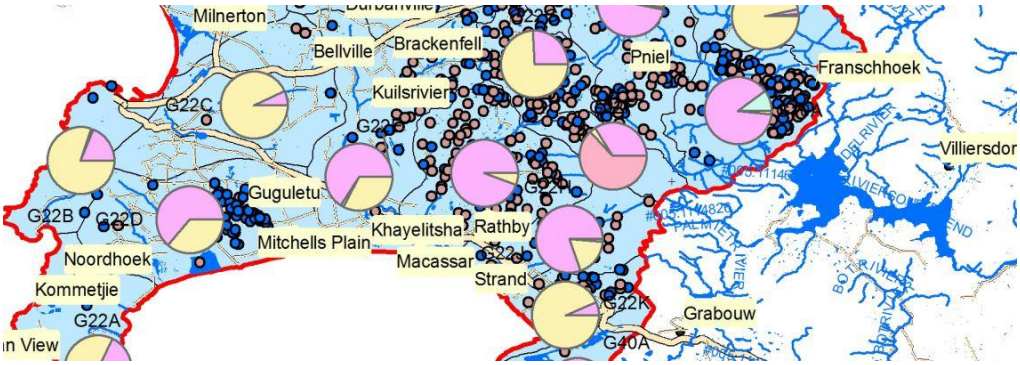
The GreenCape Sector Development Agency

Progress Report on Strategic Project

Water as a Constraint on Economic Development

2013-2014



Report Prepared for:

Trade and Sector Development

Department of Economic Development and Tourism

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EXECUTIVE SUMMARY

1. Project Motivation and Inception Phase

The Western Cape is a water-stressed region. In order to plan for economic growth, an understanding of how much water is used by the region's economy, and where and how it is used, is required. The project therefore aimed to conduct a detailed analysis of water consumption across the economy, linked to measures of economic productivity, in order to identify critical constraints, and to design and implement interventions to alleviate these.

Two interest areas formed part of the driving motivation of the project. The first is the proposed development in **Saldanha Bay**, for which the project was tasked with indicating what the water resources implications were. The second interest area was **water pricing**, and a clear understanding of the role water pricing could play in ensuring that there is adequate water for the Saldanha Bay development was required.

An **Inception Report**, documenting the project motivation, deliverables and project plan was released and accepted by project stakeholders. The five **deliverables** for the project were defined as:

ID	Title	Detail
1	Water availability and use data	Collate information on water availability, water quality, water use and intensity per industry sector, in an easily accessible format, across the Berg Water Management Area (WMA).
2	Water& Economy Links	Develop an understanding of the links between Water Availability (quantity and quality) and Economic Activity (cause and victim), throughout the Berg WMA, thus identifying key links, impacts, and constraints.
3	Impact of Constraints	Identify how current & future water constraints may impact on future development plans, throughout the Berg WMA.
4	Interventions	Identify interventions to alleviate constraints & sustain economic activity, including water pricing mechanisms for major consumer industries in Berg WMA
5	Methodology	Through implementing this study, develop and demonstrate a methodology for implementing water-economy studies

2. Literature Review and Data Collation

A **spatial database** was established of water resources and economics data, to be used during the project analysis of the water resources situation, and of how water flows through the economy. A **literature catalogue** was generated in which the relevance of other literature to this project is described in tabular format. The spatial database and literature catalogue were

released in draft format and accepted by project stakeholders (Phase 1 Progress Report, October 2013).

It is recommended that the spatial database and literature catalogue be updated and maintained the regularly, and made available to external parties via the GreenCape website (see recommendations).

3. Framing Question Defined Through Action Learning

The literature review, and informal stakeholder liaison with various professionals and with several linked projects, provided information on the degree to which other work already catered for parts of the project key questions. Thus an iterative "**action learning**" phase ensued during which the project questions were assessed against this existing work. Perspectives on the current situation were gleaned from stakeholders and are summarized with sets of quotes, which reveal a wide range in opinions. The literature review and informal stakeholder liaison led to a number of **key insights** on the current water resources and economics baseline situation, and on how economic development and water resources provision is planned. It became evident that although parts of the project key questions could be answered by existing work, a linked systems analysis of the water and economics situation for Saldanha Bay planning could not be established in existing work. One framing question was developed that the project team felt summarized the "gaps" in existing work, and was a question through which the project could add most value to the existing work: **What are the "right" sources of water, at what quality, for the "right" developments, for the "right" price?**

4. Model for Integrated Water & Economics Planning

The framing question is a truly different sort of question to questions such as how much water is available for development? Or what economic developments do we need to take into account in water resources projections? In both of these questions, one half of the question is a fixed or independent variable i.e. the "proposed development" is a static variable for which enough water must be made available. Conversely the question of the right sources for the right developments for the right price, **recognises the co-dependence of economic development and water**, and **accommodates the full complexity_**of water resources and development planning.

A conceptual model is proposed which could address the framing question, shown in Figure 1. Within this model, economic and water resources planners would need to start with a definition

of the development scenario, of where we want to be and what development we want in our future. We would then need to look at the water demand of this development scenario requires, which includes the volume of the required water resource, and also the required water quality. Given that the Western Cape Water Supply System is a fully allocated system, these water requirements need to come from new resource interventions. So, based on the demand of this future development scenario, new resource interventions, and their impact and cost can be assessed. Subsequently, and almost most importantly, based on the cost and the impact, **a strategic decision is required** on whether the proposed scenario reflects "smart" use of resources. Technical work carried out during the remainder of the project, (November 2013 – March 2014), centered on exploring and addressing parts of this question.

