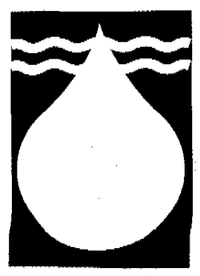
TROUBLE SHOOTING GUIDE FOR THE DOMESTIC CONSUMER

By Jenny-Lee de Fontaine

WRC Report No 963/1/00



Water Research Commission

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TROUBLE SHOOTING GUIDE FOR THE DOMESTIC CONSUMER

by

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EXECUTIVE SUMMARY

Motivation

Consumers in South Africa are becoming increasingly conscious about the quality of their drinking water. In urban areas, where consumers enjoy a well-developed water supply infrastructure, this trend is currently being amplified by media coverage of water quality related problems and aggressive marketing campaigns by bottled water and home treatment device companies. This is evidenced in the number and nature of queries received by water services providers from consumers. In rural areas with a limited water supply infrastructure, water quality will gradually become a topic of increased interest amongst consumers once the more fundamental problems of supply are addressed.

Given this scenario, it is vital that consumers are supplied with scientifically sound information about relevant water quality issues. This will allow informed decision making and allay many unfounded fears and perceptions about drinking water quality. What is needed is an educational tool (or tools) that addresses the water quality information needs of consumers in urban and rural areas in an easy to understand format.

Objectives

In order to meet the increased demand for water quality related information from consumers, this study aimed to achieve the following:

a.) to collect and collate consumer questions posed to drinking water suppliers and other affected parties about perceived problems that they may encounter with drinking water quality;

b.) to formulate answers to these frequently asked questions (FAQs) in an easily comprehensible format; and

c.) to propose different ways of presenting this information to both urban and rural populations.

Results and Conclusions

Urban Component of the Study

Consumer's FAQs about water quality in urban areas were collected and collated by surveying key persons in 17 Local Authorities in Rand Water's area of supply, 5 Water Boards and 7 Major Local Authorities in South Africa by questionnaire. The FAQs received by all respondents fell into 15 categories namely: colour; tastes and odours; white water; fluoride; hardness; home treatment systems; health; chlorine; worms; bottled water; iron; gardens and plants; perceived deterioration of water quality; chemical and microbiological content; and the comparison between municipal and borehole water.

When the FAQs were analysed according to the consumer's income group, those aspects that are readily perceivable by the primary senses (colour; tastes and odours; and white water) occurred at the highest levels across all income groups. There were fewer FAQs received from low-income consumers overall. In middle- and high-income groups health, hardness (linked to dishwashers) and home treatment device queries were also prominent. This is probably due to increased awareness due to media publicity, targeting by home treatment device salespersons, and the ability of these groups to afford dishwashers.

Analysing the data according to the type of water services organisation surveyed revealed that Water Boards receive more queries from consumers than either small or large Local Authorities. This could indicate that consumers regard these organisations as the best source of information, or perhaps that local authorities usually pass consumer queries onto Water Boards.

The answers to urban consumer's water quality related FAQs were consolidated into a Trouble Shooting Guide consisting of 20 question-and-answer Fact Sheets. Each Fact Sheet deals with a specific FAQ and details: the specific question, possible answers to the question, possible effects on the consumer

(including health, aesthetic and economic), and advice on what the consumer should do if the problem should arise.

Few local authorities currently produce water quality information for the consumer in the form of brochures or even yearly summaries. In contrast, 80% of the Water Boards surveyed do. This could be due to budget constraints, lack of knowledge or a lack of customer focus amongst the local authorities.

An analysis of the developments in dealing with consumer complaints planned in the various organisations showed that the majority had no suggestions or were satisfied with the current situation. Some did plan to develop a more customer-focused structure.

Improved communication with and education of the consumer was identified as the main way of improving customer care and various methods to achieve this were presented. The idea that customer care should be the responsibility of the bulk supplier was a prevailing belief. Local Authorities felt that the bulk supplier should be responsible for communication and education of consumers and officials in Local Authorities.

Water service providers need to accept that the provision of information regarding a service or product that they provide is an essential part of that service or product itself. Ways to improve customer focus, and consumer education and education need to explored and implemented in water service providers. Support and information transfer between water boards and local authorities need to be improved in this regard.

Rural Component of the Study

Because of the highly variable rural water supply landscape in South Africa, it was far more challenging to ascertain the water quality related FAQs that consumers in rural communities have. A small study was however conducted

within the constraints of the project scope and budget. A questionnaire-based survey was conducted among 10 organisations involved in rural water supply and sanitation programmes around the country. The respondents had experience in working with rural communities in the Eastern Cape, KwaZulu Natal, Mpumalanga, Gauteng, and Northern Province.

The rural communities among which the respondents had worked used a wide range of sources of drinking water. The FAQs were analysed according to the following categories of drinking water sources: rivers and dams; boreholes, wells and springs; standpipes and tankers; and a regulated water supply on the property. The FAQs across all water sources fell into 11 categories, namely: aesthetics; convenience of supply; funding; health; infrastructure; maintenance; metering; monitoring; payment; reliability of supply; and tradition and ownership. Clearly, rural consumers have queries about a broad range of water-related topics and not many about water quality.

Consumers with a regulated supply on their property had the least queries, indicating either satisfaction with the scheme, or a lack of problems. In contrast, those using groundwater sources had many varied queries. This is understandable from people using a communal and concentrated source. Users of rivers and dams had queries predominantly about infrastructure and funding and payment, as would be expected from consumers considering upgrading their water scheme. Consumers using standpipes and tankers had concerns about maintenance and payment as responsibility for these communal schemes are a topic of debate.

The only strictly water quality related FAQs received from rural consumers were those falling into the aesthetic, health and monitoring categories. The queries (especially those in the health category) revealed a need for education and training about fundamental issues such as disease, hygiene and water itself. They also highlighted beliefs that dismiss the role of water quality in disease. In

the light of these findings, it was clear that a simple question and answer type Trouble Shooting Guide would not be adequate or informative for rural consumers at this stage. More thorough water education and training programmes about water need to be designed (with local beliefs and traditions in mind) to raise the overall knowledge base.

Therefore, recommendations for the content of water-related education training programmes were compiled for use by all parties involved in the development of such programmes. These include topics under the headings of: What is Water and What is it Made Up Of; Water Treatment; Water Quality and Health; Basic Health and Hygiene Awareness; The Importance of Monitoring; and The Monitoring Process.

Water related education and training programmes using the recommended content need to be presented to rural communities in appropriate and effective formats if they are to be effective. The organisations surveyed had many suggestions regarding ways to communicate with rural consumers. As would be expected amongst communities with low literacy levels, verbal and interactive or pictorial means of communication stand out above written forms. Radio was the most frequently suggested avenue, followed by community workshops. Drama was also a popular choice. School children stood out as an important group for information dissemination via both talks by experts or more importantly the curriculum itself. The chosen format should be dictated by the community involved and the existing community structures and belief systems.

Achievements

The urban component of the study was largely successful in reaching the original objectives. The FAQs were collected from a large and fairly representative sample. A Trouble Shooting Guide in the form of 20 question-and-answer Fact Sheets was produced and is ready for use by consumers. The issue of how to better address consumer concerns about water quality was investigated

revealing a lack of existing resources amongst local authorities, and a lack of customer focus. The need for improved communication with and education of the consumer was revealed. Various suggestions in this regard were presented.
The rural study was far more challenging within the scope of this project's time and budget. As a result the rural component should be viewed as a pilot study and a springboard for future research. However it does give an indication of the range of FAQs existing in rural consumer groups and how they vary according to the water source being utilised. The data also reveal a need for basic education about water and water-related issues amongst these communities. Both the content of water education and training programmes and ways of conveying this information across were suggested.

Recommendations for Future Research and Technology

In the urban context, there is a need to investigate ways of improving customer focus amongst water services providers. Resources and methods of communicating with and educating the consumer in the water supply industry need to be researched and developed. The communication between water boards and local authorities (especially in the field of customer care) needs to be improved.

A more thorough investigation into the water related concerns of rural consumer's needs to be conducted. Education and training programmes about water and related issues need to be developed and implemented through appropriate channels.

ACKNOWLEDGMENTS

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Project Team

The efforts of the project team are greatly appreciated. In particular the author expresses her thanks to Ann Vicente for her assistance regarding water quality and her insight into customer care. Thanks also go to Cynthia Motau for her comments on the sociological aspects of rural communities.

Alheit du Toit's assistance with the statistical aspects of the study is truly appreciated.

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1 INTRODUCTION

1.1 Background

One of the most basic needs that people share around the world is the need for a good drinking water supply. The criteria of a good drinking water supply include factors related to water quantity and water quality. Water quantity variables include, amongst others, the affordability, reliability and convenience of the supply. Factors related to water quality refer to the aesthetic, physical, chemical and microbiological properties of the water.

Consumers are usually primarily concerned with water quantity related issues and water quality takes a back seat. Only once a supply has been established do consumers turn their attention to water quality. That is if water quality is questioned at all. It has recently been recognised, however, that consumers are becoming increasingly conscious of the quality of their drinking water supply.

This trend has been promoted by increased public awareness about the environment and media coverage of water related problems. Aggressive marketing campaigns for bottled water and home treatment devices by commercial companies have further fuelled consumer's concerns about water quality. Drinking water suppliers are receiving more water quality related questions from consumers who are becoming increasingly concerned about water quality even in the absence of any degradation in that quality.

In the face of this rising consumer consciousness, water services bodies need to revisit their relationship with their consumers. No longer can these bodies continue to determine their performance simply by whether water comes out the consumer's tap or not. The body's performance is increasingly influenced by the subjective perceptions that consumers have regarding water quality. Gaining and retaining the support of the consumer, who ultimately pays for their service, is essential to the success of any water services body. Water authorities and providers will have to acknowledge and respect the values and concerns of their consumers regarding their perceptions of risk pertaining to

water quality. The approach should be to understand, accept and fulfil consumer's needs.

The task of convincing consumers that the water is safe is becoming increasingly difficult, and requires efforts and programmes beyond those usually undertaken by water services bodies. Interaction and involvement with the consumer is vital to this task. These processes can only be successful if there is an understanding on both sides of the subject matter involved. To this end, the goal should be to use communications to develop an informed, reasonable and collaborative consumer.

Scientifically correct information about water quality related topics that are important to the consumer must be made available to the consumer. This information must be in a format that can be easily understood by the consumer, without detracting from the scientific integrity of such information. The information must also be disseminated through appropriate channels for maximum impact. Armed with facts about water quality, the consumer will be better able to make informed decisions, participate in meaningful debate and recognise myths and misinformation as they arise.

1.2 Study Objectives

This study was commissioned in order to explore consumer's information needs relating to drinking water quality in South Africa and to determine ways of best meeting these needs. The objectives of the study are:

a.) to collect and collate consumer questions posed to drinking water suppliers and other affected parties about perceived problems that they may encounter with drinking water quality;

b.) to formulate answers to these frequently asked questions (FAQs) in an easily comprehensible format; and

c.) to propose different ways of presenting this information to both urban and rural populations.

Consumers in urban and rural areas are exposed to vastly different levels of water supply and sanitation services. As a result, the water issues that are of importance to consumers in different areas may differ. Socio-economic factors may also influence the ways of communicating with urban and rural communities. In light of these considerations, the study explores the water quality information needs of urban and rural consumers separately.

2. WATER QUALITY AND THE CONSUMER

The questions that consumers ask about the quality of drinking water are sensitive to the level of access to potable water that they enjoy, and their relative awareness level about water quality issues. Consequently the information needs of different consumer groups may differ, as may the tools and channels used for information dissemination. Any information must be targeted to specific audience needs, concerns, preferences, and levels of knowledge (Glicker, 1992).

2.1 Urban Communities with Developed Infrastructure

For many years, drinking water in developed countries was considered the province of a small band of research scientists and a group of dedicated professionals in the water industry (Fawell and Miller, 1992). However, as environmental awareness has increased globally, so has public concern about water quality. The increasing study of environmental problems, heightened awareness of these problems because of the information explosion and public concern about pollution have magnified people's concern about the quality of drinking water. Sales campaigns for home filters and bottled water have only added to public concerns – even in the absence of any degradation of water quality (Yoo, 1987; Glicker, 1992). Even otherwise well-educated doctors are not averse to spreading an unsubstantiated rumor that some stomach complaint is due to a "bug in the water". Additionally, consumers are also becoming more water quality conscious as the issue of the supply of water no longer presents a problem (Glicker, 1992).

The water industry is becoming increasingly demand-driven in developed countries. And like other demand-led utilities, water utilities have a body of customers who are more knowledgeable of the market in which the utility operates, better informed as to what the utility does and how it should do it, and more exacting in their demands that their expectations be met (Devlin *et al*, 1997). Overall, the consumer in these communities is now a quality conscious consumer. Indications are that consumers living in areas of South Africa that receive first world water supply and sanitation services have

concerns about drinking water quality much in line with those of consumers in other developed countries (Lubout, 1996).

In such a climate, it has been suggested that water utilities be proactive, in providing information about tap water quality to consumers (Yoo, 1987; Glicker, 1992). This approach would enable consumers to make informed decisions about water quality issues, and counter some of the misinformation that is supplied by parties with varied and vested interests. A range of public relations tools such as brochures, newsletters, meetings with the media, account inserts, and education packages for schools, could be employed for this purpose. (Miller and Leiby, 1990) These information products may include information about water supply, new facilities, answers to frequently asked questions, or special alerts (Yoo, 1987, Glicker, 1992).

Furthermore, to counter the distrust of the water supply industry, it is important that the basis of standards or guidelines for both microbiological and chemical parameters is absolutely clear and scientifically defensible, since these are the yardsticks against which quality and safety will be judged. It is also important that the public is given some understanding of the comparative risks involved and that a proper balance is struck between maintaining microbiological quality and achieving chemical standards, especially for disinfection by-products. Without this, the demand for more stringent standards in a search for absolute safety will result in more costly water, while standards approach the unachievable (Fawell and Miller, 1992).

Communication with the public should ideally be an ongoing, two-way dialogue. This dialogue can be accomplished using multiple sources of credible information, such as health agencies, regulatory agencies, and other perceived independent experts or trusted community leaders (Glicker, 1992).

2.2 Rural Communities with Limited Infrastructure

The number and proportion of people in the world without access to adequate water and sanitation services remains very high. An estimated 2 million people die and several billions become sick each year because of inadequate water and sanitation facilities (Cross, 1996). South Africa also faces a backlog of service provision of considerable proportions. It is estimated that more than 12 million people do not have access to an adequate supply of potable water, nearly 21 million lack basic sanitation (DWAF, 1994).

In areas where a first world supply of water is not a reality, the needs and concerns of consumers lean more towards issues of water supply than water quality. The need for a reliable, affordable and equitable supply of water has been paramount in such communities. However, a recent study conducted in South Africa noted, as a gratifying new trend, the emerging awareness of the need for the maintenance of water quality. The communities highlighted the need for attention to the specific actions that would promote water purification at village level and could improve basic access to sanitation and awareness about the importance of health and hygiene practices related to water, sanitation and waste management in the home (Schoeman and Pybus, 1996).

A strong sentiment has also been expressed by these communities that communications should be addressed as an essential requisite of water and sanitation related development. There is a need for two-way communication and information exchange from local to national level (Schoeman and Pybus, 1996).

