Greater Cape Town Water Fund
Sustainable Funding Strategy

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Contents

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Abbreviations

BGCMA	Breede-Gouritz Catchment Management Agency
CMA	Catchment Management Agency
CoCT	City of Cape Town
DSS	Decision Support System
DWS	Department of Water and Sanitation
EIIF	Ecological Infrastructure Investment Framework
EI4WS	Ecological Infrastructure for Water Security
GCTWF	Greater Cape Town Water Fund
GEF	Global Environmental Facility
HMU	Hydrological Management Unit
IAP	Invasive Alien Plants
MFMA	Municipal Finance Management Act
MoU	Memorandum of Understanding
NBAL	Natural Biological Alien Land Cover Attribute
NRM	Natural Resource Management
PFMA	Public Finance Management Act
MTEF	Medium Term Expenditure Framework
ROI	Return on Investment
SFR	Streamflow Reduction
TCTA	Trans-Caledon Tunnel Authority
TNC	The Nature Conservancy
URV	Unit Reference Value
WCWSS	Western Cape Water Supply System
WMA	Water Management Area
WRD	Water Resource Development
WRM	Water Resources Management
WRMC	Water Resources Management Charge
WUA	Water Users Association
WWF-SA	World Wide Fund for Nature – South Africa

Executive Summary

The core objective of the Greater Cape Town Water Fund (GCTWF) is to comprehensively clear Invasive Alien Plants in seven priority sub-catchments within South Africa's Western Cape Water Supply. These 'seven priorities' were selected as the least-cost geographies for delivering meaningful water yield benefits to the supply system. To achieve this objective requires targeted and sustained catchment restoration funding over a 30-year horizon encompassing implementation, maintenance, and program management expenses. Moreover, the GCTWF aims to build off the success of existing efforts to coordinate investments towards prioritized areas as well as attracting new resources to meet the overall funding need.

This sustainable funding strategy provides a medium- and long-term roadmap for approaching these funding requirements. It addresses core questions such as: what are the projected water security outcomes under different funding scenarios? Which in-hand and prospective resources could be effectively mobilized for reaching 'full implementation' across the seven priorities? And lastly, what actions should the GCTWF take to maximize the likelihood of securing these long-term funding commitments?

Background Context

The spread of Invasive Alien Plants (IAPs) results in reduced groundwater replenishment and dam runoff to the Western Cape Water Supply System (WCWSS), a dynamic that has been known for at least twenty years. Despite significant efforts undertaken to address the issue, including establishing the Working for Water program, the IAP threat has continued to grow.

Manifold reasons inform this failure. The absence of a timely long-term follow up and maintenance schedule after initial clearing and fires results in IAP re-growth, highlighting the need for precise implementation planning and execution. When remote mountainous areas are not prioritized and cleared – which requires investing in the specialized implementation capacity needed to clear IAPs on steep slopes – further densification and spread of IAPs occurs. Furthermore, multiple implementers work within the catchment, necessitating thoughtful coordination and planning to avoid duplication of efforts. Due to these and other factors, the spread of IAPs can be temporarily stymied but not conclusively dealt with absent a systematic and integrated approach.

To address these dynamics, the GCTWF was organized in 2019. Water funds serve as collective action platforms that bring together different water users to invest in the upstream ecosystem management, restoration and protection for the catchments they depend upon. Against this backdrop, the GCTWF has been specifically established to align and harness a collective of implementation partners and strategic funders into a coordinated execution approach to clear and maintain priority sub-catchments deemed to deliver the highest water benefit within the WCWSS.

Meaningful Outcomes for People and Nature

Controlling IAPs and maintaining cleared areas upstream from the WCWSS dams is a cost-effective "no-regrets" option for addressing water security. This cost-effectiveness argument, first outlined in the 2018 business case analysis, is further explored in this sustainable funding strategy, which outlines the costs and benefits associated with specific funding and execution scenarios. This sustainable funding strategy analysis highlights how a six-year push to clear the seven priority sub-catchments is estimated to avoid average water yield losses of 35 Mm^3 per annum, rising to 70 Mm3 per annum (or 12% of overall system yield) within 30 years. When these water-related benefits are monetized, and compared to full-cycle costs, the result is a total benefit / cost ratio of 4.5x (alternatively stated as a return-on-investment of 351%). Furthermore, such an implementation push is forecasted to generate important co-benefits including sustainable livelihoods (by generating 191 jobs) and biodiversity uplift (for example, by improving catchment dry season water availability by 24%).

To execute this vision, total funding volume of R 674 M is estimated to be required over the 30-year program to pay for clearing treatment and associated program management costs. This sustainable funding strategy outlines the current 'confirmed' funding – estimated at R 284 M, or 42% of the required total – and provides recommendations on where GCTWF leadership should concentrate its efforts for organizing the balance of funds, with specific detail provided for the initial six year 'high-impact' period and subsequent long-term maintenance period.

Furthermore, the study confirmed the clear and present need for completing IAP clearing today versus allowing the status quo to continue. The 'costs of inaction' due to ongoing IAP spread were modelled under a 'delayed implementation' scenario, which confirmed that waiting fifteen years before clearing the seven priorities would cause initial clearing costs to roughly double from R288 M to R531 M.

Realizing the Catchment Restoration Vision

This strategy aligns with and complements current initiatives and strategies such as the South African National Biodiversity Institute (SANBI) Ecological Infrastructure for Water Security (EI4WS) lead by Worldwide Fund for Nature – South Africa (WWF-SA), Breede-Gouritz Catchment Management Agency (BGCMA)[i] Breede-Gouritz Catchment Management Strategy, Working for Water, Western Cape Department Ecological Infrastructure Investment Framework (EIIF) as well as the strategies of CapeNature, the City of Cape Town and others.

The GCTWF Steering Committee has endorsed an ambitious set of objectives for the next five-year period which are tightly consistent with the notion of a post COVID-19 'green recovery'. This sustainable funding strategy aims to provide a detailed roadmap for resourcing this vision, the success of informs not only water availability in the Greater Cape Town Region, but also the broader movement towards integrating nature-based solutions into thoughtful long-term water sector investment planning.

I. Introduction

Study Context

This document contributes to the overall Greater Cape Town Water Fund (GCTWF) Strategy 2020 – 2025, which defines the GCTWF's strategic objectives, implementation strategy, financial and organizational arrangements for successfully restoring seven of the twenty-five priority sub-catchments, reclaim water losses and develop local capacity. Specifically, the strategy document comprises four distinct but related components:

1) Sustainable funding strategy (this document)
2) Governance & institutional arrangements
3) Implementation strategy
4) Monitoring & evaluation framework

The GCTWF plans to review the strategy – including this sustainable funding component – every three years, as a means of both noting the progress made against plans as well as calibrating and iterating the GCTWF's strategic approach based on historical experience.

Sustainable Funding Strategy Analysis Objectives

To realize the GCTWF's objectives, catchment restoration investment in a targeted and sustained manner is required. This requires both the maximization of existing resources through enhanced coordination towards prioritized areas as well as the mobilization of new funding sources to overcome resource gaps.

This sustainable funding strategy: (1) outlines projected outcomes associated with different implementation scenarios, (2) details which in-hand and prospective resources could be effectively mobilized for program activities, and (3) recommends a series of actions to maximize the likelihood of successful long-term resourcing commitments.

II. Scenario Evaluation

Comparison with Prior Efforts

This sustainable funding strategy builds off the GCTWF Business Case ('Business Case') launched in November 2018 in partnership with local actors.[ii] The Business Case formalized the rationale for investing in ecological infrastructure by showing how nature-based solutions, specifically the controlling of Invasive Alien Plants (IAPs) and rehabilitating wetlands, could generate 55 Mm^3 of annual water gains within six years for as little as one-tenth ($1/10^{th}$) the unit cost of alternative supply options such as desalination.

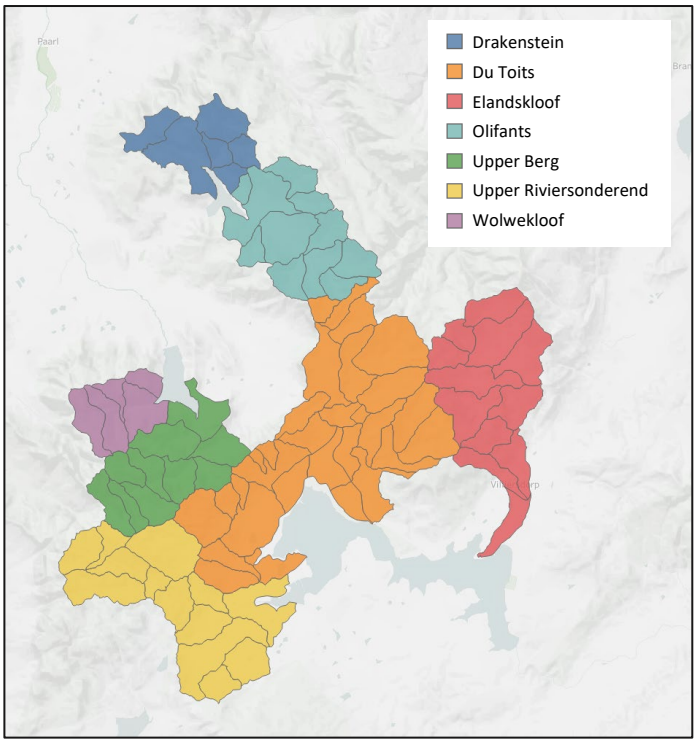
This sustainable funding strategy and accompanying Decision Support System (DSS) expands upon the Business Case methodology in important ways by providing water yield estimates associated with implementation activities, flexibly evaluating projected benefits associated under different future funding scenarios, and articulating the potential funding options for bridging resource gaps. The DSS consists of three components: (1) a scenario modeler that estimates benefits and costs under different funding assumptions; (2) a financial model that incorporates program management costs and benefits monetization to arrive at full-cycle return on investment; and (3) an online visual platform that provides ongoing implementation tracking and reporting of estimated realized benefits. The scenario results presented in this sustainable funding strategy are generated using components (1) and (2), and will be used to drive the GCTWF's strategic direction and annual implementation planning efforts (the net results of which are displayed in (3) the online visual platform).

A comprehensive evaluation of the methodology relied upon in the DSS, and the differences between prior efforts for the Business Case and a 2019 study conducted by the City of Cape Town, can be found in Appendix I – DSS Methodology Overview & Recommended Strengthening Areas.

Scale of Spatial Analysis

The Decision Support System addresses the same seven priority sub-catchments for the Berg River, Wemmershoek, and Theewaterskloof dams identified in the 2018 Business Case (Drakenstein, Du Toits, Elandskloof, Olifants, Upper Berg, Upper Riviersonderend, and Wolwekloof). These source water areas supply 73% of the surface water contribution to the Western Cape Water Supply System (WCWSS) and were deemed to deliver water at the lowest overall cost. The sub-catchments were then further delineated in the DSS into strategic planning units – Hydrological Management Units or 'HMUs' – at an average size of approximately 500 hectares (see Figure 1). This was deemed an appropriate geographic scale to conduct long-term cost/benefit evaluation, prioritization and planning. Note that implementation coordination, Annual Plans of Operation (APO) and contracting will continue to be conducted at the historical Natural Biological Alien Land Cover Attribute (NBAL) spatial level, which average roughly 100 hectares in size.