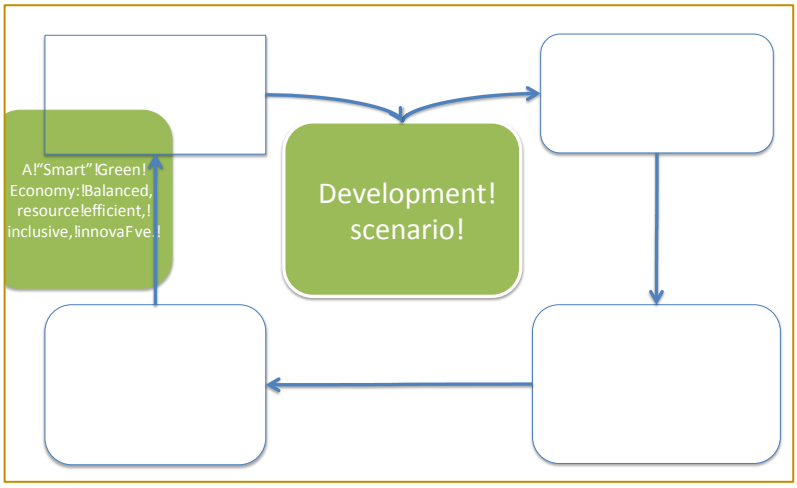

Figure 1: Model for addressing the Framing Question

5. Saldanha Water Demand informed by Development Scenarios

One **key insight** highlighted that future water resources interventions are planned based on future water demands generated from generalized growth percent's, for various reasons including that water resources planners could not source, or did not have access to, information on proposed developments.

As a test of the conceptual model in Figure 1 that puts development at the centre of the planning, and of the difference that may result if the planning cycle were to start with the definition of the development scenario, all proposed developments for Saldanha Bay were collated, a **water demand trajectory was developed based on these developments**. A spreadsheet model was developed to generate the water demand trajectory, which reads basic project information and develops the water demand curves. Various scenarios were developed, including low, medium and high growth, and a conventional and green approach to water

resources. There is a significant difference in the volumes of water required between the scenarios, and between the two approaches. What the difference in water demand between the two approaches (gradual percent, and based on proposed industrial developments) means for the development planning, and how uncertainty is handled, be, should be unpacked in liaison with stakeholders (see recommendations).

6. Tools for Smart Water Use

The key insights reflect the lack of a strategic assessment of "smart" water use for development options, and a lack of tools for strategic decision-making. In light of these insights, an investigation ensued into two potential tools for assessing smart water use:

1. **Statistical water accounting** on a macroeconomic level and as a stocks-and-flows input-output analysis, was implemented for the Berg Catchment. The method provides an alternative view of water flows than that provided by the standard water balance approach implemented by Department of Water Affairs. It is recommended that the stocks-and-flows tables generating the diagram be coded into a "live" system, such that large scale water resources interventions can be tested in this model – thus providing a simplified decision support tool (see recommendations).
2. **Water efficiency and economic productivity indices**. The Water Footprint Assessment (WFA) was investigated as a tool for incorporating all water used in production and consumption (rather than only abstracted water), especially in areas such as agriculture and food industries. The water footprints of various sectors across the Berg Catchment were developed. As an indicator of the "smartness" of an economic activity in terms of resource efficiency and productivity, the rand generated per total drop (GDP / water footprint as m^3), and the jobs generated per drop, were generated per macroeconomic sector.

The implementation of these two tools for the Berg Catchment can define a baseline of water-economic productivity. It is recommended that these analyses be extended to inform the "smart" use of water resources for the future development options for Saldanha.

7. The People in the Planning System

For this project to make any lasting impact for integrated and coordinated water and economic development plans in Saldanha, a response to the Framing Question needs to be generated in liaison with all other responsible stakeholders. Indeed this response needs to first commence with verification of whether GreenCape's framing question and the proposed model to answer it,

are indeed valid. Even prior to this, our insights that led to this framing question and proposed model (section 3) need to be tested in a wider sphere. A workshop was therefore held with these intentions in mind, on 24th February 2014. The workshop report is currently underway (to be completed by mid-March), the outcomes of which will inform the direction of the project in its second year.

8. Conclusion and Recommendations

In summary, deliverables 1 and 2 have been met, and deliverables 3, 4 and 5 were replaced with the establishment of the framing question (a result in itself), and the work done towards answering this question.

In developing, posing and unpacking the Framing Question, the project has challenged various norms, and has added value in the water and economics planning space. The potential positive impact of the project is best summarised in a statement made by a key senior figure in the water resources planning sector, in the workshop feedback form:

> "GreenCape has bitten off a big chunk [and a previous response highlights an uncertainty that the project can deliver results], **but *if successful*, the project could *really* add value**"

To achieve the *real* value-add highlighted as possible in the comment, the programme needs to consider a 3-5 years timeframe. The **overarching aim** of the 3-5 year programme is: to contribute to strategic decision-making for economic development, through answering the framing question of the right sources of water, for the right development for the right price. The **vision** of a new (and "green" or "resource-efficient") economy, in which different sources and qualities of water are sold at different prices, to different economies, for different uses, is aligned with this overarching aim.

To address the overarching aim and the vision, recommended activities for 2014-2015 have been articulated in the GreenCape Business Plan. Key outputs for the 2014-2015 year will be

- GIS based analysis of water resource productivity
- Systems dynamics based model of water use to enable testing of intervention strategies

Cost-benefit analysis for water use in Saldanha