Cooperative Research Centre for Coastal Zone, Estuary & Waterway Management

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Central Queensland Healthy Waterways Survey

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CRC for Coastal Zone
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Executive summary

In May 2002, a telephone survey of 818 residents of urban centres in the Lower Fitzroy and Port Curtis catchments of Central Queensland was undertaken to investigate:

- key waterway values and management priorities;
- perceptions of water quality and change in water quality;
- use of information sources regarding waterways; and,
- attitudes towards a range of waterway-related issues such as the economic and ecological impacts of development, regulation of waterway and water use, equity of access to waterways and decision-making, and responsibility for addressing waterway health problems.

This data was collected to inform the research, public participation and education activities of the Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management (Coastal CRC) and its partner organisations. Of particular note is the Central Queensland Healthy Waterways Campaign; a multi-agency public awareness campaign initiated in March 2002 under the coordination of the Coastal CRC.

In November 2002 a small group of questions from the original survey were replicated on the Central Queensland Social Survey, an annual survey conducted by the Centre for Social Science Research.

Values and priorities: environment, safety and beauty

The key waterway use values to emerge were the ecological or environmental significance of waterways and town water supplies. These were followed by scenery and landscape values and symbolic or landmark functions. Least valued uses were residential development and passenger transportation.

Safe drinking and swimming water and environmental protection were rated by the majority of respondents as priorities that should never be compromised in waterway management.

Perceptions of water quality: decline and uncertainty

In both catchments respondents believed water quality in the inshore marine areas of Keppel Bay and Port Curtis to be higher than water quality in creeks and rivers near where they lived. Water quality in Keppel Bay was also rated more highly than water quality in Port Curtis.

Few people (≤15%) believed water quality in either in-shore marine areas or creeks and rivers to be improving. Roughly equal numbers of people believed it was deteriorating or staying the same. However, large numbers of people (43.3%) claimed not to know whether marine water quality was improving or deteriorating.

The most frequently mentioned changes were more pollution and less aquatic life – such as fish and turtles – while the most frequently mentioned causes of these changes were population growth, industry, agriculture and rubbish dumping.

Waterway information: access and usefulness

The most widely accessed sources of information on waterways were television (75%), environmental groups (47.6%), local newspapers (46.5%) and friends and colleagues (40.4%). These were followed by schools and educational materials (26.5%), festivals and events (22.5%) and radio (21.8%). Although environmental groups received the highest score for their usefulness in informing assessments of water quality, none of these sources received substantially lower scores.

Among those information sources that had not been widely accessed, the Internet (7.8%) stood out for the relatively high usefulness rating from those who had accessed it.

Nearly 60 percent of people were aware of the Central Queensland Healthy Waterways Campaign, most of whom had heard of it through the television. Should they wish to receive more detailed information on issues featured in the campaign, respondents preferred to receive this via mail (46.8%) and the Internet (29.2%).

Attitudes to waterway issues: development, but not at any cost

Questions in this section of the survey showed that while people had firm views on the general principles that should underlie waterway management, there were often high levels of uncertainty regarding specific waterway issues and proposals. Uncertainty was generally greatest among communities located outside the catchment in which particular proposals were based, and among women.

Respondents believed that development of Central Queensland water resources was essential to the long-term economic prosperity of the region. Many people were unsure, however, about whether benefits would flow from large inland dams, the proposed Nathan Dam on the Dawson River in particular.

Large numbers of people were also uncertain about the environmental impacts of large dams, but tended to believe that coastal developments such as urban growth, port expansion and industrial development would have major environmental impacts.

An overwhelming majority or respondents (89.7%) were concerned about the impacts of waterway pollution on human health.

Respondents believed that no group – whether farmers, the general public, governments or industry and developers – take enough responsibility for activities that damage waterways, although they were somewhat less critical of farmers than of the other groups.

Strong support was shown for strict regulation of activities that affect waterway health (97.2%) and for the complete exclusion of mining from the Great Barrier Reef (88.5%).

Strong support was also shown for the use of water meters to ensure the sustainability of domestic water supplies (75.4%). While this support was significantly weaker in Rockhampton than in communities already using domestic water meters, 58.5 percent of Rockhampton residents still believed their use necessary.

The polluter pays principle was strongly endorsed (91.4%), as was the proposition that since the whole community benefits from healthier waterways, the whole community should contribute to the cost of addressing problems (90.9%).

While a majority of respondents (62.7%) believed that downstream residents did not get enough say over activities in the upper catchment that affected water quality, nearly half (45.0%) were not sure whether enough water was allocated in the Fitzroy system for environmental flows.

Conclusions and implications

Urban residents of the Lower Fitzroy and Port Curtis catchments agree that development is necessary for economic prosperity, but they do not support development at any cost. Attaining community support for any development or waterway management initiative is utterly dependent on being able to demonstrate the maintenance of community safety and protection of the environmental and aesthetic qualities of waterways.

High levels of uncertainty regarding water quality in marine waters and the implications of existing issues and proposals suggests a need for substantial improvements in communication.

Mass media sources of information are widely used, but in the absence of opportunities for meaningful participation in decision-making will not, by themselves, resolve this uncertainty. Opportunities may exist to work more closely with community environment groups to address this issue given the sector's high levels of both penetration and credibility.

Women express significantly higher levels of uncertainty than men, suggesting that steps need to be taken to both communicate more effectively, and open more avenues for participation, with this group.

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1 Introduction

Maintaining the ecological health of Central Queensland waterways requires the input and support of the entire community. The Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management (Coastal CRC) is working with a range of community groups, government agencies and industries to link research, policy and action in innovative ways to improve waterway management. Of particular relevance to this report are a number of initiatives designed to improve incorporation of the values, attitudes, knowledge and aspirations of all stakeholders affected by coastal zone management into the decision-making process. Doing this is dependent not only on getting a better handle on just what those values, attitudes, knowledge and aspirations night be, but on using such knowledge to provide mechanisms for meaningful participation in decision-making.

This survey is closely linked with a range of research and education activities which have informed survey design and which will themselves be informed by the survey results. The Coastal CRC's Citizen Science team at Central Queensland University are undertaking a detailed Stakeholder Analysis of the Lower Fitzroy and Port Curtis catchments (both focus catchments for Coastal CRC research). Early results have highlighted a lack of avenues for researchers and natural resource managers to access the large number of urban residents not directly involved in community environment groups such as Waterwatch or Coastcare. This contrasts dramatically with groups such as commercial fishers and farmers who have high rates of participation in industry representative and environmental groups. The Coastal CRC has also facilitated the development of the Central Queensland Healthy Waterways Campaign; a regional communication strategy aimed at educating the general community about what sorts of things are being done to improve water quality and who is doing them. Launched in March 2002, the main communication channel, to date, has been television advertisements and community service announcements.

The main purpose of this survey was to collect data on the values, attitudes, knowledge and aspirations of urban residents in regard to waterways and the coastal zone. The specific objectives were to:

1. Benchmark existing community values, attitudes, knowledge and aspirations regarding waterways and waterway management in the Lower Fitzroy and Port Curtis catchments;
2. Contribute to the development of targeted community participation and education programs such as the Central Queensland Healthy Waterways Strategy; and,
3. Identify information needs and preferred avenues of participation/ representation in natural resource decision-making among communities with low levels of participation in existing stakeholder groups;

By surveying a representative sample of the population the study was designed to provide a means through which community members may begin to have more influence over research, policy and decision-making, and to help to identify opportunities to get more community members involved in initiatives like Waterwatch and Landcare. The communities targeted were the urban populations of the Lower Fitzroy (Rockhampton, Yeppoon, Emu Park) and Port Curtis (Gladstone, Boyne Island, Tannum Sands).

2 Methods

Data was collected using Computer-Assisted Telephone Interviewing (CATI) techniques from a total of 818 respondents in May 2002. A small number of questions were replicated on the Central Queensland Social Survey (CQSS), an annual CATI survey of around 1200 respondents in November 2002.

2.1 Sampling Design

The target population designated for telephone interviewing was all persons 18 years of age or older who, at the time of the survey, were living in a dwelling unit in urban areas of the Lower Fitzroy and Port Curtis catchments that could be contacted by a direct-dialled, land-based telephone service. Due to substantial differences in population for each of the two catchments the sample was stratified to ensure sufficient responses to enable analysis of each catchment. For the purposes of aggregate analysis of the entire sample each response was then postweighted to reflect actual populations using Australian Bureau of Statistics 1996 Census data. The sampling design followed is shown in Table 1.

Table 1 Sampling design – main survey

Sub-region	***Cities and Towns***	***Sample size***		
		Target	***Actual***	***Weighted***
Lower Fitzroy	Rockhampton Yeppoon Emu Park	400	411	552
Port Curtis	Gladstone Boyne Island Tannum Sands	400	407	266

Within each sub-region a random selection approach was used to ensure that all respondents had an equal chance to be contacted. The Population Research Laboratory (PRL) holds a database of telephone numbers covering the entire region that is updated regularly. The sample was drawn from this database by using a computer program to select, with replacement, a simple random sample of phone numbers. All duplicate, mobile and business numbers were removed from the computer-generated list. Nursing homes and collective dwellings were also deleted from the sample. Within the household, one eligible person was selected as the respondent for the 20 minute interview.

A similar selection approach was followed for the Central Queensland Social Survey (CQSS). The target population, however, was defined as residents of the City of Rockhampton and residents of the rest of Central Queensland. For the purposes

of the survey, Central Queensland was defined as the area stretching from Bundaberg in the south to Mackay in the north, and from the state border in the west to the coast in the east. In total, 420 residents of Rockhampton and 821 residents of the rest of Central Queensland were surveyed.

2.2 The Survey Instrument

The survey instrument consisted of a twenty minute questionnaire designed in consultation with stakeholders in the Coastal CRC and CQ Healthy Waterways Campaign. The questionnaire was pilot tested by trained interviewers on a random selection of Rockhampton area households. Interviewer comments (on, for example, confusing wording, inadequate response categories, question order effect, etc.) were considered in the finalisation of questions. The survey received approval by the Human Ethics Research Review Panel at Central Queensland University before administration. The complete list of questions can be found in Appendix 1. Those questions repeated on the CQSS are marked with a telephone symbol ☎

3 Results

Unless otherwise stated, all data contained in this report are based on the Central Queensland Healthy Waterways Survey conducted in May 2002. Those data collected in the later Central Queensland Social Survey are clearly identified as such.

The Central Queensland Healthy Waterways Survey was structured around four key areas:

- waterway values and management priorities;
- perceptions of water quality;
- information sources and awareness of the Healthy Waterways Campaign; and,
- attitudes towards a range of waterway-related issues such as the economic and ecological impacts of development, regulation of waterway use, equity of access and so on.

Data are presented here for the entire weighted sample, each of the two catchments, gender, and other dimensions of demographic variability that emerged as significant during data analysis. While catchment of residence and gender emerged as the most important dimensions of difference during data analysis it is important to note that the sample did not include enough respondents of Aboriginal or non-English speaking backgrounds to enable meaningful analysis of these variables.