Figure 1: Hydrological Management Units within the seven priority sub-catchments



Costing

The DSS considers program implementation costs (including costs for initial clearing, follow up and subsequent long-term maintenance) as well as program management costs (which include stakeholder engagement, implementation coordination, monitoring & evaluation, auditing, fundraising and advocacy functions provided by the GCTWF).

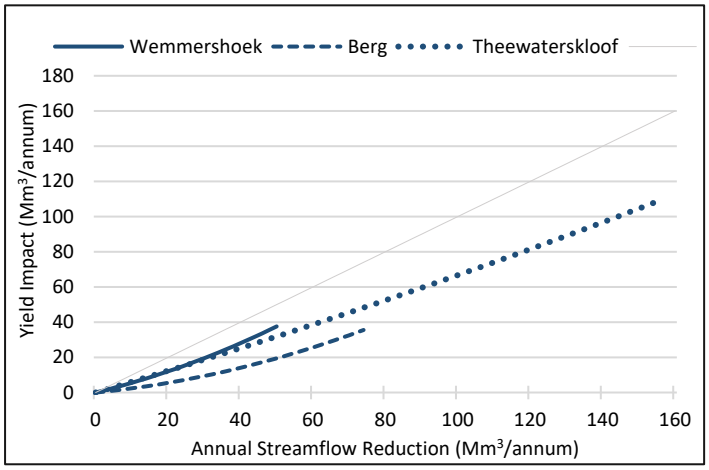
Implementation costs are calculated at an HMU level and are based on a tailored implementation program that considers the species type, age class, area extent, and density of IAPs present. These attributes provide context for the work effort required to remove IAPs from the landscape and are referenced in the form of 'person days/hectare' required for clearing (i.e. the number of individuals required to clear one hectare per day). The cost of this work effort is referenced as 'person-day cost', which is a blended figure including all operational costs (wages, protective gear, tools & equipment, transportation, and herbicides where applicable) and associated overhead expenses (administrative cost, training and fees). In this analysis, person-day costs are estimated to range from R300/person-day to R1,200/person-day, and depend on factors such as implementation team skill level (e.g. High Angle, Intermediate, or General) and the ease of terrain access (e.g. helicopter or walk-in).

A logistic model is employed to simulate the spread of IAP invasion over time, based on a precipitation-based intrinsic spread rate. Spread is limited to a maximum invadable area that excludes transformed geography (e.g. agriculture) or non-suitable terrain (e.g. hard rock). In addition, a 15-year random fire cycle is used to restrict maximum age and approximate natural conditions.

Water Benefits Evaluation

IAP species are sorted into bins at the HMU level based on species type, age class, and growing conditions, and are evaluated on an annual basis taking into account the spread rate, projected treatment events, and the fire cycle. Streamflow reduction for a given level of IAP density is then estimated based on catchment experiments conducted in the 1990s[iii] to determine water consumption differences between the native fynbos landscape and the IAP.

Figure 2: Streamflow reduction to Yield Impact curves for WCWSS dams at 50- year assurance level



To take the next step of quantifying the impact on water yield for different IAP density levels, curves were generated for the dams within the seven priorities (Theewaterskloof, Wemmershoek, and Berg River) to create a relationship between projected streamflow reduction and dam yield at 1:50, 1:100 and 1:200-year assurance levels (see Figure 2, which presents curves for the 1:50 year assurance level). These curves were generated using the updated Water Resources Yield Model, which indicates a total estimated system yield of 565Mm³ per annum at a 50 year assurance level.[iv] Note that while there are no upstream demand impacts for either Berg or Wemmershoek dam (outside of IAP and forestry impacts), a number of farm dams and irrigation demands exist upstream of Theewaterskloof Dam.

Funding Scenarios Evaluated

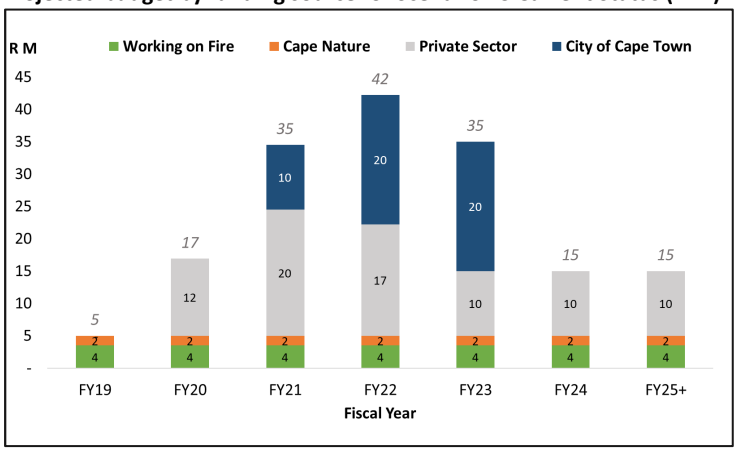
Pre-defined funding scenarios were prepared to evaluate the outcomes associated with different levels of resource commitment to IAP clearing within the seven priority sub-catchments. These scenarios include:

I. **Do nothing:** This scenario assumes zero spending on IAP removal, resulting in maximum IAP spread.

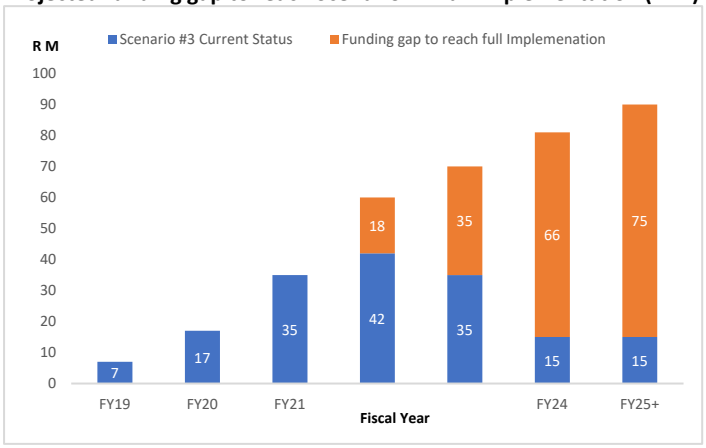
II. **Business as Usual (BaU)**: The BaU scenario assumes a continuation of pre-2018 funding levels, with an aim to demonstrating the value provided to water users by these existing efforts. This scenario does not include the existence of the GCTWF acting in its coordination role, and therefore resources are prioritized based on minimizing person-day costs (to mimic working in the most readily accessible areas) rather than maximizing the water yield / cost ratio (as prioritization based on water yield is a central outcome provided by the GCTWF).

Figure 3: Funding volume projects for Scenarios #3 and #4

Projected budget by funding source for Scenario #3 Current Status (R M)



Projected funding gap to reach Scenario #4 Full Implementation (R M)



I. **Current Status** *(including 3-year City of Cape Town funding):* This scenario assumes the existence and functioning of the GCTWF, which serves to coordinate the activities of existing implementers, and prioritize investments based on maximizing cost-effective water yield. Furthermore, the GCTWF to-date has secured additional resources towards clearing the seven priority sub-catchments, including a series of private-sector resources as well as a confirmed R 50 M contribution by the City of Cape Town (CoCT) spread over the next three years. Figure 3 provides a budget breakout by assumed funding source. However, resources revert to Scenario 2 once these existing in-hand private sector resources have been spent by FY26 (i.e. reverting to FY19 levels of spending, which entail neither additional CoCT nor private sector contributions).

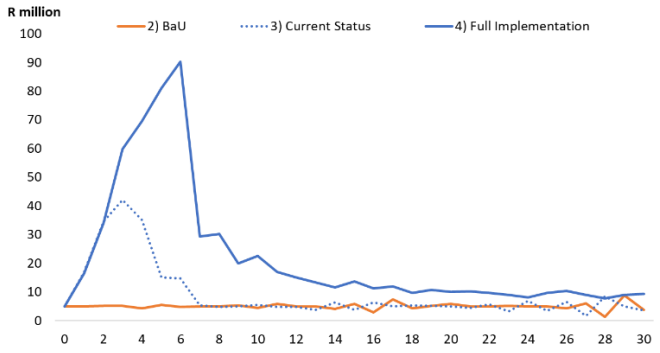
II. **Full Implementation**: Identical to Scenario III, however assumes that sustainable long-term funding sources (e.g. municipality, Catchment Management Agency, and Water Users Association contributions) and additional private voluntary contributions are secured to carry out the full initial clearing, complete scheduled follow-up treatments, conduct ongoing maintenance operations, and sustain the future GCTWF structure's operational costs. Note that CoCT's 2019 Water Strategy makes provision for ongoing annual R20 M contributions, and that the GCTWF should aim to secure similar long-term commitments from other downstream users and the CMAs (per below Section III. Funding Sources Assessment).

Scenario Results

Each of the four scenarios is presented below (Figure 4) against a 30-year implementation projection, with scenario results varying based on the respective level of funding available. Year 0 for each of these charts corresponds to the pre-GCTWF baseline of 2018.

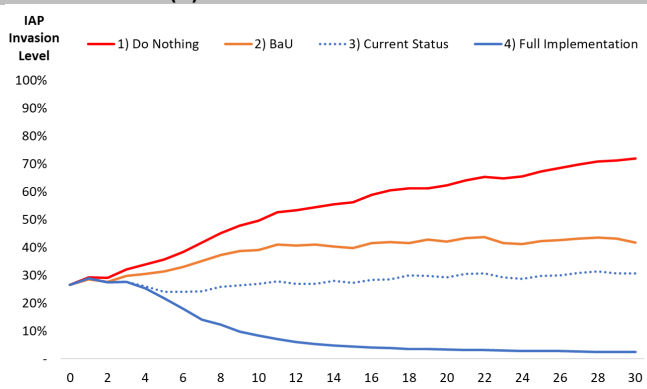
Figure 4: 30-year scenario projections by funding scenario (current Rand value)

Annual Investment (R million)



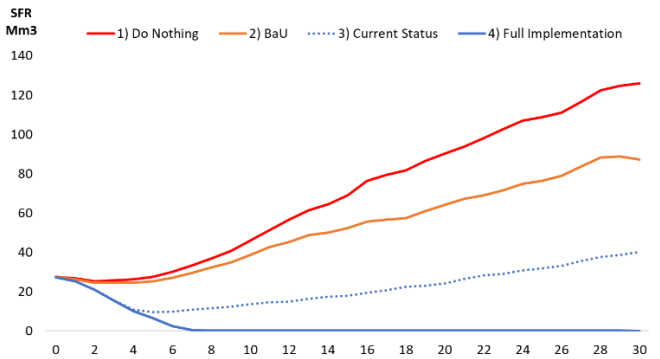
This chart shows the order-of-magnitude investment difference during the high-impact period between Scenario #2 (Business as Usual practices) and Scenario #4 (the full estimated resources required for clearing and maintaining the seven priority sub-catchments). Long-term, this difference is roughly 2x to maintain and consolidate gains.