South Africa, a country of contradictions and extremes, with its mix of developed and developing areas presents a challenge when attempting to develop "A Guide" for domestic consumers. Clearly one single guide will not be practical, but rather a range of tools tailor-made for different communities based on their needs, and in a format that is clearly understandable to them. The approach taken for this project is to assess the needs of consumers in both developed and developing areas. The information tools and

recommended means of presentation will depend on the nature of these needs and the level of understanding of issues pertaining to water quality.

3 URBAN COMPONENT OF THE STUDY

3.1 Frequently Asked Questions (FAQs)

3.1.1 Materials and Methods

In the urban areas of South Africa that enjoy a well-developed water supply, the water supply sector is fairly well organised and formalised. Those bodies involved in water supply can be classed as Water Services Providers and Water Services Authorities according to the Water Services Act of 1997 (DWAF). Water Services Providers include bodies involved in the work of water and sanitation service provision (such as water boards). Water Services Authorities are those bodies that have the responsibility of providing water services to customers and consumers (typically local government structures). Sometimes, a water services body can fulfil the role of both Water Services Provider and Water Services Authority, as is the case with certain of the large local authorities around the country.

The existence of this formalised network of water services bodies offers a good opportunity of assessing the questions that urban consumers have regarding water quality by means of a questionnaire-based survey. A questionnaire was compiled by personnel at Rand Water with extensive experience in the field of water science. This questionnaire was sent to key persons in various water services bodies by facsimile or post, with follow up telephone calls to confirm delivery. The key persons were selected on the basis that they were involved in regular communication with consumers about water quality issues. The questionnaire was sent to 43 water services bodies in total, and 67% of those bodies surveyed responded. The sample breakdown is shown in Table 1.

Table 1: Urban study sample breakdown.

Type of Water Services Body	Number of Bodies Surveyed	Number of Respondents	Reply Percentage (%)
Local Authorities in Rand Water's Area of Supply	30	17	57
Water Boards in South Africa	6	5	83
Major Local Authorities in South Africa	7	7	100
Total	**43**	**29**	**67**

The concentration of bodies around Rand Water's area of supply (the Gauteng area) should be considered in the context that approximately 50% of South Africa's urban communities are located in Gauteng.

The questionnaire was divided into three components:

Supply statistics – dealing with basic information such as area involved, number of people supplied and chlorination;

Handling of queries/complaints – to ascertain how consumer's concerns are dealt with; and

Types of queries received – the actual frequently asked questions (FAQs) received from consumers in low, middle and high-income groups regarding water quality related issues.

The first two sections were included merely for background purposes and recipients were informed that answers to questions in these sections would not be released to the public. The third section was needed to compile a database of the FAQs received by the surveyed organisations. This section asked the respondent to list the FAQs by consumers about the quality of their tap water under the headings:

- Queries from consumers living in predominantly rural areas
- Queries from consumers living in low income urban areas
- Queries from consumers living in middle income urban areas
- Queries from consumers living in high income urban areas

The respondents were also asked whether the queries received were categorised according to the nature of the complaint, and whether any statistics regarding the FAQs were available.

The questionnaire, although structured, consisted mainly of open-ended questions. The data obtained was therefore categorised into meaningful categories such as "health related queries" and "chlorine related queries". Only descriptive statistics were executed due to the fact that the sample size was relatively small. The descriptive statistics consisted of frequencies for the total group of water services bodies that participated in the survey, as well as cross tabulations. The cross tabulations analysed the differences between the three types of participating water services bodies: Local Authorities in Rand Water's Area of Supply, Major Local Authorities in South Africa and Water Boards in South Africa. Statistical analyses were performed using the "SPSS" (Statistics for Social Sciences) programme.

It should be noted that, in line with the scope of this project, only those FAQs related to water quality, or those FAQs perceived by consumers to be related to water quality were analysed and reported. Furthermore, the queries received from rural consumers were not used, the formalised urban water services bodies not being an appropriate group to use to assess rural consumer's information needs. The concerns of rural consumers were later surveyed separately and are reported under Section 4 of this report.

The results of the data analyses were interpreted in close consultation with the original survey responses to ensure that all issues related to each category of FAQs were addressed.

3.1.2 Results and Discussion

The 67% reply rate is considered a good level in terms of a questionnaire-based study. In hindsight, the questionnaire could have been less open ended to avoid subjectivity in interpreting the results.

Despite the fact that the questionnaire specifically asked the participants to list water quality related FAQs, many respondents included other types of FAQs. These included queries about upgrading current water supply system, payment queries, pressure problems, meter readings, and reliability of the supply. These types of queries were received from low income groups more frequently than from middle or high-income groups. Once again it is stressed that in keeping with the objectives of the study, only the water quality related queries were analysed and addressed.

All the water quality related FAQs could be grouped into 15 categories, namely:

- Colour;
- Tastes and odours;
- White water;
- Fluoride;
- Hardness;
- Home treatment systems;
- Health;
- Chlorine;
- Worms;
- Bottled water;
- Iron;

- Gardens and plants;
- Perceived deterioration of water quality;
- Chemical and microbiological content; and
- Comparison of municipal and borehole water quality.

a.) Water Quality Related FAQs Received from Consumers Living in Low, Middle and High Income Groups in All Types of Water Services Bodies Surveyed

When the data were analysed according to the income group of the consumer, some interesting patterns emerged (Figures 1 – 3).

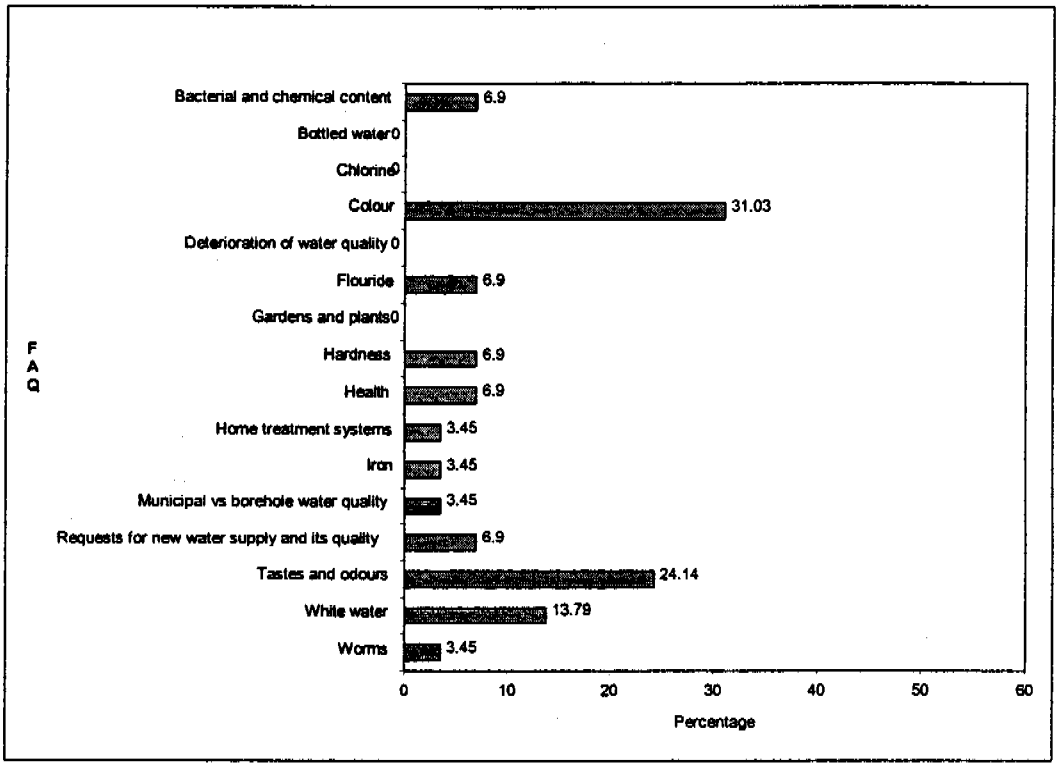

Figure 1: Water Quality Related FAQs from Low Income Consumers received by All Types of Water Supply Organisations

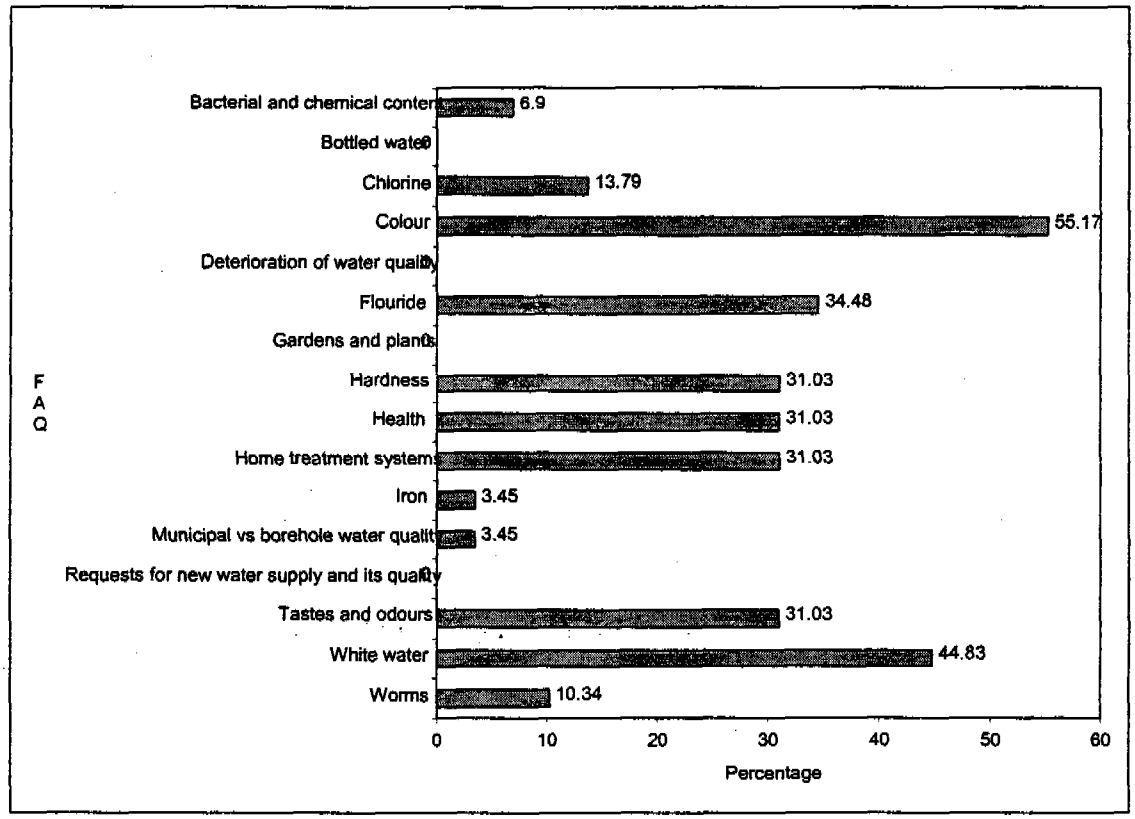

Figure 2: Water Quality Related FAQs from Middle Income Consumers received by All Types of Water Supply Organisations

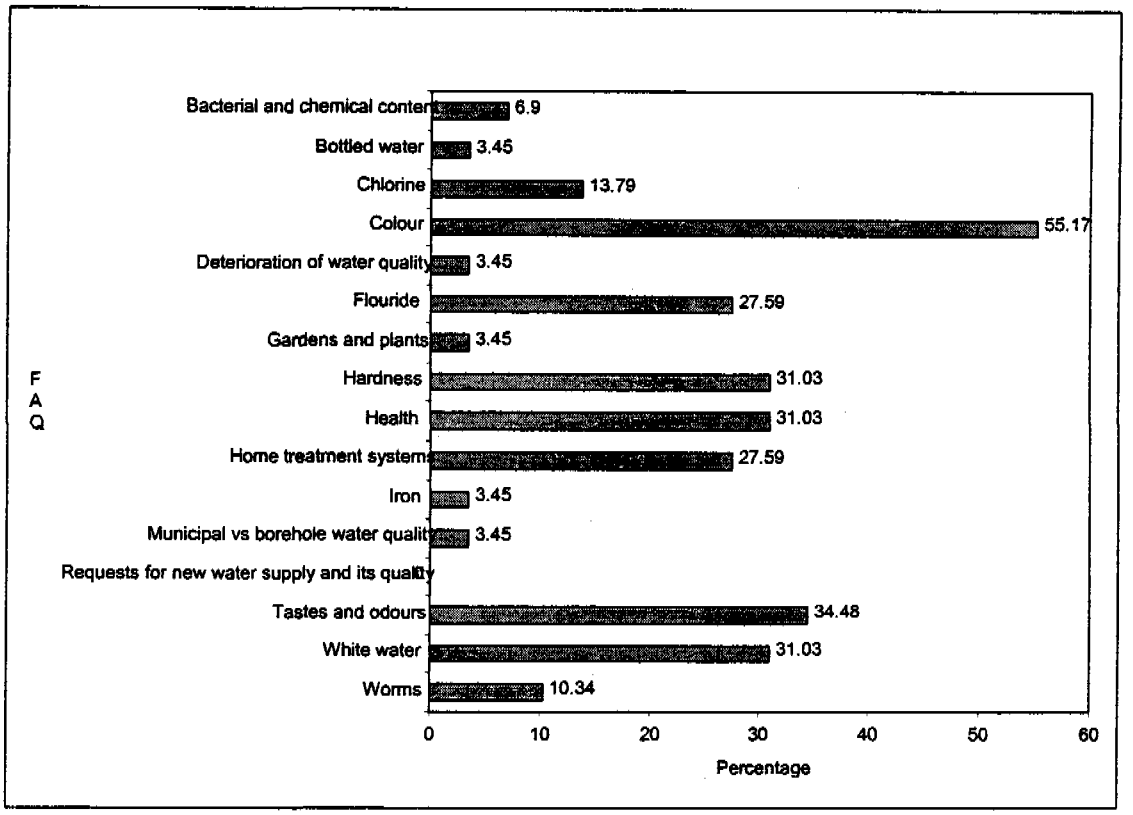

Figure 3: Water Quality Related FAQs from High Income Consumers received by All Types of Water Supply Organisations

Overall there is clearly a lower level of water quality related FAQs that come from low-income consumers than either middle or high-income consumers. This could be due to a lower level of awareness of water quality issues amongst this group. Salespersons marketing expensive home treatment devices may not target the low-income group as intensely as the middle and high-income earners, which would contribute to lower awareness levels. Additionally, although they are not dealt with in this study, there were also more non water quality related FAQs received form low-income consumers, regarding topics such as reliability of their supply, pressure problems and requests for upgrades of their water scheme. This may indicate that water quality is perhaps not as much of a priority amongst the low-income group than the middle and high-income groups, who already enjoy reliable and advanced supply schemes. This would be in line with the view that water quality concerns only really emerge once more basic needs have been met (Glicker, 1992).

What stands out across all income groups is that the most frequently received FAQs are related to aspects that consumers can readily perceive via their primary senses, namely Colour, Tastes and Odours and White Water, the most common all FAQs being related to Colour.

A second cluster of FAQs includes those related to Health, Hardness and Home Treatment Devices. This cluster does not appear very prominently in the low -income group. It is suggested that the high levels of Health and Home Treatment FAQs are the result of marketing efforts of home treatment devices and publicity in the media raising consumer awareness about water quality aspects beyond those that the consumer can perceive first hand. Hardness queries are most often related to dishwasher use and it is therefore understandable that this issue

feature so strongly in middle and high income groups were these appliances can be afforded.

