Considerations for Developing Water Policy Appropriate Guidelines for Conducting Contingent Valuation Studies: A Kat River Valley Case Study[1]

C. N. Mbatha[2]

Abstract:

Guidelines for administering the Contingent Valuation (CV) method advocate the exclusion of Willing To Pay (WTP) values from respondents with no reported incomes. However, in cases where the CV method is administered for the implementation of a public policy whose objective is to protect public resources, by mobilising local participation, the said exclusion criterion may yield inappropriate results. In addition, no literature guidelines exist for dealing with discrepancies between market and cultural values inherent to unit currencies such as livestock used by rural and traditional respondents. Using unit currencies to which cultural values are attached for the same type and quantity of resources may yield different outcomes to economic values in monetary units. Hence, research findings from a Kat River Valley (KRV) survey in the Eastern Cape, 2004, suggest that: a) incomes alongside considerations for policy objectives should determine which WTP values may be excludable from analyses, and b) guidelines for dealing with value discrepancies induced through the use of cultural unit currencies should be developed.

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[2] Rhodes University, Department of Economics: c.mbatha@ru.ac.za

1. Introduction

A Contingent Valuation (CV) survey was undertaken in the Kat River Valley (KRV), Eastern Cape province in 2004. The aim of the survey was to estimate the economic value of licences for water resources and aspects of their management, using the Willingness to Pay (WTP) method. The protection of water resources, through physical monitoring, and the establishment of a water governing institution (i.e. Catchment Management Agency (CMA)) were the two management aspects valuated (Mbatha, 2005).

However, in the KRV survey it was found that literature guidelines for administering CV methods do not adequately address:

a) the effects of traditional beliefs and cultural values on economic valuations of environmental resources in rural traditional areas, and
b) public policy factors, which should contribute to the process of eliminating 'protest' values from data analysis.

Furthermore, the research also found that consumer surpluses exist in markets for labour units and water resources. This finding signalled that an economic opportunity exists for exploitation by the Department of Water Affairs and Forestry (DWAF) in the implementation process of the National Water Policy (NWP) (1997).

In section 2, the paper reviews the method guidelines for administering CV surveys. The relevant objectives of the NWP (1997) are discussed in section 3. A contextual discussion of administering CV methods in the KRV is presented in section 3. Results are presented and discussed in section 4. The implications of findings for the NWP (1997) are discussed in section 5, and concluding remarks are presented in section 6.

2. The review of CV method guidelines

2.1 The conceptual challenges to CV methods in water resources

In the water sector economic valuation studies can be used, firstly, to approximate aggregated values of individual users of water resources, and secondly, to approximate the levels of effective water discharge charges and water abstraction licence prices that can be imposed as disincentives and incentives aimed at protecting resources against degradation.

There are several valuation methods that could be used in valuating environmental resources for setting effective prices, and each has its strengths and weaknesses (Willis, 2002:635-645). The CV method, however, has received the most attention in recent literature (Willis, 2002; Hanemann, 1994; Hanley, 2000; Willington, 1998, etc.). Often other valuation methods[3] are employed alongside the CV method to cross

[3] The following is a description of three further valuation methods that can be used alongside the CV methods, as described by Willis (2002):
a) The *Mitigating and Averting Expenditure and Opportunity Cost Measures:* the method is often used in measuring the costs of people's averting behaviour e.g. the costs of avoiding pollution effects such costs in avoiding illness (e.g. medical costs). Using the method, the aggregated individual costs of installing air conditioners, medicine consumption, even migration, etc. are investigated, estimated and treated as the equivalent costs for pollution abatement policies and programmes.

check the validity and acceptability of results (Baustista et al., 2000 and van Zyl et al., 2000:92-98).

The CV is a straight forward method of asking people for the economic value they are Willing To Pay (WTP) or Accept (WTA) for the provision or removal of some resource in an hypothetical market context. For instance, the context may entail the implementation of a public policy whose aims are to protect environmental resources from misuse. Compared to the WTA, however, WTP values are considered to be more reliable and realistic, as they do not suffer as much from value distortions. For example, WTP values do not suffer from the 'endowment' effect (i.e. sentimental attachments to goods owned over a long time), and from income and substitution effects (Morrison, 1997; Shogren and Shin, 1994; Hanemann, 1994 cited in Snowball, 1998:58-59). Morrison (1997 in Snowball, 1998:59) argues that sometimes people value goods they have owned over a long time significantly higher than goods they have acquired recently. On the other hand, where WTP values are often regulated by income constraints, WTA values are not necessarily reliant on present incomes. In fact, WTA values can be infinite and therefore impossible to work with, because they make it easier for respondents to express their political stances (Snowball, 1998).