IAP Invasion Level (%)



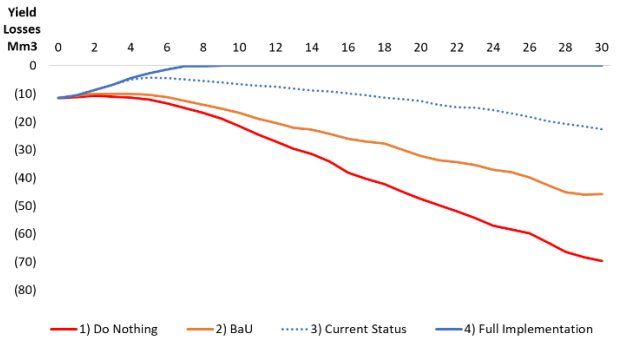
Scenario #4 provides sufficient resources to fully clear and thereafter maintain invasion reduction gains. By contrast, Scenarios #2 & #3 make substantial contributions, but these scenarios can neither consolidate nor maintain those gains. Note that this graph also points to the importance of coordinated follow-up clearing treatments (as timely follow-ups substantially reduce full-cycle program costs).

Annual Streamflow Reduction (SFR, in Mm^3)



Scenarios #2 and #3 provide immediate streamflow reduction benefits in the early years, however these gains are lost over time without sufficient follow-on investment to pay for maintenance activities. In this sense, voluntary contributions do drive meaningful benefits, however these benefits are erased over time due to the ongoing spread function and aging of existing IAP populations.

Annual Yield Losses (Mm^3, 50 year assurance level)



The baseline water losses in 2018 are 12 Mm3/annum, rising to 46 Mm^3/annum over time under the BaU scenario (8% of overall system yield within the WCWSS). Assuming no action (Scenario #1), these estimated losses will go up by 50% to 70 Mm^3/annum or 12% of overall system yield within 30 years. These figures are especially problematic given the growing supply needs, historical water availability shortages, and adverse long-term climate change-related precipitation trends within the WCWSS.

A consolidated perspective comparing the different scenarios is found in Table I. Of note is the Unit Reference Value (URV) – the mean present value cost per cubic meter of water gain – under Scenario #4 'Full Implementation'. The indicated URV of 2.0 – which includes raw water treatment costs of R0.8 per m^3 to allow comparison with other water supply options – reflects an attractive comparative cost/benefit ratio, a dynamic that is explored further in Section II – Figures 7 and 8.

In addition, Table I points to important co-benefits generated by the GCTWF including poverty alleviation and skills development (estimated via total jobs generated), freshwater biodiversity health (represented via reduction in low flow SFR losses, a metric that indicates dry-season flows important for ecological health). Additional co-benefits include biodiversity gains (via IAP removal which allows for restoration and recovery of native fynbos habitat) and economic benefits (reduction in likelihood of damaging wildfires).

Table 1: Comparison of Scenario Results

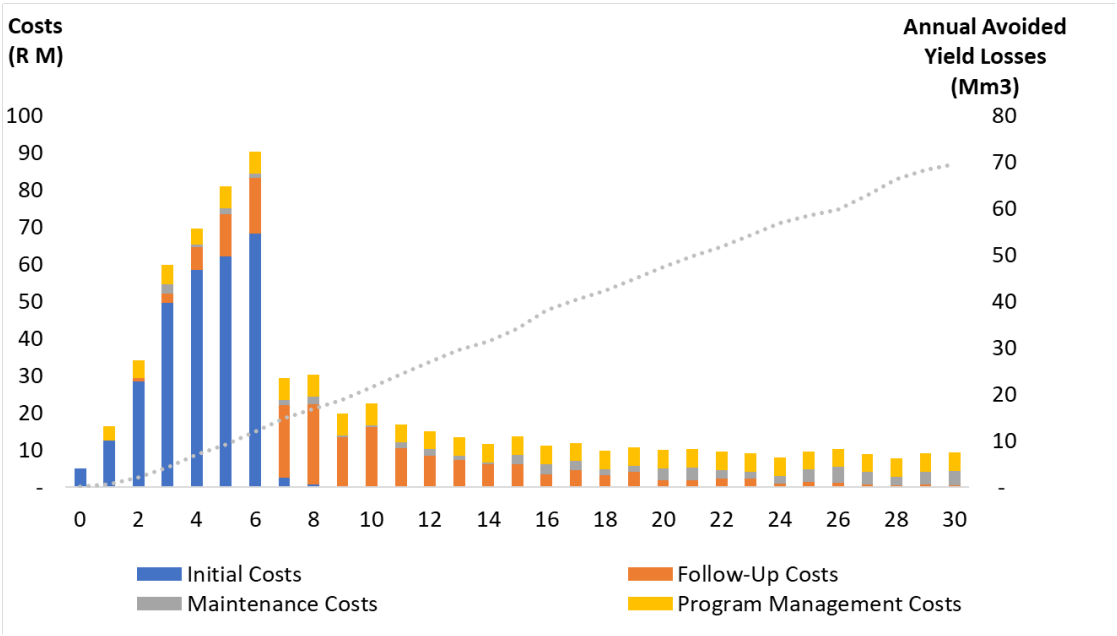
	#1 Do Nothing	#2 Business As Usual	#3 Current Status	#4 Full Implementation
Costs (R M)				
Initial Clearing	-	93	148	288
Follow-Up	-	47	92	175
Maintenance	-	14	27	59
Total Implementation Costs	-	*154*	*267*	*522*
Program Management	-	-	15	152
Total Program Costs	**-**	**154**	**282**	**674**
Total Program Costs (NPV)	-	*69*	*170*	*393*
30-yr Avoided Yield Losses (Mm^3, 50 yr assurance)				
Total Avoided Losses	-	330	761	1,065
Total Avoided Losses (NPV)	-	96	238	329
URV				2.0
Additional Benefits (annual average)				
Jobs	-	78	116	191
Low-Flow SFR Losses	(26%)	(20%)	(9%)	(2%)
IAP Statistics (average)				
IAP Density	54%	39%	28%	9%
IAP Age	10.7	7.6	5.8	2.9

Furthermore, the 'cost of inaction' was evaluated via an additional 'delayed implementation' scenario, which re-evaluates Scenario #4 assuming fifteen years are allowed to elapse before clearing the seven priority sub-catchments. These results indicate that initial clearing costs are expected to roughly double from R288 M (under the 'Full Implementation' scenario) to R531 M.

These results point to the following important conclusions:

1) Per Scenario #2 'Business as Usual', maintaining historical levels of IAP clearing over the next 30 years will help avoid 330 Mm^3 in yield losses (or 11 Mm^3 per annum). This highlights the important contributions made to-date by historical catchment management efforts towards achieving water security in the WCWSS.
2) Per Scenario #3 'Current Status', recently-secured contributions by the private sector and the CoCT provide a meaningful boost for conducting initial clearing of the seven priority sub-catchments. Furthermore, the coordination and prioritization functions of the GCTWF allow resources to be targeted towards highest-ROI areas for water gains, resulting in a more efficient use of resources. The net effect is estimated at 761 Mm^3 in avoided total yield losses (or 25 Mm^3 per annum).
3) Per Scenario #4 'Full Implementation', it is essential to provide a long-term sustainable funding base to conduct the required follow-up treatments for eliminating IAP and thereafter maintaining those gains. Such efforts avoid 1,065 Mm^3 in total yield losses (or 35 Mm^3 per annum). The total annual funding requirements to fulfil Scenario #4 'Full Implementation', as distinguished by cost category, is presented in Figure 5.

Figure 5: Scenario #4 'Full Implementation' annual costs and avoided yield losses



This chart provides a breakdown of full-lifecycle costs for the 30-year program. During the 'high-impact Period' (2019-2025) resources are concentrated on initial and follow up clearing of the seven priority sub-catchments, with ongoing follow-up and then maintenance clearing treatments building in over time. Program management costs are highest during the first ten years of the program due to start-up analytical efforts, and continue for the program duration to coordinate ongoing follow-up / maintenance treatments, conduct monitoring & evaluation activities, and spearhead expansion efforts for clearing IAP across the broader 24 WCWSS sub-catchments.

III. Funding Sources Assessment

Proposed Funding Strategy Principles

A series of interviews were conducted in May and June 2020 to obtain feedback on the appropriate long-term institutional and governance structure for the GCTWF to pursue. During these interviews, the following principles emerged as desirable qualities for the GCTWF's funding strategy:

- **Pursue a mixed funding model**: Given the variety of both public and private sector actors that are interested in supporting the GCTWF's outcomes, stakeholders support a funding strategy and related institutional model that is able to flexibly absorb and coordinate these resources. A blended approach was found to promote a better risk profile in terms of diversification of revenue sources, as well as the attractive prospect of continually 'crowding in' multiple public and private resource streams against a common vision of catchment rehabilitation.
- **Secure core funding to ensure business continuity**: Identifying permanent core funding to pay for GCTWF programmatic costs via the establishment of an endowment fund was widely supported by stakeholders. One supporting rationale is that governmental entities and corporates are more likely to fund implementation costs that can be directly linked to a quantifiable impact rather than overhead and coordination-related costs, and that therefore covering such overhead from other sources (such as an endowment) would likely accelerate meeting the GCTWFs implementation objectives.
- **Restrain from diverting funds from other key water agencies**: Certain stakeholders were vocal during interviews that diverting funds from existing water agencies – e.g. user charge funding from CMAs – could negatively impact the relationships between GCTWF and water agencies.

A further principle that has emerged from past water fund experiences is the importance of budget predictability and sustainability to meet the planning, coordination, implementation and verification efforts associated with ambitious catchment management programs. This is particularly true in the context of IAP removal where ongoing follow-up and maintenance control efforts are required. Therefore, it is incumbent upon the GCTWF to ensure predictability over the high-impact period to successfully and efficiently conduct initial clearing of the catchments, as well as secure the long-term funding needed to maintain the water gains from IAP clearing into perpetuity.