3.1 Values and priorities

Questions in this part of the survey were designed to elicit from respondents a sense of the relative importance of a range of waterway uses and potential management priorities. Two distinct sets of questions were used to allow a degree of triangulation, or cross-checking, in relation to the values raised and thus to enhance the validity of conclusions. The first set of questions allowed respondents to assess the value of different waterway uses independently (and thus potentially to rate each use as of equal value), while the second forced them to choose between competing management priorities.

3.1.1 Key waterway values

Respondents were asked to score out of 10 the value they placed on each of a list of 19 waterway uses or functions. Table 2 shows the most important of these to be the environmental significance of waterways, town water supplies and the aesthetic and affective qualities of waterways. Commercial uses vary considerably in value with agriculture, tourism and industrial water supply seen as the most valuable, and commercial fishing, sand and gravel extraction, residential

development and passenger transport seen as the least valuable. Recreational uses, interestingly, were allocated moderate scores, perhaps reflecting non-participation in waterway-related recreation by a substantial proportion of the population.

Table 2 Waterway use values in Central Queensland

Value	***Mean Score***	***Standard deviation***
Ecological/environmental significance	8.96	1.577
Town water supply	8.86	2.225
Scenery and landscape	8.25	1.942
Symbol or landmark	8.11	2.045
Agriculture/farming	7.64	2.726
Tourism	7.54	2.434
Industrial water supply	7.51	2.828
Stormwater disposal	7.34	2.905
Land-based recreation	7.18	2.414
Cultural and festival activities	7.17	2.395
Heritage	6.98	2.748
Water-based recreation	6.64	2.874
Wastewater disposal	6.55	3.619
Entertainment and meeting	6.39	2.637
Commercial fishing	5.86	3.121
Sand and gravel extraction	5.73	3.324
Other commercial use	5.71	3.338
Residential development	5.26	2.926
Passenger transportation	5.25	30.26

Although the overall rankings are similar, Table 3 reveals a number of significant differences in the values allocated to waterway uses and functions by the urban residents of the Lower Fitzroy and Port Curtis. Lower Fitzroy residents place significantly higher value on agriculture, stormwater disposal and sand and gravel extraction, while Port Curtis residents place significantly higher value on community uses including scenery and landscape, land and water-based recreation, cultural and festival activities and entertainment and meeting. This suggests that while the aesthetic and recreational functions of both catchments are highly valued, residents of Port Curtis identify slightly more with local waterways

and make somewhat more use of them. This may reflect what some believe to be the limited accessibility of the Fitzroy River estuary in comparison with Gladstone Harbour.

Table 3 Waterway use values in Central Queensland by sub-catchment

Value	*Lower Fitzroy (mean)*	*Port Curtis (mean)*	*Significance*
Ecological/environmental significance	8.94	9.00	ns
Town water supply	8.89	8.80	ns
Scenery and landscape	**8.08**	**8.59**	**.000**
Symbol or landmark	8.09	8.15	ns
Agriculture/farming	**7.83**	**7.23**	**.001**
Tourism	7.46	7.70	ns
Industrial water supply	7.62	7.29	ns
Stormwater disposal	**7.53**	**6.95**	**.005**
Land-based recreation	**6.97**	**7.10**	**.000**
Cultural and festival activities	**6.94**	**7.65**	**.000**
Heritage	6.97	7.00	ns
Water-based recreation	**6.42**	**7.10**	**.001**
Wastewater disposal	6.63	6.38	ns
Entertainment and meeting	**6.18**	**6.82**	**.000**
Commercial fishing	5.97	6.65	ns
Sand and gravel extraction	**5.92**	**5.34**	**.011**
Other commercial use	**5.30**	**6.55**	**.000**
Residential development	5.31	5.16	ns
Passenger transportation	**4.98**	**5.81**	**.000**

Table 4 shows that women value a number of waterway uses more highly than do men. Perhaps contrary to stereotypes, however, women not only value the aesthetic and cultural qualities and community uses of waterways more highly, but also commercial and functional uses including agriculture, tourism, industrial water supply and stormwater and wastewater disposal.

Table 4 Waterway use values in Central Queensland by gender

Value	*Women (mean)*	*Men (mean)*	*Significance*
Ecological/environmental significance	**9.05**	**8.85**	**.008**
Town water supply	**9.04**	**8.64**	**.001**
Scenery and landscape	8.52	7.92	ns
Symbol or landmark	**8.22**	**7.97**	**.010**
Agriculture/farming	**8.06**	**7.12**	**.000**
Tourism	**7.87**	**7.13**	**.000**
Industrial water supply	**7.84**	**7.11**	**.000**
Stormwater disposal	**7.63**	**6.98**	**.008**
Land-based recreation	7.34	6.97	ns
Cultural and festival activities	**7.59**	**6.67**	**.000**
Heritage	**7.43**	**6.42**	**.000**
Water-based recreation	6.45	6.86	ns
Wastewater disposal	**6.98**	**6.02**	**.001**
Entertainment and meeting	**6.77**	**5.91**	**.005**
Commercial fishing	6.16	5.51	ns
Sand and gravel extraction	6.00	5.39	ns
Other commercial use	5.93	5.43	ns
Residential development	5.36	5.13	ns
Passenger transportation	5.68	4.71	ns

3.1.2 Management priorities

Respondents were asked to nominate from a list of four potential management priorities the one priority that should never be compromised in waterway management. They were then asked to nominate a second priority. As Figures 1 to 6 demonstrate, the overwhelming concerns to emerge from this process of prioritisation were the maintenance of safe drinking and swimming water and environmental protection. This is consistent with the top scores allocated to environmental significance and town water supplies in Section 3.1.1.

These questions were repeated in the November 2002 Central Queensland Social Survey. Figures 2 and 5 show that while community health and safety and environmental protection remained by far the most important priorities, support for economic development and equitable access to resources also grew slightly among Rockhampton residents over the time between the two surveys. This is likely a reflection of dry weather in the Central Queensland region throughout 2002, the imposition by the time of the CQSS of water use restrictions in most parts of the region, and debate over the allocation of water from major storages and the Fitzroy River for different purposes.

Figures 3 and 6 also indicate slightly higher rates of support for economic development and equitable access to resources. While this is also probably a reflection of dry conditions it may also reflect slightly different values in less heavily urbanised parts of Central Queensland. Importantly, however, community safety and environmental protection remained the highest priorities.

Figure 1 Top waterway management priority - Lower Fitzroy & Port Curtis, May 2002

