG 6. Such an impact would be more acute in those areas that were neglected during the apartheid regime and are currently experiencing poor service delivery from the public sector in the democratic era. The impact of climate change disasters, manifesting through the SDG 6 indicators, may result in loss of lives.
13.1 Adoption and implementation of national disaster risk reduction strategies	6.1 Drinking water 6.2 Sanitation 6.2 Hygiene 6.3 Wastewater treatment 6.3 Water quality 6.4 Water use efficiency 6.4 Water stress 6.5 Integrated water resources management 6.b Community participation	All the SDG 6 targets are related to this SDG 13 indicator. All SDG 6 targets, when fully implemented would, in various ways, contribute to disaster risk reduction.
13.1 Local governments that adopt and implement local disaster risk reduction strategies	6.1 Drinking water 6.2 Sanitation 6.2 Hygiene 6.3 Wastewater treatment 6.3 Water quality 6.4 Water use efficiency 6.4 Water stress 6.5 Integrated water resources management 6.b Community participation	All the SDG6 targets are related to this SDG 13 indicator. All SDG6 targets, when fully implemented they would, in various ways, contribution to disaster risk reduction, including at local government level.
13.2 Countries with NDC, long-term strategies, national adaptation plans and adaptation communications	6.1 Drinking water 6.2 Sanitation 6.2 Hygiene 6.3 Wastewater treatment 6.3 Water quality 6.4 Water use efficiency 6.4 Water stress 6.5 Integrated water resources management 6.b Community participation	All the SDG 6 targets are related to the NDCs and climate change planning strategies and reporting on climate change adaptation. However, we recognise that the South African first NDC is not structured in a sectoral manner. That said, aspects that are related to the SDG 6 targets are implied in all the supporting climate change adaptation planning documents.
13.2 Total greenhouse gas	6.3 Wastewater treatment	Wastewater treatment appears to be the only SDG 6 target that is related to the SDG13 indicator

SDG 13 target/indicator	SDG 6 targets	Rationale (why/how are they related)
emissions per year		regarding total GHG emissions. The link is through the source of energy used to undertake wastewater treatment. The use of fossil fuels to power wastewater treatment plants would contribute to GHG emissions. By contrast, the use of renewable energy options to operate the wastewater treatment plants would have minimum impact on GHG emissions.
13.3 Citizenship education and education for sustainable development are mainstreamed	6.1 Drinking water 6.2 Sanitation 6.2 Hygiene 6.3 Wastewater treatment 6.3 Water quality 6.4 Water use efficiency 6.4 Water stress 6.5 Integrated water resources management 6.b Community participation	Enhanced awareness through education and other community participatory approaches would improve national and sub-national response to the indicated SDG 6 targets and indicators.
13.a Climate finance	6.1 Drinking water 6.2 Sanitation 6.2 Hygiene 6.3 Wastewater treatment 6.3 Water quality 6.4 Water use efficiency 6.4 Water stress 6.5 Integrated water resources management 6.b Community participation	Climate finance, provided by different sources including South Africa's fiscus, developed countries and domestic and international non-state actors, would contribute to improve the status of the indicated targets of SDG 6 at national and sub-national levels, particularly in areas which have already been identified or projected to be affected by climate change.
13.b Climate change plans by LDCs		At the time of writing this report, South Africa is not a Least Developed Country. Therefore, this SDG 13 target is not applicable to South Africa. As such, no attempt is made to relate it to the targets of SDG 6.

Subsequent to the high-level matching exercise, we further perused a recent WRC-funded report on the interlinkages between SDG 6 and all the other SDGs *(Libala et al.*, 2021). The report had assessed interlinkages at indicator level, which provided an opportunity for us to quantify the connections at target level. The aim of this exercise was to assess the strength of connections between the various targets. To do this, we conducted a manual count of relevant connections depicted on the network analysis by Libala *et al.* (2021) of SDG 6 and environmental SDGs, the result of which is shown in Table 3-4.

Table 3-4: Synergies between SDG 6 and SDG 13 targets (adapted from Libala *et al*., 2021). Green shaded cells denote the number of synergies between the relevant targets.

