CONTINGENT VALUATION APPROACH - A CASE STUDY OF THE KAYAS (INDIGENOUS SACRED FORESTS) IN KWALE *VIS-À-VIS* THE TITANIUM MINING PROJECT

BY

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DECLARATION

This research paper is my original work and has not been presented for a degree award in any other University.

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This research paper has been submitted for examination with our approval as University supervisors.

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DEDICATION

To wife Tatu; Son, Nzai; and Daughter, Ferida

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ACRONYMS

CVM..... Contingent Valuation Method

SD..... Sustainable Development

WCED.... World Commission for Environment and Development

WTP..... Willingness to Pay

WTAC... Willingness to Accept Compensation

PV..... Primary Value

U_o, U_1.... Level of Utility

EV..... Equivalent Variation

ES..... Equivalent Surplus

CPS..... Compensating Surplus

UNEP.... United Nations Environmental Programme

ATT.... Attitude

GEN.... Gender

SUB.... Substitutes

ED.... Education

GI... Government Influence

INC.... Income

TI..... Tiomin Influence

OLS.... Ordinary Least Squares

SPSS, PC-give 8, TSP...Econometric Computer packages

TWP.... Total Willingness to pay

AWP..... Average Willingness to pay .

N..... Number of respondents Willingness to pay

N..... Total Number of people interviewed

P..... Population of the Kaya Users

I..... 1, 2,... N Various willingness to pay bids eg 1,000 per year.

ABSTRACT

This paper examines the strength of cultural practices in conservation. In this particular case, we use the Contingent Valuation Method to examine the willingness of the Digo and the Mijikenda people to pay in preserving the Kayas (Indigenous sacred forests). The Kayas in Kwale District are threatened with extinction by the Titanium mining project.

We explore the factors that influence the people of Kwale in deciding whether they want to keep the Kaya forests by forfeiting a mining project that has enormous economic potential, using the community's WTP to conserve the forests.

The main findings of the study are that the local community at Kwale is willing to pay (average) Kshs.283 a month to preserve the Kaya forests and that willingness is influenced by attitude towards the Kayas; age of the people; level of education; availability of substitutes; gender; the Tiomin Resources Inc; and, Government policies on land and mining. The average monthly WTP translates to Kshs.452,800,000 a month when aggregated across the total Coastal Mijikenda population estimated at 1,600,000 individuals.

In order to preserve the Kaya forests and ensure sustainable utilization of natural resources within the Kaya areas, we recommend the reintroduction of collaborative frame-works amongst all stakeholders around issues of environmental conservation and the use of environmental resources.

CHAPTER ONE

1.0 Introduction / General Background

1.1The CVM

The contingent valuation method (CVM) can be used to estimate economic values for all kinds of ecosystem and environmental services. It can be used to estimate both use and non-use values and it is the most widely used method for estimating non-use values. It is also the most controversial of the non-market valuation methods.

The contingent valuation method involves directly asking people in a survey, how much they would be willing to pay for specific environmental services. In some cases, people are asked for the amount of compensation they would be willing to accept to give up specific environmental services. It is 'contingent' because people are asked to state their willingness to pay, contingent on a specific hypothetical scenario and description of the environmental service.

The contingent valuation method is referred to as a "stated preference method" because it asks people to directly state their values, rather than inferring values from actual choices. The fact that CV is based on what people say they would do, as opposed to what people are observed to do is the source of its greatest strengths and its greatest weaknesses.

Contingent Valuation is one of the only ways to assign dollar values to non-use values of the environment - values that do not involve market purchase

and may not involve direct participation. These values are sometimes referred to as "**passive use**" values. They include everything from the basic life support functions associated with ecosystem health or biodiversity, to the enjoyment of a scenic vista or a wilderness experience, to appreciating the option to fish or bird watch in the future, or the value people place on simply knowing that giant apes or whales exist.

It is clear that people are willing to pay for non-use, or passive use, environmental benefits. However, these benefits are likely to be implicitly treated as zero unless their dollar value is somehow estimated. So, how much are they worth? Since people do not reveal their willingness to pay for them through their purchases or by their behaviour, the only option for estimating a value is by asking them questions.

However, the fact that the contingent valuation method is based on asking people questions, as opposed to observing their actual behaviour, is the source of enormous controversy. The conceptual, empirical and practical problems associated with developing dollar estimates, of economic value on the basis of how people respond to hypothetical questions about hypothetical market situation are debated constantly in the economics literature, for example, the valuation of recreational gardens, wildlife, forests etc. CV researchers are attempting to address these problems, but they are far from finished. Meanwhile, many economists, as well as may psychologists and sociologists for many different reasons, do not believe the dollar estimates that result from CV are valid. More importantly, many jurists and policy-makers will not accept the results of CV. Because of its controversial nature

users must be extremely cautious about spending money on CV studies and about using the results of CV studies.

1.2 The Kayas

It is thought that Kayas, indigenous sacred forests, flourished during the 17th Century and 18th Century. The entire tribe lived in traditional thatch grass houses within the Kaya boundary, protected from marauding Galla by a palisade and a forest penetrable only by two narrow paths that were heavily defended by three wooden gates. The area immediately surrounding a Kaya forest was farmed intensively with sorghum and millet being the staple crops at this time. Land was communally owned and its division amongst the clans and sub-clans (Like Kaya) was determined by the elders.

Various areas of the Kaya and surrounding forest are set aside as burial areas, graves are frequently marked by either plants or posts. Some grave posts still remain in the Kaya today, but the majority has been stolen primarily for sale to collectors of "ethnic art". The wood used for grave post was *Muhingo,* a very hard word.

By the start of the 19th century the Mijikenda and the Giriama and Rabai in particular, were part of elaborate trading systems in which they acted as middlemen trading ivory and cattle from the Galla, Wataa and Kamba, to the Swahili and returning with trade goods such as cloth and beads. They also traded directly with the Swahili, exchanging agricultural and forest products such as gum copal, honey and beeswax for the Arabs' more exotic goods.

It was also around this time and for a number of reasons, such as drastic changes to the trade routes, arrival of colonial rule and completion of Mombasa – Nairobi railway in 1901, that the Kayas ceased to be the central residence of the entire tribe, although people returned to them for important ceremonies and as a place of refuge in attack. And, attacks there were, this time from Iloikop Maasai who had ousted the Galla and taken over their marauding role. The Duruma, Chonyi, Jibana and Ribe left their Kayas in 1850's and 60's while the Kambe and the Kauma were the last to leave in the 1870's.

This decline in the Kayas was probably inevitable in the face of the many challenges brought about by the 20th Century. A handful of Mijikenda, mainly wazee (old men) still live in the Kayas although all are in a bad state of despair. Some local people go into the Kayas occasionally as representatives of their clan to do harambee work. But while the abandoned Kayas decay only slowly by a natural process, the surrounding forests are usually damaged rather quickly by opportunists who cut down trees for sale.

All in all, the Mijikenda could now aspire to a more settled existence and prosperous life in their recently established Kayas.

1.3 The Study Site

Kwale district is one of the seven districts in Coast Province. It borders Taita Taveta to the West, Kilifi District to the North West, Mombasa and Indian Ocean to the East and Republic of Tanzania to the South. The District has an area of 8,260km ^{2} of which 62 Km^2 is under water. The population

size is estimated to be about 536,381 (2002) people with the Mijikenda tribes of the Digo and Duruma as the indigenous.

In early 1996, Tiomin Resources Inc. of Canada announced the discovery of huge deposits of Titanium in Kwale District. The exact mining area is located about 20 km inland of Msambweni town about 65km South of Mombasa. The area is currently home for local Wadigo and other settlers such as the Kamba, distributed in two villages of Maumba and Nguluku, all with a total population currently estimated about 217,000 (1999 Census Report). The natural resources of this area (geology, soils and agro-climatic zones) are generally distributed over three physiographic units, which run more or less parallel to the current coastline. The first of these units is a Coastal Plain, which is about 5 to 10 km wide rising to about 60m above sea level. Old coral reefs and Pleistocene Kilindini sands mainly underlay this. Further West are the foot plateaus otherwise mapped as uplands which are about 5km wide and lying between 60 and 90m above sea level. The Titanium rich Magarini sands underlie the foot plateaus.

In the Vumbu – Maumbu area the Titanium ore deposits constitute about 5.7% of the Magarini sediments. The concentration reduces southwards to 3% in the Nguluku area. The Titanium deposits mainly occur in ilmenite and rufile with specific gravity of 4.72 and 4.2 to 4.3 respectively. The Zirconium containing mineral in this case is Zircon which has a specific gravity of 3.9 to 4.7. The specific gravity shows that these are heavy minerals and hence are deposited at similar sites through sedimentation in riverine, lacustrine and marine waters.

The Msambweni complex of mineral deposits has about 2.8 million tones of ilmenite, 1.0 million tones of rutile and 0.6 million tones of Zircon. They occupy an area which is about 3km long, 2km wide and are generally 25m to 40m deep. First, the ilmenite contains up to 47.9% Titanium Oxide, iron content is also high being about 51.1% and there are low levels of the Calcium, magnesium and Manganese. Secondly, the rutile is a high grade source of Titanium containing about 95.2% of the metal. Finally, Zircon in Msambweni contains about 66.0% of Zirconium and being a silicate has about 32.5% of silica. All these minerals contain appreciable amounts of radioactive Uranium and Thorium of upto 309ppm and 143ppm respectively. The mining technology will need to be sophisticated and appropriate to ensure that proper standards are adhered to avert any cases of release of radioactivity in the area (World Bank Sponsored Research Project on Titanium in Kenya, Kwale, 2000).

Coastal biodiversity can be considered at three different levels. Genetic Diversity, Species Diversity and Ecosystem Landscapes. Each of the levels extends enormous often-immeasurable economic, social and other benefits to local communities. The promise of animal and plant development can only be fulfilled through conservation and close management of genetic diversity. In the study area the sites of biodiversity in most need of attention in the marine ecosystem are; the coral reefs, the mangrove and the cliffs. Over the terrestrial ecosystems, which are the focus for this study, the most threatened are coastal indigenous forests i.e. the Kayas, and the wetlands. There are several endemic as well as threatened floral and fauna species in

the area which will require special protection and conservation measure so that their genetic reserves can be maintained for posterity. The Kayas associated with the study area are, Kaya Budu, Kaya Mwahidi, Kaya Muhaka, Kaya Bombo etc.