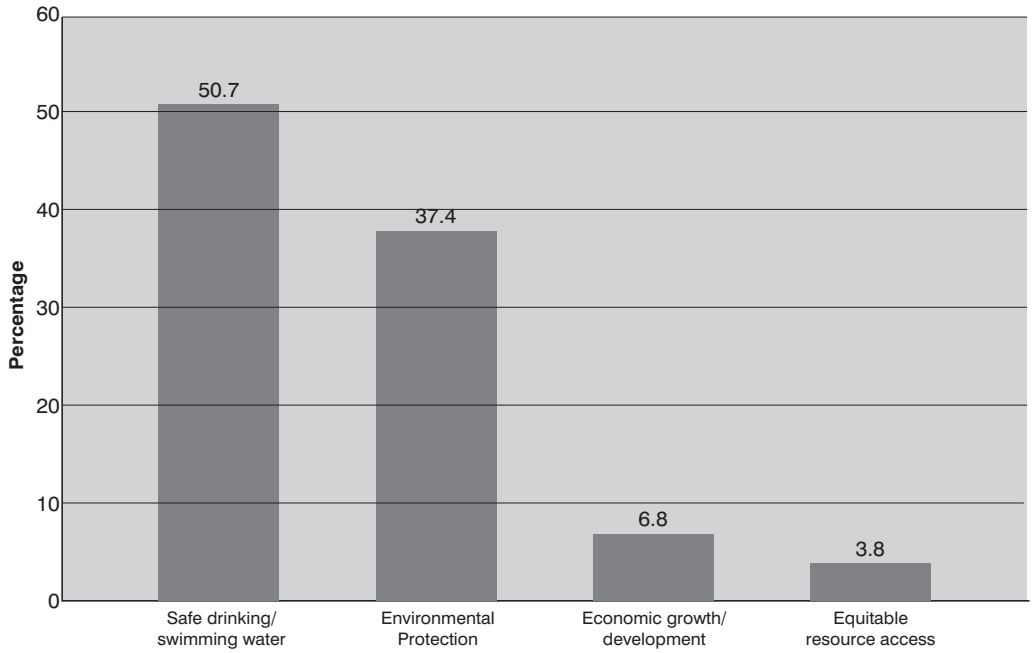


Figure 2 Top waterway management priority - Rockhampton, November 2002

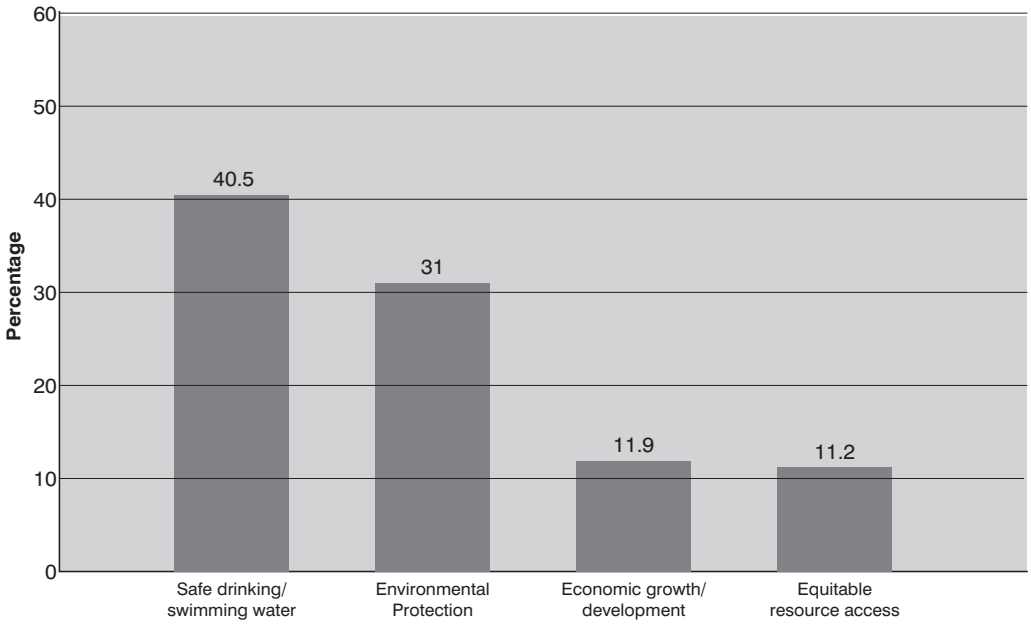


Figure 3 Top waterway management priority - rest of CQ, November 2002

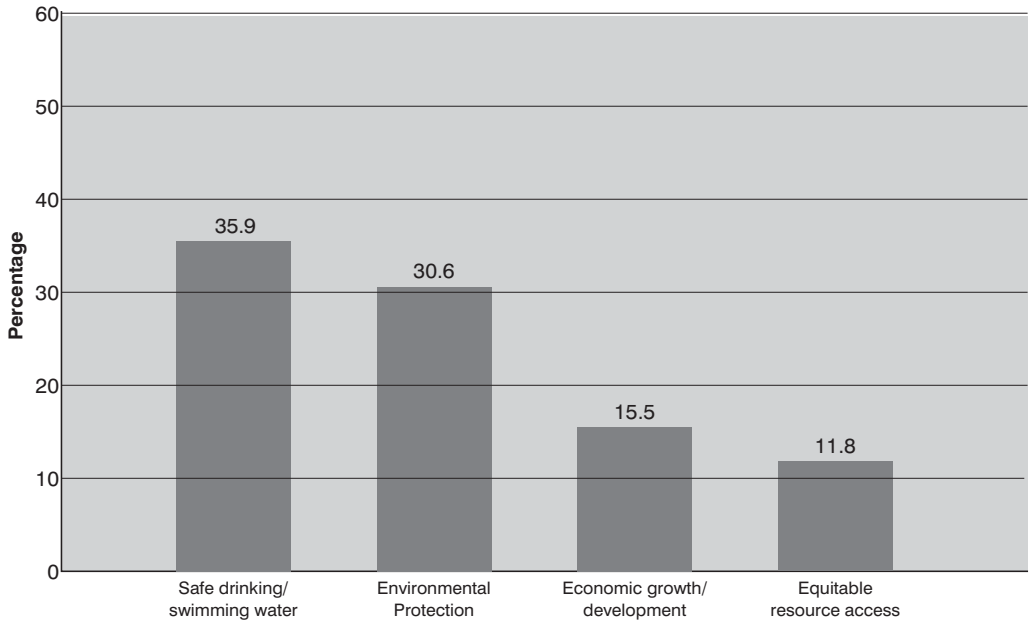


Figure 4 Second water management priority - Lower Fitzroy & Port Curtis, May 2002

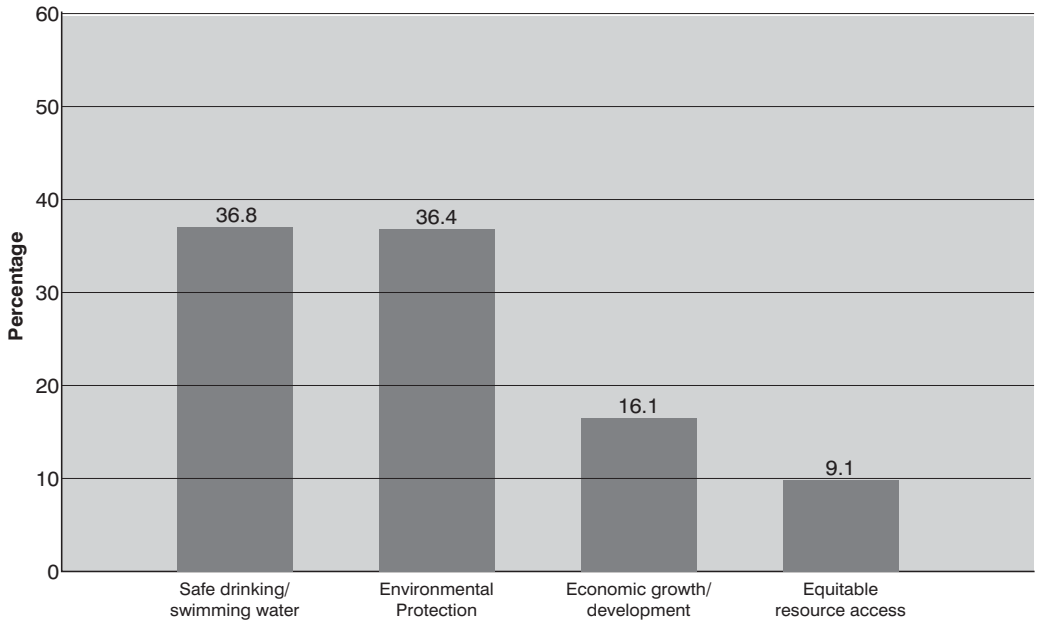


Figure 5 Second water management priority - Rockhampton, November 2002

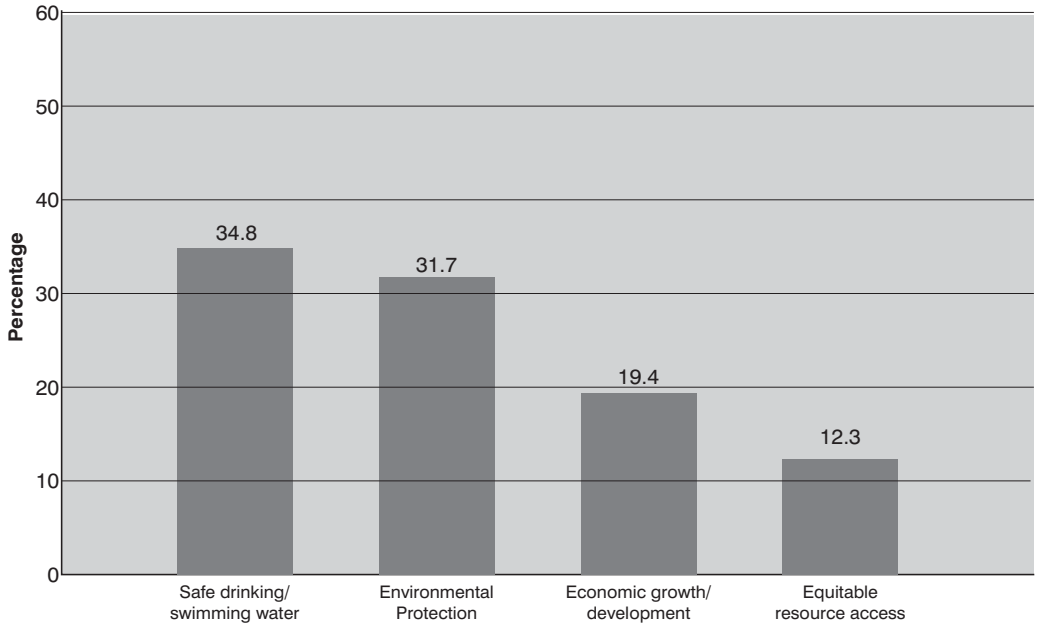
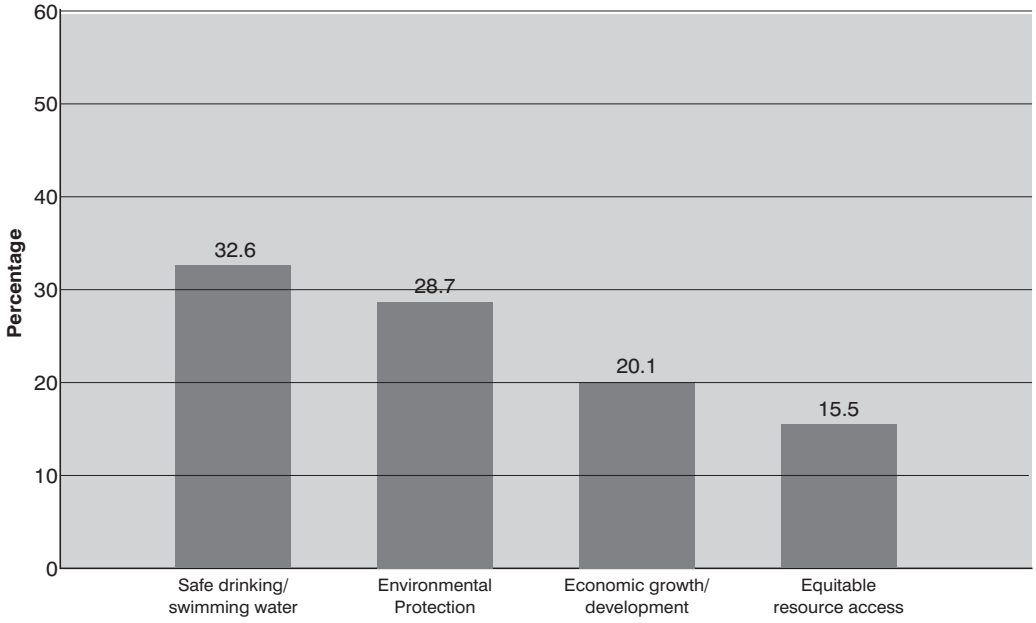


Figure 6 Second water management priority - rest of CQ, November 2002



3.2 Perceptions of water quality and change

Although the questions asked in this part of the survey elicit subjective measures of perceived water quality these provide, nevertheless, something of a basis to identify those aspects of water quality considered by respondents and their perceptions regarding what is causing changes in water quality.

3.2.1 Perceptions of water quality

Respondents were asked to allocate a score out of 10 for water quality in creeks and rivers near where they lived and in Keppel Bay (Lower Fitzroy residents) or Port Curtis (Port Curtis residents). Mean scores for the weighted sample were 6.14 for creeks and rivers (standard deviation (S.D.) 2.542) and 8.21 for Keppel Bay/Port Curtis (S.D. 2.688), indicating that marine waters were generally perceived to be in substantially better condition than creeks and rivers. Table 5, however, shows that the mean score allocated for water quality in Port Curtis was significantly lower than the mean score allocated for water quality in Keppel Bay. It is also worth noting that women rated water quality in Keppel Bay/Port Curtis more highly at 8.44 (S.D. 2.726) than did men at 7.92 (sig=.037).

Table 5 Perceived water quality by catchment

Sub-region	*Creeks & rivers*		*Sig*	*Bay/Port*		*Sig*
	Lower Fitzroy	*Port Curtis*		*Lower Fitzroy*	*Port Curtis*	
Mean Score	6.07	6.26	ns	**8.43**	**7.75**	**.000**
Standard Deviation	2.597	2.425		2.660	2.694	

3.2.2 Perceived changes in water quality

Figures 3 and 4 demonstrate that only a small number of people believed that water quality in either creeks and rivers or Keppel Bay/Port Curtis was improving, while similar numbers of people believed water quality was either deteriorating or staying much the same. Importantly, however, nearly half the respondents claimed not to know whether water quality in Keppel Bay/Port Curtis was improving or deteriorating. This compared with just over 14 percent claiming not to know whether water quality in creeks and rivers near where they lived was improving or deteriorating.