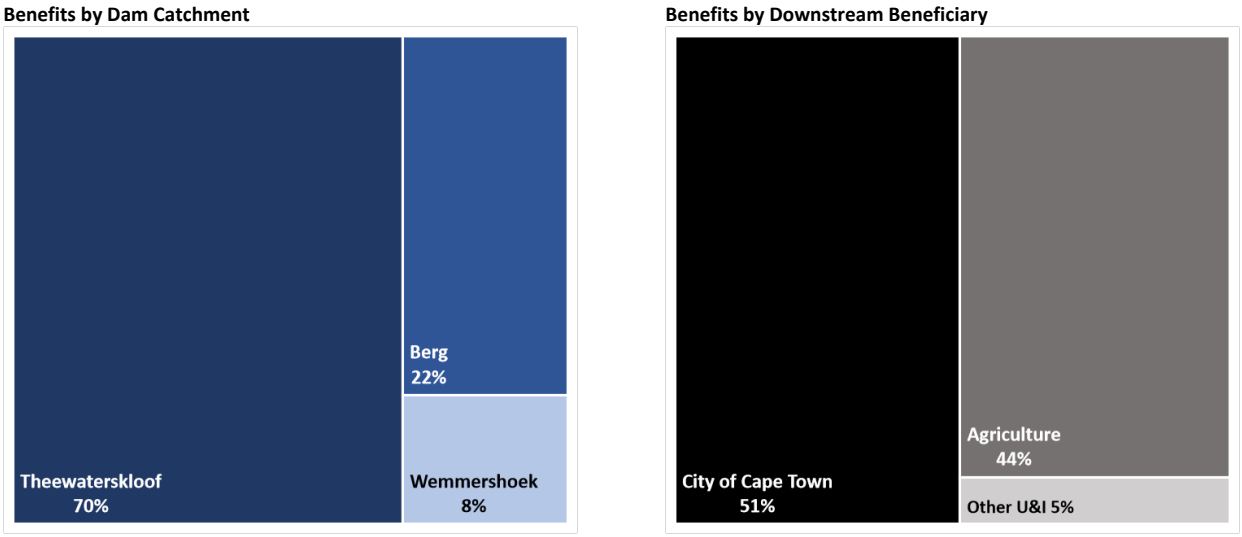
Motivating commitments for clearing and maintaining IAPs: Who benefits, and how much?

The question of 'who benefits' provides a useful framing device for the constituencies with the greatest long-term stake in the water fund meeting its implementation objectives.

Figure 6 indicates that completely clearing and maintaining the seven priority sub-catchments would generate yield benefits across the three dams, with approximately two-thirds of these benefits concentrated in Theewaterskloof. On a net present value basis, the yield benefits (based on annual user allocations) are roughly distributed half to the City of Cape Town, half to agriculture, and a minor benefit going to other Urban and Industrial (U&I) users.

An estimated ROI for downstream beneficiaries can be generated by estimating the avoided yield losses from clearing IAPs, valuing these at the cost of the next available supply alternative(s), and then comparing to the full delivery costs including program implementation, program management and raw water treatment costs. As desalination is the only 'unlimited' long-run option available, desalination's operating costs (estimated at R9/kl) are used to value the avoided yield losses generated by the IAP clearing program.

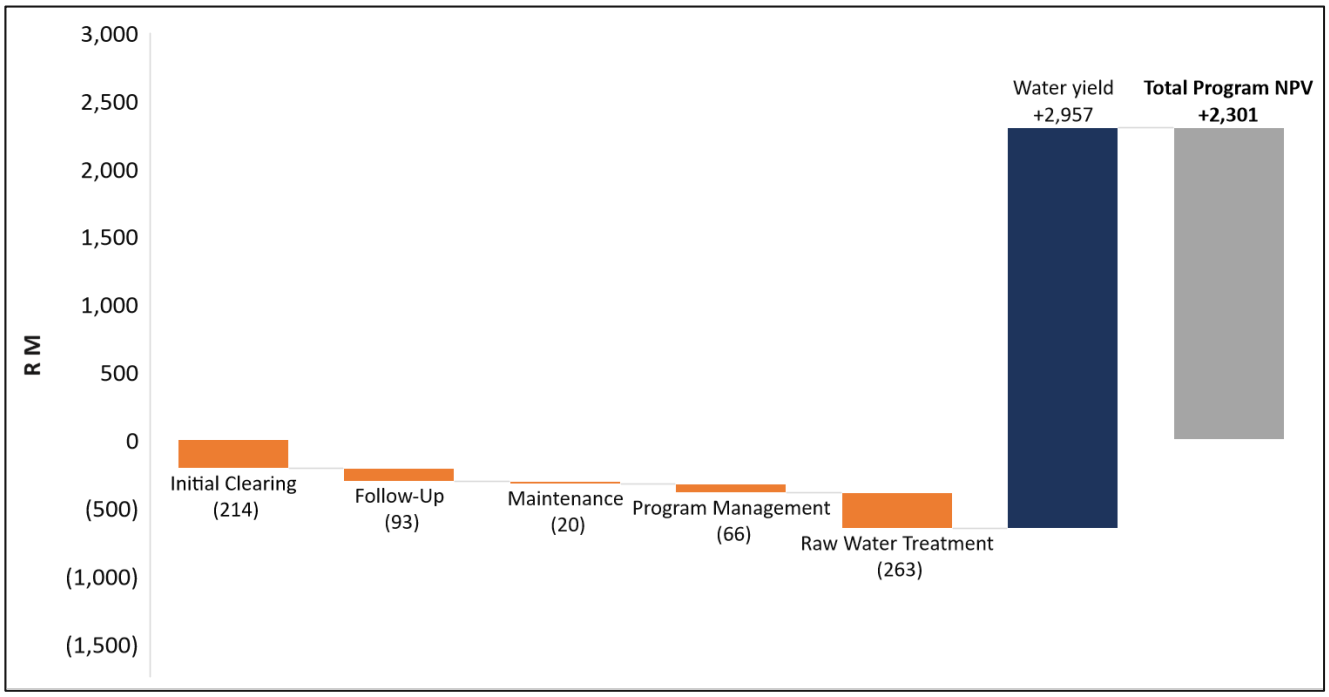
Figure 6: Avoided yield loss benefits per Scenario #4 'Full Implementation' (50 year assurance, NPV)



Per Figure 7, total NPV of water yield benefits are estimated at R 2,957 M, compared to total IAP clearing program costs of R 393 M and raw water treatment costs of R 263 M. The net result is a total estimated benefit / cost ratio of 4.5x (or alternatively stated, an estimated Return on Investment of 351%) to avoid desalination operational costs, excluding any co-benefit contributions associated with sustainable livelihoods and biodiversity gains.

Figure 7: Scenario #4 'Full Implementation' estimated NPV

Note: Avoided water yield benefits valued at avoided desalination operating costs of R9 per m^3.



Direct Beneficiary Opportunities & Constraints

As mentioned above, and indicated in Figure 6, there are three major water user groups which act as the primary beneficiaries from IAP clearing in terms of water yield generated. Each of these groups is evaluated below based on their contribution potential for supporting the GCTWF's implementation efforts.

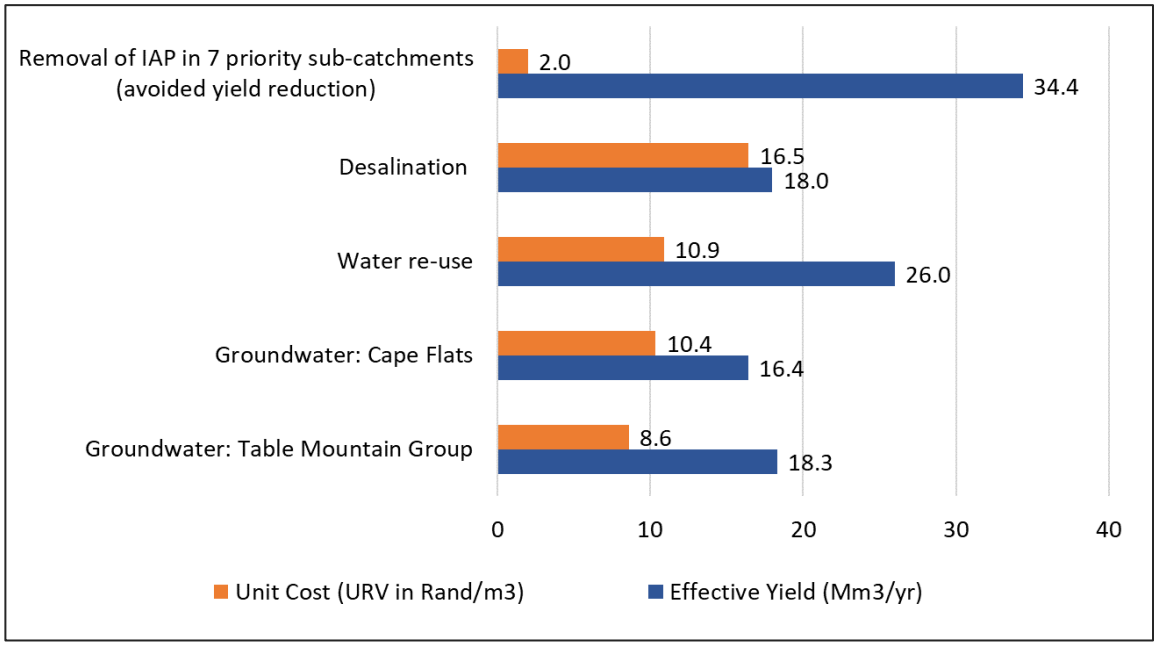
City of Cape Town

The City of Cape Town is the largest single user of water in the WCWSS and acts as a regional water utility by operating two of its own dams, providing conveyance services to two irrigation boards and supplying bulk water to two other municipalities. It has significant interest in maintaining catchment health in the face of diminishing yield and has demonstrated intentions to become a water-resilient city. The City's 2019 water strategy articulates a substantial and escalating planned investment in controlling IAPs, although it does not detail the arrangement and quantum for these catchment management investments. Figure 8 frames the avoided yield reductions and attractive URV of IAP clearing in the context of the alternative supply options outlined in the City's 2019 committed new water program over the next ten years. In this light, the GCTWF should work closely with the City with an aim to underwriting a significant proportion of the costs for catchment rehabilitation.

There are important constraints with regards to the City's investment in the GCTWF. Primarily these relate to the nature of the budgeting process for budgetary commitments greater than three years in length (see 'Prospective Resources' section for additional detail). Further, there is resistance to the City being seen as the only major user in the WCWSS to contribute substantially to catchment restoration, a traditional economic 'free-rider' concern. Lastly, while the legality of investment outside of its own jurisdictional boundaries has been addressed and confirmed[v], such expenditures do not have an extensive track record to draw upon as models.

Figure 8: IAP Clearing vs Alternative Supply Options: Unit Reference Value & Effective Water Yield

Note: URVs include raw water treatment costs of R0.8 per m^3 where applicable. Non-IAP removal supply options calculated based on inputs from the 2019 Cape Town Water Strategy. IAP clearing option refers to Scenario 4 – 'Full Implementation'.



Agriculture

Agricultural water beneficiaries include irrigators in the Riviersonderend River, Wynland Water User Association, Upper Berg River Irrigation Schemes, and Upper Berg River pumped storage scheme. The water allocations for irrigation in the Berg River Catchment are supplied from the Theewaterskloof-Berg River Dam/Tunnel System, which provides a combined assured yield of 221.8 million m^3/annum.

Given the increase in water demands, the dam system and its supplementary scheme are over-allocated by at least 57.4 million m^3/annum. This means that agriculture will be curtailed first and more frequently than the domestic and industrial users in times of drought and water scarcity.