The inhabitants of this study area are mainly subsistence cultivators growing cassava , millet, maize, rice, beans and pulses for food with coconut, cashew nuts and bixa forming the main cash crops. The local economy is therefore principally substance agriculture relying on exploitation of primary resources such as climate, soils and own labour.

The people of Kwale have an eternal desire to keep the traditions of the Kayas despite the numerous socio-economic problems and challenges they face, for instance, high incidences of poverty, unemployment and external cultural influences such as Islam and Christianity. Infact majority of the residents of Kwale, particularly the Digos, are practicing Muslims. Destruction of the Kayas simply implies that the people are detaching themselves from their God, that the Kayas are the only sacred points (culturally) where divine intervention is sought and the only place where deep reverence practices for the ancestors are performed. It is this last point that makes it difficult for the people to abandon the Kayas even though they may be practicing Muslims or Christians. The feelings of responsibility and obligations to keep in touch or show respect to the ancestors is real in every a people. These sacred forests are the equivalent of the Church and Mosque to Christians and Muslims respectively. Can there be Christianity without the Church?

The Kayas are, therefore, very crucial for preservation for the Mijikenda people.

These people are now trapped in a crucial situation that requires them to make a wise and visionary decision about the Kayas among other issues against the Titanium mining project. The controversial issues about the Canadian firm's plan to start a Kshs, 6.3 Billion mining project to exploit the highly priced Titanium mineral include, the issue of compensation and the mode to be used; about 60,000 acre forest would be destroyed; disputes over environmental impact; fear of loss of prime land; and various species of butterflies would disappear. Land, still remains the core problem in the dispute as area farmers demand sufficient compensation for the land earmarked for mining operations by the company, where more than 10,000 people face relocation once the project is fully underway.

An important point worth noting, as has been explained above, is that the destruction of the Kayas or rather the whole environment in general does not seem to be much of a concern to the people of Kwale, but rather the compensation for the use value of the land and its assets seems to be the bone of contention here.

This should not be an indication for justification that the Kayas have outlived their usefulness, no. This is simply a consequential reaction of the poverty amongst the people. The people of Kwale after suffering the dehumanizing consequences of rampant poverty over the years, naturally see the Titanium mining venture as an opportunity to alleviate them from these

conditions. And it is here that new and innovative co-operative frameworks on conservation are needed to guide the people into making the appropriate decisions. Are the cultural traditions of the Kayas effective in conservation of the forests despite the real challenges of poverty?

The perceptions surrounding the controversy on the Titanium project vary across population with the older generation seeming to have a very strong attachment to the Kayas than the younger generation. The latter are relatively more educated and exposed to Western lifestyles than the older generation. In fact nowadays it is not the whole tribe that lives in the Kayas, as it was before, but the old men selected from every clan of the tribe. The youths rarely visit the Kayas.

Schooling and closeness to the city of Mombasa where the youths can attend movies and clubs; plus unemployment which puts pressure on the people especially the youth to move out in pursuit of jobs, these and many other factors, have exposed the youth such that they nowadays seem to have abandoned such traditions as believing in the Kayas.

In this case, should age and level of education be considered as important factors in meeting the objectives of this study?

The variations in perceptions surrounding the Titanium venture are also manifested across the gender settings. Generally, women are less involved in decision-making in socio-economic and political issues than their male counterparts. Historically, the cultural traditions have given the man

authority over the woman in decision making with the latter's role remaining that of execution. The girl child in particular has been offered a lesser attention than the male child on the pertinent issue of education such that it is the boy child that attend school in many cases. However, this does not mean that the girl and the woman are not respected within the society, in fact, such phenomena should be understood as historical or caused by prevailing circumstance.

Is gender a conservational aspect?

The intense pressure from Tiomin Resources Inc. also plays a major role in influencing the decision making process of the people in the stalemate surrounding the project. The company has been accused of approaching individuals and using the local administration to sway them to accept compensation offers from the company . Some locals who desperately need money usually succumb to the pressure and take up these offers.

There have been many complaints from both the local leaders and government officials that this firm's activities are shrouded in mystery. Just as the mineral's discovery was announced in Canada instead of Kenya, the firm's operations have been kept secret, raising many questions over its intentions. Farmers in the area have accused Tiomin Resources Inc. of using questionable means to acquire their land for mining of the highly valued mineral.

Is such behavior of corporations like Tiomin Resources Inc. of influencing individuals about resource utilization, sustainable behaviour?

The Mining Act (Cap 306) of the Laws of Kenya that rests all mineral resources to the Government of Kenya definately affects the perceptions of the people in this Titanium controversy. The government has the sole right on the mineral wealth of the country. Hence the government can mine through several of its organs agencies or license miners. If mineral deposits are found in a settled area, the farmers have only 'Ground Rights'. That is a right of up to about 1m (1000cm) depth where most of the crop/positive roots are concentrated. Hence the farmers can be requested by the government to vacate the land. During such a displacement however, the Land Control Act Cap 302 need to be invoked so that the farmers can be paid a relocation fee. The mining company in Kwale does not seem to have negotiated this relocation fee with the farmers.

In fact, Nguluku village one of the two villages within the mining site with a population of 3,533 residents is said to be a settlement scheme with all the people as squatters, the land being owned by an Indian Company, Madhivan Group. It is said that this ownership dates back to 1911 when the Madhivan Group signed an agreement of ownership with the colonial government without reference to the indigenous Digos. This explains why this said Madhivan Group had invested in the collapsed Ramisi Sugar factory near the targeted mining area.

Given the Tiomin Resources Inc. mining proposals, this population would be highly disadvantaged when it comes to compensation for the land on which they reside. Indeed the residents have no title deeds that would attract compensation for land at rates available to their sister village of Maumba.

Ideally this population faces double tragedy (loss of land and zero compensation) if the mining proposals are approved by the government as they are.

Does environmental management policy of the Kenya government promote sustainable utilization of environmental resources?

CHAPTER TWO

2.0 Statement of The Problem, Study Objectives, Significance of Study and Justification of Study

2.1 Statement of The Problem

Sustainable development (SD) has become a catch-all phrase for forms of economic development which highlight the need to retain an acceptable level of environmental quality and to conserve nature's assets. The most quoted principle of sustainable development is that offered by the Brundtland Commission; 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED 1987). Therefore, achieving sustainable development (SD) involves achieving equity both within generations (intra-generations equity) and across generations (intergenerational equity).

The people of Kwale are now trapped in a crucial situation that requires them to make a wise and visionary decision about the Kayas among other issues against the Titanium mining project. They have an eternal desire to keep the traditions of the Kayas but are also faced with numerous socio-economic problems and challenges such as poverty, unemployment and retrogressive government land and mining policies. The Canadian firm's plan to start the Kshs.6.3 billion mining project has the potential of drastically alleviating some of these problems. About 60,000 acre forest would be destroyed including the indigenous sacred forests i.e. Kaya Budu, Kaya Mwahidi, Kaya Muhaka and Kaya Bombo. More than 10,000 people

including the Digo face relocation once the project is fully underway which will make it difficult to continue with the practice of believing in the Kayas.

What is required, therefore, is a strategy that will guarantee individuals their preferences for conservation or that will ensure efficient intertemporal utilization of environmental assets.

2.2 Study Objectives

The ultimate objective is to assess the strength of cultural traditions in conservation by evaluating the various perception of the people of Kwale about the Kayas using the Contingent Valuation Method at this time when the Titanium mining project is about to take off. The specific objectives are:

1. To estimate the economic value of the Kayas through the Willingness to Pay (WTP) to preserve them.
2. To formulate an econometric model relating the WTP to the individual's bio-data or socio-economic features.
3. Based on the study results, to recommend appropriate policy options that may resolve some of the problems associated with conservation and the attendant resource use conflicts.

2.3 Significance of Study

It is generally agreed among Environmental Economists that the manner in which producers and consumers use environmental resources depends on the

property rights governing these resources. Where property rights refers to a bundle of entitlements defining the owner's rights, privileges and limitations for the use of the resource. Such that, by examining such entitlements and how they affect human behavior, we will better understand how environmental problems arise from government and market allocations.

The approach of vesting property rights either with individuals, as in a capitalist economy, or with the state, as in a centrally planned socialist economy, have historically proved ineffective. It is not uncommon to hear that the source of environmental problems in a capitalist economy is the market system itself or, more specifically, the pursuit of profits. Or sometimes this point of view is expressed as, 'corporations are more interested in profits than in the needs of the people'. Centrally planned economies, such as the former Soviet Union, did not historically avoid pollution excesses too.

Market allocations will not always sustain efficient allocations due to externalities; improperly defined property rights systems (such as common-property resources and public goods); imperfect markets for trading the property rights to the resources (monopoly); and, the divergence of social and private discount rates (under the threat of nationalization).

On the other hand, due to rent-seeking behavior by special interest groups or the less than perfect implementation of efficient plans, the political system can produce inefficiencies as well. Voter ignorance on many issues coupled

with the public-good nature of any results of political activity tends to create a situation in which private, but not social, net benefits are maximized.

Whether these assertions are true or false is a matter of debate, but the point that is very clear is that these approaches still have a lot to prove.

Looking for solutions within cultural settings for environmental problems might be the only option remaining. The completeness of most cultural settings makes culture a much more superior approach than the economic and political systems in solving numerous problems not only in environmental aspects but in other areas as well, such as investment, etc. Culture is defined as the total of the inherited ideas, beliefs, values and knowledge, which constitute the shared basis of social action (The new Collins Concise English Dictionary).
Culture defines property rights exhaustively among generations.

2.4 Justification of Study

In the past, environmental economics, government policy and conservationists in general have ignored the people and their indigenous knowledge about the environment, particularly on the important subject of conservation. It is on the basis of this slight insight that the motivation of this study is derived.

Personally being a native of Coast, I can confidently assert that indigenous cultures and traditions support a healthy environment. There are strong

connections between cultural diversity and biological diversity, which is very evident in the peoples' languages (words) and taboos, for example, ***Mkone*** is a very rare indigenous tree whose seeds are less known to the people. It is culturally a taboo to use this tree for construction or as firewood where the believed punishment for disobedience is death or family catastrophe. Scientifically, such a taboo has implication for conservation due to the scarcity of this tree species.