Another issue that is high on the list of consumer concerns is the fluoride issue, particularly in middle and high-income groups. This is probably due to awareness amongst these groups of the ongoing legislative process regarding fluoridation of the countries drinking supplies.

b.) Water Quality Related FAQs Queries received by Different Water Services Bodies

The data were analysed according to the type of organisation in order to determine whether consumers directed different types FAQs to different types of organisations. This could indicate different roles that the various organisations play in the communication process.

When looking at the water quality related FAQs received form all income groups by Local authorities in Rand Water's area of supply (Figure 4), Major local authorities in South Africa (Figure 5) and Water Boards in South Africa (Figure 6), a rather different pattern emerges to the one observed when the data were analysed according to income group.

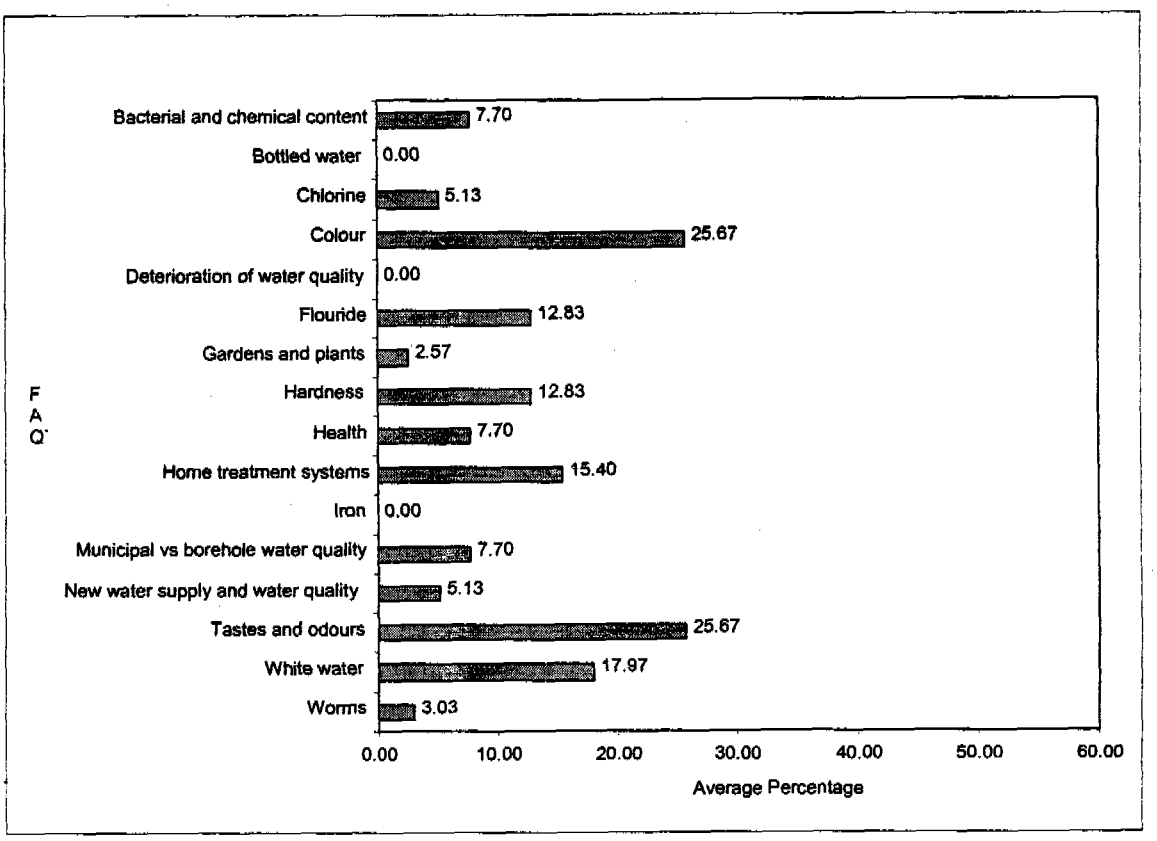

Figure 4: Average Percentage of Water Quality Related FAQs from All Consumer Income Groups as Received by Local Authorities in Rand Water's Area of Supply

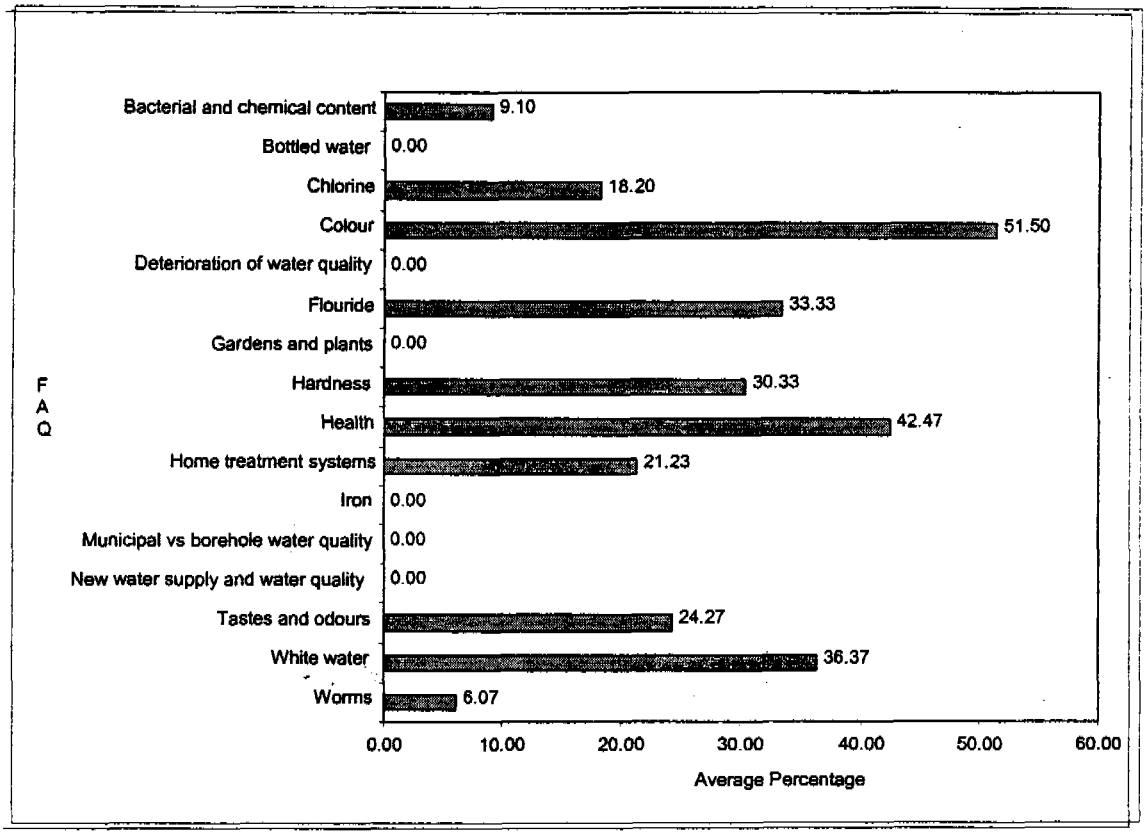

Figure 5: Average Percentage of Water Quality Related FAQs from All Consumer Income Groups as Received by Major Local Authorities in South Africa.

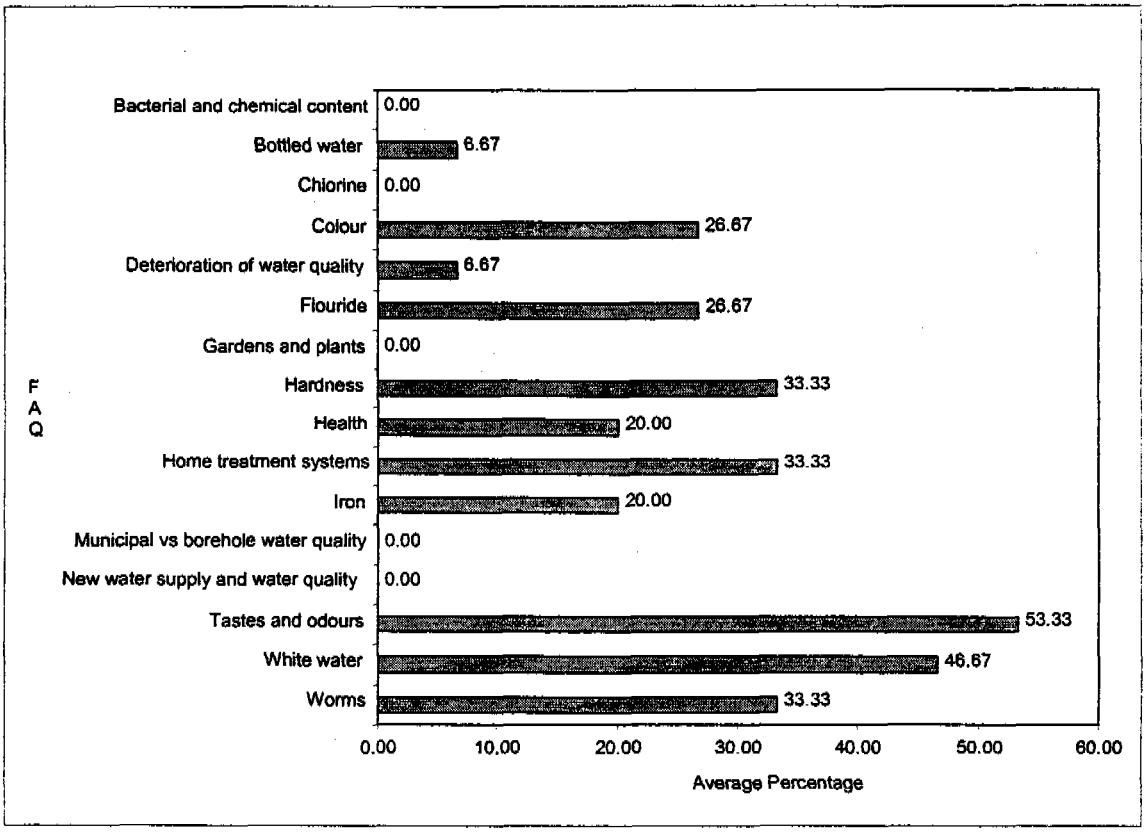

Figure 6: Average Percentage of Water Quality Related FAQs from All Consumer Income Groups as Received by Water Boards in South Africa.

Overall, there is a lower frequency of FAQs received by local authorities in Rand Water's area of supply than by Major Local Authorities or Water Boards across the country. This may indicate that the Local Authorities tend to direct consumer's queries to bulk water suppliers. Alternatively, consumers for whatever reason may view the bulk suppliers as primary information sources for water quality related queries.

Local Authorities in Rand Water's area of supply appear to receive a low level of a wide range of FAQs compared to Major Local Authorities and Water Boards that receive more FAQs from fewer categories. This may indicate a perception that Major Local Authorities and Water Boards are somewhat more specialised or expert on certain water topics than small Local Authorities.

c.) Individual Questions included in FAQ Categories.

Each water quality related FAQ category (as used in Figures 1 – 6) was composed out of various individual and more specific queries as received by the surveyed organisations. These are outlined below to provide more depth of understanding of consumer's concerns.

Colour

FAQs in the colour category included many queries about dirty, brown or reddish coloured water. These were reported to proliferate after pipebursts and were due to soil entering the system. Other colour problems could be caused by the rusting of pipes, the presence of tannins and high iron levels in different areas of the country.

Tastes and Odours

Tastes and odours were grouped into one category due to the fact that it is very difficult to differentiate between the two. It is known that the majority of what we consider to be taste is actually smell. Consumers asked rather general questions such as: "Why does my water taste/smell funny?" These queries could be due to volatile compounds

such as chlorine, geosmin, or sulphur compounds. Hardness can also be the culprit, especially in the Eastern Cape were consumers are accustomed to the softer waters of the coast. Some respondents indicated that taste and odour queries increase at certain times of the year, especially in summer. These tastes and odours could be due to a seasonal algal phenomenon, or simply due to the volatilisation of odour forming compounds at the higher summer temperatures.

White water

White water, a harmless phenomenon caused predominantly by air bubbles, was a complaint common to all groups and areas. Other causes of white water could be a high level of lime from the treatment plant that could cause white sediment to form.

Fluoride

The high level of FAQs related to fluoride illustrate increased awareness caused by the publicity that the artificial fluoridation of drinking water has received in the popular media. Consumers wanted to know if fluoride was being added to the water, and whether they needed to supplement their diet.

Hardness

FAQs regarding hardness are generally related to dishwashers and how much salt should be added to these machines. Other hardness FAQs were about scale formation in kettles and steam irons.

Chlorine

Consumers also wanted to know if chlorine was added to their water, and what the levels were. Residual chlorine problems included skin irritations, hair discoloration and taste and odour.

Home treatment systems

FAQs regarding home treatment options highlight the effectiveness in the marketing campaigns of the manufacturers of these products.

Consumers wanted to establish whether home treatment was necessary and whether it would really improve water quality. Many wished to follow up claims and allegations presented by home treatment system sales people.

Health

Health related queries included general concerns about whether the water was safe to drink. Consumers also wanted to know if the water was responsible for specific illnesses being experienced by themselves or their family. These usually included stomach upsets and skin irritations. Additionally, some consumers were concerned about waterborne diseases such as Cholera.

Worms

Worms found in water were Chironimad larvae (bloodworms), which do not pose a health threat, but which were obviously not aesthetically acceptable and a cause for great anxiety for consumers.

Bottled water

Consumers wish to know whether they should drink bottled water. This indicates a lack of confidence in the quality of their piped water supply or a belief that bottled water is a superior product.

Iron

Respondents didn't clarify what iron-related problems formed the basis of "iron issues". However, they most probably include colour, taste, and staining of laundry.

Garden and plants

FAQs in this category concerned whether the drinking water was safe for using on the garden. Additionally, consumers wanted to know why their plants were dying.

Deterioration of water quality

Certain consumers expressed concern about a perceived deterioration in the quality of their drinking water in recent times. This perception is usually linked to deterioration in other services supplied by local authorities.

Bacterial and chemical content

Some consumers requested specific details of the microbiological and chemical content of the drinking water supply.

Municipal Vs borehole water quality

People wanted to know whether borehole water was "better" than municipal water.

Requests for new water supply and its quality

Consumers from low-income groups wanted to know if they could get a new water supply scheme, and if they could, what the quality of the water would be.

3.2 Answers to FAQs

3.2.1 Materials and Methods

Once the FAQs were determined as discussed in the previous section, answers to these questions were researched. In keeping with the scope of the project, only answers for the FAQs related to water quality were compiled. These answers were based on available literature and personal communications with water scientists. The answers were drafted in a style that would be readily understandable to the consumer groups involved. They are therefore not intended to be technical references, but rather technically correct communications for the average consumer in the urban areas of South Africa.

3.2.2 Results and Discussion

The answers to the water quality related FAQs were synthesised into a tabular layout to facilitate ease of use as a Trouble Shooting Guide (Table 2). This takes the form of a series of 20 Fact Sheets, each pertaining to one FAQ. Each Fact Sheet includes the following information:

- The Question;
- Possible Answers;
- Possible Effects (including health, aesthetic and economic); and
- Advice on what the consumer should do if the problem should arise.