	SDG 13.1 Resilience and adaptive capacity	**SDG 13.2 CC integration into national policies, strategies and planning**	**SDG 13.3 Education, awareness and capacity**	**SDG 13.a Financial support**	**SDG 13.b Capacity development for LDCs**
SDG 6.1 Safe and accessible drinking water	3				
SDG 6.2 Sanitation and hygiene	3				
SDG 6.3 Wastewater and water quality	3	1			
SDG 6.4 Water-use efficiency	3	2			
SDG 6.5 Water resources management	2	1	1		
SDG 6.6 Protection and restoration of water-related ecosystems	1	1			
SDG 6.a International cooperation					
SDG 6.b Community participation					

A total of 21 synergies were observed, with most of these occurring between target 13.1 and six of the SDG 6 targets. Fewer synergies existed between target 13.2 and four SDG 6 targets, while the only other synergy was between SDG13.2 and SDG 6.5. Interestingly, no synergies were shown between SDG targets 6.a, 6.b, 13.a and 13.b, despite them addressing the same issues of funding, cooperation and participation. Nevertheless, the number of synergies documented indicated a strong opportunity to link up the two SDGs.

At the time of conducting this study, it became clear that, compared to most government departments, the Department of Water and Sanitation has a more established / institutionalised approach to tracking SDG 6. Based on this observation and the recommendation of the project reference group, it was decided that the approach be modified to use SDG 6 as an anchor for the further development of the framework. The idea was to then assess which SDG 6 indicators can be used to track which NCCAS interventions.

Like the NDCs, all the NCCAS strategic interventions are framed in a non-sectoral manner. That is, they are articulated in a manner that enables them to be relevant to all sectors of the environment, including water. As such, the SDG 6 targets could be said to be relevant to all the strategic interventions and outcomes of the NCCAS. However, for this exercise we conducted a detailed analysis of the text of each action associated with the strategic intervention, as described in section 2.2 of chapter 2. The aim was to ascertain whether specific actions proposed in the NCCAS were synergistic with SDG 6 targets.

For purposes of brevity, in Table 3-5 we used headline descriptions of the NCCAS strategic interventions. It is important to note that there is more information describing in greater detail each of the NCCAS strategic interventions. As a result, at face value (based on the text in the first column of the table) the NCCAS strategic interventions may all appear to be synergistic with the SDG 6 targets – but the table shows a lack of synergy in many instances. Where this situation exists, it is because in our analysis we took into account the complete information for each NCCAS strategic intervention, including the description of each of the 95 actions. For a full description of the analysis, please refer to page 15.

Table 3-5: An expanded version of Table 1.4 showing potential interactions between NCCAS strategic interventions and SDG 6 targets. Green blocks denote a positive impact, while clear blocks denote no discernible impact. The yellow box shows a mixed impact (i.e. a combination of positive and negative effects).

NCCAS Strategic Intervention	SDG 6 Targets							
	6.1 Safe and accessible drinking water	**6.2** Sanitation and hygiene	**6.3** Wastewater and water quality	**6.4** Water-use efficiency	**6.5** Water resources management	**6.6** Protection and restoration of water-related ecosystems	**6.a** International cooperation	**6.b** Community participation
1: Reduce human, economic, environmental, physical and ecological infrastructure vulnerability and build adaptive capacity.								
2: Develop a coordinated Climate Services system that provides climate products and services for key climate vulnerable sectors and geographic areas.								
3: Develop a vulnerability and resilience methodology framework that integrates biophysical and socio- economic								

NCCAS Strategic Intervention	SDG 6 Targets							
	6.1 Safe and accessible drinking water	**6.2** Sanitation and hygiene	**6.3** Wastewater and water quality	**6.4** Water-use efficiency	**6.5** Water resources management	**6.6** Protection and restoration of water-related ecosystems	**6.a** International cooperation	**6.b** Community participation
aspects of vulnerability and resilience.								
4: Facilitate mainstreaming of adaptation responses into sectoral planning and implementation.								
5: Promote research application, technology development, transfer and adoption to support planning and implementation.								
6: Build the necessary capacity and awareness for climate change responses.								
7: Establish effective governance and legislative processes to integrate climate change in development planning.								

NCCAS Strategic Intervention	SDG 6 Targets							
	6.1 Safe and accessible drinking water	**6.2** Sanitation and hygiene	**6.3** Wastewater and water quality	**6.4** Water-use efficiency	**6.5** Water resources management	**6.6** Protection and restoration of water-related ecosystems	**6.a** International cooperation	**6.b** Community participation
8: Enable substantial flows of climate change adaptation finance from various sources.								
9: Develop and implement an M&E system that tracks implementation of adaptation actions and their effectiveness.								