Indigenous knowledge and traditions partnered with knowledge of others will always support a healthy economy and healthy landscape for everyone. In fact, it is part of African culture to work with others on the basis of respect and consensus.

Conservationists while embracing participatory methods to conservation issues, usually pay less attention to indigenous knowledge and practices and instead start teaching people on conservational techniques or approaches such as planting of trees. Such approaches usually fail or succeed only in the short term because they are not introduced within the cultural settings of the people. Rather they are introduced as external phenomenon and are therefore regarded as foreign conservational methods by the people, this is so despite the fact that tree planting is an activity that has been undertaken by indigenous people for many generations. It is the approach in which this activity is introduced that is not responsive and not the activity itself. The study is intended to correct this situation. Conservationists mistake this reaction with ignorance, no. Traditional cultural systems of life are very closed and unless such approaches penetrate these settings they are bound to

fail. Why indigenous people, knowledge and traditions have not ensured acceptable level of environmental quality and conserved nature's assets, is also subject of this study too.

The Kayas are specifically chosen because these are the cultural apex of the Mijikenda people and given that I am a member of that society gives abundant motivation for this study, and the fact that these are located deep in the forests warrants them a study as environmental assets. Destroying the forests means destroying the Kayas and therefore loosing touch with the gods. Another reason is that the value of the Kayas is non-use contrary to the many studies undertaken on forests that have persistently emphasized on the use value of the forests. This reason therefore makes this study unique.

The contingent Valuation Method (CVM) is specifically selected because non-use values are the largest component if not all of the value for preserving Kayas which of course are potentially significant to the Mijikenda people as shown above,

Since non-use values are significant and few people from outside the area actually visit the place to enjoy the services of the Kayas, other methods such as the travel cost method, will underestimate the benefits of preserving the Kayas. In this case, contingent choice methods might also be used, depending on the questions that must be answered and whether contingent choice question formats are more effective than standard contingent valuation questions. This would be decided in the survey development stage of the application.

Last but not least, evidence that a similar study has been undertaken is not forthcoming. In fact, most preservation studies that are available have analyzed and emphasized the environmental impacts on environmental assets on the basis of their use-value only. A similar approach has been undertaken on the study of environmental impact assessment of the Titanium mining project. Therefore, the success of this study is unique additional knowledge to the methods of conservation and an increased input towards resolving the controversies surrounding the CVM approaches. It may also assist in resolving the controversy between the people of Kwale, the government and Tiomin Resources Inc. about the Titanium mining project.

CHAPTER THREE

3.0 Literature Review

3.1 Introduction

Recent debates, both within the economics profession and between economists and non-economists, about the usefulness (i.e. the reliability and validity) of the contingent valuation method, have brought to the surface several general and fundamental questions. Thus, the theory, methodology and application of non-market valuation of the environmental resources have all come under close scrutiny, Harris and Brown (1992), for example, have noted that who gains or loses from some environmental change and how motivations (feelings of responsibility) and/or self interest influence the value judgments of those gainers and losers, all have important implications for CVM.

The CVM requires that individuals express their preferences for some environmental resources, or change in resource status, by answering questions about hypothetical choices. The very nature of this methodology has therefore meant, that CVM has been subject to criticism from both economic and psychological experimentalists, whose growing research focus has been the problem of preference elicitation. This criticism has in turn caused supporters of CVM to pay much more attention to a testing protocol in which questions of method reliability and validity are directly addressed.

The respondents to a CVM questionnaire are asked a variety of questions about how much they would be willing to pay (WTP) to ensure a welfare gain from a change in the provision of a non-market environmental commodity; or how much they would be willing to accept (WTA) in compensation to endure a welfare loss from a reduced level of provision. A basic question for the implementation of the CVM is therefore whether WTP or WTA is the most appropriate indicator of value in a given situation.

For cost-benefit analysis based on the Hicks-Kaldor compensation test, WTP would seem to be the appropriate measure for gainers from some resource-allocation decision and WTA the proper measure for losers from that same reallocation. But as Harris and Brown (1992) have pointed out, it is often not easy since this judgement is itself influenced by valuer's own perspective.

The format of the questions used to elicit valuations may be continuous (or open-minded), i.e. asking respondents to state WTA or WTP without any prompts concerning possible answers or discreet (or dichotomous) i.e. presenting the respondent with a single buying price or selling price which must be accepted or rejected. Many intermediate formats are also possible, e.g. bidding games. These differences in format can produce systematically different responses.

3.2 Review Of Theoretical Literature

Willig (1976) claimed that, WTP and WTA measures should in the absence of strong income effects produce estimates of monetary value that are fairly

close (within 5%). However, since 1976 strong evidence has been accumulated which shows that, for given environmental goods, WTA is significantly greater than WTP (over 40% - divergence). In addition, WTA valuations seem to have greater variance than WTP ones and are less accurate predictors of actual buying and selling decisions.

There may be income effects, as predicted by Hicksian Consumer theory. In a recent paper Hanemann (1991) has argued that such effects could account for some observed WTP /WTA differences for public goods. He has calculated that a WTA measure five times greater than WTP can be justified in cases where the elasticity of substitution is low and/or the WTP/Income rate is high, i.e. for unique, irreplaceable environmental assets about which individuals care a great deal.

Eberle and Hayden (1991); Bishop and Heberlein (1979), say that a psychological phenomenon, loss aversion, may be important especially in the case of potential losers in a resource change when WTA questions are related to giving up things, rights or privilege. Valuations may be made relative to reference points, losses being weighted more heavily than gains. Such effects, which could account for some WTP/WTA differences have been found experimentally. Similarly anchoring effects (or starting point bias) may cause differences between responses to discreet and continuous formats (Green and Tunstall ,1991).

Hoehn and Randall (1987) assert that WTA questions may be less readily understandable than WTP ones, since most people have more experience of

buying goods, paying taxes etc. than of selling. Similarly, continuous questions may be less readily understandable than discreet one, since most people have more experience of choosing whether or not to pay stated prices than of stating valuations.

Harris and Brown (1992) say that overall, it is likely that merely identifying gainers and losers in some resource change situation will be insufficient to determine whether WTP or WTA is the most appropriate indicator of value. We need to know more about the motives of the valuer. Economics has much to learn from psychological research in this context. In fact, some of CVM's strongest critics are to be found outside the economics profession, in the ranks of philosophers, psychologists, and political scientists.

Sagoff (1988) has argued that economics makes a 'category mistake' in its approach to environmental valuation. For him, it is not preferences but attitudes that determine people's environmental valuations. Thus people may not be willing to consider market-like transactions (assumed by CVM) involving public resources. CVM surveys pick this effect up into the form of refusals and protests bids. Some combination of individual preferences and public (collectively held) preferences will be held by any given individual who by necessity has to operate in daily life as both a consumer and a citizen. Thus the environment can be both a purchase commodity and a moral or ethical concern (Turner 1988a, 1988b).

According to Sagoff, environmental economics has no role to play in the determination of the goals of environmental policy. Environmental

protection standards are determined by political, cultural and historical factors not by preference-based values. If economics has a role it is restricted to revealing the costs (social opportunity costs) of the pre-emptive environmental standards. But if action is taken on the basis of the opportunity cost analysis then an implicit valuation has been made. Nevertheless, from this viewpoint, there is no role for direct monetary valuation (preference -based) of the benefits of environmental protection policy.

Ehrlich and Ehrlich (1992) assert that some scientists have argued that the full contribution of the component species and processes to the aggregate life-support service provided by ecosystems has not been captured in economic values. There does not seem to be a sense in which this scientific critique of the partial nature of economic valuation has some validity-not in relation to individual species and processes but in terms of the prior value of the aggregate ecosystem structure and its life-support capacity.

Turner (1992) says that since it is the case that the component parts of a system are contingent on the existence and functioning of the whole, then putting an aggregate value on ecosystems is rather more complicated a matter than has previously been supposed in the economics literature. Taking wetland ecosystem as an example, the total wetland is the source of primary value (PV).

Methodological issues most pertinent to the CVM can be roughly divided to validity, reliability and bias categories. Validity refers to the degree to which

the CVM evaluation correctly indicates the true value of the assets under investigation, bias being a common cause of low validity. Reliability refers to the consistency or repeatability of CVM estimates.

Bateman et al (1991) consider reliability and validity in terms of a standard generalized linear model (GLM):

$$Y=a\,x + b + e$$

Where

Y= the measured value of the variable.

X= the true value of the valuable

a,b = constants

e = residual error

The reliability of the CVM instrument can then be measured by e, while a and b reflect validity; the instrument being absolutely valid if a=1; b=0 and e is a random variable. Where e is a non-random variable then a bias is likely to be present.

Smith and Desvousges (1986) and Kristrom (1990) say that the conventional classification partitions bias into general, procedural and instrument types.

3.3 Empirical Review

The contingent valuation method first came into use in the early 1960's when economist Robert K. Davis (1963, a, b, 1964) used questionnaires to estimate the benefits of outdoor recreation in Maine backwoods area. Earlier Ciriacy-Wantrup (1947) had suggested the use of the 'direct interview method' to measure the values associated with natural resources (Mitchell and Carson 1989). The essence of the interview method of measuring recreationist benefits is that through a properly constructed interview approach one can elicit from recreationists information concerning the maximum price they would pay in order to avoid being deprived of the use of a particular area for whatever use they may make of it (Knetsch and Davis, 1966). In their study Knetsch and Davis, carried out 185 interviews on users of forest recreation in northern Maine and elicited the WTP per household per day ranging from zero to $16.6. An econometric model relating WTP to income (y), years of experience by the households in visiting the area (E) and length of stay in the area (L) was used and the regression results were reported as follows:

$$W = -48.57 + 2.85\ Y + 2.88E + 4.76\ L$$
$$(0.58) \quad (1.03)$$
$$R^2 = 0.5925$$

According to these authors, income reflects the ability to pay as well as a positive elasticity of demand of outdoor recreation services; years of experience in returning to the area was interpreted as the effect of an

accumulated consumer capital consisting of the knowledge of the area, acquisition of skills which enhance the enjoyment of the area and in some cases use of permanent or mobile housing on the areas; length of stay was taken to measure the quantity of goods consumed and also reflects a quality dimension suggesting that longer stays probably reflect a greater degree of preference for the area.

