

Water Sector Skills Gap Analysis

Green Skills Methodology Case Study

Prepared by Adie Vienings, Zoë Visser and Leigh Cobban



Introduction

What is the status of this research?

The Department of Water and Sanitation (DWS) appointed the Water Research Commission (WRC) to develop and manage a research project entitled 'An Integrated Water Sector Skills Intervention Map Based on a Sector Skills Gap Analysis' (referred to in short as the Sector Skills Gap Analysis). The research was conducted over a three year period (August 2011 - July 2014). This case study was developed by Adie Vienings of [Water Concepts](#), and Green Skills researchers Zoë Visser and Leigh Cobban. Adie was the one of two consultants leading the team of experts for this project.

The Sector Skills Gap Analysis produced: i) a Literature Review; ii) an inception report; iii) a report on the skills audit; and iv) a final intervention map. Project progress reports are available on the [Water Concepts website](#). In addition to these four deliverables, a web-based user interface [skills audit tool](#) was made available to the sector for further use after the project's completion. The web-based skills audit tool consolidates all occupations, job titles, technical functions and skills lists for the sample selected in the public water sector. Occupations are listed from artisan level to managerial level. This case study is focussed on the methodology used to determine the gap between the demand and supply of institutional capacity and individuals' skills within the water sector.

Purpose

What problem or question motivated the research?

The project was commissioned by the WRC on behalf of the DWS in response to repeated claims that the water sector in South Africa was lacking, and losing, necessary skills. These skills included those relating to planning for and maintaining water resources, and the public supply of water services. The project was tasked with confirming or refuting these claims, and with providing a method to derive up-to-date skills gaps to help decision making.

The project researched the supply of skills in the public water sector occupations in order to develop a strategy for up-skilling incumbents in posts that do not meet job requirements. It considered both institutional capacity (defined in this research as the number of staff required per job title) and the individual skill requirements (defined as the competencies required by an individual to perform necessary tasks).

The project used a sample of 39 institutions to determine the number of posts per job title in the entire public water sector and the percentages of these posts that are filled and vacant. This constitutes the institutional capacity gap. The project also determined – using a sample of 4 institutions – the gaps between the skills required for technical posts as per job profile and the existing skills of incumbents in the posts, to determine individuals' skills gaps. This case study is focussed on both the capacity gap and skills gap assessments.

Design

What Methodology was used?

The co-project leaders (from Water Concepts and Onyx Human capital) were supported by a team of experts in the fields of science, environment, wastewater, water distribution, water resources, and construction.

Selecting a sample for this research involved two sets of selection: i) selecting institutions reflective of all types of institutions in the public water sector institutions; and ii) selecting job titles and incumbents in posts representative of all job titles in public water sector, as respondents. Although initially the research aimed for a large, statistically significant sample which could be representative of the full public water sector, it was not able to include sufficient quotas across all the different types of institutions, namely: i) National government, ii) Government utility, iii) Catchment Management Agency (CMA), iv) Water User Association, v) Water board, vi) Water Services Authority (WSA) or municipalities. Instead, this research included 1 CMA, 1 Water Board and 1 WSA, representing 11%, 7% and 1% of these institutional types respectively. Institutional capacity and individual skills assessments were carried out at each of these Water Service Institutions (hereafter ‘institutions’).