Moreover, because respondents do not always have all the information on the biological interdependencies among different species or resources in ecosystems, they do not always place an economic value on this aspect of the environment (i.e. biodiversity). Evidence also shows that *part-whole biases* (discussed shortly) exist in the administering of valuation surveys (Willis, 2002; Hanemann, 1994; Hanley, 2000; Willington, 1998, etc.). In addressing some of these challenges, Stated Choice (SC) experiments are useful, because they are more specific about the environmental good that is being valuated. These experiments can value combinations of different attributes of the same good. However, this sophistication makes it harder for the experiments to be administered and their results are more difficult to analyse econometrically (Willis, 2002:641-643).

2.2 The challenges of administering CV studies

Various biases associated with CV methods are discussed in literature (e.g. Hanley, 2000:241-246 and Willis, 2002:635-645). These biases are discussed individually in the following subsections. It should be kept in mind that different challenges and biases may be experienced in different contexts. For instance, the administering of CV surveys in developing countries poses added challenges.

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b) The *Travel-Cost method:* using this method the economic values of recreational parks, for instance, are normally estimated. The average costs of travelling to a park are taken as equivalent to the price the visitors are willing to pay for the existence of the park or components thereof.

c) *Hedonic Pricing Method:* looks at the increase or drop in prices of assets like houses due to installations of environmental goods or bads. The average price differences between similar assets in different environmental conditions are treated as the price of the environmental good or bad, that buyers are willing to pay or forego.

2.2.1 Part-whole bias or embedding effects

A resource is normally valued higher in isolation than when forming a part of a bigger bundle, especially if its identifiable parts are substitutes for each other (Hanley 2000:241-246). For instance, a tourist may be willing to pay a higher price to see a lion or a rhino on its own and at the same time be willing to pay less for the same lion if there was also a rhino to see next to it. Water resources, with various related riverine uses, are also open to similar biases. In fact, Diamond and Hausman (1994:45-65) point out that these biases are against economic theory and they form the biggest criticism against the use of CV methods. "One possible 'cure' for the (biases) is to ask respondents to bid for the more inclusive good first, and then to apportion some of the total bid to the good that is being valued (i.e. the attribute)" (Hanley, 2000:242). Obviously, this approach has high administrative costs associated with it.

2.2.2 Lexicographic preferences or protests

Respondents may bid infinite WTA values and zero WTP values for the same resource in the same survey, which would mean that their choice bids are motivated by non-utilitarian or economic reasons (e.g. political protests) (Hanley 2000:241-246 and Willis 2002:635-645). Since such behaviour is not consistent with a model underlying the Cost Benefit Analysis (CBA), the respondents' values should be excluded from the data analysis. Therefore, the rule of thumb in limiting the effects of political protests in surveys is to accept a WTP value only if it is within a 5% range of the respondent's gross income (Hanley, 2000:244).

2.2.3 Aggregated values

The values of non-use goods (e.g. goods valued merely for their existence) can be very high. This is because any person in the global population can bid for a non-use good. In this case, the NOAA (1993) advocates the use of "an ad hoc 50% (of the total value) in the absence of an experimental study undertaken with any given CV method". Hanley (2000:243), however, argues that this suggestion neglects the probable existence of various calibrations in different contingent markets "across the non-use/use and public/private good continuums". Therefore, different calibrations need to be applied to different economic values in the continuums, although such calibrations are not yet specified in literature.

2.2.4 The effects of cultural values on economic bids

Most difficult to deal with in rural areas of developing countries are the effects of **cultural and traditional values** placed on environmental resources over and above the economic one. In most cases, the western notion of CBA as a means of making economic decisions may fit poorly with cultural beliefs and practice. Hence, the valuation of the environment using the CBA framework may lead to unreliable bids. As will be reiterated in coming sections, no satisfactory remedy is discussed in CV literature for this problem.

2.3 Recommendations for conducting CV studies

The CV challenges presented in the preceding sections highlight the fact that CV methods are not perfect, and their execution is faced with a diverse number of methodological problems. Hence, the following are generic recommendations for surveys conducted in different contexts. Some of the recommendations are only applicable to studies in developing countries.