Abala (1984) in his study of willingness to pay for park services showed that both the socio-economic factors and park attributes were significant in explaining peoples WTP for park services. Notably, the study showed that people with high education and income level tended to exhibit higher willingness to pay. Also park attributes such as roads, guides, viewing points, variety of species, amenities, shelter and security of park users proved important. Congestion negatively affect WTP while animals per se may not be important in determining park users willingness to pay (Abala, 1984, in Eastern Africa Economic Review 1987). The setting of the study was done correctly and it shed some light on some of the variables that are important in explaining the WTP. However, the conclusion that animals per se may not be important in explaining the WTP needs further investigation since it is widely known that the major incentive of people to visit national parks is connected to the possibility of viewing wildlife. Also, the study did not include some variables that have proved important determinants of the WTP. For instance, variables like attitude, purpose and number of visits have proved to be important determinants of the WTP.

Scura and Maimon (1993) conducted a CVM study in the metropolitan region of Rio de Janeiro (MRRJ) to elicit willingness to pay for ambient surface water quality improvements. The set up for the study followed the Mitchell-Carson format: (i) a detailed description of the whole scenario including different levels of water quality needed for different uses such as boating, swimming and fishing, (ii) questions on the respondents biodata (income, age, education, frequency of and preferences for surface water uses and perceptions of severity and importance of surface water quality problems and (iii) questions to determine respondent single bids for specific incremental improvements in surface water quality- for example, an improvement from boatable quality to fishable or from fishable to swimmable quality. The WTP responses were averaged and generalized to the total population of MRRJ to get an estimate of aggregate WTP for improvements in surface water quality. The results revealed that WTP for boatable water quality was about US$ 133 million, swimmable quality was valued at US $ 228 million and fishable quality at US$ 159 million per year. The results show that the respondents valued swimmable water quality more than any other quality. The setting of the study was correctly done except that for comparison purposes the researcher should have presented the respondents with a choice of one quality to find out which quality was most preferred. Asking respondents to choose one quality rather than the other gives them a chance to express their preferences directly better than when they are asked to value one at a time.

Scura and Van't Hof (1993) carried out a CVM study on the Bonaire Marine Park (BMP) to assess the environmental carrying capacity of the BMP from

a divers perspective. A photo analysis was carried out to analyse coral cover and species diversity. The results of photo-analysis indicated that increased diver use was having an adverse impact on the coral reefs since the extent of coral cover had decreased significantly at the most frequently dived sites. The study estimated a conservative annual carrying capacity of 190,000 to 200,000 dives per year. A willingness to pay on the BMP revealed that 92 per cent of the park users were willing to pay the proposed fee of $10/diver per year, 80 per cent of those surveyed indicated WTP of $20/diver per year, 48 per cent to pay at least $30/diver per year and 16 per cent to pay at least $50/diver per year. These bids showed clearly that the majority were willing to pay more than the proposed amount of $10/diver per year. The average was $27.40/diver per year. This indicates a $17.40 consumer surplus for park users.

This study was well conducted and its strengths are mainly to do with the recommendations on how to ensure sustainability in the use of the resources of the park.. Again the findings of this study can be useful in the general management of related resources with similar problems. Like the author argues, improved park management and diver education can help reduce stress on the resources of any marine park.

Many CVM studies have been used elsewhere. Ronald Ridker (1967) used the CVM method in several studies. For instance in Philadelphia and Syracuse he used a CVM and the questions sought to know how much people would be willing to pay to avoid 'dirt' and 'soot' from air pollution. His experience with this was that he needed a deeper and psychologically

more sophisticated questionnaire to measure and untangle the various determinants of clearing costs.

Singh et al (1993), in Dixon et al (1995) used a CVM to examine the WTP for yard taps or house connections in several rural villages in Kerala State, India. His research question was: Is there potential for the system to rise out of its current trap? In his opinion, the supply of water to the village was inefficient and insufficient forcing the villagers to supplement their piped water with water from traditional, often low quality sources such as shallow wells, rivers, ponds, rainwater and vendors. The water supply was in a low equilibrium trap. His results concluded that there was a potential for the water system to rise out of its low-level equilibrium trap.

Nyangena (1997) conducted a CVM study on Lake Bogoria National Reserve to assess the economic benefits and costs of the reserve to the stakeholders. He used a voluntary tax and park fee as the payment vehicle. The results revealed that the voluntary tax performed better than the park fee. This is attributed to the fact that park users associate a tax with developmental fund, which can be used to develop the area's infrastructure or construct schools, health centers to benefit the entire community. The mean willingness to pay tax to preserve the park was estimated at Kshs.40 (US$0.7) per household per month. The park fee elicited a mean WTP of Kshs.65 per household. The willingness to pay tax (WTP_{tax}) was estimated to be Kshs.122,240/- (US$2100) per month for the park. The aggregate WTP_{tax} and WTP_{fee} were estimated to be Kshs.1,466,880/- (US$25,204) and Kshs.1,390,675/- (US$23,977) respectively.

The WTA questions were administered to the locals and the results show that the respondents were willing to give up a mean of 3.4 hectares for the reserve at a mean WTA of Kshs.39,750 (US$685.3) per hectare. This was generalized to 3000 households and the aggregate WTA was estimated to be Kshs.405,450,000 (US$8,190,000).

The study also examined the determinants of WTP. The results of a regression analysis relating WTP to the determinants is given below:

$$\text{Ln WTP} = -5.48 - 0.740\text{Att} + 0.242\text{Educ} + 0.346\ \text{Age} + 0.852\text{Inc.} - 0.67\ \text{Subsite} + 0.251\ \text{fam size.}$$

$R^2 = 0.443\%$ Adj $R^2 = 0.426\%$ $F = 32.07$

Given the controversy that surrounded the park this study was handy in the sense that the information elicited would provide a platform of proper action to resolve the problem. Again the set up of the study was correctly done in accordance with the Mitchell and Carsons (1989) recommendations. The coefficients have the right signs and, therefore, conform to theory. However, the researcher did not address the determinants of WTA which, given the nature of the problem are likely to be different from those influencing the WTP. For instance, profitability, fertility and size of the land could be important determinants of WTA. Also, the study did not categorize the respondents into homogenous groups such as residents and non-residents. Similarly, farmers should have been categorized into say, size of

land owned or type of economic activities engaged in. This was important because it could help explain the variation in WTP/A from one group to another.

3.4 Summary Of Literature Review

CVM is a widely applicable and widely applied monetary evaluation method. It has the potential for application to a wider range of environmental goods than any of the other main monetary valuation techniques. CVM possesses a strong theoretical basis, with the unique advantage that it estimates income-compensated welfare measures. Furthermore, it can be demonstrated that this theoretical basis is consistent with many of the empirical results obtained in practice (notably the observed asymmetry of WTP/WTA measures) which, rather than being symptomatic of a flow in the technique, appear to have considerable theoretical justification.

Because of its nature as an expressed-preference survey technique, CVM is susceptible to bias and, indeed, while it is easy to instill bias into responses, the task of minimizing such bias to an acceptable level is, we recognize, one that requires considerable skill. Certainly CVM cannot be currently classed as a non-expert technique. However, the analysis of bias issues is cautiously optimistic. In particular, it is felt that the widely held notion that free-rider problems or strategic bias form a fatal Achilles' heel is poorly founded in fact.

While reliability testing is infrequently applied in practice, that cannot be a problem. In contrast, however, validity testing still appears to be

considerably under-researched. In particular, it is a concern amongst many researchers that the emphasis upon convergent validity testing has paid too little attention to the basic fact that these comparative methods are estimating different values.

Nevertheless, there are considerable reasons for optimism particularly in the application of criterion testing for quasi-private goods. For pure public goods there do seem scope for the use of bid curve analysis to provide theoretic validity testing by examining coefficient estimates for expected signs and magnitudes.

Young and Allen (1986), in criticizing the CVM approach, felt that the method could only be justified if the expected deviation of the estimated valuation is more acceptable than complete ignorance. Many of the items valued via the CVM have indeed traditionally been ignored by decision-markers.

While cautious, the analysis of CVM should attempt to highlight the major pitfalls of empirical application and seek to show how, by their avoidance, the technique can provide evaluations of environmental goods which are sufficiently valid and accurate to enhance significantly the economic analysis and appraisal of projects which in some way impact upon these goods.

CHAPTER FOUR

4.0 Theoretical Framework

The roots of Contingent Valuation Method (CVM) are found in consumer theory. The CVM approach, in eliciting explicit statements of how much income consumers are WTP to ensure that a welfare gain occurs (or prevent a welfare loss occurring) or how much income they are WTA to ensure a welfare loss (or forgo a welfare gain), is, in theory, directly estimating the true Hicksian Welfare measures of these changes. Despite the methodological criticisms of the empirical method, this theoretical ability to estimate true welfare measures represents a considerable potential advance over other approaches and deserves emphasis.

The Hicksian approach evaluates welfare change as the money income adjustment necessary to maintain a constant level of utility before and after the change of provision. Two such welfare change measures are feasible for such an approach. The compensating variation (CV) is the money Income adjustment (welfare change) necessary to keep an individual at his initial level of utility (U_O) throughout the change of provision, while the 'equivalent variation' (EV) is the money Income adjustment (welfare change) necessary to maintain an individual at his final level of utility (U_1) throughout the provision change.

There are therefore, two approaches to measuring welfare changes. Furthermore, these changes can be either positive (a welfare gain) or

negative (a welfare loss) giving four possible scenarios. For a proposed welfare gain (i.e. a change in provision which increases utility for example more recreation or less pollution) the CV measures tells how much money Income the individual should be willing to give up (WTP) to ensure that the change occurs, while the EV measure tells us how much extra money income would have to be given to an individual (WTA) for that person to attain the final improved utility level in the absence of the provision change occurring. For a proposed welfare loss (i.e. a change in provision, which decreases utility for example less recreation or more pollution) the EV measure will now show how much an individual is WTP to prevent the welfare loss occurring, while the CV measure how shows the individual's WTA compensation for allowing the welfare loss to occur.