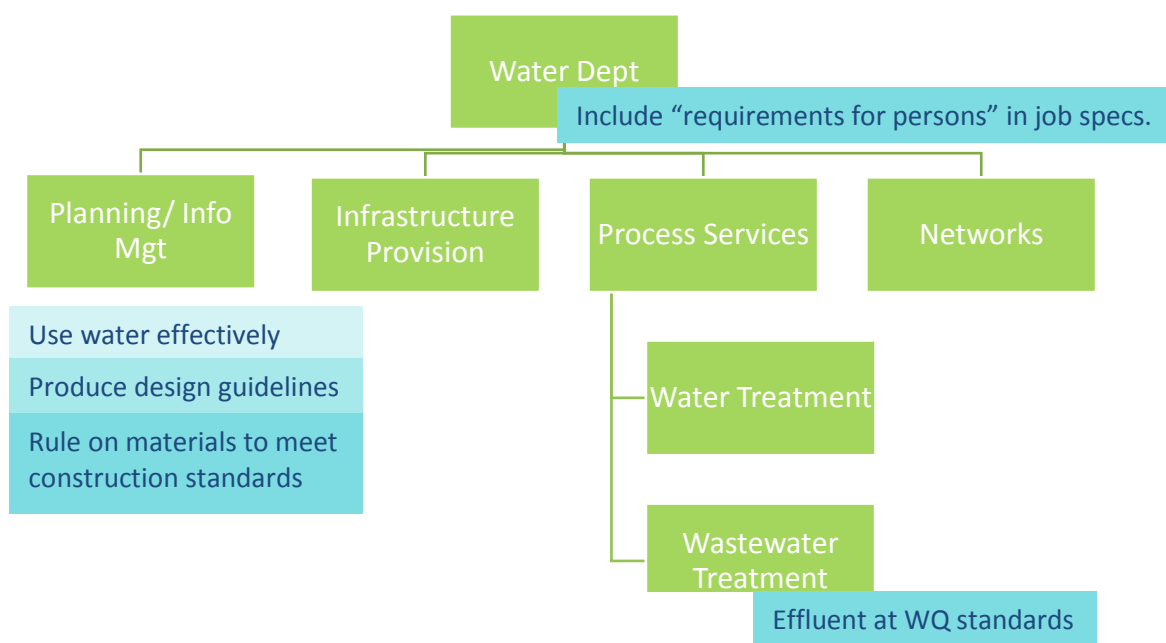
1. Capacity Gap Assessment

In this research, the researchers defined capacity as: a whole institution’s staff requirements by job title with predetermined minimum qualification requirements e.g. ten plumbers with N2/NTC II with a trade test, and four sewer master planners with BSc. Eng. (Civil). Staff requirements were determined using staffing norms based on technical ‘units of measure’ e.g. 1 plumbing team per 160 km of water pipeline, or 1 water master planner per municipal planning region or depot. A capacity gap was defined as the difference between the demand for and supply of capacity in an institution.

Step A: Demand for capacity was determined through the following actions:

- 1) The mandates of selected institutions (as defined in legislation such as the National Water Act and/or the Water Services Act) were identified.
- 2) These mandates were mapped onto an organogram, and then onto individual job titles.

Figure 1: Water Services Act mandates in municipal organogram (Ref: Adie Vienings; Green Skills Symposium Presentation (2015): “The Water Sector Capacity and Skills Gap Methods”)



- 3) The unit that predominantly controls each mandate/responsibility e.g. length of rivers or number of stakeholders to be serviced was identified for each function.
- 4) The amount of a unit that one job title or a team of job titles can handle over a particular time period (e.g. one plumbing team can cope with 160km of piping per year) was proposed. Data was gathered from discussions with technical staff about how often tasks related to the mandate occurred across a year, and the extent of physical aspects to these tasks.
- 5) The number of staff required per job title was then calculated. The calculation is based on the total time in days per annum to deliver mandates (the number of tasks multiplied by the time needed to perform a task) divided by 220 working days per annum.

$\text{Number of staff required per job title} = \frac{\text{Number of tasks across all mandates} \times \text{Time to perform each task}}{220 \text{ working days per annum}}$

Step B: Supply of capacity was determined by: i) analysing institutional organograms together with staff information provided by relevant HR Management Information Systems (HRMISs) including information on the department, job title, whether the position is filled or vacant, the incumbent’s name, gender, race, highest qualification and years of experience; and ii) aggregating these itemized staff lists to determine the final number of staff per job title. If incumbents did not meet minimum qualifications and years of experience as per job profiles, they were not counted in as supply of capacity.

Step C: The capacity gap in participating institutions was determined by subtracting the supply per job title from the demand per job title.

2. Skills Gap Assessment

The skills gap is the difference between the demand for skills (i.e. the skills requirements of the job) and the supply of skills (i.e. the actual skills held by staff). The demand for skills was established using a ‘Skills Matrix’, while the supply was measured through a web-based skills audit tool, in the form of a self-administered survey.

Image 1: The online Skills Survey System

**Welcome to the
WRC/DWA Water Sector Skills Audit**

This skills audit project is being implemented by ONYXX Human Capital and Water Concepts on behalf of the Water Research Commission (WRC) and the Department of Water Affairs (DWA).

Questions & Answers:

- How long will it take me to complete?
± 45 minutes in total.
- Do I have to complete the audit in one go?
No. However, we recommend that you provide as much information as possible.
- Why should I fill out this questionnaire?
To help identify any skills gaps that you might have and to identify appropriate skills interventions you might need. Also to help the WRC and DWA to test this method of identifying skills gaps viz. this website and the generic skills list.
- Will I get a copy of my final skills audit?
Yes, your HR representative will give you a copy to sign and place on your file.
- Is my information open for everyone to see?
No. The information is hosted on a secure website which is not open or available to anybody except the HR Representative and the Project Administrator.