Firstly, the results of CV surveys are more accurate when a **dichotomous choice** format has been used. This means that the provision of minimum and maximum WTP values by enumerators within which respondents can express their economic values yields better results. However, the value parameters provided by enumerators or researchers will always be subjective. **Secondly**, a minimum **response rate of 70%** of the target sample should be achieved in surveys. Statistically, this would ensure that the aggregated WTP values are representative of the target sample. **Thirdly**, respondents should always be reminded of their budget constraints. Otherwise, the **5% income** rule should be applied, which means that only values within a 5% of (gross) income are acceptable.

In developing countries, extra precautionary measures must be taken when administering CV surveys (Hanley, 2000:246 and Willington, 1998:21-30). Low incomes and their irregular flows, demand **that units other than money** should be used in expressing the WTP by respondents. The units may be in the form of labour time, livestock, crop, etc., that respondents are willing to forgo (Willington, 1998:21-28). The use of these cultural currencies may also eliminate the negative effects that cultural values may have on economic bids. Nonetheless, limited attention has been given to this problem in literature. **Interview settings** need to be carefully planned and controlled. It has been found that during interview processes in developing countries, prestige and/or shame contribute significantly to WTP bids, if the bids are made by respondents in the company of others (Hanley, 2000:241-246).

3. The National Water Policy objectives

The NWP (1997) aims to politically and economically empower previously disadvantaged water users such as rural subsistence farmers and rural women, by giving water access to the previously disempowered South African population in ways that protect natural water resources from overuse and degradation (NWP, 1997). The economic development of local areas, for instance, through the creation of employment, is mentioned as one of the important socio-political objectives of the water policy. In achieving its objectives, the policy advocates the devolution of water resource management responsibilities to locally established institutions. This partly entails the decentralisation of *economic* management responsibilities to local institutions. Appendix 1 illustrates the policy's envisaged institutional structure at a local level. The Kat River Valley falls within the Fish River to the Tsitsikama River Water Management Area (WMA) of the Eastern Cape province, for which the establishment of a sovereign water management institution is also proposed.

The use of economic tools, such as water permits and waste discharge charges, has been proposed as one way to achieve some of the objectives for efficient management. It is hoped the management tools would curb resource overuse and degradation as well

as generate sufficient revenues for institutional and financial viability (NWP, 1997). Therefore, it should be apparent from the objectives that the policy implementation process would require enough financial and human resource investments. It would also require a widespread consultation process for persuasion of local stakeholders to be involved in establishing and administering local institutions. The involvement of stakeholders would ensure, firstly, that a variety of local voices inform the management decisions, and secondly, that the economic needs of stakeholders are factored into management strategies (NWP, 1997). However, the achievement of stakeholder involvement has been identified by the Department of Water Affairs and Forestry (DWAF) as one of the most challenging tasks in the policy implementation process. This is because without effective incentives, the DWAF has found that it is hard to rally stakeholder involvement. Hence, the KRV CV study was born from a need for research to discover, firstly, the economic values that stakeholders would place on water resources and their management, before effective incentives could be put in place.

4. Administering the CV method in the KRV

4.1 The Kat River Valley background information

The KRV covers approximately 1700 to 1800 km^2, and is located in the eastern part of the Fish to Tsitsikamma Water Management Area (WMA) in the Eastern Cape province. The area falls into the Amatola Climatic Zone, with rainfalls ranging from 500 mm per annum to 1200 mm in the highest mountains (Department of Land Affairs (DLA), 1998:7).

The Kat River with its tributaries is the main source of water that is drained into the Kat Dam (near Seymour in map 1of Appendix 2). The dam has a yield of 11.88 million cm^3 per annum. One thousand five hundred hectares of land are scheduled for irrigation water under the KRV Water User Association (WUA), with gross water requirements of an estimated 11.44 million cm^3 per annum. However, close to half of the water scheduled land (>700 ha) is currently not being used for production (KRV WUA, 2004).

Several agricultural land and water uses characterise the valley. Historically, these include citrus production, which is the most intensive of the land and water uses in the middle to lower reaches. “The conditions in the area favour citrus production, particularly soft citrus, which shows very high returns” (DLA, 1999:5). Also practiced are stock and game farming in the lower to the upper reaches, small-scale community farming (a wide range of vegetables) and commercial forestry in the most upper reaches. The map 2 shows the division of land along different communities and respective economic activities. The survey data discussed in the paper comes from six rural villages in the upper reaches of the valley.

4.2 Survey methods employed in the study

The WTP section of the questionnaire used in the KRV survey is presented in Appendix 3. The survey was divided into two phases: a pilot study, the results of which were used in improving the questionnaire. The main survey was conducted three months after the pilot. In addition to data on environmental economic values, the

survey also collected information on demographic variables and individual consumption-use patterns of riverine resources, the paper, however, only discusses economic values and presents some demographic information as background.