Figure 7 Perceived change in water quality in creeks & rivers

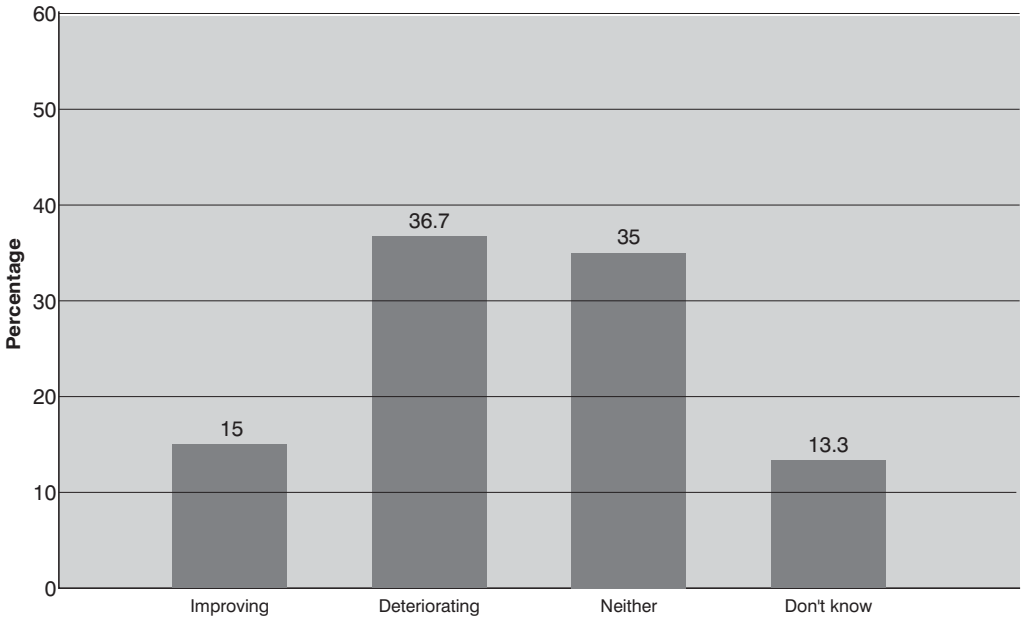
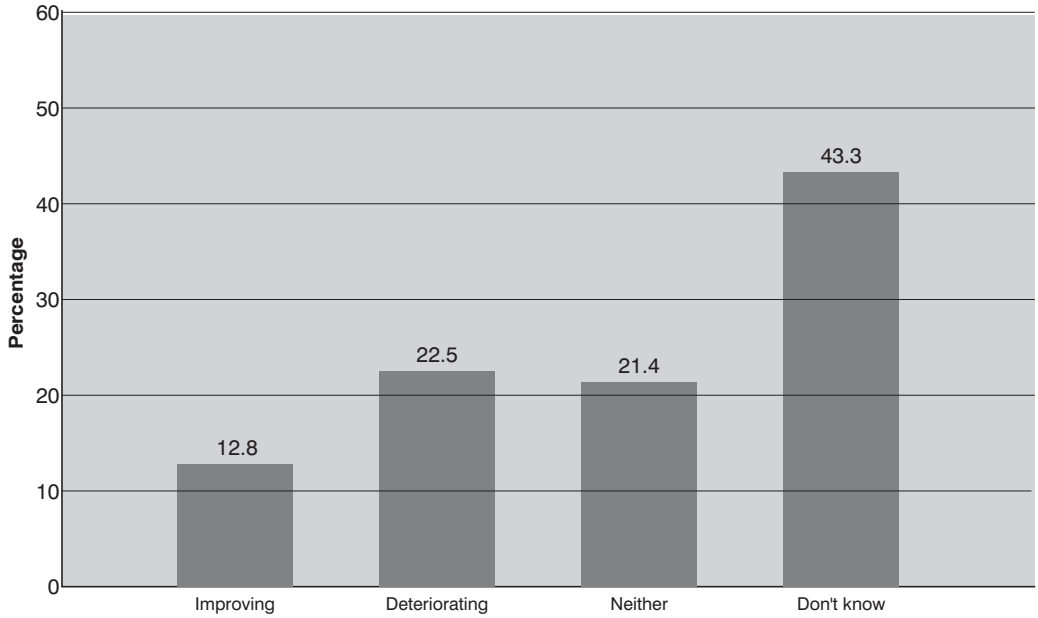


Figure 8 Perceived change in water quality in Port or Bay



The large number of people expressing uncertainty over marine water quality suggests that people either have less access to independent information on marine water quality or depend largely on their own observations of water quality and have either less opportunity to observe marine waters or greater difficulty identifying indicators of water quality for marine waters. It is also worth noting an important gender dimension to this issue with women substantially more likely to say they don't know whether water quality in Port Curtis or Keppel Bay is changing (64.1%) than men (35.9%)(x^2=23.822, df=3, sig=.000).

Table 6 Perceived change in water quality in creeks and rivers by catchment

	Lower Fitzroy (%)	***Port Curtis (%)***
Improving	16.6	11.5
Deteriorating	34.2	41.8
Neither	35.2	34.6
Don't know	13.9	12.0

x^2=7.369, df=3, sig=.061 ns

Table 6 demonstrates no significant differences between the catchments in terms of perceived change in water quality in creeks and rivers, while Table 7 demonstrates that residents of Port Curtis are significantly less likely to claim they don't know whether marine water quality is changing and significantly more likely to believe it is deteriorating.

Table 7 Perceived change in water quality in Port or Bay by catchment

	Lower Fitzroy (%)	*Port Curtis (%)*
Improving	13.4	11.5
Deteriorating	19.8	28.0
Neither	20.0	24.1
Don't know	46.7	36.4

x^2=13.084, df=3, sig=.004

The specific changes noticed by respondents are shown in Table 8. This demonstrates that people tend to be most aware of those changes that are visible, or apparent, to themselves via their own experience of waterways. While various forms of pollution were the most frequently mentioned changes, the effects of pollution on aquatic life – particularly in Port Curtis – were also rated highly.

*Table 8 Specific changes in water quality by catchment**

Value	*Percent (%)*		
	Lower Fitzroy	*Port Curtis*	*Total CQ*
More polluted in general	18.5	17.7	18.3
Aquatic life affected (e.g. less fish, dugongs)	**13.8**	**22.9**	**16.8**
Silted	10.7	13.5	11.6
More visible pollution (e.g. oil, litter)	12.6	8.9	11.4
Dirtier water	10.4	7.9	9.9
Change in water colour	9.0	5.7	7.9
Smells worse	5.3	4.7	5.1
Worse clarity	3.1	5.6	4.0
Water shortage/drought	1.7	2.5	1.9
Cleaner/smells better/improving	2.3	.7	1.9
Blue-green algae	1.7	1.5	1.6
Taste	1.5	1.7	1.5
Weeds/grass	.7	.5	.7
Don't know/no response	24.8	29.0	26.1

* This is a multiple response question with no limit set on the number of answers provided by each respondent. Percentages do not, therefore, add up to 100 percent.

3.2.3 Perceived causes of change in water quality

Table 9 shows that industry, population growth, agriculture and rubbish dumping were believed by respondents to be the activities with greatest impact on water quality. It is interesting to note that by raising these as the top four causes of change in water quality, respondents have, in effect, avoided the placement of blame for waterway degradation on just one sector of the community. While industry and agriculture are clearly identified, the issues of population growth and rubbish dumping implicate both the general community and the various layers of government responsible for planning and service provision.

*Table 9 Most frequently mentioned causes of change in water quality by catchment**

Value	*Percent*		
	Lower Fitzroy	*Port Curtis*	*Total CQ*
Industrial waste/development	10.5	29.2	16.6
Population growth	16.5	15.7	16.3
Agricultural activity	17.5	7.9	14.4
Dumped rubbish	11.7	11.0	11.5
Government inaction	9.0	9.9	9.3
Stormwater/water from drains	7.7	6.2	7.2
Boats/ferries/watercraft	6.1	7.4	6.5
Drought/floods	5.4	8.4	6.3
Gravel dredging	5.3	7.9	6.2
Wastewater/treated effluent	5.6	6.6	5.9
Foreshore/urban development	5.1	7.1	5.7
Sewerage	3.8	5.9	4.5
Dams/weirs/barrage	1.0	2.9	1.6
Blue-green algae	.5	0	.3
Fishing	.5	1.0	.6
Mining	.2	0	.2
Don't know/no response	33.6	32.2	32.8

* Multiple response - no limits

3.3 Information and Healthy Waterways

Questions regarding information related to both waterway information in general and to information about the Healthy Waterways Campaign in particular.

3.3.1 Waterway information sources and usefulness

Respondents were asked whether they had seen information on Central Queensland waterways through a number of information sources (Figure 5) and then, if yes, how useful that information had been in informing the assessment of water quality the respondent had already made (Figure 6). Figure 5 shows television to be by far the most visible source of information on waterways, probably reflecting the commencement of the Central Queensland Healthy Waterways Campaign roughly two months prior to the conduct of this survey. Other widely used sources of information were environmental groups, local newspapers and friends and colleagues. Schools and education materials, festivals and events and radio were all also used by significant numbers of people.

Very few differences were evident in information access between catchments or on the basis of demographic differences. The most notable differences were the greater use of schools and educational materials by women (31.0%) compared with men (20.5%)(x^2=16.705, df=2, p=.000), and the greater use of the Internet by men (10.5%) compared with women (5.6%)(x^2=6.902, df=2, p=.032).

Interestingly, Figure 6 shows that all these sources of information achieved similar mean scores for their usefulness. While environmental groups were allocated the highest usefulness score, friends and colleagues, schools and educational materials, the Internet, television, radio, local newspapers and festivals and events were not substantially lower.