For any queries or assistance contact Alice Coelho on [083 540 7300](tel:0835407300) / info@onyxx.co.za

Click here to REGISTER

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ID Number OR
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Cellphone (eg. [0821234321](tel:0821234321))

Resume
Admin Login (Office use only)

[Respondent's Manual](#) [HR Representative's Manual](#)

Step A: The demand for skills is deemed to be the skills required by job titles at water sector institutions. Initially the project did not envision the research to include an assessment of the skills of individuals. However, the research proposal proposed a method to measure individual skills, as well as institutional capacity.

Four components were refined in order to determine the demand for technical skills:

- understanding of different types of skills;
- understanding of a competency framework to ensure exact wording of skills across the audit;
- understanding of a skills matrix; and
- the use of a rating scale.

Types of skills: Skills were made up of technical skills, knowledge areas and behavioural competencies and attributes. An example of each of these skills is provided in **Table 1**, below.

Table 1: Types of skills

Type of skill	Example
Technical skills	Install pressure control valves Conduct harvest surveys Identify wetland and aquatic species Maintain electrical switchgear Identify leakage points
Knowledge areas	Knowledge of sector legislation Knowledge of institutional supply chain management rules Knowledge of survey technologies Knowledge of installation rules as per SANS 10142
Behavioural competencies	Communication skills Negotiation skills Planning skills

The web-based audit tool did contain a list of behavioural skills, but the researchers did not obtain the demand for (or required) behavioural competencies from line managers. Without the demand, the behavioural skills gap could not be determined.

Competency Framework: In order to aggregate skills from an individual level to an institutional level and then to a national level, it was imperative that the wording for a skill be identical throughout the collection of data. To ensure that all skills were identically worded, a Water Sector Competency Framework with a Skills Bank was developed.

Skills Matrix: Each job title requires a unique set of skills which will be a subset of skills from the Water Sector Competency Framework. With the skills in the Competency Framework down one axis (the vertical axis) of a spreadsheet and all the job titles across the other axis (the horizontal axis), a skills matrix for all job titles in an institution is established. In other words, the skills matrix is deemed to be the predefined subsets of skills required per job title, or the demand for skills for a particular job title.

Skills Rating Scale: In order to work with numbers when determining the skills gap a rating scale is employed. The rating scale employed on this project is outlined in **Table 2**. If a skill is required for a job then the level of competence required from the rating scale is *full evidence of competence*. The demand for that skill is thus a score of five (5) which is entered against that skill in the Competency Framework.

Rating	Description	Description in the first person
1	No evidence of competence	I do not demonstrate competence in the skill. I require formal training and exposure in the workplace to the skill.
2	Some evidence of competence, needs further training and workplace exposure	I demonstrate part competence in the skill. I definitely need further formal training and further workplace exposure to the skill.
3	Evidence of competence, needs further training	I demonstrate competence in the skill but I need further formal training in the skill. I am at a lower level than the position requires.
4	Evidence of competence, needs more workplace exposure	I demonstrate competence and have relevant formal training in the skill. I need further workplace exposure to ensure improvement and full competence.
5	Full evidence of competence	I demonstrate full competence and have all the relevant formal training and workplace exposure to the skill.

Step B: The supply of skills in an institution was determined by surveying all technical staff. Technical staff were given a full list of skills (in the Competency Framework) to identify the skills they hold, and rated their competence in these skills using the rating system above. These self-assessments were then verified by line managers. If a line manager disagreed with the assessments, meetings were held between the individual, line manager, an expert in the subject (if necessary) and an HR representative to agree on a final rating.

Step C: The skills gap (in an individual) was derived by subtracting the supply of a skill from the demand for a skill.

Findings

What did the research find in relation to the research question?

The project faced several challenges that limited the findings, and it was not able to fully account for the skill levels in the public water sector. The project was not representative of the full public water sector as it was unable to secure participation from a wide variety and number of water sector institutions and largely drew findings from an analysis of 4 institutions. The web-based auditing tool could not be widely used due to slow internet connections at most institutions. It was suggested that the tool be re-coded so that it could be more widely adopted for continual and more widespread use.

The capacity gap analysis returned results for the CMA and the WSA (gaps of 44 and 58% respectively), but for the water board, the analysis returned a lower number of staff required than the water board actually had, leading the researchers to question the accuracy of this method when it is applied to a water board.

The results of the skills gap analysis can be requested from the researcher.

Reflections on the research

- A consistent, quantitative approach was used as we wanted to quantify the problem by way of generating numerical data that could consistently be gathered across the country so as to be transformed into useable statistics.
- A 50/50 mix of HR/Engineering in the research team made for a strong team. HR brought well established methods to the table regarding HR planning and skills audits. The engineers and scientists contributed empirical (i.e. based on experience) and content knowledge. Engineers also felt comfortable mainstreaming IT/database approaches to capture data using HR methods, and an analytical ability to draw out results from the mountain of data.

References

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Available at: <http://waterskills.co.za/index.php/survey>

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