The Fact Sheets are written in English, but could obviously be translated into other languages that are prevalent and preferred in local consumer communities. Care should be taken that in the translation process no distortions of facts, style and tone of the contents occur. For further information on the issues covered in Table 2, the reader is referred to the references listed in Appendix 1.

Table 2: Trouble Shooting Guide for the Urban Consumer

1. Why is my drinking water milky or white in colour?		
Possible Answers	**Possible Effects**	**What should I do?**
Stand a glass of the water on a surface and watch it closely. If the white colour clears from the bottom up, it is caused by very small bubbles of air. The air is usually dissolved in the water under high pressure but when you open the tap, the pressure is released and the air bubbles to the surface. This is much like when you open a fizzy cooldrink!	This is a totally harmless phenomenon.	If you wish, let the water stand until it clears.
Stand a glass of the water on a surface and observe it closely. If the water clears from the top down and a white substance settles out on the bottom of the glass, there may an excess of some type of mineral or chemical (such as calcium or zinc) in the water.	This should not normally happen in a well-regulated water supply system. Depending on what the substance is, it may or may not be harmful, but it does indicate a problem that must be attended to by your local authority or water provider.	Contact your local authority or water provider immediately and inform them of the problem. Ask them to identify the substance and advise you on what you need to do.

2. Why is my drinking water a reddish-brown colour?

Possible Answers	Possible Effects	What should I do?
The pipes leading to your home or the pipes in your home may be rusting. Your geyser may also be rusting. The rust collects in the pipes when water is not being used and is then flushed out when you open the tap.	Rust is basically iron oxide, a reddish brown substance formed when iron metal is exposed to water and air. Apart from causing discoloration of the water, iron oxide can stain laundry and impart a metallic taste to the water. (Caution: Acute poisoning in babies and children can occur after exposure to massive amounts of iron. A chronic form of poisoning called haemochromotosis can develop after years of regular intake of high iron concentrations.)	Let the water run until it clears. Use the "rusty" water to water your plants. If the problem is excessive, consider repairing or replacing the rusting pipes or geyser.
Iron may be dissolved in the water. When it is exposed to air as you open the tap, it turns a reddish brown colour.	The main effects of elevated iron concentrations are discoloration of the water, staining of laundry and a metallic taste. Iron is an essential nutrient for the human body and should not cause health problems at the concentrations normally found in drinking water supplies. (Caution: Acute poisoning in babies and children can occur after exposure to massive amounts of iron. A chronic form of poisoning called haemochromotosis can develop after years of regular intake of high iron concentrations	Contact you local authority or water provider and ask to have your drinking water tested. Make sure you are given the test results and an interpretation of what they mean.
Your water may contain harmless brown substances called humic compounds. These come from decomposing plant matter. They are picked up as river water flows over leaves and roots of plants (similar to the way water changes colour when tealeaves are added to it!). This phenomenon is prevalent in the Eastern and Western Cape areas where humic substances come from the fynbos vegetation.	These substances are totally harmless. They may however cause staining of laundry. There is currently a debate amongst scientists as to whether humic compounds may be involved in the formation of chlorine disinfection by-products (see question 15).	Ask you local authority or water provider what is being planned to remove the colour from the drinking water, and if there is anything you can do to remove the colour once the water reaches your home.

3. Why is my drinking water dirty or muddy?

Possible Answers	Possible Effects	What should I do?
A muddy appearance could be due to soil or sand that entered the pipes supplying your home during a pipeburst, repairs or maintenance operations.	Sometimes microorganisms grow around the particles of soil and these microorganisms may pose a health threat.	Allow the water to run until it clears. Use the muddy water to water your plants. If the problem persists, contact your local authority or water provider to check the pipes and flush them out if necessary.

4. Why does my drinking water smell or taste strange?

Possible Answers	Possible Effects	What should I do?
A disinfectant-like smell or taste (like that found in public swimming pools) is caused by a substance called chlorine. Chlorine is added to drinking water as a disinfectant to kill microorganisms, particularly those that could cause waterborne diseases.	When chlorine is used for disinfection, it can react with other substances in the water to form disinfection by-products (DBPs). Animal research involving high levels of DBPs found increased formation of cancer, however the reason for this is not known. Research into the relationship between DBPs, cancer and other health risks is ongoing. Chlorine has been used as a disinfectant since the late nineteenth century and has virtually wiped out instances of waterborne diseases like typhoid fever, cholera and dysentery in those areas where it is used. The risks of epidemics of waterborne diseases in the absence of chlorinaton far outweigh the risks associated with the possible cancer causing effects of chlorination by-products. However, obviously everything possible should be done to minimise both risks.	Let the water stand for a few hours or stir it vigorously to release the chlorine into the air. Chilling the water may also help because tastes and odours are less noticeable at low temperatures. Chlorine can also be removed using carbon filters that are commercially available. If the smell is very strong (more strong than usual) contact local authority of water provider.
An earthy or musty taste or odour is usually caused by a harmless substance called geosmin. Algae (tiny water plants) in rivers and dams produce this at certain times of the year, usually during summer months.	The substance is harmless. But it does have a strong smell that the human nose is very sensitive to. You could detect 1 teaspoonful of geosmin in 200 Olympic sized swimming pools!	The smell can be removed by carbon filters that are commercially available.
A rotten egg smell or taste comes from sulphur-containing substances formed by various types of bacteria and fungi. These organisms can be present in certain rivers and dams and some (sulphur reducing bacteria) can be found in some water supply pipes where they can cause corrosion of the inside surface of the pipe.	The smell is probably due to a gas called hydrogen sulphide (H_2S). The human nose can detect very low levels of this gas. Most often a faint smell of rotten eggs does not indicate levels that would be harmful. However, high levels this gas is toxic and should not be inhaled.	If you notice a sudden strong smell of rotten eggs in your drinking water, close the tap and evacuate the room. Go outside and breathe in lots of fresh air. Inform your local authority or water provider immediately.

A mineral taste (salty or bitter or metallic) can be caused by a variety of dissolved mineral salts in the water. These minerals occur naturally and come from the rocks, soils and vegetation that water flows over or through. Some are also introduced to drinking water when it is purified. The levels of minerals in drinking water vary from area to area.	Minerals are important for maintaining a healthy body. However they should be consumed in the correct amounts. If your intake is too low this could lead to deficiency illnesses. If you consume too much this could also lead to illness. For example too little calcium leads to problems with bones, but too much calcium can contribute to kidney stone formation in sensitive individuals. In a well-regulated supply, the levels of minerals in the water should not be harmful.	If you experience sudden change in the taste of your drinking water, contact you local authority or water provider.

5. How hard is my drinking water?

Possible Answers	Possible Effects	What should I do?
The hardness of water refers to the sum of the concentrations of two harmless minerals: calcium and magnesium. The greater the concentration of these minerals, the harder the water. The hardness of drinking water around South Africa varies depending on the rocks and soils of the area that the water comes from, and the treatment process used by the water provider.	Hard water is healthy to drink because it provides high levels of minerals, but can cause other problems. It forms scums and is difficult to lather making washing difficult. It can also form scale deposits in pipes and hot water appliances like kettles. Hard water may also change the taste of water, especially for brewing tea and coffee. Soft water is better for washing, but has been linked to heart disease. It can also corrode pipes and appliances.	Contact your local authority or water provider to find out the hardness of your drinking water supply. Most South African water providers quote water hardness as mg/l$CaCO_3$. Water with a level of calcium carbonate over 80-100mg/l is considered "hard". Water with less than 100 mg/l $CaCO_3$ is generally labelled "soft". Hardness can also be expressed in a number of ways including mg/l $CaCO_3$, ppm $CaCO_3$, mmol/l alkaline earth metals, German Degrees Hardness, or French Degrees Hardness.

6. How much salt should I add to my dishwasher?

Possible Answers	Possible Effects	What should I do?
Dishwashers contain water softeners that are systems that replace the harmless hardness minerals of calcium and magnesium with sodium. The water softener system must be periodically recharged with a salt solution. The amount of salt that should be added depends on the make and model of your machine as well as the hardness of the drinking water supply in your area. The harder the water, the more salt you need to add to your machine to soften the water.	Soft water is easier to wash with than hard water because it forms a good lather. However, the sodium that is used to soften water is believed to cause high blood pressure in some people. Softened water should therefore only be used for washing and not for drinking.	Contact your local authority or water provider to find out the hardness of your drinking water supply. Remember the water is "hard" if it contains over 100mg/l $CaCO_3$, and "soft" if it contains less than 100 mg/l $CaCO_3$. Consult your dishwashing machine manufacturer's guidelines and dose your machine with salt accordingly. You may need to convert mg/l $CaCO_3$ into the units used in you dishwasher manufacturer's manual. If so use the following: 1mg/l $CaCO_3$ = 0.056 German Degrees; 1mg/l $CaCO_3$ = 0.10 French Degrees; 1mg/l $CaCO_3$ = 0.01 mmol/l alkaline earth ions.

7. Why is there a white substance collecting in my kettle or on the plate of my steam iron?

Possible Answers	Possible Effects	What should I do?
Why is there a white substance collecting in my kettle, or on the plate of my steam iron?	Minerals such as calcium and magnesium that are dissolved in your drinking water tend to settle out when water is heated and evaporates. These minerals are white and accumulate in hot water devices such as kettles, steam irons and showerheads.	These deposits of minerals are harmless, but can affect the functioning of the appliance being utilised.

8. Is fluoride added to my water?

Possible Answers	Possible Effects	What should I do?
No, not yet. The fluoridation of drinking water is still a hotly debated topic in South Africa. Indeed this debate has been raging around the world since the 1950's. Fluoride is currently added to certain drinking water supplies in the UK, US and Canada as a cost-effective way to prevent dental cavities. However, this practice has been rejected in 13 European Union countries. The Department of Health and various medical and dental organisations are driving the campaign to have fluoride added to water supplies in South Africa. However, some water supply organisations and directorates of the Department of Water Affairs and Forestry in South Africa have expressed caution about the concept as it is difficult to control fluoride levels when interbasin transfer schemes are involved, and because of the unknown medical and environmental impact. The Department of Agriculture is similarly opposed to fluoridation due to possible effects on crop growth. Fluoridation is also fiercely opposed by some groups who view it as mass medication and opposed to the individual's right of choice.	Fluoride is an essential trace element of a normal diet. It occurs in water and food. As with many chemicals, fluoride can be helpful in certain amounts, but harmful if it exceeds certain levels. Fluoride is needed in trace amounts during tooth formation to harden tooth enamel. It also protects teeth against cavities by increasing the resistance of tooth enamel to the acids produces by bacterial plaques. There is also some evidence that long term consumption of water borne fluoride may prevent the development of osteoporosis. However, at high levels, fluoride is toxic and can lead to a range of harmful health effects. Dental fluorosis can occur where teeth become mottled and stained. Furthermore, long term high intakes of fluoride can damage the skeleton, causing brittle bones, fractures and crippling. It has also been suggested that excessive fluoride intake can cause heart, kidney, thyroid and immune system problems. Because fluoride accumulates in the body over time (even when the levels are low), it may be linked to cancer. However the World Health Organisation has not found any evidence to link fluoride and cancer in humans. .	You need to make up your own mind about this issue, based on facts and not purely emotion. Be aware of the debate and voice your opinions if you like. Also be aware that there are alternatives to fluoridation of water. Fluoridated toothpastes and salts are widely available, and you could use fluoride tablets to treat your own water. There are also fluoride supplements that could be used if necessary. These are more expensive options.

9. How much fluoride is in my drinking water? Is there enough or do I need use a supplement?

Possible Answers	Possible Effects	What should I do?
The amount of fluoride in drinking water varies from area to area depending on the levels of fluoride that naturally occur in the soils. The levels also vary with the seasons. The World Health Organisation recommends that the optimal level of fluoride in drinking water should be in the range of 0.5 – 1.0 mg F / l in order to maximise protection against dental cavities and minimise health risks. The required levels of fluoride is estimated as at approximately 0.1 – 0.5 mg F / day for children younger than 6 months old, while for adults the range is about 0.7mg F / day.	As outlined in question 8, fluoride is helpful in low levels in the prevention of dental cavities, but is toxic at high levels. Therefore the levels of fluoride in drinking water supplies need to be very carefully controlled. The climate of an area will affect the amount of fluoride added to drinking water for instance, where the temperature is high, people will consume more water, so lower levels of fluoride need to be maintained in the water supply (0.5mgF/l). Other factors such as age, lifestyle and diet affect a persons overall daily intake and utilisation of fluoride, making it difficult to give a "correct" fluoride level for everyone.	Contact your local authority or water provider to find out the level of fluoride in your drinking water. Discuss fluoride supplementation with your doctor or dentist.

10. Is my drinking water harmful?

Possible Answers	Possible Effects	What should I do?
It is obviously impossible to give one definitive answer for a country as large as South Africa and with so many different sources of drinking water and treatment processes. However if the water supply meets the latest South African Bureau of Standards specifications for drinking water quality, which are in line with World Health Organisation standards the water should be safe. The water supplies of most of the large towns and cities in South Africa do meet these specifications, and it is usually only the smaller water supply systems that have problems in this regard.	Water can basically be harmful in two ways. Firstly it can pose the threat of disease due to the presence of pathogenic (disease-causing) organisms in the water. Secondly it can hold a risk of chemical-related illnesses due to the presence of dissolved substance in the water. In areas with a well-developed water supply and sanitation system, where drinking water is properly disinfected and wastewater (sewage) is effectively removed and treated, water related diseases are rare. Fortunately, the chemical substances that are naturally dissolved in water normally occur at concentrations that are very low and therefore should not pose a health threat. However there are some chemicals used in agriculture, industry and the home that find their way into water sources and occur at levels that are potentially harmful.	Ask your local authority or water provider about the specifications that they use as guidelines for treating your drinking water. Find out how often they test the quality of the drinking water supply and if you can get the results of these tests. If you have concerns that can't be resolved at the local level, the Department of Water Affairs and Forestry (DWAF) is the authority responsible for water related issues in the country.

11. Can my drinking water cause specific illnesses such as stomach upsets or waterborne diseases?

Possible Answers	Possible Effects	What should I do?
In a properly managed drinking water system, disease-causing organisms (called pathogens or germs) should not be present in your drinking water. A water purification process is designed to remove large numbers of germs through processes such as filtration. Furthermore, to ensure that drinking water quality specifications are met, a final disinfection step is used in which chlorine or other disinfectants such as ozone or ultra-violet light are used to destroy any remaining germs.	There are many diseases caused by waterborne germs. These include, amongst others, cholera, typhoid fever, infectious hepatitis, dysentery, diarrhoea, gastro-enteritis, cryptosporidiosis, giardiasis, and bilharzia. These conditions can be very serious. Most germs should be destroyed during the disinfection stage of water purification however a few are difficult to destroy using conventional treatment. Monitoring occurs at all stages of the water purification and supply to ensure that the levels of these germs do not occur at high enough levels to cause disease.	Remember that illnesses like stomach upsets can be contracted by routes other than water, including air, food and contact with sick people. Any illness should be thoroughly checked by a doctor. The doctor will be able to make a correct diagnosis of the cause of the illness and prescribe appropriate treatment. If a waterborne illness is confirmed, inform your local authority or water provider and follow up on their actions to ensure a safe water supply.