Agricultural users find the cost of water delivered on the farm unaffordable and will likely push back against paying more should the current cap of the Water Resource Management (WRM) charge be removed. However, the agricultural sector is the dominant user of the Theewaterskloof system, and over time stands to benefit from least-cost options such as IAP clearing to be implemented to avoid curtailment and avoid more significant eventual tariff increases. Therefore, over the medium-term there is a potential opportunity to promote dialogue with the agricultural sector and secure their involvement in the GCTWF through for example adding a catchment restoration levy to the existing water tariff structure dedicated to clearing IAPs.

Other urban municipal and industrial users

Additional municipal and industrial parties procure raw water from the Berg and Theewaterskloof dam systems. The City conducts bulkwater sales to Drakenstein and Stellenbosch municipalities, however the consumption of these municipalities is captured within CoCT's existing tariff structure and therefore are reflected in the City's contribution.

Furthermore, the Swartland and West Coast Municipalities were allocated 11 million m^3/a per year of the Berg River dam's yield, equivalent to 15% of total. Similar to CoCT's commitment, the GCTWF should approach these municipalities to pay for their pro-rata share within the Berg River sub-catchments, with a view towards securing similar grant funding within operational budgets towards IAP clearing.

Summarizing Existing Commitments

As indicated in Table 1, an estimated R674 M in funding need to be mobilized over thirty years to reach the GCTWF's goal of clearing and maintaining the seven priority sub-catchments (Scenario #4 'Full Implementation'). We estimate that R284 M (or 42%) of these resources are committed at this point from the following sources:

Private sector contributions: Both the World Wide Fund for Nature – South Africa (WWF-SA) and The Nature Conservancy (TNC) are GCTWF members that have the capability, as registered Public Benefit Organizations, to attract private sector investment towards catchment restoration objectives. The private sector sources WWF-SA and TNC have mobilized in concert with the GCTWF's objectives include:

- **Corporate sector:** Large corporate water users such as food and beverage companies often implement water stewardship programs. During the FY20 period (April 1 2019 – March 31 2020), a total of R4.1 M in funding volume such work supported the clearing of an average 2.9 K hectares.Furthermore in-hand commitments have been secured of a further R4.8 M through 2023.
- **Private philanthropy**: During the FY'20 period (April 1 2019 – March 31 2020) philanthropy contributed R3.3 M / 2.4 K hectares; furthermore in-hand commitments have been secured for a further R26.4 M through 2023.

Government programs: Three existing government programs are acting in concert with the GCTWF to deliver results on the ground and maximize implementation efficiency:

- **CapeNature**: This program has the statutory responsibility to protect and manage a total area of over 840,000 ha (6.5% of the surface area of the Western Cape) consisting of formally protected areas and Wilderness Areas. As a result, over 90% of the surface areas of the 7 priority sub-catchments are owned and managed by CapeNature. Programmatic funding for IAP clearing is primarily sourced via an allocation by the Western Cape Provincial government (operational budget), supplemented by conditional grants e.g. NRM – Working for Water. For FY'20 CapeNature contributed R1.5 M / 2.5k hectares to the total GCTWF clearing effort.
- **Working on Fire (WoF) as implementing agent for Natural Resource Management (NRM)**: This integrated fire management program focuses on promoting fire awareness, prevention and suppression via job creation in marginalized communities and High Altitude IAP operations. Working on Fire acts as an implementing agent for the broader NRM program, whose vision is to promote equity and prosperity in harmony with South Africa's natural resources and is funded through the Department of Environmental Affairs and Expanded Public Works Program. Over the FY'20 period WoF contributed an estimated R 3.3 M / 1.3k hectares to the combined GCTWF effort.
- **City of Cape Town (CoCT)**: To date, the City has focused its IAP treatment resources on City-owned land. Funding for IAP operations is derived from NRM – Working for Water to clear city-owned portions of the Wemmershoek dam, mainly in the Olifants sub-catchment and operational funding for clearing IAPs on the Atlantis aquifer. The City recognizes the benefits of investing in NBS substantially outweigh the costs and therefore committed to funding IAP control as part of its New Water Strategy adopted in 2019.[vi] Pursuant to the New Water Strategy, CoCT has committed R50 M of IAP clearing activities over the next three years.

Estimating the Funding Gap

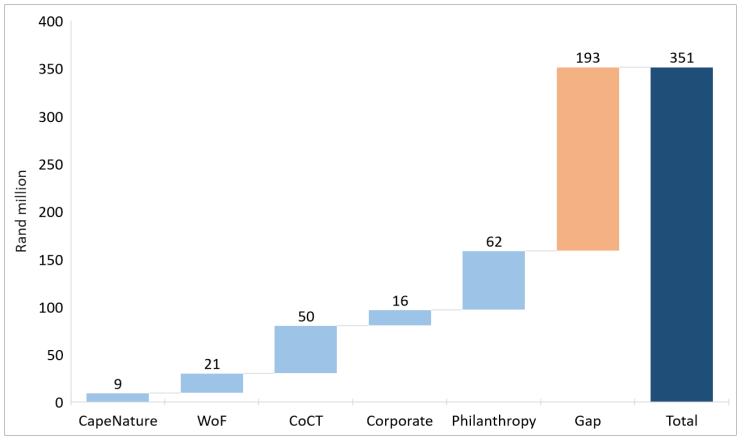
Maintaining catchment health within the WCWSS requires long-term management planning and prioritization given the need to control IAPs on an ongoing basis. The implementation effort and hence the resourcing need for the GCTWF can broadly be subdivided into two phases: 'high-impact' and 'long-term maintenance'.

High-Impact Period (Mar. 2019 – Mar. 2025)

The first six years of the GCTWF require disproportionate spend as initial clearing needs to be supported by scheduled follow-ups (varying between 6 months and 3 years depending on the IAPs, densities, and fire occurrence prior to clearing) to fully bring invasive populations under control and restore catchments.

Figure 9 presents the estimated set of resources that today are in-hand to pay for the high-impact period, as well as the funding gap to reach Scenario

Figure 9: Resource gap for high-impact period (Years 1 - 6) under Scenario #4: "Full Implementation"



#4 “Full Implementation” (see Figure 3 for presentation on an annual basis). These secured resources assume continued contributions by Cape Nature and Working on Fire based on FY’20 implementation patterns, the execution of in-hand private corporate and philanthropy mandates, and the execution of the one-time CoCT grant described prior.

Achieving the water benefits over the 6-year high-impact period requires total funding volume of R351 M. Of this, roughly R159 M (or 45% of total) can be considered ‘in-hand’ while a further R193 M (or 55% of total) still needs to be secured, with the majority of this gap present in the later years of the high-impact period (2024 – 2025). Assuming the CoCT continues to make a R20 M commitment to IAP clearing per its 2019 Water Strategy, and 75% of this funding goes towards the current GCTWF implementation areas, the gap falls to R163 M (46% of the total).

Long-Term Maintenance Period (2025+)

Further resources need to be secured to preserve the gains made during the high-impact period. An average of R10-20 M is required annually to conduct remaining residual follow-up work and ensure long-term maintenance clearing. These resources are also necessary to support the ongoing programmatic costs of the future GCTWF entity to provide coordination support services and reporting in its role as secretariat. Of these resources, which total R323M over the total long-term maintenance period, we assume that the CapeNature and Working on Fire programs (~R5 M annually, or 1/3 of total required) will continue to coordinate via the GCTWF over the long-term maintenance period. Assuming these ongoing contributions by Cape Nature and Working on Fire, there net funding gap is R198 M over the long-term maintenance period.

Prospective Funding Sources to Fill the Gap

Table 2 synthesizes the different potential options that may be available to the GCTWF to overcome its projected resource gap. The table differentiates between voluntary contributions (philanthropy, voluntary replenishment programs, international transfers and/or individual expenditures) and sustainable recurrent sources (which occur over multi-year periods and typically rely upon taxes or user charges). Each resource is categorized per the following rubric:

- *Feasibility*: Likelihood and timeliness of organizing resources, given current enabling conditions
- *Alignment*: Ability for funds to align with GCTWF’s core mandate (restoring catchments to promote water gains) in GCTWF’s designated geographic scope (seven priority sub-catchments plus Atlantis)
- *Dependability*: Dependability of resources on an ongoing basis
- *Volume:* Potential funding volume amount
- *Efficiency*: Resource deployment efficiency of arrangement (based on flexibility and ease of implementation procurement / reporting requirements / etc.)
- *Priority*: Overall ranking relative to other sources (1 = high, 5 = low). Note that multiple high-priority options are expected to be pursued in parallel during the GCTWF’s high-impact period.

Further detail on each of these funding options and rationale supporting their respective prioritization is provided below.

Table 2: Prioritization recommendation for additional sources to bridge funding gap

Option	Feasibility	Alignment	Depend-ability	Volume	Efficiency	Priority
Voluntary Funding Contributions						
(1) Private Sector - Corporate replenishment	High	High	Low	Low - Med	Med – High	3
(2) Private Sector - Philanthropy	High	High	Low	Low - Med	Med – High	2
(3) Donor agencies & global funds	Medium	Medium	Low – Med	Medium	Medium	1
(4) Municipal budget expenditure	High	Med - High	Medium	Med - High	Medium	1
Sustainable Recurring Funding Sources						
(5a) Provincial government programming	Low – Med	Medium	Medium	Medium	Medium	4
(5b) National government programming	Low	Medium	Medium	Medium	Low – Med	5
(6) Bulk water charge + Section 33 process	Med - High	Med - High	High	High	High	1
(7) Water Resource Management Charge	Low	High	Low – Med	Med – High	Low – Med	2
(8) CMA Rehab Scheme via WRD charge	Medium	Medium	Medium	Medium	Low	3
(9) Water Users Association Levy	Medium	Medium	Medium	Medium	Low	3
(10) TCTA infrastructure charge	Low	Low – Med	High	High	Med – High	Discard
Additional Resourcing Mechanisms						
(11) In-kind contributions	High	High	Medium	Low – Med	Med – High	1
(12) Value Added industries	Medium	High	Medium	Low – Med	Low – Med	5
(13) Endowment	Med – High	High	High	Med – High	High	Linked to Option 1-9
(14) Repayable financing	Low	High	High	High	High	Postpone

Voluntary Contributions

Experience has shown that voluntary resources such as philanthropy, corporate water stewardship programs, and one-time budget expenditures offer flexibility and timeliness, and therefore are particularly relevant during the water fund program's establishment phases (Feasibility, Design and Creation), as well as for specific portions of implementation work or related special research and development projects. Nevertheless, these voluntary resources can be time-consuming to secure, difficult to scale, short-term in nature and are unlikely to create the required security to promote a stable GCTWF implementation structure that successfully meets its catchment rehabilitation objectives over a long-term horizon.

Major relevant voluntary resource categories include:

(1) Private Sector - Corporate replenishment (*recommended priority: 3*) Corporate water stewardship programs often include replenishment projects which seek to return water to ecosystems and communities to 'balance' the water used by their industrial or agricultural operations. These programs have been growing in popularity over the past decade and are typically framed in the context of attempting to generate a 'water neutral' footprint. The GCTWF has generated substantial replenishment investment to-date given the attractive profile of estimated water yield as well as relevant livelihood & biodiversity co-benefits.