These variation measure (CV and EV) only strictly apply where the consumer is free to vary continuously (i.e. non-discreetly) the quantity of the good consumed. Where the consumer is constrained to consume only discrete or fixed quantities (as for most environment public goods) then we should consider compensating surplus (CPS) and equivalent surplus (ES) measures in place of CV and EV, respectively.

At first glance it might be expected there to be no difference in the amount which consumers would be WTP for a specific welfare gains compared to the amount which they would be WTA in compensation for an equivalent loss; indeed, neo-classical utility theory, might well lead us to expect such a result, Schoemaker (1982). However, there is a theoretical asymmetry between WTP and WTA.

In his seminal articles, Willig (1973; 1976) showed that, for priced normal goods in most plausible situations the deviation between compensating and equivalent variations measures should be relatively small (thus promoting consumer surplus as valid welfare measure). The Willig limits suggest that Hicksian WTP and WTA should generally lie within 2% - either side of the Marshallian consumer surplus. These results using Hicksian analysis were formulated for price changes (Hicks 1943). It can be shown, that this asymmetry is, in theory, slightly more pronounced for un-priced goods subject to quantity constraints.

Nevertheless, these limits in no way provide a theoretical explanation of the very wide WTP/WTA asymmetry found in empirical testing. In practice CVM studies have recorded very wide divergence between WTP and WTA. These large divergences have caused considerable concern about the validity of CVM. We therefore need to consider whether such a pronounced empirical asymmetry is indicative of a fundamentally flawed methodology or whether it has any theoretical plausibility.

Various findings (Randall and Stoll, 1980; Hanemann, 1991 etc) have extended rather than refute the original Willig limits. Indeed, they show that the observed WTP/WTA asymmetry does have a theoretical basis and we should expect such asymmetry to occur-where we are evaluating environmental goods which are in some significant way unique, irreplaceable or lacking substitutability. Such asymmetry, rather than being a methodological glitch, should actually be interpreted as theoretical backing for the internal consistency of the CVM.

However, Brookshire et al (1980) put forward an arguement to explain the apparent WTP/WTA asymmetry, by illustrating the standard Willig–type divergence between CV (WTP) and EV (WTA) as the smooth standard evaluation curve.

Critics of the CVM have persistently cited the empirical asymmetry of WTA over WTP sums as evidence of the unreliability of the method. However, from the above discussion we see that, far from being a pure methodological glitch, the marked differences between WTA and WTP sums observed in CVM studies do have a strong theoretical basis stemming directly from neo-classical economics.

Such an argument supports the use of either WTP or WTA question formats as appropriate and Harris and Brown (1992), set out the conditions under which WTP is the correct welfare measure. It is important at what is still a formative stage in the development of CVM that we do not abandon the theoretical high ground because of empirical problem posed, in particular, by past WTA results. Such results are perceived with unease by many economists, used as they are to value via payment rather than compensation.

Nevertheless, it may well be that WTA responses are not methodological artifacts but rather pointers towards the narrowness of the basic psychological assumptions underlying conventional utilitarian value theory.

In summary, Bateman and Turner (1992) argue that the observed asymmetry between WTP and WTA sums does have theoretical justification and can be seen as support for rather than a rejection of CVM. They recognize competition between theories justifying this asymmetry and currently advise against the present use of WTA formats in empirical tests. However, they do find strong theoretical backing for the empirical use of WTP scenarios to evaluate welfare gains and certain welfare losses.

4.1 Why CVM?

Since non-use values are significant in this study of the Kayas and few people from outside the area actually visit the place to enjoy the services of the Kayas, other methods, such as the travel cost method, will underestimate the benefits of preserving the Kayas. The choice of the CVM in this study is based on its appropriateness and superiority over the other valuation methods inherent in its ability to capture all the values i.e. both use and non-use values. There are other methods that can be used to value environmental resources. These methods include hedonic price method, mitigative expenditure, shadow project, change in productivity and replacement cost approaches. These methods though useful in the valuation of the environmental resources, cannot capture such values as option, existence or bequest values. For instance, change in productivity approach can capture this opportunity cost, however, this method, while it is completely unable to capture non-use value, it may also not be able to capture use values in some cases.

Therefore, despite the shortcomings of the CVM it is the most appropriate and applicable technique in our circumstances. And its major advantages are to measure both the use and non-use values simultaneously apart from its ability to measure the economic loss associated with the existence of the resource through WTAC

4.2 Elicitation Method

Interviews were on face-to-face with the users of the Kayas in the exercise of obtaining responses to the questionnaires. In this particular case the users were the Digo people who are also indigenous to the study site, where in the process:

(i) The legal status of the Titanium mining project; a detailed explanation of the environmental impacts of the project to the Kayas and the area in general; and the payment vehicle to be used, all were presented to the respondents. The respondents understand the significance of the Kayas, especially the older generations. However, the relevance of culture in socio-economic life and environmental sustainable concerns were explained to the youth.

(ii) Questions on WTP designed appropriately to facilitate the valuation process were presented to the respondents. The questions were open-ended to produce continuous bids variables and to take care of outliers effectively.

(iii) Respondents were also asked questions on their socio-economic features (for example, income, age, gender, education, etc.)

Other elicitation methods such as payment cards and bidding games with suggested starting points were not used. Several studies have noted that the suggestion of an initial staring point in a bidding game can significantly influence the final bid-for example, the choice of a low (high) starting point leads to a low (high) mean (Desvousges et al 1983; Boyle et al 1985; Navrud 1989; Green et. al 1990; Green and Tunstall 1991).

Likewise, an approach that allows the respondents to choose a bid from a range shown on a payment card produces anchoring of bids within the range given on the card, with most respondents assuming that such a range contains the correct valuation and outliers being effectively ignored (Kahneman and Tversky 1982; Roberts and Thompson 1983; Kahneman 1986; Harris et. al 1989).

Dichotomous choice formats, also called take-it-or-leave-it choice formats may be open to anchoring bias according to the level of bid asked to respondents and as such they were avoided.

CHAPTER FIVE

5.0 METHODOLOGY

5.1 Study Hypotheses

The respondents in the study were the affected people of the Maumba and Nguluku villages and of the Digo ethnic group. Although all the Mjikenda people value the Kayas, the perceptions of the people from these two villages was definitely different from the Mijikenda people of other villages, given that one group is faced with a real confronting situation while the circumstances of the rest is just hypothetical.

These respondents are men and women aged 18 years and above, which is the official adult age in Kenya where one can take responsibility for his/her decisions. Consequently, one broad hypothesis was developed that helped to operationalize the study objectives.

A special target group of the Kaya clan elders was studied but hypothesis was not developed for testing.

5.2 The Kaya Clan Elders (Vaya)

This is the most important target group in the study as far as the valuation of the Kayas is concerned, and it is the class that was to reveal the strength of culture in conservational issues.

This group was not subjected to any empirical scientific exercise such as a CVM questionnaire due to their strong belief and cultural practices of the Kayas. These elders are in fact the people entrusted with the responsibility of ensuring the continuity of the belief and practice of the Kayas, although the upkeep and maintenance of the Kayas may involve the larger community, of course with the guidance of these elders.

However, the useful information that was extracted from them on the significance of non-use values of these indigenous forests and the strength of the cultural practices of the Kayas on conservational issues was compared against other scientific knowledge and practices to come up with concrete conclusions as regards this divergence.

5.3Hypothesis for Testing

1. It was hypothesized that the responses on WTP for people interviewed was influenced by the age; gender; attitude towards the Kayas; Income; Education; Influence by Tiomin Resource Inc.; Government Policy on the project and mining in general; and, the availability of substitutes. It was expected that age; attitude; gender (particularly men); Income; and, education were positively correlated with WTP.

this, for the older generation, while it is the contrary to the younger generation. The influence by the Tiomin Resources Inc.; Government Policy; and, the availability of substitutes have a negative effect on the WTP bids for both the older and the younger generations.

For instance, the older generation do not have a robust desire for material things unlike the youth, such that their attitudes towards cultural practices and traditions at this tempting times of the project would still be expected to be positive, and could therefore refuse the project. The youth shall look at the project in the material perspective such as the creation of employment. The concern for employment might be an issue also with the older generation, but usually this is for the sake of the youth and not themselves. Particularly, the uneducated older generation of men and women, the concern for reverence with the ancestors tends to make them have a stronger attitude towards the Kayas than those that have attended school.

5.4 Model Specification

To test the behavioral relationships hypothesized above, a model is specified in the general linear form as below:

$$WTP = \propto + \beta x + e_t$$

Where,

WTP = Maximum willingness to pay of an individual.

X = A vector of variables representing the respondent's bio-data and socio-economic characteristics and Kaya attributes.

$\propto$, β = Are the parameters to be estimated and e_t is the error term.

5.5Regression Equation

The actual equation estimated was specified on the basis of the variables thought useful in explaining the WTP of the respondents. The Linear Version of this equation is given below as follows:

$$WTP = \beta_0 + \beta_1 Age + \beta_2 ATT + \beta_3 GEN + \beta_4 INC. + \beta_5 ED + \beta_6 TI + \beta_7 GP + \beta_8 SUB + e_t$$

Note: This specification was arrived at after several trials with other forms of specifications. The Linear specification performed better than other specifications, for instance, we expected WTP to increase steadily with the age. The coefficients gave us the marginal value of change of the WTP bids from a unit change of the explanatory variable or the condition of the dummy.

5.6 Definition of Variables

The variables used in the equations above are defined below as follows:

(i) WTP = The respondents' Willingness-to-Pay in Kenya Shillings

(ii) Age = The respondents' age measured in years

(iii) ATT = The respondents' attitude towards the Kayas where, 1= important and 0 = not important

(iv) GEN = Gender, where, 1= male and 0 = female

(v) INC = The respondents' monthly income in Kenya Shillings

(vi) ED = The respondents' education level measured in years

(vii) TI = Influences by Tiomin Resources Inc. where, 1= substantial and 0 = not substantial

(viii) GP = Influences of Government policy on mining and land where, 1= important and 0 = not important

(ix) SUB = Availability of substitutes for the Kayas, where, 1= exists and 0 = otherwise

5.7Data Types and Sources

The study used both primary and secondary data. Primary data was obtained through face-to-face interviews, discussions with the respondents and the information from the questionnaires. The interviews, discussions and the questionnaires covered the appropriate sample of the men and women above 18 years.