12. Could my drinking water cause skin irritations?

Possible Answers	Possible Effects	What should I do?
Irritations of the skin are rarely caused by chemicals in the water, but by frequent contact with drinking water itself. Over washing or repeated contact and immersion in water can cause the skin to become chapped as it loses its natural oils and lipids. This can lead to a variety of skin problems.	The loss of the skin's natural oils and lipids makes it more vulnerable to minor irritants that would not usually irritate a "normal skin". The skin may then develop inflammation called "dermatitis" or "eczema" which causes itching. This when scratched causes more inflammation setting up a vicious cycle. The skin would look dry and scaly, like parchment paper, with a rough texture and sometimes with red areas. In severe cases, weeping and oozing may result which may be complicated by secondary infection. At first you may only be aware of a dry chapped sensation, but this may progress to severe itching. The hands are often the first to be affected, but the lower legs, thighs and back are often also affected.	Have any skin irritation checked by your doctor to make sure you get the right diagnosis. If it is cased by chapping from drinking water contact, note that frequent bathing worsens the condition, over washing, the use of detergents, foaming agents, perfumed products, harsh soaps and foam bath. These practices should be avoided. Also, the hotter the water, the more oils are washed out of the skin so keep the water cool. Simple creams, bland ointments, super-fatted soaps and non-perfumed bath oil may be enough to reduce mild irritations. However, if the condition is severe, see your doctor as you may need medication.

13. Should I use a home treatment device such as a jug filter or in line treatment system?

Possible Answers	Possible Effects	What should I do?
This is a personal decision. Home treatment devices are not needed to make the water safe if it meets drinking water specifications. In fact if the devices are not properly maintained, they can actually promote water quality and health problems. You only need to consider buying a home treatment system are if you have a medical condition that makes you sensitive to components in drinking water or if taste is very important to you. You may also want to use one as an alternative to using and unregulated water supply such as a borehole or rain tank.	There are many types of home treatment systems available. Some are jug filters and some are in-line or point of use devices. Each type is designed to remove specific substances from water. It is crucial that you select the right system for your needs, and that you correctly maintain the system to avoid health risks such as bacterial build-up. Particulate filters remove turbidity, colour, particles, specific inorganic compounds (e.g. iron, aluminium and manganese) and some microorganisms. A disadvantage of these devices is that bacteria may grow on the filters and contaminate drinking water. Adsorption filters contain some form of activated carbon which absorb tastes and odours, pesticides, decaying organic matter, dissolved gases, chlorine and chlorine by-products, some turbidity, suspended solids and organic substances. By removing chlorine from the water, however the growth of bacteria may be encouraged. Reverse osmosis units will remove to varying degrees dissolved inorganics like sodium, calcium, nitrates and fluoride. Organic contaminants such as pesticides and solvents are also removed. There are several drawbacks to reverse osmosis systems: the incoming water must be of a good quality, the membrane must be chemically cleaned and replaced regularly, flow rate is very slow and the treated water is often soft and acidic making it unhealthy to drink. Additionally for every one volume of water produced by the system, three volumes are wasted as "reject" water. Ion exchange units do not purify water really, but they do remove nitrates and soften water by removing calcium and magnesium as well as mercury and iron. It is not healthy to drink water that is too soft, and it should only be used for washing.	There is currently no controlling body that regulates home treatment devices in South Africa. Some home treatment device companies use aggressive scare tactics to market their products. Some salespersons use dramatic visual demonstrations and make claims that are totally incorrect and unfounded. It is important that you get the correct facts about the quality of you drinking water before you make any decisions which could cost you a lot of money, and even cause water quality problems. Contact you local authority or water provider. They should be able to provide you with a complete record of the quality of your drinking water and advise you on how it complies with drinking water specifications. Investigate all claims made by home treatment device salespersons for factual correctness. If after looking at all the facts you are still not satisfied that your water meets your personal criteria, buy a home treatment system that is designed to remove the particular components that you are concerned about. Be sure that you only buy a treatment system from a reputable dealer approved and always carefully follow the

	Water softeners remove hardness but care should be taken to avoid over softening drinking water because it can cause high blood pressure. Distillation units remove some organic and inorganic substances (hardness, and nitrates). Some organic chemicals pass through the unit with the steam and contaminate the "distilled water". Distilled water has a flat taste and is missing many of the minerals that are found in regular drinking water. These minerals may be beneficial for your health. Ultraviolet disinfection units (UV units) will disinfect water by killing microorganisms that could cause disease. These systems do not remove anything else from the water. It is important that the incoming water is relatively clean. The sleeves of the unit need to be replaced periodically, and the bulbs will need replacing a few times a year. However, these jug filters must be properly cared for and the filters replaced regularly to avoid health problems. Because jug filters remove the residual chlorine in your water, bacteria can grow quickly in filtered water. Therefore the water should always be kept in a refrigerator. Overused filters can actually release heavy metals and bacteria into your water. In-line or point of use home treatment systems can be connected directly to your tap, before the tap, or separately from the plumbing system. There are many available types of these systems, designed to remove different substance from water. Particulate filters remove particles. Adsorption filters remove chlorine, tastes and odours and some organic compounds like pesticides. But bacteria grow in these filters. Reverse osmosis filters remove hardness, some chemicals like nitrates and some organic solvents. However they are sensitive to chlorine so you will need to remove chlorine before the water enters the unit. Ion exchange resins are purported to remove nitrates Both jug and in-line home treatment systems involve financial outlay, which	instructions for maintenance and care of any home treatment device to avoid creating health problems.

	can be substantial in the case of certain systems. Additionally, it is essential that the device or system be properly maintained to avoid health risks developing.	

14. Should I drink bottled water?

Possible Answers	Possible Effects	What should I do?
In urban areas where there is a regulated water supply system, the answer is "no". You do not need to drink bottled water for health reasons. The only reasons you should choose bottled water is if you prefer the taste, or if you have a medical condition for which your doctor has prescribed a specific bottled water. For example, if you are on a very restrictive sodium diet, your doctor may prescribe a certain bottled water has a lower sodium content than your tap water.	In South Africa, the bottled water industry is presently not well controlled with strict specifications concerning water quality and health standards and testing and monitoring. Bottled water, like any water is prone to contamination by disease causing microorganisms if it is not properly disinfected. Bottled water is only disinfected at source and does not contain a long lasting disinfectant. With no residual disinfectant present, microorganisms are free to grow and multiply in the water once it leaves the source. As a result, it has been shown that microorganisms grow in the bottles after bottling and while they stand on shop shelves. You therefore put yourself at risk of potential waterborne disease by consuming bottled water that could be contaminated. Highly mineralised bottled waters may contain levels of certain minerals that exceed the safety levels specified for drinking water. Sensitive groups of people such as children, the elderly and people with immune disorders should be aware of all the risks involved in bottled water. In South Africa, bottled mineral water is on average 950 times as expensive at tap water, and bottled spring water is on average 1098 times more expensive than tap water.	Firstly ensure that your tap water complies with drinking water specifications by getting the facts from a reliable source such as your local authority or water provider. If it does comply, you do not need to buy bottled water for health reasons. If you need to use bottled water, try to buy it from a reputable dealer, where it hasn't been standing in storage for a long time.

15. Is there chlorine in my drinking water and if so how much is present?

Possible Answers	Possible Effects	What should I do?
If you have a piped supply of water from a regulated water provider, there most probably is chlorine in your drinking water. Chlorine has been used as a disinfectant since the late nineteenth century and has virtually wiped out instances of waterborne diseases like typhoid fever, cholera and dysentery in those areas where it is used. It is currently the most commonly used disinfectant in water treatment processes world-wide. It kills the microorganisms (including disease-causing germs) that are present in the water. In South Africa, as in the USA, enough chlorine is added to drinking water to ensure that the disinfectant effect lasts right up to your tap. This practice helps prevent any growth of microorganisms in the network of pipes and reservoirs between the treatment plant and your home. Although no specifications have been set for chlorine levels in South African drinking water, the residual chlorine levels at your home should be in the range of 0.2 and 1.5 milligrams of chlorine per litre.	The greatest health risk arises when there is not enough chlorine in your water. With no chlorine present, microorganisms can multiply and cause disease. Unusually high levels of chlorine can cause a disinfectant type taste and odour (similar to a public swimming pool). Chlorine can also react with other substances in the water to form disinfection by-products (DBPs). Animal research involving high levels of DBPs found increased formation of cancer, however the reason for this is not known. Research into the relationship between DBPs, cancer and other health risks is ongoing. The risks of epidemics of waterborne diseases in the absence of chlorination far outweigh the risks associated with the possible cancer causing effects of chlorination by-products. However, obviously everything possible should be done to minimise both risks. Other ways of disinfecting drinking water are with ozone, ultraviolet radiation and membrane filters. These are expensive and do not provide a residual disinfectant effect along the water distribution network. Continuous research is being done around the world to find new disinfection methods.	Contact your local authority or water provider to find out if they use chlorine as a disinfectant. Ask what the chlorine levels are in the water at your home. If you suddenly experience an abnormally strong smell of chlorine, ask your local authority or water provider to test your drinking water at your home.

16. There are worms in my drinking water! What are they and are they harmful?

Possible Answers	Possible Effects	What should I do?
There is a range of organisms that would find water an attractive habitat to live or breed in. A common type of "worm" that sometimes finds its way into drinking water supplies is the Chironimid larva. These are slender elongated cylindrical organisms that are pink to deep red in colour. These organisms are commonly known as blood worms (due to their colour). They are the larval stage of the midge insect. The adult midge resembles small mosquitoes and lay eggs in water which later hatch into the larvae. The larvae then pupate and emerge as adults from the water.	There should not be worms or any other larvae or insects in your water because this indicates that your drinking water supply system has been compromised somewhere between the treatment plant and your tap, allowing access to these creatures. The organisms themselves may or may not be harmful, but the fact that they could gain entry to the system indicates a potential health hazard. Chironimid larvae are harmless and swallowing one would be as harmless as swallowing an ant. However, it is obviously not aesthetically acceptable to have them in drinking water.	Contact your local authority or water provider and get them to correctly identify the organism. Find out where the organisms entered your water supply system and make sure you rectify the problem and prevent it from happening again. Possible points of entry include the tap itself, an overhead tank, storage reservoirs or at treatment plants. Until the problem is resolved, you could boil and strain the water if you wish.

17. Can I use drinking water for watering my plants or my garden?

Possible Answers	Possible Effects	What should I do?
Yes, absolutely. Water that has been treated to a standard fit for human consumption, it is more than adequately safe to use for plants.	There should be no negative effects on plants, on the contrary they should be very healthy if all their other needs such as nutrients, drainage, light, temperature, pest and disease control are taken care of.	Water your garden and plants with tap water and watch them flourish. But remember that water is a scarce resource in South Africa, so you should not waste it. Practice "Water Wise" gardening methods such as selecting indigenous plants with low water requirements, grouping plants according to their water needs, watering in the cool of the day, using a watering can where possible, mulching and container gardening.

18. Is borehole water "better" than municipal water?

Possible Answers	Possible Effects	What should I do?
To determine whether borehole water is "better" than municipal water you need to consider aspects of health, aesthetics and economics. You need to investigate which type of supply best suits your needs, situation and the use to which you want to put the water. Groundwater is water that occurs underground in certain layers of rock. Groundwater is abstracted from water-bearing or water-saturated layers of rock via boreholes and wells. There are many different types of wells and boreholes of varying depths and dug by different methods (including dug, borred, driven, jetted or drilled). Boreholes are smaller and deeper then wells. There is a common perception that groundwater is pure and not affected by pollution or contamination. In many instances in South Africa this is true and groundwater meets SABS drinking water specifications. However, groundwater quality varies greatly from area to area and just like surface water (rivers and dams) is affected by the activities in the area (e.g. agriculture, industry, sewage systems) as water, pollutants and contaminants can to move from the surface into the ground and reach the groundwater.	Groundwater can offer excellent quality drinking water. However, groundwater is not immune to pollution and contamination from natural and man-made sources. The rocks in the area may have a particularly high amount of certain minerals (such as fluoride). Human and animal wastes, agricultural products and mining and industrial effluents can all move into the soil and eventually into the rock layers containing the groundwater. If polluted or contaminated water is consumed, people may become ill or even die. Note that if the groundwater does not meet drinking water specifications, it may still be suitable for other uses like irrigation, washing or bathing. You are responsible for maintaining your borehole system, and for monitoring the groundwater quality. You also need to ensure that the water is not contaminated after it is abstracted from the ground, for instance in reservoirs or storage tanks.	You need to base your decision on facts. Have samples of your borehole water and municipal water tested by a reputable laboratory. Compare the water quality. Also compare the costs involved for each option. Select the one that best meets your specific needs. If you decide to use borehole water for drinking, remember to monitor its quality regularly.

19. Has the quality of my drinking water declined over the years?

Possible Answers	Possible Effects	What should I do?
A correct answer to this question requires a study of water quality analyses performed over time on your drinking water. It is however highly unlikely that there has been an overall deterioration of drinking water quality. Ongoing research and improvements in water treatment technology world-wide results in continually improving processes and monitoring systems. Contrary to the pervasive belief amongst certain urban populations, drinking water quality has actually improved in many parts of South Africa. Legislation requires water providers and local authorities involved in drinking water supply to adhere to specifications set by the South African Bureau of Standards (SABS). The SABS specifications are based in international guidelines for drinking water quality.	A deterioration of the quality of drinking water supplies would rapidly manifest itself in massive outbreaks of diseases and illness, especially in sensitive groups of people.	Ask your local authority or water provider for records of water analyses taken over the years in which you have perceived a change in water quality. You could even have independent tests conducted on your drinking water by a reputable laboratory to put your mind thoroughly at ease. Study these facts to determine if there has really been a deterioration in water quality. If there has been a deterioration, you must bring this to the attention of local authority or water provider if they don't already know. Apply pressure to ensure that steps are taken to improve water quality or at least stop any further decline. These steps may include improved protection of source waters, changes in the treatment process, improved monitoring and the protection and maintenance of the distribution system.

20. What is the chemical and microbiological content of my drinking water?

Possible Answers	Possible Effects	What should I do?
Both the chemical and microbiological content of water will vary from area to area based on where the water comes from and how it is treated at the purification plant. The chemical content of water refers to type an level of dissolved substances such as minerals, gases, metal salts, chemicals and organic compounds that may be present in water. These may occur naturally, or may be due to pollution. Some chemicals in water are added during purification to make it suitable for drinking. There are routine tests used to evaluate the levels of important compounds in drinking water. The microbiological content refers to the type and number of microorganisms present in the water. These microorganisms may be algae, fungi, bacteria, viruses, protozoa and worm or insect larvae. Usually, water is tested for the presence of faecal coliforms or *E.coli*, which are bacteria present in the digestive systems of humans and animals. If these are present it indicates that the water may be contaminated by human or animal wastes.	This will vary from are to area. Water quality is first determined by the catchment or water basin that the rivers and dams are situated in. It is influenced by the rocks, soils, vegetation and the human activities taking place in the catchment. Water quality is then also affected by the treatment process use to purify it for drinking. It is important to understand that water purification aims to remove harmful or offensive substances form the water to make it safe and pleasant to drink in a cost effective way. The aim is not to load the water with additional substances, although certain chemicals are needed to make the water drinkable. Legislation in South Africa requires that all water providers and local authorities ensure that drinking water complies with SABS specifications for drinking water, which are based on international guidelines.	The chemical and microbiological content of drinking water is routinely monitored. Ask you local authority or your local water provider for results of chemical and microbiological analyses performed on the drinking water in your area. Also ask for an interpretation of the results so that you can understand the data.