Compared to government or donor agencies, corporate resources are typically more flexible, with a focus on impact and applying monies to the best outcome if circumstances on the ground shift. However, these resources also feature drawbacks: these are voluntary offset programs and are therefore prone to changing corporate priorities and budget cycles; furthermore, they often require bespoke reporting. These factors constrain the long-term dependability, efficiency, and volume potential of corporate replenishment resources. Nevertheless, it is desirable to secure 20% of funding needs from flexible sources (including philanthropy, below) which are able to be shifted geographically or temporally for maximum impact. Importantly, large WCWSS corporate water users with at-risk supply chains – e.g. agro-processors – can potentially make material contributions to the GCTWF.

(2) Private Sector – Philanthropy (*recommended priority: 2*) This pool represents resources raised from private individuals, foundations, and corporates, and typically involves once-off and/or short-term (1-3 year) funding allocated against specific deliverables. Currently, the GCTWF channels private philanthropy from both TNC and WWF; depending on the GCTWF's future orientation, it itself could host tax-deductible donations from South African donors, as well as continue to coordinate with other NGOs and foundations who have aligned mandates and are interested in supporting the GCTWF's implementation efforts. However, similar to corporate replenishment work, these resources are affected by changing priorities (both by the donors themselves, as well as the non-governmental organizations that raise funds from the donors) and therefore are challenging to continually raise on an annual basis to meet overall implementation objectives.

(3) Donors agencies & global funds (*recommended priority: 1*) The GCTWF could apply to a range of bilateral or multilateral donors with overlapping priority sets, especially given that the GTCWF's water security focus tightly aligns with the overall Sustainable Development Goal (SDG) agenda. Donor agencies and global funds have been important contributors to the broader water funds network and tend to be especially relevant for one-time projects as well as upscaling / model replication efforts. By way of example, the Nairobi Water Fund has successfully attracted Global Environmental Facility (GEF)

funding of $USD 7.3mm, $1mm of which was used to seed an endowment fund (the balance being used to cover water fund setup costs, three full-time staff over five years, and initial implementation activities).

(4) Municipal budget expenditure (*recommended priority: 1*) As governed by the Public Finance Management Act (PFMA), it is possible to commit state budgets and contract activity for up to a three-year term per the Medium-Term Expenditure Framework (MTEF). Sharing the responsibility amongst the users is desirable as the City of Cape Town does not favour being the single largest contributor to catchment restoration. This makes such expenditures expedient for the initial portion of the high-impact period, but politically vulnerable to rely upon for the long-term maintenance period. The CoCT has a tender for IAP clearing operations, but the tender is restricted to City-owned land. The City has the option of outsourcing the clearing of IAPs to one of the GCTWF partners on a single source basis, however the process is cumbersome and requires approval by legal and supply chain teams. The CoCT at the time of drafting this strategy is finalizing the contracting process with TNC to execute R 50 M of IAP treatment activities over the next three years.

Sustainable Recurrent Funding Sources

There are several sustainable long-term sources which the GCTWF might be able to tap into. The most promising among these options include:

(5) Government programmatic funds

a. **Province** (*recommended priority: 4*) The Western Cape Province controls CapeNature, which is the entity responsible for the bulk of the strategic water source areas and most of the WCWSS. Healthy functioning catchments represent an important contributor to provincial economic health, and conversely the losses caused by unplanned wildfires, droughts and floods (all exacerbated by IAPs) furthermore adds to the fact that catchment rehabilitation and management is attractive to the Province. Furthermore, the province has invested in the Ecological Infrastructure Investment Framework to clarify this benefit, and plan and coordinate where optimal investment should occur. Given this alignment, the province could expand its annual allocation to catchment rehabilitation, which could either be carried out directly by CapeNature (in partnership with the GCTWF as coordinator) or the GCTWF could act directly as implementer in areas where CapeNature lacks presence. Nevertheless, it should be noted that the Province's fiscal space is small, with R2.6bn of revenue generation over the 2018/2019 budget cycle, of which R197 M is devoted within CapeNature's budget for all of its reserve and off-reserve management functions. Lastly, Province has similar constraints to the municipalities in procuring services beyond a three-year window and likely requires a bid/tender process for external implementation.

b. **National Government** (*recommended priority: 5*) The standard mechanism for securing government programmatic funding is a conditional grant framework to the Province. National fiscal capacity however is severely constrained at present given difficulties faced by various state-owned entities combined with anaemic growth and revenue stagnation (with each of these aspects further exacerbated by COVID-19 related challenges). Organizing such government funding requires a political champion and strong administrative support from a key functional department, alongside a special purpose agreement with the GCTWF for

implementation. It is unclear how any of these requirements could be met over the short and/or medium term.

(6) Bulk water infrastructure charge & Section 33 process (*recommended priority: 1*) Raw water infrastructure charges are applied to finance the development of water resource management infrastructure and can include natural infrastructure components. Local municipal governments recover such charges via water supply tariffs. Under this model, the City of Cape Town would use part of its funds from its sales of bulk and/or potable water for investment in catchment restoration through the GCTWF. These catchment implementation activities would then be negotiated via a long-term agreement between the City and GCTWF based on a set of agreed-upon performance metrics and related payment schedule. This implies a long-term funding arrangement between the City and GCTWF beyond the traditional three-year limit described above. For longer-term funding commitments, certain process requirements are triggered by Section 33 of the Municipal Finance Management Act (MFMA) including public advertisement, council resolutions, approvals from National Treasury, and consultation processes. Due to their arduous nature and level of scrutiny, Section 33 processes are typically only pursued for long-term arrangements involving capital repayments (e.g. the CoCT envisages using them to enter into power purchase agreements with independent power producers). Nevertheless, given the CoCT's structural dependence on the health of the priority sub-catchments, its relatively strong fiscal capacity, and the long-term structural need for the GCTWF to resource the long-term maintenance period, this funding source is deemed to be highest priority within the potential sustainable recurrent funding options.

The GCTWF should also consider similar long-term infrastructure charge arrangements with other municipalities (e.g. in the Berg River dam system) that are anticipated to benefit from the GCTWF's operations. The proposed CoCT WRG hydro-economic analysis currently under tender is designed to provide water-related regional economic resilience arguments, and upon release could provide a useful platform for mobilizing other municipalities to participate in non-conventional augmentation options.

(7) Water Resources Management Charge (WRMC) (*recommended priority: 2*) Water Resource Management Charges (WRMC) are designed to fund water resource management activities in Water Management Areas (WMA), including water use allocation, water resources protection, water conservation, and management and control of all of the water resources in the country. There are two components to WRMC: the abstraction water use charge and the waste discharge related water use charge. The WRM charges are theoretically the ideal means to assure a predictable funding stream for the kind of activities undertaken by GCTWF and could include specific indications of the budgets for IAP control over a 3-year MTEF period.

However, until the Catchment Management Agencies (CMAs) are fully established and fully capacitated, these activities of levying charges and investing in the catchment are shared between the CMA and the Department of Water and Sanitation (DWS) National and Regional offices. The WRMC currently under-recovers the full cost of WRM, resulting in the CMA not being able to contribute meaningfully to catchment restoration activities such as IAP control. Expanding and capturing a WRMC charge may prove politically difficult as it is limited to users with the lowest ability to pay within the catchment, without differentiation by geography or sub-sector basis. Note that the Breede- Gouritz Catchment Management Agency (BGCMA) contributes in the order of R8 M to clearing IAPs, outside the priority

sub-catchments. Relatedly, improving the determination, operation and re-investment of these charges is an intended focus of the Ecological Infrastructure for Water Security (EI4WS) project.

GCTWF partnership in collaboration with the EI4WS should continue working with the department and other stakeholders to quantify appropriate ecological infrastructure costs to be incorporated in budgets. Especially in these times of heightened need in the water value chain, the choice of least-cost path should be attractive to users and the Department alike. Yet, when budgets are tight the IAP budgets are usually among the first to be sacrificed as they are seldom "committed" and thus easily reallocated, resulting in the ongoing spread and water impacts as a result of ongoing catchment degradation. A Memorandum of Understanding (MoU) or similar arrangement with the CMA and the GCTWF should be pursued to access funding to clear IAPs across the 7 priority sub-catchments. Furthermore, working towards removing / adjusting the current cap on agriculture and forestry charges is necessary to address under-recovery and generate the availability of meaningful resources that could potentially be directed towards IAP clearing.

(8) Dedicated CMA Catchment Rehabilitation Scheme via WRD charge (*recommended priority: 3*) Under this arrangement, the CMAs would create a catchment rehabilitation scheme whose costs are covered by all water users within the catchment area via a Water Resource Development (WRD) charge. The charge is allocated based on the relative use by each user and can be supported by subsidies where available. Thereafter, the CMAs contract with implementing agents to deliver the scheme outcomes (i.e. catchment rehabilitation). Benefits of this model include that it reinforces the intended architecture for how the water sector delivers catchment rehabilitation (by relying on the CMAs) and avoids free-rider issues (by internalising the cost of catchment management into the water pricing across all users). However, such a scheme has not been established before and would require significant negotiations with the DWS at regional and national levels to bring to fruition. Further challenges include a potential objective mismatch (as the CMA planning the scheme's implementation may have a broader outcome set in mind than the GCTWF's narrow vision) and procurement challenges (as there may be requirements to implement via existing governmental programs such as NRM). For these reasons there is little guarantee that the GCTWF would have a long-term role in scheme implementation, or that the individual CMA scheme would be coordinated with the broader GCTWF implementation vision. Unless the GCTWF has a close, formalized CMA relationship, it would be difficult for the fund to effectively rely on CMA resources for ongoing implementation. Given the challenges and institutional flux, this arrangement will likely require several years to organize, making it an unrealistic option during the high-impact period but perhaps leaving it as a path forward during the long-term maintenance period.

(9) Water Users Association (WUA) Levies (*recommended priority: 3*) Similar to the WRD charge, irrigation boards can charge their agricultural members levies to support dedicated development schemes. Focusing on WUAs that are in the direct vicinity and/or direct beneficiaries of IAP clearing may be a promising approach; such levies are dependent on infrastructure repayment and operation, so depending on their constitution there is a possibility that they could expand this to green infrastructure so long as they can negotiate an associated assurance of supply. Given that agriculture is projected to capture a large amount (44%) of the associated yield benefits from the GCTWF's operations, this user group is a natural candidate for potential outreach. With this in mind, all three WUAs across the GCTWF's seven priority sub-catchments need to be approached individually, making this a medium-term and cumbersome option to execute.

(10) Bundling catchment charge into TCTA infrastructure financing (*recommended priority: Discard*) Catchments can be considered 'ecological infrastructure' and contribute to the overall operational profile and cost structure of the supply system. Therefore, it could be argued that catchment rehabilitation costs be included as part of the overall financing scheme, for example as part of the Lower-Berg Voëlvlei augmentation project managed by the Trans-Caledon Tunnel Authority (TCTA). This would allow the costs of catchment rehabilitation to be included in the TCTA Build-Operate-Transfer scheme costs to be paid by the dam users. However, TCTA is constrained by legislation on what it can incorporate in the purview of the infrastructure it finances and builds, and while theoretically the TCTA can include activities which improve water infrastructure longevity, efficiency or repayment rates, in practice there is no track record for incorporating such green infrastructure logic into TCTA financing schemes. National Treasury and TCTA have advised the GCTWF not to pursue catchment-linked charges associated with any new augmentation schemes funded and built by TCTA in the WCWSS.