For the main survey, systematic and stratified sampling techniques (Stoker, 1984:3-9) were used in collecting data at household and individual levels to ensure representativeness. Rural villages were divided into five zones using town planning and topographic maps. The sampled villages were; Fairburn, Hertzog, Tamboeksvlei, Ekuphumileni and Balfour in Appendix 2. In total, information from 102 village households was collected, which represented over 248 individuals.

The questions aimed at soliciting the WTP values allowed for different unit currency options (see Appendix 3) from which economic values could be expressed, namely: a) monetary (South African rands); b) livestock; c) specified crop units; d) labour time units; and e) combinations thereof, as advocated by Willington (1998:21-28).

Individual economic values were sought for three aspects of the riverine resource management (licences for water abstraction, protection of the resources and the establishment of a local governing body). For each aspect, enumerators were instructed to offer bid values only when it was obvious that the respondents were struggling to provide their own. Hence, a non-dichotomous bidding system was used for fear of introducing enumerator biases (Hanemann, 1994:19-43). In the process, bids would be offered in all unit currencies, as listed in the questionnaire. The enumerators would increase or decrease the bids until respondents accepted them as their own.

After all primary data was collected, WTP values were converted into monetary currency (South African rands) using the KRV's prevalent market prices of 2004. The conversion of values into a single unit currency was convenient for the analyses. As discussed in section 2, however, an inflated value structure (based on cultural beliefs) may have been embedded in values quoted in unit currencies such as livestock, which means the conversion may in fact have introduced distorted the final values. Nonetheless, because at present the literature does not address this challenge directly, no other alternatives were available to treat the problem.

The final stages of gathering and interpreting data required that a debrief session be held with community representatives from the research area. The main objective of the session was to discover new and more accurate interpretations of the data. Questions aimed at understanding data on WTP values, based on unit currencies other than money were of specific interest.

5. The results and discussions

The reported average levels of unemployment[4], monthly incomes and years of education are presented in table 1. Even though both male and female respondents reported similar levels of education (through years spent in formal schooling), by far

[4] For the survey, a broad definition of unemployment was used. No cross-checking methods were used to determine the levels of informal employment, under employment or active searches for new employment.

the female respondents were less active in the formal labour market. This was also reflected in their lower average incomes.

Table 1 Demographic variables

Demographic variable	Gender	
	Male	Female
Reported average unemployment level	37%	63%
Reported average monthly income	R740.00 (~114 US dollars)	R453.00 (~70 US dollars)
Reported average years of education	7.3	7.4

The data in table 1 is an illustration of how underdeveloped the formal labour market was in the KRV villages. Hence, in the survey the use of a variety of unit currencies for soliciting WTP values was imperative.

5.2 The WTP values

In table 2, the WTP values[5] are presented for three aspects of resources management, namely, water licence prices, the ecological reserve (resource protection) and the CMA establishment process. The values are also discussed for each unit currency. Te column on the right hand side presents aggregated values for by each valuated resource or service.

Table 2 WTP values (**in South African rands**) for water licences by various currencies, 2004

Area	**Average water licence WTP values by currency**			
	Money	Labour time	Livestock/crop	Aggregate
Villages	R18 (Obs:132) (Std dev =18.2)	**R134** (Obs:10) (Std dev: 49.1)	R25 (Obs:13) (Std dev:0)	R22 (Obs:178) (Std dev:26.5)
Area	**Average resource protection WTP values by unit currency**			
	Money only	Labour only	Livestock/crop	Aggregate
Villages	R14 (Obs:136) (Std dev:18.4)	**R166** (Obs:8) (Std dev:43.7)	R25 (Obs:14) (Std dev:0)	R20 (Obs:181) (Std dev:29.1)
Area	**Average resource protection WTP Values by Currency**			
	Money only	Labour only	Livestock/crop	Aggregate
Villages	R12 (Obs:135) (Std dev:11.2)	**R123** (Obs:11) (Std dev:62.2)	R24 (Obs:14) (Std dev:4)	R17 (Obs:181) (Std dev:24.1)

Obs=number of respondents
Std dev= Standard deviation from mean
Labour time units were converted to rands by using KRV's average incomes
The 'mixed currency' category was excluded from the final presentation of WTP values, because it was observed that this category did not add value to the analysis and hence the number of respondents in the aggregated total is slightly higher than the sum total.