A total of 12 synergistic interactions were observed between SDG 6 targets and the NCCAS strategic interventions. Notably, the most synergies were with target 6.b, which is concerned with community participation in water resource management. There were no discernible synergies or trade-offs between any of the SDG 6 targets and strategic interventions 3 and 9. Similarly, we note with concern the absence of synergies with target 6.2 (sanitation and hygiene).

Table 3-4 and Table 3-5 above show which SDG 6 targets could potentially be used to track SDG 13 targets and NCCAS interventions, respectively. To rank the SDG 6 target with the highest potential to contribute to the tracking of the climate change response, we tallied up the synergistic interactions of each SDG 6 target and ended up with the ranking depicted in Table 3-6. Synergies with the NCCAS were given a higher weight in order to resolve tied rankings between targets (e.g. 6.a and 6.2 both had two synergies each; 6.1 and 6.3 had five each; 6.4 and 6.5 had six each). In these instances, the target that had more synergies with the NCCAS was given a higher final ranking than its competitor. The reason for this approach is the perceived relative domestic importance of the NCCAS compared to SDG 13.

Table 3-6: Ranking of SDG 6 targets according to their potential to contribute to tracking the climate change response.

	Synergies with the NCCAS	Synergies with SDG 13	Total number of synergies	Ranking
SDG 6.4	1	5	6	1
SDG 6.5	2	4	6	2
SDG 6.1	2	3	5	3
SDG 6.3	1	4	5	4
SDG 6.b	4	0	4	5
SDG 6.6	1	2	3	6
SDG 6.a	2	0	2	7
SDG 6.2	0	2	2	8

3.3 PROPOSED FRAMEWORK

The National Water Security Framework (NWSF) defines a *framework* as a particular set of rules, ideas or beliefs which are used to address problems or to decide what to do (Nepfumbada & Seetal, 2020). Based on this simple definition, our approach to developing a linked-up framework for the monitoring and reporting of South Africa's water-related issues for the SDGs and the Paris Agreement entailed compiling a set of ideas to guide how the monitoring and reporting should be integrated. Having established in chapter 1 that SDG 13 and the adaptation component of the Paris Agreement, as reflected in the NDC, are essentially two sides of the same coin, we henceforth combine the two under the umbrella term "climate change response". The key guiding policy document for the climate change response in South Africa is the NCCAS. For the purposes of this work, this umbrella term refers to the adaptation component of the climate change response, and specifically excludes the mitigation component.

A key guiding question was whether there is scope to mould the existing SDG 6 indicators in order to contribute to the Paris Agreement. In other words, what indicators can maximize the interlinkages between SDG 6 and the climate change response? An underlying assumption to the framework is that DFFE, as the focal point for the climate change response, will co-lead the implementation of the framework with DWS.

Based on the ranking exercise described above, Table 3-7 represents our ideas on how to integrate and optimise the monitoring and reporting of water issues under the SDGs and the Paris Agreement. The ranks imply the priority that must be given to the various SDG targets in terms of planning, implementation, monitoring and reporting so as to realise the biggest cross-cutting returns.

Table 3-7: Proposed linked-up framework for the monitoring and reporting of South Africa's progress towards climate change adaptation, anchored in SDG 6.

Rank	SDG 6 Target	Indicator	How it reflects progress in adaptation
1	**SDG 6.4** Water use efficiency and freshwater stress	6.4.1 Change in water-use efficiency over time	An improvement in water-use efficiency will reduce vulnerability to water scarcity
		6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	A reduction in water stress will reflect a reduction in vulnerability to water scarcity
2	**SDG 6.5** Integrated water resources management	6.5.1 Degree of integrated water resources management implementation (0-100)	Achieving a balance among competing water demands from across society and the economy could ensure sustained and equitable availability of water
		6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	Transboundary cooperation could promote long-term sustainable and equitable management of shared water resources
3	**SDG 6.1** Access to safe drinking water	6.1.1 Proportion of population using safely managed drinking water services	Improved human health because of reduced water-borne diseases would be evidence of progress in adaptation
4	**SDG 6.3** Water quality	6.3.1 Proportion of wastewater safely treated	A reduction in the proportion of domestic and industrial wastewater that is discharged into water bodies will contribute to an improved condition of aquatic ecosystems, especially in urban areas. This also has linkages to reduced water-borne diseases.
		6.3.2 Proportion of bodies of water with good ambient water quality	A higher proportion of water bodies with good water quality might improve access to safe drinking water for a higher proportion of the population,