3.3 Recommendations for Information Transfer

3.3.1 Materials and Methods

The questions in the questionnaire that related to information transfer and customer relations were extracted and analysed. The two questions relating to information transfer included:

- Have any brochures dealing with water quality been published for the consumer's benefit?, and
- Are yearly summaries of results of water quality analyses made available to the consumer?

These were used to gain an indication of what water quality information was currently available to the consumer and from which organisations.

The respondent's replies to questions regarding dealing with consumer's queries and complaints and customer care in general were used to determine possible ways forward for the field of customer relations in the water supply industry.

3.3.2 Results and Discussion

a.) Water quality Information currently available to the consumer

A total of only 17.2% of all the water services organisations interviewed had produced brochures about water quality for the consumer's benefit. Of the Local Authorities in Rand Water's area of supply that were surveyed, only 7.7% had produced brochures regarding water quality for the consumer's benefit. None of the Major Local Authorities had produced such brochures (although one respondent did not complete this question), but 80% of the Water Boards had.

41.4% of all the organisations surveyed make yearly summaries of the results of water quality analyses available to the consumer. 80% of the Water Boards, 45.5% of the Major Local Authorities and 23.1% of the Local Authorities in Rand Water's area of supply had made summaries available.

This indicates that relatively speaking, Water Boards produce far more consumer education material than the Local Authorities surveyed. This could be due to budget constraints or a lack of knowledge of water quality related issues. The knowledge definitely seems to be available in the Water Boards. Is the knowledge residing only with experts in Water Boards? If so, is this due to complacency or poor communication between Water Boards and Local Authorities? What is clear is that there appears to be a lack of customer focus in Local Authorities and that relationships with the consumer are not a priority in these organisations. What the data does not indicate is how widely the information is actually distributed. Is it actively circulated to consumers or is it a case of the consumers having to contact a water services organisation first? The data also does not indicate how understandable the material is to the average consumer.

b) Plans and suggestions for developments in customer care

When all the water services organisations were asked what further developments they were planning in terms of dealing with customer complaints and queries, it emerged that the majority (55.2%) had no plans or were satisfied with the current situation (Figure 7). A few (17.2%) indicated they planned to develop a more customer-focused structure. This included plans to appoint a customer services officer, start a public relations section, establish a centralised division for customer care incorporating an advisory service and customer care centre and setting up area offices to deal with consumer queries and complaints. The remaining suggestions included improved response times to queries and better recording and reporting systems through such developments as computerised systems and more understandable reports. Improved education of the customer was also planned through the publication of brochures on water quality issues. Some of the respondents had plans for a number of developments ranging from improved education and communication with the consumer, improved response times and on site testing of water samples.

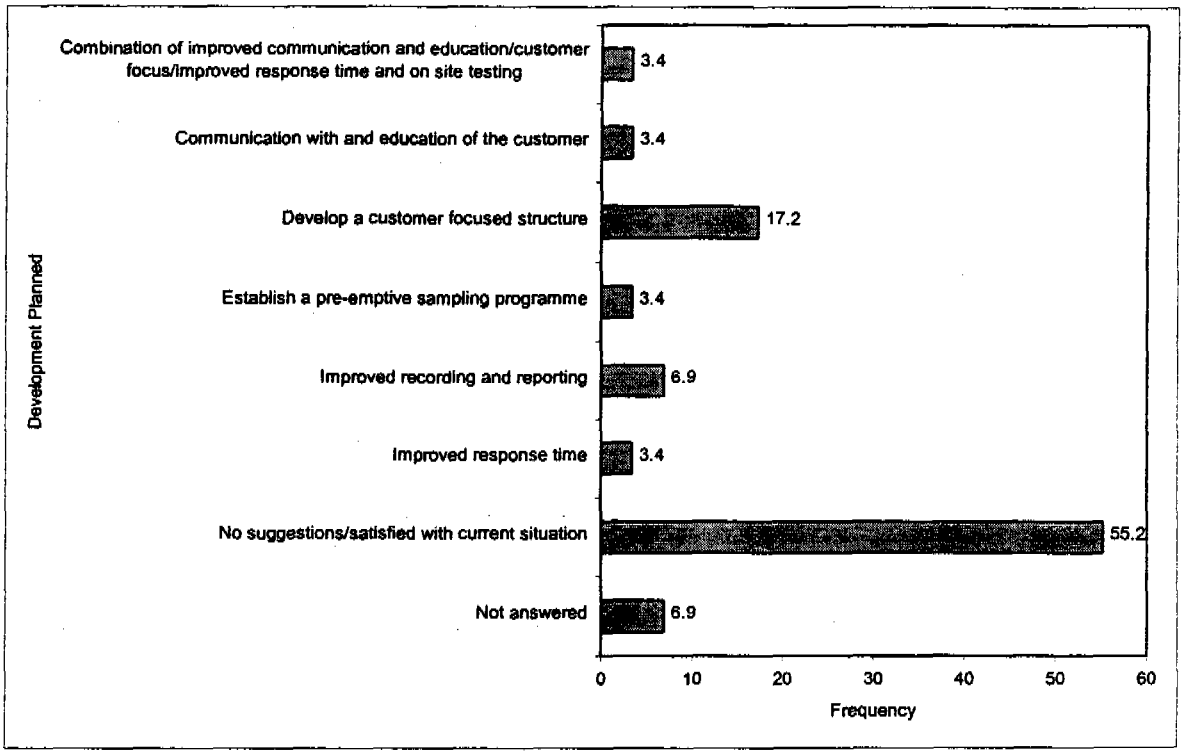

Figure 7: Developments Planned for Dealing with Customer Complaints and Queries

The organisations interviewed had more suggestions on how to improve customer care and allay consumer's fears about water quality than they had actual plans for their own organisation. Figure 8 indicates the developments that were recommended in the field of customer care and water quality.

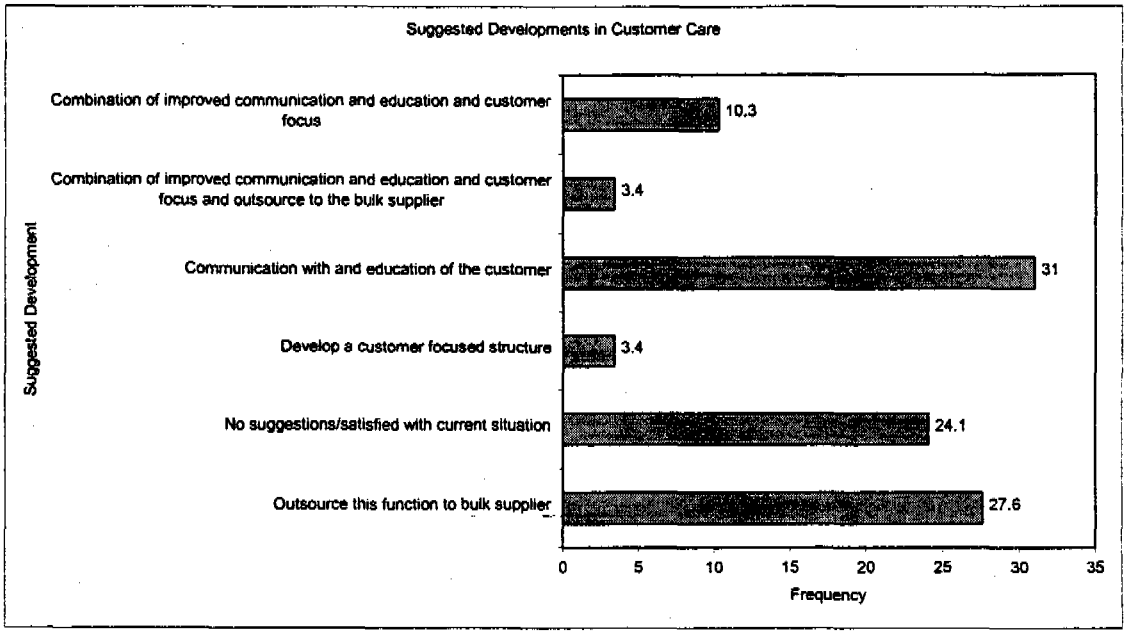

Figure 8: Suggested Developments in the Field of Customer Care

There were still 24.1% that had no suggestions or were satisfied with the current situation. However, 31% saw the need for communication with and education of the consumer/customer. Suggested ways to achieve this included:

- proactive publicity campaigns;
- regular communication campaigns;
- advertising campaigns about the safety of drinking water as a product;
- pamphlets;
- leaflets;
- articles in local newspapers;
- regular and well-publicised comparisons in the mass media of tap water and bottled water;
- educational visits to treatment works;
- countering of inaccurate allegations made by home treatment device salespersons; and
- education of the public about the practicality of removing certain aesthetic components of water such as odours.

A large percentage of those organisations interviewed (27.6%) felt that customer/consumer care was the responsibility of the bulk water supplier and suggested that the function be outsourced to the bulk utility. This function included:

- performing public education exercises;
- going public on the standards of their water;
- notification that samples are analysed in their area, and that the results are available;
- following up on complaints and queries with visits to the consumer and testing of water samples;
- setting up customer service helplines to service both consumers and officials in the industry; and
- the responsibility of keeping both the public and local authority officials informed about water quality issues.

Once again the need for some kind of improved customer focus to develop a closer relationship was identified with the establishment of consumer education centres.

Water services bodies need to accept that the provision of information pertaining to the service or product that they provide is an essential part of that service or product.

4. Rural Component of the Study

4.1 Frequently Asked Questions (FAQs)

4.1.1 Materials and Methods

In contrast to the highly structured water services sector in the urban areas of South Africa, the water services sector in rural areas is a highly variable one, with many different types of bodies involved at different levels and in different areas. These include Provincial Departments of Health and Water Affairs and Forestry, non-governmental organisations, research organisations and private consultants. Furthermore, the sources of water used by consumers, and the range of different water schemes in operation varies widely from community to community. As a result, the task of determining the water quality related questions of rural consumers had to be approached differently to the urban component of the study.

Ideally, a grassroots level survey involving face to face communication with rural consumers around the country would have been conducted. However, the scope and financial limitations of this project prohibited this approach. In order to get at least an approximation of the range of water quality related queries that exist amongst rural consumers a questionnaire-based survey was conducted among a selected group of organisations involved in rural water supply and sanitation. A questionnaire was compiled in consultation with persons with relevant water quality and sociological experience in the field of water supply. This questionnaire was applied by facsimile, or over the telephone to 14 organisations in total, and 71% replied. The sample distribution according to the geographical areas covered during the course of the participant's work should be noted by the reader, as it is somewhat skewed towards the KwaZulu Natal Province:

Table 3: Rural Study Sample Breakdown

Province	Number of Bodies Surveyed	Number of Respondents	Reply Percentage (%)
Eastern Cape	2	1	50
KwaZulu Natal	5	5	100
Mpumalanga	1	1	100
Gauteng	1	1	100
Northern Province	1	1	100
Northern Cape	1	0	0
Eastern Cape and Northern Province	1	1	100
National	2	0	0
Total	**14**	**10**	**71**

The high KwaZulu Natal presence reflects in part the high level of rural water supply and sanitation activities currently occurring in this area. Due to the small sample size, this study should be regarded as a pilot study to be used to direct future more refined research.

The questionnaire was divided into two components:

1. Background Information
2. Types of queries received

The first section was included merely for background purposes. The second section was needed to compile a database of the FAQs received by the surveyed organisations. This section asked the respondent to list the FAQs by consumers about the quality of their drinking water under the headings:

- Queries from consumers using dams and rivers as sources of drinking water
- Queries from consumers using boreholes or wells as sources of drinking water
- Queries from consumers using standpipes or tankers as sources of drinking water
- Queries from consumers using a regulated water supply on their property as their source of drinking water.

The respondents were also asked to describe the level of awareness of water quality related issues in the communities in which they have worked, and what water quality related topics most urgently need addressing. Additionally, the participants were asked to indicate what they felt were the most appropriate ways of communicating information about water quality to consumers in rural, peri-urban and urban communities.

As was the case with the urban study, the questionnaire was composed of mainly open-ended questions. The data were analyses according to the type of water source used for drinking water, and the frequently asked questions were categorised into meaningful categories such as "payment issues" and " health related queries". Due to the very small sample size, only descriptive statistics consisting of frequencies were calculated. The SPSS package (Statistics for Social Sciences) was used to execute the analyses. The results of these analyses were interpreted by close examination of the original responses ensuring that all aspects of each category were addressed.

4.1.2 Results and Discussion

The sample size for this component is very small, with only 10 participants responding. There is however, a wide range of sources of drinking water used by members of the rural communities in which the participants worked (Figure 9). These included both groundwater and

surface water sources and schemes with various types of infrastructure. Thus a broad range of water situations and their corresponding queries were sampled.

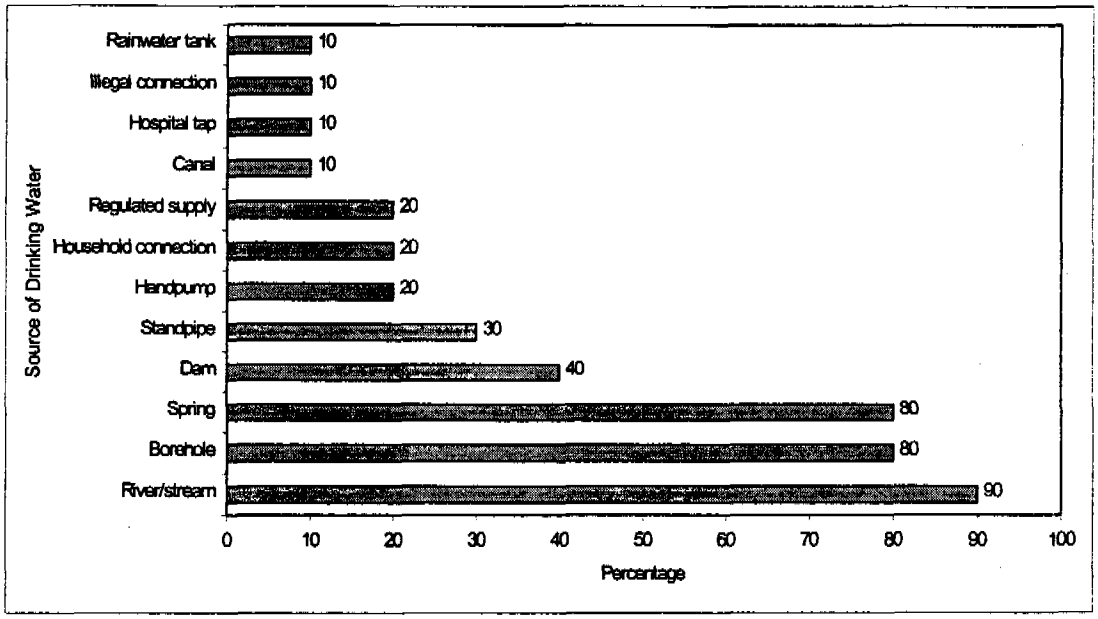

Figure 9: Sources of drinking water used by consumers in rural areas surveyed

The FAQs received from consumers across all types of water sources could be arranged into 11 categories:

- Aesthetics;
- Convenience of supply;
- Funding;
- Health;
- Infrastructure;
- Maintenance;
- Metering;
- Monitoring;
- Payment;
- Reliability of supply; and
- Tradition and ownership.

