

### **3.5 Study Period**

A study period of 5 years was used for assessing the water inorganic chemical quality status of surface water resources extending from the beginning of 1996 to the end of the year 2000. The median (the most commonly) observed concentration for each variable is used in comparison with the domestic and irrigation use guidelines.

### 3.6 Presentation of Results

Assessment of the water quality across South Africa is described in terms of fitness-for-use for domestic and irrigated agricultural use, and by means of the trophic status of selected impoundments. The results of the assessment of the water quality are depicted by means of maps and also in a tabular format.

Maps for the depiction of land cover and water quality across South Africa include:

- i) The Land Cover of South Africa (after Fairbanks *et al.*, 2000) which was detailed previously (Map 1);
- ii) A Maucha diagram map showing the salt balances at each of the national assessment sample sites (Map 4);
- iii) The Guideline Compliance Pie Diagrams for South Africa, with the constituent sets outlined in Section 2 above, for the national assessment sample site set (Map 5, 7 and 9); and
- iv) The Guideline Compliance Pie Diagrams for South Africa, with the constituent sets outlined in Section 2 above, for the “hot spot” sites (Maps 6, 8 and 10).

The Guideline Compliance Pie Diagrams (Figure 1) illustrate the median concentrations for each of the constituents depicted over the study period. Median constituent concentrations are depicted in a “pie wedge” that only projects beyond the circular “pie” when the concentration falls outside of the *Very Good* range in the case of the domestic use guidelines or the Target Water Quality Range (TWQR) in the case of the agriculture guidelines. If it does project beyond the *Very Good* (or TWQR) range then the colour and extent of the projection indicates the extent of exceedence of the median value.

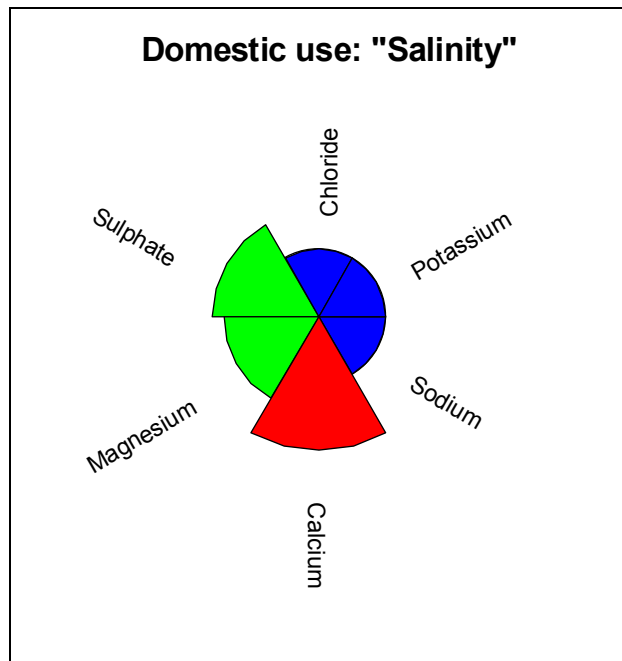


Figure 1 A typical compliance pie diagram for the fitness-for-use class Domestic Use: “Salinity”

Two sets of three Guideline Compliance Pie Diagram maps were produced for South Africa (Maps 5 to 10). The first set of three maps (Map 5, 7 and 9) represent the national assessment sample site set and the second set of three maps (Map 6, 8 and 10) represent the “hot spot” sites that were highlighted during the process of producing the maps for the individual Water Management Areas (WMAs). In order for the maps to be compared between the national assessment sample site and the “hot spots”, the latter follow on immediately from the former for each water user class reported. The water quality “hot spots” are those sample sites where water quality median values exceed the *Very Good* and *Good* guideline values for sites that may not be part of the national sample site set, but are on the individual WMA sample site sets.

The first four maps (Map 5 to Map 8) are for the comparison of the median water quality values evident with domestic use guidelines (DWAF, 1996a and WRC, 1998) – of:

- firstly,  $\text{NO}_3+\text{NO}_2$ ;  $\text{NH}_4$ ; pH; TDS; and F (the Domestic Use “Health” maps, Maps 5 and 6), and
- secondly, Na; Mg; K; Cl; Ca; and  $\text{SO}_4$  (the Domestic Use “Salinity” maps, Maps 7 and 8).

The Domestic Use results were split in to the two sets (“Health” and “Salinity”) on a largely arbitrary basis due to the limited space available for variables on the Guideline Compliance Pie Diagrams. All of the desired variables would not have fitted onto one symbol and still been easily legible.

The last two maps, Maps 9 and 10, considered certain constituents important to irrigated agriculture (SAR; Cl; EC; B; and pH) compared with their respective irrigation water use guidelines (DWAF, 1996b).

The assessment results are presented in a series of Maps and Tables. The symbols used in the assessment maps are referred to as Guideline Compliance Pie Diagrams (Figure 1) and illustrate the median concentrations for each of the constituents depicted over the study period. Median constituent concentrations are depicted in a “pie wedge” that only projects beyond the circular “pie” when the concentration falls outside of the *Very Good* range in the case of the domestic use guidelines or the Target Water Quality Range (TWQR) in the case of the agriculture guidelines. If it does project beyond the *Very Good* range, then the colour and extent of the projection indicates the extent of exceedence of the median value.

Information from the Trophic Status Project is also included in the report. The trophic status on a national scale of selected impoundments across South Africa, specifically those impoundments managed by DWAF is reflected in Table 4.7. Information is also given on a priority ranking for the 49 selected impoundments indicating the relative need for eutrophication management (Table 4.8).

#### **4. WATER QUALITY STATUS**

##### **4.1 Maucha diagrams**

The Maucha Diagram map (Map 4) provides an indication of the salt balances at the various national assessment sample site sets. To a large extent it provides an indication of the salt balances due to natural geology.

It can be seen that the Western Cape, Eastern Cape and KwaZulu Natal coasts are sodium chloride dominant – a legacy of their marine geology and proximity to the ocean. The more inland areas, including the Orange and Vaal WMAs have high alkalinity as represented by the high bicarbonate levels. The water in these regions is typically harder and has a pH above 7. It will not lather as well as water that is softer (for example, mountain water) and may also result in faster scaling of kettles and other water heaters and steam irons.

Map 4      Maucha diagram map showing salt balances for the national sample site set