Rank	SDG 6 Target	Indicator	How it reflects progress in adaptation
			which in turn would reflect progress in adaptive capacity
5	**SDG 6.b** Local engagement	6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management	Coordination, stakeholder participation, co-development and co-ownership of local policies could promote sustainable water management at the local level, where impacts are felt most directly.
6	**SDG 6.6** Water-related ecosystems	6.6.1 Change in the extent of water-related ecosystems over time	The protection and restoration of water-related ecosystems would contribute to improving long-term water security.
7	**SDG 6.a** Water and sanitation support	6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan	Implementation of the climate change response requires financial support. Increased government spending would contribute to building climate resilience
8	**SDG 6.2** Sanitation and hygiene	6.2.1 Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap	Improved sanitation would result in improved human health.

The negative impacts of climate change on water resources are manifold, with increased freshwater scarcity being reported as one of the biggest impacts that South Africa will face. As such, it makes sense that monitoring of and reporting on the climate change response should, at a bare minimum, reflect progress towards addressing this threat. The framework presented above reflects this priority. In other words, the recommendation is that future reports to the UNFCCC on adaptation progress should include the latest statistics on water use efficiency and freshwater stress, as reflected in SDG target 6.4. The focal point for the UNFCCC (which we understand to be within the Climate Change Branch of the DFFE) is at a distinct advantage because these statistics are readily available from DWS, the custodian of SDG 6. In fact, the entrenched SDG 6 programme within DWS works in such a way that progress on all the SDG targets is reviewed on an annual basis. This then means that irrespective of any misalignment in the respective reporting cycles, the most up-to-date information would never be more than a year old. This is true for all the SDG 6 targets, which then implies that reporting meaningfully and timeously on South Africa's water-related progress to climate change adaptation is possible. An opportunity to operationalise this framework exists in the form of a dedicated climate change Technical Team that is currently under consideration for addition to the DWS institutional structure for the achievement of SDG 6 (see Figure 2-6). We thus strongly recommend proactive involvement of a representative from the Climate Change Branch of the DFFE in this Technical Team, particularly a technical person closely involved in the reporting of adaptation action under the Paris Agreement.

3.4 LIMITATIONS

A potential limitation of this framework is its subjectivity. The ranking exercise undertaken was based on expert opinion of the people that took part in the exercise. It is thus likely that a different set of authors could draw up a framework that looks different to ours. Additionally, we were attempting to link up components of two rather divergent global treaties, which made their alignment difficult. We do, however, believe that the work done herein provides a solid base upon which the further development of coherent, collaborative and meaningful monitoring and reporting on adaptation can take place.

CHAPTER 4. REFLECTIONS AND RECOMMENDATIONS FOR FUTURE WORK

4.1 REFLECTIONS ON THE JOURNEY

At the start of this project we had high hopes of designing "a simple, functional, cost-effective and integrated framework for monitoring and reporting of South Africa's water-related issues for the SDGs and the Paris Agreement". It is with humility that we concede that we had clearly underestimated the complexity of attempting to merge two global agendas that are as diverse as they are convergent. The SDGs are supported by globally agreed-upon metrics for what to report, highly specific methodologies for monitoring, as well as well-defined guidelines on how to report on progress towards their achievement. In contrast, the Paris Agreement, especially when it comes to its adaptation goal, does not have such stringent reporting requirements. Indeed, the reporting requirements for non-Annex I parties (such as South Africa) are even less developed than those for the developed countries. Instead, the UNFCCC leaves it to individual countries to determine their own adaptation targets, which they set out in the NDC. Moreover, the lack of consensus on metrics and indicators makes it inherently difficult to meaningfully track the pledges made in the NDC. This, in turn, creates a significant obstacle for comparable reporting between the two treaties. This misalignment was probably the biggest obstacle we encountered in doing this work. Towards the end of the project an updated NDC was published and it also transpired that updated guidelines for the upcoming Enhanced Transparency Framework were being developed. Unfortunately, these developments came to light too late to have an impact on the direction of the study.