Figure 9 CQ waterway information sources accessed

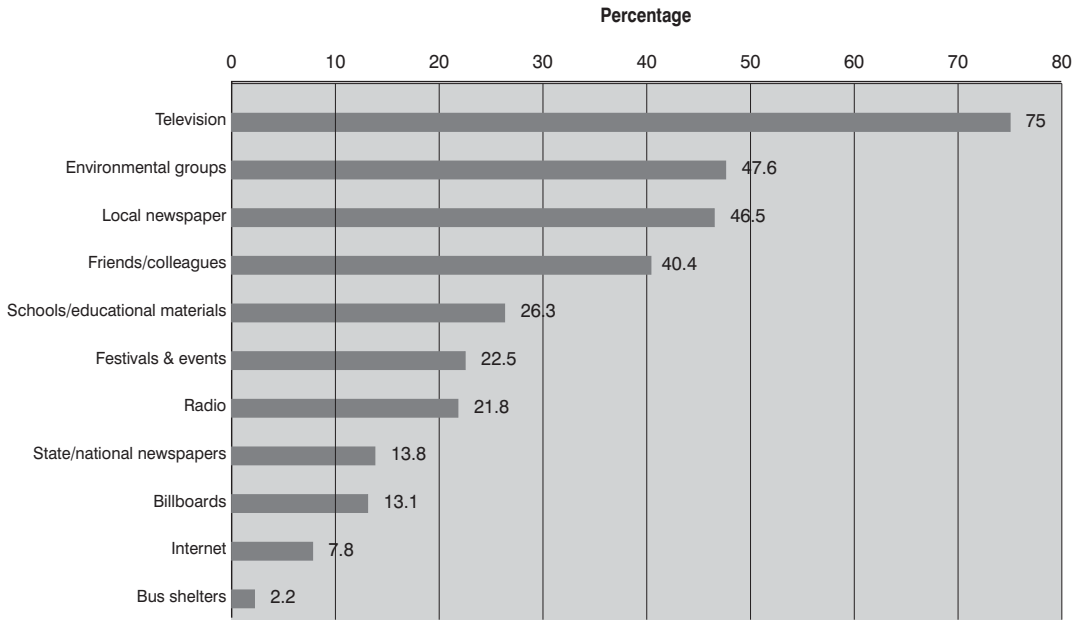
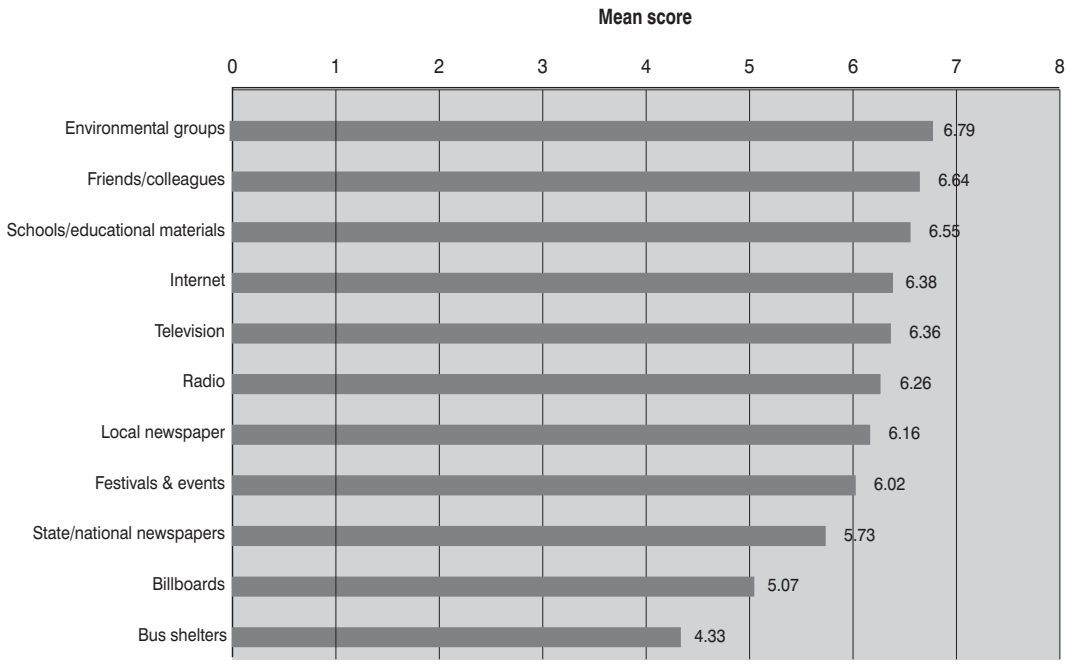


Figure 10 Usefulness of information sources in assessing water quality



Very basic signposting, on the other hand, via billboards and bus shelters was neither seen by considerable numbers of people nor seen as particularly useful by those who did.

While no differences were evident between the catchments in relation to the usefulness of the various information sources, Table 10 shows that women rated television, environmental groups and billboards as slightly more useful than do men.

*Table 10 Usefulness of information sourced by gender**

	Women (mean score)	***Men (mean score)***	***Sig***
Environmental groups	7.13	6.37	.001
Television	6.61	6.05	.004
Billboards	5.54	4.45	.043

* Statistically significant differences only

3.3.2 Healthy Waterways Campaign awareness

In May 2002, 59.6 percent of respondents, all of whom were residents of urban communities in the Lower Fitzroy and Port Curtis catchments, claimed to have heard of the Healthy Waterways Campaign. Of these, 75.8 percent had heard of it via television, 11.1 percent through the newspaper, and 1.4 percent via the Campaign launch. Another 11.8 percent nominated the category other.

By November 2002, 75.2 percent of respondents from Rockhampton had heard of the Campaign. Of these, 54.4 percent had heard of it via television. 23.1 percent via newspaper and 0.9 percent via the Campaign launch. A further 21.6 percent nominated other or don't know.

By contrast, in November 2002 only 47.9 percent of respondents from the rest of Central Queensland had heard of the Campaign. Among those who had, sources were similar with 56.7 percent hearing of the Campaign through television, 19.8 percent through newspapers, 1.5 percent through the launch and 21.9 percent either other or don't know.

The most preferred sources of extra information should respondents wish to follow up on an issue they were alerted to through the Campaign were found in the first survey to be mail (46.8%), the Internet (29.2%) and face-to-face (13.0%). Telephone and fax were nominated by 4.8 and 1.1 percent of respondents only. Similar results were recorded when this question was repeated on the CQSS.

Table 11 Segment recollection from Healthy Waterways Television Campaign

Segment topic	***Percent***
Introduction and Sponsors	4.7
Dawson River fish project	13.4
Neighbourhood catchments and revegetation	15.9
Barramundi and freshwater flows	18.7
Scientists measuring water quality	17.7
Fitzroy Basin Waterwatch - community monitoring	14.8
Port Curtis Harbour monitoring	5.8
Gladstone Volunteer Portwatch	12.2
Fitzroy riparian/streambank vegetation	4.3
Rockhampton creek revegetation project	12.9
Indigenous involvement in Natural Resource Management cultural heritage	5.5
Monitoring	4.7
Other topic not included in Campaign	2.0
Don't know/no response	24.6

* Sample includes only those respondents claiming to have heard of Healthy Waterways via television

Table 11 shows the level of recollection of the various television segments among those respondents claiming to have heard of the Healthy Waterways Campaign via television. Those topics with highest recognition tended to be those that had received, at the time of the survey, most coverage. A substantial number of respondents could not, however, recall any segments.

Table 12 lists those issues identified by respondents as topics they would like to see highlighted through the education and publicity activities of the Healthy Waterways Campaign. When interpreting this data it is worth keeping in mind that many respondents raised issues that they believed their fellow community members needed to be educated about rather than information they would like to receive themselves. This was particularly evident in relation to the number one issue of rubbish dumping. Other respondents raised things they would like to see done—such as the restoration of Lion Creek, reduction in fish catches, or dredging of the causeway lake on the Yeppoon–Emu Park Road.

*Table 12 Recommended topics for Healthy Waterways Campaign**

Topic	***Percent***
Rubbish dumping	10.8
Contributions general community can make	8.8
Industry/industrial pollution	7.2
Water conservation	6.1
Waterway restoration	6.0
Aquatic life/fishing	5.2
Waterway condition	3.7
Effects of agricultural/garden runoff/fertilisers/chemicals	3.5
Drinking water quality/supply	3.0
Environmental flows/water allocation	2.4
Dams	2.2
Wastewater recycling/management	1.6
Dredging	1.6
Waterway management/catchment management	1.5
Regulation/planning/government	1.5
Erosion/turbidity/silting	1.4
Other	4.3
Don't know/no response	12.7

* Multiple response - no limits

It is also important to realise that many respondents conceptualised these issues in terms of waterway cleanliness. 'Cleaning up waterways' had four clear dimensions:

- removal of weeds;
- removal of rubbish;
- reduced pollution; and,
- reduced sediment and turbidity.

It is worth giving some consideration to the use of language in the Healthy Waterways Campaign as the notion of 'waterway cleanliness' may have more meaning to a number of community members than the notion of 'waterway health'.

3.4 Attitudes to waterway-related issues

For ease of interpretation the questions in this section are divided into broad topic areas:

- the economic benefits of waterway development;
- the environmental impacts of development;
- the health impacts of development;
- responsibility for improving water quality;
- regulation; and,
- equity in resource access and decision-making.

The questions were not designed as internally reliable scales for the measurement of general dispositions towards each broad topic and, as far as possible, focussed instead on specific issues facing natural resource managers in Central Queensland. As such, these questions provide some insight into how the values and priorities identified in Section 3.1 influence attitudes to specific issues and the inevitable complexities and tradeoffs that these entail.

3.4.1 Economic benefits of waterway development

Table 13 shows respondents generally to believe that development of Central Queensland's waterways is essential to the economic prosperity of the region. It is notable, however, that a great deal of uncertainty exists in relation to the potential economic benefits of large dams with over half of urban residents unsure of whether benefits would flow on from the construction of the proposed Nathan Dam on the Dawson River and a third unsure about whether benefits would flow on from the extension of Awoonga Dam on the Boyne River. This may, in part,

reflect the considerable distance between coastal communities and the sites of these developments. However, given the considerable media coverage that these proposals generate it is also highly likely that there is a degree of scepticism among community members regarding the claims they have heard both for and against this proposal.

Table 13 Attitudes towards the economic benefits of waterways development in Central Queensland

	Percentage (%)				
Questions	***SA***	***A***	***D***	***SD***	***DK****
The extension of Awoonga Dam near Gladstone is vital to the long-term prosperity of the Central Queensland region	11.8	**45.1**	8.6	1.1	33.3
The construction of the proposed Nathan Dam on the Dawson River is vital to the long-term prosperity of the Central Queensland region	6.7	28.3	10.9	3.5	**50.6**
Industrial development and port expansion on the coast and waterways is vital for the long-term prosperity of the Central Queensland region	6.9	**57.2**	16.8	1.6	17.6
The development of marinas and tourism facilities along the Capricorn Coast is vital for the long-term prosperity of the Central Queensland region	9.2	**53.5**	22.4	2.4	12.6
In Central Queensland we need to use our water resources to secure more economic and industrial development	7.0	**53.4**	21.0	2.3	16.3

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know

There were significant differences between the attitudes expressed in each of the two catchments towards all but one of the questions relating to the economic benefits of development (see Table 14). While nearly half of the respondents from the Lower Fitzroy did not know whether the extension of Awoonga Dam was vital to the long-term prosperity of the region, less than a tenth of respondents from Port Curtis expressed the same uncertainty. In fact, residents of Port Curtis expressed very strong belief in the necessity of this particular development. Residents of the Lower Fitzroy were just as uncertain about the economic necessity of the proposed Nathan Dam but, in this case, Port Curtis residents were more uncertain still, with nearly two thirds claiming not to know whether this development was vital to the long-term prosperity of the region.