It is clearly that the queries received from consumers in rural areas cover a much broader and more varied range of topics than those in

urban areas. Rural based consumers are more interested in topics that are not water quality related, but have to do with water quantity, finances, responsibility and beliefs. This is in line with the perceptions that people only start becoming water quality conscious once their other water supply needs are met (Glicker, 1992).

Looking at the frequently asked questions received from consumers using different drinking water sources (Figures 10 – 13), it is immediately clear that the issues that concern consumers differ according to the source of water they are using.

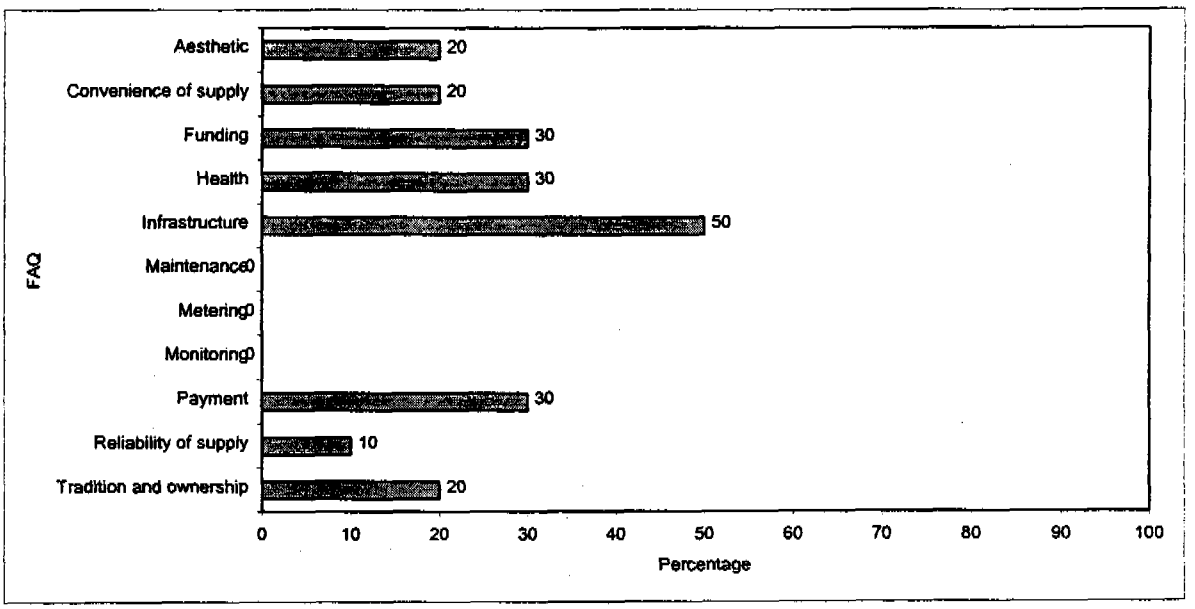

Figure 10: Water related FAQs received from rural consumers using rivers and dams as a drinking water source

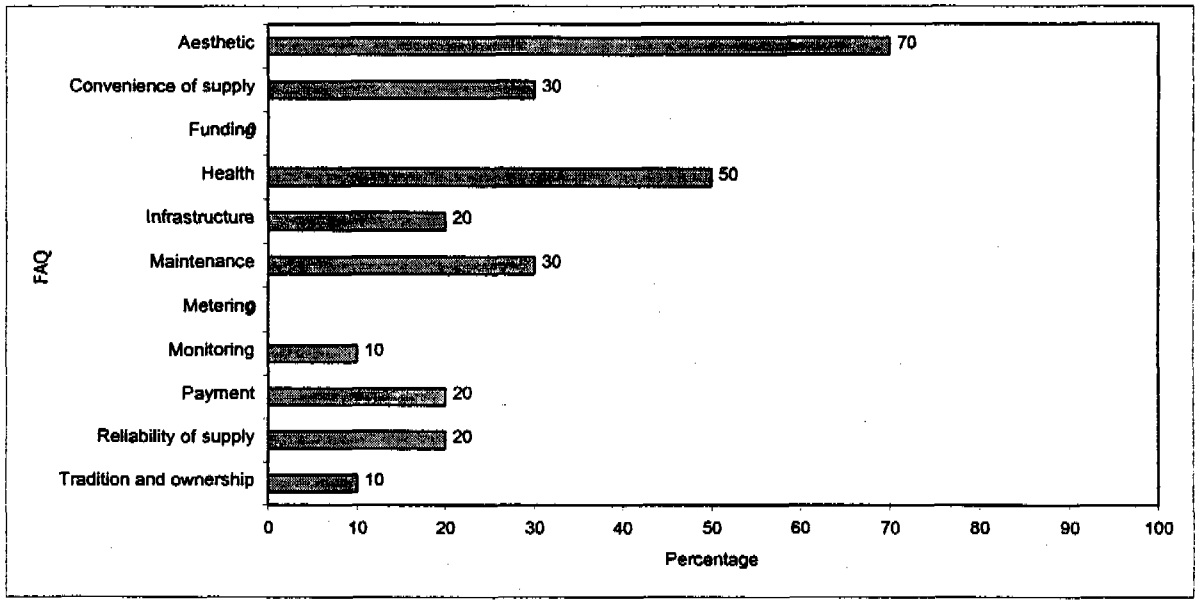

Figure 11: Water related FAQs received from rural consumers using boreholes, wells and springs as a drinking water source

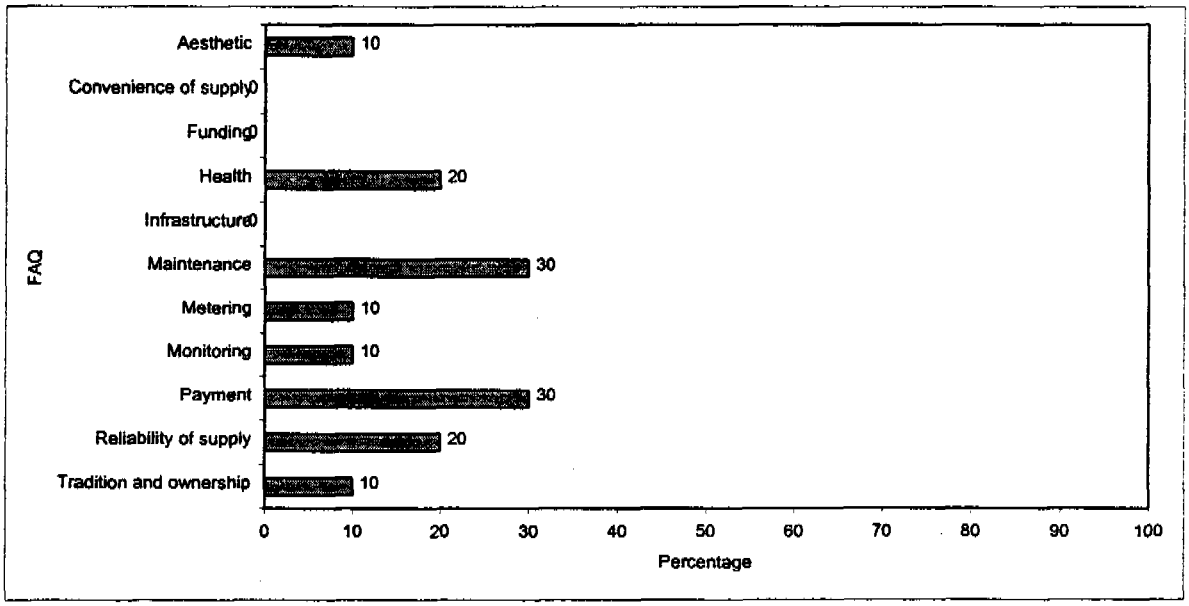

Figure 12: Water related FAQs received from rural consumers using standpipes and tankers as a drinking water source

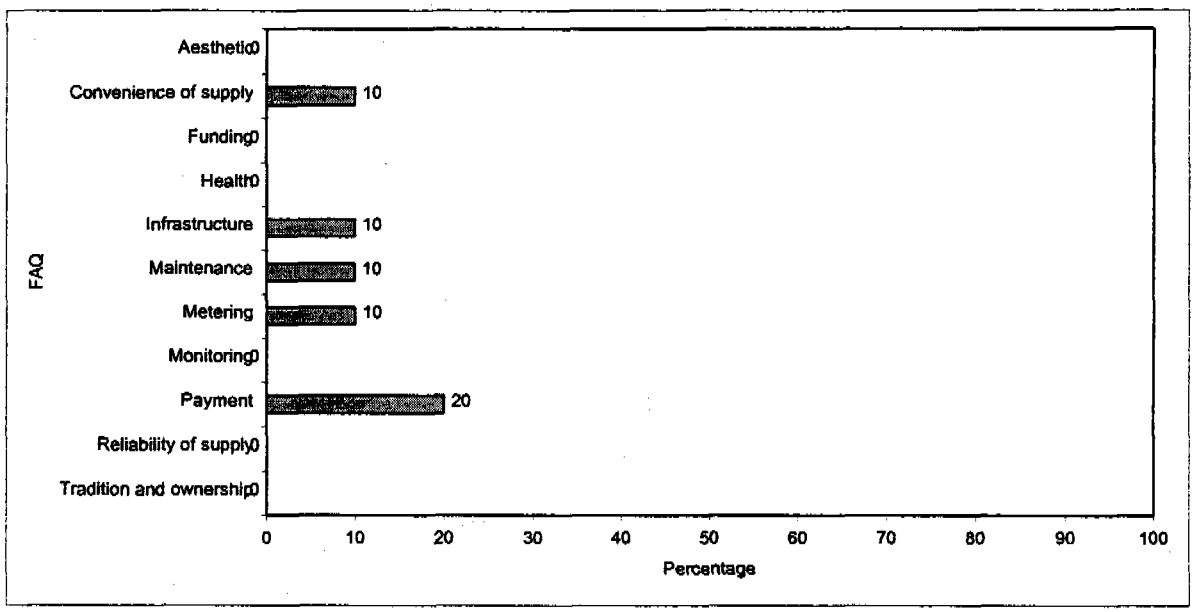

Figure 13: Water related FAQs received from rural consumers using a regulated supply on their property as a drinking water source

There is a low level of FAQs emanating from consumers using a regulated supply on their property (Figure 13) as opposed to those received from consumers using any of the other water sources. This could indicate a satisfaction with the water supply, and fewer problems occurring with a regulated source. The one issue that does stand out in this group is that of payment. This is understandable, as this is still a relatively new issue for rural communities.

On the other end of the FAQ spectrum, is the group of consumers using groundwater sources (boreholes, wells and springs). These consumers have a high frequency of FAQs that span a wide range of topics (Figure 11). This is understandable amongst people using a communal, concentrated water source. The high (70%) of queries related to aesthetics in this group, were due mostly to salty or brackish tasting water a common problem in boreholes in this country. The high score under the health category was due to concern about contamination by human or animal waste and queries about nitrates. A large component of the health issues were related to resistance to new ideas about health as related to water quality, with science clashing with traditional beliefs about topics such as diarrhoea in children. The fact that these sources of drinking water are usually communal could be responsible for the high levels of queries about convenience of the supply and who is responsible for maintenance of the scheme.

Users of rivers and dams as drinking water sources have queries that deal mainly with infrastructure and the funding and payment thereof (Figure 10). Health is also a key area for this group, due once again to resistance to new ideas about health and water quality. The unprotected nature of the source also adds to health concerns.

Finally, consumers using standpipes and tankers as drinking water sources are most concerned about maintenance and payment of the scheme (Figure 12). This is understandable as these are communal schemes and responsibility is often disputed amongst users.

Convenience is oddly enough not an issue amongst these users. Perhaps the communities involved have just received an upgrade to a standpipe system and it is better than what they had before. Reliability of supply problems in this group are probably due to problems experienced at peak usage times in these communal schemes.

The specific questions related to each FAQ category are detailed below to add depth and understanding to each topic.

Aesthetics

FAQs in this category included issues related to taste and colour. Consumers needed to know why water tasted salty, brackish or "funny". This query came mostly from consumers using an underground water source. Queries regarding colour were related to turbidity experienced after storms, and discoloration due to high iron levels. Milky or white water and the formation of scale (a white deposit) on cooking utensils were other aesthetically based FAQs received.

Convenience of supply

Concerns about convenience of supply were related to the distance to the nearest supply, the placement of the supply point. In addition to the time and energy expended in the task of collecting water, complex problems can develop when people collect water after dark while others are asleep to avoid long queues. Girls are sometimes taken advantage of, leading to teenage pregnancies. Some consumers complained about pumps being difficult to operate.

Funding

Consumers in rural areas need to know if they can get access to funding in order to improve their water schemes. They need to know where to go to get funding, and what procedures need to be followed.

Health

There were many diverse FAQs related in some way to health. Some revealed the belief that health is in no way related to water quality. Some communities hold the beliefs that disease is caused by people being bewitched, and that children need to go through diarrhoea as part of growing up. Consumers also wanted to know whether their water source was harmful. Some asked if they were immune to water-related diseases. Concerns were expressed about the contamination of groundwater sources with sewage from nearby toilets. Some consumers wanted to know whether their drinking water was contaminated if it smelled of sewage when they opened the tap. The origin and safety of water tankers are questioned revealing issues of mistrust. One participant had received questions from consumers about nitrates after someone had told the community about nitrates in water.

Infrastructure

Consumers wanted to know why their community had different water schemes to those found in cities. The comparison to city water schemes extended to the size of dams in the area and those used for city supplies. A frequent issue that arises is that the volume of water available is not sufficient for everyone. This is especially the case when a wedding or funeral is being planned. People also require advice on upgrading their water scheme.

Maintenance

People in rural communities want to know why boreholes are not working, and how to fix their scheme. More often however, people want to know who is responsible for repairs and maintenance of the scheme. There are strong feelings about whether the community or the government are supposed to repair, maintain and clean the various components of their water scheme.

Metering

Some consumers are interested in meter reading and how they can measure the amount of water that they use.

Monitoring

A few consumers want to know if water samples are taken regularly. Others want to know where they can take samples of their water supply for scientific analysis.

Payment

Costs related to water supply are queried, being a relatively new issue in rural communities. Specifically people want to know why they should pay for water especially since they haven't paid for water in the past. There are also questions about who is responsible for paying for different aspects of their scheme, such as repairs. A belief exists in some communities that once they have paid for rent or have paid for the water scheme to be established they do not need to pay anything more.

Reliability of supply

This issue differs from convenience of supply and infrastructure in that it involves the constancy of flow in a given water scheme as opposed to placement or available volume. Consumers want to know why the flow is irregular.

Tradition and ownership

Certain communities exhibit a resistance to interventions that is based on traditions and ownership. This is seen in questions such as "It has always been this way therefore why all this talk of diseases now?" and "why should we protect our springs, they have been operating since before we were born", and statements like "the river belongs to us nobody can give us advice". This kind of perception is based on the belief that water is free from God, and this makes it difficult for consumers to pay for operation and maintenance costs.