The global goal of adaptation (to the adverse impacts of climate change) has typically been less prominent than its twin goal of mitigation (i.e. the temperature goal). This apparent neglect is evident in how reporting on the two goals takes place. For example, different country reports to the UNFCCC contain detailed sections on how South Africa is performing in terms of its carbon emissions targets, whereas the same kind of detail is not apparent in sections dealing with the adaptation goal (see for example the updated NDC and the latest (4th) Biennial Update Report). Currently, the indicators used by South Africa to track progress towards the transition to climate resilience include numbers of policies/plans and strategies that integrate climate change; number of stakeholder platforms on adaptation-related activities; number of monitoring systems and networks to monitor climate and atmospheric parameters; and number of monitoring systems and networks to monitor climate change impacts (Department of Environmental Affairs, 2018). Although these ARE quantitative indicators, they are not adequate to monitor how we are doing as a country in terms of adaptation action and its intended impact. As stated in the Paris Agreement, adaptation focuses on **"enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change** in the context of the temperature goal of the Agreement". The three components of the adaptation goal are fundamentally difficult to quantify. When does a country or a sector reach a point where it can be said to have achieved resilience, or is fully adapted to the impacts of climate change? Additionally, the lengthy time scales of climate change impacts mean that it may take decades to see evidence of effectiveness of adaptation actions. Furthermore, it is difficult to ascribe cause and effect to certain adaptation actions. But we strongly believe that the framework developed through this project presents an important starting point to demonstrating incremental progress.

The main driver behind our attempt to develop a linked monitoring and reporting framework for SDG 6, SDG 13 and the Paris Agreement was to enhance reporting synergies, to reduce duplication in data/information

collation, to maximise use of limited human, financial and technical resources and to develop a consistent messaging to national and international audiences regarding progress on SDGs and the climate change response. As far as we could ascertain, it appears that there is no tangible duplication in the reporting of SDGs and climate change issues in South Africa. Rather, there is variation in the level of effort to monitor and report against SDG 13 and SDG 6, as well as skewed reporting towards the mitigation goal of the Paris Agreement, while the adaptation component lags behind. The reasons for these imbalances have been discussed, as well as how they presented a considerable challenge to achieving the ultimate objective of this work.

Another challenge that we faced was poor cooperation within and across the government departments responsible for the SDGs and the Paris Agreement. The structuring and configuration of institutions that deal with issues of climate change and water is clear. Similarly, the mandates of such entities are clear. However, working in silos remains an intractable problem. For example, we observed that people working in the climate change policy space understood NCCAS and NDC issues very well, but did not seem invested in SDG 13. This reflects poor intradepartmental coordination/collaboration and is also evident in the dismal reporting against SDG 13 in South Africa's reports to the HLPF to date.

The strides made by DWS in tracking progress against SDG 6 are commendable, and the approach of this Department provides a useful template that other government Departments may adopt and adapt accordingly. We would like to encourage DFFE to explore the possibility of institutional ownership of SDG 13 by linking this work with the established UNFCCC structure within the department. While we fully acknowledge the potential financial and administrative burden of setting up an advanced internal coordination mechanism for the seamless integration of SDG 13 into the operations of DFFE, we would still highly recommend better internal communication, whereby the Sustainable Development Unit and the Climate Change Adaptation Unit improve lines of communication such that there is a shared understanding of reporting cycles as well as data requirements. It is crucial that such internal communication is ongoing rather than being intensified only when reports are due. This will enable the exchange/sharing of data that will, in turn, support meaningful reporting as well as allow for continuous improvement. Furthermore, and related to the need for continuous improvement, we also highly recommend the adoption of an adaptive management approach that will emphasize the strengthening of interlinkages between implementation, monitoring, reporting and evaluation.