[5] The units for WTP values for licences were given in rands per cubic metre of water and the units for values for the resource protection and CMA establishment were given in rands per month.

Even though high levels of unemployment were reported in the survey, the majority of respondents expressed their WTP values in monetary units. The number of respondents who expressed values in livestock and labour time unit currencies was significantly small for all three valuated resource management aspects. The values expressed in monetary and livestock unit currencies were notably not significantly different, especially for water licences (i.e. R18 versus R25). For the other management aspects, however, the value differences were almost double (i.e. R14 versus R20 and R12 versus R17). On the other hand, values in labour time units were **by far** higher than those expressed in other units and for all three management aspects.

5.3 Are there cultural value biases in the valuation of each management aspect?

If the higher values expressed in livestock and crop unit currencies were as a result of additional cultural values inherent in these currencies, then it could be argued that; other factors kept constant, the cultural values placed on environmental resources by KRV respondents were 50% higher than values in monetary terms. However, such a conclusion would not account, for instance, for the likely effects of formal unemployment in lower monetary values. The separate effects of each of the potentially contributing factors would need to be investigated further.

Table 2 also indicates that a high level of consistency exists across all valuated resources in WTP values expressed in cultural terms (e.g. livestock units). In fact, not only were the values similar at R25 per cubic meter of water or per month towards resource protection, etc., but the deviations from the averages were also low. However, it should also be kept in mind that unlike money, cultural currencies (especially livestock) are not as readily divisible and hence lower deviations around the average values and lower fluctuations across different resources may partly be reflective of the indivisibleness of these units.

In sum, on the surface, the KRV data indicate that the WTP values in cultural units were higher by more than 50% when compared to monetary currency for valuated resources. Irrespective of the effects from other contributing factors, the point is that if the water policy used economic values, based on cultural unit currencies; dependant on how high the involved transaction costs would be, higher potential revenues from cultural unit values would be available in the policy implementation process. But based on the fact that fewer respondents in the KRV sample (just over 5%) preferred to express their values in non-monetary units, the costs involved in using such values may be too high.

5.4 Are there social factors affecting WTP values expressed in labour time units?

Even though very few respondents expressed their WTP values in labour unit currencies (~5%), it is important to note that the values in these units were **significantly** higher than those expressed in other units, and this was consistently the case across all valuated resources. In the final debrief session held with community representatives, it transpired that many of the respondents in the sample might have used labour time units as an expression of their **willingness to work**. That is

especially true with regard to working in resource protection and in the establishment of a CMA aspects. Therefore, in this sense, the values were an expression of respondents' willingness to accept (WTA) potential future employment opportunities within the water policy implementation framework. Furthermore, 83% of values in labour time units were from unemployed respondents.

However, the above interpretation did not explain why the WTP values **for water licences** (in labour time units) were also very high. It was not explained how potential employment opportunities could have been perceived to exist in the process of receiving licences. Unlike the concept of water resource protection, water licences are as tangible as water quantities and therefore their allocation should not be misread as an area of possible work opportunities. Nevertheless, it could concluded that the KRV respondents who expressed their WTP values in labour time units were willing to work at lower than the average market labour price for water resource protection and management (see values table 2).

In terms of economic theory, however, the labour time unit values from strictly **unemployed** respondents are not indicative of incurred opportunity costs, and hence do not indicate a willingness to pay. Hence, the values are deemed unaffordable to respondents, as they fall outside their budget lines. The application of the 5% of income rule would entail that these values be excluded from analysis. However, in the KRV study the values were included, based on the consideration of water policy objectives (i.e. a declaration to create employment opportunities in the process of implementing the policy). These considerations are discussed in the following section.

6. Implications for the National Water Policy

Because there was no validating test conducted alongside the KRV CV study, the '50% thumb rule' as advocated by the NOAA (1993) had to be applied to values in table 2. This meant that the KRV respondents were actually only willing to pay an average of R11 (50% of R22) per cubic metre of water, and an average of R10 per month for resource protection as well as R8.50 per month for the establishment of a CMA.

The KRV's average economic value for a water licence was significantly higher than the 2004 water prices (as charged by the DWAF and municipalities) to commercial farmers, industry and household consumers. Commercial farmers in the KRV reported water prices paid to DWAF at R357.46 per hectare per annum of scheduled area[6]. The KRV values were also higher than various water resource estimates from other case studies summarised by Nieuwoudt et al. (2004:162-182).