Additional Resourcing Mechanisms

Additional resourcing mechanisms represent monies or actions that directly promote GCTWF's objectives but don't appear as a direct monetary flow to the GCTWF or one of its aligned implementation partners. These sources include:

(11) In-kind contributions (*recommended priority: 1*) In-kind contributions provide an expedient method to align resources among actors which have overlapping competencies and existing funding resources to pay for those competences. For example, CapeNature and the CoCT provide quality control officers to inspect cleared areas and provide Monitoring and Evaluation (M&E) support free of charge. In-kind resources have made a material contribution to the GCTWF's operations to-date and are anticipated to continue doing so into the future.

(12) Value Added Industries (*recommended priority: 5*) Generating charcoal and wood chips are options to generate revenues from IAP clearing during the initial phases. This option is restricted to accessible areas, which is problematic because >90% of the seven priority sub-catchments are too remote to make this a viable option. Nevertheless, it is an option in the Steenbras and Wemmershoek catchments, where the CoCT can ringfence the income from the timber harvesting of the remaining plantations to offset the initial clearing cost. In addition, the lower-lying areas specifically around the Theewaterskloof dam (Du Toits and Upper Riviersonderend sub-catchments) present an opportunity for value added industries.

The GCTWF should calculate the cost and potential revenues associated with these value-added industries via a collaboration with Landcare, the Western Cape Province and NRM. Such an effort will serve to ground-truth potential opportunities afforded by such schemes.

(13) Endowment (*recommended priority: Linked to fundraising success for options #1 - #9*) Investment income generated by an endowment has been a successful strategy employed by multiple water funds to-date, including Quito, Medellín, Lima and Nairobi. Such income is typically designed to cover all or a majority of core operational costs and further can operate as a reserve fund during difficult funding periods. Particularly relevant are the perpetual and sinking fund models discussed in Box 1, however

note that all of these fund models require significant efforts to organize initial capitalization, an undertaking that involves tapping one or more of the funding options listed in (1) – (9) above.

(14) Repayable financing (*recommended priority: postpone consideration*): Repayable finance is a tool considered in certain watershed investment contexts to either (1) organize a loan so that 'future' Rands can be deployed 'today' with the aim of accelerating conservation outcomes, or (2) enable pay-for-success contractual arrangements where a downstream beneficiary would like to make funding contingent upon the realization of certain performance indicators being met. Repayable financing arrangements however also entail additional costs (related to transaction origination and interest repayment), require ongoing reporting burdens, and most importantly necessitate sufficient credit-worthy funding streams and/or performance contracts to act as the backbone of the transaction. Furthermore, if the aim of is to accelerate conservation outcomes, the efficacy of repayable financing is contingent on absorption capacity to immediately execute and implement those resources. In the case of the GCTWF, this field capacity is still being built out and would be overwhelmed if the full six year high-impact period funding were made available today with immediate execution expectations.

Given that neither of the two pre-conditions exist – applicability to context, nor sufficient credit-worthy cashflow stream(s) – it was decided to postpone consideration of repayable finance as an immediate focus for GCTWF's funding strategy.

Box 1: Types of Fund Structures

Funding structures can be classified based on their source of finance and the sustainability of their funding practices. Four general kinds that are relevant to consider are presented below. Given that the GCTWF aims to combine multiple funding sources incrementally over time against a defined overall plan, it will likely be categorized as a 'Revolving Fund'. If the GCTWF successfully organizes an endowment (which might take the form of a 'perpetual' or 'sinking' fund), then the resulting structure would be categorized as a 'mixed' fund.

- **Endowment Perpetual Fund**: The fund's capital is invested into market securities, thereby generating annual income that can be spent on grant or operational activities. The fund aims to operate into 'perpetuity', and therefore annual spend is limited to investment income (ideally, after adjusting for inflation) with an aim towards holding or growing the capital base over time, in the process maintaining or building the fund's disbursement capacity. However, large initial funds are required to establish the endowment's initial capital base.

- **Endowment Sinking Fund**: This arrangement is similar in principle to the perpetual fund model, however, differs in that disbursements included both investment income as well as capital principal, creating a decline in the capital base over time and ensuing reduction in disbursement capacity. Such funds are typically arranged with a 10 to 20-year view in mind and have more moderate initial capitalization requirements than the perpetual model.
- **Revolving Fund:** These structures are designed to finance continuing operations by balancing outgoing expenditures with regular repayment of initial cash outlays by beneficiaries. For example, a fund can issue loans or projects which result in respectively loan and performance contract repayments. Moderate seed funding is required to initiate such programs, however, care must be taken that the activities are linked either directly or indirectly to sufficient and timely replenishment funding to prevent insolvency.
- **Mixed funds:** These funds represent combinations of the above categories and are often operationalized via separate accounts. Separate accounts allow for different arrangements for different funders – e.g. donors can contribute funding to specific programs on a sinking fund basis, other funders can contribute to an endowment aligned with the overall strategy, while financiers can enter into loan-type revolving fund arrangements.

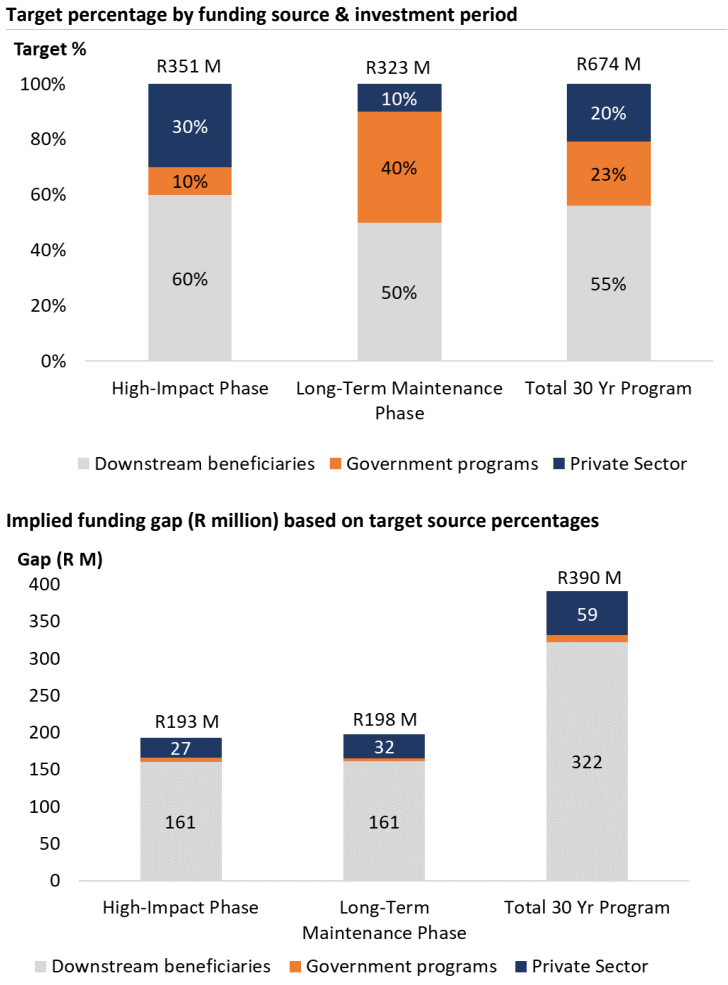
IV. Summary Recommendations & Proposed Path Forward

Summary GCTWF Funding Strategy Recommendations

Given that each potential funding source has its own unique set of complexities, negotiations, and follow-up requirements, there are noteworthy opportunity costs to consider when constructing a sensible resourcing strategy for the GCTWF. From the above analysis, the following recommendations emerge:

- **Implement efficiently, transparently and cost-effectively** with existing in-hand resources. A compelling track record supported by thoughtful monitoring and evaluation will highlight the GCTWF's value proposition, thereby driving continued stakeholder investment as well as operational excellence among implementers
- **Finalize the MOU** between TNC and CoCT and prioritize the 3-year IAP control program to optimize the city's contribution
- **Support EI4WS** to increase CMA budgets and allocations through WRM charge
- **Sign MOU with BGCMA** to improve collaboration, improve prioritization
- **Privilege** the organization of long-term sustainable funding source(s) that can act as an anchor for the GCTWF's implementation activities. The most feasible near-term candidate is a **bulk water charge by the City** alongside a Section 33 application for GCTWF to act as program implementer. Furthermore, it includes **approaching other municipalities** who receive allocations from Berg River dam and **negotiating with WUA** to contribute to catchment restoration via the GCTWF
- **Continue to leverage and advocate for** public funding programs (e.g NRM) that align with catchment management
- **Continue to channel** private philanthropy and corporate replenishment funding, especially during the initial high-impact period. Furthermore, use these sources to organize necessary research and development efforts to further drive efficiencies and best practices within the GCTWF secretariat. As a guidepost, however, do not aim to derive >20% of implementation monies from voluntary / one-time contributions given their inherent lack of dependability and bespoke reporting requirements
- **Consider** – in partnership with donor agencies and global funds – the creation of a long-term perpetual endowment to secure GCTWF's operational platform costs and weather low-points during funding cycles. Furthermore, opportunistically pursue engagements where clear alignment exists between donor mandates and GCTWF's implementation vision.

Figure 10: Proposed phased funding target percentage guideposts, and associated implied funding gaps



- **Quantify water benefits and ROI** for the Steenbras and Voëlvlei sub-catchments with an aim of understanding the broader potential for the twenty-five subcatchments.

Pursuant to these recommendations, a set of funding targets is provided in Figure 10 for the high-impact and long-term maintenance phases. The contributions of downstream beneficiaries (e.g. City of Cape Town, agriculture and additional municipalities) form the 'bedrock' of contributions, with permanent government programs (NRM, Cape Nature) providing consistent supporting contributions for the whole 30-year program duration given the GCTWFs alignment with their existing mandates. By contrast, private sector contributions (philanthropy, corporate replenishment) initially figure heavily to help address the initial implementation 'hump', but then scale back once the long-term maintenance phase begins. Beyond this, it is recommended that the GCTWF explore funding opportunities with global agencies and donor funds to identify whether interest exists to help set up a long-term endowment that could help defray the GCTWF's ongoing program management operating costs.

Proposed Next Steps

The GCTWF's credibility depends on integrity and transparency. Good governance, clean audits, and appropriate accounting systems are key supporting elements for this aspiration. Furthermore, implementation progress and performance must be demonstrated and documented while delivering funding commitments and meeting partner expectations.