The compilation of future NCs must include a concerted effort to report on the strategic outcomes identified in the National Climate Change Adaptation Strategy (NCCAS), and more importantly, the actual indicators listed under each intervention. Previous iterations of the NC have done a commendable job of reporting on the first two components of holistic adaptation (i.e. assessing impacts, vulnerability and risks; and planning for adaptation) (UNFCCC Adaptation Committee, 2013), and this is likely to continue in future reports, especially if the National Climate Risk and Vulnerability Assessment Framework (NCRVAF) proposed under action 3.1.1 of the NCCAS is developed and operationalised. However, it is also important to advance reporting on the other two components (namely, implementation of adaptation measures; and monitoring, reporting and evaluation of adaptation). Encouragingly, through our engagements with DFFE we have been informed that this is going to be done under the Enhanced Transparency Framework. Importantly, we call for the consideration of indicators that relate directly to key sustainable development outcomes, such as access to water and sanitation services. This is where we see the framework being of critical importance, as it clearly links SDG 6 indicators to measures of adaptation progress. The development of this framework therefore seems timely.

Mainstreaming the importance of meeting the reporting requirements to the international community on SDGs and the climate change response should be done intentionally, particularly within institutions that are key sources of relevant information. This could be done by anchoring substantive aspects of required information in institutions whose mandates already include collating and archiving such information. To this end, we propose that DPME could play a pivotal role in engendering the ownership of SDGs by line departments by promoting the prominence of the SDGs in the MTSF, which is the guiding document for departmental work programmes. In particular, we would like to make reference to the National Planning Commission's vision for a just transition, which includes a statement around "equitable access to water resources". Reference to water issues in the just transition discourse is mainly around the anticipated reduction in water use when power stations are decommissioned. However, discussions on issues pertaining to water also resulted in consensus around equitable access to water, improved water management, water conservation with penalties, awareness raising around water conservation, rehabilitation of catchment areas and additional focus on wastewater treatment, improved data collection systems and rainwater harvesting (NPC, 2019). These issues are in direct alignment with the proposed framework and imply that the NPC could be a key partner in operationalising the framework.

Another potential partner is the Presidential Climate Commission (PCC). The PCC is charged with developing consensus between social partners around the core components of a just transition in South Africa (The Presidential Climate Commission, 2021). It is a multistakeholder body established by the President of the Republic of South Africa to advise on the country's climate change response and pathways to a low-carbon, climate-resilient economy and society (Patel, 2021). However, because it is a recently established entity, we could not quite ascertain the role that the PCC could play in the uptake of the framework. This is an area that could be explored further in future work.

An understated challenge in reporting on water related issues for SDG 6 and the Paris Agreement is accessing information and data from the private sector. The private sector of South Africa is actively engaged in reporting against the SDGs, having contributed inputs through DPME in 2018 for South Africa's Voluntary National Report (https://globalcompactsa.org.za/wp-content/uploads/2019/08/GCNSA-VNR-July-Report-2019-20190823-digital-version.pdf). It would therefore be a worthwhile exercise to explore how to fully involve the private sector as a partner.

Lastly, we would like to emphasize that in developing this framework, the goal was not to replace or duplicate existing monitoring and data collection tools. Rather, we sought to design a tool that is optimised for reporting specifically on water and sanitation issues in the context of climate change adaptation. To this end, we acknowledge the existence of the National Climate Change Information System (NCCIS), which is a key tool developed under the NCCAS, and call for its sustained maintenance to support evidence-based reporting well into the future. Similarly, we recognise StatsSA's Integrated Indicator Framework, which is currently under development, and propose an exploration of how these various systems/tools could be seamlessly integrated.

4.2 RECOMMENDATIONS FOR FURTHER RESEARCH

Future research in this area should recognise that some of the key documents on climate change are written in a non-sectoral manner and do not include detailed reporting aspects. An example is the NDC. An interesting exercise would therefore be to engage with DFFE to explore whether there is scope to include more meaningful reporting in future iterations of such documents, but still within the UNFCCC reporting guidelines.

Secondly, and related to our recommendation for DFFE to take full ownership of SDG 13, an in-depth assessment of the financial and logistical implications of fully institutionalizing SDG 13 would help with realistic planning and eventual implementation. DWS's SDG 6 structure provides a useful template upon which such an exercise could be based. Such work should, however, not look at SDG 13 in isolation, but rather seek to integrate other environmental SDGs (e.g. SDG 14 and 15) and other international treaties that DFFE has reporting obligations towards, such as the United Nations Convention to Combat Desertification (UNCCD), among others. Identifying common indicators across the various treaties could potentially improve resource use efficiency.