Table 14 Attitudes towards the economic benefits of waterway development by catchment

Questions	Gender	Percentage (%) SA	A	D	SD	DK	Sig*
The extension of Awoonga Dam near Gladstone is vital to the long-term prosperity of the Central Queensland region	**Lower Fitzroy**	**5.9**	**39.4**	**8.6**	**1.0**	**45.2**	**.000**
	Port Curtis	**24.1**	**57.0**	**8.6**	**1.5**	**8.8**	
The construction of the proposed Nathan Dam on the Dawson River is vital to the long-term prosperity of the Central Queensland region	**Lower Fitzroy**	**7.3**	**28.6**	**13.0**	**4.6**	**46.5**	**.000**
	Port Curtis	**5.4**	**27.5**	**6.6**	**1.2**	**59.2**	
Industrial development and port expansion on the coast and waterways is vital for the long-term prosperity of the Central Queensland region	**Lower Fitzroy**	**7.1**	**52.8**	**18.1**	**1.7**	**20.3**	**.002**
	Port Curtis	**6.4**	**66.3**	**14.0**	**1.2**	**12.0**	
The development of marinas and tourism facilities along the Capricorn Coast is vital for the long-term prosperity of the Central Queensland region	Lower Fitzroy	10.5	52.8	22.5	2.4	11.7	ns
	Port Curtis	6.4	54.8	22.1	2.5	14.3	
In Central Queensland we need to use our water resources to secure more economic and industrial development	**Lower Fitzroy**	**8.3**	**51.8**	**19.3**	**2.0**	**18.6**	**.004**
	Port Curtis	**4.4**	**56.8**	**24.3**	**2.9**	**11.5**	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

Industrial development and port expansion along the coast, together with the need to use water resources to secure economic development, also saw Port Curtis residents somewhat more convinced of the benefits of this type of development than Lower Fitzroy residents.

Table 15 shows that while women reflected the general trend of believing development necessary to economic prosperity, they were, nevertheless, significantly more likely than men to express both scepticism and uncertainty towards such claims.

Table 15 Attitudes towards the economic benefits of waterway development by gender

Questions	*Gender*	*Percentage (%)* *SA*	*A*	*D*	*SD*	*DK*	*Sig**
The extension of Awoonga Dam near Gladstone is vital to the long-term prosperity of the Central Queensland region	**Women**	**7.4**	**45.6**	**7.9**	**1.6**	**37.5**	**.000**
	Men	**17.0**	**44.6**	**9.5**	**.5**	**28.4**	
The construction of the proposed Nathan Dam on the Dawson River is vital to the long-term prosperity of the Central Queensland region	**Women**	**4.3**	**26.9**	**8.7**	**2.9**	**57.2**	**.000**
	Men	**9.5**	**29.8**	**13.6**	**4.3**	**42.8**	
Industrial development and port expansion on the coast and waterways is vital for the long-term prosperity of the Central Queensland region	**Women**	**4.9**	**53.7**	**16.6**	**1.6**	**23.1**	**.000**
	Men	**9.2**	**61.4**	**17.0**	**1.6**	**10.8**	
The development of marinas and tourism facilities along the Capricorn Coast is vital for the long-term prosperity of the Central Queensland region	**Women**	**9.6**	**56.1**	**18.4**	**2.2**	**13.7**	**.046**
	Men	**8.6**	**50.1**	**27.2**	**2.7**	**11.3**	
In Central Queensland we need to use our water resources to secure more economic and industrial development	**Women**	**6.7**	**49.8**	**21.3**	**1.6**	**20.6**	**.003**
	Men	**7.3**	**57.8**	**20.5**	**3.2**	**11.1**	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

3.4.2 Environmental impacts of development

Attitudes towards the environmental impacts of development demonstrated the same levels of uncertainty in relation to inland developments such as the Awoonga and Nathan Dams (see Table 16). Coastal developments, on the other hand, such as urban growth, port expansion and industrial development, it was believed, would generate major environmental impacts. Almost all respondents expressed concern about the impacts of land-based activities on the health of the Great Barrier Reef.

Table 16 Attitudes towards the environmental impacts of development

	Percentage (%)				
Questions	***SA***	***A***	***D***	***SD***	***DK****
The extension of Awoonga Dam will have very few downstream environmental effects	10.3	26.4	16.5	1.1	**45.6**
The construction of the proposed Nathan Dam will have very few downstream environmental effects	1.7	10.9	22.5	6.6	**58.3**
Continued urban development will have major environmental impacts on rivers and the coast	23.4	**55.6**	11.1	.2	9.7
The expansion of port facilities in Gladstone will have very few environmental impacts	1.7	20.3	**36.5**	5.1	**36.4**
The growth of industry in Gladstone and Rockhampton will have major environmental effects on waterways	**23.4**	**55.7**	9.5	.8	10.7
I am very concerned about the impacts of land-based activities on the health of the Great Barrier Reef	**28.2**	**54.9**	7.9	.3	8.7

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know

Differences between the two catchments in relation to the environmental impacts of development (see Table 17) nearly mirrored those differences found in relation to the economic benefits of development. Uncertainty over the extent of environmental impact accounts for the major differences between the catchments, with greater levels of uncertainty being found outside the catchment in which particular developments will be located and at sites most removed from coastal communities.

Table 17 Attitudes towards the environmental impacts of development by catchment

Questions	*Catchment*	*Percentage (%)* *SA*	*A*	*D*	*SD*	*DK*	*Sig**
The extension of Awoonga Dam will have very few downstream environmental effects	**Lower Fitzroy**	**8.1**	**23.7**	**10.3**	**1.0**	**57.0**	**.000**
	Port Curtis	**15.0**	**31.9**	**29.5**	**1.5**	**22.1**	
The construction of the proposed Nathan Dam will have very few downstream environmental effects	**Lower Fitzroy**	**2.0**	**11.2**	**23.7**	**8.3**	**54.8**	**.004**
	Port Curtis	**1.2**	**10.1**	**19.9**	**3.2**	**65.6**	
Continued urban development will have major environmental impacts on rivers and the coast	Lower Fitzroy	22.7	54.3	11.5	.2	11.2	ns
	Port Curtis	24.8	58.2	10.3	0	6.6	
The expansion of port facilities in Gladstone will have very few environmental impacts	**Lower Fitzroy**	**1.2**	**16.9**	**34.5**	**3.9**	**43.5**	**.000**
	Port Curtis	**2.7**	**27.3**	**40.5**	**7.6**	**21.9**	
The growth of industry in Gladstone and Rockhampton will have major environmental effects on waterways	**Lower Fitzroy**	**20.8**	**56.0**	**8.8**	**1.0**	**13.4**	**.000**
	Port Curtis	**28.7**	**55.0**	**10.8**	**.5**	**4.9**	
I am very concerned about the impacts of land-based activities on the health of the Great Barrier Reef	Lower Fitzroy	29.1	55.0	7.1	.2	8.6	ns
	Port Curtis	26.3	54.5	9.6	.5	9.1	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

As Table 18 shows, there were significant differences between women and men on all questions related to the environmental impacts of development, with much of this difference accounted for by greater levels of uncertainty among women than among men.

Table 18 Attitudes towards the environmental impacts of development by gender

		Percentage (%)					
Questions	***Gender***	***SA***	***A***	***D***	***SD***	***DK***	***Sig****
The extension of Awoonga Dam will have very few downstream environmental effects	**Women**	**9.2**	**28.8**	**10.3**	**.4**	**51.2**	**.000**
	Men	**11.6**	**23.5**	**24.1**	**1.9**	**38.9**	
The construction of the proposed Nathan Dam will have very few downstream environmental effects	**Women**	**.7**	**8.3**	**19.8**	**5.2**	**66.1**	**.000**
	Men	**3.0**	**13.8**	**25.7**	**8.4**	**49.2**	
Continued urban development will have major environmental impacts on rivers and the coast	**Women**	**22.5**	**57.1**	**8.3**	**0**	**12.1**	**.006**
	Men	**24.7**	**53.9**	**14.4**	**.3**	**6.8**	
The expansion of port facilities in Gladstone will have very few environmental impacts	**Women**	**.7**	**14.8**	**35.0**	**5.2**	**44.4**	**.000**
	Men	**3.0**	**27.0**	**38.3**	**5.1**	**26.7**	
The growth of industry in Gladstone and Rockhampton will have major environmental effects on waterways	**Women**	**23.9**	**59.2**	**6.1**	**.7**	**10.1**	**.007**
	Men	**22.8**	**51.8**	**13.6**	**.8**	**11.1**	
I am very concerned about the impacts of land-based activities on the health of the Great Barrier Reef	**Women**	**29.4**	**55.4**	**4.7**	**0**	**10.5**	**.001**
	Men	**26.8**	**54.1**	**11.6**	**.8**	**6.8**	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

3.4.3 Health impacts of development

Only one question was asked regarding the impacts of development on human health. Tables 19 to 21 show almost universal concern over this issue, with slightly higher levels of concern among women than among men.

Table 19 Attitudes towards the health impacts of development

	Percentage (%)				
Questions	***SA***	***A***	***D***	***SD***	***DK****
I am very concerned about the impacts of pollution in waterways in the health of Central Queensland residents	**29.9**	**59.6**	6.4	.5	3.6

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know

Table 20 Attitudes towards the health impacts of development by catchment

		Percentage (%)					
Questions	***Catchment***	***SA***	***A***	***D***	***SD***	***DK***	***Sig****
I am very concerned about the impacts of pollution in waterways on the health of Central Queensland residents	Lower Fitzroy	30.6	58.9	6.1	.5	3.9	ns
	Port Curtis	28.5	60.9	7.1	.5	2.9	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

Table 21 Attitudes towards the health impacts of development by gender

		Percentage (%)					
Questions	***Gender***	***SA***	***A***	***D***	***SD***	***DK***	***Sig****
I am very concerned about the impacts of pollution in waterways on the health of Central Queensland residents	**Women**	**30.3**	**61.9**	**3.8**	**.2**	**3.8**	**.009**
	Men	**29.5**	**56.8**	**9.7**	**.8**	**3.2**	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

3.4.4 Responsibility for water quality

None of the groups examined – whether farmers, the general public, governments, or industry and developments – were seen to take enough responsibility for water quality, although respondents were somewhat less critical of farmers than they were of the other groups (see Table 22). Residents of Port Curtis were more critical of governments and industry and developers than were Lower Fitzroy residents (see Table 23), while women were less critical of farmers and more critical of the general public and industry and developers than were men (see Table 24).