4.2 Answers to FAQs

4.2.1 Materials and Methods

Water related questions received from consumers in rural areas are varied and cover a very broad range of issues. Many of the questions reveal a need for awareness and education on topics such as human biology, disease, chemistry and infrastructure. In trying to construct answers to the FAQs from these consumers, one is faced with the dilemma of wanting to provide an easy to understand answer but in order to do so, one needs to first explain concepts that may be entirely novel to the audience involved. For example, if one is asked "are we immune to water related diseases?", one would first need to explain such concepts as invisible microorganisms, disease and its cycles and transmission routes, and the functioning of immune systems. One cannot assume a prior basic knowledge of these concepts, and without this basic knowledge, a short and simple answer to the FAQs will be neither adequate nor useful. Furthermore, low literacy levels in many rural areas makes the use of a written guide rather difficult.

Additionally, some excellent educational resources have already been produced such as guides about Water and Sanitation (DWAF and Department of Health, 1996, Palmer Development Group, 1994) and the Assessment of Domestic Water Supplies (WRC, 1998), and it would be redundant to repeat this work.

A more practical approach, in terms of the scope of this study, would be to use the data to recommend topics that need to be addressed in more comprehensive and in depth education and training programmes than would be possible in a Trouble Shooting Guide format. Water quality related topics requiring awareness and education programmes in rural communities were identified based on the FAQs received from consumers (as presented in the previous section). In keeping with the scope of this project, only the water quality related FAQs were considered. These included queries falling into the topics of: aesthetics, health and monitoring. It should be noted however that water quality

queries do not form the bulk the types of queries received from rural based consumers and clearly there is a need for future work in terms of non-water quality topics.

4.2.2 Results and Discussion

The water quality related FAQs received from consumers in rural areas together with recommended fundamental education and training topics are presented in Table 4. This table is intended for use as a guide for all parties involved in the development of water quality education and training programmes for rural communities.

Table 4: Guide to Recommended Content for Water Quality Education and Training Programmes

<table>
<tr><th colspan="3">1. Water Quality and Aesthetics</th></tr>
<tr><th>Specific FAQs</th><th>Technical Cause</th><th>Recommended Content of Education and Training Programmes</th></tr>
<tr><td>Why does the water taste salty?</td><td>High mineral content of source.</td><td rowspan="5">1. What is water and what is it made up of?
This should cover:
a) Chemical component of water including dissolved gases (such as air), dissolved salts (such as nitrates, iron, calcium and magnesium) and suspended solids (such as soil);
b) Microbiological component of water with emphasis on those organisms that can cause aesthetic problems (such as algae).

2. Water Treatment
This should emphasise the removal of aesthetically offensive substances (such as filtration to remove turbidity).</td></tr>
<tr><td>Why is my water dirty/muddy?</td><td>Turbidity after storms</td></tr>
<tr><td>Why is my water a reddish brown colour? (due to high iron content)</td><td>High iron levels</td></tr>
<tr><td>Why is my water white/milky?</td><td>Dissolved air</td></tr>
<tr><td>Why does a white layer form on cooking utensils)</td><td>Scale formation due to mineral content</td></tr>
</table>

2. Water Quality and Health	
Specific FAQs	**Recommended Content of Education and Training Programmes**
Belief that water quality is not related to health Is the water source harmful? Are we immune to water related diseases? Can our groundwater be contaminated by toilets nearby? If our water smells of sewage when we open the tap, is it contaminated? Are water tankers safe? Where do water tankers come from? (Are water tankers the same as those used to build roads?) Are nitrates in the water a problem?	**1. Water Quality and Health** This should include aspects of: a.) Chemical Water Quality and Health - explaining both toxic level and deficiency level illnesses. Include discussion on sources of pollution. b.) Microbiological Water Quality and Health - detailing the difference between pathogenic and non-pathogenic organisms. Include sources of contamination. **2. Basic Health and Hygiene Awareness** This should emphasise: a.) Fundamentals of Disease - such as how disease is transmitted (air, food, contact, water, insect etc.), how it can be prevented (source protection, hygiene, correct treatment and storage) and how it can be treated (medication and immunisation). b.) Safe Water Use – detailing the safe treatment, storage and use of water. Note: In all of these programmes it will be important to be sensitive to existing belief systems and perceptions. Efforts should be made to bridge the gap between scientific facts and cultural or religious beliefs.

3. Water Quality and Monitoring	
Specific FAQs	**Recommended Content of Education and Training Programmes**
Are water samples taken regularly? Where can I take my water samples for analyses?	**1. The Importance of Monitoring** This must cover aspects of: a.) The Importance of Monitoring – including the supply of factual information in addition to aspects that can be perceived by the primary senses. To safeguard health and assist in planning of such activities as agriculture and development. b.) Water Quality Standards - the necessity of standards, how standards are decided, and the issues of acute versus chronic effects of different substances. **2. The Monitoring Process** Highlighting those steps that influence monitoring results: a.) Sampling - where, how and when to take samples. b.) Analysis – how to select a reputable laboratory for water testing, and how to interpret results of analyses.

4.3 Recommendations for Information Transfer

4.3.1 Materials and Methods

Participants in the survey were asked to suggest potential ways of communicating water quality information to consumers in rural communities. The responses received were used in conjunction with expert opinion to compile recommendations for future information transfer.

4.3.2 Results and Discussion

A wide range of suggestions for information communication channels were received from the organisations surveyed (Figure 14). These ranged from verbal to pictorial to interactive to written techniques. The overall trend indicates that verbal and interactive communication techniques are the most appropriate, including radio, workshops, talks to schools, drama and community meetings. These are followed by posters, pamphlets and billboards that may be highly pictorial in nature, but still require some literacy to understand.

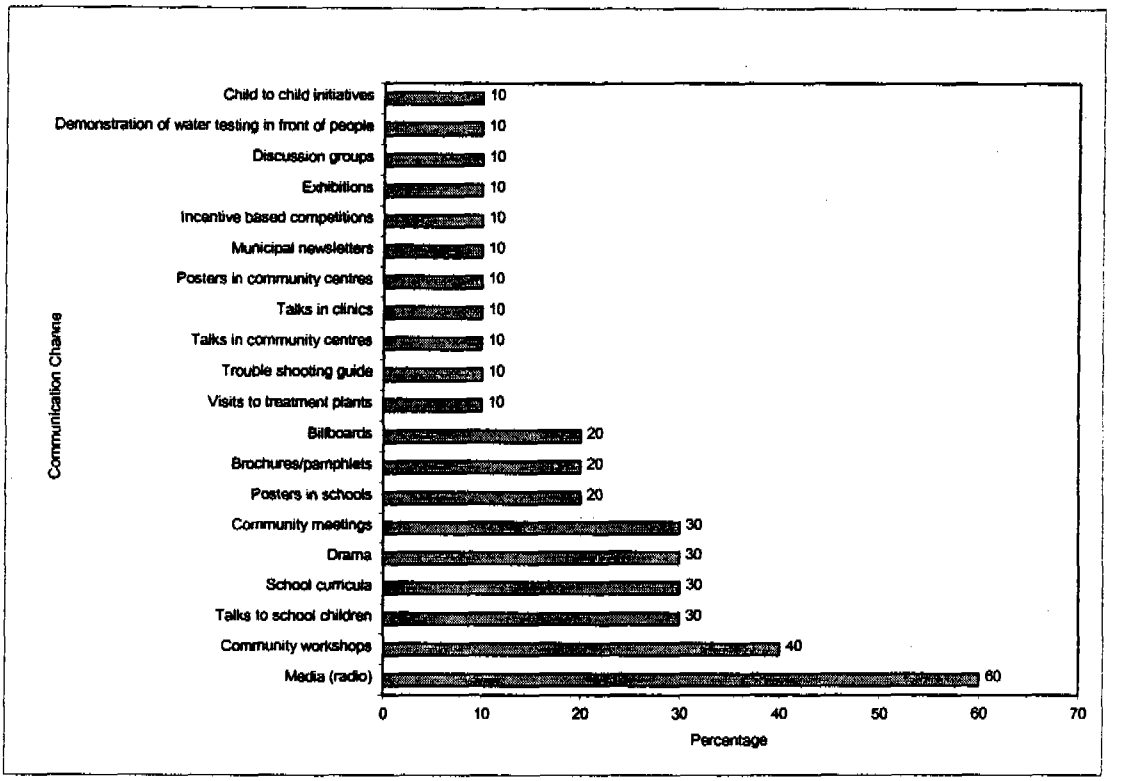

Figure 14: Recommended Channels for Information Transfer about Water Quality with Rural Communities

Radio definatley stands out as the medium of choice when connumicating with rural communities (60%). The lack of other media forms such as television or regular print media publications contributes to radio's success, as well as the fact that radio is accessible to illiterate individuals. Radio could definitely be used for water education and training for rural communities. To maximise the impact of such programmes, it is suggested that celebrity personalities or people of status in the community are incorporated into the format to attract listeners. Furthermore, it would be advisable to make the programme content highly relevant to community life experiences. For example, use sport and the importance of hydration in soccer stars or other athletes as a way into the topic of water and its many issues. Many other creative approaches can be used by identifying those issues at the heart of the community's water uses.

Community workshops were also a popular suggestion (40%). These can involve people of various ages, and literacy levels. Workshops are interactive and involve the community in identifying both problems and solutions. Many tools are available for conducting community workshops such as KAP, PHAST, RRA etc. These tools could easily be adapted and used for water education and training.

School children deserve a special mention as a very important target group for water education and training programmes. Younger primary school children especially are open to new ideas, and are very impressionable. As education in rural communities develops to redress past inequalities and as curricula are changing, there is an opportunity to incorporate water education into school curricula. It is important that school children are not only exposed to once off talks about water, but that water is incorporated fully into the curriculum. This will not only allow a more full understanding of the subject, but also ensure a better "by-in" from teachers who will see it not as an add on, but as a fundamental. It is suggested that an emphasis be placed on a problem solving approaches to practical water problems, which are relevant to the children.

Drama is a very exciting vehicle for transfering information to various communities. Drama involves the audience by utilising humour and conveying emotions in a unique way, leaving a longlasting impression on the audience. Theatre fits very well with oral traditions of story telling and is accessible to illiterate and literate audiences alike. Furthermore community or development drama does not require a lot of resources. It can be performed under a tree with minimal props.

Poster, pamphlets and billboards are of limited use in communites where literacy is a problem. These media can usually only convey a limited amount of informatio, typically a single message. They can be highly visual and self explanatory if carefully constructed, but care need

to be taken that they are senstive to the beliefs of the community and will be interpreted correctly.

There are various opportunities for communicating with rural communities. These are highly organised societies and there are existing structures that can be utilised as a platform for education and training about water. Each community differs in what would be the optimal way to introduce water education and training successfully, and the choice of techniques and media should be based on the nature of the specific community involved. As with all interventions of this nature, it is important to get support from community leaders when initiating such programmes, and to involve the community in every step of the process.

CONCLUSIONS

1. The literature survey indicated that consumers in South Africa, like their international counterparts, are becoming more conscious about the quality of their drinking water. In urban areas this is due to increased media publicity and aggressive marketing of bottled water and home treatment devices. In rural areas water quality a topic of increased interest as other more fundamental issues of supply are addressed. In this context, consumers need scientifically correct information about water quality issues relevant to them to enable them to make informed decisions and allay unfounded fears.

2. Water quality-related FAQs of consumers in urban areas fell into 15 categories, namely: colour; tastes and odours; white water; fluoride; hardness; home treatment systems; health; chlorine; worms; bottled water; iron; gardens and plants; perceived deterioration of water quality; chemical and microbiological content; and the comparison between municipal and borehole water.

3. Urban consumers mostly asked about water quality aspects that were readily perceivable by the primary senses (colour, tastes and odours and white water).

4. Middle- and low-income consumers are also showed a high level of FAQs related to health, hardness (linked to dishwashers) and home treatment devices. This is probably due to increased awareness due to media publicity, targeting by home treatment device salespersons, and the ability of these groups to afford dishwashers.

5. Water Boards receive more queries from consumers than either small or large Local Authorities. This could indicate that consumers regard these organisations as the best source of information, or perhaps that local authorities usually pass consumer queries onto Water Boards.

6. The answers to urban consumer's water quality related FAQs were consolidated into a Trouble Shooting Guide consisting of 20 question-and-answer Fact Sheets. Each Fact Sheet deals with a specific FAQ and details: the specific question, possible answers to the question, possible effects on the consumer (including health, aesthetic and economic), and advice on what the consumer should do if the problem should arise.

7. Few local authorities currently produce water quality information for the consumer in the form of brochures or even yearly summaries. In contrast, 80% of the Water Board surveyed do. This could be due to budget constraints, lack of knowledge or a lack of customer focus amongst the local authorities.

8. An analysis of the developments in dealing with consumer complaints planned in the various organisations showed that the majority had no suggestions or were satisfied with the current situation. Some did plan to develop a more customer-focused structure.

9. Improved communication with and education of the consumer was identified as the main way of improving customer care and various methods to achieve this were presented. The idea that customer care should be the responsibility of the bulk supplier was a prevailing belief. Local Authorities felt that the bulk supplier should be responsible for communication and education of consumers and officials in Local Authorities.

10. Water service providers need to accept that the provision of information regarding a service or product that they provide is an essential part of that service or product itself. Ways to improve customer focus, and consumer education and education need to explored and implemented in water service providers. Support and information transfer between water boards and local authorities need to be improved in this regard.

11. The FAQs from rural consumers across all water sources (rivers and dams; boreholes, wells and springs; standpipes and tankers; and a regulated water supply on the property) fell into 11 categories, namely: aesthetics; convenience of supply; funding; health; infrastructure; maintenance; metering; monitoring; payment; reliability of supply; and tradition and ownership.

12. Clearly, rural consumers had queries about a broad range of water-related topics and not many about water quality.

13. Consumers with a regulated supply on their property had the least queries, indicating either satisfaction with the scheme, or a lack of problems. In contrast, those using groundwater sources had many, varied queries. This is understandable from people using a communal and concentrated source. Users of rivers and dams had queries predominantly about infrastructure and funding and payment, as would be expected from consumers considering upgrading their water scheme. Consumers using standpipes and tankers had concerns about maintenance and payment probably because responsibility for these communal schemes is a topic of debate.

14. The only strictly water quality related FAQs received from rural consumers were those falling into the aesthetic, health and monitoring categories. The queries (especially those in the health category) revealed a need for education and training about fundamental issues such as disease, hygiene and water itself. They also highlighted beliefs that dismiss the role of water quality in disease.

15. In the light of the results of the rural survey, was clear that a simple question and answer type Trouble Shooting Guide would not be adequate or informative for rural consumers at this stage. More thorough water education and training programmes about water need to be designed (with local beliefs and traditions in mind) to raise the overall knowledge base.

16. Some of the fundamental water topics that would need to be included in education and training programmes include: What is Water and What is it Made Up Of; Water Treatment; Water Quality and Health; Basic Health and Hygiene Awareness; The Importance of Monitoring; and The Monitoring Process.

17. Water related education and training programmes using the recommended content need to be presented to rural communities in appropriate and effective formats if they are to be effective. As these communities have a low level of literacy, verbal and interactive or pictorial means of communication are recommended. Radio, community workshops and drama are suggested. School children are an important group for information dissemination via both talks by experts or more importantly the curriculum itself. The chosen format should be dictated by the community involved and the existing community structures and belief systems.

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