Another good exercise would be to do a gap analysis in respect of the NCCAS by mapping actions done by various sectors in respect of climate change adaptation against the 192 actions listed in the NCCAS. Subsequent to this gap analysis, proper plans could be put in place to implement whatever actions are lagging behind. Of specific relevance to the proposed monitoring and reporting framework, the gap analysis could map how SDG 6 and SDG 13 feed into the NCCAS and how, in turn, the NCCAS is linked to the NW&SMP.

Lastly, it has often been said that South Africa has a plethora of well-meaning policies and strategies, but often-times these policies fail to have the desired impact on the ground, as a result of poor implementation and lack of monitoring and evaluation. This could be a symptom of a persistent research-policy-implementation gap and a siloed approach to work in general. We acknowledge that it would be a difficult exercise to conduct an in-depth assessment of this gap, but we also propose that it would be a much-needed exercise. Ultimately, such an exercise would help guide future policy-making, ensuring that it is evidence-based and that there is seamless integration, implementation, monitoring, evaluation and reporting of the impact thereof. To this end, we would like to conclude by emphasizing the importance of an adaptive approach to dealing with wicked problems.

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APPENDICES

Appendix 1: SDG 6 Targets and Indicators

Targets	Indicators
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services
6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	6.2.1 Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	6.3.1 Proportion of wastewater safely treated
	6.3.2 Proportion of bodies of water with good ambient water quality
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	6.4.1 Change in water-use efficiency over time
	6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	6.5.1 Degree of integrated water resources management implementation (0-100)
	6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	6.6.1 Change in the extent of water-related ecosystems over time

Targets	Indicators
6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies	6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan
6.b Support and strengthen the participation of local communities in improving water and sanitation management	6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management

Appendix 2: SDG 13 Targets and Indicators

Target	Indicators
13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	13.1.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population.
	13.1.2 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030.
	13.1.3 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies.
13.2 Integrate climate change measures into national policies, strategies and planning.	13.2.1 Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other).
13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.	13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula.
	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions.

Target	Indicators
13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible.	13.a.1 Mobilized amount of United States dollars per year between 2020 and 2025 accountable towards the $100 billion commitment.
13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities.	13.b.1 Number of least developed countries and small island developing States that are receiving specialized support, and amount of support, including finance, technology and capacity-building, for mechanisms for raising capacities for effective climate change-related planning and management, including focusing on women, youth and local and marginalized communities.

Appendix 3: NDC Goals

	1st NDC	Draft updated NDC
Goal 1	Develop a National Adaptation Plan, and begin operationalization as part of implementing the NCCRP for the period from 2020 to 2025 and for the period 2025 to 2030.	Enhance climate change adaptation governance and legal frameworks
Goal 2	Take into account climate considerations in national development, sub-national and sector policy frameworks for the period 2020 to 2030.	Develop an understanding of the impacts on South Africa of 1.5 and 2°C global warming and the underlying global emission pathways […] and adaptation needs in the context of strengthening the key sectors of the economy.
Goal 3	Build the necessary institutional capacity for climate change response planning and implementation for the period 2020 to 2030.	Implementation of NCCAS adaptation interventions for the period 2021 to 20304
Goal 4	Develop an early warning, vulnerability and adaptation monitoring system for key climate vulnerable sectors and geographic areas for the period 2020 to 2030, and reporting in terms of the National Adaptation Plan with rolling five-year implementation periods.	Mobilise funding for adaptation implementation through multilateral funding mechanisms
Goal 5	Develop a vulnerability assessment and adaptation needs framework by 2020 to support a continuous presentation of adaptation needs.	Quantification and acknowledgement of the national adaptation and resilience efforts.
Goal 6	Communicate past investments in adaptation for education and awareness as well as for international recognition.	

Appendix 4: Water resources related information contained in the three National Communications

1st National Communication	2nd National Communication	3rd National Communication
Vulnerability	Natural resources and related sectors	National circumstances
Adaptation	Current vulnerabilities	Water and Sanitation
	Observed temperature and rainfall trends	Climate change over South Africa from trends and projected changes to vulnerability assessments and the status quo of national adaptation strategies
	Projections of impacts on water resources	A spatial analysis of rainfall trends over South Africa
	Quantity of water resources	Annual rainfall totals
	Quality of water resources	Annual total precipitation from daily precipitation > 95th percentile
	Vegetation responses to climate change and impacts on water resources	Annual total precipitation from daily precipitation > 99th percentile
	Vulnerability and future risks	Annual maximum 1-day precipitation
	Adaptation	Annual count of days when precipitation ≥10 mm, ≥ 20 mm and ≥ 25 mm
		Simple Daily Intensity Index, annual mean of daily precipitation intensity
		Annual maximum length of wet spell, maximum number of consecutive days with precipitation ≥ 1mm
		Annual maximum length of dry spell, maximum number of consecutive days with precipitation < 1mm
		Vulnerability and adaptation assessments of key socio-economic sectors
		Risks and vulnerabilities
		Water quantity
		Water quality
		Adaptation