For instance, Conradie (2002) in Nieuwoudt et al. (2004:168) "estimates the marginal benefit of water to consumers at R2.40/m^3, which is equivalent to an annual rental value of R21, 600/ha for a 9,000 m^3 allocation" in the Nelson Mandela Metropolitan. Hosking et al. (2002) in Nieuwoudt et al. (2004:170-171) "estimated the value of freshwater inflows in the Keurboom Estuary using the Contingent Valuation Method (CVM)" and found the WTP values of R274 per user to prevent the cutting off of

[6] 9000m^3 was equivalent to one hectare per annum in the agricultural sector in 2004 (Nieuwoudt et al., 2004:166).

freshwater inflow. "The total recreational value of water was estimated at R3,626,128 or 4,6/m^3/annum", but this estimate was substantially less than the WTP for water for farming (R12,5/m^3). It seems that even though the KRV villages were economically underdeveloped area, with high levels of unemployment and low average incomes, there still was a high consumer surplus, specifically, for water licences.

The creation of employment opportunities for economic development through stakeholder involvement in water institutions were emphasised as of paramount importance to the water policy in section 3 as well as in approaching the KRV research. Therefore, for the water policy, opportunities existed in the KRV in the form of a high willingness to be involved in water management institutions *albeit* motivated by employment seeking. The point, however, is that for the water policy implementation process, the expression of this willingness was valuable in a sense that it complimented policy objectives, and hence it could not be disregarded from analysis as advocated by CV guidelines, discussed in section 2.

The WTP values from unemployed respondents were also relevant to data analysis primarily because of the DWAF plans to recruit local stakeholders to perform, **with payment**, different tasks in establishing and administering CMAs (DWAF, 2002). Therefore, even though the values in labour units conceptually represent a willingness to accept (WTA), with a careful analysis, they could be used for estimating the potential future labour costs to the DWAF plans, and if only in the KRV.

Compared to proposed salary rates (DWAF, 2002) of R30 000 per annum (R2500 per month) for human resources employed in CMA administrations, it seems that some stakeholders in the KRV (those who used labour unit currencies) were prepared to work for a lower wage rate. In fact, the rate was even lower than the legislated basic income of around R800 rands per month. Hence, for the purposes of the water policy, the abundant cheap labour could be taken advantage of successfully, but only through effective implementation programmes.

The implementation programmes should be effectively formulated because, among other things, local stakeholders could only be employed effectively if they were skilled in various aspects of managing the environment. The skills' transfer to, especially, rural stakeholders would require significant investments from the DWAF. However, irrespective of which programme was used by the DWAF, the spending on skills' transfer would always be a requirement, and hence such costs could never be completely avoided.

7. Conclusion

The paper argued that the literature guidelines for administering CV studies and analysing WTP values do not adequately address:

c) the effects of cultural beliefs and values (of a non-utilitarian nature) on economic valuations of environmental resources by respondents from rural and traditional areas, and
d) the implications for policy objectives in deciding on which WTP values to exclude and which to include in data analysis.

Firstly, in geographical areas where money income flows are irregular, CV guidelines advocate the use of unit currencies other than money in expressing economic WTP values (e.g. livestock or crops). However, no guidelines exist on how to deal with valuation inconsistencies that may arise from using non-monetary unit currencies, as these may have inherent cultural value attributes. **Secondly**, the CV guidelines advocate the exclusion of non-affordable WTP values from analysis, because such values may represent political protests. However, in cases where the expression of WTP values (in labour time units and by unemployed respondents) may be useful for informing policy decisions, the application of this exclusion criterion may be inappropriate.

Finally, the 2004 KRV study also found that high consumer surpluses exist in markets for labour units and water resources. This finding signalled that an economic opportunity existed for exploitation by the DWAF in the implementation of the water policy. However, the DWAF would only exploit the opportunity successfully if programmes for implementing the policy were formulated with an aim of taking advantage of the existing surpluses.