The GCTWF has three key enabling requirements to meet its overall funding requirements for clearing the 55,000 hectares and subsequently maintaining those gains. These include: (1) a robust plan on what sources of funding can be mobilized, (2) convincing different water users within the priority sub-catchments of the unique value proposition provided by coordinated and targeted IAP clearing, and lastly (3) a demonstrated track record of the GCTWF's ability to implement, collaborate, and showcase partnerships between government private sector and NGOs.

This GCTWF sustainable funding strategy is designed to enable requirements (1) and (2) above, and via the DSS provides an analytical backbone to deliver impact reporting that will showcase (3) over time. The funding strategy is considered over two timeframe periods: high-impact (2019 – 2025) and long-term maintenance period (2026 – 2050). The goal of this strategy is to support an appropriately resourced and financially sustainable future GCTWF entity.

The following recommended actions are designed to give effect to the strategy:

- Strengthen the GCTWF Sustainable Funding Working Group and commit to a collaborative approach (members and responsibilities described below),
- Filling the high-impact phase R193 million funding gap & prioritizing potential sources of long-term sustainable recurrent funding options, per the resourcing strategy recommendations above,
- Implement efficiently to build a credible track record of GCTWF's value proposition,
- Support EI4WS, identify and pursue policy outcomes to invest in ecological infrastructure for water security, and
- GCTWF funding working group to co-develop an implementation plan to give effect to this strategy, track and review annually.

Institutional arrangement for executing next steps

The Governance & Institutional Arrangements component of the Greater Cape Town Water Fund Strategy 2020 – 2025 provides detail on the current and future institutional arrangements of the entity. Until the future entity is in place, this sustainable funding strategy will be implemented by TNC as secretariat in collaboration with the Funding Working Group.

The GCTWF Sustainable Funding Working Group is composed of representatives of TNC, WWF, CapeNature, DEA/DP, CoCT, REMGRO and Coca-Cola Peninsula Beverages and reports to the Steering Committee's Founding Members until the future entity is in place. The responsibilities of this working group include:

- Identifying opportunities for unlocking resources,
- Helping leverage resources towards priority areas,
- Informing a sustainable and scalable resource allocation model,
- Coordinating funding allocation for restoring seven priority sub catchments, and
- Preparing the strategic implementation plan, tracking progress, updating annual plans of operations.

Conclusion

The COVID-19 pandemic has shown how rapidly the world can change. Public attention quickly shifts in focus from crisis to crisis, leaving day zero as a distant memory when dams are full.

The eyes of the world are on the GCTWF to showcase how collective action, and pooling of resources can be used to secure water. The ability to deliver on this vision is directly related to the GCTWF's ability to raise funds, and therefore the refinement and execution of this sustainable funding strategy is of central importance over the coming years.

Appendices

Appendix I: DSS Methodology Overview & Recommended Future Strengthening Areas

The following table provides a breakdown of the methodological differences between the Decision Support System generated to produce for the sustainable funding strategy and the 2019 & 2018 analytical efforts.

	2018 GCTWF Business Case	2019 Aurecon CoCT Study	Decision Support System
Scenarios evaluated	• Current IAP impact • No action (30 year spread projection) • No IAP present (full clearing)	• Current IAP impact • No action (30 year spread projection) • No IAP present (full clearing)	• No action (30 year spread projection) • Custom scenarios defined by 30 year budget projections (including "Business as Usual", "Current Status", "Full Implementation")
Time step	Annual	Linear interpolation over 30-year period	Annual
Geographic extent	The 25 source water areas of the WCWSS based on NFEPA catchment areas	All contributing catchments of the WCWSS based on the calibration catchments for the WRYM	Seven priority sub-catchments but modelled at the scale of delineated Hydrological Management Units (HMU)
Prioritization resolution level	NFEPA sub-catchment	Hydrological calibration catchments used in the existing WRYM and at the scale of individual dams and total system	Hydrological Management Unit (HMU) – approximately 500 ha in size – as derived from digital elevation model (DEM) and aligned with existing catchment boundaries and flow gauges
Implementation costing	Estimated at patch level based on seven variables including species, slope, density, person-day cost, person-days per hectare	Total clearing costs assumed identical to 2018 GCTWF Business Case	Similar to 2018 Business Case, with additional inclusion of transportation modifier to reflect access costs
Streamflow reduction benefits estimation	• Calibrated WR2005 "Pitman" Rainfall-Runoff Model used to estimate hydrological processes including streamflow • IAP SFR estimated per methodology in Scott & Smith (1997). IAPs assumed equivalent to either Pine or Eucalyptus w/ SFR of 15 years average age in sub-optimal growth environment. Allow for groundwater (x1.5) & riparian (x2) additional benefits.	Same as 2018 Business Case	• Rainfall-runoff estimates rely on same methodology as 2018 Business Case but evaluated on HMU level. • IAP SFR estimated per same Scott & Smith (1997) methodology, but SFR calculated at HMU level using 9 total bins (Pine, Eucalyptus, and Shrub in three age classes - seedling, young, &adult). Each bin associated assigned a unique automized treatment schedule and tracks IAP population average age, species condensed density, spread rate, and clearing cost
Hydrological yield estimation	Aurecon ResSIM reservoir simulation model (at 1:10 year level of assurance)	Water Resources Yield Model (WRYM) determined yield for 1:50, 1:100 and 1:200 year assurance levels	WRYM yields generated by dam-specific SFR / Yield curves for 1:50, 1:100 and 1:200 year assurance levels
IAP spatial layer	• Görgens et al 2016 data set, supplemented by	• Update of 2018 Business Case data	• Data set: Cape Nature, 2018 • Total IAP condensed area = 10,294 ha

	2018 GCTWF Business Case	2019 Aurecon CoCT Study	Decision Support System
	Cape Nature, CoCT, LandCare and others • Total IAP condensed area = 10,488 ha	with additional cleaning • Total IAP condensed area = 10,024 ha	
Spread model	Linear spread with a 10% increase in invaded area per year plus 1% increase in density till 2045. Based on Van Wilgen and Le Maitre (2013)	Same as 2018 Business Case.	Logistic spread function per Cullis et al (2007)[vii] . Logistic curve with 10% maximum rate of spread for increase in the condensed IAP area and limited by maximum invadable area (i.e. untransformed land excluding hard rock and water)
Fire cycle	Not considered	Not considered	15 year random fire cycle

Recommended Areas for Future Strengthening of the Decision Support System

- Operationalize DSS with Operations Working Group with an aim towards standardizing and automating impact reporting.
- Over time, extend the DSS to cover the other priority sub-catchments within the WCWSS.
- Updated and improved mapping of IAP extent based on species type, density, and age class.
- Based on GCTWF's in-field M&E efforts as well as other observed gauge data, revisit streamflow reduction factors for different IAP categories indicated by Scott & Smith (1997).
- Revise logistic spread model used to determine spread rate of IAP populations as indicated by Cullis et al (2007).
- Integrate different control methods such as prescriptive fire and biological controls.
- Revise fire cycle methodology to integrate Monte-Carlo simulation and integrate with spread rate equation.
- Integrate more detailed catchment modelling (e.g. MIKE SHE model being developed by the University of Cape Town) to increase accuracy of Mean Annual Precipitation contributions by individual HMUs.
- Enhance resolution of Benefits Model to account for distinctions between IAP impacts for populations with access to riparian and groundwater sources (as opposed to surface water sources).
- Share methodology and associated learnings with other catchment management programs.

Appendix II: Glossary

Currency: monetary values are expressed in South African rand (R). The rand to United States dollar conversion rate at year-end 2020 stood at 14.6 ZAR to 1 USD.

Catchment: the area of land that drains water from a divide or ridge to an outlet location such as a stream channel, which may also lead into waterbodies such as bays or dams. The word catchment is used interchangeably with the terms watershed and drainage basin.

Dam: an artificial body of water used for water storage before it is supplied for later use. This report follows the terminology used in South Africa. Therefore, the term "dam" is used to describe what might be termed a "reservoir" in the USA and many other countries.

Discount Rate: the interest rate used in discounted cash flow analysis to determine the present value of future cash flows.

Hydrological Management Unit (HMU): planning unit used by the GCTWF to conduct strategic prioritization of implementation activity. These spatial units average approximately 500 ha in size and are at a scale that can be cleared in roughly a years' time. The HMUs are within the seven priority sub-catchments, as delineated for the National Freshwater Ecological Priority Areas (NFEPA).

Invasive alien plants (IAPs): introduced vegetation that is non-native to an ecosystem, and which may have adverse economic and environmental impacts. They can impact negatively on biodiversity through competition and disrupt local ecosystems and ecosystem function.

Millions of cubic meters (Mm3): default volumetric unit of water in this document is the cubic meter, typically expressed in millions given the large volumes of water discussed in this document. One cubic meter is equivalent to 1,000 liters.

Natural Environment Biological Alien (NBAL): planning unit used by Working for Water Programme. The GCTWF has adopted this as standard for contract level (smallest unit) planning. NBAL boundaries are generally determined by natural features e.g. rivers or footpaths.

Person day: number of individuals required to clear one hectare per day. This figure is influenced by the species being cleared, its age class, and the associated density level.

Person day cost: daily implementation contracting costs that vary as a result of the skill level of the team (e.g. High Angle, Intermediate, or General) and level of terrain accessibility (e.g. helicopter or walk-in).

Unit reference value (URV): developed by the South African Department of Water Affairs as a means of comparing the cost of delivering water from different water supply schemes, by estimating the cost in rands of delivering one cubic meter of water. The URV of a project is calculated by dividing the present value of the total cost of the infrastructure (construction, maintenance, operational) by the discounted stream of water generated over the economic life of the project. It therefore does take the growth in savings over time into account, making it comparable to other investments.

Water Fund: funding and governance mechanism that enables water users to provide financial and technical support collectively for catchment restoration alongside upstream communities.

Water security: "the availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies" [viii]

Endnotes

[i] Including future CMA institutional arrangements.

[ii] Stafford, L., et al. (2018). The Greater Cape Town Water Fund: Assessing the Return on Investment for Ecological Infrastructure Restoration – Business Case. The Nature Conservancy, Cape Town, South Africa.

[iii] Scott D.F. and Smith R.E. (1997). Preliminary Empirical Models to Predict Reduction in total and low flows resulting from afforestion. Water SA Vol. 23 No.2 April 1997 pp 135-140.

[iv] Aurecon (2019). Inputs to the City of Cape Town Water Strategy. Report by Aurecon South Africa (PTY) LTD.

[v] Mosdell S (2019). Advice Regarding Legal Constraints on the Spending of Municipal Fund Outside of Statutory Boundaries. Report by Winstanley Inc.

[vi] City of Cape Town (2019). Cape Town Water Strategy: our shared water future.

[vii] Cullis JDS, Görgens AHM, and Marais C (2007). A Strategic Study of the Impact of Invasive Alien Plants in the High Rainfall Catchments and Riparian Zones of South Africa on Total Surface Water Yield. Water SA Vol. 33 No. 1.

[viii] Grey, D and Sadoff C (2007). Sink or Swim? Water Security for Growth and Development. Water Policy. 9 . 10.2166/wp.2007.021.