Appendix 5: NCCAS objectives, interventions and outcomes

Objective	Intervention	Outcome
1: Build climate resilience and adaptive capacity to respond to climate change risk and vulnerability.	1: Reduce human, economic, environmental, physical and ecological infrastructure vulnerability and build adaptive capacity.	1.1: Increased resilience and adaptive capacity achieved in human, economic, environmental, physical and ecological infrastructure.
	2: Develop a coordinated Climate Services system that provides climate products and services for key climate vulnerable sectors and geographic areas.	2.1: Climate products and services for key climate vulnerable sectors and geographic areas developed and implemented.
2: Promote the integration of climate change adaptation response into development objectives, policy, planning and implementation.	3: Develop a vulnerability and resilience methodology framework that integrates biophysical and socio- economic aspects of vulnerability and resilience.	3.1: A Climate Risk and Vulnerability Assessment Framework developed and implemented across 100% of key adaptation sectors
	4: Facilitate mainstreaming of adaptation responses into sectoral planning and implementation.	4.1: Effective adaptation planning that covers at least 100% of the South African sectors identified in the NCCAS.
		4.2: Achieve a 100% coverage of climate change considerations in sectoral operational plans.
3: Improve understanding of climate change impacts and capacity to respond to these impacts.	5: Promote research application, technology development, transfer and adoption to support planning and implementation.	5.1: Increased research output and technology uptake to support planning and implementation.
	6: Build the necessary capacity and awareness for climate change responses.	6.1: Capacity building and awareness for climate change response enhanced.
4: Ensure resources and systems are in place to enable implementation of climate change responses.	7: Establish effective governance and legislative processes to integrate climate change in development planning.	7.1: Adaptation governance defined and legislated through the Climate Change Act once approved by parliament.
		7.2: Institutional structures for climate change adaptation strengthened.
		7.3: Enhanced public-private-civil society collaboration and stewardship.
	8: Enable substantial flows of climate change adaptation finance from various sources.	8.1: Adequate financial resources for national adaptation priorities from national fiscus and international sources.

Objective	Intervention	Outcome
	9: Develop and implement an M&E system that tracks implementation of adaptation actions and their effectiveness.	9.1: A national M&E system developed and implemented.

Appendix 6A: List of institutions represented at the Stakeholder Engagement Session held on 20 May 2021

Institution	Acronym
Department of Forestry, Fisheries and the Environment	DFFE
Department of Planning, Monitoring and Evaluation	DPME
Department of Water and Sanitation	DWS
Deutsche Gesellschaft für Internationale Zusammenarbeit	GIZ
National Disaster Management Centre	NDMC
Statistics South Africa	StatsSA
Pegasys	N/A
Western Cape Disaster Management Centre	WCDMC

Appendix 6B: List of institutions represented at the Stakeholder Engagement Session held on 17 August 2021

Institution	Acronym
Council for Scientific and Industrial Research	CSIR
Department of Forestry, Fisheries and the Environment	DFFE
Department of Planning, Monitoring and Evaluation	DPME
Department of Water and Sanitation	DWS
National Disaster Management Centre	NDMC
Parliament of South Africa	N/A
Rand Water	N/A
Statistics South Africa	StatsSA
Walter Sisulu University	WSU
Water Research Commission	WRC

Appendix 7: List of questions used to guide the discussion during the Stakeholder Engagement Session held on 20 May 2021

- What are the information/data needs for reporting in terms of SDG 6, SDG 13 and the Paris Agreement?
- Who are the holders/sources of information?
- What tools exist to monitor and collate data/information for trends analysis and reporting?
- How does information flow from the implementers to the reporters?
- Who are the key public sector stakeholders in the reporting process?
- What are the gaps, enablers and lessons in monitoring and reporting?