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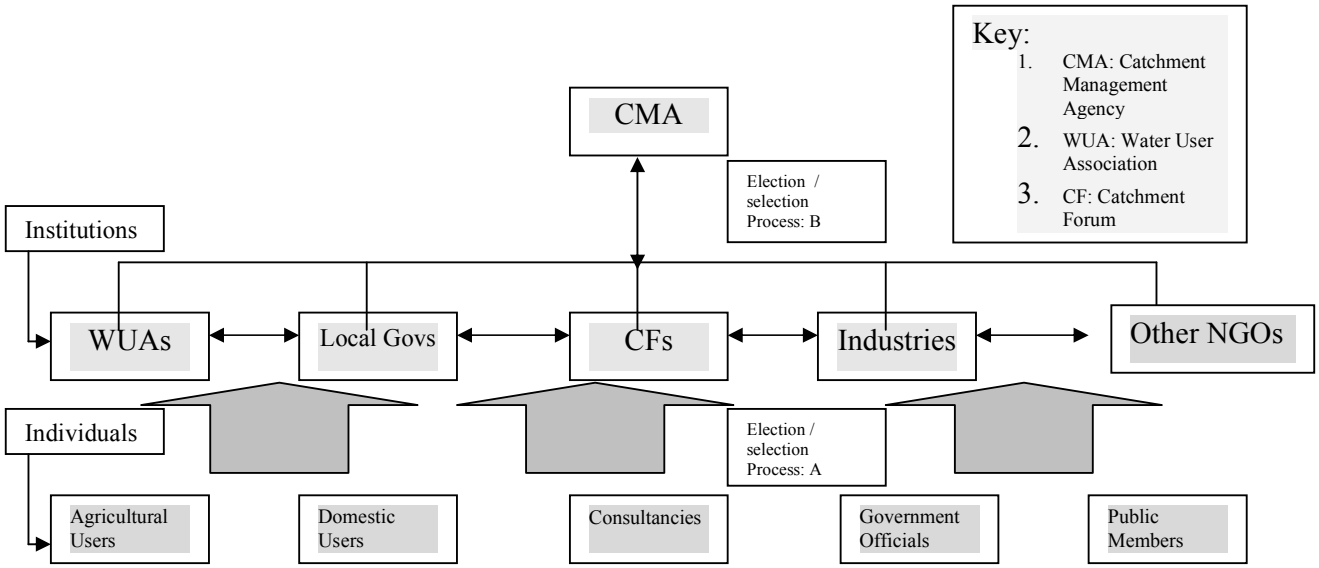
9. List of appendices