Secondary data was obtained from books, various publications, Ministry of Environment, and United Nations Environmental Programme (UNEP) in Nairobi.

5.8Sampling and Sample Size.

A stratified random sampling procedure was restricted only to the Digo people and especially in the affected villages of Maumba and Nguluku.

Stratified random sampling is an example of mixed sampling and it involves stratification of the population and then simple random sampling is done to determine the items to be included in the sample for study. Those that were interviewed were the Digos who have the historical attachment with the Kayas whether they still practice this cultural activity or not.

This was advantageous in two ways: one, it distinguished potential from effective demand of the good; two, it minimized the hypothetical bias since those interviewed have at least full or some knowledge about what was being asked (Knetsch and Davis, 1966). The sample frame consisted of men and women above 18 years.

The members of the sample were then interviewed on a first encounter basis. This criterion was chosen because it was be both the most practical and cheap option in our circumstances since options like random numbers or listing of all items and systematically or randomly picking the sample out of it was not only impractical but also expensive in our case. A total of 100 respondents were interviewed.

5.9Estimation Technique and Statistical Package Used

Estimation of the regression equations was done using Ordinary Least Squares (OLS) technique. The statistical packages used were SPSS version 8.0 and STATA. The packages were chosen because of their simplicity. Other packages included PC – give 8, TSP and Limdep but these packages were more sophisticated than SPSS. Also, packages like PC-give and Limdep give more sophisticated results that are hard to interpret.

5.91 Data Analysis

Basically two approaches were used to analyze data. Qualitative and quantitative analysis. In qualitative analysis, tabulations were done to summarize the mass data collected in the field. Since this study developed a single-equation regression model, the problems associated with this model were tested i.e. multicollinearity and heteroscedasticity. In quantitative analysis, a regression analysis was used to help in analyzing the behavioral relationship between WTP and the explanatory variables. Aggregation and generalization of willingness to pay and accept bids was done on the basis of

(i) individuals that responded and, (ii) for the entire population of the Digos within the study site.

Sampled respondents' bids were generalized for the whole population in order to arrive at the total willingness to pay or accept. In the absence of outliers, this value is usually taken to be the true value of the resource being valued, in this case, the Kayas.

The formula used in aggregation is:

$$TWP = \sum_{i=1}^{n} AWP_i \left(\frac{ni}{N} \right) P$$

Where,

TWP = Total willingness to pay

AWP_i = Average willingness to pay

n_i = Number of respondents willingness to pay AWP_i

N = Total number of people interviewed

P = Population of the Kaya users

I = 1,2,…,N = Various willingness to pay bids e.g. 1,000 per year; 1,500 year etc.

CHAPTER SIX

6.0 Data Analysis and Empirical Results.

6.1 Pre-test study and Target Group

A pre-test study was carried out on a total of 30 respondents. These people were not included in the main study. The purpose of the pre-test study was to:

i) Assess the appropriateness of the questionnaire in terms of whether the information provided was sufficient or not in order to enable us achieve our objectives.
ii) Assess the suitability of the payment vehicle specified and whether the respondents understand it or not.

The pilot study assisted in redesigning the questionnaire to suit the circumstance to enable us achieve the objectives of the research. For instance, it was generally agreed amongst many respondents that the payment should be monthly voluntary contribution and not any form of tax from the government. The full details of the final questionnaire designed are in appendix 1I a and b.

The respondents were asked about their attitude towards the Kayas, the availability of substitutes for the Kayas, any due influence from Tiomin Resources Inc. about the Titanium mining project, their Income, level of education etc. The main purpose was to identify potential explanatory

variables for their WTP to preserve and improve the Kaya forests. The WTP question was asked last and respondents were reminded that the monthly contribution was to be used to maintain the Kaya forests as the apex of their cultural asset as well as an important environmental asset capable of ensuring the quality of the surrounding environment in general.

For purposes of acquainting the respondents with the study objectives, introductory statements preceded the other questions. These statements are also included in the questionnaire at the appendix.

The purpose of the WTP study was to assess the support of the people for the preservation and improvement of the Kayas forests surrounding the Titanium Mining site and in general, the support and knowledge they have for conservation programs. It was revealed that the majority had indigenous knowledge about conservation which was evident in the cultural tabooes e.g. the people said that for a long time they have respected the taboo that they are forbidden from cutting trees within the Kayas. And have obeyed this from generation to generation, and this has been taught amongst all generations. They also suggested that conservation programs can effectively succeed if local people are involved. They also understand that the payments they contribute are used to maintain the Kaya forests. These payments, according to theory, indicate the respondents' preference towards the Kayas forests.

Below we use both descriptive and regression (quantitative) methods to analyse our data.

6.2 Descriptive Analysis of the WTP for the Kayas.

The WTP questionnaire was administered to 100 male and female respondents of 18 years old and above.

A summary of the quantitative variables for the 100 respondents is shown in table 1 below.

Variable	Minimum	Mixiumum	Mean
WTP(Ksh)	0	5000	Ksh.283
Age (Years)	18	82	41 years
Education(Years)	0	16	9 years
Income (Ksh)	0	Ksh.35,000	Ksh.9,975

Source: own survey 2004

A summary of the qualitative variables for the 100 respondents is shown in table 2 below:

Variable	Percentage of ones(1)	Percentage of Zeros(0)
ATT	80%	20%
GEN	77%	23%
TI	37%	63%
GP	94%	6%
SUB	19%	81%

Source: own survey 2004

Prior to asking the respondents to state their maximum WTP to preserve the Kaya forests, we sought to know their attitude towards the Kayas and the reasons for their attitude. This question was important because it could reveal the inconsistency in responses from the respondents. We expected that negative attitude towards the Kayas should be followed by a low or zero WTP bid, and the converse to be true too. From our results this presupposition was not uniform to all respondents because in some cases a low or even zero bid followed a positive attitude towards the Kayas, and the reverse was true also. The reasons given for this inconsistency was that the Kaya forests have existed for many years without interference and that if left alone, trees would grow naturally. Others with negative attitudes towards the Kaya forests were willing to pay for them as environmental assets and for the respect of other peoples cultures.

The respondents were asked about their attitude towards the Titanium mining project and if they expected any benefits from that project. We expected that positive attitudes towards the Titanium mining project would

be followed by a low or zero WTP bid. Surprisingly though 37% of the respondents expected material benefits from the project, majority of them still had a positive attitude towards the preservation of the Kayas.

Majority of the respondents i.e. 81% were commensurate with those who had a positive attitude towards the Kayas to reveal that there are no substitutes for Kayas. They revealed that the Kayas are a traditional heritage passed from one generation to generation and that there cannot be a substitute that can offer similar services to the Mijikenda people.

From our interviews it was revealed that 94% of the respondents believed that there was substantial Government influence towards the implementation of the project. The Kaya elders were in fact categoric that during the stakeholders meetings they were not allowed to mention issues related to the Kayas.

Most women shied away from answering questions such that most questionnaires from them were declared to be non-responsive. This is the reason why we have lesser female respondents than male. However, majority of the female respondents were very positive about the Kayas and negative about the Titanium mining project. In fact most of them seem not to be concerned about the benefits of the project.

The mean of years of education was nine (9) years. Majority of them had primary education that is not sufficient to understand the environmental impacts of the project nor its material benefits. They could also not

understand the costs of conservation and protection programs. Despite the low education level, the study revealed that 80% had positive attitude towards the Kaya forests and only 37% expected to benefit materially from the project. The average age and income are 41 years and Kshs.9,975 respectively.

6.3 Regression Analysis of the WTP for the Kayas.

The theoretical validity of any CV study is obtained by estimating the WTP equation.

Estimation of the equation helps in investigating the determinants of WTP bids. Our apriori expectations are that WTP is determined by factors like income, education, age, attitude towards the Kaya forests, availability of substitutes for the Kayas etc.

Below we discuss the econometric model relating to the target group's WTP.

The regression results of the WTP equation are given below as follows:

$$WTP = -660.482 + 642.921\ ATT + 408.527SUB + 389.115\ TI$$
$$(-1.46) \quad (3.12) \quad (2.0) \quad (2.43)$$

$$-68.935GP + 60.534\ GEN + 0.989\ AGE + 69.697\ INC$$
$$(0.37) \quad (0.43) \quad (0.18) \quad 1.07)$$

$$+ 6.821\ EDU$$
$$(0.36)$$

$R^2 = 0.151 \quad AR^2 = 0.077$

NB: The figures in brackets are the t-statistics

These results conform to our apriori theoretical expectations. All explanatory variables have the expected signs.

All the variables except Government Influence are positively correlated to the dependent variable WTP. The variable, attitude towards the Kaya being the most important factor in determining the preservation of the Kayas is positively associated with WTP meaning that those with a positive attitude towards the Kayas are willing to pay more for their preservation. The converse should also hold.

For the case of Government Influence, in its presence then the people would not be willing to pay to preserve the Kayas. The implication is that once the government decides to move the people, then they are left with little options.

The existence of substitutes for the Kayas variable is also positively related to the WTP variable. Those people that claim there are substitutes for the Kayas then are expected to show zero values for WTP bids. Attitude towards the Kayas is the most statistically significant at 5% level. This is theoretically expected. This is the most influential factor as regards the perceptions in preservation of the Kayas. These indigenous forests are an environmental asset but more they are a cultural heritage. Therefore, attitude should determine their fate.

Availability of substitutes for the Kayas and Tiomin Resource influence, both of these variables were also statistically significant at 5% level.

The other variables age, income, education, gender and government policy were statistically insignificant at 5% level.

Only 23% of the respondents were female, which is a small portion of the sample to make any significant impact on WTP. Over 80% of the respondents had 8 to 13 years of education, which is equivalent to primary education. These levels of education are not enough to make a significant impact on their WTP because it is not really sufficient to affect the respondents' perception about our environmental resources.

The insignificant variables were all dropped to see their effect on the overall fit of the model. It was noted that dropping the insignificant variables just slightly enhanced the significance of attitude towards the Kayas, but in fact lowered the significance of the other two variables that were statistically

significant. The R^2 was in fact reduced meaning that the dropped variables were explaining the variations in the dependent variable to some extent. The expected signs for the variables still stood, but one variable, substitutes for the Kayas became insignificant at 5% level.