Table 22 Attitudes towards responsibility for water quality

Questions	Percentage (%) SA	A	D	SD	DK*
Farmers do not take enough responsibility to stop doing things that damage our waterways	14.9	**39.7**	**23.9**	1.3	20.2
The general public do not take enough responsibility to stop doing things that damage our waterways	**25.2**	**63.0**	8.0	.3	3.5
Governments do not take enough responsibility to stop doing things that damage our waterways	**24.3**	**52.5**	13.0	0	10.1
Industries and developers do not take enough responsibility to stop doing things that damage our waterways	**21.6**	**53.3**	11.9	.7	12.5

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know

Table 23 Attitudes towards responsibility for water quality by catchment

Questions	Catchment	Percentage (%) SA	A	D	SD	DK	Sig*
Farmers do not take enough responsibility to stop doing things that damage our waterways	Lower Fitzroy	15.4	38.9	24.0	1.0	20.8	ns
	Port Curtis	13.8	41.5	23.8	2.0	18.9	
The general public do not take enough responsibility to stop doing things that damage our waterways	Lower Fitzroy	25.9	62.6	7.3	.5	3.7	ns
	Port Curtis	23.6	63.9	9.3	0	3.2	
Governments do not take enough responsibility to stop doing things that damage our waterways	**Lower Fitzroy**	**23.7**	**50.4**	**14.9**	**0**	**11.0**	**0.27**
	Port Curtis	**25.6**	**57.0**	**9.1**	**0**	**8.4**	
Industries and developers do not take enough responsibility to stop doing things that damage our waterways	**Lower Fitzroy**	**18.8**	**54.8**	**11.0**	**.5**	**14.9**	**.000**
	Port Curtis	**27.3**	**50.4**	**13.8**	**1.2**	**7.4**	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

Table 24 Attitudes towards responsibility for water quality by gender

Questions	*Catchment*	*Percentage (%)* *SA*	*A*	*D*	*SD*	*DK*	*Sig**
Farmers do not take enough responsibility to stop doing things that damage our waterways	**Women**	**11.2**	**41.0**	**23.1**	**1.6**	**23.1**	**.008**
	Men	**19.2**	**38.1**	**24.9**	**1.1**	**16.8**	
The general public do not take enough responsibility to stop doing things that damage our waterways	**Women**	**27.0**	**63.4**	**5.4**	**.2**	**4.0**	**.038**
	Men	**23.0**	**62.7**	**11.1**	**.3**	**3.0**	
Governments do not take enough responsibility to stop doing things that damage our waterways	Women	22.5	55.1	11.2	0	11.2	ns
	Men	26.5	49.5	15.1	0	8.9	
Industries and developers do not take enough responsibility to stop doing things that damage our waterways	**Women**	**22.4**	**56.2**	**8.5**	**.2**	**12.8**	**.005**
	Men	**20.6**	**49.9**	**16.0**	**1.4**	**12.2**	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

3.4.5 Regulation

Tables 25 to 28 show strong support for strict regulation of activities that affect the quality of waterways. Water pollution and mining within areas of the Great Barrier Reef were strongly opposed while the use of water meters to regulate domestic water use was seen as essential to the sustainability of town water supplies.

The only significant differences between groups in relation to these questions relate to the issue of water meters, with residents of Rockhampton less convinced of their value than residents of other communities within Central Queensland (see Table 27). While this is not surprising given recent debate over the introduction of water meters within Rockhampton (the last local government area in Australia to take this step) and opposition to this initiative by a number of public representatives, it is notable that over half of Rockhampton residents believed their introduction necessary while, in those communities already using water meters, almost all residents believed them necessary.

Table 25 Attitudes towards regulation

Questions	Percentage (%) SA	A	D	SD	DK*
The use of water meters to regulate domestic water use is necessary to the sustainability of town water supplies	**25.9**	**49.5**	14.9	5.2	4.6
Governments need to strictly enforce regulations against water pollution	**45.8**	**51.4**	1.9	.2	.7
Mining in areas of the Great Barrier Reef should not be allowed	**58.4**	**30.1**	5.0	1.7	4.7

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know

Table 26 Attitudes towards regulation by catchment

Questions	Catchment	Percentage (%) SA	A	D	SD	DK	Sig*
The use of water meters to regulate domestic water use is necessary to the sustainability of town water supplies	**Lower Fitzroy**	**22.2**	**44.7**	**19.8**	**7.6**	**5.6**	**.000**
	Port Curtis	**33.4**	**59.2**	**4.7**	**.2**	**2.5**	
Governments need to strictly enforce regulations against water pollution	Lower Fitzroy	45.2	52.3	1.7	.2	.5	ns
	Port Curtis	46.9	49.6	2.2	0	1.2	
Mining in areas of the Great Barrier Reef should not be allowed	Lower Fitzroy	57.9	31.1	4.2	2.0	4.9	ns
	Port Curtis	59.2	28.3	6.9	1.2	4.4	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

Table 27 Comparison between Rockhampton and other CQ residents on attitude towards ecological necessity of water meters

Questions	Catchment	Percentage (%) SA	A	D	SD	DK	Sig*
The use of water meters to regulate domestic water use is necessary to the sustainability of town water supplies	**Rockhampton**	**14.7**	**43.8**	**25.0**	**10.5**	**6.0**	**.000**
	Other CQ	**35.8**	**54.5**	**5.8**	**.5**	**3.4**	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

Table 28 Attitudes towards regulation by gender

Questions	Catchment	Percentage (%) SA	A	D	SD	DK	Sig*
The use of water meters to regulate domestic water use is necessary to the sustainability of town water supplies	Women	25.1	51.1	14.8	5.2	3.8	ns
	Men	26.8	47.3	15.1	5.1	5.7	
Governments need to strictly enforce regulations against water pollution	Women	45.8	51.9	1.6	.2	.4	ns
	Men	45.9	50.8	2.2	0	1.1	
Mining in areas of the Great Barrier Reef should not be allowed	Women	60.5	29.8	3.8	1.1	4.7	ns
	Men	55.7	30.5	6.8	2.4	4.6	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

3.4.6 Equity

Table 29 shows that the vast majority of respondents agreed with the general principles – however contradictory they may, at first, appear – that both the beneficiaries and the perpetrators of environmental damage should contribute to the cost of dealing with problems. Respondents were almost equally split on a third general principle of maximising economic gain from waterway use for the current generation. Together these responses suggest that achieving a sense of fairness in the allocation of costs cannot be achieved by following a simple recipe, but that processes – themselves believed fair and transparent – must be utilised to determine those circumstances where individual polluters should meet all costs and those for which cost sharing is appropriate.

Both questions asked here in relation to specific issues again elicited high numbers of 'don't know' responses, particular with regard to the allocation of water in the Fitzroy for environmental flows. Importantly, when responses to this question are

examined on a catchment basis the number of respondents within the Lower Fitzroy answering 'don't know' remains high (see Table 30). When the broad agreement with the proposition that downstream residents do not get enough say over activities in the upper catchment that affect water quality is also taken into consideration it becomes clear that the majority of lower catchment residents feel removed or excluded from decision-making over issues like environmental flows.

Table 29 Attitudes towards questions of equity in resource access and decision-making

	Percentage (%)				
Questions	***SA***	***A***	***D***	***SD***	***DK****
Whether they cause them or not, the whole community benefits from healthier waterways so everybody should contribute to the cost of addressing problems	**33.3**	**57.6**	4.5	.3	4.3
Polluter pays. Whoever causes problems should pay to fix them whatever the cost	**47.5**	**43.9**	5.1	.7	2.8
Central Queensland's waterways should be utilised for maximum economic gain for the current generation	7.4	**36.5**	**37.6**	8.7	9.9
Downstream residents and waterway users don't get enough say over activities in the upper catchment that effect water quality	13.3	**49.4**	9.6	.7	26.9
Too much water in the Fitzroy system is allocated to agriculture and industry, and not enough to the environment	5.2	22.1	26.1	1.5	**45.0**

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know

Table 30 Attitudes towards questions of equity in resource access and decision-making by catchment

Questions	Catchment	Percentage (%) SA	A	D	SD	DK	Sig*
Whether they cause them or not, the whole community benefits from healthier waterways so everybody should contribute to the cost of addressing problems	Lower Fitzroy	32.8	57.7	4.2	.2	5.1	ns
	Port Curtis	34.4	57.2	5.2	.5	2.7	
Polluter pays. Whoever causes problems should pay to fix them whatever the cost	Lower Fitzroy	47.2	44.0	5.4	1.0	2.4	ns
	Port Curtis	48.2	43.7	4.4	.2	3.4	
Central Queensland's waterways should be utilised for maximum economic gain for the current generation	Lower Fitzroy	7.8	38.6	34.7	9.0	9.8	ns
	Port Curtis	6.4	32.2	43.5	7.9	10.1	
Downstream residents and waterway users don't get enough say over activities in the upper catchment that effect water quality	**Lower Fitzroy**	**15.2**	**46.7**	**10.3**	**1.0**	**26.9**	**.013**
	Port Curtis	**9.6**	**55.0**	**8.4**	**0**	**27.0**	
Too much water in the Fitzroy system is allocated to agriculture and industry, and not enough to the environment	**Lower Fitzroy**	**5.9**	**21.8**	**30.3**	**1.5**	**40.6**	**.000**
	Port Curtis	**3.9**	**22.9**	**17.4**	**1.7**	**54.1**	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

Table 31 shows that women were slightly more inclined to agree that waterways should be managed for maximum economic gain for the current generation, and that they were significantly more likely to express uncertainty over the specific issues of environmental flows and exclusion of downstream residents from decision-making.

Table 31 Attitudes towards questions of equity in resource access and decision-making by gender

		Percentage (%)					
Questions	***Gender***	***SA***	***A***	***D***	***SD***	***DK***	***Sig****
Whether they cause them or not, the whole community benefits from healthier waterways so everybody should contribute to the cost of addressing problems	Women	32.4	57.3	5.2	0	5.2	ns
	Men	34.3	57.8	3.8	.8	3.2	
Polluter pays. Whoever causes problems should pay to fix them whatever the cost	Women	49.0	44.0	4.0	.2	2.7	ns
	Men	45.8	43.7	6.2	1.3	3.0	
Central Queensland's waterways should be utilised for maximum economic gain for the current generation	**Women**	**7.2**	**39.3**	**33.7**	**7.9**	**11.9**	**.032**
	Men	**7.6**	**33.1**	**42.3**	**9.5**	**7.6**	
Downstream residents and waterway users don't get enough say over activities in the upper catchment that effect water quality	**Women**	**11.4**	**49.0**	**7.8**	**.7**	**31.1**	**.013**
	Men	**15.7**	**49.7**	**11.9**	**.8**	**21.9**	
Too much water in the Fitzroy system is allocated to agriculture and industry, and not enough to the environment	**Women**	**4.0**	**22.6**	**23.3**	**1.1**	**59.7**	**.027**
	Men	**6.8**	**21.6**	**29.5**	**2.2**	**40.0**	

* SA = Strongly agree; A = Agree; D = Disagree; SD = Strongly disagree; DK = Don't know; Sig = Significant

4. Conclusion and implications

The results of this survey highlight a considerable dilemma in natural resource management between encouraging the active participation of all citizens affected by natural resource decision-making in that decision-making, and accepting that in large populations (such as those found in the cities of Rockhampton and Gladstone) such participation in all decisions may be both unmanageable (due to a lack of appropriate processes and resources) and unrealistic (due to conflicting priorities and interests for large numbers of people). Where direct participation is possible people may speak and act for themselves. Where it is not, representative forms of decision-making become necessary, with surveys such as this providing mechanisms to better understand the values and aspirations of those not directly involved. Both approaches have the potential to contribute to the democratisation of decision-making provided they are used neither to cement the domination of a limited number of interest groups nor to over-ride legitimate minority viewpoints. Resolving this tension requires not so much a balancing of the two approaches as a commitment to using each to strengthen the other. Tools such as surveys and representation may be used to open opportunities for those impacted by proposals and decisions to participate in negotiation over their management, just as community groups and other participatory forums may be drawn into representative processes, communication strategies such as CQ Healthy Waterways, and so on.