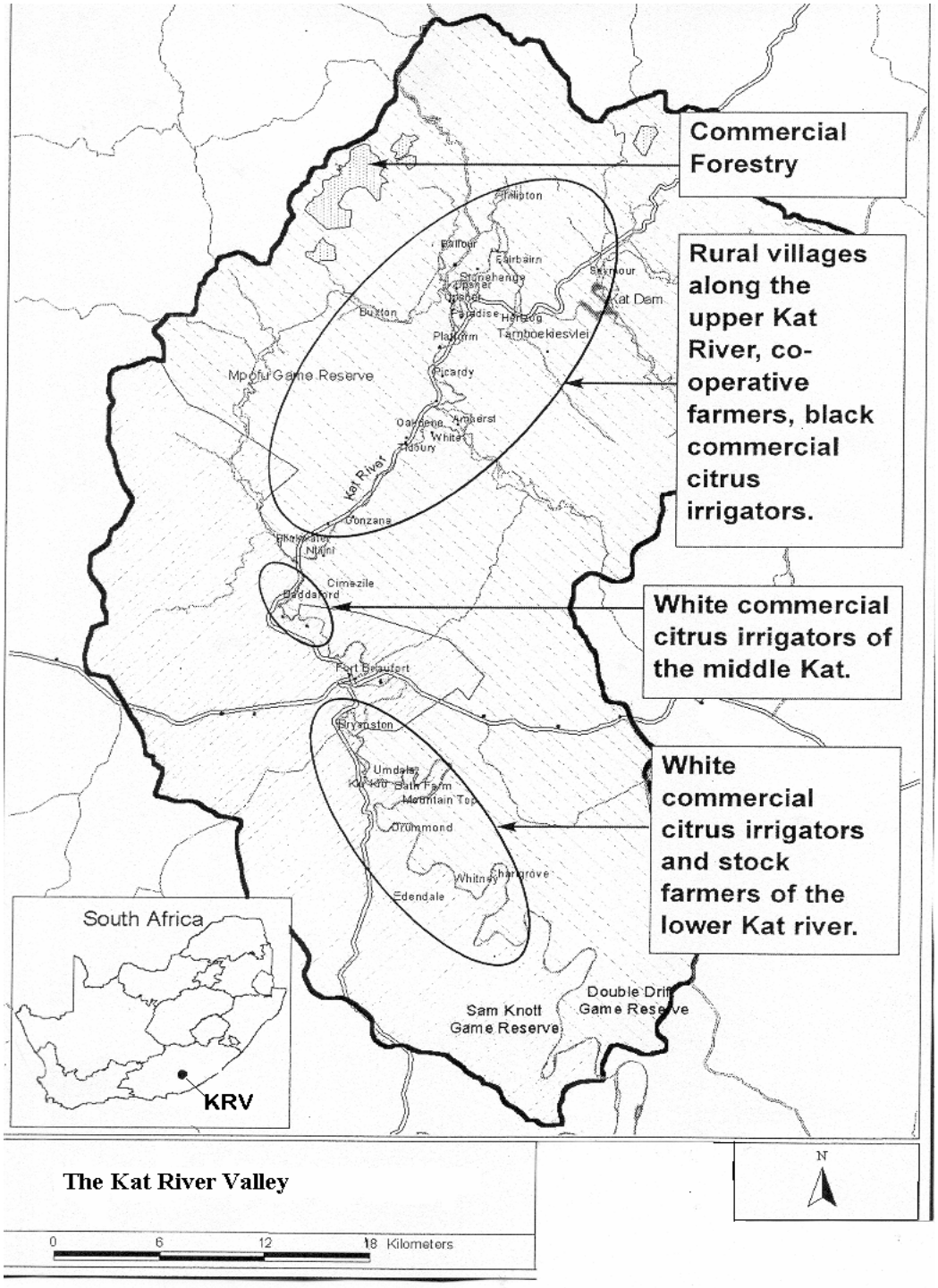
Appendix 1



Institutional arrangement at Water Management Area level (Adapted from: DWAF, 2004)

The CMA is the local governing body at a Water Management Area level. Through a consultative and representative political process representative from other local stakeholder institutions are either elected or nominated to the CMA's governing board. The diagram's list of potential local institutions that may be represented at a CMA level is only illustrative and it is not exhaustive. It should also be borne in mind that the political process enabling government representation on the board is different to the one for other institutions. For instance, government officials are not elected into the board, they are nominated.

Appendix 2
The Kat River Valley



Map 1 The Kat River Valley

Appendix 3
The WTP questionnaire

INSTRUCTION TO THE INTERVIEWER! Read out and explain the following information to respondents

BACKGROUND ENVIRONMENTAL INFORMATION

1. Water is a scarce resource in South Africa.
2. Prior to 1994 access to water resources were distributed unequally among water users of different economic and racial backgrounds
3. Therefore in 1997 the South African government formulated a new National Water Policy (NWP) whose objectives are to protect and equally distribute water resources among all its users in a sustainable manner.
4. To achieve this the government divided the country into 19 Water Management Areas (WMA) to be managed by local people in a representative way
5. The management requires that licences to use water are issued to big users of water (like farmers with over 5 hectares of irrigation land).
6. The Kat River Valley is in one of the 19 WMAs.
7. The government needs local people to fully participate in creating a water management body and in deciding the state (quality and quantity) in which local people want the river to be maintained.
8. By doing this the government believes the KRV will be sustained for a long time and for the coming generations to use it.

Individual environmental values for 3 aspects of the NWP

Hh **R** **O** **S** **T** **E** **R** **N** **U** **M** **B** **E** **R**	**5.2.1** **<u>WATER LICENCE</u>** **HOW MUCH** **1. MONEY** **OR** **2. LABOUR TIME** **OR** **3. LIVESTOCK (INCL BIRDS)** **OR** **4. A BAG OF: POTATOES OR CABBAGE OR OTHER (SPECIFY) OR** **5. OTHER UNIT** **ARE YOU WILLING TO PAY/SPEND TO OBTAIN A WATER LICENCE TO USE A CUBIC METER OF WATER?**	**5.2.2** **<u>RESERVE -CONSERVATION</u>** **HOW MUCH** **1. MONEY** **OR** **2. LABOUR TIME** **OR** **3. LIVESTOCK (INCL BIRDS)** **OR** **4. A BAG OF: POTATOES OR CABBAGE OR OTHER (SPECIFY) OR** **5. OTHER UNIT** **ARE YOU WILLING TO PAY/SPEND TO PREVENT THE RIVER FROM BECOMING UNUSABLE (e.g. BECAUSE OF pollution, overuse etc.?**	**5.2.3** **<u>CATCHMENT MANAGEMENT</u>** **HOW MUCH** **1. MONEY** **OR** **2. LABOUR TIME** **OR** **3. LIVESTOCK (INCL BIRDS)** **OR** **4 A BAG OF: POTATOES OR CABBAGE OR OTHER (SPECIFY) OR** **5. OTHER UNIT** **ARE YOU WILLING TO PAY/SPEND TO HAVE A WELL RUNNING CMA IN THE KRV?**
1. (head)			
2.			
3.			
4.			
5.			
6.			
7.			
8.			