The variables were tested for multicollinearity but it was non-existent. However, heteroscedasticity was found to be a problem and this probably explains why age, Income and Government Influence were not statistically significant. The existence of heteroscedasticity may often occur in the cross-section data. For example, the variance of savings among high-income families may be larger than the variance among low-income families.

Nevertheless, these results are acceptable given that the main effect of heteroscedasticity is not on the biasness of the estimated regression coefficients but on efficiency- the variance of the estimated regression coefficients. The attitude towards the Kayas; existence of substitutes to the Kayas; and influence of the Titanium project, the three being the most important variables in this research problem were statistically significant at 5% level.

We can, therefore, accept the alternative hypothesis that the WTP for the people is determined by their level of education, age, income, Government Influence, Tiomin Resources Inc. Influence, attitude towards the Kayas, gender and existence of substitutes for the Kayas. However, it is only attitude, existence of substitutes and Tiomin Influence that are significant

determinants of the WTP. The other variables are statistically insignificant determinants at 5% level.

CHAPTER SEVEN

7.0 Conclusion, Policy Implications and Limitations

7.1 Conclusion and Policy Implications

This study used the contingent valuation method to evaluate the various perceptions and preferences of people concerning the existence of the Kayas forests in Kwale as an environmental asset though it derives its strength from the cultural perspective at a time when they are threatened with destruction by the Titanium mining project. One welfare measure was used, the WTP. The WTP measure was administered to a target group of the Mijikenda people within the areas that would be affected by the mining project. The respondents were male and female who were above 18 years of age. The WTP questionnaire was framed in a way supportive of the preservation and improvement in quality and size of the Kaya forests and the environmental forest cover in general. Therefore, the WTP questionnaire intended to reveal the support all the area people, and all the Mijikenda in general, through expressing the maximum amount they would be willing to pay to enable the Kayas elders achieve the objective of preserving them.

All the people supported strongly the preservation of the cultural Kaya forests at this time when they are threatened with destruction by the Titanium mining project. The mean WTP was Ksh.283

The Total Willingness to pay (TWTP) elicited was Ksh.2,830,000 per month for the population of 10,000 people that are within the affected areas. We

interpreted this value as the total economic value the people place on these Kaya forests.

Our study also focused the various conflicts associated with Kayas and other stakeholders (Conservationists, the Mijikenda, Government, Christians, Muslims etc) views concerning how these conflicts can be managed appropriately. The general consensus was that authorities should involve all the stakeholders in the conservation programs or in any economic ventures. Based on our findings we argue that, to solve the various conflicts and controversies surrounding conservation needs and resource use needs, the government and other conservation agencies should work hand-in-hand with the local communities who are the immediate beneficiaries or losers of such programs, and who have very useful indigenous knowledge about conservation. This means that, it would be advisable for the government and Tiomin Resources Inc. to consider acting on the views of the local people if the conflict and controversy surrounding the Titanium mining project is to be ended sustainably.

They need to consider why the local people give more weight to the Kaya forests than the project and decide on what is best for them and the local people and the environment at large. By so doing, they secure their support for these programs and, therefore face little or no resistance at all.

The point we are emphasizing is that the Government and Tiomin Resources Inc. should consider using an integrated approach to managing natural resources. They should realize that the success of these projects very much

depend on how much input the local people are willing to put towards them. And on conservation, the success will also depend on how much input the local people are willing to put towards the conservation programs irrespective of the conservation agency's efforts. Undertaking such projects without the support of the local people have to some extent caused civil strife in many parts of the world.

7.2 Limitations of the study

The limitations of this study are associated with the practical problems of the contingent valuation method. Since the technique is hypothetical in nature, some of the respondents might have misunderstood the scenario presented to them and hence gave biased responses. Also, crucial in CV survey is the question of how much information to give and this can lead to information bias. Because of the natural human behaviour of benefit acquisition and cost or penalty avoidance, we expect them to behave strategically, which may lead to biased results. These and many other problems inherent in the nature of the study may hamper the reliability of the study results.

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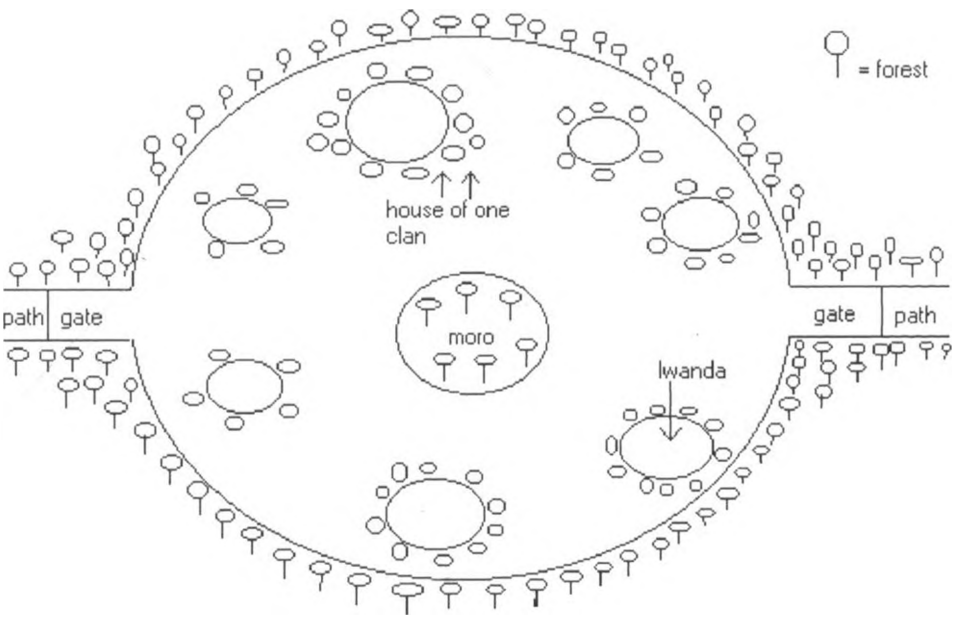
APPENDIX I

THE KAYAS

These are sacred forests of the Mijikenda people that are situated deep within the ordinary forests. The Mijikenda communities seek for divine intervention in these Kayas through various ritual practices and teachings that are performed by clan elders so that the people might have prosperous and abundant lives.

The Kayas are equivalent of the Churches and Mosques of the Christians and Muslims, respectively



A generalized plan of Kaya- protected from marauding Galla by a palisade and a forest penetrable only by two narrow paths.

APPENDIX IIa

Questionnaire

Hello, I am a Postgraduate student from the University of Nairobi undertaking my Research Project for the award of a Masters Degree in Economics, on a topic in Environmental Economics. The Research is generally on the preservation of the Kayas, the sacred indigenous forests of the Mijikenda people, especially those Kaya forests in Kwale at this time when they are threatened with destruction by the commissioned Titanium mining project. The Kayas are both an environmental asset and the apex of the culture and traditions of the Mijikenda people.

This Research is aimed at evaluating the strengths and effectiveness of cultural practices and traditions in conservational and sustainability issues through your perceptions as regards how you value the Kayas. The technique used in the study is the Contingent Valuation Method where the perceptions of the people are elicited through a questionnaire like this one, and then Econometric techniques shall be done on those answers.

You have been selected randomly and your readiness to spare a few minutes and answer voluntarily the following questions shall be highly appreciated and will ensure the success of this study.

A. GENERAL

Name .....
Please tick where applicable.

1. Sex
   ( ) Male
   ( ) Female

2. Please indicate your age .....

3. Are you a Mijikenda?
   ( ) Yes
   ( ) No

APPENDIX IIb

4. Please indicate your practicing Religion

Christian	Muslim	Traditionalist	Christian + Traditionalist	Muslim + Traditionalist

5. Please indicate the range of your monthly income.

Below Ksh 5,000	Ksh 5,000 – Ksh 10,000	Ksh 10,001 – Ksh 20,000	Ksh 20,001 – Ksh 50,000	Above Ksh 50,000

6. Please indicate your education level.

Primary	O - Level	A - Level	University	Others (Specify)

B. THE KAYAS

1. Do you know anything about the Kayas?
   ( ) Yes
   ( ) No.

2. Do you go to the Kayas?
   ( ) Yes
   ( ) No

3. Are the Kayas important to you?
   ( ) Yes
   ( ) No

4. Do you think the Kayas have any importance to the Mijikenda people?
   ( ) Yes
   ( ) No

5. Are there substitutes for Kayas?
   ( ) Yes
   ( ) No

APPENDIX IIc

6. What are the substitutes?.....

C. THE TITANIUM MINING PROJECT

1. Do you know anything about the Titanium mining project?
   ( ) Yes
   ( ) No

2. Do you know anything about the benefits the project will bring to you?
   ( ) Yes
   ( ) No

3. Do you know the environmental impact of the project especially on the Kayas?
   ( ) Yes
   ( ) No

4. Do you expect any material benefit from the project?
   ( ) Yes
   ( ) No

5. Is the project important to you?
   ( ) Yes
   ( ) No

6. Were you involved in the negotiations to allow the project to take off?
   ( ) Yes
   ( ) No

7. Who was involved? .....

8. Did Tiomin Resources Inc. influence you in any way to accept the project?
   ( ) Yes
   ( ) No

9. Did you choose to move from this project site?
   ( ) Yes
   ( ) No

10. Who made the decision for you? .....

APPENDIX IId

D. GOVERNMENT POLICY

1. Do you know anything about Government policy on mining?
   ( ) Yes
   ( ) No

2. Did Government Officials talk to you about the project?
   ( ) Yes
   ( ) No

3. Did the Government Officials influence you to accept the project?
   ( ) Yes
   ( ) No

4. Did the Government Officials influence you to reject the project?
   ( ) Yes
   ( ) No
5. Did you like the decision to commission the project?
   ( ) Yes
   ( ) No