Urban residents of the Lower Fitzroy and Port Curtis catchments agree that development is necessary for economic prosperity, but they do not support development at any cost. Rather, they support strong regulation of potentially polluting activities, the complete exclusion of mining from areas of the Great Barrier Reef, and an absolute priority on protecting environmental values and community safety. Maintaining the amenity and character of Central Queensland waterways is also of substantial importance. On this basis it is safe to conclude that attaining community support for any development or waterway management initiative is utterly dependent on being able to demonstrate the maintenance of community safety and protection of the environmental and aesthetic qualities of waterways.

It is not simply enough, however, for development or policy proponents and relevant agencies simply to make decisions on the basis of these priorities and then to communicate those decisions to the general public. High levels of uncertainty regarding both water quality in marine waters, and the implications of existing issues and proposals, suggests a need for substantial improvements in communication. This is despite high levels of awareness of waterway-related information across a number of media sources. While increasing the amount of waterway-related information disseminated through the mass media via initiatives such as the Healthy Waterways Campaign may lead to improvements in communication, these results suggest that such initiatives will attain most impact

if they provide linkages between scientific information on waterways, people's own observations of changes in waterways and catchments, and opportunities for meaningful participation in decision-making and action.

Survey respondents indicated that their preferred sources of additional information were by mail and the Internet. Given, however, the high levels of awareness respondents had of information disseminated by community environmental groups—and the high credibility of these groups—the survey suggests that working closely with the community environment sector may pay substantial dividends in linking scientific information, community knowledge/observations, and decision-making/action. Clearly, many agencies are already heavily engaged with groups such as Landcare, Waterwatch, Integrated Catchment Management and so on. Nevertheless, exploring more ways in which initiatives such as the Central Queensland Healthy Waterways Campaign may both support and draw on the community environment sector deserves consideration.

While equity of access to resources and decision-making was not rated highly when compared with safe drinking and swimming water and environmental protection, the importance of equity was evident in the survey in several ways. In addition to the belief that downstream residents did not have sufficient input into upper catchment developments that affect waterway health, it was clear that fair and transparent processes are necessary when resolving the balance, in practice, between the principles of polluter-pays and cost sharing. Further, the significantly higher levels of uncertainty expressed by women than men on a number of questions suggests very strongly that steps need to be taken to both communicate more effectively, and open more avenues for participation, with this group. With more women than men exposed to waterway information through schools and educational materials this would appear to be one way of addressing the imbalance. On the whole, however, information appears to be getting out to women just as effectively as to men. The difference would appear to lie more in the confidence of women to form opinions on the basis of that information suggesting, again, that the effectiveness of communication would be enhanced through greater linking of information to opportunities for participation in discussion, action and decision-making.

Appendix 1

CENTRAL QUEENSLAND HEALTHY WATERWAYS QUESTIONNAIRE

The first few questions relate to the waterways near where you live and how much value you place on the different functions they can be used for. When we say waterways we mean rivers, streams, wetlands and bays such as Port Curtis/ Keppel Bay.

Q. To start, could you tell me the name of the water catchment in which you live, that is, the name of the nearest creek or river?

Q. On a scale of one to ten, where one means not at all important and ten means extremely important, could you tell me how important the waterways of Central Queensland are to you?

Q. On a scale of one to ten, where one means not at all important and ten means extremely important, please score each of the following waterway functions and uses according to the importance that you place on them.

- Recreational activities on the water (e.g.. boating, fishing, swimming)
- Land based recreational activities on the waterside (e.g.. picnicking, walking, cycling)
- Entertainment and meeting places (e.g.. riverside restaurants, marinas)
- Tourism
- As a symbol or landmark for the city and region
- As a setting for cultural and festival activities
- Scenery and landscape (e.g.. enjoying the view)
- Heritage (e.g.. historical and Aboriginal sites)
- Passenger transportation
- Agriculture/farming
- Sand and gravel extraction
- Commercial fishing
- Sites for residential development
- Other commercial use (e.g.. coal transport, port facility)
- Town water supply
- Industrial water supply

- Wastewater disposal
- Stormwater disposal
- Ecological/environmental significance (e.g.. aquatic plants, animals and their habitat)

☎ Q. When making decisions about management of waterways we're often faced with lots of different priorities. If you had to choose just one priority from the following list that could not be compromised in the future management of Central Queensland waterways what would it be?

- Equitable access to resources
- Environmental protection
- Economic growth and development
- Safe drinking and swimming water

☎ Q. If you could choose a second priority from the same list what would it be?

- Equitable access to resources
- Environmental protection
- Economic growth and development
- Safe drinking and swimming water

Thank you. We're interested now in what you think of the water quality in Central Queensland waterways.

Q. If you had to give a score out of ten, where one equals extremely poor and ten equals extremely good, what score would you give for the quality of water in the creek or river nearest where you live?

Q. Do you think that water quality in that creek or river nearest where you live is currently improving, deteriorating or staying the same?

Q. Out of ten again, what score would you give for water quality in Port Curtis/ Keppel Bay?

Q. Do you think that water quality in Port Curtis/Keppel Bay is currently improving, deteriorating or staying the same?

Q. What specific changes in water quality throughout Central Queensland have you noticed or heard about? [open]

Q. What do you think has caused these changes? [open]

The next few questions are about where you have seen information about waterways in Central Queensland.

For each of the following sources of information, I'd like you to let me know: first, whether you have seen or received information about waterways related issues from this source (e.g.. water quality, waste, cultural heritage, clean-up campaigns); and second, how you would score the usefulness to yourself of this source in forming opinions about waterways.

Q. Have you received information about Central Queensland waterways through ...?

Q. What score would you give ... out of ten for their usefulness to yourself?

- Local newspapers
- State and national newspapers (e.g.. Courier Mail, The Australian)
- Television
- Radio
- Events and displays (e.g.. science week, shopping centre displays)
- Local Council (Fitzroy, Rockhampton, Livingston, Calliope, Gladstone)
- State Government departments (Natural Resources and Mines, Primary Industries etc.)
- Schools/educational materials
- Environmental groups like Landcare, Catchment Management or Waterwatch
- Friends or colleagues
- The Internet

☎ Q. Have you heard of the Central Queensland Healthy Waterways Campaign? YES/NO

☎ Q. Where have you heard about the Healthy Waterways Campaign?

- Television

- Newspaper
- Launch
- Other

Q. Can you tell me any of the topics that have been covered by the Central Queensland Healthy Waterways Campaign?

- Introduction and sponsors
- Dawson river fish project
- Neighbourhood catchments and revegetation
- Barramundi need good freshwater flows
- Scientists measuring water quality
- Fitzroy basin Waterwatch — community monitoring
- Port Curtis harbour monitoring
- Gladstone volunteer Portwatch — dugongs, dolphins, turtles, crocodiles
- Fitzroy riparian/streambank vegetation
- Rockhampton creek re-vegetation project
- Indigenous involvement in natural resource management — cultural heritage
- Monitoring other

☎ Q. If you wanted to get more information on a Healthy Waterways initiative you saw on television or in the newspaper, would you prefer to get that information via the:

- Internet
- Mail
- Fax
- Phone
- Person-to-person

Q. Are there any particular waterways issues that you think need more publicity and education through the Central Queensland Healthy Waterways campaign? [open]

Thank you. We're interested now in the beliefs that you have about waterway related issues in Central Queensland. Please remember as we go through these questions that all your answers are completely confidential. We need to know what it really is that you think about these issues.

I'm going to put a number of statements to you, and would like you to tell me how strongly you agree or disagree with each of them, or if you don't know. The answers you can give are strongly agree, agree, disagree, strongly disagree, or don't know.

Q. Too much water in the Fitzroy system is allocated to agriculture and industry, and not enough to the environment

Q. Whether they cause them or not, the whole community benefits from healthier waterways so everybody should contribute to the cost of addressing problems

Q. Farmers do not take enough responsibility to stop doing things that damage our waterways

Q. Polluter pays. Whoever causes problems should pay to fix them whatever the cost

Q. The use of water meters to regulate domestic water use is necessary to the sustainability of town water supplies

Q. The extension of Awoonga Dam will have major downstream environmental effects

Q. The general public does not take enough responsibility to stop doing things that damage our waterways

Q. I am very concerned about the impacts of pollution in waterways on the health of Central Queensland residents

Q. Governments need to strictly enforce regulations against water pollution

Q. Continued urban development will have major environmental impacts on rivers and the coast

Q. Governments do not take enough responsibility to stop doing things that damage our waterways

Q. Mining in areas of the Great Barrier Reef should not be allowed

Q. The growth of industry in Gladstone and Rockhampton will have major impacts on waterway environments

Q. The extension of Awoonga Dam near Gladstone is vital to the long-term prosperity of the region (Central Queensland)

Q. Industries and developers do not take enough responsibility to stop doing things that damage our waterways

Q. The construction of the proposed Nathan Dam on the Dawson River is vital to the long-term prosperity of the region (Central Queensland)

Q. The expansion of port facilities in Gladstone will have very few environmental impacts

Q. Industrial development and port expansion on the coast and waterways is vital for the long-term prosperity of the region (Central Queensland)

Q. I am very concerned about the impacts of land-based activities on the health of the Great Barrier Reef

Q. The construction of the proposed Nathan Dam will have very few downstream environmental effects

Q. The development of marinas and tourism facilities along the Capricorn Coast is vital for the long-term prosperity of the region (Central Queensland)

Q. In Central Queensland we need to use our water resources to secure more economic and industrial development

Q. Downstream residents and waterway users don't get enough say over activities in the upper catchment that affect water quality

Q. Central Queensland's waterways should be utilised for maximum economic gain for the current generation

Now I'd like to finish with just a few questions about yourself.

Q. What is your age?

Q. How long have you resided in Central Queensland?

Q. What is your City or Shire of residence?

Q. Record respondent's gender

Q. What is you highest level of education? This includes complete and incomplete.

Q. What is your annual income?

Q. What is your occupation?

Q. Would you describe yourself as:

- Aboriginal
- Torres Strait Islander
- South Sea Islander
- None of the above

Thank you for your time. The information you have provided will be invaluable in the formulation of government policy and programs to improve water quality in Central Queensland.