E. WILLINGNESS TO PAY

1. Do you know anything about environmental conservation?
   ( ) Yes
   ( ) No

2. Have you ever participated in any local conservational program?
   ( ) Yes
   ( ) No

3. Have you ever planted trees at the Kayas?
   ( ) Yes
   ( ) No

4. Who planted the trees at the Kayas? .....

APPENDIX IIe

5. Have you ever-participated in conservational activities at the Kayas?
   ( ) Yes
   ( ) No

6. Would you be willing to participate in conservational program like afforestation/community tree nurseries program especially at the Kayas?
   ( ) Yes
   ( ) No

7. What is the maximum amount you would be Willing-to-Pay per month to preserve the Kaya forests .....

8. What is the minimum amount you would be Willing-to-Accept as compensation to forgo the Kaya forests .....

BY

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DISTRICT: KILIFI
LOCATION: RABAI
ADDRESS: P.O. BOX 30510-00100, NAIROBI, Tel. 0722-807049, 0733-372683

"THANK YOU FOR YOUR CO-OPERATION"

	wtp	atk	sfk	tri	gp	g	age
1	500.00	.00	1.00	.00	1.00	.00	26.00
2	50.00	.00	1.00	1.00	1.00	1.00	32.00
3	200.00	.00	.00	.00	1.00	1.00	30.00
4	500.00	1.00	.00	1.00	1.00	.00	34.00
5	.00	1.00	.00	.00	1.00	1.00	35.00
6	.00	.00	.00	.00	1.00	.00	31.00
7	.00	1.00	.00	.00	1.00	.00	27.00
8	200.00	1.00	.00	.00	1.00	1.00	36.00
9	500.00	1.00	.00	.00	1.00	1.00	35.00
10	.00	1.00	.00	.00	1.00	1.00	27.00
11	.00	1.00	.00	.00	1.00	1.00	25.00
12	.00	1.00	.00	.00	1.00	1.00	18.00
13	3000.00	1.00	.00	1.00	.00	1.00	18.00
14	500.00	1.00	1.00	1.00	.00	1.00	20.00
15	200.00	1.00	1.00	1.00	1.00	1.00	20.00
16	100.00	1.00	.00	1.00	.00	1.00	21.00
17	50.00	1.00	.00	1.00	.00	1.00	24.00
18	5000.00	1.00	1.00	1.00	1.00	1.00	22.00
19	50.00	1.00	.00	1.00	1.00	.00	31.00
20	.00	.00	1.00	1.00	.00	.00	34.00
21	.00	.00	1.00	.00	.00	.00	19.00
22	1000.00	1.00	.00	.00	1.00	1.00	48.00
23	20.00	.00	.00	1.00	1.00	1.00	26.00
24	20.00	1.00	.00	1.00	1.00	1.00	19.00
25	250.00	1.00	.00	1.00	1.00	.00	30.00
26	200.00	1.00	.00	1.00	.00	1.00	25.00
27	1000.00	1.00	.00	1.00	.00	1.00	67.00
28	100.00	1.00	.00	1.00	1.00	1.00	25.00
29	50.00	1.00	.00	1.00	1.00	1.00	23.00
30	3000.00	1.00	.00	1.00	1.00	.00	52.00
31	300.00	1.00	.00	1.00	1.00	1.00	38.00
32	150.00	1.00	.00	.00	1.00	1.00	71.00
33	500.00	1.00	.00	.00	1.00	1.00	82.00
34	200.00	1.00	.00	.00	1.00	.00	76.00
35	50.00	1.00	.00	.00	1.00	.00	81.00
36	100.00	1.00	.00	.00	1.00	1.00	76.00
37	50.00	1.00	.00	.00	1.00	1.00	80.00
38	100.00	1.00	.00	.00	1.00	1.00	77.00
39	150.00	1.00	.00	.00	1.00	.00	72.00
40	100.00	1.00	.00	.00	1.00	1.00	81.00
41	50.00	1.00	.00	.00	1.00	1.00	22.00
42	20.00	1.00	.00	.00	1.00	1.00	18.00

	wtp	atk	sfk	tri	gp	g	age
43	100.00	1.00	.00	.00	1.00	1.00	18.00
44	20.00	1.00	.00	.00	1.00	1.00	20.00
45	.00	.00	1.00	1.00	1.00	.00	19.00
46	.00	.00	1.00	1.00	.00	1.00	21.00
47	.00	.00	1.00	1.00	1.00	1.00	19.00
48	.00	.00	1.00	1.00	1.00	.00	18.00
49	50.00	1.00	.00	.00	1.00	.00	18.00
50	100.00	1.00	.00	.00	.00	.00	19.00
51	50.00	1.00	.00	1.00	1.00	.00	18.00
52	50.00	1.00	.00	1.00	1.00	.00	20.00
53	.00	1.00	.00	.00	1.00	1.00	21.00
54	50.00	1.00	.00	.00	1.00	1.00	18.00
55	50.00	.00	1.00	1.00	1.00	.00	22.00
56	100.00	1.00	.00	.00	1.00	.00	19.00
57	200.00	1.00	.00	.00	1.00	1.00	19.00
58	.00	.00	1.00	1.00	1.00	1.00	21.00
59	.00	.00	1.00	1.00	1.00	1.00	20.00
60	.00	.00	.00	1.00	1.00	1.00	20.00
61	500.00	1.00	.00	.00	1.00	1.00	45.00
62	300.00	1.00	.00	.00	1.00	1.00	49.00
63	500.00	1.00	.00	.00	1.00	1.00	42.00
64	100.00	1.00	.00	.00	1.00	.00	40.00
65	200.00	1.00	.00	1.00	1.00	1.00	45.00
66	50.00	1.00	.00	1.00	1.00	.00	45.00
67	200.00	1.00	.00	.00	1.00	.00	50.00
68	250.00	1.00	.00	.00	1.00	1.00	41.00
69	500.00	1.00	.00	.00	1.00	1.00	50.00
70	500.00	1.00	.00	.00	1.00	1.00	50.00
71	400.00	1.00	.00	.00	1.00	1.00	40.00
72	400.00	1.00	.00	.00	1.00	1.00	46.00
73	300.00	1.00	.00	.00	1.00	.00	44.00
74	200.00	1.00	.00	.00	1.00	.00	48.00
75	200.00	1.00	.00	.00	1.00	.00	48.00
76	300.00	1.00	.00	.00	1.00	1.00	41.00
77	50.00	1.00	.00	.00	1.00	1.00	42.00
78	200.00	1.00	.00	.00	1.00	1.00	42.00
79	200.00	1.00	.00	1.00	1.00	1.00	44.00
80	200.00	1.00	.00	1.00	1.00	1.00	43.00
81	500.00	1.00	.00	.00	1.00	1.00	66.00
82	400.00	1.00	.00	.00	1.00	1.00	53.00
83	400.00	1.00	.00	.00	1.00	1.00	69.00
84	250.00	1.00	.00	.00	1.00	.00	61.00

	wtp	atk	sfk	tri	gp	g	age
85	50.00	1.00	1.00	.00	1.00	.00	56.00
86	.00	.00	.00	1.00	1.00	1.00	55.00
87	100.00	1.00	.00	.00	.00	1.00	56.00
88	.00	.00	.00	1.00	1.00	1.00	52.00
89	200.00	1.00	.00	.00	.00	.00	63.00
90	200.00	1.00	.00	.00	1.00	1.00	62.00
91	200.00	1.00	1.00	.00	1.00	.00	67.00
92	50.00	1.00	1.00	.00	1.00	.00	56.00
93	.00	.00	.00	1.00	1.00	.00	53.00
94	.00	.00	.00	1.00	.00	1.00	55.00
95	150.00	1.00	.00	.00	.00	.00	68.00
96	500.00	1.00	.00	.00	1.00	1.00	62.00
97	300.00	1.00	.00	.00	1.00	1.00	61.00
98	200.00	1.00	.00	.00	1.00	1.00	60.00
99	100.00	1.00	.00	.00	1.00	1.00	64.00
100	50.00	1.00	.00	.00	1.00	1.00	68.00

	income	edu
1	1.00	12.00
2	3.00	14.00
3	3.00	12.00
4	3.00	14.00
5	2.00	12.00
6	1.00	12.00
7	1.00	12.00
8	4.00	13.00
9	3.00	16.00
10	1.00	8.00
11	1.00	12.00
12	1.00	9.00
13	3.00	8.00
14	1.00	12.00
15	2.00	8.00
16	1.00	8.00
17	1.00	8.00
18	1.00	8.00
19	1.00	12.00
20	1.00	12.00
21	1.00	10.00
22	1.00	15.00
23	1.00	8.00
24	1.00	8.00
25	2.00	12.00
26	1.00	8.00
27	1.00	7.00
28	1.00	12.00
29	1.00	12.00
30	1.00	7.00
31	2.00	7.00
32	1.00	.00
33	4.00	15.00
34	2.00	.00
35	3.00	8.00
36	3.00	7.00
37	2.00	.00
38	2.00	.00
39	1.00	.00
40	2.00	.00
41	1.00	14.00
42	.00	11.00

	income	edu
43	.00	11.00
44	1.00	12.00
45	.00	11.00
46	1.00	13.00
47	.00	12.00
48	.00	11.00
49	.00	11.00
50	.00	12.00
51	.00	11.00
52	.00	13.00
53	.00	13.00
54	.00	11.00
55	.00	14.00
56	.00	12.00
57	.00	12.00
58	.00	13.00
59	.00	13.00
60	.00	13.00
61	4.00	15.00
62	4.00	15.00
63	4.00	15.00
64	1.00	.00
65	1.00	.00
66	1.00	.00
67	4.00	14.00
68	4.00	12.00
69	4.00	15.00
70	4.00	15.00
71	4.00	8.00
72	4.00	14.00
73	3.00	8.00
74	4.00	8.00
75	3.00	12.00
76	4.00	14.00
77	4.00	14.00
78	4.00	14.00
79	3.00	.00
80	3.00	.00
81	3.00	8.00
82	3.00	8.00
83	3.00	8.00
84	1.00	.00

	income	edu
85	1.00	.00
86	2.00	8.00
87	2.00	8.00
88	3.00	8.00
89	2.00	.00
90	2.00	.00
91	2.00	.00
92	2.00	8.00
93	2.00	8.00
94	1.00	8.00
95	2.00	.00
96	3.00	8.00
97	3.00	8.00
98	2.00	8.00
99	2.00	8.00
100	1.00	.00